

Final

**Remedial Investigation Report
Stauffer Management Company Site
Skaneateles Falls, New York**

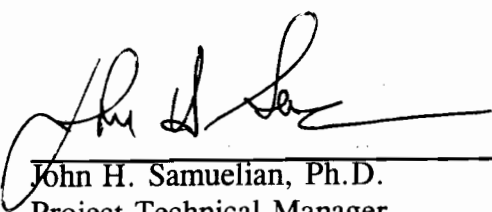
**Volume 1 of 2
(Text through Appendix B)**

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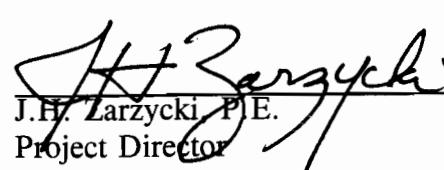
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EXECUTIVE SUMMARY

ES.1 INTRODUCTION

EA Engineering, Science, and Technology was retained by the Stauffer Management Company (SMC) to perform the remedial investigation (RI) for the former Stauffer Chemical Company site located in Skaneateles Falls, New York. This RI was in response to the Order of Consent, Index No. A7-0101-8612, issued by the State of New York on 1 April 1991. This report documents the results from the 2-phase RI performed at the SMC Skaneateles Falls site in accordance with work plans approved by the New York State Department of Environmental Conservation (NYSDEC).

Concern regarding the need to investigate the site was first realized in 1986 when leachate seeps were observed discharging from the north end of an onsite landfill and dark-colored water was found to be discharging from a drain in the basement of the warehouse portion of the Main Plant Building. Stauffer Chemical Company immediately initiated actions to collect and treat the leachate and drainage from the warehouse basement. Stauffer Chemical Company then conducted a preliminary field and laboratory investigation to identify the hydrogeological conditions around the landfill and to characterize the leachate. The results of these studies were reported to NYSDEC on 10 September 1986. Based on this initial information, Stauffer Chemical Company developed a plan for further investigation and characterization of the site, which provided the framework for the RI.

ES.2 SITE DESCRIPTION

The site is located in central New York State, in Skaneateles Falls, Onondaga County, approximately 3 mi north of Skaneateles Lake, and 15 mi southwest of the City of Syracuse. The SMC facility encompasses an area of approximately 120 acres. The focus of this RI was an approximate 20-acre portion of the property at the western end of the site. This includes areas formally used to support manufacturing operations (existing and former building areas, parking areas, and a landfill) and Skaneateles Creek as it flows north through the site. The study area (SMC site) is bounded by residential and commercial areas to the west and north, while undeveloped land occupies the areas immediately to the east and south.

ES.3 SCOPE OF THE REMEDIAL INVESTIGATION ACTIVITIES

The RI consisted of a field sampling and analysis program followed by quality assurance/quality control validation of the chemical data and evaluation of the data collected. The validated data were used to determine the nature and extent of contamination, as well as to complete a baseline human health and environmental risk assessment. The geologic and hydrogeologic conditions at the site were used to determine ground-water flow, as well as the factors affecting contaminant fate and transport.

In October 1991, EA initiated the RI field program based on the NYSDEC-approved Work Plan. The original focus of the RI was the onsite landfill located east of Skaneateles Creek. The initial RI included: a magnetometer survey over the entire landfill; landfill test pits;

landfill and landfill perimeter test borings; installation of 6 overburden, 11 upper bedrock, and 9 deep bedrock monitoring wells; installation of 9 piezometers (4 overburden and 5 upper bedrock); ground-water, stream surface water/sediment, soil, waste, and basement seep sampling; and a habitat assessment.

During the course of the initial field program, adjustments were made which expanded the field effort. These adjustments included collection of additional samples (i.e., creek seeps and soil near the former Organics Plant) and modifications to the drilling program. The modifications included the collection of additional geologic data (i.e., rock cores and packer tests) and enhanced monitoring well/piezometer construction methods (i.e., surface casing to isolate the various ground-water zones and increased completion depths of the deep bedrock monitoring wells). The field work for the initial phase of the RI was completed in March 1992.

Based on results of the initial RI, it was determined that a second phase of investigation at the site was required to fill data gaps. The Phase II investigation expanded the scope of the RI beyond its original focus to include evaluation of an area of concern identified in the area north of the Main Plant Building and evaluation of data from the sludge disposal area monitoring wells east of the landfill.

The Phase II investigation consisted of several field efforts; specifically, soil vapor contaminant assessment®; seismic refraction survey; test borings and sampling; installation of additional onsite and offsite monitoring wells; sampling of ambient air; stream surface water/sediment, landfill leachate, creek seep, and ground-water sampling; continuous monitoring of deep ground-water elevations; collection of Skaneateles Creek flow data; and a private well mail survey. Field work for Phase II was completed in October 1993.

ES.4 NATURE AND EXTENT OF CONTAMINATION

Two principal source areas for chemicals were delineated by the investigation, the landfill, and the area of the former Organics Plant. The landfill, which was used from the mid-1940s until 1973, is located southeast of the Main Plant Building across Skaneateles Creek. Analytical samples of the landfill waste showed the presence of organic compounds and metals. Organic compounds present at the highest concentration level were xylenes and toluic acid isomers. Chlorinated organics and polyaromatic hydrocarbons were detected in landfill piezometers and seeps downgradient from the landfill. Metals included cobalt and arsenic. The landfill is believed to be the source of contamination detected in the overburden, upper bedrock, and deep bedrock ground water based on samples collected from monitoring wells in the vicinity of the landfill.

Chemical analysis of the former Organics Plant area soils (northeast of the Main Plant Building) showed the presence of volatile organic compounds (e.g., xylenes) and semi-volatile organic compounds (e.g., toluic acid) at several locations. Some chlorinated aliphatic compounds were detected in the area west of the former Organics Plant. Several metals were also observed at concentrations greater than typical background concentrations of metals in New York State. The overburden and upper bedrock ground water is contaminated in this area, although at lower concentrations than observed near the landfill.

Analysis of monitoring well samples indicates contamination of overburden, upper, and deep bedrock ground water in areas near the landfill and the former Organics Plant. Offsite contamination by site-related chemicals was detected in the upper bedrock monitoring well located about 500 ft west of the site (800 ft west of the landfill). The deep bedrock ground water was not contaminated at this location. No contamination was detected in any other offsite wells or in the deep ground water along the south, southwest, northwest, north, northeast, or east site boundaries.

ES.5 SITE HYDROGEOLOGY

Based on analysis of the available data, there are three distinct zones of ground water at the SMC site: a shallow zone present in the overburden, an intermediate zone in the upper bedrock, and the phreatic ground-water zone present deeper into bedrock. Both the shallow overburden and the deep bedrock ground-water zones are under unconfined water table conditions.

Lateral migration of water through the overburden is through primary openings in the geologic material and controlled by horizontal hydraulic gradients across the site. These gradients are influenced by both the topography and surface water drainage.

A general downward vertical hydraulic gradient between the overburden and upper bedrock persists across most of the site. Hydraulic communication between overlying unconsolidated sediment and the upper bedrock exists via bedding, fractures, and/or joints in the upper rock.

In the upper bedrock, most ground-water migration is through secondary openings (bedding, fractures, joints, etc.). Ground-water movement through bedrock to the phreatic zone is inferred to be vadose flow in enlarged secondary openings. This flow is controlled by gravity and the structure of the rock and water moves as vertically as possible. Lateral movement in vadose flow through the bedrock is controlled by the southerly dip of the strata, with some deviation in the direction of strike (east-west).

After the ground water enters the phreatic zone through the vadose feeders, water migration changes. Horizontal flow is the primary flow component functioning in the phreatic zone. Hydraulic gradients are normally low due to the efficiency of using enlarged openings to transmit ground water. Phreatic ground-water flow at the site is expected to be generally in a northerly direction.

ES.6 RISK ASSESSMENT

A human health and environmental risk assessment was performed using the analytical data collected from the 2-phase field investigation. The calculated risks in the risk assessment are conservative estimates of current or potential risks based upon the exposure scenarios that were developed.

The human health risk assessment evaluated both present-use and potential future-use exposure scenarios for residents and onsite workers. The average and plausible maximum carcinogenic and non-carcinogenic risks were calculated. Present-use scenarios evaluated

included inhalation of vapors emanating from the site, dermal contact with stream sediments or creek seeps present onsite, and incidental ingestion of stream sediments. The future-use pathways included an evaluation of the use of upper, deep, and combined ("mixed") bedrock ground water west of the site, ground water for the eastern portion of the site, and ground water for the principal study area. Exposure scenarios included ingestion of drinking water, incidental ingestion, inhalation of vapors from the ground water (e.g., showering, washing of hands), dermal contact (from swimming), and use of ground water as water supply for a vegetable garden. In addition, the potential risks associated with non-remedial construction activities (e.g., installing a trench or other excavation) and vapor flux into a subsurface structure were examined.

The present-use scenarios included an examination of risks to residents who may be breathing any volatile organic compounds emanating from the area north of the Main Plant Building and from the landfill. The calculated flux rates, based upon observed contaminant concentrations, and equivalent air concentrations were low and do not pose any risk above threshold values to the residents.

Dermal contact of stream sediments did show a carcinogenic risk above the risk threshold ($1E-6$), but only under the plausible maximum exposure scenario for the Round 1 sampling event. This risk was due to the presence of carcinogenic polycyclic aromatic hydrocarbons. These compounds are found in association with the non-carcinogenic polycyclic aromatic hydrocarbons.

Future-use scenarios for residents included an examination of risks associated with non-remedial construction activity at the site, use of ground water for potable and non-potable uses at the site, and use of ground water offsite for potable and non-potable uses. The residential use of ground water was evaluated in the case where a homeowner would (in the future) supplement their municipal supply with their own well. Carcinogenic risks above the threshold value were calculated for both ingestion- and inhalation-based pathways. These were due to the presence of chlorinated compounds (e.g., vinyl chloride, trichloroethene, and tetrachloroethene). There were also non-carcinogenic risks calculated above threshold values from these exposure pathways. Arsenic, toluic acid isomers, and tetrachloroethane were principally responsible for these risks.

Onsite industrial receptors (workers) also showed calculated carcinogenic risks above the threshold values from the use of ground water at the site. These calculated risks paralleled those calculated for an onsite resident, although the calculated risks were slightly lower due to the shorter exposures used in the models.

Models for the environmental risk assessment were not as qualitative as those used in the human health risk assessment. The evaluation consisted of a comparison of the analytical results to existing state standards and sediment criteria. This comparison showed that there would be no fixed toluic effect to aquatic organisms that reside in the stream and come in contact with contaminated sediments or seeps.

The RI report provides a detailed description of the study and evaluation of the data.

1. INTRODUCTION

EA Engineering, Science, and Technology was retained by Stauffer Management Company (SMC) to perform a remedial investigation (RI) for the site located in Skaneateles Falls, New York (New York State Department of Environmental Conservation [NYSDEC] Site No. 7-34-010). This was in response to the Order of Consent, Index No. A701O18612, issued by the State of New York on 1 April 1991.

Concern regarding the need to investigate the site was first realized in 1986 when leachate seeps were observed discharging from the north end of an onsite landfill and dark-colored water was found to be discharging from a basement drain in the warehouse of the Main Plant Building. Stauffer Chemical Company immediately initiated actions to collect and treat the leachate and drainage from the warehouse basement. Stauffer Chemical Company then conducted a preliminary field and laboratory investigation to identify the hydrogeological conditions around the landfill and to characterize the leachate. The results of these studies were reported to NYSDEC on 10 September 1986. Based on this initial information, Stauffer Chemical Company developed a plan for further investigation and characterization of the site, which provided a basis for the present RI/FS Work Plan.

In October 1991, EA initiated the RI field program based on the NYSDEC approved Work Plan (BBL 1990). The original focus of the RI was the onsite landfill located east of Skaneateles Creek. As hydrogeological and chemical analytical data became available during the 1991 RI field program, it was recognized that subsurface conditions at the SMC site were more complicated than originally envisioned in the Work Plan. Adjustments to the 1991 RI field program were made during the course of the field effort to include the collection of additional samples and modifications to the drilling program. The field work for the initial phase of the RI was completed in March 1992.

An Interim Data Report (EA 1992a) was submitted after completion of the initial phase of the RI. Based on the results, it was determined that a Phase II investigation at the site was required to fill data gaps. The Phase II investigation expanded the scope of the RI beyond its original focus to include evaluation of an area of concern identified in the area north of the Main Plant Building, evaluation of data from the sludge disposal area monitoring wells east of the landfill, and installation and sampling of additional onsite and offsite monitoring wells. The Phase II field work was completed in October 1993.

1.1 DESCRIPTION OF CURRENT STUDY

This report presents all of the data collected during the initial RI and the Phase II RI programs completed at the SMC site. The initial RI field program, which began in October 1991, focused primarily on characterization of the onsite landfill and the dark-colored water present in the basement of the Main Plant Building. The field work was completed in March 1992.

The initial investigation included: a magnetometer survey over the entire landfill; landfill test pits; landfill and landfill perimeter test borings; installation of 6 overburden, 11 upper bedrock, and 9 deep bedrock monitoring wells; installation of 9 piezometers (4 overburden and 5 upper bedrock); ground-water, stream surface water/sediment, soil, waste, and basement seep sampling; and a habitat assessment.

During the course of the initial RI field work, it was recognized that the hydrogeologic conditions at the site were more complicated than originally envisioned in the Work Plan (BBL 1990). In addition, data collected suggested the possibility of a potential area of concern northeast of the Main Plant Building, near the location of the former Organics Plant. Adjustments to the initial investigation were made during the course of the field program which expanded the field effort. These adjustments included collection of additional samples (i.e., creek seeps and soil near the former Organics Plant) and modifications to the drilling program. The modifications included the collection of additional geologic data (i.e., rock coring and packer testing) and enhanced monitoring well/piezometer construction methods (i.e., surface casing to isolate the various ground-water zones and increased completion depths of the deep bedrock monitoring wells).

Following completion of the initial investigation, the chemical data was submitted in the form of an Interim Data Report in July 1992 (EA 1992a). The findings of the initial RI were discussed during a meeting held with NYSDEC after the report was submitted. Based on the findings of the initial investigation, it was determined that further investigation of the site was required to fill data gaps. This study expanded the scope of the RI beyond its original focus, which was the landfill located southeast of the Main Plant Building to include characterization of the potential area of concern northeast of the Main Plant Building (former Organics Plant area), evaluation of the sanitary sewage leachfield in the northern portion of the site, an evaluation of the sludge disposal area wells east of the landfill, and installation and sampling of additional onsite and offsite monitoring wells.

Following the meeting with NYSDEC, several field efforts were conducted. An investigation of the former Organics Plant area was initiated in September 1992. It included a soil vapor study followed by the installation of test borings and monitoring wells. This work was described in a document entitled "MW-5 Area Investigation Work Plan" (EA 1992b). Subsequent to this investigation at the northern end of the site, a seismic refraction survey was performed onsite in the areas surrounding the landfill (north, south, east, and west) and areas beyond the western and southern property boundaries. The seismic refraction survey was performed in order to provide additional information on the subsurface geology of the site, to help understand ground-water movement beneath the site, and to aid in the planning and placement of Phase II onsite and offsite monitoring wells. The available geologic information from the initial RI field effort indicated that the bedrock surface varied across the site and that bedrock lows were present both to the north and south of the landfill.

Concurrent with the performance of the field program in the northern end of the site and the seismic survey, a Work Plan Amendment was developed for the Phase II investigation. This Work Plan Amendment included all efforts not documented in previous work plans. Therefore, portions of the Phase II program, even though completed, were documented in the Work Plan Amendment (EA 1993). Based upon discussions with NYSDEC concerning the

draft version of the Work Plan Amendment (April 1993), field work was again initiated (May 1993) in advance of final publication of the document. Final NYSDEC approval of the Work Plan Amendment was issued on 28 October 1993. Field work was completed in October 1993.

The Phase II investigation consisted of several field efforts. Specifically, the following efforts comprised the Phase II program: soil vapor contaminant assessment (SVCA®); seismic refraction survey; test borings and sampling; installation of additional onsite and offsite monitoring wells; sampling of ambient air; stream surface water/sediment, landfill leachate, creek seep, and ground-water sampling; continuous monitoring of deep ground-water elevations; collection of Skaneateles Creek flow data; and a private well mail survey.

The database used in preparation of this RI report was comprised of all of the site-specific and other relevant regional data collected between 1991 and 1993. Section 1.3 includes a summary of site investigations prior to the RI; this information is also fully utilized in the interpretation of nature and extent of contamination and environmental fate and transport. Chapter 2 details the field activities and field sampling methods employed at the site during the initial and Phase II investigations. The remaining chapters of this report summarize the physical characterization of the study area, nature and extent of contamination, contaminant fate and transport, characterization of risk to human health and the environment, and recommendations and conclusions.

1.1.1 Objectives

The objectives of the RI, as presented in the original Work Plan (BBL 1990), were to:

1. "Determine the vertical and horizontal extent of landfill leachate migration on the east side of the creek."
2. "Determine if the discolored water seep in the basement of the former mill building has chemical characteristics similar to that of the landfill leachate, and if the landfill leachate is the source of the basement seepage."
3. "Determine the quality of the ground water as it moves off the plant site."
4. "Determine the extent of the landfill area, and chemical characteristics of the landfill waste and observed leachate."
5. "Determine if the existing site conditions are resulting in volatile organic chemical emissions from the site via air migratory pathways."
6. "Provide sufficient data to perform an environmental Risk Assessment, including a Habitat-Based Assessment of the impact on fish and wildlife."

7. "Determine any additional investigative or remedial activities which may be warranted."

Collection and evaluation of the first phase of field work and review of the analytical results expanded the RI objectives to include the following, as described in the Work Plan Amendment (EA 1993):

- Provide additional information on subsurface stratigraphy relative to potential contaminant migration pathways.
- Determine the extent of chemical constituents within upper and deep bedrock ground water south, west, and north of the landfill.
- Provide additional hydrogeologic data for the overburden, upper bedrock, and deep bedrock east, south, north, and west of the landfill.
- Provide information to determine chemical constituents present, potential source(s) of contamination, environmental media affected, and areal extent of soil contamination north of the Main Plant Building.
- Evaluate the MW-7 area and sanitary sewage leachfield system for potential secondary onsite areas of concern.
- Provide additional geologic and hydrogeologic data in support of the RI.
- Perform a private well use survey to support the human health risk assessment.

The RI objectives have been established to ensure that the data collected is sufficient to provide a basis for risk management decisions, and for the screening and selection of remedial alternatives to be performed during the Feasibility Study.

1.2 SITE BACKGROUND AND SETTING

The SMC site is located in central New York State in Skaneateles Falls, Onondaga County. The site, located at 4512 Jordan Road, is approximately 3 mi north of Skaneateles Lake and 15 mi southwest of the City of Syracuse (Figures 1-1 and 1-2).

The SMC facility encompasses an area of approximately 120 acres. The focus of this study includes the areas formerly used to support production operations (including existing and former building structures located west of Skaneateles Creek and east of Jordan Road) and the landfill located east of Skaneateles Creek. This portion of the property encompasses approximately 20 acres. Skaneateles Creek, the outlet of Skaneateles Lake, flows in a northerly direction through the western portion of the site (Plate 1). The SMC site is bounded by residential and commercial areas to the west and north, while undeveloped land

occupies the areas immediately to the east and south. The Town of Skaneateles water supply system services the areas along the Skaneateles Creek Valley in the vicinity of the site. This public water system utilizes surface water from Skaneateles Lake as its source.

1.2.1 Site History

The SMC facility in Skaneateles Falls, New York was formerly used to manufacture potassium and sodium silicates, detergents, and organic intermediates for other industries. The principal organic compound manufactured at the site was toluic acid, which used xylene as a raw material. Currently, there are no manufacturing activities conducted at the site.

The original facility was built in the mid-1920s by Draycott Mills, which manufactured felt roofing materials. A mill pond, located west of the current landfill, was used by Draycott Mills as a power and water source. Remnants of the mill pond dam and raceway are still apparent at the site. Cowles Chemical Company bought the property in the mid-1940s and initiated the manufacture of potassium and sodium silicates and industrial detergents. Organic compounds were manufactured at the facility from the late 1950s to 1981. Stauffer Chemical Company purchased the facility from Cowles Chemical Company in the late 1960s and continued operations until 1985. Under Stauffer Chemical Company, the Main Plant Building manufactured industrial cleaners, dry cleaning compounds, lubricants, metal finishing compounds, and water softeners.

Onsite disposal areas include the landfill, former inorganic settling basins, closed sludge disposal area, and the sanitary sewage leachfield. Of these, only the sanitary sewage leachfield currently receives waste. The sludge disposal area, located east of the landfill, received excavated solids from the former settling basins. The sludge disposal area was closed in 1980 following Resource Conservation and Recovery Act (RCRA) requirements and is currently monitored on a quarterly basis.

From initiation of the Cowles operations in the mid-1940s until 1973, an onsite landfill was operated in the area east of the former mill pond. This was reported to be a low, swampy area east of Skaneateles Creek. The landfill reportedly received process wastes, such as silicate sludges, as well as general plant refuse. The landfill operations ceased in 1973 and a soil cover was installed. A clay cap was subsequently installed over the landfill in 1979.

Process water generated from the manufacture of potassium and sodium silicates which contained suspended material (primarily calcium silicates, carbonates, and sulfates) was piped, after neutralization, to one of two settling basins. The initial settling basins were located on the east side of the creek immediately north of the landfill. A second set of basins were later constructed further to the east. For a short time in the 1960s, the initial settling basins functioned as pre-settling basins for waste before it was routed to the second set. The initial settling basins were constructed in the early 1960s and closed in the mid-1960s. The second set of settling basins were constructed in the mid-1960s and closed in 1982. Both sets of settling basins have been closed under permit with NYSDEC.

The sludge disposal area located east of the onsite landfill was used to contain the sludge accumulated in the settling basins. The sludge consisted of the settled material from the process water generated during manufacturing of potassium and sodium silicates. The sludge disposal area was closed in 1982 under permit with NYSDEC.

A sanitary sewage leachfield is located in the northern portion of the site. The leachfield receives domestic sewage from the Main Plant Building and several private homes along Jordan Road west of the property. The sanitary sewage leachfield is still in operation.

1.2.2 Climate

The climate of Onondaga County is humid and continental, somewhat modified by the proximity of the Great Lakes. It is characterized by warm summers; long, cold winters; and abundant precipitation. Lake Ontario impacts Onondaga County by moderating air temperatures and providing moisture during the winter months resulting in "lake effect" snow squalls and storms (Hutton and Rice 1977). Northern and eastern Onondaga County experience the highest level of snowfall, with average annual totals from 100 to 120 in. (Hutton and Rice 1977). The average daily high temperature for Syracuse in July is 82 F and the average low in January is 15 F (NOAA 1982).

The site is located immediately north of the Appalachian Upland. The Appalachian Upland has a slightly different climate due to its higher elevations, and tends to be wetter and cooler which influences stream flow in Skaneateles Creek as it flows north through the site. Precipitation in the site area is rather evenly distributed throughout the entire year, averaging approximately 3 in. per month. Average annual precipitation for the Skaneateles Falls area is 38.23 in. (NOAA 1982). The average annual runoff and annual lake evaporation for Onondaga County are 18.16 in. and 20.34 in., respectively (Knox and Nordenson 1961).

1.2.3 Regional Physiography, Geology, and Soils

Onondaga County has a land area of 793.5 mi². Based on variations in bedrock lithology and glacial topography, Onondaga County has been divided into two distinct physiographic provinces: the Appalachian Upland to the south and the Ontario Lowland to the north (Figure 1-3). The boundary between the two provinces is an east-west trending escarpment, formed by Upper Silurian and Lower Devonian limestone and dolostone beds. The Silurian-Devonian escarpment is a series of step-like terraces caused by differential erosion of bedrock strata (Muller 1964). This area, which includes the SMC site, is referred to as the Appalachian Upland Border Scarp zone (Winkley 1989).

Glacial topography is superimposed upon the bedrock in the form of glacial and glaciofluvial erosion. The escarpment valleys created by glacial troughs in the Appalachian Upland Border Scarp zone are rather narrow due to resistance from the local carbonate strata. Other areas of the Appalachian Upland consist of wide, flat-floored glacial troughs. The hills and basins are aligned north-south, as are the north flowing finger lakes in the region. The topography of the area immediately around the SMC site can be characterized by abrupt rises in elevation in the southward direction and wide sloping limestone benches in an east-west direction. The site has an average elevation of 700 ft above mean sea level (MSL) and is

relatively flat. Wet, low-lying areas adjacent to Skaneateles Creek are present at both the northern and southern portions of the site. Skaneateles Creek flows in a northerly direction through the site from its source of Skaneateles Lake to its destination in the Seneca River to the north, and eventually Cross Lake near Jordan.

The geology of Onondaga County is characterized by depositional formations as a result of the deep foreland basin that covered central New York (Frazier and Schwimmer 1987) from the Middle Silurian to the Late Devonian. The region is underlain by sedimentary rocks typically consisting of limestone, shale, and sandstone, with intergradations between these major lithologic types being common. The sedimentary rocks in the site area range in age from late Silurian to Upper Devonian. The rock strata has a general east-west strike with a regional dip of from 20 to 50 ft per mile in a slightly west of south direction (Smith 1935). As a result, the older Silurian units are exposed in the north with progressively younger rocks outcropping in a southerly direction. Devonian Aged rocks are exposed in the central and southern parts of the region. The bedrock stratigraphy of Onondaga County is summarized in Table 1-1.

The structural geology of Onondaga County is primarily the result of marginal effects of tectonic events during the different Appalachian Orogenies and dissolution of Silurian aged evaporite bedrock. Tectonic events and evaporite dissolution are responsible for the following:

- The regional southward dip of all formations.
- Near north-south and east-west orientation of joints and fractures in the region. Joints generally occur in clusters consisting of 20-30 joints within a spacing of 4-20 ft. Cluster distances commonly range from 100 to 1,000 ft apart. It has been noted that shales have about 50 percent more joints than limestones. Limestone fractures can be up to 75 ft deep, whereas the deepest fractures in the shales are 30 ft deep. Some joints are exposed over horizontal distances of up to 250 ft (DeGroff 1954).
- Several thrust faults which cut Silurian and Devonian Carbonates in Onondaga County (Chute 1964).
- Slump blocks, domes, synclines, and basins formed as a result of evaporite dissolution and subsidence (Winkley 1989).

The majority of the bedrock in Onondaga County is overlain by unconsolidated material which was deposited during the Pleistocene Age by the advance and retreat of glaciers. The majority of the deposits are characterized as: lodgement till, consisting of a dense, medium to poorly sorted mixture of rock fragments ranging in size from clay to boulders deposited directly on the ground at the ice contact; outwash sand and gravel, silt, and clay deposited in melt water streams and lakes; waterlaid tills (ablation till) associated with the fluctuation of the glacial margins; peat and marl found in lakes and ponds; and alluvial fans and deltaic sediments (Winkley 1989).

The most common unconsolidated sediment found is till, which is a glacial deposit consisting generally of an unstratified and unsorted mixture of rock fragments ranging in size from clay to large boulders. Relative proportions of clay and boulders are highly variable from place to place. Most of the till in the county appears to have been laid down as lodgement till which consists of highly compressed, poorly drained, clay-rich glacial sediment deposited directly on the ground beneath the ice sheet as it invaded the area from the north. The remainder is ablation till deposited when the ice melted. Ablation till is relatively loose material which was deposited on the ground as the ice melted.

Another glacial deposit of significance is stratified drift which consists of stratified deposits of gravel, sand, silt, and clay laid down by or in water during deglaciation. Stratified drift deposits are reported to be present south of the SMC site within the Skaneateles Creek Valley (Winkley 1989).

The dominant soil types in Onondaga County are derived from glacial deposits containing varying amounts of limestone, shale, and sandstone. The principal soil type in the area of the SMC site is the Cazenovia silt loam, with 2-8 percent slope. The Cazenovia association is characterized as having gently sloping, deep, moderately well drained and well drained, and medium-textured soil types that formed in upland glacial till plains rich in reddish clay shale and limestone (Hutton and Rice 1977). Although the Cazenovia soils have a fairly high permeability in the upper horizon, the soils have severe limitations for many land uses because of the low to very low permeabilities and clayey texture of the subsoil and substratum.

Alluvial land or fluvaquents (frequently flooded) cover the narrow flood plain of Skaneateles Creek which flows through the western portion of the SMC property. The fluvaquents are characterized by alluvial soils dominantly consisting of silt loam and sandy loam. The soil material generally ranges from well drained to very poorly drained over short distances.

1.2.4 Regional Hydrogeology

A total of six hydrostratigraphic bedrock units have been identified in Onondaga County (Winkley 1989). A hydrostratigraphic unit is defined as a section of rock with considerable lateral extent that consists of the necessary geologic framework to be a reasonably distinct hydrologic system. Table 1-2 provides a list of the hydrostratigraphic units in Onondaga County. Two hydrostratigraphic units are predominant in the Appalachian Upland Border Scarp zone, the Silurian-Devonian Carbonate Unit, and the Post-Vernon Evaporitic Unit.

The Silurian-Devonian Carbonate Unit is present beneath the SMC site and consists of dolostones and limestones of the Cobleskill, Chrysler, Manlius, and Onondaga formations. This hydrostratigraphic unit ranks as one of Onondaga County's most productive bedrock units with well yields up to 700 gallons per minute (gpm) in selected areas. Generally, the bedrock units are suitable aquifers only within the outcrop bands. The highest yield should be found in areas of concentrated fractures, due to the increased recharge and enhanced dissolution from vertical and inclined fractures. In general, units contain water in primary openings or secondary openings. Primary openings occur when ground water flows through

the natural porosity in the unit. Secondary openings are a result of ground-water flow in fractures, faults, or dissolution channels in the unit. Generally, the bedrock units yield water largely from secondary openings.

The hydrogeology of the area in the vicinity of the SMC site is influenced by the occurrence of bedrock at or near the surface, and by a cuesta-form landscape consisting of terraces and connecting slopes of the Appalachian Border Scarp zone, the largest of which is formed by the Onondaga Limestone formation (Winkley 1989).

Ground-water recharge predominates in the Appalachian Upland Border Scarp zone because bedrock is generally at or near ground surface. Ground-water flow in the Appalachian Upland Border Scarp zone is predominantly in a northerly direction, traveling downward through fractures in the Silurian-Devonian Carbonate Unit and eventually returning to the surface via small seeps and springs that are discharged to streams, rivers, and lakes at areas of lower elevation to the north. The regional ground-water contours generally reflect the topography of the area. There is evidence that rapid local flow systems exist through enlarged openings within the Silurian-Devonian Carbonate Unit. The presence of inclined to vertical fractures in the bedrock results in a higher rate of recharge and downward flow into bedrock. Velocities may be on the order of up to 100 ft/day, particularly across the Onondaga Limestone terrace (Winkley 1989).

In the region, ground water is also found in unconsolidated sediments which are usually located in unconfined or water table conditions. The best unconsolidated aquifers are sand and gravel deposits laid down as river alluvium or glacial outwash deposits. Although these aquifers are present throughout the County, none were observed in the vicinity of the SMC site. Other unconsolidated sediment aquifers common throughout the region are glacial stratified drift deposits. These deposits are characterized as interbedded sediments consisting of sand, gravel, silts, and clays. Ground-water availability from stratified drift deposits varies widely depending upon the extent of coarse grained material (sand and gravel) within the deposit and the thickness of this material below the water table. Stratified drift deposits are present in the Skaneateles Creek valley south of the SMC site.

In Onondaga County and the Seneca River Valley, the most common naturally occurring water quality problems are attributable to dissolved solids, including chloride, calcium, magnesium, and iron solutions. Ground water becomes increasingly mineralized with flowpath length. As a result, ground water found in discharge areas typically has high values of total dissolved solids. Chloride is commonly associated with saline water, and is present in ground water which extended into the evaporite units of the mid- to late Silurian period. Saline waters are also present in regional discharge areas (Winkley 1989). Calcium and magnesium solutions or "hardness" are common in the ground water due to the vast quantity of carbonate rocks present.

1.2.5 Regional Surface Water Drainage

Approximately 95 percent of surface waters in Onondaga County are a tributary to Lake Ontario. Only a very small portion of southern Onondaga County is a tributary to the

Susquehanna River Basin. The Lake Ontario Drainage System within Onondaga County consists of the Oswego, Oneida, and Seneca River basins (Figure 1-4).

The Oswego River Basin is formed at the confluence of the Oneida and Seneca rivers at the northern margin of the County. The Oneida River Basin drains the eastern portion of the County and contains the water sheds of Butternut Creek, Limestone Creek, Chittenango Creek, Peat Swamp, Cicero Swamp, Oneida Lake, and the Oneida River. The Seneca River Basin drains the western portion of the County in which the SMC site is located and includes drainage from Onondaga Lake, Otisco Lake, Nine-Mile Creek, Skaneateles Lake, Skaneateles Creek, Cross Lake, and the Seneca River (Figure 1-4).

The SMC site is located within the watershed of Skaneateles Creek. Skaneateles Creek, which flows in a northerly direction through the western part of the site, originates at the outlet of Skaneateles Lake 3.2 mi to the south. Discharge from Skaneateles Lake is regulated and monitored by the City of Syracuse. Skaneateles Lake occupies a depression left by glaciation in the County. Surface water from Skaneateles Lake is the primary source of drinking water for the City of Syracuse and most of the communities along the Skaneateles Creek Valley.

1.3 PREVIOUS INVESTIGATIONS

1.3.1 Investigation of Proposed Industrial Waste Disposal Area

In 1980, an investigation of the site hydrogeology and geology was performed to evaluate whether portions of the site were suitable for a sludge disposal area (Yare 1980). This area was to be used to contain sludges generated from the settling basins located northeast of the landfill. According to this report, the sludge consisted of calcium silicates, carbonates, and sulfates generated from the inorganic manufacturing process. The area considered for the disposal of the inorganic sludges and which was investigated and found to be suitable is located uphill and east of the landfill. Field activities performed in the area included:

- Characterization of soil lithology with 11 soil borings
- Installation of 2-in. piezometers in 8 of the 11 boreholes
- Rock coring at each soil boring location to confirm the presence of bedrock
- Performance of grain size, permeability, and cation exchange capacity analysis of selected spilt-spoon samples
- Performance of falling-head field permeability tests in 5 of the piezometers
- Installation of three 6-in. bedrock wells (MW-1, MW-2, and MW-3) ranging in depth from 148 to 173 ft

- Collection of ground-water samples from the deep monitoring wells for baseline chemical analysis.

The principal findings of the investigation of the area included the following:

- The dominant overburden material in the area was a red-brown clay with little fine-to-coarse gravel and fine-to-coarse sand.
- No coarse-grained permeable soils were found.
- Clay and silt were from 8.5- to 18.0-ft thick in the southern part of the area and from 3.8- to 7.1-ft thick in the northern part.
- Laboratory permeability values for the clay and silt ranged from 3.7×10^{-7} to 7.5×10^{-9} cm/sec.
- Clayey, coarse material resting on bedrock showed permeability ranging from 1.9×10^{-5} to 7.1×10^{-6} cm/sec.
- No zone of saturation was found in the unconsolidated soils.
- Depth to water in the bedrock aquifer ranged from 80 to 128 ft below ground surface.
- Ground-water flow was to the northwest with a gradient of 0.11 ft/ft.
- Ground-water quality was generally good but the water was excessively hard.

1.3.2 Summary Report of Site Investigation Activities at Skaneateles Falls Site

In 1986, Stauffer Chemical Company performed preliminary site investigations aimed at characterizing the landfill east of Skaneateles Creek and the Main Plant Building area west of the Creek (SCC 1986). The field effort was in response to NYSDEC concerns regarding ground-water and surface water quality at the site. These concerns arose after dark-colored leachate was observed emanating from the north end of the landfill. Dark-colored water was also observed in the basement of the plant.

The sampling activities were performed at the site in 1986 in an effort to characterize water quality of the leachate seeps, surface water in ditches, and Skaneateles Creek surface water. Additionally, a total of 23 piezometers were installed at the site under the supervision of Roux Associates, Inc. The piezometers consisted of 19 overburden piezometers, 3 bedrock piezometers, and 1 drive point piezometer near Skaneateles Creek (BBL 1990).

Based on the available data, the principal findings of this investigation included the following:

- A shallow flow system comprised of overburden and upper bedrock ground water was isolated from a deeper ground-water flow system. Recharge to the deeper system may occur at substantial distances to the south and may be isolated from the upper system by less transmissive rock units.
- Flow in both the overburden and upper rock was probably affected by topography and was in a northwesterly direction in the vicinity of the landfill.
- Within the landfill area, the water levels observed in the piezometers showed a potential for downward flow from the overburden to the upper rock. The water in the overburden appeared to be perched and not in direct connection with the deep bedrock ground water.
- Chemical analysis showed the presence of some organics and metals in the leachate, stream, and ditch samples. It was concluded that there were no significant metal concentrations and low organic compound concentrations except for toluic acids. Toluic acid concentrations were found to range from detected at the limit of detection (0.02 mg/L) to 0.17 mg/L in samples collected from Skaneateles Creek. Samples collected from the ditch on the south side of the landfill were found to contain 2.1 and 5.2 mg/L of toluic acids.

As a result of the investigation, a leachate collection and treatment system was installed at the site. The treated leachate is discharged to Skaneateles Creek under NYSDEC State Pollutant Discharge Elimination System (SPDES) permit.

Based on this initial information, Stauffer Chemical Company developed a plan for further investigation and characterization of the site. This plan provided a basis for the first RI/FS Work Plan (BBL 1990) which was approved by NYSDEC.

Comparison of the findings from these previous investigations are compared to the findings of this RI in Section 3.7.

2. REMEDIAL INVESTIGATION ACTIVITIES

This chapter describes the field activities and field sampling methods employed at the SMC site by EA in support of the RI. A variety of activities and field sampling techniques were performed during the RI which include: geophysical surveys (magnetometer and seismic refraction); SVCA; test borings and sampling; test pit excavation; well installation; and ground-water, leachate, seep, surface water, sediment, and air sampling.

The site investigation was conducted in two phases: an initial RI field program which began in October 1991, and a subsequent Phase II RI field program which began in July 1993. The Phase II field activities were conducted in several field efforts which included an SVCA in the northern portion of the site, test borings and sampling, seismic refraction survey, installation and sampling of additional onsite and offsite monitoring wells, and evaluation of potential secondary sources. The following is a chronology of the RI activities and dates performed:

Remedial Investigation Activities	Date Performed	
	Initial	Phase II
Magnetometer Survey of Landfill	OCT 1991	---
Landfill Test Pit Excavation	OCT 1991	---
Onsite Landfill Test Borings	OCT 1991	---
Landfill Perimeter Test Borings	OCT 1991	---
Test Boring Program North of Main Plant Building	APR 1991	NOV 1992 and JUL 1993
Baseline Air Sampling	---	NOV 1992
Air Sampling During Well Installation	---	DEC 1992
Monitoring Well Installation	OCT 1991 - APR 1992	DEC 1992 - JAN 1993 JUL, AUG, SEP 1993
Piezometer Installation	NOV-DEC 1991	---
Continuous Water Level Elevations Monitoring	---	MAY-JUL 1993
Ground-Water Sampling	MAR-MAY 1992	AUG-OCT 1993
Landfill Leachate Sampling	---	SEP 1993
Basement Seep Sampling	APR 1992	SEP 1993
Skaneateles Creek Seep Sampling	APR 1992	OCT 1993
Former Raceway Sampling	---	SEP 1993
Stream Surface Water and Sediment Sampling	APR 1992	OCT 1993
Soil Vapor Contaminant Assessment	---	JUL 1992
Seismic Refraction Survey	---	JAN 1993
Sanitary Sewage System Sampling	---	SEP 1993
Private Well Mail Survey	---	OCT 1993

Tables 2-1 and 2-2 summarize the Round 1 and Round 2 sampling programs, respectively. The following sections and tables detail the methods, sample designation, sample locations, and other pertinent information for all field activities performed as part of the SMC investigation.

2.1 MAGNETOMETER SURVEY OF LANDFILL

During the initial RI field program, a magnetometer survey was conducted over the entire landfill in order to define the extent of ferrous metals (e.g., buried drums). The magnetometer technique was selected as the most appropriate for use at the SMC site because it is impacted the least by the limitations imposed by the shallow ground-water table and the metal content of the fill. Data from the magnetometer survey were utilized to aid in the planning of the different invasive activities within the landfill (i.e., test pits and test borings). In addition, the data were used to interpret subsurface conditions at the landfill.

The survey was conducted by EA personnel on 2 and 4 October 1991 utilizing a magnetometer/gradiometer. All field activities were overseen by an NYSDEC representative. In order to perform the magnetometer survey, a 50- × 20-ft grid was established across the entire landfill. Stakes were spaced 50 ft apart in a north-south direction along lines spaced 20 ft apart in an east-west direction. Figure 2-1 shows the layout of the grid established over the landfill. Magnetic measurements were taken every 10 ft while walking in a north-south direction along the lines spaced 20 ft apart using an EDA OMNI PLUS total field magnetometer and gradiometer. Total magnetic field and gradiometer measurements were obtained at approximately 900 locations on the approximately 500 × 300 ft landfill. Background measurements were established approximately 150 ft east of the landfill. Background readings were taken, at a minimum, at the start of every day, once mid-day, and at the end of the day to correct for any changes in the earth's magnetic field over time. The collected data was downloaded into an IBM-compatible computer upon return to the office. The total field measurements were used to develop a contour map. The generated data was interpreted using digital terrain modeling with DCA computer software in the AutoCAD environment. Two- and three-dimensional total field contour maps were generated from the data which indicated areas of both high and low magnetic anomalies. The contour maps were developed by subtracting the average background total field readings taken before and after each surveyed segment from the total magnetic field. These maps were used during the planning stage for locating the confirmatory test pits.

The following modifications to the Field Sampling and Analysis Plan (EA 1991) during the magnetometer survey were made in the field due to site conditions:

1. During the work on the eastern portion of the landfill, background readings were taken more frequently to closely monitor any fluctuations due to the nearby utility lines.

2. An anomaly was located along the metal chain-link fence on the southern portion of the landfill which was likely due to interference from the fence. Therefore, the anomalies were not considered to be representative of the underlying fill, and readings were not taken south of the chain-link fence.
3. A section along the southeast portion of the landfill beneath the power line had extremely low total magnetic field readings, which prompted EA to collect a second set of magnetometer readings of this section. The result again was an abrupt drop in the total magnetic field as the survey passed beneath the power lines indicating that the occurrence was attributable to interference from the overhead high voltage power lines.

2.2 TEST PIT EXCAVATION IN LANDFILL

Following the evaluation of the magnetometer survey results, four test pits were excavated within the landfill. The purpose of the test pits was to delineate any potential areas of buried metallic material within the landfill and to provide information on the physical characteristics of the waste within the landfill through visual observation and field screening with an HNu and combustible gas indicator. This information was then used during the planning for the landfill test boring and landfill piezometer installation program.

The test pit excavations were performed on 8-9 October 1991, under the supervision of an EA geologist who was responsible for the documentation of test pit activities and visual identification of the unearthed material. All field activities were overseen by an NYSDEC representative. An EA site health and safety officer was present to continuously monitor volatile organic levels and explosive conditions during activities. The test pits were excavated by Environmental Products and Services (Syracuse, New York) using a backhoe. The test pits were constructed to intersect the center of the geophysical anomalies (both high and low magnetic field readings). Test Pit 1 (TP-1) was located 80 ft east of the western edge of the landfill and 410 ft north of the chain-link fence on the southern perimeter of the landfill. Test Pit 2 (TP-2) was located 130 ft east of the western perimeter of the landfill and 190 ft north of the chain-link fence. Test Pit 3 (TP-3) was located 160 ft east of the western perimeter and 50 ft north of the chain-link fence. Test Pit 4 (TP-4) was located 80 ft east of the western perimeter of the landfill and 70 ft north of the chain-link fence. The test pit locations are shown on Figure 2-2. A summary of test pit construction is provided in Table 2-3.

All excavation and backfilling activities were performed in Level C personal protection equipment with continuous monitoring using HNu, explosimeter, oxygen, and dust monitors. Test pits were staked and plastic sheeting was placed along the sides of the pits to allow segregation of the cap material from the underlying waste material. The exclusion zone was clearly marked with hazard tape. All excavation equipment was steam-cleaned prior to the initiation of all test pit activities and after each test pit was backfilled. All test pits were backfilled by first placing the waste material at the bottom and then covering it with the existing cap (clay).

Because crushed drums were encountered in the first four test pits, the two additional planned test pits were deemed not necessary. It was concluded that crushed drums were present throughout much of the landfill.

2.3 SOIL/WASTE TEST BORING PROGRAM

2.3.1 Onsite Landfill Test Borings

The landfill test boring program was implemented at the SMC landfill to provide information on the thickness and lithology of the landfill cap, soils beneath the fill, and the physical and chemical characteristics of the landfill waste material. Additionally, the borings provided information on the depth to water and depth to bedrock.

On 21-28 October 1991, 12 soil borings were installed within the landfill. The borings were installed by American Auger & Ditching Company (Constantia, New York) under the supervision of an EA geologist. All field activities were overseen by an NYSDEC representative. The test borings within the landfill were installed in a grid-like pattern so that the entire landfill was represented. Additionally, two test borings were installed in the vicinity of TP-3 to characterize waste material observed during the installation of the test pits. The test borings within the landfill were continuously sampled until spoon refusal or a confining layer was encountered. All borings within the landfill were drilled using a truck-mounted Mobile B-57 drill rig with 4.25-in. inner diameter (ID) hollow stem augers. Up to three discrete soil samples (one sample from the landfill cap, one from the waste, and one from the underlying natural soil) were collected from each of the borings and sent to EA Laboratories (Sparks, Maryland) for analysis. A total of 18 samples (including one duplicate) were collected for analysis from the landfill test borings. All analytical samples from the borings were analyzed for full Target Compound List (TCL) organics (plus toluic acid), Target Analyte List (TAL) inorganics (plus cyanide), and total organic carbon (TOC). Selected samples were analyzed for grain-size analysis (Appendix A), followed by hydrometer/Atterberg limits if 20 percent of sample was less than a 200 sieve size.

Borehole cuttings from each of the soil borings were collected in drums to containerize fill material brought to the surface. The cuttings were analyzed for RCRA waste characteristics to characterize the material for proper disposal at a later date.

The soil boring logs are included in Appendix B. Landfill test boring locations are shown in Figure 2-3. Table 2-4 lists the sample designation, depth, date sampled, and analytical parameters for all landfill test boring samples. Soil borings SMC-SB26 and SMC-SB27 were installed in the vicinity of TP-3 for the purpose of analyzing the waste encountered during the preceding test pit excavation at the request of NYSDEC. Three discrete samples of waste material from these borings were collected and shipped to EA Laboratories for chemical analysis. The samples were analyzed for full TCL organics (plus toluic acid) and TOC.

2.3.2 Landfill Perimeter Test Borings

The perimeter test boring program consisted of the installation of 34 soil borings around the perimeter of the landfill on 14-18 October 1991, to define the limits of the landfill and the characterization of the natural soils on the landfill perimeter. Landfill perimeter test boring locations are shown in Figure 2-3. The perimeter borings were installed at an approximately 100-ft spacing around the perimeter of the landfill. At each perimeter location, a boring was placed just inside the suspected perimeter of the landfill. After fill material was identified, the borehole was terminated, grouted to ground surface, and a new borehole was started by moving outward from the waste disposal area on a 10- to 15-ft spacing interval until no apparent waste was observed. With the exception of one boring, all landfill perimeter borings were sampled until spoon refusal was encountered. One discrete soil sample was collected from each of the perimeter borings and sent to EA Laboratories for chemical analysis. All analytical samples were analyzed for full TCL organics (plus toluic acid), TAL inorganics (plus cyanide), and TOC. The discrete soil sample was taken just below the interface of landfill cap (if present), from the top 2 ft of the natural soil (if present and no cap was present), or at the top of the water table or at the top of bedrock, whichever came first. Table 2-5 provides a summary of the sample designation of the landfill perimeter test boring sampling scheme. Selected samples were also analyzed for grain-size analysis and hydrometer/Atterberg limits (if 20 percent of sample was less than a 200 sieve size) (Appendix A).

The following modifications were made to the perimeter test boring program presented in the Field Sampling and Analysis Plan (EA 1991) due to site conditions:

1. No analytical sample was obtained from the SMC-SB01 location as originally planned due to the landfill extending out to the edge of the drainage swale located east of the landfill. Due to the presence of the former sludge settling basin on the eastern side of the drainage swale, no borings were installed east of the drainage swale so as not to bias the perimeter boring analytical results.
2. Due to access problems, it was not possible to install a boring outside the landfill at location SMC-SB15. Instead, a sample was collected in the outermost boring from the landfill at that position (south of the chain-link fence).

2.3.3 Test Boring Program North of Former Organics Plant

The test boring program of the former Organics Plant area was designed to provide information for the characterization of subsurface conditions and to confirm the areal extent of potential soil contamination.

On 22 April 1992, one test boring (MW5-MWB01) was installed near MW-5I and a soil sample was obtained. The soil sample was analyzed for full TCL organics (plus toluic acid), and TAL inorganics (plus cyanide). The purpose of this boring was to evaluate elevated vapor readings obtained from drill cuttings during the installation of MW-5I and MW-5D.

A total of nine soil borings (MW5-SB01 through MW5-SB09) were then installed north of the Main Plant Building during November 1992. Three of the soil borings were located within areas where the SVCA showed the presence of volatile organic compounds (VOCs) in the vapor phase, and six were placed in areas that showed low or no detectable compounds in the vapor phase.

One discrete sample per boring was sent to the laboratory for chemical analysis. All soil samples were analyzed for TCL organics (plus toluic acid) and TAL inorganics (plus cyanide). Samples from four of the borings were also analyzed for TOC. In order to characterize soil conditions within this area, the determination of the depth of the discrete samples was based upon field observations that included visual inspection and field screening with an organic vapor analyzer (OVA) and/or HNu. If no visual contamination or elevation of HNu/OVA readings was observed in any of the split-spoons, the soil sample for chemical analysis was collected to correspond to the depth at which the SVCA sampling was performed at the selected location. Field monitoring with an HNu or OVA for VOCs performed on each split-spoon sample interval was recorded on the soil boring log.

In order to further define the lateral extent of saturated zone soil contamination, a total of five additional soil borings (MW5-SB10 through MW5-SB14) were installed in the vicinity of the sanitary sewage leachfield. Two of these were placed northeast and three northwest of the leachfield (Figure 2-4). In addition, two soil borings (MW5-SB15 and MW5-SB16) were installed in the vicinity of MW5-SB09 (one north and one east) to further define lateral extent of soil contamination in this portion of the site. The soil borings were extended to auger refusal (to the top of bedrock) following procedures specified in the Field Sampling and Analysis Plan (EA 1991). The depth of the single discrete sample was based upon field observations and field screening with an HNu and OVA. If no visual contamination or elevation of HNu/OVA readings was observed in any split-spoon, the soil sample for chemical analysis was the depth which corresponded to the same depths at which the soil samples adjacent to the sanitary sewage leachfield (MW5-SB04 and MW5-SB05) and/or MW5-SB09 were collected. A summary of the test boring sampling scheme for the area north of the Main Plant Building is provided in Table 2-6.

2.4 AMBIENT AIR SAMPLING

The ambient air sampling program was designed to determine whether VOCs were emanating from the site. Ambient air was sampled prior to initiating invasive activities to establish baseline ambient air concentrations in the area of the landfill and along the west and northwest property boundary. Ambient air was also sampled during the installation of MW-5S and MW-7D to determine whether there was any release of VOCs during drilling activities at known areas of subsurface volatile organic contamination.

2.4.1 Baseline Air Sampling

In November 1992, four 8-hour integrated samples of ambient air were obtained using sorbent traps analyzed in compliance with U.S. Environmental Protection Agency (EPA) Method TO-2. Samples were analyzed by a laboratory (CTM Analytical, Latham,

New York) certified in the "air emissions" category for VOCs by the New York State Department of Health. The ambient air samples were collected at a time when no invasive activities were being conducted at the site.

Air samples were obtained upwind and downwind (total of two) of the landfill in the breathing zone. The samplers were located on the southern and northern perimeters of the landfill lift. Stakes with flagging tape were placed at several locations on the landfill to determine and monitor wind direction at the start of and throughout the sampling period.

A third sampler was located near MW-7S along the site property boundary (west of the landfill). A meteorological station was placed near this sampler to continuously monitor wind direction and wind speed during the sampling period. The remaining sampler was located on the northwestern property boundary, along Jordan Road northwest of the Main Plant Building. Wind direction and speed were documented on a continuous basis during air sampling with a second meteorological station at this location. Ambient air sample locations are shown on Figure 2-5.

2.4.2 Air Sampling During Well Installation

To evaluate potential releases of VOCs during invasive drilling, two 8-hour integrated samples were obtained in the breathing zone at downwind locations during the installation of MW-5S and MW-7D. The samples were collected outside the Exclusion Zone at a distance agreed upon between EA and the NYSDEC representative. The sample from MW-5S was obtained in November 1992, and the sample from MW-7D was obtained in January 1993. The air samples were obtained using sorbent traps and analyzed in compliance with EPA Method TO-2. Samples were analyzed by a laboratory certified for VOCs by New York State Department of Health (CTM Analytical, Latham, New York). These air samples were subsequently used to determine whether any VOCs that may have been released during drilling migrated from the drilling location. The results will be used to support the risk assessment and to quantify the potential exposure for the nearby residents. This effort was performed in addition to the established site health and safety monitoring program.

2.5 GROUND-WATER MONITORING PROGRAM

The ground-water monitoring program was designed to: provide a ground-water monitoring network; investigate the site-specific hydrogeology; and provide ground-water sampling points to identify, monitor, and evaluate whether any chemical compounds originating from the SMC site have impacted ground-water quality and, if so, to what degree.

2.5.1 Monitoring Well Installation

The objectives of the monitoring well installation were as follows: (1) characterize the subsurface geology of the study area, (2) evaluate the ground-water potentiometric configuration and vertical gradients between the various ground-water zones, and (3) provide ground-water sampling locations to assess ground-water quality of the various units both onsite and offsite.

Three types of monitoring wells were installed by EA during various stages of the RI. Overburden wells were installed to assess shallow ground-water quality and develop potentiometric data of the shallow water table. The second type, upper bedrock wells, were designed to assess ground-water quality in the bedrock immediately underlying the unconsolidated overburden material as well as provide potentiometric data to evaluate the relationship between overburden ground water and ground water within the upper bedrock. The third type, deep bedrock wells, were designed to assess ground-water quality in the upper portion of the deep regional ground water and provide potentiometric data for the regional aquifer. Tables 2-7 through 2-9 summarize the well construction information for the monitoring wells installed at the SMC site.

As part of the RI, monitoring well clusters consisting of an overburden well, an upper bedrock well, and a deep bedrock well were installed at seven locations (MW-1, MW-2, MW-4, MW-5, MW-6, MW-7, and MW-14). Monitoring well couplets consisting of an overburden well and an upper bedrock well were installed at three locations (MW-8, MW-12, and MW-18). Monitoring well couplets consisting of an upper bedrock well and a deep bedrock well were installed at eight locations (MW-3, MW-9, MW-10, MW-11, MW-13, MW-15, MW-16, and MW-17). The locations of the monitoring wells are shown on Plate 2. In labeling monitoring wells, the following terminology was used: the overburden wells were considered to represent the shallow ground-water zone and were labeled with the post-fix "S"; the upper bedrock wells were considered to represent intermediate ground-water zone and were labeled with the post-fix "I"; the deep bedrock wells were considered to represent the deep ground-water zone and were labeled with the post-fix "D."

At each well cluster and well couplet location, an exploratory boring was performed in which split-spoon samples were obtained continuously through the overburden and rock core samples were obtained continuously through the interval of the deep bedrock well for stratigraphic identification purposes. In addition, packer tests were performed during the exploratory boring at selected depths to determine the hydraulic conductivity of the bedrock. The packer test information was used to evaluate whether any confining layer was present below the shallow ground water and to verify any significant deep water-bearing zone. All borehole drilling and testing was performed under the full-time supervision of an EA geologist. All split-spoon soil samples, rock core samples, water level measurements, air monitoring readings, packer test data, and other pertinent drilling observations were logged by the supervisory EA geologist. The information obtained from the exploratory boring was used during well installation to determine completion depth and well construction design for the wells to be installed at that location.

During overburden well installation, drilling was accomplished with a truck-mounted drill rig using 6.25-in. ID (10.25-in. outer diameter [OD]) hollow-stem augers. Placement of the overburden monitoring well was based on the lithologic descriptions determined from overburden characterization during the exploratory boring. Typically, the overburden wells consisted of a 5-ft length of 4-in. diameter stainless steel screen installed such that the screened interval intersected the overburden water table.

The upper bedrock monitoring wells were drilled and installed by a truck-mounted drill rig using air rotary drilling method. In order to isolate the overburden ground water, permanent 8-in. ID steel surface casing was grouted 3-5 ft into bedrock. Typically, the upper bedrock wells consisted of a 5-ft length of 4-in. diameter stainless steel screen installed in the upper 10-15 ft of bedrock.

The deep bedrock wells were installed with a truck-mounted drill rig using air rotary drilling method. In order to isolate the deep bedrock ground water from the upper bedrock ground water, a permanent 8-in. ID steel surface casing was grouted a minimum of 10 ft below the completed depth of the adjacent upper bedrock well. The actual depth at which the surface casing was set was based on data from the exploratory borings (rock cores and packer tests) and was made at the concurrence of the EA geologist and NYSDEC representative. All deep bedrock wells were completed as open-hole rock wells due to the large fluctuation of water levels in the deep aquifer. Boring logs are provided in Appendix B.

During the course of the initial drilling program field work, it was recognized that the subsurface hydrogeologic conditions at the site were more complicated than originally envisioned in the Work Plan (BBL 1990). Adjustments to the drilling program were made during the initial field effort. The majority of the changes modified the procedures for installing the bedrock wells, especially the deep wells.

On 5 November 1991, the following additions or changes were made to the Field Sampling and Analysis Plan (EA 1991) monitoring well installation protocol for all subsequent work:

- All bedrock monitoring wells completed after 5 November 1991 were installed using 10-in. spin casing or temporary casing advanced through the overburden during drilling of bedrock wells to effectively isolate the overburden from the borehole during the drilling process.
- Bedrock coring was to be completed during drilling of all deep bedrock monitoring well locations to identify and characterize bedrock. At any future monitoring well couplet locations where a deep bedrock well was not planned, rock coring was to be completed during the drilling of the upper bedrock well.
- The Field Sampling and Analysis Plan (EA 1991) specified that the grout must be allowed to set for 12-24 hours before drilling can commence inside the surface casing. NYSDEC required a 48-hour waiting period before drilling could be resumed through the in-place casing.

On 18 February 1992, the following additions or changes were made to the currently accepted protocols for all subsequent deep bedrock monitoring well installations:

- The original Work Plan (BBL 1990) specified that deep bedrock monitoring wells were to be installed with permanent 8-in. surface casing installed 5 ft into bedrock. New protocols required that 8-in. casing in deep bedrock monitoring wells be installed to a minimum depth

of 10 ft below the adjacent upper bedrock well. In addition, the final depth of the surface casing was to be made at the concurrence of the EA field geologist, NYSDEC representative, and NYSDEC.

- The Work Plan (BBL 1990) stipulated that the deep bedrock monitoring wells were to be installed 25-30 ft into bedrock. New protocols required that all deep monitoring wells be installed in the next significant water-bearing zone, with screen placement at the concurrence of the EA field geologist, NYSDEC representative, and NYSDEC. In addition, packer tests were to be conducted continuously at 5- to 10-ft intervals at MW-03D and MW-04D during coring to determine the hydraulic conductivity at selected depths, to identify any potential confining zone, and to verify that a significant water-bearing zone had been encountered. For all other deep bedrock wells, two packer tests were to be performed at each location, one to identify a confining layer and one to verify the deep water-bearing zone.

The following modification was made to the protocol during installation of the Phase II monitoring wells:

- At offsite monitoring well couplet locations (MW-16 and MW-17), both the upper and deep bedrock wells were to be completed as 6-in. open-hole bedrock wells.

The following modifications were made to the monitoring well installation program in response to site conditions at the agreement of the EA geologist, NYSDEC, and NYSDEC representation:

- The 8-in. surface casing was not installed into bedrock for upper bedrock monitoring well MW-3I due to bedrock being encountered less than 4 ft below ground surface and no water present in the overburden.
- Deep well MW-2D was installed approximately 100 ft north of the overburden and upper bedrock well couplet of MW-2S and MW-2I due to access problems with the air rotary drill rig at this location.
- Deep monitoring well MW-5D was installed approximately 75 ft north of the overburden and upper bedrock well couplet of MW-5S and MW-5I due to high VOCs present in the overburden at this location.
- The original Work Plan (BBL 1990) called for all deep bedrock wells to be screened over a 5-ft interval with 4-in. stainless steel screens. Due to the large and rapid fluctuation of the water levels observed for the deep ground water, the deep wells were completed as open hole bedrock wells.

- No ground water was encountered during installation of the upper bedrock wells MW-15I and MW-17I. These wells were left as open-hole bedrock wells in order to evaluate if ground water would be present at certain times of the year and the depth to water.
- No ground water was encountered in the silty clay overburden soils during auger drilling at the proposed overburden monitoring well location MW-17S. As a result, and with the concurrence of the NYSDEC representative, this well was not completed.

2.5.2 Piezometer Installation

The objectives of the piezometer installation program were to provide additional information on subsurface geology and ground-water potentiometric data for the overburden and upper bedrock ground water. This information was used in conjunction with data from the monitoring well installation program during site characterization.

The piezometer installation program consisted of installing two piezometers within the fill material of the onsite landfill, two piezometer couplets (overburden and upper bedrock) west of Skaneateles Creek; retrofitting two existing landfill perimeter open-hole upper bedrock piezometers; and replacing one existing landfill perimeter open-hole upper bedrock piezometer.

The two landfill piezometers were installed in the south-central and north-central portions of the landfill to obtain potentiometric data of the landfill water table. The piezometer couplets west of Skaneateles Creek were installed to obtain potentiometric data for the shallow overburden water table and the upper bedrock ground-water zone between the landfill and the Main Plant Building.

The three existing open-hole bedrock piezometers located along the perimeter of the landfill were retrofitted to correspond with the screened interval of the newly installed upper bedrock wells and piezometer in order to obtain potentiometric data of the upper bedrock ground water in the immediate vicinity of the landfill.

All piezometers completed in the unconsolidated deposits were installed with a truck-mounted drill rig using 4.25-in. ID hollow-stem augers and consisted of a 5-ft, 2-in. stainless steel screen.

All bedrock piezometers were installed with a truck-mounted rig using 6.25-in. ID hollow-stem augers in the overburden and rock coring and air rotary in the bedrock.

All drilling was performed under the full-time supervision of an EA geologist who was responsible for logging the soils and rock samples obtained during drilling, as well as water level measurements, air monitoring readings, and other pertinent observations. The boring logs are provided in Appendix B. Tables 2-7 and 2-8 summarize the piezometer construction information for the various piezometers installed at the site.

During the course of the drilling program, the following modifications were made to the piezometer installation protocols:

- In the original Work Plan (BBL 1990), bedrock piezometers were to be installed without any permanent casing being set into bedrock. The new protocols require that permanent 4-in. steel casing be installed 3-5 ft into rock.
- In bedrock piezometers, rock coring was to be completed during drilling.

2.5.2.1 Non-Aqueous Phase Liquid Wipe Sampling

During installation of the landfill piezometer in the south-central portion of the landfill (LFP-01), a thin layer of non-aqueous phase liquid was observed on the outside of a drill auger after it was removed from the ground. On 24 March 1992, test borings were installed in the vicinity of LFP-01 to obtain a sample of the non-aqueous phase liquid for chemical analysis. Due to only a thin layer of non-aqueous phase liquid being present on the water table, a wipe sample was collected from the outside of a clean, dedicated bailer lowered into the test boring. The wipe sample was collected following procedures outlined in the EPA Region 2 Comprehensive Environmental Response, Compensation, and Liability Act Quality Assurance Manual (Part II, Section VIII, Subsection G) and analyzed for total petroleum hydrocarbon fingerprint analysis, TCL base neutral/acid extractable organics, and TCL polychlorinated biphenyls (PCBs).

2.5.3 Monitoring of Water Level Elevations

Water level measurements made by EA during the Phase I field effort and as part of the SMC quarterly monitoring program of the sludge disposal area wells have shown large changes in water levels in the deep bedrock ground water. In order to evaluate this phenomena, a selected group of four deep monitoring wells were monitored with continuous water level recording instruments for a total period of three months (3 May to 28 July 1993). The four wells selected were MW-1D, MW-4D, MW-5D, and MW-11D. Precipitation data and any available stream flow information was obtained from local sources. The data was used to evaluate the potential correlation between precipitation events, stream flow, and water level data and to further define the site hydrogeology.

Water level data was electronically field recorded using an *In Situ* Hermit Environmental Data Logger (Model SE1000B) and transducer, which detects water level changes to hundredths of a foot. The Hermit data logger automates the measuring and recording of water level changes during long-term aquifer monitoring. The Hermit data logger was set to record water levels six times a day. The stored data can be viewed directly on the data logger's LCD display, as well as downloaded to a computer. As a quality control check, water levels were periodically measured in the four monitoring wells and recorded in the field notebook.

Four full rounds of water level data were obtained from the Phase I monitoring wells and piezometers in May, June, and December 1992 and January 1993. During EA's Phase II field work, a full round of water level measurements were obtained on a monthly basis from May to September 1993. Water level data and potentiometric contour maps of the various ground-water zones are provided in Section 3.5.

2.5.4 Ground-Water Sampling

The ground-water sampling program was designed to provide information to determine ground-water quality in the landfill area, beneath the Main Plant Building, along the perimeter of the site, and offsite. The analytical data was used to evaluate the potential source(s) of contaminants at the site, nature and extent of any ground-water contamination, potential risks, and remedial alternatives.

Round 1 ground-water samples were obtained from the 26 Phase I monitoring wells for chemical analysis. Samples from six overburden monitoring wells (MW-1S, MW-2S, MW-4S, MW-6S, MW-7S, and MW-8S) and 11 upper bedrock wells (MW-1I through MW-11I) were obtained from 18 to 21 March 1992. Six of the deep monitoring wells (MW-1D, MW-2D, MW-3D, MW-4D, MW-6D, and MW-9D) were sampled from 27 to 29 April 1992. The remaining three deep monitoring wells (MW-5D, MW-10D, and MW-11D) were sampled on 14 May 1992.

In 1993, after all new Phase II monitoring wells were completed, a second round of samples from 17 of the 26 Phase I monitoring wells was obtained, as well as samples from 13 of 17 Phase II monitoring wells. Ground-water samples were not obtained from Phase I monitoring wells MW-1S, MW-1D through MW-6D, MW-10D, and MW-11D, and Phase II monitoring wells MW-14S, MW-15I, MW-17I, and MW-14D because these wells were dry during the sampling event. From 27 August to 3 September 1993, ground-water samples were obtained from 14 upper bedrock monitoring wells (MW-1I through MW-14I) and two overburden wells (MW-5S and MW-12S). From 1 to 8 October 1993, ground-water samples were obtained from 6 overburden wells (MW-2S, MW-4S, MW-6S, MW-7S, MW-8S, and MW-18S), 2 upper bedrock wells (MW-16I and MW-18I), and 6 deep wells (MW-7D, MW-9D, MW-13D, MW-15D, MW-16D, and MW-17D). In addition, water samples were collected for the 3 sludge disposal area wells (SPW-1, SPW-2, and SPW-3) located east of the landfill on 30 September 1993.

Upon arrival at each monitoring well, the well and the immediate area were thoroughly inspected to determine the integrity and security of the monitoring well. Well site conditions and any unusual observations were noted. The sampling personnel then measured the depth to water from the top of casing using an electric water-level indicator to the top of the casing. The data was used to calculate the static volume of water in the casing. Next, to ensure that a representative sample of ground water was obtained, 3-5 times the calculated volume of standing water in the well was purged from each well prior to sample acquisition. In low yielding wells, the well was purged to dryness and allowed to recover for a minimum of 20 minutes and purged to dryness a second time.

Samples for chemical analysis were obtained immediately after well purging was complete. For slow recovering wells, the sample was collected immediately after a sufficient volume was available.

Samples were collected using dedicated bailers (i.e., separate bailer for each well). Samples were placed into a sampling container containing an appropriate preservative for the parameter to be analyzed. Measurements of pH, Eh, temperature, and specific conductivity were obtained in the field. All samples were placed in coolers on ice to maintain 4 C immediately after sampling. The samples were packaged and shipped via overnight carrier under strict chain-of-custody protocols to the laboratory for immediate chemical analysis. The Phase I ground-water samples were analyzed for TCL organics (plus toluic acid), TAL inorganics (plus cyanide), and water quality parameters. The Phase II ground-water samples were analyzed for full TCL organics (plus toluic acid) and TAL inorganics (plus cyanide). Tables 2-1 and 2-2 summarize the ground-water sampling scheme for both Round 1 and Round 2 sampling events.

2.6 LEACHATE/SEEP SAMPLING

The leachate/seep sampling program was designed to provide data on the chemical quality of the landfill leachate and seeps present in the basement of the Main Plant Building and along Skaneateles Creek. The data was subsequently evaluated to determine the relationship between the landfill leachate and the seeps. In addition, the data was used to evaluate potential risks to human health and the environment, as well as evaluating remedial alternatives for the site.

2.6.1 Landfill Leachate Sampling

On 3 September 1993, one leachate sample was collected from each of the two piezometers (LFP-1 and LFP-2) completed in the fill material of the onsite landfill (Plate 2). The samples were analyzed for TCL organics (plus toluic acid) and TAL inorganics (plus cyanide).

To ensure that a representative sample of the leachate was obtained, 3-5 times the calculated volume of standing water in the piezometer was purged prior to sample acquisition. A round of static water level measurements was obtained with an electronic water level indicator both prior to and after purging to ensure recovery before sampling. All purged water was collected and transported back to the Main Plant Building where it was discharged into the onsite treatment system.

Upon completion of the purging operation, samples were obtained from each piezometer using dedicated (a separate bailer for each well), clean, bottom-filling bailers. Samples were placed into sample containers with appropriate preservatives for the parameters to be analyzed. Measurements of pH, Eh, temperature, and conductivity were obtained in the field. All samples were placed in coolers on ice to maintain 4 C immediately after sample collection. The samples were packaged and shipped via overnight carrier under strict chain-of-custody protocols to the laboratory for immediate chemical analysis.

2.6.2 Basement Seep Sampling

Two rounds of basement seep samples were collected from the sump located in the basement of the Main Plant Building. The sample was analyzed for TCL organics (plus toluic acid) and TAL inorganics (plus cyanide) during both sampling rounds.

A clean, dedicated bailer was used to collect the sample. The sample was then poured into appropriate laboratory containers and placed immediately in coolers on ice to maintain a temperature of 4 C. At the end of the sampling effort, the samples were packaged and shipped via overnight carrier under strict chain-of-custody protocols to the laboratory for chemical analysis.

2.6.3 Skaneateles Creek Seep Sampling

During the Phase I field effort, several seeps were observed emanating from the creek bank along Skaneateles Creek following a precipitation event. The original Work Plan was modified to incorporate a sampling program which would provide analytical data to characterize these seeps.

On 7 April 1992, four aqueous samples were collected from seeps discharging to Skaneateles Creek. One sample (CS01-01A) was collected from the swampy area approximately 150 ft north of the sanitary sewage leachfield and three seep samples were collected from dark-colored seeps emanating from the eastern bank of Skaneateles Creek immediately west of the landfill in the vicinity of the former rock dam. In addition, a sediment sample was collected at one of the dark-colored seep locations (CS03-01A). All samples were analyzed for full TCL organics (plus toluic acid) and TAL inorganics (plus cyanide). Creek seep and sample locations are shown on Figure 2-6.

On 8 October 1993, a second round sample was obtained from CS-03 and SS-03. The remaining three seep locations from the April 1992 sampling effort showed no active leachate release. The sample from CS-03 was obtained from a small pit dug to collect leachate prior to its discharge to the Creek. These samples were analyzed for TCL volatile organic analytes and TCL base neutral analytes (BNAs) (plus toluic acid). A sufficient sample was unavailable for TCL pesticide/PCB or TAL inorganic analyses.

2.6.4 Former Raceway Sampling

During the Phase II RI field effort, the location and condition of the former mill pond raceway was verified. The raceway had been abandoned by filling in portions of the raceway with cement. During the Phase II field effort, liquid was observed in the unfilled portions of the raceway within the Main Plant Building.

On 14 September 1993, a sample of the liquid from the abandoned raceway was collected and analyzed for full TCL organics (plus toluic acid) and TAL inorganics (plus cyanide). The sample was collected using a clean, dedicated bailer. The sample was poured in appropriate laboratory containers, placed immediately in a cooler on ice, and then shipped overnight to the laboratory for chemical analysis.

2.7 STREAM SURFACE WATER AND SEDIMENT SAMPLING

The surface water/sediment sampling program was designed to evaluate whether potential contaminants generated from the past activities at the site have impacted stream water and sediment quality.

Four surface water samples were collected from Skaneateles Creek; one upstream sampling location south of the Main Plant Building and landfill; one mid-site sampling location just downstream of the landfill and adjacent to the Main Plant Building; and two sampling points located downstream, one along the northern portion of the property and one off the property just west of Jordan Road. The locations of the surface water samples are shown on Figure 2-7. Two rounds of surface water/sediment samples were collected from the four sample locations for purposes of this investigation.

During the Phase II sampling round, the surface water/sediment sampling was conducted to correspond to the presence of creek seeps so that any potential impact to stream quality from the seeps could be evaluated.

The Round 1 surface water samples were analyzed for full TCL organics (plus toluic acid), TAL inorganics (plus cyanide), and water quality parameters. The Round 2 surface water samples were analyzed for TCL organics (plus toluic acid) and TAL inorganics (plus cyanide). Field measurements of pH, Eh, temperature, and specific conductivity were obtained during both rounds of sampling.

Both rounds of stream sediment samples were analyzed for full TCL organics (plus toluic acid) and TAL inorganics (plus cyanide). All four Round 1 sediment samples were also analyzed for TOC.

2.8 SOIL VAPOR CONTAMINANT ASSESSMENT

An SVCA® was performed in the former Organics Plant area (north of the Main Plant Building) as a screening method to aid in placement of test borings and monitoring wells for characterization of this portion of the site. An SVCA is an investigative technique which adapts soil exploration and environmental/analytical chemistry techniques to the identification and definition of subsurface contamination. It is a rapid method of assessing subsurface soil contamination gradients for planning more detailed investigations. The SVCA includes sampling of soil vapor utilizing a field gas chromatograph. A detailed explanation of SVCA procedures are described below.

2.8.1 Sample Collection Procedures

The SVCA sampling was conducted by a two-person team in July 1992 as part of the Phase II field investigation. Upon arrival at the site, a 50- × 50-ft sampling grid was established in the immediate vicinity of MW-5I and a 100- × 100-ft grid established on the perimeter of this area, north of the Main Plant Building and near the sanitary sewage leachfield. A total of 45 soil vapor samples were collected. SVCA sampling points are identified on Figure 2-8. Depth to ground water in this area of the site ranges from 4 to 7 ft

based upon water level measurements from nearby overburden wells. The sampling probe was driven to a nominal depth of 3-4 ft with the actual depth of the probe dependent on ground-water and subsurface obstructions. Vertical SVCA profiling has shown little effect of ground-water volatile organic contamination on SVCA volatile organics data when the probe depth is less than or equal to half of the depth to ground water (Tracer Research Corporation, unpublished). Thus, a depth of 3-4 ft would predominantly represent vadose zone volatile organic contamination. The sampling probe consisted of a 0.625-in. stainless steel probe with a vertically slotted (0.019-in.) tip. Special care was taken to ensure that the sampling probe was seated in the ground such that aspiration of ambient air was precluded. After the sampling probe was firmly seated, a sampling manifold was attached. The probe was then purged with a vacuum pump until a near-steady state was attained (2-4 minutes).

During purging, soil resistance to vapor flow was measured via an in-line vacuum gauge and recorded. The vacuum gauge was useful in determining if vapors were entering the probe from the subsurface. If the vacuum gauge showed essentially no reduction in pressure after the vacuum pump was activated, vapors were being readily obtained and the system needed only to be purged for about 1 minute. This purged a surplus of probe and sampler volumes. If a significant reduction of pressure (e.g., 15-in. Hg vacuum) was observed, but the pressure returned to atmospheric fairly quickly after closing the sampling valve, a longer pumping time of 3-5 minutes was required. If, when the valve was closed, the pressure did not noticeably increase in 30 seconds, soil vapor was not adequately entering the probe and sampling apparatus. In this case, the probe was removed, relocated to a new borehole that was drilled within 5 ft of the original location, and the original borehole was plugged. Up to three attempts were made to collect soil vapor samples in this manner. If a soil vapor sample was not collected after three attempts, the borehole was plugged and the information documented in the field notebook.

Following purging, a 500- to 1,000- μ L soil vapor sample was withdrawn and injected into a field gas chromatograph. EA used a programmable gas chromatograph equipped with both a flame ionization detector and an electron capture detector with dual-column capability (HNU 421 GC). This is a mobile system, with the gas chromatographs and associated equipment mounted in a van. The flame ionization detector was used to quantify the concentrations of non-chlorinated aromatic compounds and the electron capture detector was used to quantify the chlorinated compounds.

Soil vapor concentrations were calculated using the external standard method. The instrument was calibrated with a standard mixture at the start of the day and after every fifth sample run. This ensured control of any detector sensitivity changes during the operation day. The following equation was used to calculate the soil vapor concentrations:

$$C_i = CF_i * A_i * V_s / V_{std}$$

where

- C_i = Vapor concentration of analyte of concern (ppm_v)
- CF_i = Calibration factor for analyte of concern
- A_i = Observed area of targeted analyte
- V_s = Vapor volume of sample (ml)
- V_{std} = Vapor volume of standard (ml).

CF_i is calculated by dividing the concentration of the target analyte in the calibration standard (ppm_v) by its observed peak area on the gas chromatogram.

Based upon results from analysis of the soil samples collected from the soil boring near MW-5I and other soil samples from the site during the Phase I investigation, analytes were targeted for the SVCA. These include benzene, toluene, xylene, trichloroethene, tetrachloroethene, ethylbenzene, methylene chloride, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and trichloroethane.

2.8.2 Quality Assurance and Quality Control

In order to ensure the integrity and validity of all aspects of the field screening analysis and the data generated, a comprehensive quality assurance program was instituted during all aspects of this SVCA. Records for all calibration, operations, and maintenance on the instrument were documented in the SVCA logbook. Detection limits for all targeted compounds were typically less than 0.5 ppm_v. A separate field logbook recording all sample preparation activities was used. Prior to analysis, the SVCA equipment was calibrated via an external standard run. Replicate analyses were performed every 20 samples to ensure result integrity, and blanks were analyzed every 8 hours to confirm system cleanliness. Sample tracking and custody was also performed.

2.8.3 Decontamination

Upon completion of soil vapor sampling at each location, the probe was decontaminated in the existing area specifically designated for decontamination. The sampling probe and associated equipment was first dismantled and brushed to remove any soil. The probe and sampling manifold was then decontaminated using Alconox and water. The gas-tight syringe was purged with zero air (air containing no organic compounds) and then heated to drive off any residual compounds following each injection into the gas chromatographs. Water generated during decontamination was collected and disposed in the onsite treatment system.

2.9 SEISMIC REFRACTION SURVEY

Data compiled from the installation of wells and piezometers during the Phase I field study indicated a bedrock surface high near the approximate northern extent of the landfill with the bedrock sloping to the south and north. Bedrock was observed to outcrop within the SMC property at the location of the former rock dam a short distance to the north and south of the site property boundary. This indicated that possible bedrock surface lows were present in the areas to the north and south of the landfill. In order to define the bedrock surface, which

could affect ground-water flow, a seismic refraction survey was performed in January 1993. The field survey, data compilation, and data evaluation were performed by an EA subcontractor (Gartner-Lee, Inc., Niagara Falls, New York). Eleven seismic lines (a total of approximately 10,000 linear ft) were located to best define onsite and offsite bedrock surface contours. The seismic lines are shown on Figure 2-9.

The seismic interpretation in conjunction with other hydrogeologic data (i.e., soil borings, well borings, rock cores, etc.) and logistic considerations were used to select the best location for placement of additional wells (both onsite and offsite) to further define ground-water migration pathways.

2.9.1 Methodologies

The seismic refraction survey was conducted by setting up a seismic spread of up to 48 geophones (channels) spaced 10 ft apart. Each seismic spread consisted of two cables comprised of 24 geophones each. The seismic source (shot) was weight drop and/or a sledge hammer falling onto a steel plate. For each shot position, a shot was recorded using the first 24 channels; then a second shot was recorded using the second 24 channels to create a 48-channel spread. Shots were made in both a forward and reverse direction. In keeping with the Generalized Reciprocal Method, a minimum of seven shot positions were made on each spread; one at either end, three mid-spread locations, and one offset from each end of the spread. The location of the offset shots was determined in the field based on observed travel times. For the far offset shots, it was necessary to stack first arrivals. Stacking involves making repeated signals in order to amplify the refracted response. Data were measured with a single 14-Hz geophone per channel utilizing the in-line refraction profiling technique. Each seismic spread was overlapped by 3-4 geophones with the previous spread for quality assurance/quality control and data analysis requirements.

The velocity and depth of refracting layers were calculated by plotting arrival times on a time-distance graph for shots made at various offsets (source to first geophone). In order for a refracting layer to be identified, it must be of sufficient thickness relative to geophone spacing, it must display a significant contrasts in Primary wave (P-wave) velocity relative to adjacent layers, and the P-wave velocity of the refracting layer must be greater than the layer immediately above it.

Data processing was carried out upon completion of data acquisition. The Generalized Reciprocal Method was used to analyze refraction data. The Generalized Reciprocal Method allowed the determination of depth to undulating refractors through the analysis of refracted first arrivals. The resulting velocity and depth analysis was displayed as interpreted cross-sections of the overburden/bedrock interface. This technique allows unweathered bedrock depth to be determined beneath each geophone. Approximately 950 data points of the subsurface were provided from the geophysical survey. A seismic refraction report, containing bedrock surface cross-sections, is provided in Appendix C. Based on all available data, an interpreted "plan view" of the bedrock surface was prepared and submitted to NYSDEC following completion of the seismic refraction survey.

Following completion of the Phase II field program, the bedrock surface contours were re-examined using the additional geologic data provided from the Phase II monitoring well borings and rock cores. The revised interpretation of the bedrock surface differs from the original interpretation in the southwest portion of the study area. This change was due to bedrock being encountered at a shallower depth in MW-17D than was reported in the seismic refraction report (Appendix C) for this location. Inaccuracies of the seismic data for this portion of the site (Seismic Line 3C) which were obtained along the shoulder of Jordan Road, appears to have been caused by the amount of cultural interference (i.e., former railroad spur, traffic, water line, and gas line) present at this location. Refer to Section 3.4 for a discussion of the bedrock surface.

2.10 SANITARY SEWAGE SYSTEM SAMPLING

A sanitary sewage leachfield is located north of the Main Plant Building. Sanitary sewage from several of the homes on the west side of Jordan Road and from the Main Plant Building sanitary facilities is discharged to the SPDES permitted system. In order to assess whether there may be any non-sanitary wastewaters, discharged to this system, an analytical sample of the wastewater was obtained from the concrete holding/distribution tank located immediately south of the leachfields on 14 September 1993. The sample was analyzed for TCL organics (plus toluic acid) and TAL inorganics (plus cyanide).

2.11 PRIVATE WELL MAIL SURVEY

A survey of private well usage in the vicinity of the site was performed in support of the human health risk assessment. The initial evaluation consisted of contacting local municipalities and public water systems to determine which residences may be on private or public water. Next, SMC developed a mailing list of property owners for approximately 165 properties within an approximate 0.5 mi radius of the site. A private well usage questionnaire developed by NYSDEC was then sent by SMC to each of the property owners. The questionnaires were returned to NYSDEC who tabulated the data and sent the results to SMC.

3. PHYSICAL CHARACTERISTICS OF STUDY AREA

3.1 SITE TOPOGRAPHY/SURFACE FEATURES

The SMC property encompasses an area of approximately 120 acres, of which about 20 acres in the western portion of the property were used for manufacturing and related operations. This area of the property (SMC site) was the main focus of the RI. The 20-acre area consists of the Main Plant Building, concrete foundations of removed buildings, parking areas, access roads, a closed landfill, and an active sanitary sewage leachfield. Two former inorganic settling basins (approximately 1.5 acres) and the closed inorganic sludge disposal area (approximately 4 acres) are located to the east of this 20-acre area (northeast and east of the landfill, respectively). A chain-link fence completely surrounds both the 20-acre site and the inorganic disposal areas to the east. Skaneateles Creek flows north bisecting the site. A site plan and topographic map is provided as Plate 1.

The Main Plant Building is located in the center of the 20-acre site at a mean elevation of 690 ft above MSL. The Main Plant Building is a 3-story brick and steel building, approximately 150 ft wide and 400 ft long. Immediately northeast of the Main Plant Building are several concrete pads that were the foundations of other operations buildings which were removed. The area has been built up with dry fill (concrete, bricks, wood, cinders, soil, etc.) and slopes gently to the north. A paved driveway, graveled areas, and grassy areas are present around the concrete pads in this portion of the site.

The area north of the Main Plant Building has also been filled and consists of paved and gravel parking areas, an access road, an entrance gate, and the sanitary sewage leachfield. A railroad spur formerly entered the site from Jordan Road and ran into the warehouse area of the Main Plant Building. North of the parking areas and the sanitary sewage leachfield the topography drops off 4-6 ft to a natural, low-lying, wooded wet area adjacent to Skaneateles Creek. Further north, opposite Skaneateles Creek, the topography rises steeply to an elevation of 698 ft above MSL.

South of the Main Plant Building the topography gently rises to the south. A gravel access road enters the site from Jordan Road at the south entrance gate. Much of the area immediately south of the building has also been filled with dry fill material and soil fill.

The landfill is situated southeast of the Main Plant Building and immediately east of Skaneateles Creek. The landfill is mounded 8-10 ft higher than the surrounding land surface and has a surface elevation of 708 ft above MSL. Access to the landfill and the eastern portion of the property is over a 150-ft long culvert which conveys Skaneateles Creek between the north end of the landfill and the Main Plant Building.

East of the landfill a grass field rises gently to the east. The former inorganic settling basins and inorganic sludge disposal areas are located in this portion of the property. South of the landfill the topography is relatively flat with an elevation of about 702 ft above MSL. This area consists of low-lying woods that extend to Skaneateles Creek. South of Skaneateles Creek the topography rises steeply 20-30 ft to an elevation of 730 ft above MSL.

Skaneateles Creek enters the site approximately 500 ft southeast of the landfill at an elevation of 700 ft above MSL. In the center of the site at the former rock dam, Skaneateles Creek flows over exposed limestone bedrock and falls 3-4 ft from an elevation of 696 ft above MSL and then flows through the culvert. The creek exits the site in the northwest corner of the property at an elevation of 675 ft above MSL.

3.2 NATURAL RESOURCES

The SMC property consists of 120 acres located in the Eastern Lake Plain forestry subregion of central New York State (Stout 1958). The different areas of the site include the former manufacturing area (west of Skaneateles Creek), the landfill area (east of Skaneateles Creek), Skaneateles Creek, the riparian area, and the upland area.

The former manufacturing area consists of approximately 15 acres located along the western boundary of the site between Jordan Road and Skaneateles Creek. This area includes the existing Main Plant Building, former building sites, parking areas, driveways, and lawn areas. The soil types in this area are of the Cazenovia Series (Cfb) or are Made Land (ML). The Cazenovia series is well suited for all but wetlands habitats. The lawn area consists of grasses with assorted ornamental shrubs and trees. The lawn area is used extensively by deer for grazing as was evidenced by the presence of deer droppings. Other species identified as using this area are raccoons, woodchucks, mice, rabbits, and skunks. Small bird species were also observed to use this area.

The landfill area consists of approximately 5 acres (landfill and adjacent areas) located on the east side of Skaneateles Creek opposite the former manufacturing area. The area is covered with grasses and an unimproved dirt road. This area is used by deer, woodchucks, raccoons, mice, and other small mammals.

3.2.1 Skaneateles Creek

The streambed of Skaneateles Creek is the only onsite area which supports a permanent aquatic community. This Creek drains Skaneateles Lake with a flow ranging from approximately 7-270 million gallons per day (MGD) and is part of the Oswego River watershed. This watershed combines the outflow of the Finger Lakes to the south and west and the outflow of Lake Oneida to the east into the Oswego River which flows into Lake Ontario at Oswego, New York. The drainage pattern from each of these lakes has been altered by diversion into several man-made waterways, including the Cayuga and Seneca Canal and the New York State Barge Canal prior to their confluence into the Oswego River. Skaneateles Creek is located upstream from the canal systems. The predominating natural influence over the aquatic community in the headwater sections of the stream, within which the SMC site is located, is the proximity of the Skaneateles Lake outfall.

Skaneateles Creek is characterized within the SMC site by a relatively low gradient course, dropping only 25 ft in elevation in transit, from an elevation of 700 ft above MSL to 675 ft above MSL. Over most of this distance, the streambed is narrow and is confined within steep to moderately steep banks which are well stabilized by riparian vegetation.

The streambed has been altered to the west of the landfill site where it has been channelized into a 150-ft length of culvert pipe which supports a roadbed between the Main Plant Building and the landfill.

Two low-flow barriers to upstream fish passage exist within the site's section of streambed. The culvert, described above, and a 3- to 4-ft natural drop over a limestone ledge located immediately upstream from the culvert, restrict the upstream migration of fishes during most streamflow conditions.

To the south and north of the developed portions of the site, the stream bank is well vegetated, providing a good to excellent variety of crown, bank, or instream cover. These portions of the creek are also typified by a variety of shallow to moderately sized pools intermixed with streambed riffles and channel runs. Instream collections of benthic macroinvertebrates, made during October 1991, yielded nymphs of mayflies, caddisflies, stoneflies, and dragonflies, as well as crayfish and waterpenny beetles. Concurrent collections of fishes yielded six species of widely distributed minnows typical of central New York streams (Table 3-1).

New York State's Natural Heritage Program has identified the fishes within New York State watersheds that receive legal protection under Environmental Conservation Law (Section 11-0535/Endangered and Threatened Species). None of the fish species collected onsite are listed in the New York Rare Animal Status List. Additionally, none of the fishes identified in the Natural Heritage Program listing as receiving legal protection under Section 11-0535 have been reported to occur within the Oswego River watershed.

3.2.2 Riparian Area

The riparian area is defined as the area adjacent to or on the banks of the creek, which includes the floodplain. At the SMC property, the riparian area consists of the banks of Skaneateles Creek and two separate floodplain areas located along Skaneateles Creek: one located north of the Main Plant Building, and the other located to the west and southwest of the landfill. The two riparian areas combined occupy approximately 6 acres. The area north of the Main Plant Building is primarily forested with limited areas of herbaceous wetland vegetation. The majority of this forested area consists of palustrine forested wetlands with the remainder being transitional forest between wetlands and uplands. The canopy in this area is dominated by small red maple and American elm ranging in height up to approximately 30 ft. Other tree species found in this area include willow (along the creek), alder, ash, apple, and oak. The understory is quite dense and is dominated by small maples and elms. Also present in the understory are numerous shrubs, including ash, birch, blackberry, hawthorn, dewberry, dogwood, grape, greenbrier, poison ivy, raspberry, spicebush, and willow. The area west and southwest of the landfill is primarily covered with herbaceous wetland vegetation with limited forested areas. Herbaceous species in this area include asters, cattail, clover, ferns, grasses, jewelweed, knotweed, nettle, plantain, rushes, sedges, smartweed, thistle, and violets. A wide variety of animal species are expected to use the riparian areas. Evidence was found onsite indicating the presence of deer, raccoon, woodchuck, opossum, rabbit, squirrel, chipmunk, and skunk. Deer were observed in the riparian area north and south of the site.

3.2.3 Upland Areas

The remainder of the property is comprised of upland areas. These areas consist of approximately 85 acres east and northeast of the landfill, and 9 acres southeast of the landfill. The majority of the area to the east consists of mowed fields or overgrown fields; the remainder consists of hedgerows. The mowed fields are similar in nature to the landfill area and are dominated by grasses. The overgrown fields are dominated by grasses and shrubs. The dominant species are blackberry, raspberry, dogwood, aster, clover, goldenrod, plantain, Queen Anne's lace, thistle, violet, dogwood, sumac, hawthorn, and rose. The hedgerows are dominated by maple, elm, ash, oak, raspberry, blackberry, dogwood, rose, grape, poison ivy, cherry, apple, and walnut. The ecotone between the cover of the hedgerow and the open fields provides excellent habitat for deer, raccoon, woodchuck, opossum, rabbit, squirrel, chipmunk, and skunk.

Bird species observed directly or indirectly onsite include: cardinal, catbird, bluebird, robin, sparrow, starling, thrush, woodpeckers, and hawks.

National Wetlands Inventory maps (U.S. Fish and Wildlife Service) indicate wetlands to be present in the riparian zone along Skaneateles Creek.

Currently, NYSDEC files do not identify the presence of any endangered, threatened, or special concern wildlife species, rare plant, animal, or natural community occurrences, or other significant habitats at this site (Buffington 1992).

The New York State Breeding Bird Atlas for the Skaneateles, Elbridge, and Sennett areas (Block 3776D) lists no threatened or endangered species within these areas. The Atlas lists 2 protected special-concern species, 55 protected species, 2 game species, and 3 unprotected species known or suspected to be breeding in the general area of the site.

An investigation of the areas surrounding the site revealed land cover patterns similar to those found on the site. The area immediately to the north and west of the site is mixed residential, commercial, and industrial. The areas to the east and south, as well as those areas west of the adjacent residential area, consist of farmed fields separated by forested hedgerows, pastures, overgrown fields, and forested areas.

3.3 SURFACE WATER HYDROLOGY

3.3.1 Surface Runoff/Stream Flow

The SMC site is located in the Skaneateles Creek drainage basin which drains north to the Seneca River. Skaneateles Creek enters the site from the south, meanders through the western portion of the property, and exits at the northwest corner. Skaneateles Creek originates as the outflow of Skaneateles Lake 3.2 mi to the south and discharges to the Seneca River approximately 3.5 mi north of the site.

Surface water runoff emanating from the site drains to Skaneateles Creek via sheet flow, natural drainage depressions, intermittent streams, and man-made ditches. Two intermittent

streams drain much of the eastern portion of the SMC property and enter Skaneateles Creek in the northeast portion of the site. A drainage ditch present along the eastern and southern perimeter of the landfill diverts surface water runoff around the landfill and discharges to Skaneateles Creek southwest of the landfill.

In the vicinity of the former manufacturing areas, surface water enters Skaneateles Creek through natural drainage depressions or as sheet flow. Some surface water runoff enters the Main Plant Building through a grate at the overhead door in the rear of the building and a grate near the plant's front entrance. This water, along with any seepage into the plant's basement, is fed to the onsite treatment system and, after treatment, is discharged to Skaneateles Creek via the SPDES permitted outfall. Stream flow in the vicinity of the SMC site is measured by the Syracuse Water Department at a weir located just to the north of the site. Stream flow in early May 1993 was reported to be approximately 270 MGD. Surface water discharge from Skaneateles Lake during early May 1993 was 250 MGD. In August 1993, stream flow at the weir was approximately 7 MGD, and surface water discharged from Skaneateles Lake was 4 MGD.

3.3.2 Influent/Effluent Stream Conditions

Skaneateles Creek can be both an effluent (gaining) and influent (losing) stream depending on stream flow, ground-water table conditions, and the segment of the stream. Gaining streams receive ground-water baseflow, and losing streams allow surface water to infiltrate into the ground-water system.

Data obtained during the RI indicates that during times of extremely high stream flow (spring of the year), surface water seepage from Skaneateles Creek enters the ground-water system from a segment of the creek south of the landfill. It appears that a primary source of ground-water recharge during these events is an area of stream bed approximately 1,000 ft south of the site and east of Marysville. In this area, Skaneateles Creek flows over exposed limestone bedrock.

Both gaining and losing conditions exist in the segment of Skaneateles Creek on the SMC site west of the landfill and south of the former rock dam. During the spring when shallow water table conditions are high due to precipitation and surface water runoff from snow melt, seeps emanate from the creek bed providing ground-water baseflow to Skaneateles Creek. During dry periods of the year (late summer) when shallow water table conditions are at their lowest, losing conditions appear to exist in this segment of Skaneateles Creek. However, infiltration rates through the fine-grained substrate are expected to be slow. Shallow water table elevations during late summer and fall are lower than the elevation of Skaneateles Creek. This condition allows shallow ground water to flow beneath the creek with only minimal influence from the stream.

The segment of Skaneateles Creek north of the dam and culvert appears to act as a hydraulic barrier to lateral movement of ground water in the shallow overburden ground-water system. Shallow water table elevations in this portion of the site are at or above the elevation of Skaneateles Creek during both dry and wet times of the year. This condition restricts the migration of shallow ground-water flow past the creek to the north.

3.4 LOCAL GEOLOGY

3.4.1 Description of Underlying Formations

The study area is located almost entirely in the Onondaga Limestone outcrop area of the Appalachian Upland Border Scarp zone (Section 1.2.3). A small portion of the site property east of the inorganic sludge disposal area is underlain by the Union Spring member of the Marcellus Formation. A bedrock geologic map of the site area is provided as Figure 3-1.

Based on rock cores from the site, the Onondaga Limestone is characterized as gray to dark gray, massive, compact, and chert-bearing in its upper part and tends to be crystalline and faintly bedded in its lower layers. Dark gray to black shaley phases were also observed within the Onondaga Limestone. The chert nodules were black to gray in color and tended to be arranged in bands. They were irregular in shape and ranged in thickness from 4 to 8 in. Towards its base, the limestone was observed to be transitional from a thin quartz sandstone, which Smith (1935) called the "reworked Oriskany." At the site, sandy limestone with irregular inclusions of dark gray limestone was observed at the base of the Onondaga Limestone.

Based on the rock cores obtained during well installation at the site, the Onondaga Limestone ranged in thickness from 20 ft along the northern boundary of the site (MW-11D) to 80 ft along the southern property boundary (MW-15D). Below the Onondaga Limestone is the Oriskany Sandstone which was white to yellowish in color and ranged in thickness from 7 to 15 ft across the site.

The Oriskany Sandstone is underlain by the Manlius Formation. The Manlius Formation generally consisted of dark gray, fine-grained limestone with areas of olive gray and tan dolostone. Rock cores extend into the Manlius Formation in the northern half of the site. The Oriskany Sandstone and Manlius Formation are exposed at an outcrop located a short distance (0.35 mi) north of the site property along Jordan Road, just north of the intersection of Stump Road (Figure 3-1). The Manlius strata are also exposed along Skaneateles Creek northeast of the site.

The bedrock of the Union Springs member of the Marcellus Formation, which overlies the Onondaga Limestone in the southeastern portion of the site property, is characterized by interbedded, black, sooty shale and black to gray limestone (Yare 1980). The limestone beds become more prominent in the lower part of the section (Smith 1935). The Union Springs bedrock is important because it marks the start of a greater than 1,000-ft thick sequence of interbedded shale and siltstone exposed in the Appalachian Uplands south of the site.

3.4.2 Bedrock Structure

Due to the gentle southerly dip of the bedrock strata and erosional forces during glaciation, the bedrock surface across the site is arranged in a series of step-like terraces in a north-south direction.

A north-south geologic cross-section across the site is provided as Figure 3-2. In the central portion of the site, at the northern edge of the landfill, bedrock is at or near ground surface at an elevation of about 695 ft above MSL. From this location, bedrock slopes toward both the north and south to a low of 665 ft above MSL (800 ft to the north) and 660 ft above MSL (800 ft to the south). A short distance north and south of Skaneateles Creek, bedrock again rises to an elevation of 680 ft and 690 ft above MSL, respectively. Both bedrock lows are located below the meandering channel of Skaneateles Creek and are oriented in an east-to-west direction.

The bedrock surface rises gently from an elevation of 695 ft above MSL at the north end of the landfill to about 700 ft above MSL 400 ft to the east. In a westerly direction from the north end of the landfill, the bedrock surface slopes downward to an elevation of 665 ft above MSL at MW-16D, located about 900 ft to the west. An east-west geologic cross-section is provided as Figure 3-3.

A seismic refraction survey was performed over the study area to aid in interpreting the features of the bedrock surface. The seismic refraction data, in conjunction with geologic data obtained from the Phase I and Phase II test borings, well borings, and rock coring, were used to develop a bedrock surface contour map of the study area (Figure 3-4).

A few feet of Onondaga Limestone are exposed onsite at the former dam in the west central portion of the 20-acre site (Figure 3-1). Skaneateles Creek flows over exposed limestone and falls 3-4 ft. The rock has an east-west strike with a gentle southerly dip (<0.5 degrees). The limestone contains chert nodules and is blocky. About 0.5 mi to the south and slightly east, the Onondaga Limestone is again exposed on Skaneateles Creek at the meander east of Marysville (Figure 3-1). At this location, Skaneateles Creek flows over exposed limestone beds and drops about 10-15 ft over a distance of approximately 150 ft. Manmade outcrops are also present on both the east and west side of the creek. On the east side, an old mill race was dug into the limestone exposing about 15-20 ft of chert-bearing limestone. An old quarry is present on the west side of the creek, however, this outcrop is difficult to see because the area is very overgrown. In the southern portion of the mill race, on the east side of the creek, the strata have a gentle southerly dip (<0.5 degrees); however, towards the northern end, the strata take a sudden northward dip. The dip was measured at the extreme north end of the raceway to be approximately 20 degrees.

Two strongly developed sets of joints are found across central New York, one striking north-south; the other oriented nearly east-west (DeGroff 1954). The joints are believed to be related to marginal effects of the forces from the different Appalachian Orogenes. The joints are nearly vertical, dipping between 80-90 degrees. DeGroff (1954) noted that some joints in the limestone are 50-75 ft deep and are exposed over horizontal distances of up to 250 ft.

DeGroff (1954) mapped joint sets at one location near the site, an abandoned quarry approximately 0.4 mi north of the site. East-west oriented joints were also observed by EA at the outcrop along Skaneateles Creek south of the site.

3.4.3 Bedrock Composition

Limestone underlying the site was generally of fair to good rock quality (rock quality designations [RQDs] of 75-90 percent). RQDs from rock cores throughout the site ranged from 20 to 98 percent. The lowest RQDs (rock of poor quality; 25-50 percent) were typically obtained from the upper 10 ft of bedrock. At many of the monitoring well locations, bedrock of excellent quality (RQDs of greater than 90 percent) were obtained from 5- to 10-ft intervals, usually between 25-40 ft into bedrock. Intervals of excellent quality rock were also present at depths greater than 50 ft into bedrock at some locations.

The limestone contained fractures throughout the 60-85 ft of rock cored at each of the deep monitoring well locations. The majority of the fractures were horizontal (parallel to bedding). Fractures with dips ranging from 30 to 90 degrees were present and observed less frequently. Many of the fractures, especially in the upper rock, were filled with silt and clay. Areas of rust-colored oxidation and secondary calcite deposits were present on many of the fracture surfaces throughout the cored interval.

3.4.4 Unconsolidated Deposits

The unconsolidated deposits overlying bedrock at the site consist of unstratified glacial deposits (Pleistocene) and recent aged alluvial deposits. Thickness of the unconsolidated material ranged from less than 2 ft to as much as 40 ft.

Two types of glacial deposits were present at the site. Over most of the site area, a red clay till was present consisting of a sticky reddish clay with no visible stratification, little angular gravel, and little to no sand. Boulders, when present, were small and usually few in number. The red clay till was relatively thin, generally not greater than 10 ft thick. At areas of the site where the overburden was fairly thick (greater than 10 ft), a brown till consisting of a poorly sorted mixture of clay, silt, sand, gravel, and boulders was encountered. The material was medium-dense to dense and had a fairly high sand content. The brown till deposit was present below the southern portion of the landfill and the areas immediately to the south and southwest of the landfill. A brown till was also present along the southern property boundary (MW-15D) and offsite to the west (MW-16D).

A layer of coarse sand, angular gravel, and cobbles was present directly overlying bedrock at a few locations in the study area (MW-11I, MW-21I, and MW-71I). These monitoring wells are located south, southwest, and west of the landfill and appear to be associated with the bedrock surface low in this portion of the site. This coarse material, when present, ranged in thickness from 4 to 7 ft.

Alluvial deposits consisting of silt, silty clay, and silty sand were present locally in the flood plain of Skaneateles Creek. These deposits were relatively thin (2- to 6-ft thick) and restricted to the low-lying areas adjacent to Skaneateles Creek at two locations of the site. One was located north of the Main Plant Building and the other was located immediately west and southwest of the onsite landfill.

3.4.5 Summary of Local Geology

The following is a summary of geologic conditions at the SMC site based on the analysis of the available data:

- Unconsolidated deposits overlying bedrock over much of the site consist of unstratified glacial deposits (till) ranging from 2 ft to as much as 40 ft.
- A 4- to 7-ft thick layer of coarse sediment was present directly overlying bedrock at a few well locations at the site. These locations are generally south and west of the landfill.
- The entire site is underlain by Onondaga Limestone which is characterized as gray to dark gray, massive to medium bedded, and hard. The limestone is fractured and has a gentle southerly stratal dip (0.5 degrees) across the site.
- Approximately 1,000 ft south of the SMC property and east of Marysville, dip reversal of the strata was observed at an outcrop (approximately 20 degrees north).
- Two strongly developed sets of joints, one striking north-south, the other oriented nearly east-west, were identified in the study area.
- The Onondaga Limestone surface is at or near ground surface in the center of the 20-acre site (at former rock dam) and slopes downward towards both the south and north. Bedrock lows are aligned in an east-west direction and located approximately 800 ft to the north and south of the former rock dam.

3.5 LOCAL HYDROGEOLOGY

3.5.1 Aquifer Characteristics

The principal aquifer in the SMC site area is the Silurian-Devonian Carbonate Unit consisting of dolostones and limestones of the Cobleskill, Chrysler, Manlius, and Onondaga formations. The site is located in the Onondaga Limestone outcrop area of the Appalachian Upland Border Scarp zone where limestone bedrock is at or near ground surface and ground-water recharge dominates.

There is no evidence of cavernous conditions within the carbonate bedrock in the site area. All voids encountered during bedrock drilling, indicated by an immediate drop in the drill stem, ranged from approximately 3 to 6 in. Silt and clay fill fractures ranged only from 0.5 to 1.0 in. However, the hydraulic properties of the unit indicated that a network of enlarged openings does exist beneath the site.

The following hydrogeologic conditions observed during the RI indicate that the carbonate unit underlying the SMC site exhibits characteristics of an aquifer with enlarged secondary openings:

- The actual phreatic zone (deep ground water) is under unconfined water table conditions at considerable depth indicative of highly permeable bedrock at depths.
- The phreatic zone is variable across the site suggesting that enlarged openings may be discontinuous locally.
- A 24- to 48-ft zone of non-water yielding, inactive bedrock separates an intermediate water-bearing zone from the deeper phreatic zone. It is common in carbonate rock with enlarged openings for water descending through the vadose zone to become stratigraphically perched in the bedrock.
- The phreatic zone water level elevation fluctuates as much as 80 ft as a result of temporal variations in recharge rates. The fluctuations in water level elevation correlate directly with fluctuations in stream flow in Skaneateles Creek, indicating seepage from surface water through enlarged openings in the bedrock.
- Phreatic zone water levels have been shown to react quickly across the site to changes in recharge rates (stream flow) indicating abnormally high ground-water velocities within the carbonate unit which is indicative of water movement through enlarged openings.

3.5.2 Ground-Water Zones

During the RI, three zones of ground water were identified underlying the site. A shallow ground-water zone was present in the unconsolidated glacial deposits at depths ranging from 4 to 18 ft, an intermediate water-yielding rock zone was present generally in the upper 10-20 ft of bedrock immediately beneath the overburden, and a deep ground-water zone (phreatic zone) was on the average 75 ft below ground surface during most times of the year.

3.5.3 Shallow Zone Ground-Water Flow

Shallow ground-water movement in the unconsolidated sediments is through the primary openings of the materials (interstices) developed during deposition and is controlled by the hydraulic gradient (both horizontal and vertical). The shallow ground water at the SMC site is mounded in the onsite landfill and moves laterally away from the landfill. The primary flow is westerly and southerly towards Skaneateles Creek and areas of lower topography. Horizontal movement of shallow ground water to the north of the landfill is restricted by a thin layer of fine grained overburden (approximately 2 ft), which overlies bedrock immediately north of landfill. A leachate collection system installed at the northeast corner of the landfill diverts some of the flow in this direction to the onsite leachate treatment

system located in the Main Plant Building. East of the landfill lateral movement of shallow ground water is also restricted by low hydraulic gradients due to the slightly higher topography and a red clay deposit overlying bedrock present in this portion of the site.

In the northern portion of the site, north and northeast of the Main Plant Building, shallow ground-water movement through the unconsolidated sediment is in a northerly direction towards Skaneateles Creek.

The horizontal hydraulic gradients in the overburden are influenced by both the topography and the surface water drainage. The configuration of the potentiometric surfaces is also affected by temporal changes in recharge and discharge rates. The potentiometric surfaces of the overburden ground water in May and June 1993 are shown in Figures 3-5 and 3-6, respectively.

Shallow overburden ground water was not present at all locations in the study area; along the northern (MW-10 and MW-11) and southern (MW-15 and MW-17) property boundaries, shallow ground water was not encountered. At each of these locations either clay or silty clay deposits directly overlie bedrock. At other locations at the site, a few of the overburden monitoring wells went dry (MW-1S, MW-14S, and EAP-1S) during dry periods of the year.

3.5.4 Upper Bedrock Ground-Water Flow

The intermediate water-yielding zone in the upper bedrock was not present at all locations across the study areas. Along the northern property boundary at well locations MW-10I and MW-11I, the upper water-yielding rock was encountered 20-25 ft into rock. Water was not present in these wells during dry periods of the year (August-October 1993). An intermediate water-yielding zone was not encountered in September 1993 at MW-15I and MW-17I located along the southern property boundary. These wells were drilled 27 ft and 30 ft into bedrock, respectively, and completed as open-hole wells.

Once in bedrock, most of the ground-water movement is through secondary openings (bedding, fractures, joints, etc.). In carbonate bedrock, the volume and velocity of ground-water flow through the enlarged openings is greater than the flow through unenlarged fractures, partings, and intergranular pore spaces. In aquifers with enlarged openings, the geologic setting (bedrock structure) strongly influences the subsurface water flow paths. There are also major differences in how water moves through the vadose and phreatic zones.

As water flows through the vadose zone its movement is controlled by gravitational forces. In medium bedded fractured bedrock, which is present at the SMC site, water descends through existing passages present in the rock (i.e., bedding, fractures, joints, etc.). These passages are commonly found along bedding planes and are not steeply inclined, thus the water tends to flow laterally as it descends to the phreatic water table. Studies have shown that the geologic setting (structure) strongly influences the enlarged openings produced by water flow through the vadose zone. These openings, even in well fractured rocks, tend to follow the direction of the dip of the strata (Palmer 1986). The bedrock underlying the site

has a gentle southerly dip (20-50 ft/mi). Therefore, as water migrates through the vadose zone of the bedrock, it is expected to be in a southerly direction with some deviation in the direction of the strike (east-west).

Stratigraphic perching of the water as it descends through the vadose zone is common. Most of the bedrock remains non-water yielding, except locally where it is breached by vadose percolation. In areas where stratigraphic perching occurs and the bedrock has a gentle dip, as is the case at the SMC site, the perched water can migrate laterally before reaching the phreatic water table. In the site area stratigraphically perched water does not appear to extend great distances to the north, south, and east. Much of the perching appears to occur in the vicinity of the 20-acre site and west of the SMC property at least as far as MW-16I. As discussed previously in the geologic section of this report, dip reversal has occurred south of the site. It is likely that vertical openings through the vadose zone to the phreatic zone would be enhanced in this area. Movement of water in the vadose zone is not likely to migrate south past this area.

In the vicinity of the Main Plant Building and the onsite landfill, an intermediate water-yielding bedrock zone is present in the upper 10-20 ft of bedrock directly beneath the overburden. Beneath this intermediate zone is 24-48 ft of non-water yielding bedrock separating it from the deeper phreatic zone, which is under unconfined water table conditions. This indicates that the intermediate water-yielding zone is perched within the vadose zone. Figures 3-7 and 3-8 show the potentiometric surface of the upper bedrock ground-water zone May and June 1993, respectively. Comparison of shallow overburden water table contour maps (Figures 3-5 and 3-6) and the intermediate zone potentiometric contour maps show a similar configuration, mounding beneath the onsite landfill and lower potentiometric level laterally away from the landfill. Temporal variations in recharge and discharge rates can also be seen in the configuration in the potentiometric surface contour maps for the different months.

Comparison of shallow monitoring well water levels with their intermediate cluster companion well data indicates a general downward vertical gradient over much of the study area. Full rounds of shallow and intermediate monitoring well water level data were collected in May, June, and December 1992 during the Phase I field program and on a monthly basis from 3 May through 23 September 1993 during the Phase II field program. The water level data are provided in Tables 3-2 through 3-5.

3.5.5 Deep Zone Ground-Water Flow

In the 20-acre site area, recharge rates of the phreatic zone directly correlate with temporal variations of stream flow in Skaneateles Creek. Continuous water level measurements were recorded in 4 deep monitoring wells (MW-1D, MW-4D, MW-5D, and MW-11D) aligned in a northerly direction across the site over a 3-month period (3 May to 20 July 1993). Graphs showing water level elevations and stream flow in Skaneateles Creek over the 3-month period are provided in Figures 3-9 through 3-12. Skaneateles Creek stream flow data were obtained from the Syracuse Water Department which records measurements of stream flow at a weir 0.35 mi north of the site.

In early May, stream flow rates were at a maximum due to a high volume of surface water being released from the Skaneateles Lake. Water level elevations within the phreatic zone at the site were also at their highest levels. In late May and early June as stream flow quickly declined, water levels across the site also decreased rapidly. During this time period there were short intervals where discharge from the lake and stream flow increased. Subtle fluctuations in water levels also occurred in the deep monitoring wells at the site.

Throughout July, a minimum volume of surface water was discharged from Skaneateles Lake. During this time, the water level elevations in the phreatic zone showed a slow continuous decline.

Water levels in all of the wells reacted rapidly to charges in stream flow in a nearly identical fashion. MW-1D located south of the landfill showed the largest change in water level elevation (62 ft) and largest reaction to subtle changes in stream flow during the 3-month period. MW-11D located along the northern site boundary had the smallest change in water level elevations (50 ft) and reacted slower to changes in stream flow. This indicates that the primary source of ground-water recharge is closest to MW-1D and is likely located south of the site and MW-1D. The most probable recharge area is located at the outcrop area east of Marysville where Skaneateles Creek flows over exposed bedrock and a dip reversal of the bedrock strata is present. A portion of the streambed (approximately 150 ft) at this location has been filled with concrete. This area of the creek bed was filled with concrete in the late 1960s by the City of Syracuse to fill cracks in the rock which allowed surface water seepage into bedrock and caused significant loss of stream flow in Skaneateles Creek (SWD 1993).

Water flow in the phreatic zone tends to follow paths of greatest hydraulic efficiencies from the vadose feeders (recharge areas) to low hydraulic potential valley outlets. Studies have shown that phreatic enlarged openings tend to be aligned roughly along the strike of the bedrock because it offers the shallowest pathways without cutting across the strata. However, up-dip phreatic flow does occur in highly fractured rock that has been subjected to continental glaciation, where stresses have widened existing fractures and joints (Palmer 1986).

Based on hydrogeologic data from the study area, the recharge areas for the phreatic zone are present south of the landfill. The areas of lower hydraulic potential are located to the north of the site where carbonate bedrock is exposed at lower topographic elevations along stream valleys. The bedrock beneath the site is fractured at depth and joints have been identified in the site area. This information along with water level data from the phreatic zone, which shows a general northerly horizontal gradient across the site, suggests that deep ground water migrates in a northerly direction. The potentiometric surface of the deep bedrock for May 1993 is shown in Figure 3-13. In May 1993, during a period of high phreatic zone recharge, the hydraulic gradient was 0.006 ft/ft to the north. In June 1993, phreatic zone water levels were nearly flat across the site. The configuration of the potentiometric surface is greatly affected by changes in recharge rates, showing fluctuations of as much as 80 ft at some locations. The lowest phreatic zone water table elevation at the SMC site observed during the RI field program was approximately 610 ft above MSL (MW-13D, 23 September

1993). This occurred at the end of an unusually dry spring and summer, and is likely near the base ground-water table elevation. Deep water level data collected during both the Phase I and Phase II field programs are provided in Tables 3-6 and 3-7.

3.5.6 Summary of Local Hydrogeology

Based on the analysis of available data, there are three distinct zones of ground water at the SMC site, a shallow zone present in the overburden, an intermediate zone in the upper bedrock, and the phreatic ground-water zone present deeper into bedrock.

Lateral migration of water through the overburden is through primary openings in the geologic material and controlled by horizontal hydraulic gradients across the site. These gradients are influenced by both topography and surface water drainage.

A general downward vertical hydraulic gradient between the overburden and upper bedrock persists across most of the site. Hydraulic communication between overlying unconsolidated sediment and the upper bedrock exists via bedding, fractures, and/or joints in the upper rock. Water movement through bedrock to the phreatic zone is inferred to be vadose flow in enlarged secondary openings. This flow is controlled by gravity and the geologic setting. Water descends as vertically as possible following existing paths in the rock such as joints, bedding, and/or fractures. Lateral movement in vadose flow through the bedrock is controlled by the southerly dip of the strata.

Horizontal flow is the primary flow component functioning in the phreatic zone. Hydraulic gradients are normally low due to the efficiency of enlarged openings to transmit ground water. Regionally, phreatic ground-water flow in the site area is expected to be in a northerly direction. However, bedrock structure may influence migration pathways locally and cause them to deviate along the strike (east-west).

Buildup of hydraulic head in the phreatic zone during times of rapid recharge may also create different ground-water flow systems. During Spring 1993, when high volumes of surface water were released from Skaneateles Lake, stream flow in Skaneateles Creek in early May 1993 was 269 MGD. Surface water entered the underground enlarged openings very rapidly filling the phreatic openings and raising the water table into normally dry openings of the bedrock. This water then either moved along alternate routes through these water-filled passages or was temporally held in the unenlarged openings as storage and released back into the main openings as the water levels receded.

Recharge to the site ground-water system is supplied by local precipitation and from seepage of surface water from Skaneateles Creek. Temporal variations of ground-water recharge are significant and are chiefly governed by stream flow in Skaneateles Creek which is controlled by release of surface water from Skaneateles Lake.

3.6 LANDFILL

The onsite landfill is located southeast of the Main Plant Building and immediately east of Skaneateles Creek. It is approximately 3 acres in size and covered by a 3-ft clay cap.

3.6.1 Landfill Surface Features

The landfill surface is grass covered and relatively flat. The north, west, and south sides of the landfill slope gently 6-10 ft to the low-lying land surrounding it. The topography gently rises to the east. A 2- to 3-ft swale borders the landfill along its eastern perimeter. The swale is relatively flat; and during time of surface water runoff from precipitation events and/or snow melt, standing water is present. A drainage ditch originating along the southeastern perimeter of the landfill extends to the southwest perimeter. The drainage ditch along the southeast perimeter of the landfill is nearly flat; during times of surface water runoff, standing water is present in the ditch along the southeast perimeter and is ponded in a small area off the southeast corner of the landfill. The grass on the landfill and the fields to the north and east are regularly mowed and well maintained. A row of trees borders the western landfill perimeter and separates it from the natural, low-lying, narrow flood plain bounding Skaneateles Creek. A wooded area is present south of the landfill.

3.6.2 Landfill Waste Description

As part of site characterization during the RI, a magnetometer survey, test pit excavation, test borings, and piezometer installation activities were performed at the onsite landfill. The following discussion is based on field observations and the findings of these activities.

The waste material within the landfill ranged from 5 to 12 ft in thickness (8 ft on average). The approximate 3-acre landfill contained an estimated quantity of 38,700 yd³ of solid waste. The waste material consisted of a mixture of numerous crushed metal and fiber drums, debris (wood, scrap metal, brick, concrete, etc.), general waste (plastic, paper, glass), manufacturing waste, and soil fill. The magnetometer survey indicated that large amounts of ferrous metals were present throughout much of the landfill.

3.6.3 Geology

The landfill is located in an area of the site where limestone bedrock is at or near ground surface and slopes off in a southerly direction. Depth to bedrock ranged from 2 ft near the northern perimeter of landfill to 25 ft at the southern perimeter. A north-south geologic cross-section across the landfill is shown in Figure 3-14. Fill material in the northern portion directly overlies bedrock. In the southern portion of the landfill, approximately 15 ft of natural unconsolidated deposits (glacial till) were present beneath fill material overlying bedrock. A reddish-brown to maroon color clay layer is present below the fill material in the 6 test borings located in the southern half of the landfill. The clay layer was 1 ft thick at SMC-SB24; 2 ft thick at SMC-SB16, SMC-SB17, SMC-SB20, and SMC-SB21; and 6 ft thick at SMC-SB23 (Figure 2-3). Beneath the clay deposit is a brown till consisting of an unsorted mixture of silt, sand and gravel, with occasional boulders.

3.6.4 Hydrogeology

Shallow ground water is mounded within the fill material of the landfill at a depth of approximately 4 ft below ground surface. The water table is present immediately below the clay and soil cap at most locations, therefore, nearly the entire thickness of the waste

material (on average 8 ft) in the approximate 3-acre landfill is below the water table. Assuming a 33 percent porosity for the fill material, an estimated quantity of 2.6 million gal of water is present within the landfill.

Lateral flow of the shallow ground water through the unconsolidated sediments is primarily in a westerly and southerly direction. Only a small component of the ground water will flow laterally to the north and east. A collection sump installed at the northeast corner of the landfill intercepts some of the flow in this direction. A general downward vertical hydraulic gradient between the overburden and upper bedrock persists in the areas of the landfill.

Based on the available data hydraulic communication between the unconsolidated materials and the upper bedrock is inferred to exist through the bedding, fractures, and/or joints present in the bedrock.

The shallow water table within the landfill fluctuates about 1-2 ft throughout the year in response to temporal variation to recharge and discharge rates. This change is much less than the changes in the shallow water table in other parts of the site that fluctuate as much as 10 ft at some locations. The fact that the shallow water table within the landfill does not fluctuate significantly throughout the year suggests that both horizontal and vertical flow rates of the shallow ground water are low due to the fine-grained deposits present beneath and surrounding the landfill. However, the high hydraulic head due to the mounding of water within the landfill does provide a constant source of water to the ground-water system.

Recharge to the shallow water table is supplied by local precipitation. Based on the available data, it appears that the primary source of recharge to the shallow water table within the landfill is from infiltration of surface water from the swale to the east, the drainage ditch along the southeast perimeter, and the ponded area off the southeast corner of the landfill. During the spring when both precipitation and surface water runoff from snow melt are high, seeps were observed emanating along the banks of Skaneateles Creek adjacent to the landfill. The seeps appear when the shallow water table intersects the creek elevation. During periods of the year when precipitation is low, the shallow water table elevations indicate that the shallow ground-water flow can bypass the creek to the west with only a minimal influence from the stream.

Based on analysis of the available data, shallow ground water beneath the landfill will primarily move laterally to the south and west. The shallow ground-water flow through the unconsolidated sediments is controlled by both the topography and slope of the underlying bedrock surface. The bedrock surface in this portion of the site slopes to the south. Shallow ground water has a downward vertical gradient in the vicinity of the landfill. Once shallow ground water enters bedrock, its movement through the bedrock vadose zone is controlled by gravity and the structure of the bedrock, and it will move laterally in a southerly direction until it reaches the deeper phreatic zone. At the site, water movement through the bedrock vadose zone is chiefly controlled by the southerly dip of the underlying strata and will move independent of the phreatic ground-water flow. At the site, vadose feeders to the phreatic zone are believed to be located south of the landfill. The mostly likely location is in the area of the bedrock low (Figure 3-4) where the phreatic water table is closest to the bedrock

surface. At this location, it is possible that the stratigraphic perching layer has been eroded away or there are more vertical openings present. The bedrock low at the site is aligned in an east-west direction approximately 400 ft south of the landfill. After reaching the phreatic zone south of the landfill, regional ground-water flow is in a northerly direction towards lower topographic elevations where carbonate bedrock is exposed along stream valleys (Figure 3-1).

Horizontal flow is the primary flow component in the phreatic zone. Hydraulic gradients in the phreatic zone at the site are normally low (17 June 1993, 0.0025 ft/ft) due to the efficiency of enlarged openings to transmit water. However, in the spring of the year when recharge to the ground-water system is high due to surface water seepage from Skaneateles Creek south of the site, the hydraulic gradients are higher (3 May 1993, 0.0075 ft/ft) beneath the landfill.

3.7 COMPARISON TO PRIOR HYDROGEOLOGICAL INVESTIGATIONS

A hydrogeological study was performed in 1986 (SCC 1986) which included the installation of piezometers on the perimeter of the landfill. This study was performed to evaluate the need for a leachate collection system which was subsequently installed at the site. The information obtained from this study was used to aid in the development of the original Work Plan for the RI (BBL 1990).

Based on additional hydrogeologic data obtained during the RI field programs, the following subsurface conditions were observed at the onsite landfill which differed from the findings of the 1986 site investigation report (SCC 1986):

- The north-south interpreted cross-section along the western perimeter of the landfill provided in the 1986 site investigation report indicated that a bedrock low exists in the approximate center of the landfill. Based on additional information obtained from rock cores, test borings, well borings, and a seismic refraction survey during the RI field programs, it was determined that bedrock continues to slope downward beneath the landfill to the south. The 1986 borings, which indicated that a bedrock high existed along the southern end of the landfill, were terminated within a till deposit (boulder) which was incorrectly interpreted as bedrock.
- The 1986 site investigation indicated that shallow ground-water flow in the vicinity of the landfill was in a northwesterly direction. Based on additional water level data from piezometers and monitoring wells installed during the RI field programs in the vicinity of the landfill, it is now believed that shallow ground water is mounded within the landfill and a portion of shallow ground-water flow through the unconsolidated sediments is also in a north, west, and south direction.

3.8 AREA NORTH OF THE MAIN PLANT BUILDING

The area north of the Main Plant Building is approximately 5 acres in size and is bounded by Skaneateles Creek to the east, a low-lying wooded area and Skaneateles Creek to the north, and Jordan Road to the west. Included in this portion of the site are the former Organics Plant area located northeast of the Main Plant Building and the sanitary sewage leachfield to the north of the plant.

3.8.1 Surface Features

The area north of the Main Plant Building consists of concrete pads, paved and gravel parking areas, grassy areas, an access road, an entrance gate, and the sanitary sewage leachfield. A railroad spur formerly entered the site from Jordan Road and ran into the warehouse portion of the Main Plant Building. The former Organics Plant was located in the area northeast of the Main Plant Building.

The area has a gentle downward northerly slope towards Skaneateles Creek. The area in the vicinity of the facility has been built up with dry fill (e.g., concrete, bricks, wood, cinders, etc.). North of the parking areas and the sanitary sewage leachfield the topography drops off 4-6 ft to a natural, low-lying, wooded wet area adjacent to Skaneateles Creek. Further north opposite the creek the topography rises steeply about 16 ft.

3.8.2 Hydrogeology

The area north of the Main Plant Building is underlain by 4-10 ft of mixed dry fill which overlie natural alluvial deposits consisting of silts, silty sands, and sandy gravel. In some areas, a red-brown clayey till or an unsorted till deposit underlies the mixed fill and/or the alluvial deposits.

Depth to limestone bedrock ranges from 7 to 19 ft across this area. The bedrock surface slopes in a northerly direction to a low of approximately 670 ft above MSL beneath the Skaneateles Creek bed, then rises steeply to approximately 685 ft above MSL opposite (north) Skaneateles Creek at the northern property boundary. North-south cross-section A-A' (Figure 3-2) bisects this area of the site. A contour map of the bedrock surface is provided as Figure 3-4.

The shallow water table is present at a depth of 4-6 ft below ground surface. Shallow ground-water flow through the unconsolidated sediment is in a northerly direction and is controlled by both the topography and surface water drainage. Based on the available information, the shallow water table elevations in this portion of the site are at or above the elevation of Skaneateles Creek during most times of the year. This condition will restrict the movement of shallow ground water to the north and northeast past Skaneateles Creek.

A perched intermediate ground-water zone is also present in the upper 10-20 ft of bedrock directly beneath the overburden. Water level data from the wells indicate that a downward

vertical gradient exists between the overburden and upper bedrock across this portion of the site. Deep bedrock ground water is separated from the shallow and intermediate ground water by approximately 30 ft of non-water yielding bedrock.

Once shallow ground water enters bedrock, its movement through the bedrock vadose zone, as it descends to the phreatic zone, is chiefly controlled by gravity and the structure of the bedrock. Shallow ground-water flow in bedrock will be in a southerly direction controlled by the stratal dip. Ground-water flow through the bedrock vadose zone is independent of the phreatic ground-water flow.

Based on the available information, vadose feeders to the phreatic zone are believed to be located south of the landfill. After reaching the phreatic zone, ground-water flow is in a northerly direction towards lower topographic elevations where the carbonate unit is exposed along stream valleys.

3.9 MAIN PLANT BUILDING AND BASEMENT SEEPS

The Main Plant Building is a 3-story brick and steel building, approximately 150-ft wide and 400-ft long located along Jordan Road in the western portion of the site. The landfill is located approximately 200 ft southeast of the plant and opposite (east of) Skaneateles Creek. The former Organics Plant area is located in the area immediately northeast of the Main Plant Building.

3.9.1 Building Features

The basement of the Main Plant Building has two levels, a higher level beneath the southern one-third of the building and a lower level (approximately 6 ft lower in elevation) beneath the northern two-thirds (warehouse area). Dark-colored water seeps into the basement at several locations and is collected in the building's drainage system. This water is treated in an onsite system and discharged via a New York SPDES outfall.

The main basement seep is located adjacent to a drain pipe in the basement of the warehouse portion of the building. The dark-colored water at this location is currently collected in a sump installed at this location to keep dark-colored water from entering the adjacent drain pipe. Another area of seepage into the basement is along the south wall of the building. Several seeps emanate from the wall at elevations above the basement floor and flow into drains within the basement. This water is also treated in an onsite system.

3.9.2 Geology

During the RI field program, a piezometer couplet (EAP-2S and EAP-2I) was installed immediately east of the warehouse portion of the building in line with the main basement seep location. A well cluster (MW-6S, MW-6I, and MW-6D) was also installed off the southeast corner of the Main Plant Building (Plate 2).

The overburden at EAP-2S consisted of 4-6 ft of filled soils overlying a brown, silty, gravelly sand. Limestone bedrock was encountered at 9 ft below ground surface. At MW-6S, the overburden consisted of 7 ft of fill soil and dry fill material which were underlain by about 3 ft of silty gravelly sand. Limestone bedrock was encountered at 10.5 ft below ground surface at this location.

The available geologic information indicates that the basement floor beneath both the southern end of the building and the area of the seep beneath the warehouse portion of the building are on or near the bedrock surface.

3.9.3 Hydrogeology

The shallow water table at EAP-2S was on average approximately 4 ft below ground surface (Tables 3-2 and 3-3). The level of the basement seep present below the warehouse is at a lower elevation than the shallow water table measured in EAP-2S. Water is periodically pumped from the seep which creates a depressed shallow water table providing a shallow ground-water discharge point for the overburden ground water and possibly the upper bedrock ground water. It appears, based on the available information, that shallow ground water from the area northeast of the building can be the source of the basement seep observed at this location.

The areas of water seepage into the basement in the southern end of the building are located along the walls of the foundation above the elevation of the floor and, therefore, the bedrock surface. It appears that the source of this seepage is the shallow overburden ground water south of the building which becomes blocked by the building as it flows in a northerly direction.

4. NATURE AND EXTENT OF CONTAMINATION

This chapter discusses the nature and extent of contamination at the Skaneateles Falls site. The analytical results are presented in tabular format in Appendix D. Appendix E contains the Data Validation reports.

Split samples for chemical analysis of soil, sediment, ground water, surface water, and seeps were collected by NYSDEC as part of the Project Quality Assurance Program. The split sample results were used in place of the data reported by EA Laboratories in those cases where the results were rejected following data validation review. For soil or sediment samples, the split sample results were added to the EA Laboratories database, since there is a greater potential for matrix variations in these solid samples. For the aqueous samples, the split sample results replaced those in the EA Laboratories database only in those instances when the latter showed lower concentrations. This is a conservative approach. The split sample results are identified as "<Sample Name> Split" on the summary tables presented in this chapter. A comparison of the split sample and EA Laboratories' results are provided in Appendix E.

4.1 SOIL VAPOR AND AMBIENT AIR

4.1.1 Soil Vapor Samples

The principal objective of the SVCA was to identify areas of potential vadose zone contamination in the vicinity of the former Organics Plant. A total of 53 soil vapor samples (including two duplicates) from an original grid of 63 locations (Figure 2-8) were obtained and analyzed in the field using an HNu 421 gas chromatograph equipped with flame ionization and electron capture detectors. A total of 12 VOCs were targeted analytes, with sample quantification performed using the external standard method. Samples were not concentrated prior to analysis. The results are summarized in Table 4-1 and detailed in Appendix Table D-1. The SVCA report, dated October 1992 (Appendix F), was submitted to NYSDEC.

All of the targeted analytes, with the exception of benzene and carbon tetrachloride, were identified in at least 10 of the 53 sampling points. Benzene and carbon tetrachloride were not detected in any of the samples. Tetrachloroethene was found at the greatest frequency (28 of 53 samples), followed by *m/p*-xylene (23 of 53 samples), *o*-xylene (22 of 53 samples), and trichloroethane (17 of 53 samples). Data in Table 4-1 indicates that *m/p*-xylene and *o*-xylene showed the largest maximum concentrations (91.4 and 417.2 ppm_v, respectively) and mean concentrations (3.46 and 13.58 ppm_v) relative to the other components identified. The maximum concentrations for the chlorinated compounds were less than 1.7 ppm_v.

The SVCA report (Appendix F) provides a detailed statistical analysis and interpretative contouring of these results. The SVCA showed the following results:

- Xylenes were found in close proximity to MW-5I. This is in the vicinity of the former Organics Plant. Additionally, lower

concentrations of xylenes were found in a smaller area northwest of the Main Plant Building.

- Toluene was found in association with xylenes in the vicinity of MW-5I and was also identified in the area just south of the sanitary sewage leachfield. Toluene concentrations were 1-2 orders of magnitude lower than those of the xylenes.
- Trichloroethene and tetrachloroethene were identified in areas north and northwest of the Main Plant Building, near the loading dock (north end of warehouse). Trichloroethene and tetrachloroethene were present at levels comparable to toluene and significantly lower than xylenes. The SVCA did not show the presence of these components in the immediate vicinity of the former Organics Plant (i.e., MW-5 cluster).

4.1.2 Ambient Air Samples

A total of 6 samples of ambient air were obtained using Tenax sorbent traps and personal air sampler pumps. A minimum of 5 L of air was passed through the traps which concentrated any VOCs present in the air. Samples were analyzed by an offsite laboratory for TCL volatile compounds, following the analytical method described in EPA TO-1. Sample locations are shown on Figure 2-5. Table 4-2 shows the results of the ambient air sampling.

Two Tenax samplers (AS-3 and AS-4) were located upwind and downwind of the landfill, at the edges of the landfill lift, when no invasive activities were occurring at the site. These were positioned to collect air in the breathing zone. Subsequent analysis of the sorbent traps showed low concentrations of chloromethane (ND to 2 ppm_v), 2-butanone (from ND to 1 ppm_v), and trichlorofluoromethene. The observed concentrations for the upwind and downwind landfill locations were comparable. These concentrations were also comparable to those considered background in ambient air (Shah and Singh 1988) and were below their respective NYSDEC ambient guideline concentrations (NYSDEC 1991).

Simultaneously with this sampling event, air samplers were placed at two locations along Jordan Road (AS-1 and AS-4) to determine whether any VOCs were migrating offsite when there were no invasive actions at the site. Subsequent analysis of the sorbent traps showed low concentrations of bromomethane (from ND to 1 ppm_v), 1,1,1-trichloroethane (from ND to 3 ppm_v), benzene (from 1 to 2 ppm_v), toluene (from 3 to 4 ppm_v), acetone (from 6 to 10 ppm_v), xylenes (2 ppm_v), and 2-butanone (from ND to 3 ppm_v). The concentrations were comparable between these two locations and were below the NYSDEC ambient guideline concentrations, except for benzene. However, the benzene results were likely due to the influence of vehicular traffic along Jordan Road since air samples along roadways typically show the presence of aromatic volatiles (Shah and Singh 1988).

To determine whether there was any offsite migration of VOCs during the invasive site activities, samplers were placed downwind of the installation of MW-7D (AS-6) and MW-5S

(AS-5). These wells were located in areas of known VOC contamination. Subsequent analysis of the sorbent traps showed no detectable volatile analytes.

In summary, the ambient air samples showed the presence of VOCs comparable to background levels with no apparent emission of volatiles from the site during baseline conditions, from the landfill, or during conditions when drilling was occurring.

4.2 LANDFILL PERIMETER SOIL BORINGS

The purpose of collecting soil samples from the landfill perimeter area was to define lateral extent of landfill.

A total of 15 soil samples (including one duplicate) were collected for chemical analysis from 14 locations on the perimeter of the landfill (Figure 2-3) and labeled SB-02 through SB-15. Average soil sampling depths ranged from 1 to 7 ft. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. Soil lithology and field measurement data (e.g., OVA readings) are provided in Appendix B. An analytical sample was not collected from SB-01 since it was located within the narrow drainage swale between the landfill and the adjacent closed inorganics sludge basin.

Soil samples along the perimeter of the landfill showed no detectable or low concentrations of VOCs and semi-VOCs. Three soil samples (SB-04, SB-05, and SB-14) showed VOCs and semi-VOCs due to the fact that they were located partially within the landfill. There were no detectable pesticide/PCBs in these samples. The observed metals concentrations were generally consistent with the ranges anticipated as background. The resulting analytical data and field observations were sufficient to define the landfill footprint. The following subsections provide detailed discussion of the analytical results.

4.2.1 Target Compound List Organic Analytes

The TCL volatile, semi-volatile, and pesticide/PCB results are summarized in Table 4-3 and detailed in Tables D-2 and D-3. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

4.2.1.1 Volatile Organics

Up to 7 TCL volatile organics were identified in the perimeter soil samples, although no more than 4 were present in any of the samples. The aromatic volatile organics present included toluene, ethylbenzene, and xylenes. Xylenes were present at the greatest frequency (8 of 15 samples) and were present at the greatest maximum concentration (670 $\mu\text{g/kg}$) relative to the other aromatic volatile compounds. Toluene and ethylbenzene were present in 2 and 1, respectively, of the 15 samples, and at concentrations below the sample quantitation limits (sub-SQL). These are considered estimated trace concentrations since they are below the calibrated range of the instrument. The chlorinated volatiles included tetrachloroethene and methylene chloride, which were observed in 1 and 2, respectively, of the 15 samples.

The maximum concentration for tetrachloroethane was 2 $\mu\text{g/kg}$, and 3 $\mu\text{g/kg}$ for methylene chloride. Acetone and 2-butanone were also identified in the perimeter soil samples, at frequencies of 12 and 4, respectively, of the 15 samples. One of the soil samples (SB-08) showed the presence of a volatile tentatively identified compound (TIC) (undecane) at a concentration of 22 $\mu\text{g/kg}$.

The spatial variation of the aromatic volatile organic data is shown on Figure 4-1. Xylenes were identified proximal to SB-04/SB-05 and at SB-14. A review of the boring logs (Appendix B) shows that the samples from both SB-04 and SB-05 were moist, silty sands, exhibiting some black staining. This suggests that the source of the volatile contamination may have been the dark-colored leachate from the fill mass. Sample SB-14 included brick fragments, which suggests that the observed contamination was due to the fact that the soil boring was within the waste mass.

The distribution of both methylene chloride and tetrachloroethene was sporadic and appears to be independent of each other and the distribution of the aromatic volatiles. The sub-SQL concentrations and low frequency of occurrence of these analytes are not a concern in the landfill perimeter soils.

4.2.1.2 Semi-Volatile Organics

Up to 25 semi-volatile organics were present in the perimeter soils, although no more than 18 were present in any sample (Table 4-3). The semi-volatile compounds identified included phenolic compounds (e.g., 2-methylphenol), aromatic acid compounds (e.g., toluic acid), polycyclic aromatic hydrocarbons (PAHs), an amine compound, and several phthalate compounds. Five of the soil samples (SB-05DUP, SB-06, SB-07, SB-13, and SB-14) showed TICs that matched library records, and all of the samples contained some unknown compounds. A list of the TICs is presented in Table 4-4.

The phenolic compounds present were 2-methylphenol, 3-methylphenol, *o*-toluic acid, and *m*-toluic acid. These compounds were found at sub-SQL concentrations, with maximum concentrations of 40, 29, 170, and 120 $\mu\text{g/kg}$, respectively. They were identified in 2, 1, 3, and 2, respectively, of the 15 perimeter soil samples. A review of Table D-3 and Figure 4-2 shows that the methylphenols were typically present when toluic acid was also observed. The methylphenols are structurally similar to the toluic acids, having the carboxylic acid group in the 1-position replaced with a hydroxyl group. The analytical results show that the *o*- and *m*-isomers of toluic acid are more likely to be present than the *para* isomer. Figure 4-2 shows that toluic acid was identified at 3 boring locations (SB-05, SB-13, and SB-14). The black staining of these samples noted in the soil boring logs was, therefore, likely from leachate or fill waste.

The PAHs represent the next class of compounds present in the perimeter soil samples. With the exception of SB-05, the individual PAHs were present at sub-SQL concentrations. The frequencies of detection ranged from 1 to 5 of the 15 perimeter soil samples. Figure 4-3 shows the spatial variation of the PAHs, summarized as total PAHs (t-PAHs) and total carcinogenic PAHs (c-PAHs). The c-PAHs are those PAHs which have been classified as Class A carcinogens by the EPA, and include the compounds benzo(a)anthracene,

benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)-anthracene, and indeno(1,2,3-cd)pyrene. The latter two compounds were not identified in the perimeter soil samples. The t-PAHs were identified in SB-05, SB-06, SB-07, and SB-11, with the maximum total concentration observed in SB-05.

The amine compounds and phthalates were present sporadically and at low concentrations. They were not considered to be contaminants of concern at this site.

The semi-volatile TICs were subdivided into four categories based upon their library identification which included: (1) benzene derivatives and aromatic acids, (2) non-aromatic acids, (3) PAHs, and (4) miscellaneous compounds (Table 4-4). The first group includes benzaldehyde and phenolic compounds, both of which are structurally related to xylenes and toluic acid. These compounds are suspected to be either degradation products of toluic acid, or are byproducts of toluic acid production. The non-aromatic TICs include alkyl acid compounds (e.g., hexadecanoic acid), which can derive from natural sources (i.e., fatty acids). The PAH TICs were found in SB-05, which also exhibited the maximum t-PAH concentration (15 mg/kg) of the perimeter soils sampled.

4.2.1.3 Pesticide/Polychlorinated Biphenyls

The pesticides 4,4'-DDE and 4,4'-DDD were present in 3 and 1, respectively, of the 15 perimeter soil samples. The maximum observed concentrations for 4,4'-DDE and 4,4'-DDD were 36 and 6 $\mu\text{g/kg}$, respectively. No PCBs were detected.

4.2.2 Target Analyte List Inorganics

The TAL inorganic results are summarized in Table 4-5 and detailed in Table D-4. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols. Analytical results were compared to typical background concentrations for the United States, eastern United States, and New York State.

Up to 21 inorganics were identified in the perimeter soil samples. Antimony, mercury, selenium, and thallium were the only TAL analytes not detected in all of the soil samples. The comparison of the range and mean concentrations to typical background concentrations (Bodek et al. 1988) for the eastern United States, entire United States, and New York State (Table 4-5) showed that all of the analytes fell within background concentrations for New York State, except for calcium (9 of 15 samples), magnesium (13 of 15 samples), mercury (1 of 15 samples), and nickel (10 of 15 samples). Of this group, only the observed magnesium concentrations also exceeded background concentrations anticipated for the entire United States. The observed concentrations for antimony, silver, and thallium (where data is lacking for New York State background) fell within the anticipated background concentrations for the entire United States.

4.2.3 Total Organic Carbon

TOC was also analyzed in these samples. The results are detailed in Table D-4. The organic carbon content of the soils ranged from 0.21 to 2.95 percent (mean: 0.95 percent). The TOC content of the perimeter soils is consistent with that considered "typical" for average soils (Bodek et al. 1988).

4.3 LANDFILL INTERIOR SOIL BORINGS

The purpose of analyzing soil samples and waste within the landfill was to assist in characterizing the nature of waste within the landfill.

Thirteen soil samples were collected from 10 borings located within the landfill (Figure 2-3), and labeled SB-16 through SB-25. The samples collected for chemical analysis represented the matrices present within the landfill, which included the soil cap, clay cap, fill, and underlying clay layer. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. In addition, samples of the black and white waste present in the landfill (labeled as SB-26 and SB-27) were collected for chemical analyses. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. Figures 4-4, 4-5, 4-6, and 4-7 show the spatial distribution of aromatic volatiles, chlorinated volatiles, aromatic acids, and PAHs in the landfill soil borings. The aromatic volatiles, aromatic acids, and PAHs were found simultaneously, except at SB-26 (a black waste sample) and SB-23 (underlying clay).

The chemical analysis of landfill interior soil borings showed low or no detectable organic contamination in the soil cap or clay cap. The fill and waste, as anticipated, contained volatile and semi-volatile contamination. The clay underlying the landfill showed organic contamination derived from the fill. Some metals (e.g., cobalt) were present at elevated concentrations in the fill when compared to background.

4.3.1 Target Compound List Organic Analytes

The results are summarized by matrix type in Table 4-6 and detailed in Tables D-5, D-6A, and D-6B. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

4.3.1.1 Soil Cap

The chemical analysis of the soil cap showed the presence of the volatile compounds acetone (26 $\mu\text{g/kg}$) and 2-butanone (12 $\mu\text{g/kg}$). These compounds are structurally related and often occur as laboratory contaminants. There were no VOC TICs present in the sample of the soil cap. The soil cap sample showed no detectable semi-volatiles except for sub-SQL concentration of bis(2-ethylhexyl)phthalate (58 $\mu\text{g/kg}$). This phthalate is a common laboratory contaminant, and may be a false-positive in this sample. There are no BNA TICs or pesticide/PCBs identified in the soil cap sample.

4.3.1.2 Clay Cap

The chemical analysis of the clay cap showed the presence of chloroform at sub-SQL concentrations ($0.7 \mu\text{g/kg}$), and no detectable VOC TICs. The clay cap was free of detectable semi-volatiles, except for bis(2-ethylhexyl)phthalate ($480 \mu\text{g/kg}$). This phthalate is a common laboratory contaminant, and may not represent true contamination of this sample. Two hexadecanoic acid compounds were identified in this sample which are fatty acids that may be derived from natural plant materials. There were no pesticide/PCBs identified in the clay cap sample.

4.3.1.3 Fill Samples

The samples of the fill contained the largest number, types, and concentrations of volatile organics, compared to the other matrices sampled in the landfill. The fill lithology consisted of soils and clay mixed with the waste disposed at the landfill. The volatile compounds consisted of chlorinated aliphatics (methylene chloride, chloroform, trichloroethene, tetrachloroethane), chlorinated aromatics (chlorobenzene), ketones (acetone, 2-butanone), and non-chlorinated aromatics (benzene, toluene, ethylbenzene, xylenes). The latter group showed the greatest overall concentration. The respective maximum observed concentrations for benzene, toluene, ethylbenzene, and xylenes were 19 mg/kg , $1,000 \text{ mg/kg}$, 92 mg/kg , and $25,000 \text{ mg/kg}$. There were no VOC TICs in any of the fill samples.

Up to 30 BNA compounds were quantified in the fill samples. These consisted of 4 phenolic compounds, 17 PAHs, 4 aromatic acids, 3 phthalate compounds, and 2 N-heterocyclic compounds. The methylphenols were present at the greatest frequency for the phenolic compounds (up to 3 of the samples) but 2,4-dimethylphenol showed the highest concentration (12 mg/kg) of this group. The methylphenols are structurally related to toluic acid, and may be present as either degradation products or reaction product residues disposed within the landfill with the carbon waste. The most common PAH was 2-methylnaphthalene (8 of 9 samples) but the maximum PAH concentration was fluorene (3.6 mg/kg). The 3 toluic acid isomers were identified in most of the fill samples, and the maximum concentrations of the *o*-, *m*-, and *p*-isomers of 81, 2.1, and $1,600 \text{ mg/kg}$, respectively. Approximately 3 to 7 TICs were identified in these samples. Table 4-7 summarizes these by general chemical class. There were a large number of benzene derivatives, which may be degradation products of toluic acid or reaction product residues disposed within the landfill.

The pesticide/PCB analysis of the fill samples showed the presence of 4,4'-DDE (3 of 9 samples), 4,4'-DDD (2 of 9 samples), 4,4'-DDT (1 of 9 samples), and Aroclor 1248 (1 of 9 samples). A review of the manufacturing history of this site does not indicate that these compounds were disposed onsite as waste product.

4.3.1.4 Underlying Clay

The underlying clay showed evidence of contamination from the fill mass by volatile and semi-volatile organics. Up to 8 volatile organics were identified in these samples, including chlorinated aliphatics (methylene chloride, chloroform, tetrachloroethane), chlorinated aromatics (chlorobenzene), ketones (acetone, 2-butanone), and non-chlorinated aromatics

(benzene, toluene, ethylbenzene, xylenes). These compounds were also identified in the fill samples, albeit at significantly higher concentrations. Toluene and xylenes were identified in both samples of the underlying clay, with maximum concentrations of 16 $\mu\text{g/kg}$ and 700 $\mu\text{g/kg}$, respectively.

Up to 5 BNA compounds were identified in the underlying clay samples, including 1 phenolic compound, 1 phthalate compound, and 3 aromatic acids. The 3 toluic acid isomers were identified in 1 of the 2 samples, and the maximum concentrations of the *o*-, *m*-, and *p*-isomers of 62, 1,300, and 750 $\mu\text{g/kg}$, respectively. The concentrations of the *o*- and *p*-isomers are approximately 3 orders of magnitude lower than those of the fill mass. The concentration of the *m*-isomer was similar between the fill and underlying clay. Only one BNA TIC was identified in these samples. There were no detectable pesticide/PCBs in the underlying clay samples.

4.3.1.5 Waste Samples

Samples of the black waste and white waste were also obtained. The black waste contained up to 4 volatile organics, including chlorinated aliphatics (methylene chloride, tetrachloroethane), and non-chlorinated aromatics (toluene, xylenes). Methylene chloride and tetrachloroethane were both detected in one of the waste samples (SB-27-02A), with the maximum concentration of 3.6 and 2.7 mg/kg, respectively. The aromatics were present at the greatest frequency and overall concentration relative to the other volatile compounds identified in the black waste. Toluene and xylenes were identified in both samples, with the maximum concentrations of 51 and 4,700 mg/kg, respectively. The single sample of white waste showed the presence of toluene (330 mg/kg) and xylenes (2,100 mg/kg). There were no VOC TICs in either the black or white waste samples.

Up to 6 BNA compounds were identified in the black waste. These consisted of 3 phenolic compounds and 3 aromatic acids. The phenolic compounds were identified in 1 of the black waste samples, consisting of 2-methylphenol (15 mg/kg), 4-methylphenol (10 mg/kg), and 2,4-dimethylphenol (110 mg/kg). The 3 toluic acid isomers were identified in the samples, with the maximum concentrations of the *o*-, *m*-, and *p*-isomers of 67, 1,200, and 5.8 mg/kg, respectively. The single sample of white waste contained 2,4-dimethylphenol (63 mg/kg) and *m*-toluic acid (8,500 mg/kg). There were no detectable pesticide/PCBs in either the black or white waste that was sampled.

Table 4-7 summarizes the BNA TICs that were identified in the landfill soil borings. These compounds were found predominantly in the fill and waste samples. Representative classes included benzene derivatives, non-aromatic acids, amines, and ketones. Several of the benzene derivatives (e.g., 4-methyl benzaldehyde, 2-methyl benzene methanol) are suspected to be by-products from the production of toluic acid.

4.3.2 Target Analyte List Inorganics

The TAL inorganic results are summarized in Table 4-8 and detailed in Table D-7. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

4.3.2.1 Soil Cap

Nineteen metals were identified in the soil cap sample. Mercury, selenium, thallium, and cyanide were not detected in the soil cap. The comparison of the range and mean concentrations to typical background concentrations for the eastern United States, entire United States, and New York State (Table 4-8) showed that all of the analytes fell within background concentrations for New York State, except for calcium and magnesium. Of this group, only the observed magnesium concentrations also exceeded background concentrations anticipated for the entire United States. The results show that the soil cap does not contain any metals in excess of those generally considered as background.

4.3.2.2 Clay Cap

Twenty-one metals were identified in the clay cap sample. Antimony, selenium, and cyanide were not detected in the clay cap. The comparison of range and mean concentrations to typical background concentrations for the eastern United States, entire United States, and New York State (Table 4-8) showed that all of the analytes fell within background concentrations for New York State, except for magnesium. The observed magnesium concentration was within the anticipated background concentration for the entire United States. Comparison of the clay cap and soil cap results showed that the metals concentrations are generally consistent, except that the clay cap showed lower aluminum, calcium, magnesium, and sodium concentrations, and higher mercury and barium concentrations.

4.3.2.3 Fill Samples

Up to 22 metals were identified in the fill samples. The comparison of the range and mean concentrations to typical background concentrations for the eastern United States, entire United States, and New York State (Table 4-8) showed that all of the analytes fell within background concentrations for New York State, except for arsenic (1 of 9 samples), chromium (4 of 9 samples), cobalt (3 of 9 samples), copper (2 of 9 samples), lead (3 of 9 samples), magnesium (9 of 9 samples), mercury (6 of 9 samples), nickel (4 of 9 samples), sodium (5 of 9 samples), and zinc (9 of 9 samples).

4.3.2.4 Waste Samples

Up to 21 metals were identified in the black waste samples. All TAL metals were detected except for selenium and thallium. A review of this data showed that the black waste contains large concentrations of cobalt. Cobalt was used as a catalyst in the production of toluic acid.

Seventeen metals were identified in the sample of white waste. Antimony, beryllium, mercury, selenium, silver, thallium, and cyanide were not detected in the sample. A review of Table 4-8 shows that the metals content is very low compared to the other sampled matrices.

4.3.3 Total Organic Carbon

TOC was also analyzed in these samples and the results are detailed in Table D-7. TOC concentrations were similar between the soil cap (1.1 percent) and clay cap (1.5 percent), both of which were greater than those observed in the underlying clay (range: from 0.27 to 0.7 percent; mean: 0.48 percent). The organic carbon content of the fill overlapped that of the clay and soil cap (range: from 0.7 to 2.8 percent; mean: 1.5 percent), as well as that of the black waste (range: from 0.87 to 14.1 percent; mean: 7.4 percent).

4.4 FORMER ORGANICS PLANT AREA SOIL BORINGS

The purpose of collecting soil samples in the former Organics Plant was to delineate the extent of soil contamination discovered during the installation of MW-5 during the Phase I investigation.

Seventeen soil samples were collected from 17 borings located in the vicinity of the former Organics Plant (Figure 2-9). The first of these was labeled MW5-MWB-1, since the sample was obtained during the installation of MW-5I. The remaining samples were labeled MW5-SB-01 through MW5-SB-16. The samples collected for chemical analysis represented vadose zone and saturated zone soils at this portion of the site. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide.

Chemical analysis of the former Organics Plant area soils showed the presence of volatile organics and semi-volatile organics at several locations. These included proximal to well cluster MW-5 (located near the former plant), near the sanitary sewage leachfield, and near Jordan Road. The following subsections provide the detailed discussion of the analytical results.

4.4.1 Target Compound List Organic Analytes

The results are summarized in Table 4-9 and detailed in Tables D-8, D-9A, and D-9B. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

4.4.1.1 Volatiles

Up to 7 volatile organics were identified in these samples, although no more than 4 were present in any individual sample. The chemical classes present included 2 ketones (acetone, 2-butanone), 3 chlorinated aliphatics (1,1-dichloroethane, 1,2-dichloroethene, tetrachloroethene), and 3 non-chlorinated aromatics (benzene, toluene, and xylenes). The maximum concentration for acetone and 2-butanone were 140 and 59 $\mu\text{g}/\text{kg}$, respectively. The chlorinated aliphatics were present at the lowest frequency, but the individual compounds were identified in different samples. All of the observed chlorinated aliphatics concentrations were sub-SQL.

Figure 4-8 shows the spatial distribution of aromatic volatiles. Of the three aromatic volatiles identified in the soil samples, xylenes showed the greatest frequency and greatest maximum concentration (2,200 mg/kg). This sample (MW5-MB-1) was located near MW-5I, in the immediate vicinity of the former Organics Plant. Sample SB-01, which was obtained near MW5-MB-1, showed the next highest xylene concentrations (320 mg/kg). Two samples (SB-04 and SB-05) located on the west and east sides, respectively, of the sanitary sewage leachfield, also showed the presence of xylenes. This contamination appears localized, since the soil samples taken northwest and northeast of these locations showed no detectable xylenes. Up to 10 unknown VOCs were present in 4 of these samples (MW5-SB-01, MW5-SB-04, MW5-SB-05, and MW5-SB-09). The laboratory was unable to provide a library match to any of these compounds.

4.4.1.2 Semi-Volatiles

Up to 30 BNA compounds were quantified in these samples. These consisted of 4 phenolic compounds, 19 PAHs, 3 aromatic acids, 3 phthalate compounds, and 1 N-heterocyclic compounds. Figure 4-9 shows the spatial distribution of toluic acid. The methylphenols were present at the greatest frequency for the phenolic compounds (up to 2 of the samples) but 2,4-dimethylphenol showed the highest concentration (3.7 mg/kg) of this group. The methylphenols are structurally related to toluic acid, and may be present as either degradation products or reaction product residues. The PAHs were found at the greatest overall frequency relative to the other BNA compounds identified. The most common PAH was fluoranthene (10 of 17 samples), but the PAH with the largest maximum concentration was benzo(a)pyrene (7.9 mg/kg). The 3 toluic acid isomers were identified in up to 4 of the samples, and the maximum concentrations of the *o*-, *m*-, and *p*-isomers of 19, 46, and 14 mg/kg, respectively. These samples also contained a large number of TICs. TICs were present at the greatest number and concentrations when the samples showed elevated PAH concentrations. The laboratory was unable to provide a library match to most of these compounds.

Figure 4-10 shows the spatial distribution of t-PAHs and c-PAHs in the former Organics Plant area. PAHs were identified along the north side of the warehouse (samples SB-2 and SB-7), along the old railroad spur (SB-9 and SB-15), with lower levels found adjacent to the sanitary sewage leachfield (SB-4 and SB-5). PAHs were not detected in soil samples taken adjacent to or within the low wet area north of the warehouse (SB-10, SB-12, SB-13, SB-14, and SB-16). The spatial distribution of the PAHs, along with the soil lithology of this area, suggests that the type of fill used in this area may be the source of these compounds.

4.4.1.3 Pesticide/Polychlorinated Biphenyls

One soil sample (MW5-SB-15) exhibited the presence of 4,4'-DDD (8.7 µg/kg) and Aroclor 1248 (59 µg/kg). This sample was located adjacent to the former railroad spur (Figure 4-10). The sporadic presence of these compounds and low concentrations supports the conclusion that these compounds were not disposed onsite as waste products.

4.4.2 Target Analyte List Inorganics

The TAL inorganic results are summarized in Table 4-10 and detailed in Table D-10. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

Up to 24 metals were identified in the soil samples, with 18-21 identified in the individual samples. The comparison of the range and mean concentrations to typical background concentrations for the eastern United States, entire United States, and New York State (Table 4-7) shows that all of the analytes fell within background concentrations for New York State, except for arsenic (2 of 17 samples), barium (3 of 17 samples), cadmium (1 of 17 samples), calcium (8 of 17 samples), chromium (6 of 17 samples), copper (6 of 17 samples), lead (12 of 17 samples), magnesium (13 of 17 samples), manganese (1 of 17 samples), mercury (11 of 16 samples), nickel (13 of 17 samples), and zinc (15 of 17 samples). Of this group, some of the observed cadmium, calcium, copper, lead, magnesium, and zinc concentrations also exceeded background concentrations anticipated for the entire United States. A review of the soil boring logs (Appendix B) show the presence of metal and demolition debris in this area, which was filled over several years. The source of some of these elevated metals may be due to this debris.

4.5 CREEK SEEPS AND SEEP SEDIMENT

The purpose of analyzing seep and seep sediment samples was to confirm the presence of constituents associated with potential sources of contamination (i.e., the landfill and the sanitary sewage leachfield). Seep sediment samples were obtained from the 0- to 6-in. interval immediately below the dark-colored aqueous seep.

Four samples of creek seep (CS-01 through CS-04) and 1 sample of seep sediment (SS-03) were collected during the first round of sampling. Three seeps were located in the vicinity of the landfill and one was located near the sanitary sewage leachfield. The sampling locations are shown on Figure 2-6. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. Although a confirmatory round of seep samples from all locations were attempted during the second round of sampling, a seep was available only from sampling point CS-03. The second round of samples occurred during drought conditions, which may have affected the production of seeps. Due to the small volume of seep available, this sample was analyzed only for TCL volatiles and TCL semi-volatiles plus toluic acid. The Round 2 sample from CS-03 showed toluic acid concentrations several orders of magnitude below the corresponding Round 1 sample. Due to this poor comparability, it was determined that the laboratory reported result was likely not representative of the environmental conditions, and the Round 2 result was not evaluated for this assessment. The corresponding sediment sample SS-03 is also not discussed below.

Creek seeps located adjacent to the landfill showed the presence of volatile and semi-volatile compounds found in landfill leachate samples (Section 4.9) and landfill fill samples (Section 4.3.1). The observed analytes present were also consistent with those observed in leachate samples collected in 1986 (Section 1.3.2). The creek seep collected near the sanitary sewage

leachfield showed no detectable volatile or semi-volatile compounds. There were no detectable pesticide/PCBs in any of the creek seep samples. The following subsections provide a detailed discussion of the analytical results.

4.5.1 Target Compound List Organic Analytes - Round 1

The results are summarized in Table 4-11 and detailed in Table D-11A. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

4.5.1.1 Volatiles

Up to 6 volatile organics were identified in the creek seep aqueous samples, with from 5 to 6 compounds identified in 3 of the 4 samples. Sample CS-01 (located near the discharge of the sanitary sewage leachfield) was free of detectable volatile organics. Volatile compound classes included ketones (acetone), chlorinated aliphatics (1,2-dichloroethene, trichloroethene, and tetrachloroethene), and aromatic volatiles (toluene and xylenes). The maximum observed concentration of the chlorinated aliphatics 1,2-dichloroethene, trichloroethene, and tetrachloroethene were 670, 260, and 560 $\mu\text{g/L}$, respectively, in the Round 1 samples. The maximum observed concentrations of the aromatic volatiles were 20 and 570 $\mu\text{g/L}$, respectively, in the Round 1 samples. There were no detectable TICs in any of the creek seep samples. The observed analytes were consistent with those present in leachate samples collected in 1986 (SCC 1986).

Sample CS-3 showed the greatest total volatile concentration (1,653 $\mu\text{g/L}$), followed by CS-04 (1,302 $\mu\text{g/L}$) and CS-02 (253 $\mu\text{g/L}$). In sample CS-03, 1,2-dichloroethene and xylenes contributed 41 and 34 percent, respectively, of the total volatile concentration. In sample CS-04, tetrachloroethene and xylenes each contributed approximately 44 percent of the total volatile concentration.

Sample SS-03 showed the presence of 1,2-dichloroethene (84 $\mu\text{g/kg}$), trichloroethene (54 $\mu\text{g/kg}$), tetrachloroethene (34 $\mu\text{g/kg}$), toluene (13 $\mu\text{g/kg}$), and xylenes (200 $\mu\text{g/kg}$).

4.5.1.2 Semi-Volatiles

Up to 19 semi-volatile compounds were identified in the Round 1 creek seep samples, with from 1 to 18 analytes identified in the individual samples. The compound classes present included phenolic compounds, phthalates, PAHs, and aromatic acids. With the exception of PAHs, these compounds were also observed in the 1986 leachate samples (SCC 1986). The 3 toluic acid isomers were present in 3 of the 4 seep samples, at concentrations several orders of magnitude greater than the other semi-volatile analytes. The maximum observed concentrations for *o*-, *m*-, and *p*-toluic acids were 5,800 $\mu\text{g/L}$, 94,000 $\mu\text{g/L}$, and 63,000 $\mu\text{g/L}$, respectively. Sample CS-03 showed the greatest total toluic acid concentration (152,800 $\mu\text{g/L}$), followed by CS-02 (150,600 $\mu\text{g/L}$) and CS-04 (66,830 $\mu\text{g/L}$). Sample CS-01 contained no detectable toluic acid.

Samples which showed high toluic acid concentrations also showed numerous TICs. The TICs that matched library scans were substituted benzene compounds, which may be degradation products of toluic acid or by-products from the toluic acid synthesis. There were also from 13 to 15 unknown compounds in these samples.

Sample SS-03 showed the presence of bis(2-ethylhexyl)phthalate (190 $\mu\text{g/kg}$), and the *o*-, *m*-, and *p*-toluic acids were present at 420 $\mu\text{g/kg}$, 340 $\mu\text{g/kg}$, and 2,200 $\mu\text{g/kg}$, respectively. This sample exhibited a single unknown compound.

4.5.2 Target Analyte List Inorganics - Round 1

The TAL inorganic results are summarized in Table 4-12 and detailed in Table D-12. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

Up to 22 inorganic analytes were identified in the Round 1 creek seep samples, with from 15 to 21 identified in the individual samples. These samples were free of detectable silver and cyanide. A comparison to Table 4-6 shows that those samples which exhibited high concentrations of xylenes or toluic acid also contained elevated concentrations of arsenic (maximum 170 $\mu\text{g/L}$), chromium (maximum 92.4 $\mu\text{g/L}$), cobalt (maximum 28.3 $\mu\text{g/L}$), copper (maximum 158 $\mu\text{g/L}$), iron (maximum 34,600 $\mu\text{g/L}$), nickel (maximum 238 $\mu\text{g/L}$), potassium (maximum 22,700 $\mu\text{g/L}$), sodium (maximum 2,670,000 $\mu\text{g/L}$), and zinc (maximum 244 $\mu\text{g/L}$).

Sample SS-03 contained 21 metals. The observed concentrations in this sediment sample are within those anticipated as background in New York State soils. The concentrations were also within the range observed in the landfill perimeter soils, and suggest no significant contribution to creek seep metal constituents to the sediments.

4.6 OVERBURDEN GROUND WATER

Six wells installed as part of the Phase I investigation, and 4 additional wells installed as part of the Phase II investigation, were used to characterize the overburden ground water.

Wells installed as part of Phase I had two rounds of analytical sampling, while those for Phase II had one round of sampling. The sampling locations are shown on Plate 2. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. The ground-water samples were not filtered prior to chemical analysis.

The analytical results for TCL organics are summarized in Table 4-13 and detailed in Tables D-13A and D-13B. The analytical results for TAL inorganics are summarized in Table 4-14 and detailed in Tables D-14A and D-14B. The analytical results for water quality parameters are summarized in Table 4-14 and detailed in Table D-15. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols. Analytical results were compared to NYSDEC ground-water (Class GA) quality standards.

Xylene was present above New York State Class GA standards in 5 overburden monitoring wells (MW-4S, MW-7S, MW-5S, MW-12S, and MW-18S) in at least one round of sampling. Only shallow monitoring wells MW-7S and MW-5S had levels of other chemical constituents at elevated levels. MW-7S contained toluic acid, xylene, toluene, volatile chlorinated aliphatic compounds, and phenols in both rounds of sampling. MW-5S was installed in Phase II, and Round 2 sampling of the well resulted in elevated levels of toluic acid, xylene, toluene, and the phenols, but the volatile chlorinated aliphatic compounds were not detected. MW-2S was sampled in both rounds with toluic acid not being detected in Round 1, but being present at greater than 2 µg/L in Round 2. The NYSDEC has not established ground-water quality standards for the toluic acid isomers.

Spatial comparison of Round 1 to Round 2 data (Figure 4-11) indicates no clearly evident patterns of contamination pertaining to the chlorinated aliphatics. The aromatic volatiles were present in 3 of the Phase II wells: MW-5S located at the former Organics Plant, MW-12S located north of the former Organics Plant, and MW-18S located northwest of the former Organics Plant (Figure 4-12). Well MW-7S showed the presence of toluene and xylenes during both sample rounds while the surrounding wells were free of aromatic volatiles. Aromatic acids displayed a similar distribution as the aromatic volatiles, with the exception of the presence in MW-2S (Figure 4-13). The phenolics were present in Phase II MW-5S and in both rounds for MW-7S. The remaining wells indicated no clear pattern of distribution (Figure 4-14). PAHs were detected in 2 Phase II wells, MW-5S and MW-12S, located at the former Organics Plant and north of the former Organics Plant, respectively (Figure 4-15). Pesticide/PCBs were not detected in any of the Round 1 or Round 2 samples.

The following subsections provide a detailed discussion of the analytical results.

4.6.1 Target Compound List Organics - Round 1

4.6.1.1 Volatiles

The Round 1 samples of the 6 wells showed no detectable volatiles in MW-1S or MW-6S. Approximately 2 to 5 volatile compounds were identified in each of the remaining 4 wells. The compound classes represented included chlorinated aliphatics (vinyl chloride, 1,2-dichloroethene, trichloroethene, and tetrachloroethene) and aromatic volatiles (toluene and xylenes). Three of the chlorinated aliphatics were identified in one well (MW-7S), with the observed concentration of vinyl chloride, 1,2-dichloroethene, and trichloroethene of 5, 18, and 2 µg/L, respectively. These concentrations were less than the SQL, except for 1,2-dichloroethene. Tetrachloroethene was present in MW-4S (2 µg/L) at sub-SQL concentration. Toluene was observed in 1 of the 6 wells (MW-7S; 2 µg/L) and xylenes were identified in 3 of the 6 wells (MW-2S, MW-4S, and MW-7S), with a maximum concentration of 19 µg/L. There were no detectable TICs in these samples.

Comparison of the Round 1 results to NYSDEC Class GA standards or guidance values showed that the maximum observed concentrations for vinyl chloride, 1,2-dichloroethene, and xylenes were above their respective standards. For all of these analytes, only 1 of the 6 wells had concentrations above the standard or guidance values.

4.6.1.2 Semi-Volatiles

The Round 1 samples of the 6 wells showed no detectable semi-volatiles in MW-1S or MW-4S and MW-8S. Approximately 1 to 9 analytes were identified in the remaining 3 wells. The compound classes represented included phenolics (2-methylphenol and 4-methylphenol), aromatic acids (benzoic acid and *o*-toluic acid), phthalates (dimethyl phthalate and bis[2-ethylhexyl]phthalate), and PAHs. The methylphenols were identified in only 1 well (MW-8S) with observed concentrations of 2-methylphenol and 4-methylphenol of 15 and 11 µg/L. This well was the only one that exhibited the presence of benzoic acid (4 µg/L), *o*-toluic acid (11,000 µg/L), and the phthalate bis(2-ethylhexyl)phthalate (2 µg/L). Dimethylphthalate (21 µg/L) was the only BNA compound identified in MW-2S. A total of 8 PAHs were identified, all in MW-6S, with individual concentrations ranging from 1 to 4 µg/L. Two of the overburden wells contained 1 to 4 TICs that matched library searches, and 3 wells contained several unknown compounds.

Comparison of the Round 1 results to NYSDEC Class GA standards or guidance values showed that the 2-methylphenol and 4-methylphenol results in MW-7S were above the standards or guidance values. This was the only well that contains these compounds. Four PAHs (benzo[a]anthracene, chrysenes, benzo[b]fluoranthene, and benzo[k]fluoranthene) were above their respective standards in MW-6S, although the reported concentrations were all sub-SQL.

4.6.2 Target Compound List Organics - Round 2

The Phase II field program included the installation of 4 additional wells (MW-5S, MW-12S, MW-14S, and MW-18S).

4.6.2.1 Volatiles

Two of the 10 overburden wells were dry during the Round 2 sampling (MW-1S and MW-14S). Three of the remaining 8 wells (MW-2S, MW-6S, and MW-8S) showed no detectable volatiles. Up to five volatile compounds were identified in the remaining 5 wells with from 1 to 4 present in the individual samples. The compound classes represented included chlorinated aliphatics (vinyl chloride, 1,1-dichloroethane, and 1,2-dichloroethene) and aromatic volatiles (toluene and xylenes). Two of the chlorinated aliphatics were identified in 1 well (MW-7S), which contained vinyl chloride and 1,2-dichloroethene at 5 and 85 µg/L, respectively. Toluene was observed in 2 of the 8 wells (MW-5S and MW-7S) at concentrations of 270 µg/L and 6 µg/L, respectively. Total xylenes were identified in 5 of the 8 wells (MW-4S, MW-5S, MW-7S, MW-12S and MW-18S), with a maximum concentration of 28,000 µg/L in MW-5S. Xylene was detected above the SQL at 26 µg/L, 41 µg/L, 55 µg/L, and 450 µg/L for wells MW-4S, MW-7S, MW-12S, and MW-18S, respectively. There were no detectable TICs in these samples.

Comparison of the Round 2 results to NYSDEC Class GA standards or guidance values showed that the maximum observed concentrations for vinyl chloride, 1,2-dichloroethene (total), toluene, and total xylenes were above their respective standards. For vinyl chloride and 1,2-dichloroethene, only 1 of the 8 wells had concentrations above the standard or

guidance values. All 5 wells which showed xylenes and the 2 wells showing toluene were above the Class GA guidance value for these compounds.

4.6.2.2 Semi-Volatiles

The Round 2 samples of the 8 wells sampled showed detectable semi-volatiles in all the samples. Up to 26 BNA compounds were identified in the 8 wells with from 1 to 13 present in the individual wells. The compound classes represented included chlorinated aromatics (1,3-dichlorobenzene), phenolics (phenol, 2-methylphenol and 4-methylphenol, 2,4-dimethylphenol, and pentachlorophenol), aromatic acids (*o*-, *m*- and *p*-toluic acids), phthalates (bis[2-ethylhexyl]phthalate), and PAHs.

Phenol was detected in 1 well (MW-5S) above the SQL at 12 µg/L. The methylphenols were identified in 5 of the 8 wells. Two of the 3 observed concentrations of 2-methylphenol were below the SQL at concentrations of 1 µg/L and 9 µg/L for MW-2S and MW-7S, respectively. MW-5S had a concentration of 13 µg/L, above the SQL; 4-methylphenol appeared in MW-5S and MW-7S at 150 µg/L and 9 µg/L, respectively; however, MW-7S was below the SQL, and 2,4 dimethylphenol was detected above the SQL at 14 µg/L for MW-4S and below the SQL at 4 µg/L for MW-18S. Pentachlorophenol was detected in only one well (MW-5S) at a level below the SQL (2 µg/L).

The aromatic acids were detectable in 6 of the 8 overburden well samples. This class, represented by the three toluic acid isomers, had the greatest concentrations relative to the other BNA compounds. MW-5S and MW-7S were the only two wells containing all three isomers (*o*, *m*, and *p*) at levels of 66,300, 4,800, and 270 µg/L for MW-5S and 14,000, 6,500, and 700 µg/L for MW-7S, respectively. Wells MW-2S and MW-12S showed the *o*- and *m*-isomers at levels ranging from 40 to 1,500 µg/L. Sample MW-4S contained only the *o*-isomer at 17 µg/L.

A total of 14 PAHs were identified, the majority of these being in MW-5S and MW-6S. MW-5S had individual concentrations ranging from 1 to 5 µg/L (below the SQL), however, no c-PAHs were identified. Sample MW-6S, on the other hand, had individual concentrations ranging from 0.7 to 27 µg/L. Three c-PAHs were identified at or above the SQL, in MW-6S; chrysene, benzo(b)fluoranthene, and benzo(a)pyrene at concentrations of 13, 19, and 10 µg/L, respectively.

One of the 8 overburden wells (MW-7S) contained 1 TIC that matched library searches, and all the wells with the exception of SW-12S had unknown compounds ranging from 2 to 20 in number per well.

Comparison of the Round 2 results to NYSDEC Class GA standards or guidance values showed that the maximum observed concentrations for three semi-volatiles (phenol, 2-methylphenol, and 4-methylphenol) and three PAHs (benzo[a]anthracene, chrysenes, and benzo[b]fluoranthene) were above their respective standards.

4.6.3 Target Analyte List Inorganics - Round 1

Up to 19 TAL analytes were identified in the Round 1 samples of overburden ground water, with from 13 to 16 present in the individual samples. Nine of the positively detected analytes (antimony, arsenic, beryllium, cobalt, lead, magnesium, sodium, vanadium, and cyanide) were detected in only some of the wells. Comparison of the observed concentrations to the Class GA standards or guidance values showed that the concentrations of aluminum (6 of 6 wells), chromium (1 of 6 wells), cobalt (4 of 6 wells), copper (1 of 6 wells), manganese (5 of 6 wells), sodium (6 of 6 wells), and zinc (1 of 6 wells) were above their respective standard or guidance values.

4.6.4 Target Analyte List Inorganics - Round 2

Up to 22 TAL analytes were identified in the Round 2 samples of overburden ground water, with from 15 to 20 present in the individual samples. Eight of the positively detected analytes (antimony, barium, beryllium, cadmium, chromium, cobalt, selenium, and cyanide) were detected in only a portion of the wells. Comparison of the observed concentrations to the Class GA standards or guidance values showed that the concentrations of arsenic (3 of 8 wells), chromium (4 of 8 wells), copper (3 of 8 wells), iron (6 of 6 wells), lead (5 of 8 wells), magnesium (3 of 8 wells), manganese (7 of 8 wells), nickel (7 of 8 wells), sodium (8 of 8 wells), and zinc (4 of 8 wells) were above their respective standard or guidance values. Iron was rejected for 2 of the 8 wells during data validation.

Comparison of the Round 1 and Round 2 results for the Phase I wells showed that the concentrations were consistent, although the concentrations of some analytes (e.g., zinc) increased in Round 2. The Round 2 samples also showed the presence of three analytes (cadmium, mercury, and selenium) which were not detected in Round 1. These three analytes were identified in some of the Round 2 samples from the Phase I wells.

4.6.5 Water Quality Parameters - Round 1

Water quality parameters were collected from the Round 1 wells only. Up to 9 water quality parameters were identified in the overburden ground water sampled in Round 1, with from 6 to 8 parameters identified in the individual samples. Comparison to NYSDEC standards and guidance values showed that chloride (1 of 6 wells), fluoride (1 of 6 wells), and ammonia (1 of 6 wells) concentrations were above their respective regulatory limits. The elevated fluoride and ammonia concentrations were both in MW-7S, while the chloride concentration was in MW-8S. The elevated chloride concentration may be due to road salt infiltration since MW-8S is located near Jordan Road. MW-7S, also located near Jordan Road, showed a higher chloride level than wells located farther from the road. Standards or guidance values have not been established for the other parameters.

4.6.6 Water Quality Parameters - Round 2

Water quality parameters were not determined in the Round 2 sampling event. Field measurements of pH, eH, and conductivity were determined at time of sampling. The comparison to the NYSDEC Class A standard showed that 4 of the 7 sampled wells exceeded

the upper pH limit. The maximum observed pH was 9.73. The eH measurement ranged from 141 to 275 millivolts (mean: 206 millivolts), and the conductivity ranged from 785 to 2,440 $\mu\text{mhos/cm}$ (mean: 1,745 $\mu\text{mhos/cm}$). There was no NYSDEC standard for eH or conductivity.

4.7 UPPER BEDROCK GROUND WATER

Eleven wells installed as part of the Phase I investigation, and 7 additional wells installed as part of the Phase II investigation, were used to characterize the upper bedrock ground water. Wells installed as part of Phase I had two rounds of analytical sampling, while those for Phase II had one round of sampling. The sampling locations are shown on Plate 2. These wells were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. The ground-water samples were not filtered prior to chemical analysis.

The analytical results for TCL organics are summarized in Table 4-15 and detailed in Tables D-16A and D-16B. The analytical results for TAL inorganics are summarized in Table 4-16 and detailed in Tables D-17A and D-17B. The single round analytical results of water quality parameter measurements are summarized in Table 4-16 and detailed in Table D-18. The water quality data were reviewed for data usability following a modification of the EPA Region 2 protocols. All other data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

Upper bedrock wells in the immediate vicinity of the landfill are contaminated with toluic acid. Wells MW-1I, MW-2I, MW-3I, and MW-4I all contain xylene and at least one phenolic and one volatile chlorinated aliphatic compound above NYSDEC Class GA standards. Wells MW-7I and MW-16I, located west of the landfill, were also contaminated but at lower levels than wells closer to the landfill. In the vicinity of the former Organics Plant, MW-5I and MW-12I showed xylene and volatile chlorinated aliphatic compounds above New York State Class GA standards. These two wells also contain elevated levels of toluic acid. Low concentrations of pesticides were detected in some of the Round 2 samples. Several metals exceeded NYSDEC Class GA standards in both rounds of sampling.

Spatial analysis of the Round 1 results showed that the elevated volatile contamination is occurring in the immediate vicinity of the landfill, and near the former Organics Plant (Figure 4-16). A similar distribution was noted for the phenolics and aromatic acids (Figures 4-17 and 4-18). There were no detectable organic compounds along the northwest and northern boundary of the property (as represented by MW-8, MW-9, MW-10, and MW-11).

Spatial analysis of the Round 2 results showed that the elevated volatiles, phenolics, and aromatic acid contamination was occurring in two areas, in the immediate vicinity of the landfill, and near the former Organics Plant. This was consistent with the Round 1 results. There were no detectable volatile compounds along the northwestern and northern boundary of the property. These compounds were observed in a property line well immediately west of the landfill (MW-7I), and in an offsite western well (MW-16I). Two of the Phase II

wells, MW-12I (located north of the former Organics Plant building) and MW-18I (located northwest of the former Organics Plant), showed a presence of both chlorinated aliphatics and aromatics volatiles with xylene being the highest in concentration.

Spatial comparison between Rounds 1 and 2 verifies that there appears to be no organic contamination in the northwest quadrant relative to the former Organics Plant. For Phase I wells sampled in both rounds, the second round showed higher relative concentrations than the first round for individual wells. This may be due to the effect of drought conditions during Phase II sampling. Aromatic acids and elevated volatile contamination (xylenes) is occurring in the immediate vicinity of the landfill, and near the former Organics Plant as confirmed in both rounds.

The following subsections provide a detailed discussion of the analytical results.

4.7.1 Target Compound List Organics - Round 1

4.7.1.1 Volatiles

The Round 1 samples of the upper bedrock wells showed no detectable volatile compounds in 5 wells (MW-6I, MW-8I, MW-9I, MW-10I, and MW-11I). Up to 12 volatile compounds were identified in the remaining 6 wells, with 5-7 present in the individual wells. The compound classes identified included 6 chlorinated aliphatics (chloroethane, vinyl chloride, 1,1-dichloroethene, 1,2-dichloroethene, trichloroethene, and tetrachloroethene), 2 ketones (acetone, 4-methyl-2-pentanone), and 3 aromatics (benzene, toluene, and xylenes). The most frequently detected chlorinated aliphatics identified in these wells were 1,2-dichloroethene (8 of 13 samples), trichloroethene (7 of 13 samples), and tetrachloroethene (6 of 13 samples). The maximum observed concentrations of these 3 compounds were 160, 190, and 2,300 $\mu\text{g/L}$, respectively. There were no detectable volatile TICs in these samples.

Comparison to the NYSDEC standards or guidance values for the VOCs showed that concentrations of vinyl chloride (2 of 13 samples), 1,2-dichloroethene (3 of 13 samples), trichloroethene (5 of 13 samples), benzene (1 of 13 samples), tetrachloroethene (5 of 9 samples), toluene (7 of 13 samples), and xylenes (7 of 13 samples) were above their respective standard or guidance values.

4.7.1.2 Semi-Volatiles

Up to 19 BNA compounds were identified in the upper bedrock wells, with from 1 to 12 present in the individual samples. The chemical classes present included 4 phenolics (phenol, 2-methylphenol, 3-methylphenol, and pentachlorophenol), 4 aromatic acids (benzoic acid, *m*-, *p*-, and *o*-toluic acids), 3 PAHs, 3 phthalates, and 5 miscellaneous compounds. The aromatic acids were present at the greatest frequency, followed by the phenolic compounds. The *o*-, *m*-, and *p*-isomers of toluic acid were present at the greatest overall concentration, with maximum observed concentrations of 87, 50, and 5.4 mg/L , respectively. The wells located on the northwestern and northern property boundaries showed no detectable phenolics or aromatic acid compounds. Five of the sampled wells (MW-1I, MW-2I, MW-3I, MW-4I, and MW-7I) showed the presence of TICs, which are summarized

by general class in Table 4-17. Benzene derivatives and aliphatic acids were represented as TICs. Some of the benzene compounds (e.g., 4-methyl benzenemethanol) may be a degradation product of toluic acid.

A review of the data showed that the phenolic compounds were identified concurrently with toluic acid (albeit at lower concentrations). This may be indicative of degradation of the toluic acid isomers to these compounds.

The semi-volatile compounds showed that concentrations for phenol (7 of 13 samples), 2-methylphenol (4 of 13 samples), 4-methylphenol (6 of 13 samples), benzo(a)anthracene (1 of 13 samples), and bis(2-ethylhexyl)phthalate (1 of 13 samples) were above their respective NYSDEC standards or guidance values.

4.7.1.3 Pesticide/Polychlorinated Biphenyls

There were no detectable pesticide/PCBs in any of the Round 1 upper bedrock wells.

4.7.2 Target Compound List Organics - Round 2

4.7.2.1 Volatiles

Two of the 7 Phase II wells installed for Round 2 (MW-15I and MW-17I) were dry at the time of sampling. Round 2 samples of the upper bedrock wells showed no detectable TCL volatile compounds in 5 of 16 wells (MW-8I, MW-9I, MW-10I, MW-11I, and MW-14I). Up to 11 volatile compounds were identified in the remaining 11 wells, with from 1 to 7 present in the individual wells. The compounds classes identified included 6 chlorinated aliphatics (chloroethane, vinyl chloride, 1,1-dichloroethene, 1,2-dichloroethene, trichloroethene, and tetrachloroethene), 1 ketone (acetone), and 4 aromatics (benzene, toluene, ethyl benzene, and xylenes).

The most frequently detected chlorinated aliphatics identified in these wells were 1,2-dichloroethene (9 of the 17 samples), followed by trichloroethene (5 of 17 samples). The maximum observed concentrations of these 2 compounds were 1,500 and 54 $\mu\text{g/L}$, respectively, and both of which were detected in MW-3I. Tetrachloroethene, 1,1-dichloroethane, vinyl chloride, and chloroethane were present in 3 of the 11 remaining samples, with maximum concentrations of 190, 150, and 49 $\mu\text{g/L}$, respectively.

Aromatic compounds appeared in all of the 11 wells containing volatiles. The most frequently detected volatile aromatic identified in these 11 wells was xylene (10 of 11 wells), followed by toluene (7 of 11 wells). The maximum observed concentrations of these two compounds was 1,900 $\mu\text{g/L}$ (MW-4I) and 37 $\mu\text{g/L}$ (MW-3I), respectively. Benzene and ethyl benzene were detected at sub-SQL concentrations only once in MW-13I and MW-5I, respectively.

Unknown VOCs were detected in 3 of the sampled wells (MW-18I, MW-9I, and MW-11I). The number of TICs detected ranged from 1 to 9 and total concentrations ranged from 24 to 135 $\mu\text{g/L}$.

Comparison to the NYSDEC standards or guidance values for the VOCs showed that concentrations of vinyl chloride (1 of 17 wells), 1,2-dichloroethene (8 of 17 wells), trichloroethene (4 of 17 wells), benzene (1 of 17 wells), tetrachloroethene (3 of 17 wells), toluene (5 of 17 wells), and xylenes (10 of 17 wells) were above their respective standards or guidance values.

4.7.2.2 Semi-Volatiles

Up to 11 BNA compounds were identified in the upper bedrock wells, with from 1 to 7 compounds present in 13 of the 17 wells. The chemical classes present included 4 phenolics (phenol, 2-methylphenol, 3-methylphenol, and 2,4-dimethylphenol), 3 aromatic acids (*m*-, *p*-, and *o*-toluic acids), 2 PAHs, and 2 phthalates.

The aromatic acids were present at the greatest frequency, followed by the phenolic compounds. The *o*-, *m*-, and *p*-isomers of toluic acid were present in 12 of the 17 wells at the greatest overall (maximum) concentration of 220, 150, and 240 mg/L, respectively. Well MW-2I showed the greatest total toluic acid concentration (560 mg/L), followed by MW-1I (429 mg/L) and MW-7I (122 mg/L). Offsite well MW-16I showed a total toluic acid concentration of 5.9 mg/L, with *o*, *m*, and *p*-isomer concentrations of 4.5, 1.2, and 0.19 mg/L, respectively. The remaining seven wells showed concentrations less than 76 mg/L.

The phenolic compounds were present in 8 of the 17 wells, with from 1 to 3 compounds present in individual samples. The maximum observed concentrations for phenol, 2-methylphenol, and 4-methylphenol were observed in MW-1I at 2,400, 30, and 69 µg/L, respectively. Five other wells also contained 3 of the 4 detected phenols (MW-2I, MW-6I, MW-7I, MW-12I, and MW-16I) at concentration ranges of from 1 to 370 µg/L. The wells located on the northwestern and northern property boundaries showed no detectable phenolic or aromatic compounds with the exception of MW-18I, where 2,4-Dimethylphenol was detected below the SQL at 7 µg/L.

Three of the sampled wells (MW-3I, MW-6I, and MW-12I) showed the presence of TICs that were also present in the Round 1 samples. With the exception of 3 wells (MW-10I, MW-14I, and MW-16I), all the wells indicated unknown compounds ranging from 1 to 20 per sample, and ranging from 9 to 17,600 µg/L in concentrations.

The semi-volatile compounds showed concentrations of phenol (6 of 17 wells), 2-methylphenol (3 of 17 samples), 4-methylphenol (4 of 17 wells), and bis(2-ethylhexyl) phthalate (1 of 17 wells) above their respective standard or guidance values.

4.7.2.3 Pesticide/Polychlorinated Biphenyls

The Round 2 samples showed the presence of 4,4'-DDE not identified in the Round 1 sampling of upper bedrock wells. Wells MW-3I and MW-4I had 0.23 and 0.61 µg/L, respectively. All other wells were non-detect.

4.7.3 Target Analyte List Inorganics - Round 1

Up to 20 TAL analytes were identified in the Round 1 samples of the upper bedrock ground water, with from 11 to 18 present in the individual samples. Nine of the positively detected analytes (arsenic, chromium, cobalt, lead, mercury, nickel, vanadium, zinc, and cyanide) were detected in only a portion of the wells. Comparison of the observed concentrations to the Class GA standards or guidance values showed that aluminum (13 of 13 samples), arsenic (2 of 9 samples), chromium (1 of 13 samples), cobalt (8 of 13 samples), iron (13 of 13 samples), lead (1 of 8 samples), manganese (3 of 13 samples), and sodium (6 of 8 samples) concentrations were above their respective standard or guidance values.

4.7.4 Target Analyte List Inorganics - Round 2

Up to 21 TAL analytes were identified in the Round 2 samples of the upper bedrock ground water, with from 10 to 20 present in the individual samples. Fourteen of the positively detected analytes (arsenic, barium, beryllium, cadmium, chromium, copper, cobalt, lead, mercury, nickel, selenium, thallium, vanadium, and cyanide) were detected in only a portion of the samples. Comparison of the observed concentrations to the Class GA standards or guidance values showed that aluminum (17 of 17 samples), arsenic (6 of 10 samples), cadmium, (1 of 5 samples), chromium (1 of 13 samples), cobalt (8 of 13 samples), iron (16 of 16 samples), lead (5 of 15 samples), magnesium (1 of 17 samples), manganese (6 of 17 samples), sodium (17 of 17 samples), and zinc (1 of 17 samples) concentrations were above their respective standard or guidance values. Iron data for 1 well was rejected during data validation.

4.7.5 Water Quality Parameters - Round 1

Up to 9 water quality parameters were positively identified, with from 7 to 8 present in the individual samples. The comparison to NYSDEC Class A or GA standards and guidance values showed that chloride (3 of 13 samples), fluoride (7 of 13 samples), ammonia (7 of 13 samples), and pH (4 of 9 samples) were in excess of the standards. The observed sulfate concentrations were all below the standard. The maximum observed concentrations for chloride, ammonia, and fluoride were 340, 32.9, and 15 mg/L, respectively. The maximum observed pH measurement from the sampled wells was 10.38. There were no NYSDEC standards for alkalinity, hardness, total suspended solids, or dissolved organic carbon.

4.7.6 Water Quality Parameters - Round 2

Water quality parameters were not determined in the Round 2 sampling event. Field measurements of pH, Eh, and conductivity were determined at time of sampling. The comparison to the NYSDEC Class A standard showed that 7 of the 16 sampled wells exceeded the upper pH limit. The maximum observed pH was 11.35. The eH measurements ranged from -71 to 371 millivolts (mean: 164 millivolts), and the conductivity ranged from 513 to 16,940 μ mhos/cm (mean: 3,786 μ mhs/cm). There was no NYSDEC standard for eH or conductivity.

4.8 DEEP BEDROCK GROUND WATER

Nine wells installed as part of the Phase I investigation, and six additional wells installed as part of the Phase II investigation, were used to characterize the deep bedrock ground water. Wells installed as part of Phase I had two rounds of analytical sampling, while those for Phase II had one round of sampling. The sampling locations are shown on Plate 2. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. The ground-water samples were not filtered prior to chemical analysis.

The analytical results for TCL organics are summarized in Table 4-18 and detailed in Tables D-19A and D-19B. The analytical results for TAL inorganics are summarized in Table 4-19 and detailed in Tables D-20A and D-20B. The single round analytical results of water quality parameter measurements are summarized in Table 4-19 and detailed in Table D-21. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

Six of the 9 Phase I deep bedrock wells contained volatile compounds, representing the chlorinated aliphatic, ketone, and aromatic volatile classes. Two of the 9 wells showed concentrations above the NYSDEC standards or guidance values for these compounds. Four of the 9 Phase I wells showed phenolic compounds and the three toluic acid isomers. Wells MW-1D and MW-2D showed concentrations above the NYSDEC Class GA standards or guidance values for the phenolic compounds.

One of the 6 Phase II wells (MW-7D) sampled contained volatile compounds, representing the chlorinated aliphatic, ketone, and aromatic volatile classes. One of the wells showed concentrations above the NYSDEC Class GA standards for certain of these compounds. This well also showed the presence of phenolic compounds and the three toluic acid isomers, as well as a low concentration of pesticides in one round of samples.

Spatial analysis of the Round 1 results showed that the elevated volatile contamination is occurring in the immediate vicinity of the landfill (Figure 4-19). A similar distribution was noted for the phenolics and aromatic acids (Figures 4-20 and 4-21). There were no detectable volatile compounds along the northwest and northern boundary of the property.

Spatial analysis of the Round 2 results showed that the elevated volatile contamination is occurring west of the landfill. MW-2D was dry during Round 2 sampling. There were no detectable volatile compounds along the east, northwest, and northern boundaries of the property, or in the offsite well.

Wells MW-1D, MW-2D, MW-3D, and MW-4D, which are immediately adjacent to the landfill on the south, west, and north sides, were all dry during Round 2. In Round 1, MW-1D and MW-2D showed elevated levels of toluic acid and MW-4D also had toluic acid present. Several volatile aliphatic organic compounds and phenolic compounds were detected in MW-1D and MW-2D. Well MW-7D was installed during Phase II and is located west of the landfill and MW-2D along Jordan Road. It also showed the presence of phenolic compounds, volatile chlorinated aliphatic compounds, xylene, and toluene. Elevated levels

of toluic acid were also present in MW-7D. Well MW-16D, which is located west of MW-7D and off the site across Jordan Road, showed no detectable levels of contamination.

No deep wells in the north and northwestern portion of the site showed detectable levels of organics. Round 1 samples showed no detectable levels of pesticides, whereas Round 2 samples showed low concentrations of pesticides. Levels of several metals in both rounds of sampling were above their respective NYSDEC ground-water quality standards.

The following subsections provide a detailed discussion of the analytical results.

4.8.1 Target Compound List Organics - Round 1

Comparison to the NYSDEC standards or guidance values for the VOCs show levels of 1,2-dichloroethene (1 of 9 samples), tetrachloroethene (2 of 9 samples), toluene (2 of 9 samples), and xylenes (2 of 9 samples) above their respective standard or guidance value. The semi-volatile compounds showed levels of phenol (1 of 9 samples), 2-methylphenol (1 of 9 samples), and 4-methylphenol (1 of 9 samples) above their respective standard or guidance value. Although the NYSDEC standards do not specify standards for the toluic acid isomers, data should be compared against risk-based levels calculated as part of the risk assessment analysis.

4.8.1.1 Volatiles

The Round 1 samples of the deep bedrock wells showed no detectable volatile compounds in 4 samples (MW-6D, MW-9D, MW-10D, and MW-11D). Up to 10 volatile compounds were identified in the remaining 6 wells, with from 1 to 9 present in the individual samples. The compounds classes identified included 4 chlorinated aliphatics (1,1-dichloroethane, 1,2-dichloroethene, trichloroethene, and tetrachloroethene), 2 ketones (acetone and 4-methyl-2-pentanone), and 4 aromatics (benzene, toluene, ethylbenzene, and xylenes). The most frequently detected chlorinated aliphatic identified in these samples was 1,1-dichloroethane (3 of 9 samples). The compound 1,2-dichloroethene showed the highest concentration (94 $\mu\text{g/L}$) of the chlorinated aliphatics present. The aromatics were each found in 2 of the 9 wells sampled, with maximum observed concentrations for benzene, toluene, ethylbenzene, and xylenes of 3, 23, 3, and 520 $\mu\text{g/L}$, respectively. The maximum concentrations were all observed in MW-1D. There were no detectable volatile TICs in these samples.

4.8.1.2 Semi-Volatiles

The Round 1 samples showed no detectable semi-volatile compounds in 5 wells (MW-5D, MW-6D, MW-9D, MW-10D, and MW-11D). These were the same wells which showed no volatile contamination plus MW-5D. Up to 10 semi-volatile compounds were identified in the remaining deep bedrock wells, with from 1 to 6 present in the individual samples. The chemical classes present included 5 phenolics (phenol, 2-methylphenol, 3-methylphenol, 2,4-dimethylphenol, and pentachlorophenol), 4 aromatic acids (benzoic acid, *m*-toluic acid, *p*-toluic acid, and *o*-toluic acid), 3 PAHs, 3 phthalates, and 5 miscellaneous compounds. The *o*-, *m*-, and *p*-isomers of toluic acid were present at the greatest frequency (up to 3 of the 9 samples) and greatest overall concentration, with maximum observed concentrations of

20, 9, and 1.1 mg/L, respectively. Four of the sampled wells (MW-1D, MW-2D, MW-5D, and MW-10D) showed the presence of unknown compounds.

A review of the data showed that the phenolic compounds and benzoic acid were found concurrently with toluic acid. This may be indicative of biodegradation of the toluic acid isomers to these compounds and will be evaluated in Chapter 5.

4.8.1.3 Pesticide/Polychlorinated Biphenyls

There were no detectable pesticide/PCBs in any of the Round 1 deep bedrock samples.

4.8.2 Target Compound List Organics - Round 2

4.8.2.1 Volatiles

The Round 2 samples of the deep bedrock wells were taken from 6 wells. Nine wells were dry and could not be sampled. These included MW-1D, MW-2D, MW-3D, MW-4D, MW-5D, MW-6D, MW-10D, MW-11D, and MW-14D). Five of the 6 remaining wells showed no detectable volatile compounds (MW-9D, MW-13D, MW-15D, MW-16D, and MW-17D). Seven volatile compounds were identified in the remaining well (MW-7D).

The compounds classes identified included chlorinated aliphatics (1,1-dichloroethane, 1,2-dichloroethene, trichloroethene, and tetrachloroethene), ketones (acetone), and aromatics (benzene, toluene, ethylbenzene, and xylenes). The compound 1,2-dichloroethene showed the highest concentration (5 $\mu\text{g/L}$) of the chlorinated aliphatics present. The acetone concentration was (47 $\mu\text{g/L}$) and the aromatics concentrations for toluene and xylenes were 4 and 330 $\mu\text{g/L}$, respectively. One unknown compound was detected in sample MW-13D.

Comparison to the NYSDEC standards or guidance values for the VOCs showed that concentrations of trichloroethene (1 of 6 samples), tetrachloroethene (1 of 6 samples), toluene (1 of 6 samples), and xylenes (1 of 6 samples) were above their respective standard or guidance value.

4.8.2.2 Semi-Volatiles

Well MW-7D was the only deep bedrock well sampled which showed the presence of BNA compounds. The Round 2 sample of this well showed eight detectable BNA compounds. The chemical classes present included 4 phenolics (phenol, 2-methylphenol, 4-methylphenol, and pentachlorophenol), 3 aromatic acids (*m*-toluic acid, *p*-toluic acid, and *o*-toluic acid), and a PAH (naphthalene). The *o*-, *m*-, and *p*-isomers of toluic acid were present with the greatest overall concentrations of 17, 17, and 13 mg/L, respectively. One unknown compound was detected in sample MW-9D.

The semi-volatile compounds showed exceedances of NYSDEC standards for phenol (1 of 6 samples), 2-methylphenol (1 of 6 samples), and 4-methylphenol (1 of 6 samples).

4.8.2.3 Pesticide/Polychlorinated Biphenyls

There was one detectable pesticide/PCBs (4,4-DDE) at the concentration of 0.14 $\mu\text{g/L}$ in MW-7D of the Round 2 deep bedrock samples.

4.8.3 Target Analyte List Inorganics - Round 1

Up to 19 TAL analytes were identified in the Round 1 samples of the deep bedrock ground water, with from 7 to 14 analytes present in the individual samples. Comparison of the observed concentrations to the Class GA standards or guidance values showed that concentrations of aluminum (5 of 6 samples), arsenic (2 of 9 samples), cobalt (1 of 9 samples), iron (8 of 9 samples), nickel (3 of 9 samples), and sodium (8 of 9 samples) were above their respective standard or guidance values.

4.8.4 Target Analyte List Inorganics - Round 2

Up to 19 TAL analytes were identified in the Round 2 samples of the deep bedrock ground water, with from 12 to 17 analytes present in the individual samples. Comparison of the observed concentrations to the Class GA standards or guidance values showed that concentration of aluminum (4 of 4 samples), antimony (1 of 6 samples), arsenic (1 of 6 samples), iron (4 of 4 samples), magnesium (1 of 6 samples), manganese (1 of 6 samples), nickel (1 of 9 samples), and sodium (3 of 6 samples) were above their respective standard or guidance values. Two iron results were rejected during data validation.

4.8.5 Water Quality Parameters - Round 1

Up to 9 water quality parameters were positively identified, with 6-9 present in the individual samples. The comparison to the Class GA standards and guidance values showed that fluoride (2 of 9 samples) and ammonia (1 of 9 samples) were in excess of their standards. The maximum observed concentrations for fluoride and ammonia were 10 and 3.8 mg/L, respectively. The observed sulfate concentrations were all below the standard. There were no NYSDEC standards for alkalinity, hardness, total suspended solids, or dissolved organic carbon.

Field measurements of pH and conductivity were determined at the time of sampling. The comparison to the NYSDEC Class A standard showed that 2 of the 9 wells exceeded the upper pH limit. The maximum observed pH was 10.42. Conductivity ranged from 350 to 3,800 $\mu\text{mhos/cm}$. There was no standard for conductivity.

4.8.6 Water Quality Parameters - Round 2

Water quality parameters were not collected in the Round 2 sampling event. Field measurements of pH, eH, and conductivity were determined at the time of sampling. The comparison to the NYSDEC Class A standard showed that 2 of the 7 sampled wells exceeded the upper pH limit. The maximum observed pH was 11.65. The eH measurements ranged from -20 to 397 millivolts (mean: 237 millivolts), and the conductivity ranged from 348 to 13,040 $\mu\text{mhos/cm}$ (mean: 3,221 $\mu\text{mhos/cm}$).

4.9 INORGANIC SLUDGE DISPOSAL AREA

Samples were collected from each of the 3 inorganic sludge disposal area monitoring wells located east of the landfill. These wells were installed in the early 1980s as part of a RCRA closure of sludge disposal area basins. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide.

4.9.1 Target Compound List Organics

The results are summarized in Table 4-20 and detailed in Table D-22. All data were validated to confirm compliance with NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

All inorganic sludge basin wells were free of detectable volatile, semi-volatile, and pesticide/PCB compounds.

4.9.2 Target Analyte List Inorganics

The results are summarized in Table 4-20 and detailed in Table D-23. All data were validated to confirm compliance with NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

Up to 13 inorganic analytes were detected with 9-12 analytes observed in the individual samples. Concentrations of inorganics were fairly consistent between the 3 wells except for iron (range: from 470 to 10,500 $\mu\text{g/L}$), manganese (range: from 17.4 to 202 $\mu\text{g/L}$), sodium (range: from 1,200 to 26,400 $\mu\text{g/L}$), and zinc (range: from 18.5 to 54.6 $\mu\text{g/L}$).

Comparison to NYSDEC Class A or Class GA standards or guidance values showed that concentrations of aluminum (1 of 3 wells), iron (3 of 3 wells), nickel (1 of 3 wells), and sodium (1 of 3 wells) were above their respective standard or guidance values.

4.10 LANDFILL PIEZOMETERS

The two landfill piezometers installed as part of the Phase I field program were sampled during the Round 2 field program and used to characterize the leachate within the landfill. The sampling locations are shown on Plate 2. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. These samples were not filtered prior to chemical analysis.

4.10.1 Target Compound List Organics

The results are shown in Table 4-21. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

4.10.1.1 Volatiles

Up to 3 volatile compounds were identified in these samples. Ethylbenzene was detected only in LFP-02 (160 µg/L). Toluene (range: from 140 to 1,600 µg/L; mean: 870 µg/L) and xylenes (range: from 7,900 to 73,000 µg/L; mean: 40,450 µg/L) were detected in both samples. There were no detectable TICs in these samples. A review of the data indicated that the leachate showed higher concentrations of volatiles on the southern side of the landfill.

4.10.1.2 Semi-Volatiles

The only semi-volatile compounds identified were the toluic acid isomers. Other compounds may have been present but could not be detected due to the large dilution factor required for these analyses. The *m*-isomer of toluic acid showed the greatest overall concentration (range: from 78 to 100 mg/L; mean: 89 mg/L), followed by the *o*-isomer (range: from 30 to 40 mg/L; mean: 35 mg/L), and *p*-isomer (range: from 23 to 42 mg/L; mean: 27.5 mg/L). Twenty compounds were present in each of these samples, but the laboratory was unable to provide any library matches.

4.10.1.3 Pesticide/Polychlorinated Biphenyls

There were no detectable pesticide/PCBs in the landfill piezometers except for 4,4'-DDE (range: from 0.053 to 0.19 µg/L; mean: 0.12 µg/L).

4.10.2 Target Analyte List Inorganics

The results are shown in Table 4-22. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

A total of from 15 to 16 inorganic analytes were identified in the landfill piezometer samples. The observed concentrations for most of the positively identified analytes were greater than those observed for the other aqueous matrices at the site. A review of this data and comparison to the organics results showed that when there were both high xylene and high toluic acid concentrations, the cobalt concentrations were also elevated. Cobalt was reportedly used as a catalyst in the production of toluic acid.

4.11 SURFACE WATER AND STREAM SEDIMENTS

Four samples each of Skaneateles Creek surface water and sediments were obtained in two rounds of sampling. The sampling locations are shown on Figure 2-7. These samples were analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide. The surface water samples were not filtered prior to chemical analysis.

4.11.1 Surface Water

The 4 surface water samples were identified as SW-01 through SW-04, with numbering increasing as the samples moved upstream. The two rounds of sampling confirmed that the surface water samples were free of detectable volatile compounds. The single positive semi-volatile result from the Round 1 sampling may have been false-positive since it was not detected in the second round samples. The inorganic results showed no significant effect of the site on inorganic water quality of the stream.

4.11.1.1 Target Compound List Organics - Round 1

The results are summarized in Table 4-23 and detailed in Table D-24A. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The first round of samples of surface water showed no detectable VOCs. Bis(2-ethylhexyl) phthalate was the only semi-volatile compound identified, and was present in one sample (SW-03; 210 µg/L). The calculated mean concentration (46 µg/L) and the maximum observed value were both in excess of the Class A guidance value for this analyte. However, the presence of this analyte may be artifactual, since this is a common laboratory contaminant and the low concentration suggests that it may not be representative of true environmental contamination. Low levels of from 1 to 2 BNA TICs were also present in these samples. There were no detectable pesticides or PCBs in these samples.

4.11.1.2 Target Compound List Organics - Round 2

The results are summarized in Table 4-23 and detailed in Table D-24B. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

There were no detectable volatile, semi-volatile, or pesticide/PCB analytes in these samples. Sample SW-01DUP showed one unknown compound, and SW-02 showed three unknown compounds and one known TIC (hexadecanoic acid).

4.11.1.3 Target Analyte List Inorganics - Round 1

The results are summarized in Table 4-24 and detailed in Table D-25A. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The first round of samples showed up to 12 TAL analytes present, with from 10 to 12 identified in the individual samples. Arsenic, lead, and zinc were the only analytes not found at all of the sampling locations. Comparison of the mean and maximum observed concentrations to NYSDEC Class A standards and guidance values showed the aluminum and antimony results were above these values. Four of the 5 aluminum results were above the 100 µg/L Class A standard, and all of the antimony results were above the 3 µg/L Class A

guidance value. However, for both of these analytes, the upstream concentrations were greater than the 4 downstream samples.

Table 4-24 also compares the observed inorganic concentrations to those anticipated to reflect background concentrations in surface waters (Bodek et al. 1988). The comparison showed that in most cases the observed concentrations were within those anticipated as background, with the exception of antimony and sodium. This variance does not appear to be attributable to the site since for both of these analytes the upstream concentrations were greater than the 4 downstream samples.

4.11.1.4 Target Analyte List Inorganics - Round 2

The results are summarized in Table 4-24 and detailed in Table D-25B. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

Up to 9 inorganic analytes were detected with from 8 to 10 analytes detected in the individual samples. Lead was the only analyte not detected at all of the sampling locations. None of the observed concentrations were above the NYSDEC Class A standards or guidance values. The observed concentrations were also consistent with the background concentrations anticipated for surface waters (Bodek et al. 1988).

The second round results were generally consistent with those observed in Round 1. Antimony, arsenic, barium, and zinc were detected in the Round 1 sample but not in the Round 2 sample.

4.11.1.5 Water Quality Parameters

A total of 9 water quality parameters were analyzed in the 5 Round 1 surface water samples. The results are summarized in Table 4-24, and detailed in Table D-26. Fluoride, ammonia, and total suspended solids were not detected in any of the samples. The remaining 6 parameters were detected in all of the samples, with the maximum observed concentrations of chloride, nitrate, sulfate, alkalinity, hardness, and dissolved organic carbons of 57, 1.2, 20.9, 165, 204, and 52.5 mg/L, respectively. The maximum observed concentrations for chloride, nitrate, and sulfate were below the NYSDEC Class A standards. No standards have been established for the remaining water quality parameters.

Comparison of the water quality parameter results from the downstream locations showed some variation with the upstream sample (SW-4). The anticipated environmental variation, quantified from the duplicate field samples, for chloride, sulfate, alkalinity, hardness, and TOCs were 4, 31, 17, 6, and 32 percent, respectively. A review of the individual results showed that the spatial variation for these parameters was slightly greater than that expected from natural variation. The environmental setting of the stream changes as it passes through the site due to the passage over the remnants of the old dam. There is a drop of approximately 10 ft of the stream surface from just upstream of the former rock dam to the exit point on the northern side of the site.

4.11.2 Stream Sediments

The 4 stream sediment samples were identified as SD-01 through SD-04, and were collected at the same location as the surface water samples. The sample numbering increases as the samples moved upstream.

4.11.2.1 Target Compound List Organics - Round 1

The results are summarized in Table 4-25 and detailed in Table D-27A. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The first round of samples of stream sediment samples showed the presence of 2 volatile compounds in one sample (SD-03). The observed concentrations of tetrachloroethene and xylenes were 16 $\mu\text{g/kg}$ and 2 $\mu\text{g/kg}$, respectively (Figures 4-22 and 4-23). There were no identifiable TICs, but 2 samples (SD-01 and SD-04) each showed the presence of a single unknown compound.

The first round sediment samples showed the presence of PAHs in all downstream samples (SD-01, SD-02, and SD-03). Individual samples contained from 2 to 17 PAHs, with the largest number observed in SD-03. Sample SD-03 contained the largest total PAH concentration (44.1 mg/kg), followed by SD-01 (10.2 mg/kg), SD-02 (1.8 mg/kg), and SD-01DUP (1.5 mg/kg). The spatial distribution of PAHs is shown on Figure 4-24. SD-03 also showed 6 BNA TICs that were PAHs, and the largest number of unknown compounds compared to the other samples. There were no detectable pesticides or PCBs in these samples (Figure 4-25).

4.11.2.2 Target Compound List Organics - Round 2

The results are summarized in Table 4-25 and detailed in Table D-27B. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The second round samples showed up to 8 volatile organics with from 1 to 8 detected in 3 of the samples (SD-02, SD-03, and SD-04). Sample SD-01 (and its duplicate) showed no detectable volatile analytes. Compound classes included chlorinated alkenes (vinyl chloride and 1,2-dichloroethene), ketones (acetone and 2-butanone), and aromatics (toluene, ethylbenzene, and xylenes). Sample SD-03 showed the greatest volatile concentrations relative to the other samples. The maximum observed concentration for vinyl chloride (12 $\mu\text{g/kg}$), 1,2-dichloroethene (1,100 $\mu\text{g/kg}$), toluene (48 $\mu\text{g/kg}$), and xylenes (3,600 $\mu\text{g/kg}$). The spatial distribution of the aromatic and chlorinated volatiles is shown in Figures 4-22 and 4-23.

Up to 20 semi-volatile organics were identified, with from 8 to 16 identified in 3 of the samples. Sample SD-04 showed no detectable semi-volatile organics. PAHs were the dominant chemical class represented, detected in all 3 of the contaminated samples. The three toluic acid isomers were detected in SD-03. This sample also contained elevated

xylenes, and was located near the creek seep which emanates from the rock dam remnants (Figure 4-24).

Six pesticide/PCB analytes were identified in the samples, with from 2 to 3 identified in 3 samples (SD-01, SD-02, and SD-03). Sample SD-02 showed the highest concentrations of these analytes relative to the other samples. All concentrations were less than 21 $\mu\text{g/kg}$ (Figure 4-25).

4.11.2.3 Target Analyte List Inorganics - Round 1

The results are summarized in Table 4-26 and detailed in Table D-28A. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The first round of samples showed up to 21 TAL analytes present with from 20 to 21 present in the samples.

Spatial analysis of the Round 1 data showed that the inorganic concentrations were fairly uniform across all the sampling locations, except for calcium, lead, magnesium, manganese, and zinc which all increased downstream. These increases were greater than the anticipated environmental variability of these analytes. The latter determined from the field duplicate data that calcium, lead, magnesium, manganese, and zinc would be 74, 106, 42, 3, and 46 percent, respectively.

The observed concentrations were also consistent with those considered typical background.

4.11.2.4 Target Analyte List Inorganics - Round 2

The results are summarized in Table 4-26 and detailed in Table D-28B. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

Up to 22 TAL analytes were detected in the Round 2 samples, with from 19 to 21 identified in the 5 samples. The observed concentrations were consistent with those observed in Round 1, including the spatial variability noted in that round of samples. All observed concentrations fell within the range anticipated as background.

4.12 BASEMENT SEEP

Seeps are entering the basement of the former Organics Plant at several locations. These are collected into a sump which is periodically pumped to the onsite treatment system. A sample of the basement seep (plus one duplicate) was obtained during both sampling rounds and analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide.

4.12.1 Target Compound List Organics - Round 1

The results are summarized in Table 4-27 and detailed in Table D-29A. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The first round of basement seeps sampled showed up to 7 VOCs. The chemical classes represented included 5 chlorinated aliphatics (1,1,-dichloroethane, 1,2-dichloroethene, 1,1,1-trichloroethane, trichloroethene, and tetrachloroethene) and 1 aromatic (xylene). The concentrations levels for the chlorinated compounds were less than 10 $\mu\text{g/L}$. Xylenes were present from 220 to 240 $\mu\text{g/L}$. There were no VOC TICs identified in these samples.

Two phenolic compounds (2,4-dimethylphenol and pentachlorophenol) and 2 toluic acid isomers (*ortho* and *meta*) were present in the basement seep. Toluic acid showed the greatest overall concentration of all the organics identified. The sample also showed the presence of benzene-derivative TICs. There may be biodegradation products of toluic acid or reaction products from toluic acid production.

There were no detectable pesticide/PCBs in the Round 1 seep samples.

4.12.2 Target Compound List Organics - Round 2

The results are summarized in Table 4-27 and detailed in Table D-29B. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The second round samples showed up to 6 volatiles, including chlorinated aliphatics (1,1-dichloroethane, trichloroethane, and tetrachloroethene), and 3 aromatics (toluene, ethylbenzene, and xylenes). The concentrations for all the aliphatics were sub-SQL and less than 5 $\mu\text{g/L}$. Xylenes were present at greater concentrations than the Round 1 samples, with a range of from 1,700 to 2,500 $\mu\text{g/L}$. Ethylbenzene (range: from 10 to 13 $\mu\text{g/L}$) and toluene (range: from 10 to 11 $\mu\text{g/L}$) were observed in the Round 2 samples only.

The second round samples also showed the presence of 2 phenolic compounds (2,4-methylphenol and pentachlorophenol) and 2 toluic acid isomers. The observed concentrations were comparable to the phenolic compounds, but were lower for the toluic acid isomers, when the two sampling rounds are compared.

There were no detectable pesticide/PCBs in the Round 2 seep samples.

4.12.3 Target Analyte List Inorganics - Round 1

The results are summarized in Table 4-28 and detailed in Table D-30A. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The first round of analyses showed up to 13 TAL analytes. These analytes showed elevated concentrations of arsenic (mean: 40.2 $\mu\text{g/L}$), iron (mean: 2,480 $\mu\text{g/L}$), and lead (mean: 114 $\mu\text{g/L}$) compared to what is considered background water concentration. Comparison of these results to those from the landfill piezometers showed that although most of the analytes were detected, the relative concentrations differed.

4.12.4 Target Analyte List Inorganics - Round 2

The results are summarized in Table 4-28 and detailed in Table D-30B. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

The Round 2 samples showed slightly greater concentrations of arsenic (mean: 57.7 $\mu\text{g/L}$), iron (mean: 4,560 $\mu\text{g/L}$), and lead (mean: 173.5 $\mu\text{g/L}$) when compared to the Round 1 samples.

4.12.5 Water Quality Parameters

The results are summarized in Table 4-28 and detailed in Table D-31. All data were validated to confirm compliance with the NYSDEC Analytical Services Protocols and reviewed for data usability following EPA Region 2 protocols.

Up to 8 water quality parameters were identified in the basement seep. The maximum observed concentration for chloride (142 mg/L), alkalinity (1,170 mg/L), and dissolved organic carbons (114 mg/L). The remaining analyte concentrations were comparable to those anticipated for background water concentration.

4.13 RACEWAY AND HOLDING TANK LIQUID

A portion of the raceway which connected the former mill pond to the old section of the Main Plant Building can still be accessed. This raceway periodically collects liquids and may serve as a conduit for leachate migration within the building. Samples of the liquid present in the raceway and from the sanitary sewage leachfield holding tank were collected for TCL volatile, TCL semi-volatile plus toluic acid, TCL pesticide/PCB, and TAL metals plus cyanide.

4.13.1 Target Compound List Organics

The results are presented in Table 4-29. Chloroform and acetone were qualified the both the raceway fluid and holding tank liquid. Toluene (180 $\mu\text{g/L}$) was present in the holding tank liquid. There were no BNA TICs identified in the samples.

The raceway fluid contained sub-SQL concentrations of *m*-toluic acid (6 $\mu\text{g/L}$) and *o*-toluic acid (2 $\mu\text{g/L}$). The holding tank liquid showed the presence of two phenolic compounds and two toluic acid isomers.

4.13.2 Target Analyte List Inorganics

The results are presented in Table 4-30. TAL analytes were identified in the raceway fluid. Seventeen analytes were identified in the holding tank liquid sample. The raceway sample showed high concentrations of arsenic, lead, and sodium compared to background water concentration. The holding tank liquid sampled showed elevated levels of calcium, iron, mercury, and zinc relative to background water concentration.

4.14 STORMWATER COLLECTION PIT SAMPLE

The stormwater collection pit is located east of the Main Plant Building. This pit, which is actually remnants of the former mill discharge pipe, appears to intermittently contain infiltrated ground water or surface runoff. A sample of the water was collected and analyzed for TCL volatiles, TCL semi-volatiles plus toluic acid, TCL pesticide/PCBs, and TAL metals plus cyanide.

4.14.1 Target Compound List Organics

The results are provided in Table D-32. Five chlorinated aliphatics (1,1-dichloroethane, 1,2-dichloroethene, 1,1,1-trichloroethane, trichloroethane, and tetrachloroethene), 1 ketone (acetone), and 1 aromatic volatile (xylene) were detected in this sample. All chlorinated aliphatics were present at sub-SQL concentrations with the exception of 1,1-dichloroethane (28 µg/L).

Two phenolic compounds (2-methylphenol and 2,4-diethylphenol) were detected at sub-SQL levels in this sample. There were no toluic acid isomers detected.

There were 2 pesticides reported in this sample (endosulfan I and 4,4'-DDE) but the analysis did not meet quality control criteria and the results were rejected.

4.14.2 Target Analyte List Inorganics

The results are provided in Table D-33. There were 13 inorganics identified in this sample. The observed copper, iron, mercury, sodium, and zinc concentrations were greater than those anticipated for background water concentration, but were lower than observed in nearby overburden water (e.g., MW-5S, Table D-14B). Ground water did not appear to be the sole source of water in this collection pit.

4.15 PIEZOMETER WIPE

A gauze pad wipe of the oily residue present within a piezometer installed in the landfill was analyzed for TCL semi-volatiles (base-neutral compound only) and PCBs. The validated results are provided in Table D-34. There were no detectable semi-volatile base-neutral compounds or PCBs detected in this sample.

5. CONTAMINANT FATE AND TRANSPORT

The environmental fate and transport mechanisms for the contaminants identified at the SMC site are evaluated to determine the potential for continued onsite presence and offsite migration. Such information is critical to the determination of the: (1) current or future potential for contaminant exposure to human populations, and (2) potential technologies that may be appropriate for remediation of the site.

Three factors affect a contaminant's fate and transport in the environment: (1) physico-chemical characteristics of the contaminant, (2) site environmental characteristics, and (3) biological interactions.

5.1 CONTAMINANT PHYSICOCHEMICAL CHARACTERISTICS

Tables 5-1 and 5-2 summarize some of the physicochemical characteristics of the contaminants identified at the SMC site that can influence their fate and transport. These characteristics are discussed in the following sections.

5.1.1 Water Solubility

Water solubility is a measure of the contaminant's ability to dissolve in water, and is typically expressed in a unit of mass/volume (e.g., mg/L or $\mu\text{g/L}$). Aqueous solubility is one factor that can affect the contaminant's water concentration and residence time in water. Contaminants showing high water solubility remain in solution while contaminants with low water solubility tend to go out of solution or are lost to more hydrophobic surfaces. A review of Table 5-1 shows that aromatic volatiles (including xylene and toluene) and aromatic acids (including toluic acid isomers) are relatively soluble compared to other classes of compounds such as PAHs.

5.1.2 Volatilization

Volatilization describes the movement of a contaminant from the surface of a liquid or solid matrix to the vapor phase. Generally, only the neutral (uncharged) form of a contaminant can volatilize. Volatilization is calculated from the equilibrium vapor pressure which is essentially the solubility of the contaminant in air (quantified as a partial pressure). For purposes of quantifying a contaminant's fate in the environment, a more manageable index is the Henry's Law Constant, which is the ratio of the contaminant's vapor pressure and water solubility, reported in units of $\text{atm}\cdot\text{m}^3/\text{moles}$. Lyman et al. (1990) proposed that compounds with Henry's Law Constants of $> 10^{-3}$ are readily volatilized, compounds with Constants of 10^{-3} to 10^{-5} are significantly volatilized, and compounds with Constants of $< 10^{-5}$ have limited volatility.

A review of Table 5-1 shows that the benzene derivatives, chlorinated alkanes and alkenes, and non-chlorinated alkanes identified at the SMC site would readily volatilize when in

contact with the air. The PAHs, phthalates, aromatic acid compounds, and pesticides have extremely low Henry's Law Constants resulting in their limited volatility. Because of this distinction, the latter series of compounds tend to be conservative in surficial samples.

5.1.3 Adsorption/Desorption

Adsorption/desorption represents the degree to which contaminants are bound to be released from a solid matrix. Although it is often assumed in contaminant fate modeling that contaminant adsorption is a fully reversible process, several studies have shown that the process is only partially reversible, with the amount of reversibility decreasing the longer the material has been adsorbed (Di Toro and Horzempa 1982, 1983; Voice and Weber 1983). Strongly adsorbed contaminants are not available for loss processes such as hydrolysis and oxidation, and are not readily transported in the dissolved phase. However, because they bind strongly to solid matrices, they can be readily transported via particle transport mechanisms (e.g., surface runoff, suspended sediments in rivers or streams). Partition coefficients are used to quantitate adsorption and desorption.

Partition coefficients are concentration ratios of the contaminant between two phases, and include K_{ow} , K_d and K_{oc} ; all have units of L/kg. The K_{ow} is the octanol-water partition coefficient, quantifying the concentration ratio of the contaminant in the octanol (organic) phase and aqueous phase. The octanol is used as a surrogate for lipids. Hence, the K_{ow} is often related to contaminant partitioning from water to biota. The K_d is the concentration ratio of the contaminant between a solid and aqueous phase at steady-state. The K_d is a constant for inorganic analytes (i.e., metals) but varies for organic analytes. The latter phenomenon led to the use of the K_{oc} , which is the organic carbon-water partition coefficient. The product of the contaminant's K_{oc} and the organic carbon content of the site soils or sediments is the site-specific K_d for the contaminant. High values for K_{ow} , K_{oc} , and K_d indicate a preference of the contaminant for non-aqueous phases.

The benzene derivatives, chlorinated alkanes and alkenes, non-chlorinated alkanes, and aromatic acids have lower relative K_{ow} and K_{oc} values compared with the PAHs, phthalates, and pesticides. Therefore, these compounds would tend to be more mobile and less persistent in the environment compared to the latter series of compounds.

5.1.4 Hydrolysis

Hydrolysis is the reaction between the contaminant and hydrogen ions (H^+) or hydroxyl ions (OH^-) in the water. Contaminants subject to hydrolysis must have functional groups susceptible to attack, such as $-COOH$ or $-OH$. Hydrolysis is also a pH dependent process since the susceptibility of the functional groups varies with pH.

Most of the non-acidic compounds identified at the SMC site are not susceptible or are only weakly susceptible to hydrolysis. Those that may be susceptible show the presence of chlorinated groups which are likely the functional groups of attack. Hydrolysis can readily occur with the aromatic acid and phenolic compounds (phenols, toluic acid) identified at the site.

Aromatic acids and phenolic compounds can exist in charged or neutral states, depending upon the pH of the water and dissociation constant (K_a) of the contaminant. The proportions of measured concentration of an organic acid that is dissociated (i.e., charged) is calculated with the following equation (Lyman et al. 1990):

$$\log \frac{M_{A^-}}{M_{HA}} = pH - pK_a$$

where

pH = Observed pH in sample

pK_a = Log of K_a

M_{A^-} = Molar concentration of the dissociated compound

M_{HA} = Molar concentration of the undissociated compound.

Quantification of the extent of the dissociation of an aromatic acid in an aqueous system is important in the evaluation of the chemical's fate and transport. Ionized volatiles differ from their corresponding neutral form in solubility, adsorption, bioconcentration, and toxicity. Table 5-3 shows the pH, Eh, and conductivity measurements from the ground-water and surface water samples collected at the site. Table 5-4 shows the calculated ionization (on a percentage basis) of each of the organic acids and phenolic compounds identified at the site. A review of this table shows that the three toluic acid isomers and benzoic acid would be present at greater than 99 percent in the ionized state under all measured conditions at the site. Phenol and the two methyl phenol isomers range from 0.1 to 97 percent ionized, depending on the pH of the water. The greater the pH (i.e., more basic), the more likely that the phenolic compounds would be ionized.

5.1.5 Photolysis

Photolysis is a chemical degradation process whereby radiant energy (e.g., sunlight) activates covalent bonds within the contaminant chemical structure making the molecule susceptible to degradation or attack by other chemicals present in the system. Photolysis is a significant process in surficial soils and sediments, surface water, and in the air. Dissolved organic carbon (e.g., humates) in the water column tends to attenuate photolysis of contaminants since it can act as a light receptor.

There were little data available quantifying the photolysis of the compounds identified at the SMC site. A review of the limited data suggests that the PAHs show more susceptibility to photolysis than the other compounds. This is likely due to the aromaticity and lack of functional groups in these compounds.

5.1.6 Oxidation

Oxidation is the reaction of an oxygen derivative (e.g., singlet oxygen, alkyl peroxy radicals) with the contaminant. The oxygen derivatives required for these reactions are formed via radiant energy so that the potential for oxidation would occur in similar environmental

conditions as photolysis. Oxidation involves the removal of electrons from the constituent atoms or functional groups in the contaminant, while reduction represents the reverse process. Both reactions can influence the mobility and fate of a contaminant.

5.1.7 Metal Speciation

Metals that are dissolved in water can exist in several valence ion states based upon the pH and Eh of the water. The fate and toxicity of metals is related to their valence state. Field measurements of pH and Eh taken at the time of sampling form the basis for the metals speciation analysis.

The equilibrium speciation for arsenic, lead, and chromium is shown in Figures 5-1 through 5-12. The pH/Eh diagrams were derived from Bodek et al. (1988). A review of Figures 5-1 through 5-4 shows that pH and Eh conditions observed for site ground water and surface water favor the dissolved-phase arsenic to be in the +5 valence state. This valence state is considered the less toxic form of this metal. Lead speciation (Figures 5-5 through 5-8) shows that the +2 valence state would occur under the site pH and Eh conditions. This is the most common valence state of this metal. A review of Figures 5-9 through 5-12 shows that any dissolved-phase chromium would be present in the +3 valence state under the site pH/Eh conditions. This is also the more common valence state for this metal as opposed to the more toxic and more mobile +6 valence state.

5.2 SITE ENVIRONMENTAL CHARACTERISTICS

The environmental characteristics of the site can influence the fate and transport of the contaminants present, and include geology, lithology, hydrology, and climate.

5.2.1 Geology

The local geology of the site area was detailed in Section 3.4. The unconsolidated deposits overlying the site consist of unstratified glacial deposits (Pleistocene) and recent aged alluvial deposits.

Two types of glacial deposits were present at the site. Over most of the site area, a red clay till was present consisting of a sticky reddish clay with no visible stratification, little angular gravel, and little to no sand. The red clay till was relatively thin, generally not greater than 10 ft thick. A brown till consisting of a poorly sorted mixture of clay, silt, sand, gravel, and boulders was present below the southern portion of the landfill and the areas immediately to the south and southwest of the landfill. The material was medium-dense to dense and had a fairly high sand content.

A layer of coarse sand, angular gravel, and cobbles, ranging in thickness from 4 to 7 ft, was present directly overlying bedrock south, southwest, and west of the landfill and appears to be associated with the bedrock surface low in this portion of the site.

Alluvial deposits consisting of silt, silty clay, and silty sand were present locally in the flood plain of Skaneateles Creek. These deposits were relatively thin (2- to 6-ft thick) and restricted to the low-lying areas adjacent to Skaneateles Creek north of the Main Plant Building and immediately west and southwest of the onsite landfill.

The unconsolidated sediments at the site are underlain by Onondaga Limestone which is characterized as gray to dark gray, massive to medium bedded, and hard. The limestone is fractured, has east-west strike, and a gentle southerly stratal dip (<0.5 degrees) across the site. The majority of the fractures were horizontal (parallel to bedding). Fractures with dips ranging from 30 to 90 degrees were present and observed less frequently. Two strongly developed sets of joints, one striking north-south, the other oriented nearly east-west, were identified in the study area. The bedrock surface is at or near ground surface in the center of the 20-acre site (at the former rock dam) and slopes downward towards both the south and north. Bedrock lows are aligned in an east-west direction and are located approximately 800 ft to the north and south of the former rock dam.

5.2.2 Hydrogeology

The local hydrogeology of the site was detailed in Section 3.5. Based on analysis of the available data, there are three distinct zones of ground water at the SMC site: a shallow zone present in the overburden, an intermediate zone in the upper bedrock, and the phreatic ground-water zone present deeper into bedrock. Both the shallow overburden and the deep bedrock ground-water zones are under unconfined water table conditions.

Lateral migration of water through the overburden is through primary openings in the geologic material and controlled by horizontal hydraulic gradients across the site. These gradients are influenced by both topography and surface water drainage.

A general downward vertical hydraulic gradient between the overburden and upper bedrock persists across most of the site. Hydraulic communication between overlying unconsolidated sediment and the upper bedrock exists via bedding, fractures, and/or joints in the upper rock.

In the upper bedrock, most ground-water migration is through secondary openings (bedding, fractures, joints, etc.). Ground-water movement through bedrock to the phreatic zone is inferred to be vadose flow in enlarged secondary openings. This flow is controlled by gravity and the structure of the rock and water moves as vertically as possible. Lateral movement in vadose flow through the bedrock is controlled by the southerly dip of the strata, with some deviation in the direction of strike (east-west). Therefore, ground-water flow in the upper bedrock is expected to be predominantly to the south.

After the ground water enters the phreatic zone through the vadose feeders, water migration changes. Horizontal flow is the primary flow component functioning in the phreatic zone. Hydraulic gradients are normally low due to the efficiency of enlarged openings to transmit ground water. Phreatic ground-water flow at the site is expected to be generally in a northerly direction.

5.2.3 Surface Water Hydrology

The local surface water hydrology of the site was detailed in Section 3.3. Skaneateles Creek flows north through the site and can be both an effluent (gaining) and influent (losing) stream depending on stream flow, ground-water table conditions, and the segment of the stream. Both gaining and losing conditions exist in the segment of Skaneateles Creek on the SMC site west of the landfill and south of the former rock dam. During the spring when shallow water table conditions are high due to precipitation and surface water runoff from snow melt, seeps emanate from the creek bed providing ground-water baseflow to Skaneateles Creek. During dry periods of the year (late summer) when shallow water table conditions are at their lowest, losing conditions appear to exist in this segment of Skaneateles Creek. Shallow water table elevations during late summer and fall are lower than the elevation of Skaneateles Creek. This condition allows shallow ground water within the unconsolidated sediments to migrate from the landfill to the area south of the Main Plant Building and flow beneath the creek with minimal influence from the stream.

The segment of Skaneateles Creek north of the dam and culvert appears to act as a hydraulic barrier to the lateral movement of ground water in the shallow overburden ground-water system. Shallow water table elevations in this portion of the site are at or above the elevation of Skaneateles Creek during both dry and wet times of the year. This condition will not allow shallow ground water within the unconsolidated sediments to migrate past the creek to the north and northeast.

Surface water runoff emanating from the site drains to Skaneateles Creek via sheet flow, natural drainage depressions, intermittent streams, and man-made ditches. The drainage ditch along the southeast perimeter of the landfill is nearly flat; during times of surface water runoff, standing water is present in the ditch along the southeast perimeter and is ponded in a small area off the southeast corner of the landfill, and promotes intermittent ponding and percolation of surface water into the landfill.

The area north of the Main Plant Building is relatively flat with a gentle downward northerly slope towards Skaneateles Creek. The area in the vicinity of the Main Plant Building has been built up with dry fill material (e.g., concrete, bricks, wood, cinders, etc.) which promotes intermittent ponding and percolation of surface water into the ground in this area of the site.

5.3 BIOLOGICAL INTERACTIONS

The interaction of contaminants and biota present at the SMC site may also affect the contaminants fate and transport. These interactions are briefly defined below.

5.3.1 Biotransformation/Biodegradation

Biotransformation/biodegradation of the contaminants can occur and be mediated by both micro-organisms and higher biota. Products of these biotransformations may or may not be toxic to the organism and these products may be further biotransformed by other organisms. Biotransformation includes a variety of enzyme-catalyzed oxidation and reduction reactions.

Several studies have shown that there is the potential for extensive biotransformation of organic compounds in subsurface soils by micro-organisms (Ghiorse and Wilson 1988; Swindoll et al. 1988). Methyl substituted aromatics, such as toluene and xylenes, degrade in the environment by oxidation to methylbenzaldehyde and methylbenzoate (i.e., toluic acid) derivatives. The oxidation increases the solubility of the compounds and their mobility in the environment.

The chlorinated alkenes are also susceptible to environmental dechlorination. The typical degradation is shown below:



The final step represents a splitting of the ethene group to the methyl derivatives, methylene chloride, and vinyl chloride. The degradation products of tetrachloroethene and trichloroethene were identified in site samples.

The aromatic acids and phenolic compounds are water soluble and readily biodegrade to short chain compounds. There is little direct information for the degradation of toluic acid, although it would likely be similar to the methyl phenols and benzoic acid.

5.3.2 Bioconcentration

Bioconcentration is the accumulation of contaminants by biota to greater concentrations than present in the aqueous phase. This is quantified using the bioconcentration factor which is the ratio of the contaminant concentration in the biota and in the water. When summarized in this manner, bioconcentration factors have units of L/kg. Branson et al. (1975) developed a pharmacokinetic model to calculate bioconcentration factors as the ratio of the assimilation and elimination rate contents. In this case, the bioconcentration factor is unitless, and has been related to the K_{ow} of the contaminant.

5.3.3 Bioaccumulation

Bioaccumulation is the accumulation of contaminants by biota from both aqueous phase and dietary phase exposures. As such, the bioaccumulation factor, when related to aqueous phase concentrations, is larger than the bioconcentration factor. Bioaccumulation factors can also be calculated from pharmacokinetic models relating food ration, dissolved contaminant concentrations, and contaminant tissue elimination (e.g., Thomann 1989). No biota samples were taken during this phase of the investigation to confirm whether the site was serving as a source to contaminant accumulation by biota. The potential for bioconcentration of site contaminants will be evaluated in the risk assessment.

5.4 TRANSPORT AND MECHANISMS OF MIGRATION

Based upon the contaminants' physicochemical characteristics, geologic and geohydrological conditions of the site, and the nature and extent of contamination at the SMC site,

contaminant migration may be via several pathways. These include volatilization of contaminants from soils, entrainment of soils in the overlying air, and migration of contaminants via ground water.

5.4.1 Migration into the Air

5.4.1.1 Soil Vapor Emission Rates

The emission rates through the surface of the SMC site of VOCs present in the soil vapor measured north of the Main Plant Building can be calculated using the following equation (U.S. EPA 1988a):

$$E_i = D_i C_{sv} A (P^{1.3})(M/d)(10^{-8})$$

where

- E_i = Emission rate of compound i (g/sec)
- C_{sv} = Concentration of compound in the soil vapor (ppm_v)
- D_i = Diffusion coefficient of compound i (cm²/sec)
- A = Exposed surface area (cm²)
- P = Soil porosity (dimensionless)
- M = Mole fraction of compound i in soil vapor
- d = Effective soil depth (cm)
- 10^{-8} = Conversion factor of mg/m³ to μg/cm³.

The average and 95 percent Upper Confidence Limit soil vapor contaminant concentrations were used for this calculation. Since the soil vapors were sampled at a depth of 3 ft (91.4 cm), this value was used as the effective depth of soil cover (d). The soil porosity was assumed to be 0.3, based upon field estimates. For purposes of this analysis, it was also assumed that the approximate 2-acre surface area of the site represents the volatilization surface (former Organics Plant area).

Table 5-5 shows the compounds present in the soil vapor and calculated emission rates. The spreadsheet for this calculation is shown in Appendix Table G-1. *O*-xylene accounts for 92 percent of the total calculated vapor emissions from the site, followed by *m/p*-xylene (6 percent) under average soil vapor concentrations. The remaining volatile analytes contribute a minor portion to the total site emissions.

5.4.1.2 Emissions from Soils

Volatilization from the soil is a mechanism for contaminants to migrate from soil to the air. Contaminants with low vapor pressure (e.g., PAHs and some pesticides) will not migrate in the vapor phase but will be associated with suspended and entrained dusts. When the VOCs associated with soils are exposed to the air, there is the potential for volatilization into the overlying air. This subsection will quantitate some of the flux rates based upon the

observed concentrations of volatiles in the soil. The volatilization rates of the contaminants present in the subsurface soils can be calculated. The flux from the landfill soils and north area soils were determined since these samples showed the presence of volatile contaminants.

To calculate the flux rate, the concentration of the chemical in the vapor phase C_g (g/cm^3) is calculated using the Henry's Law Constant H ($\text{atm}\cdot\text{m}^3/\text{mol}$), gas constant R ($8.19 \times 10^{-5} \text{ atm}\cdot\text{m}^3/\text{mol}\cdot\text{K}$), and soil temperature (293 K) as follows:

$$C_g = (C_s \cdot 2E-9 \cdot H) / RT$$

where

C_s = Contaminant concentration on the solid phase ($\mu\text{g}/\text{kg}$)
 $2E-9$ = Conversion factor for bulk density ($\mu\text{g}/\text{kg}[\text{g}/\text{cm}^3]^{-1}$).

Values for H were obtained from U.S. EPA (1992a). The effect of the soil characteristics on vapor phase diffusion is accounted for by using the following equation (Millington and Quirk 1961):

$$D_s = \frac{D_o (P_a)^{10/3}}{(P_t)^2}$$

where

D_s = Effective vapor phase diffusion coefficient in soil (cm^2/s)
 D_o = Vapor phase diffusion coefficient in air (cm^2/s)
 P_a = Air filled porosity (m^3/m^3), assumed = 0.14
 P_t = Total porosity (m^3/m^3), assumed = 0.5.

Values for dissolved oxygen were obtained from U.S. EPA (1988a) using the calculated C_g . The effective diffusion coefficient D_s , and the average depth of the volatile chemical in soil (cm), are used to calculate the steady-state flux ($\text{g}/\text{m}^2\cdot\text{sec}$). The model used is that reported by Karimi et al. (1988):

$$J = \frac{-D_s (C_2 - C_g) X}{L}$$

where

X = Conversion factor = $10^4 \text{ cm}^2/\text{m}^2$
 L = Assumed to equal 244 cm (the average sampling depth).

Table 5-6 summarizes the calculated flux rates for volatiles from the landfill and the area north of the Main Plant Building. The spreadsheets for these calculations are shown in Table G-2.

5.4.1.3 Equivalent Air Concentrations

Using the box model, the ambient concentration (C_i ; g/m³) of the i^{th} analyte can be calculated using the following equation:

$$C_i = \frac{Q_i}{(H/2) WV}$$

where

- Q_i = Emission rates of compound i (i/sec)
- H = Height of the box (mixing height; m)
- W = Cross wind width of the source (m)
- V = Wind velocity (m/sec).

The mixing height (H) can be calculated using the following equation by successive substitution:

$$X = 6.25 \times (H/Z \ln [H/Z] - 1.58[H/Z] + 1.58)$$

where

- X = Downwind receptor distance (m)
- Z = Roughness height of the site.

Cowherd et al. (1985) has provided a scale for the value of Z corresponding to different site conditions. Under current site conditions, where the site surface has aboveground structures and pavement, the Z -value would be 5 m. Assuming a receptor (e.g., resident) located on the edge of the property, a cross-wind width of 155 m (465 ft), and average wind speed of 4.4 m/sec, the calculated mixing height for the present-use scenario is 88 m. It should be noted that the Cowherd model does not account for any surface characteristics adjacent to the site under evaluation. The spreadsheets for these calculations are shown in Table G-3. Table 5-7 shows the calculated air concentrations for vapors emanating from the landfill and area north of the Main Plant Building. The results show that the receptor concentrations were below the NYSDEC ambient guideline concentrations. These calculations are consistent with the results from the baseline air sampling.

5.4.2 Migration with Overburden Ground Water

Contaminants can migrate through the overburden soil column with the ground water. Contaminant migration is typically slower than the ground-water flow due to the exchange (partitioning) of the contaminants to the organic carbon associated with the soil. If the flow rate of the overburden ground-water system is known, the relative migration of the organic contaminants in the soil column is estimated using the following equation:

$$V_c = V/[1 + (K_{oc} * f_{oc})/(b/P_T)]$$

where

- V_c = Contaminant flow rate (ft/day)
- K_{oc} = Organic carbon-water partition coefficient (L/kg)
- f_{oc} = Fraction organic carbon content
- b = Density of soil
- P_T = Total porosity of the soil
- V = Ground-water flow rate (ft/day).

For inorganics, the term " $K_{oc} * f_{oc}$ " is replaced with the K_d . Data on the ground-water flow rate (V) was not available for this report. However, the relative flow rate can be calculated by setting V to 1. The values for K_{oc} were obtained for Table 5-1, f_{oc} (1.8 percent) was the average TOC content of the soils, soil density (b) was assumed to be 2 g/cm³, and the total porosity (P) was assumed to be 0.5.

Table 5-8 summarizes the calculated relative flow rates for the organic compounds. The relative flow rates for the inorganic compounds are shown in Table 5-9. As the values decrease, the compound is showing lower relative mobility. The relative mobilities range from: 0.43 to 0.91 for the aromatic volatiles, 0.75 to 0.98 for the chlorinated alkenes and alkenes, 0.99 for the ketones, 0.87 to 0.99 for the aromatic acids and phenolics, 0.0004 to 0.6 for the PAHs, and 0.0001 to 0.0009 for the pesticides. The inorganic analytes showed relative velocities intermediate between the PAHs and other organics, ranging from 0.0020 to 0.0040. A review of the landfill piezometer, MW-2S, and MW-7S organic results and the creek seep organic results provide support to this relative flow calculation. The landfill piezometer samples, which are samples of the landfill leachate water, showed the presence of xylenes (average concentration: 45,450 µg/L), and toluic acid (average concentration: 156,500 µg/L). The Round 1 xylene results from MW-25 and MW-75 showed 4 and 19 µg/L (respectively), with the Round 2 results showing none detected and 41 µg/L (respectively). Xylenes were detected with toluic acid in the creek seeps, but at a much lower relative concentration ratio than seen in the landfill piezometer samples. This would suggest preferential retardation by soils.

5.4.3 Evaluation of Ground-Water Migration Pathways

The potential connections within and between ground-water zones can be determined using physical measurements (e.g., water elevations) and use of chemical tracers such as conventional water quality parameters (e.g., chloride, hardness) which migrate without retardation in the ground-water column. In both cases, the interpretation of the data can be difficult due to flooding conditions or active exchange between the ground-water zones. Field data on ground-water elevations were obtained throughout the field investigation, including periods during the drought in the Summer of 1993. Conventional water quality parameters were determined in the Round 1 monitoring wells.

Figure 5-13 shows the temporal trends in the deep bedrock potentiometric elevations, compiled from May through September 1993.

The potentiometric elevations in all monitored wells declined with time, with three types of trends observed in the data. Six of the wells (MW-1D, MW-4D, MW-5D, MW-6D, MW-10D, and MW-11D) showed similar decay patterns with time and with potentiometric elevations. The data suggest that these six wells are located in bedrock with similar secondary opening patterns and appear to be interconnected. This interpretation is consistent with the results from the continuous monitoring of four deep bedrock well elevations (Section 3.5.5). The four monitored wells (MW-1D, MW-4D, MW-5D, and MW-11D) showed rapid response to changes in recharge rate from Skaneateles Creek stream flow and similar temporal changes. It is likely that MW-6D and MW-10D would behave in a similar manner.

Wells MW-2D and MW-7D show a decay pattern in the potentiometric elevations with time, although their initial elevations were different (MW-7D was higher than MW-2D). These wells may be located in bedrock with similar types of secondary openings but these openings may not be interconnected since the elevations differ. Based upon the decay pattern, these wells may not be as effectively connected with the enlarged openings in bedrock as those seen in MW-1D, MW-4D, MW-5D, MW-6D, MW-10D, and MW-11D.

Water level elevations in MW-9D also decreases with time, but shows a different decay pattern relative to the two prior groupings. In the vicinity of MW-9D, Skaneateles Creek flows over bedrock with water flow restricted and ponded a short distance to the northwest. The higher initial potentiometric elevation and the slower decay pattern indicates that an area of vadose feeders to the phreatic zone may be present northwest of MW-9D providing a source of recharge to the bedrock. An area of deep ground-water recharge could potentially dilute any deep ground water flowing in a northwesterly direction from the site area.

The potential transport routes between the deep wells, which show similar decay in potentiometric elevations, are based upon the hydraulic gradients between the well locations. The evaluation of the decay pattern of the potentiometric elevations is used to identify whether the wells are located in bedrock with interconnected secondary openings. This assessment is not entirely supportable from the analytical database. It is noted that several of the monitored wells were dry at the time of sampling.

5.4.4 Overall Site Model

The overall site model is a compilation of the fate and transport mechanisms presented in the previous sections. Under current site conditions, there are potential pathways to the overlying air, surface water, and ground water.

The principal pathway to overlying air is due to volatilization from subsurface soils, predominantly from the area north of the Main Plant building and the landfill. However, this is a minor pathway since calculations showed low flux rates and equivalent air concentrations at a nearby receptor. Pathways associated with air releases induced by wind or vehicular traffic are also minor under current site conditions since the site is either paved or has cover grasses, brush, and trees. Air pathways will become more important if these cover materials are removed, which can occur during site remediation.

Dark-colored seeps from the landfill have been observed entering Skaneateles Creek at several locations immediately west of the landfill, and represent a release pathway. The dark-colored seeps are present at certain times of the year. During the spring when shallow water table conditions are high due to precipitation and surface water runoff from snow melt, seeps emanate from the creek bed and enter Skaneateles Creek. During dryer periods of the year when shallow water table conditions are low, the seeps are not visible. When present, the seeps are rapidly diluted due to the high flow conditions of the stream. Sediments which are in close proximity to the seep release points show evidence of contamination from the landfill. The segment of Skaneateles Creek north of the culvert appears to act as a hydraulic barrier to the overburden ground-water system in the area north of the Main Plant Building. Levels of any contaminants potentially entering Skaneateles Creek in this portion of the site would be anticipated to be low based upon sample results from MW-18S. These levels would be rapidly diluted due to the flow conditions of the stream.

The pathway which appears to have the greatest potential for both horizontal and vertical contaminant transport is via the ground water.

The interpretation of the vertical and horizontal extent of contamination at the site as affected by the local hydrogeology is complicated by the presence of two known source areas at the site: the landfill and the area north of the Main Plant Building. Section 3.5.6 provided a summary of the hydrogeological conditions and behavior of the overburden, upper bedrock, and deep bedrock ground water at the site. The hydrogeological interpretation is discussed below in the context of the observed analytical results to develop a ground-water transport model for the site.

Lateral migration of leachate water from the landfill appears to be restricted (although not eliminated) by the presence of a thin layer of fine-grained deposits north of the landfill, clay deposits east of the landfill, and a hydraulic gradient favoring movement to the northwest, west, and southwest. In addition, the leachate collection sump installed in the northeast corner of the landfill intercepts a portion of the leachate migrating in a northeasterly direction. The collected leachate is diverted to the Main Plant Building and treated. Leachate migration appears to be significantly slower than overburden ground-water movement in the vicinity of the site, as evidenced by the stable water elevations in the

landfill piezometers compared to nearby overburden wells. The migrating overburden ground water which does not provide recharge to the underlying bedrock is partially intercepted by the adjacent Skaneateles Creek. Unconsolidated deposits beneath portions of Skaneateles Creek (Figure 3-3) allows some passage of overburden ground water beneath the creek, which in turn may be the source of the seeps located along the subsurface basement walls in the south end of the Main Plant Building, and the contamination observed in MW-7S.

Once ground water from the overburden enters the upper bedrock, its flow is chiefly controlled by gravity and structure of the bedrock. Ground water descends through the upper bedrock to the deep bedrock water table via secondary openings. These openings are commonly found along bedding planes and are not steeply inclined, thus the water migrates laterally to the south along the stratal dip and to the west along the bedrock strike as it descends to the deep bedrock ground-water zone. The vadose feeders (connection between the upper bedrock and deep bedrock ground-water zones) are believed to be located south of the landfill. The most likely location is in the area of the bedrock low situated approximately 800 ft south of the former rock dam (Figure 3-4). Deep bedrock ground water migrates under confined water table conditions generally to the north-northwest, although the direction and gradient appears to vary with the time of year.

The net effect of this migratory route is that overburden ground water immediately north and east of the landfill should show low concentrations by contaminants originating from the landfill, with upper bedrock ground-water concentrations increasing as the ground water migrates southerly, until the bedrock low is encountered. At that point, the contaminants can enter the deep bedrock and migrate within this ground-water system.

Figure 5-14 presents the analytical results (xylenes and toluic acid) from the three ground-water zones as an overlay of the A-A' (north-south) cross-section (Figure 3-2). A review of this figure shows support for this proposed model at the site.

This model is also appropriate to explain the results from the area north of the Main Plant Building. The model suggests that for contaminants to be present in the upper bedrock ground water north of the source area they must first be transported in the overburden ground water and then move vertically downward into the upper bedrock. Vadose zone contamination from the former Organics Plant (near MW-5 cluster) has resulted in contamination of the overburden ground water. This area is surrounded on two sides by Skaneateles Creek. Shallow overburden ground water has both a horizontal gradient to the north and a downward vertical gradient. As a result, the migration within the overburden has resulted in contamination at the MW-12S and MW-18S. Ground water whose northerly movement is impeded by the low-lying wet area and Skaneateles Creek to the north may then serve as recharge to the underlying upper bedrock. As a result, the upper bedrock in this general area also shows evidence of volatile organic and toluic acid contamination. Once in the upper bedrock, ground water migrates in a generally south-southwesterly direction as it descends to the deep phreatic zone. No contamination was detected in the upper bedrock wells MW-9I, MW-10I, or MW-11I located north of well clusters MW-12 and MW-18,

which is consistent with the site model. The upper bedrock wells to the south of the former Organics Plant area (i.e., MW-3I, MW-4I, MW-6I, and MW-7I) would be expected to show some impact of contaminant migration from this area.

The presence of volatile and toluic acid contamination at the MW-7 cluster, located along the western perimeter of the site, was also evaluated in the context of this site model. Figure 5-15 presents the analytical results (xylenes and toluic acid) from the three ground-water zones as an overlay of the B-B' (west-east) cross-section (Figure 3-3).

The model suggests that some overburden ground water would migrate from the landfill beneath the creek in the underlying unconsolidated deposits and move westerly towards the MW-7S cluster. Contaminants which have entered the upper bedrock would also migrate in a westerly direction toward MW-7I cluster. Contaminants which have entered the deep bedrock ground water south of the landfill would migrate northwesterly towards the MW-7D cluster. In addition, any contaminants moving in a southerly direction in the upper bedrock from the area north of the Main Plant Building may also be present near MW-7I. The observed contamination of various onsite monitoring wells can be explained as a result of these different migratory pathways.

The potential source(s) of the seeps within the basement of the Main Plant Building can be identified and source apportionment determined semi-quantitatively by examining the toluic acid isomer ratios. The migratory potential of the three toluic acid isomers was assumed to be equivalent. This is a reasonable assumption since the relative rates of migration were similar (range: from 0.87 to 0.92) for these compounds.

Table 5-10 summarizes the ratios of the toluic acid isomers (normalized to the *o*-isomer) from the two potential source areas (landfill and area north of the Main Plant Building), the basement seeps MW-7I and MW-6I. Data from MW-5S and MW-5I represent the overburden and upper bedrock contamination in the area north of the Main Plant Building. These wells are located in the vicinity of the former Organics Plant. The results from the two landfill piezometers represent contamination which may emanate from the landfill. Duplicate samples and data from both sampling rounds were used when available.

The relative isomer ratios between the landfill and the Main Plant Building areas differed, especially with respect to the low relative contribution of the *p*-isomer in the area north of the Main Plant Building samples. A review of this table suggests that the toluic acid present in the basement seeps (collected from the floor sump), MW-6I and MW-7I, originates predominantly from the area north of the Main Plant Building, chiefly due to the similarities between the *p*-isomer ratios. Based upon the examination of the *m*-isomer ratios, the toluic acid at these locations does not appear to be exclusively from the area north of the Main Plant Building. The basement seeps appear to receive some contribution from the landfill. Wall seeps on the south side of the building were not sampled, therefore, no interpretive analysis of their potential source(s) can be performed.

These results are consistent with the site model presented in Section 5.4.4. Source control of the area north of the Main Plant Building would reduce but not eliminate the contamination identified in upper bedrock wells southwest of this location. The ground-water model

suggests that control measures at both source areas (landfill and area north of the Main Plant Building) would be required to eliminate the continuing input to the basement seeps.

In addition, it would likely have an effect on the occurrence of basement seeps in the basement warehouse portion of the Main Plant Building, but may not effect the occurrence of the basement seeps present at the basement wall in the south end of the Main Plant Building. The ground-water model suggests that control measures at both source areas (landfill and area north of the Main Plant Building) would be required to eliminate the continuing input to the basement seeps.

6. QUANTITATIVE RISK ASSESSMENT

This chapter presents the results of human and environmental health risk assessments for the SMC site located in Skaneateles Falls, New York. These risk assessments were conducted to evaluate the potential exposure to organics and metals and possible human and environmental health risks associated with present and potential future activities at the SMC site.

6.1 PURPOSE OF THE RISK ASSESSMENT

The purpose of these assessments was to evaluate current and future chronic risks associated with potential exposure to contaminants in soil, ground water, seeps, and air at or adjacent to the SMC site during periods of current occupational activities, future non-remedial construction and maintenance, or future residential use. Volatile and semi-volatile organic and metal contaminants are present in overburden, upper bedrock, and deep bedrock ground water; sediments along Skaneateles Creek; and soils underlying the SMC site. A possible pathway that may lead to potential exposure and associated health risks commences with onsite ground-water wells, drawing from an impacted aquifer system for industrial or residential use. Further, inhalation, incidental ingestion, and/or dermal contact with contaminated soils or ground water during construction and maintenance activities at the SMC site present potential exposure pathways. Residential exposures may also result from ingestion, inhalation, and/or dermally contacting contaminated ground water during residential activities (i.e., drinking and bathing) in the future. Additionally, exposure to sediments may result from hunting or fishing along Skaneateles Creek within the SMC site. The results of this assessment will be used to determine if remedial actions or modification to any future construction considerations are necessary to protect the health of nearby residents and workers in the area of the SMC site.

In addition to characterizing potential risk to human health, the risk assessment also addresses potential risks to the environment and ecological receptors. A risk assessment procedure to characterize potential ecological receptors-of-concern as well as exposure pathways and resulting risks to the environment has been developed by EPA, in consultation with the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration. The environmental risk characterization of the SMC site is presented in Section 6.7.

This risk assessment has been prepared in accordance with recommended guidance from the EPA for evaluating potential public health risks associated with federal Superfund sites. Although this area is not a federal Superfund site, EPA guidance was applied because it is the most widely accepted and broadly applicable guidance for assessment of risks associated with hazardous waste that is applicable for assessing potential public health risks associated with the conditions found at the SMC site. Specifically, this assessment is consistent with guidance provided in the following EPA documents:

- *Exposure Factors Handbook* (U.S. EPA 1989a, 1990)
- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual* (U.S. EPA 1989b)
- *Risk Assessment Guidance for Superfund, Volume II: Ecological Evaluation Manual* (U.S. EPA 1989c)
- *Superfund Exposure Assessment Manual* (U.S. EPA 1988a)
- *Integrated Risk Information System (IRIS)* (U.S. EPA 1993)
- *Health Effects Assessment Summary Tables (HEAST)* (U.S. EPA 1991a, 1992b)
- *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (Interim Final)* (U.S. EPA 1988b)
- *Exposure Assessment Guidelines* (U.S. EPA 1992c)
- *Ecological Assessments of Hazardous Waste Sites: A Field and Laboratory Reference Document* (U.S. EPA 1989d)
- *Developing a Work Scope for Ecological Assessments* (U.S. EPA 1992d)
- *Dermal Exposure Assessment: Principles and Applications* (U.S. EPA 1992e).

These documents were designed with the intention of providing only guidance in the conduct of health risk assessments. Considerable professional judgment must be used in application of the guidance to human and environmental health risk assessments.

6.2 ORGANIZATION OF THE RISK ASSESSMENT

The report follows the analytical integrity of a risk assessment with four components: hazard identification, dose-response assessment, exposure assessment, and risk characterization.

- In the *hazard identification* (Section 6.3), the key chemicals of concern are selected for inclusion throughout the remainder of the risk assessment and their associated toxicities (evidence regarding the potential for a chemical to cause adverse effects in exposed populations) are presented. In addition, sources of data derived by measurement or from modeling are described.
- In the *dose-response assessment* (Section 6.4), the relationship between extent of exposure and extent of toxic injury or disease are estimated for

each chemical of concern. Chemical-specific benchmark toxicity values (i.e., reference doses or concentrations for non-carcinogenic effects of chemicals and carcinogenic slope factors) are presented, along with the level of confidence in their scientific assumptions and derivation.

- In the *exposure assessment* (Section 6.5), potential receptors and pathways of exposure are identified for the chemicals of concern. This includes a discussion of the magnitude, frequency, and duration of these exposures.
- In the *risk characterization* (Section 6.6), the results of the dose-response assessment and exposure assessment are integrated to derive quantitative estimates of chronic non-carcinogenic human health risk and carcinogenic human health risk.
- In the *habitat assessment* (Section 6.7), the results of the site and study area characterization and contaminant of concern determinations are integrated to derive quantitative estimates of exposure and characterize risk or threat to indigenous biota.
- The major *uncertainties and limitations* associated with the estimates of risk and their potential ramifications are presented in Section 6.8.
- A summary is presented in Section 6.9.

6.3 HAZARD IDENTIFICATION

In this section, the chemicals of concern are identified based on the site characterization and weight of evidence for their toxicity is established. These chemicals are quantitatively evaluated in subsequent sections for potential human health risks to nearby residents and workers at the SMC site.

6.3.1 Selection of Chemicals of Concern

The chemicals of concern were chosen from the inventory of chemicals detected in the sampling program conducted by EA and previous assessments, based on guidance provided by EPA (1989b).

The selection of chemicals of concern is a multi-step process which includes: (1) availability of suitable non-carcinogenic or carcinogenic toxicity value; (2) evaluation of the analytical quality of the reported data (e.g., laboratory blank contamination, sample quantitation limits); (3) comparison of the observed concentrations to typical "background" concentrations; (4) evaluation of the frequency of detection; and (5) a concentration-toxicity screen.

Chemicals which lacked a suitable non-carcinogenic or carcinogenic toxicity were excluded from further analyses. The exception of this was the toluic acid isomers, for which a reference dose (RfD) was derived since these compounds were major constituents at this site.

All analytical data from the laboratory were validated following current NYSDEC quality control criteria. Data usability was determined by validating the data using EPA Region 2 protocols. The EPA validation procedure includes an evaluation of blank (laboratory and field) contamination, calibration accuracy, and other quality control procedures which may affect the accuracy of the reported concentration and even the presence of the chemical. For example, acetone and methylene chloride are commonly used solvents in laboratories for the preparation of samples for pesticide/PCB analyses. As a result, they are often detected in the volatile analyses of samples due to elevated background concentrations in the laboratory when it is not a true sample constituent. Positive acetone and methylene chloride are often changed to non-detect during the validation procedures because of its potential introduction into samples during analysis.

An evaluation of the observed sample concentrations to typical "background" concentrations allows for the elimination of a chemical which may not be attributable to site activities but is present. This evaluation is appropriate only for TAL inorganics since TCL organics are not typically found as "background" in sampled matrices.

An evaluation of the frequency of detection of the chemical in the different matrices is also important in the selection process. Chemicals which are present sporadically may not be representative of site contamination or site activities. On the other hand, the toxicity of the less frequently found chemical may warrant its inclusion. However, all carcinogenic chemicals are retained for quantitative analysis independent of their frequency of detection.

The last step in the evaluation is a concentration-toxicity screen of the chemicals at the site. This is accomplished by calculating the "risk factor" for each chemical using the following equation:

$$R_{ij} = (C_{ij}) * (T_{ij})$$

where

R_{ij} = Risk factor for chemical i in matrix j

C_{ij} = 95 percent upper confidence limit concentration of chemical i in matrix j
(Tables 6-1A and 6-1B)

T_{ij} = Toxicity value of chemical i in matrix j (1/RfD) (Table 6-2).

The total risk factor is calculated for each matrix and then the ratio of each of the chemical-specific risk factors to the total risk factor is calculated. Those chemicals with a low ratio contribute less to the total risk as compared to those chemicals with a higher ratio. Thus, this screen weighs both the concentration of the chemical with its toxicity to determine whether the chemical should be considered for quantitative analysis. Those chemicals contributing 1 percent or more to the total risk factor are carried through the risk assessment.

Appendix Tables H-1 and H-2 show the organic and inorganic chemicals of concern selection matrices, respectively. Risk factor calculations are shown in Tables H-3 and H-4. Tables 6-1A and 6-1B show the media-specific and sampling round-specific lists of chemicals of concern for the human health risk assessment.

6.3.2 Toxicity of Chemicals of Concern

EPA and other federal agencies have gathered toxicity information on many of the chemicals of concern at the SMC site. This information is presented as toxicity profiles that contain descriptions of potential toxic effects and qualitative scientific weights-of-evidence for a causal relationship between chemical concentration and adverse health effect. This information forms additional justification for the selection of the chemicals of concern. It also provides a scientific basis for selecting the most appropriate dose-response value associated with most critical health effect and which is to be used in the risk calculation. All toxicity values were established values obtained from the EPA IRIS (U.S. EPA 1993) or the HEAST (U.S. EPA 1991a, 1992b).

6.3.3 Toxicity of pH

Several of the groundwater samples at the SMC site showed pH values outside the NYSDEC Class GA standard of 6.5 to 8.5. Although the pH of groundwater is not typically considered in Quantitative Risk Assessments, a preliminary assessment was incorporated into this risk assessment due to the observed standard exceedances.

The effect of pH can be subdivided into 3 components: dermal contact effects to the skin; dermal contact effects to the eye; and ingestion effects. Erosional effects on skin exposed to aqueous solutions of varying pH are observed for measured pH less than 3.0 and greater than 12.0, although reddening of the skin (i.e., erythema) does occur with measured pH between 3.0 and 4.5. Ocular effects (e.g., discomfort) have been reported to occur with short-term contact to aqueous solutions at pH less than 4.5, and at pH greater than 11 (Potts and Gonansun 1990). Measured pH less than 4.5 typically results in irreversible damage to the cornea. Ingestion effects are restricted to the oral cavity, throat, and esophagus. Aqueous solutions of pH less than 3.0 or greater than 12.0 can damage these tissues. Typically there is minimal damage to the stomach since the pH of this organ is normally less than 2.

6.4 DOSE-RESPONSE ASSESSMENT

A dose-response assessment is conducted to provide a quantitative expression of the relationship between a particular chemical and a particular adverse effect in an exposed population. Where possible, the relationship between extent of exposure and extent of toxic injury or disease (i.e., dose-response evaluation) is quantified. Qualitative and quantitative toxicity information for the chemicals of concern is acquired through examination of relevant scientific literature. Studies in humans provide the most clearly relevant data, although most of the usable information on the toxic effects of chemicals comes from experiments in animals.

For non-carcinogenic effects, the outcome of the dose-response assessment is a benchmark reference concentration that expresses a threshold, with a margin of safety, at and below which toxic injury or disease is not anticipated to occur. For carcinogenic effects, the outcome of the dose-response assessment is a slope factor, which represents the slope of the dose-response curve describing the relationship between exposure and degree of carcinogenic response. Carcinogenic effects are generally assumed to have no threshold, in that there is

presumed to be no level of exposure below which carcinogenic effects will not manifest themselves. This concept of "non-threshold" supports the theory that there are small, finite probabilities of inducing a carcinogenic response associated with every level of exposure to a potential carcinogen. The EPA slope factors are upper 95th percentile confidence limits of the probability of response per unit intake of chemical over a lifetime. Slope factors are based on experimental animal data and, when available, epidemiological studies. EPA uses a linear non-threshold mathematical model for low-dose extrapolation, the linearized multistage model, to calculate numerical slope factor values.

This assessment addresses present-use (current) and future-use chronic exposure to chemicals in the air, soil, and ground water at or adjacent to the SMC site. This is based on the assumption that there will be a continuing source of these chemicals at the SMC site.

6.4.1 Dose-Response Assessment for Non-Carcinogenic Effects

Toxicity benchmark values were obtained, when available, from the EPA IRIS (U.S. EPA 1993). EPA establishes chronic toxicity values based upon an extensive process of peer review of the available literature for each chemical; such values are therefore adequately verified. For the purposes of this risk assessment, chronic IRIS toxicity benchmark values were either used directly or adjusted for their applicability to this exposure duration, as necessary.

Where toxicity benchmark values for chemicals of concern were not available from EPA IRIS (U.S. EPA 1993), the EPA HEAST (U.S. EPA 1991a, 1992b) were used as a secondary source of data. Since HEAST toxicity values are not peer reviewed for quality or acceptable scientific merit, and may not necessarily be derived in strict accordance with EPA-approved methodology, all HEAST values are discussed only in the context of the specific reference(s) and general methodology used in their derivation.

If IRIS or HEAST values were not available for one route of exposure (e.g., inhalation) but existed for another route (e.g., oral), the existing value was applied to an alternate route (if appropriate) and subsequently utilized. Where HEAST values were not available at all, chemicals were not included in this quantitative risk assessment.¹ Discussions of the methodology for deriving toxicity values, as well as site-specific toxicity values, are included in the following sections.

Non-carcinogenic effects are generally thought to have a threshold dose below which there are no observable adverse health effects or no-observed-adverse-effect level. The no-observed-adverse-effect level is the level below which adverse effects are not expected to occur. In developing a benchmark toxicity value for risk associated with non-carcinogenic effects, the approach is to first identify this threshold dose; from this, an RfD is developed. An RfD is a daily human exposure level that is not expected to result in adverse health effects to humans. RfDs are calculated by dividing the no-observed-adverse-effect level from

¹ No toxicity values were found for toluic acid. As this is one of the major constituents of the site, a toxicity value was derived as discussed in Section 6.4.3.1.

observations in experimental animals or, to a lesser extent, in exposed human populations (usually work place exposures), by uncertainty and modifying factors. Uncertainty factors are intended to account for specific types of uncertainty inherent in extrapolation from the available data (Section 6.8). Modifying factors account for the level of confidence in the scientific studies yielding the values, according to such parameters as study quality and reproducibility of the study. The use of these factors increases the health-protectiveness of the RfD. The resulting RfD is expressed in units of mg of chemical per kg of body weight per day (mg/kg-day). The methodology for deriving RfDs is more fully described in the *EPA Risk Assessment Guidance for Superfund* (U.S. EPA 1989b).

Toxicity values used for exposures which involve dermal contact with chemicals typically require adjustment of the oral toxicity values (oral RfDs) to allow for compatibility in the estimation of the daily intake dose for a dermal exposure, expressed as the absorbed daily dose. Most toxicity values are based on the actual administered dose, and must be corrected for the percent of chemical-specific absorption that occurs across the gastrointestinal tract prior to their use in dermal contact risk assessment (U.S. EPA 1989b, 1992e).

The EPA has not derived reference concentrations (RfCs) (inhalation toxicity values) for all chemicals for which an oral RfD has been derived. When the RfD is based on a systemic toxic effect rather than a localized effect (i.e., at some location[s]) in the body other than at the site of exposure, for instance in the kidney after inhalation exposure), then it is generally acceptable to apply the RfD for that route of exposure to another route (e.g., inhalation RfD to oral RfD). To the extent possible, differences in absorption should be taken into consideration. Such extrapolations cannot be conducted in cases where toxicity is seen only at the point of administration of the chemical (e.g., where gastric irritation is associated with dosing by gavage) (U.S. EPA 1989b).

6.4.2 Carcinogenic Toxicity Values

As opposed to non-carcinogenic effects, carcinogenic effects are generally assumed to have no threshold, in that there is presumed to be no level of exposure below which carcinogenic effects will not manifest themselves. This concept of "non-threshold" supports the theory that there are small, finite probabilities of inducing a carcinogenic response associated with every level of exposure to a potential carcinogen. The EPA uses a two-part evaluation for carcinogenic effects, which encompasses the assignment of a weight-of-evidence classification to a chemical based upon an examination of the body of available data, and the quantification of a toxicity value slope factor, which reflects the dose-response data for the carcinogenic endpoint(s) (U.S. EPA 1989b).

The weight-of-evidence classification system assigns a letter or alphanumeric (A through E) to each potential carcinogen, which reflects the assessment of its potential to be a human carcinogen. (NOTE: A = a definite human carcinogen; B1 = a probable human carcinogen, based on limited human data; B2 = a probable human carcinogen based on sufficient animal data and inadequate or no human data; C = a possible human carcinogen; D = Not classifiable as to human carcinogenicity; and E = Evidence of non-carcinogenicity for humans.) Only compounds which have a weight-of-evidence class of C or above are considered for their carcinogenic potential in this risk assessment.

The slope factor is typically used to estimate the upper-bound lifetime probability of a person developing cancer from exposure to a given level of a carcinogen. Due to the difficulty in detecting and measuring carcinogenic endpoints at low exposure levels, slope factors are typically developed by using a model to fit the available high-dose data, and then extrapolating down to the low-dose range anticipated for actual human exposure. EPA employs one of several models, the linear multistage model, in the absence of evidence to the contrary, which estimates a conservative (i.e., higher) slope factor. These methods and approaches are discussed in greater detail in the EPA *Risk Assessment Guidance for Superfund* (U.S. EPA 1989b).

Carcinogenic slope factors used for exposures which involve dermal contact with chemicals typically require adjustment of the oral slope factor to allow for compatibility in the estimation of the daily intake dose for a dermal exposure, expressed as the absorbed daily dose. Most toxicity values are based upon the actual administered dose, and must be corrected for the percent of chemical-specific absorption that occurs across the gastrointestinal tract prior to their use in dermal contact risk assessment (U.S. EPA 1989b).

6.4.3 Site-Specific Toxicity Values

Discussions of several pertinent issues in either the use or derivation of toxicity values within the context of this risk assessment are presented in the following sections.

6.4.3.1 Non-Carcinogenic Toxicity Values

Table 6-2 shows the available RfD values for the chemicals identified at the site. No RfD values were found for the toluic acid isomers in the EPA IRIS (U.S. EPA 1993) or HEAST (U.S. EPA 1991a, 1992b). An oral RfD for the toluic acid isomers was derived following the procedures outlined in U.S. EPA (1989b). The review of the toxicology databases included on-line searches (TOXLINE, ENVIROLINE, MEDLINE, and CHEMICAL EXPOSURE) and the published literature.

The LD₅₀ data for the 3 toluic acid isomers is summarized below:

Analyte	Animal/Route	LD ₅₀ Result	Reference
<i>o</i> -Toluic acid	Rat, oral	400-3,200 mg/kg	Verschueren (1983)
	Rat, oral	400 mg/kg	Sax (1984)
	Rabbit, oral	750 mg/kg	Verschueren (1983)
<i>m</i> -Toluic acid	Rat, oral	> 3,200 mg/kg	Verschueren (1983)
	Rat, oral	1,630 mg/kg	Sax (1984)
<i>p</i> -Toluic acid	Rat, oral	400-3,200 mg/kg	Verschueren (1983)
	Rat, oral	400 mg/kg	Sax (1984)

Using the classification system of Doull et al. (1980), the 3 toluic acid isomers are considered "moderately toxic" based upon the range of LD₅₀-values result. As a comparison,

the oral LD₅₀-value for benzoic acid is 1,700 mg/kg (Verschuere 1983). Toluic acid is benzoic acid substituted with a methyl group. Examination of the molecular structures of toluic and benzoic acids indicates that they would likely undergo the same metabolic pathways following entry into the body. Conjugation to a hippuric acid derivative or glycine conjugation and elimination are two probable pathways of biotransformation and elimination. Toluene and xylenes undergo similar biotransformation in the body (Figure 6-1).

An RfD of 3 mg/kg/day for all 3 toluic acid isomers was used for this assessment. This value was selected based upon the: (1) similarity of benzoic acid (RfD of 4 mg/kg/day [U.S. EPA 1993]) and toluic acid, (2) probable biotransformation pathway for toluic acid (conjugation), and (3) potential effect of the methyl group on toxicity, as reflected in the RfD for xylenes (2 mg/kg/day [U.S. EPA 1993]).

6.4.3.2 Carcinogenic Toxicity Values

The available media and sampling round-specific carcinogenic toxicity values that were available for the chemicals identified at the site are presented in Table 6-2. No adjustments are required for carcinogenic slope factors that were available for any of the chemicals of concern. There is no quantitative adjustment for duration exposure within the slope factor, nor is it technically applicable. All slope factors are those obtained directly from established sources.

6.4.3.3 Other Toxicity Values

For non-carcinogens, as discussed earlier, the dose-response step of the risk assessment process usually involves identifying the highest dose level at which no adverse effects are seen and determining an "acceptable daily intake" of the chemical. For lead, however, this approach is not applicable, as the highest dose level at which no adverse effects are seen has not yet been identified. Instead, the approach generally taken for lead is to assess the amount of lead that could be absorbed without exceeding a maximum tolerable blood lead concentration, which is currently 10 µg/dL.

Several methods have been developed to describe the relationship between lead uptake (absorption) and resulting blood lead concentration. One model suggested by EPA is the one developed by Harley and Kneip as revised in 1985. This "Integrated Metabolic Model for Humans of All Ages" incorporated total uptake of lead derived from all exposures and the distribution of lead to the four body compartments (blood, bone, liver, and kidney) in which 95 percent of the lead is found. The model, which was used in this risk assessment, was developed based on the distribution and equilibrium of stable lead and a naturally occurring radioactive lead isotope in the bodies of infant and juvenile baboons, and in humans during

continuous lead exposure². To facilitate calculations, the "slope" factor 0.3 is combined with the maximum plausible level to yield an "effective" RfD of 0.03.

6.5 EXPOSURE ASSESSMENT

The purpose of an exposure assessment is to determine the populations that may potentially be exposed to site-related chemicals; the pathways by which exposure may occur; and the magnitude, frequency, and duration of these potential human exposures. The exposure assessment focuses on the chemicals of concern present in or migrating from the site.

In this assessment, the following steps were followed:

- Identification of potentially exposed receptor populations, including specific subpopulations of concern
- Identification of present-use and potential future-use exposure pathways
- Estimation of exposure point concentrations for specific pathways (based both on environmental monitoring data, where available, and predictive chemical modeling results, when monitoring data are unavailable)
- Estimation of chemical intakes associated with the exposure pathways for those receptor populations that could potentially be exposed.

In this manner, the results of this assessment are pathway-specific intakes for exposures to site-related contaminants.

6.5.1 Potential Human Receptor Populations

Potential human receptor populations under current site conditions include the residents living adjacent to the site on the west side of Jordan Road and the caretaker at the site. Potential future receptor populations include new offsite residential units, residential units placed on the property, and industrial workers at the site.

There are several residences and light industrial facilities along Jordan Road west of the site property that obtain their drinking water from the Town of Skaneateles Water Company. This water is derived from Skaneateles Lake, which also services nearby towns and the City of Syracuse. Results of a mail survey of private well usage in the vicinity of the site is summarized below:

² This model has been further refined into a personal computer program for application of the Uptake/Biokinetic (UBK) Model devised called LEAD 0.60 (LEAD6) (U.S. EPA 1993c). Use of LEAD6 is currently being recommended by EPA regional offices for risk assessments for hazardous waste sites and is considered to be the "state of the art" for predicting blood lead concentrations for young children (ages from 0 to 84 months). However, for adults, a slope factor of 0.3 is used to convert intake values into blood lead levels.

Description	Quantity
Total mailing	163
Total returned	107 (65.6 percent)
Wells present	15 (14 percent)
Drinking water	4
Not in operation	9
Other	2

The survey showed that there are some wells (residential and commercial) in the vicinity of the site. Most of these are no longer used, but some do have non-potable uses (e.g., service well for Fire Pond). All 4 wells reportedly using ground water as a drinking water source (1 on Masters Road, 2 on Vinegar Hill Road, and 1 on Stump Road) are located greater than 0.5 mi from the SMC site.

A potential onsite receptor is the caretaker (and seasonal helper) at the site. Potential future occupational potential receptors are those involved in any future non-remedial construction/maintenance activities (e.g., installing new sanitary sewage leachfield service line) in the area of the SMC site and/or the resumption of new commercial operations at the plant. Remediation scenarios will be addressed in support of the feasibility study. Future plant operations may also include the use of bedrock ground water as an industrial water supply.

It is unlikely that in the future the bedrock ground water (upper and deep) will be used as a drinking water source since a public supply from Skaneateles Lake exists. However, some residents may drill wells to supplement their water use, or use the ground water for non-potable uses (e.g., filling swimming pools, gardening).

The SMC site is a highly developed area with a former landfill located within the property boundaries. Access to this area is presently restricted by fences and physical barriers, and therefore, exposure to potential trespassers is limited. However, undeveloped portions of the property, specifically adjacent to Vinegar Hill Road, could be converted to residential use. Potential exposure to creek sediments may occur since the onsite portions of Skaneateles Creek can be accessed from outside of the property lines. Other future uses of the site include industrial and commercial activities.

6.5.2 Exposure Pathways

An exposure pathway describes a characteristic mechanism by which a population or individual can be exposed to chemicals present at or migrating from a site. An exposure pathway consists of the following four components:

1. A source and mechanism of chemical release to the environment
2. An environmental transport medium for the released chemical
3. A point of potential human contact with the contaminated medium
4. A human exposure route at the point of exposure.

All four components must exist for an exposure pathway to be considered "complete" and for exposure to occur. Incomplete exposure pathways do not result in actual human exposure and are not included in the exposure assessment and resulting risk characterization.

The potential exposure pathways were evaluated considering site-specific conditions and populations in the vicinity of the site. Pathways were also developed to include "present-use" and "future-use" scenarios. The present-use scenarios are defined as the potential exposure pathways for current site conditions. For example, there are no private water supply wells currently operating on or near the site, so ground-water ingestion would not be considered a valid present-use scenario. Future-use scenarios are those where a future pathway may exist. For example, wells for drinking water may be constructed on or adjacent to the property. Future-use scenarios are, by nature, more speculative since they examine only potential pathways. This uncertainty, along with the use of present chemical concentrations as inputs, adds a substantial amount of conservatism to the future-use scenarios.

The following pathways were considered for analysis:

- Ingestion/direct contact/inhalation of subsurface soils
- Inhalation of volatiles emanating from the soils
- Ingestion/direct contact/inhalation of subsurface soils
- Ingestion/direct contact with sediments
- Direct contact with creek seeps
- Inhalation of volatiles from ground water
- Ingestion of ground water.

The input variables for all examined pathways are shown in Table 6-3.

6.5.2.1 Present-Use Exposure Pathways

Based upon the analytical database and site conditions, the following present-use exposure scenarios (PS) were evaluated:

- Inhalation of volatilized chemicals from soils in the area north of the Main Plant Building (PS-1)
- Dermal contact with stream sediments (PS-2)
- Dermal contact with creek seeps (PS-3)
- Ingestion of stream sediments (PS-4).

The flux rates and calculated air concentrations for chemicals volatilizing from the soils in the area north of the Main Plant Building and landfill were discussed in Chapter 5. The resulting data will be used to calculate the risk to a receptor located along Jordan Road. This was not a true downwind location since the prevailing winds emanate from the west and

the receptor is located west of the site. However, the close proximity of the residents to the site warrants the examination of this scenario.

Dermal contact with stream sediments or creek seeps was examined for both adults and children. For adults, a hunter or fisherman is used as a receptor. Although the property is fenced, the stream and seep sampling locations can be accessed by walking along the streambed. For children, it was assumed that exposures occurred while playing in the stream.

Ingestion of stream sediments may occur accidentally during a fall or via hand contact and transfer to the mouth while eating (child, adult) or smoking (adult). Hunters and fishermen were used as the adult receptors.

6.5.2.2 Future-Use Exposure Pathways

The future-use scenarios (FS) include both residential and industrial exposure pathways. The pathways evaluated as present-use scenarios may also occur as future exposures. The following future-use scenarios were evaluated:

- Inhalation of vapors from soils exposed during non-remedial construction (FS-1): industrial and residential
- Dermal contact with soils exposed during non-remedial construction (FS-2): industrial
- Inhalation of soils entrained in wind from soils exposed during non-remedial construction (FS-3): residential
- Inhalation of vapors entering subsurface structure (FS-4): residential
- Ingestion of bedrock ground water (FS-5): residential
- Dermal contact of bedrock ground water while swimming (FS-6): residential
- Inhalation of vapors from bedrock ground water while showering (FS-7): residential
- Ingestion of garden vegetables (FS-8): residential
- Ingestion of bedrock ground water (FS-9): industrial
- Incidental ingestion of bedrock ground water (FS-10): industrial
- Dermal contact of bedrock ground water (FS-11): industrial

- Inhalation of vapors from bedrock ground water while washing vehicles (FS-12): industrial
- Inhalation of vapors entering subsurface structure (FS-13): industrial.

If the site is left undisturbed, inhalation of volatilized chemicals will still represent a future exposure pathway, although a gradual decline in soil vapor concentrations would likely occur with time. For the future-use scenario, this exposure pathway is expanded to incorporate an evaluation of hazards associated with the subsurface soils which may be excavated and brought to the surface as a non-remedial construction activity. Furthermore, dermal contact with these excavated soils may occur.

The potential use of bedrock ground water (upper, deep, and mixed) as drinking water offsite (west) by residents was examined. The wells used for these analyses were MW-7I/7D, MW-16I/16D, and MW-17D. Potential deep bedrock ground water use on the eastern side of the property was also examined. Exposure routes include drinking, showering, bathing, swimming, and use as a water source for gardening.

Potential industrial use of the bedrock ground water (upper and deep zones) was evaluated for incidental ingestion, dermal contact, and inhalation of vapors while washing vehicles.

6.5.3 Estimating Exposure Point Concentrations

It is necessary to determine concentration levels of the chemicals of concern in each medium to assess human health risks. Chapter 4 summarized the analytical results from the sampling of ambient air, soil vapor, soils, sediments, surface water, ground water, and seeps, and evaluated the nature and extent of contamination at the SMC site. The mean and 95 percent upper confidence limit analyte concentrations of these sampled media were used to assess site risks. The mean and upper confidence limit concentrations were calculated by setting the non-detect results at one-half the sample quantitation limit reported by the Laboratory. In those cases where the upper confidence limit exceeded the maximum observed concentration, the latter value was used for the risk assessment.

For several of the exposure pathways (e.g., volatilization from exposed soils), it was necessary to estimate potential air concentrations of chemical from concentrations in soil and ground water by using empirical air models (Foster and Chrostowski 1987; U.S. EPA 1988a). These are described in the next section. Supporting calculations are provided in Appendix H with the risk calculations.

6.5.4 Quantifying Chemical Intakes

The last step in the exposure assessment is the estimation of intake and resulting dose for each of the pathways considered in the assessment. The extent of potential intake received through the various pathways is dependent on an individual's location and behavior. It is not possible to accurately estimate the level of exposure for specific individuals due to uncertainties in both current and future behavior patterns, and incomplete knowledge of

certain exposure variables. Therefore, it is necessary to make a series of prudent assumptions that are conservatively high to derive an estimate of potential human exposure.

In an exposure assessment, it is generally necessary to provide at least two different measures of intake, depending on the nature of the effect being evaluated. When evaluating longer-term exposure to non-carcinogenic chemicals, intake is calculated by averaging the intake over the exposure duration (referred to here as the averaging time [AT]) (U.S. EPA 1989b) resulting in a calculation of the average daily dose (ADD). For carcinogens, intakes are calculated by averaging the total cumulative dose over a lifetime (referred to as the lifetime average daily dose [LADD]) (U.S. EPA 1992d). The synonym "Chronic Daily Intake (CDI)" can also be used in risk assessments.

The occupational/residential population modeled in this assessment, both adult men and women, are typically represented by using default values for the average male adult for purposes of exposure assessment (U.S. EPA 1991b), as specified in the equations that follow. For most pathways, the ratio of the rate of contact with the contaminated medium and body weight are assumed to remain constant over a lifetime, so that exposure is assumed to remain constant over a lifetime.

The generic equation to calculate dose is as follows:

$$(L)ADD = \frac{C \times IF \times EF \times ED \times AF}{BW \times AT}$$

where

<i>(L)ADD</i>	= (Lifetime) average daily dose ³ (mg/kg/day)
<i>C</i>	= Concentration in a specific medium (mg/L or mg/kg)
<i>IF</i>	= Intake factor ⁴
<i>EF</i>	= Exposure frequency (days/year)
<i>ED</i>	= Exposure duration (years)
<i>AF</i>	= Absorption factor (unitless)
<i>BW</i>	= Body weight (kg)
<i>AT</i>	= Averaging time (days).

The exposure parameters utilized to estimate the dose for each pathway are presented in Table 6-4 and summarized in the following subsections.

³ The LADD is calculated for carcinogens, while the ADD is calculated for non-carcinogens.

⁴ The intake factor is the product of all intake variables that when multiplied by the concentration of the chemical of potential concern in a specific medium, results in an estimate of the chemical intake in mg/kg/day for that population and exposure pathway. Intake factors may include ingestion rate, inhalation rate, body surface area exposed to soil or water, dermal permeability constants, soil adherence factors, etc.

6.5.4.1 Inhalation of Volatile Compounds

The LADD for inhalation of volatile compounds is calculated using the following equation:

$$LADD = \frac{(AC) (IR) (ED) (EFF)}{(BW) (LT)}$$

where

AC	=	Air concentration (mg/m ³)
IR	=	Inhalation rate (m ³ /hr)
ED	=	Exposure duration (hours)
EFF	=	Fraction absorbed (percent)
BW	=	Body weight (kg)
LT	=	Lifetime of individual (years).

The adult and child inhalation rates selected represented the average and maximum daily inhalation rates (U.S. EPA 1989a). The exposure duration was calculated from the following equation:

$$ED = (hrs/wk) \times (yrs \text{ exposed}/yrs \text{ lifetime}) \times (wks \text{ exposed}/year)$$

For the present-use baseline residential exposure pathway, it was assumed that an adult would be exposed (i.e., outside) 7 hours/week and a child 21 hours/week for the 19-week period where average temperatures in Onondaga County (NOAA 1982) were above 60 F (1 June to 30 September) over either a 9-year residence time (average scenario) or 30-year residence time (plausible maximum scenario). A 100 percent adsorption efficiency was assumed for the volatile compounds.

For the future-use non-remedial construction exposure pathway (e.g., replacing piping to sanitary sewage leachfield, installing foundation footings), the exposure was assumed to be 2 hours per day for 1 work week (5 days). This exposure was based upon the installation of a 150-ft pipe and the calculated flux of volatiles from the open excavation (2 ft × 150 ft).

Migration of soil vapor through subsurface foundations into basements represents a potential exposure pathway from sites (Hodgson et al. 1988). Exposures based upon a typical residence basement and basement for an industrial building will be assessed.

With appropriate changes, the model presented in Chapter 5 from which the emission flux rate of analytes from the soil vapors to the overlying air were calculated can also be used to estimate flux rates into a basement. The effective depth of soil cover is changed to a 0.5-ft (15-cm) thick depth of fill between the foundation block and surrounding soils. The permeability of the concrete block is assumed to be much lower than the surrounding soils, such that the only valid migration pathway into the basement is via cracks or splits in the foundation.

The concentration of the chemical i (C_i ; mg/m³) can be calculated using the following equation:

$$C_i = \frac{E_i \times VR \times 1,000}{BV \times 3,600}$$

where

- E_i = Analyte-specific flux rate at sediment block interface (g/sec)
- VR = Ventilation rate of basement (hr⁻¹)
- 1,000 = Conversion factor (mg/gm)
- 3,600 = Conversion factor (sec/hr)
- BS = Basement volume (m³).

The industrial building was assumed to have a volume of 1,133 m³ (100 ft long × 50 ft wide × 8 ft high), and the residential basement was assumed to be 283 m³ (50 ft long × 25 ft wide × 8 ft high). The ventilation rate was assumed to be one basement volume per hour. The relative proportion of cracks to intact foundation was assumed to be 10 percent, with negligible contribution through the intact block. The resulting air concentrations were used to quantify the risks associated with the inhalation of analytes in a "leaky" basement.

6.5.4.2 Ingestion of Ground Water

The ADD for ingestion of contaminated ground water is calculated using the following equation:

$$ADD = \frac{(GWC) (IR) (ED) (EFF)}{(BW) (LT)}$$

where

- GWC = Ground-water concentration (mg/L)
- IR = Ingestion rate (μg/day)
- ED = Exposure duration
- EFF = Fraction absorbed
- BW = Body weight (kg)
- LT = Lifetime of individual.

The adult ingestion rates represented the average and worst-case values as recommended by EPA (1989a). The average child ingestion rate was the weighted mean rate over 0.5- to 16-year age groups (U.S. EPA 1989a). For residential usage by adults, the exposure duration was 9 years for the average exposure scenario, and 30 years for the plausible maximum scenario. For residential usage by children, the exposure duration under both average and worst-case scenarios was 9 years. The uptake efficiency for organics was assumed to be 100 percent. The uptake efficiency of the inorganics was assumed to be 5 percent, based upon a compilation by Doull et al. (1980).

For the future-use industrial pathway, it was assumed that the volume of ground water accidentally ingested would be 25 mL for average scenario and 50 mL for the plausible

maximum scenario. Exposure duration was 9 years (average) and 20 years (plausible maximum scenario).

6.5.4.3 Inhalation of Ground Water While Showering

Foster and Chrostowski (1987) developed a model to calculate the exposure to volatile organics while showering. This model differs slightly from those presented in EPA (1989a) since it integrates the exposure during each shower event. The model was modified to accommodate an average and plausible maximum residence time.

If it is assumed that the exposed individual takes a single shower each day, the ADD for inhalation of volatiles from ground water is calculated from the following equation:

$$ADD = \frac{(VR) (S) (ED) (Ds + [EXP(-RDt)/R] - [EXP(Ds - Dt)/R])}{(BW) (R) (1E3)}$$

where

- VR = Ventilation rate (m³/min)
- S = Indoor air volatile generation rate (μg/m³-min)
- ED = Exposure duration
- BW = Body weight (kg)
- R = Air exchange rate (min⁻¹)
- Ds = Shower duration (min)
- Dt = Total duration in shower room (min)
- 1E3 = Conversion factor (μg/mg).

The indoor volatiles generation rate (S) can be calculated using the following equation:

$$S = (Cwd)(FR)/SV$$

where

- Cwd = Concentration of volatiles leaving shower droplet after time Ds
- FR = Shower flow rate (L/min)
- SV = Shower room air volume (m³).

The concentration of volatiles leaving the shower droplet (Cwd) is calculated from the following equation:

$$Cwd = GWC (1 - EXP [-(KaL)(ts)/d])$$

where

- GWC = Ground-water concentration (μg/L)
- ts = Shower droplet drop time (sec)
- d = Shower droplet diameter (mm)
- KaL = Adjusted overall mass transfer coefficient (cm/hr).

The mass transfer coefficient from the droplet (KaL) must be adjusted for the specific temperature and viscosity of water at the shower temperature using the following equation:

$$KaL = KL (TiUs/TsUi)^{-0.5}$$

where

- Ti = Calibration water temperature in K (293 K)
- Ts = Shower water temperature (K)
- Ui = Water viscosity at Ti (cp)
- Us = Water viscosity at Ts (cp)
- KL = Overall mass transfer coefficient (cm/hr).

Values for Ui and Us can be obtained from Weast (1975). The mass transfer coefficient (KL) is compound-specific and calculated from the following equation:

$$KL = (1/KL + RT/HKg)^{-1}$$

where

- H = Henry's Law Constant of compound (atm-m³/vol)
- R = Gas constant
- T = Shower water temperature (K)
- Kg = Gas-film transfer coefficient (3,000 cm/hr)
- KL = Liquid-film transfer coefficient (20 cm/hr).

The adult and child inhalation rates represented the average and worst-case values as recommended by EPA (1989a). For adults, the exposure duration was 9 years for the average exposure scenario, and 30 years for the plausible maximum scenario. For a child, the exposure duration under both average and worst-case scenarios was 9 years. The uptake efficiency was assumed to be 100 percent.

6.5.4.4 Ingestion of Soils/Sediments

The LADD for the ingestion of contaminated soils/sediments is calculated using the following equation:

$$ADD = \frac{(SC) (IR) (ED) (EFF)}{(BW) (LT) (365 \text{ days/year})}$$

where

SC = Soil concentration (mg/kg)
IR = Ingestion rate (mg/day)
ED = Exposure duration
EFF = Fraction absorbed
BW = Body weight (kg)
LT = Lifetime of individual.

The soil/sediment ingestion rates for children selected represented those considered average and maximum according to EPA (1989a). Ingestion of soils is a much more common phenomenon in children, especially those who exhibit pica, although it can occur in adult populations such as in the adult clay eaters found in the southeastern United States. For most adults, ingestion of soils occurs indirectly through hand-to-mouth transfer during smoking or eating with dirty hands. Thus, for adults, the ingestion rate was estimated using the value of 100 mg/day reported by Hawley (1985) for the average scenario, and a value of 480 mg/day to represent the plausible maximum scenario. For a child, the average and plausible maximum exposure scenarios were assumed to be 200 and 800 mg/day, respectively.

The exposure duration for adults was assumed to be consistent with the hunting and fishing seasons. An average exposure duration of 15 days and plausible maximum of 30 days was used. For a child, these exposure durations were doubled for conservatism.

The product of the uptake efficiencies of contaminants from the ground-water ingestion pathway and a 15 percent matrix effect (Hawley 1985) was used to represent the uptake efficiencies of contaminants from soils/sediments.

6.5.4.5 Ingestion of Garden Vegetables

A potential non-potable future-use of ground water is the watering of vegetables by nearby residents. The potential risks from exposure of contaminants from root crops (e.g., carrots) and leafy vegetables (e.g., lettuce) were evaluated. For this assessment, it was conservatively assumed that the plant would derive all of its water from ground water in the offsite upper, deep, and mixed bedrock zones.

The following equation was used to calculate this risk:

$$ADD = \frac{(PC) (IR) (ED) (EFF)}{(BW) (LT) (365 \text{ days/year})}$$

where

PC = Plant concentration (mg/kg)
IR = Ingestion rate (mg/day)
ED = Exposure duration
EFF = Fraction absorbed
BW = Body weight (kg)
LT = Lifetime of individual.

Plant uptake of contaminants can occur through the surfaces of the leaves and via the roots. Airborne deposition, such as may occur during spraying with pesticides, predominantly occurs through leaf surfaces. Contaminants present in the soil solution (i.e., pore water) can be absorbed by the plants through the roots.

Briggs et al. (1982) examined the uptake of non-ionized chemicals by barley roots and calculated the ratio of the concentration in the roots and concentration in the soil solution (Root Concentration Factor). The authors calculated the following regression between Root Concentration Factor and chemical K_{ow} :

$$\text{Log (RCF-0.82)} = 0.77 \text{ Log } K_{ow} - 1.52$$

Figure 6-2 graphically presents this equation. A review of this figure shows that there is a rapid logarithmic increase in Root Concentration Factor at log K_{ow} values greater than 3.5. McFarlane et al. (1990) showed that this regression was a reasonably good predictor of uptake using a wide number of plant species. This model is applicable to root concentrations and will be used to calculate the uptake of chemicals present in root crops (e.g., carrots, parsnips).

For leafy vegetables, Trapp et al. (1990) examined the concentration of chemicals in the plant fluids (i.e., sap) and calculated the ratio between the concentration in the plant fluids and soil solution (Transpiration Stream Concentration Factor). The authors calculated the following regression equation between Transpiration Stream Concentration Factor and chemical K_{ow} :

$$TSCF = 0.784 * \text{EXP } ((\text{Log } K_{ow} - 1.78)^2 / 2.44)$$

Figure 6-3 graphically presents this equation. A review of this figure shows that the maximum Transpiration Stream Concentration Factor is reached at a log K_{ow} of 1.8, followed by an exponential decay to log K_{ow} of 5. This model will be used to predict chemical concentrations in leafy vegetables (e.g., lettuce).

The ingestion rate was assumed to be 15 and 24 g/day (average and plausible maximum scenarios) for root crops, and 25 and 40 g/day (average and plausible maximum case) for leafy crops. These values were based upon the total daily vegetable consumption rates of

50 g/day (average) and 80 g/day (plausible maximum), as recommended by EPA (1992c), corrected for percent contribution of root crops (30 percent) and leaf crops (50 percent) for the total diet.

The exposure duration was conservatively estimated as 350 days per year for 9 years (average scenario) or 30 years (plausible maximum scenario). The annual exposure is conservative since residents are not likely to generate and store sufficient root crops to provide sole food supply.

6.5.4.6 Dermal Contact with Soils/Sediments

The ADD for the dermal contact with contaminated soils and sediments is calculated using the following equation:

$$ADD = \frac{(SC) (SD) (SSA) (ED) (EFF)}{(BW) (365 \text{ days/year})}$$

where

- SC = Soil concentration (mg/kg)
- SD = Skin deposition rate (mg/cm²)
- SSA = Skin surface area exposed (cm²)
- ED = Exposure duration
- EFF = Fraction absorbed
- BW = Body weight (kg).

The average deposition rate was calculated from data provided by Hawley (1985); a value twice the average was used to represent the maximum plausible deposition rate. Skin surface areas were obtained from EPA (1989a). Since contact of soils/sediments occurred outside of the home, the skin surface area used for adults was the sum of the surface area of the arms for the 50th percentile adult male (average scenario) and 95th percentile adult male (maximum plausible scenario). For children, the values selected were 60 percent of the adult values, based upon the ratio between adult and children skin surface areas presented in EPA (1989a), and includes the 50 percent and 95 percent percentile values for arms and legs. Exposure duration was assumed to be 15 days/year and 30 days/year for adults (average and plausible maximum scenario), and 30 and 60 days for children (average and plausible maximum scenario). The values for adults were based upon the time expended by a hunter or fisherman in the stream. The upper value for children was based upon possible contact during the summer.

An average dermal absorption efficiency of 0.6 percent and maximum dermal absorption rate of 1.2 percent was selected for all contaminants of concern. These values were derived from a study of the dermal uptake of chlorinated dioxins by Poiger and Schlatter (1980). These authors showed that after 4 hours, approximately 4 percent of the chlorinated dioxin painted on the skin of mice was absorbed. Applying a 15 percent dermal availability factor for contaminants absorbed to soils (Hawley 1985) yielded the average absorption efficiency of 0.6 percent.

6.5.4.7 Inhalation of Suspended Soils

The ADD for the inhalation of suspected soils is calculated using the following equation:

$$ADD = \frac{(AC) (IR) (ED) (EFF)}{(BW) (LT)}$$

where

AC	=	Air concentration (mg/m ³)
IR	=	Inhalation rate (m ³ /hr)
ED	=	Exposure duration
EFF	=	Fraction absorbed
BW	=	Body weight (kg)
LT	=	Lifetime (years).

As a future-use non-remedial construction scenario (e.g., installation of sanitary sewage leachfield piping), the potential exposure to subsurface soils entrained into the overlying air due to wind erosion was assessed. Cowherd et al. (1985) has provided a model to estimate the respirable particulate emissions due to wind erosion (E_{10} ; g/m²-hr) using the following equation:

$$E_{10} = 0.036(1-V) \left(\frac{[U]}{U_t} \right)^3 F(x)$$

where

V	=	Fraction of surface with vegetative cover, assumed 0
[U]	=	Mean annual wind speed, 4.4 m/sec (NOAA 1982)
U_t	=	Threshold value of wind speed at 7 m
F(x)	=	Correction factor to estimate erosion.

The threshold value of wind speed (U_t) is determined from the roughness height (Z), discussed in Chapter 5, and the threshold friction velocity. Assuming a particle size mode of 500 μ m (typical for sandy soils) and using a figure provided by Cowherd et al. (1985), a threshold friction velocity of 50 cm/sec is selected. The value of U_t is obtained by using a second figure provided by Cowherd et al. (1985) and the roughness height (Z) of the site. For this future-use scenario, it was assumed that the roughness height was 0.01 m, which is equivalent to the level surface found north of the Main Plant Building.

F(x) is a correction factor obtained graphically (Cowherd et al. 1985), based upon the value of X. The latter is calculated using the following equation:

$$X = 0.886(U_t / [U])$$

It was assumed that the exposure would occur from the excavation of a 2 ft × 150 ft × 3 ft trench. The excavated soil (900 ft³) was assumed to be spread to a depth of 0.25 ft adjacent to this area. This would result in coverage area of 3,600 ft² (334 m²), which represents the potential surface areas for wind erosion.

The following values were calculated for these parameters:

$$\begin{aligned}U_i &= 8 \text{ m/sec} \\X &= 1.61 \\F(X) &= 0.9 \\E_{10} &= 0.005 \text{ g/m}^2\text{-hr}\end{aligned}$$

The model assumes that the surface of the exposed soil is dry and hence susceptible to wind erosion.

6.6 RISK CHARACTERIZATION

Risk characterization is the final step of the human health risk assessment process. In this step, the toxicity benchmark concentrations (i.e., RfD or RfC) and carcinogenic toxicity slope factors for the chemicals of concern (as indicated in Section 6.4) were used in conjunction with the estimated chemical dose for the modeled population (as indicated in Section 6.5) to quantitatively estimate non-carcinogenic and carcinogenic health risks associated with the various routes of exposure. The methodologies used to estimate chronic non-carcinogenic risks and carcinogenic risks are further described below.

The potential non-carcinogenic effects resulting from exposure to the chemicals of concern were estimated by comparing an exposure intake with the established RfD or RfC. The resulting ratio, known as a Hazard Quotient, was derived as shown in the following equation:

$$HQ = \frac{ADD}{RfD \text{ or } RfC}$$

where

$$\begin{aligned}HQ &= \text{Hazard Quotient: ratio of daily intake level to acceptable daily intake level (unitless)} \\ADD &= \text{Measure of average daily dose (mg/kg-day)} \\RfD \text{ or } RfC &= \text{Reference dose or reference concentration (mg/kg-day)}.\end{aligned}$$

If the ADD exceeds the RfD or RfC (i.e., if the Hazard Quotient exceeds 1), there may be concern for potential adverse, non-cancer effects. In general, the greater the value of the Hazard Quotient above one, the greater the level of concern. The Hazard Quotient does not, however, represent a statistical probability of an effect occurring.

To assess the potential for non-carcinogenic effects posed by concurrent exposure to multiple chemicals, the Hazard Quotients for all chemicals of concern associated with a specific exposure pathway are summed. The resulting sum is referred to as the Hazard Index (U.S. EPA 1989a). This approach is based on the assumption that multiple subthreshold exposures to several chemicals in combination could result in an adverse health effect. The Hazard Index is expressed as presented in the following equation:

$$HI = ADD_1/RfD_1 + ADD_2/RfD_2 + \dots + ADD_i/RfD_i$$

or

$$HI = ADD_1/RfC_1 + ADD_2/RfC_2 + \dots + ADD_i/RfC_i$$

where

HI = Hazard Index for a specific exposure pathway
 ADD_i = Average Daily Dose for the i^{th} toxicant (mg/kg-day)
 RfD_i or RfC_i = Reference dose or reference concentration for the i^{th} toxicant (mg/kg-day).

Where a population may be exposed to chemicals of concern through exposure to multiple pathways (e.g., inhalation of vapors, soil ingestion, and dermal contact with soil), the individual Hazard Indices from all relevant pathways can also be summed to obtain a grand total Hazard Index for that population. If the sum of the ratios is less than one, cumulative exposure to the chemicals of interest at the site is judged unlikely to result in an adverse non-carcinogenic effect.

If the sum is greater than 1, a more detailed and critical evaluation of the risks, including consideration of specific target organs affected and mechanisms of action of the chemicals of concern, is necessary to determine if the cumulative exposure would in fact be likely to cause adverse effects to exposed individuals. For multiple chemical exposure, the Hazard Index can exceed one even if no single chemical exceeds its acceptable level. If the total Hazard Index exceeds one, EPA guidance (U.S. EPA 1986b, 1989b) recommends refining the Hazard Index analysis, such that only those compounds exhibiting the same or similar toxic endpoints are evaluated together. The toxic endpoint to be used for the refined Hazard Index analysis is the most sensitive non-carcinogenic health effect that was used to derive the RfD, RfC, or other health-based toxicity criteria used.

It should be noted that Hazard Indices are not a direct estimate of risk (U.S. EPA 1986b).

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The numerical estimate of excess lifetime cancer risk is calculated by multiplying the lifetime average daily intake by the risk per unit dose or cancer slope factor as shown in the following equation:

$$Risk = LADD \times SF$$

where

Risk = A unitless probability of an individual developing cancer
LADD = Lifetime average daily dose (mg/kg-day)
SF = Slope factor (mg/kg-day)⁻¹.

The EPA slope factors are upper 95th percentile confidence limits of the probability of response per unit intake of chemical over a lifetime. Slope factors are based on experimental animal data and, when available, epidemiological studies. EPA uses a linear non-threshold mathematical model for low-dose extrapolation, the linearized multistage model, to calculate numerical slope factor values. This method provides upper-bound estimates of risk. The actual risk may be lower and could be zero.

EPA guidance to evaluate cancer risk from concurrent exposure to several carcinogenic chemicals assumes that incremental cancer risks are additive (U.S. EPA 1989b). The total cancer risk is estimated as presented in the following equation:

$$Risk_T = \sum Risk_i$$

where

Risk_T = Total cancer risk
Risk_i = Risk estimate for the ith toxicant

The interpretation of the significance of the cancer risk estimates is based on the appropriate public policy. EPA, in the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300), stated that: "For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10⁻⁴ and 10⁻⁶." However, the NYSDEC uses a value of 10⁻⁶ as a threshold above which remedial measures may be taken.

6.6.1 Present and Future Use - Inhalation of Vapors (PS-1)

This exposure pathway was evaluated for a receptor located on Jordan Road downwind from the area north of the Main Plant Building who may inhale soil vapors released from this portion of the site. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-4. Supporting calculations are shown in Table H-5. There were no calculated carcinogenic or non-carcinogenic risks above threshold values under either the average or plausible maximum scenario for this exposure pathway.

6.6.2 Present and Future Use - Dermal Contact with Stream Sediments (PS-2)

This exposure pathway was evaluated for a receptor (hunter or fisherman) who may come in contact with contaminated stream sediments in Skaneateles Creek. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-4 for both sampling rounds. Supporting calculations are shown in Tables H-6 and H-7.

No carcinogenic or non-carcinogenic risks above threshold values were calculated under the average exposure scenario using the Round 1 data, or under either the average or plausible maximum scenario using the Round 2 data. A carcinogenic risk above the threshold value was calculated only for the plausible maximum scenario using the Round 1 data. A review of Table H-6 shows that this risk was due to the presence of total c-PAHs. These compounds were detected at 2 of the 4 sampled locations.

6.6.3 Present and Future Use - Dermal Contact with Creek Seeps (PS-3)

This exposure pathway was evaluated for a receptor (hunter or fisherman) who may come in contact with contaminated seeps while walking along Skaneateles Creek. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-4. Supporting calculations are shown in Table H-8.

A carcinogenic risk above the $1E-6$ threshold was calculated under both the average and plausible maximum exposure scenarios for both sampling rounds. Approximately 94 percent of this total risk was attributable to total c-PAHs. Under the plausible maximum scenario, the chemical-specific calculated risks also exceeded the $1E-6$ threshold for c-PAHs, tetrachloroethene, and trichloroethene. Total c-PAHs were identified at 2 of the 4 sampled locations, and tetrachloroethene and trichloroethene at 1 of the 4 sampled locations.

There was no calculated non-carcinogenic risk above threshold under the average exposure scenario. A calculated risk above the threshold was calculated under the plausible maximum scenario. Two toluic acid isomers (*ortho* and *meta*) contributed approximately 56 percent of this calculated risk.

6.6.4 Present and Future Use - Incidental Ingestion of Creek Sediments (PS-4)

This exposure pathway was evaluated for 2 receptors. The first receptor was a hunter or fisherman who may come in contact with contaminated sediments and transfer the soils to their mouths during smoking or eating. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-4. Supporting calculations are shown in Tables H-9 and H-10.

A carcinogenic risk above the $1E-6$ threshold was calculated under both the average and plausible maximum exposure scenarios for the Round 1 data. This risk was attributable to the presence of total c-PAHs.

The carcinogenic risk above the threshold was calculated under both the average and plausible maximum scenarios using the Round 2 data. This risk was also attributable to the presence of total c-PAH in the sediments.

There was no calculated non-carcinogenic risk above the threshold value under either the average or plausible maximum scenario for this exposure pathway, for either sampling rounds.

The second potential receptor were children who may play in the stream and accidentally ingest contaminated sediments. There was no calculated non-carcinogenic risk above the threshold value under either the average or plausible maximum scenario for this exposure pathway, for either sampling rounds.

6.6.5 Future Use - Inhalation of Vapors from Exposed Soils (FS-1)

This exposure calculates the potential risk associated with vapors emanating from exposed subsurface soils from the area north of the Main Plant Building and along the landfill perimeter. The 2 receptors evaluated were the nearby residents and an onsite worker. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-5 for the residential receptors and Table 6-6 for the industrial receptors. The calculated air concentrations for both receptors are shown in Table H-11. Supporting calculations are shown in Tables H-12 and H-13 for residential receptors, and Tables H-14 and H-15 for onsite worker receptors.

There were no calculated carcinogenic or non-carcinogenic risk above threshold values under either the average or plausible maximum scenario for this exposure pathway for the residential or onsite worker receptors.

6.6.6 Future Use - Dermal Contact with Exposed Soils (FS-2)

This pathway calculates the potential risk associated with dermal contact by workers of subsurface soils exposed in the area north of the Main Plant Building and along the landfill perimeter. The pathway was modeled assuming a short-term (1 work week) exposure, as may occur during the installation of a pipe to the sanitary sewage leachfield, replacement of leachate collection pipe on the perimeter of the landfill, or construction of foundation footings. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-6. Supporting calculations are shown in Tables H-16 and H-17.

There were no calculated carcinogenic or non-carcinogenic risk above threshold values under either the average or plausible maximum scenario for this exposure pathway for soils from either the area north of the Main Plant Building or the landfill perimeter.

6.6.7 Future Use - Inhalation of Exposed Soils (Dust) (FS-3)

This pathway calculates the potential risk to nearby residents from inhalation of subsurface soils (dust) exposed in the area north of the Main Plant Building and along the landfill perimeter which may be entrained in the wind. The pathway was modeled assuming a

short-term (1 work week) exposure, as may occur during the installation of a pipe to the sanitary sewage leachfield or replacement of leachate collection pipe on the perimeter of the landfill. The receptor was the nearby residents on Jordan Road. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-5. Supporting calculations are shown in Tables H-18 and H-19.

There were no calculated carcinogenic or non-carcinogenic risk above threshold values under either the average or plausible maximum scenario for this exposure pathway for the residential or residential receptors.

6.6.8 Future Use (Residential) - Inhalation of Vapors in Subsurface Structure (FS-4)

This pathway calculates the potential risk associated with inhalation of vapors which have migrated through the foundation and into the basement of a house constructed in the area north of Main Plant Building. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-5. Supporting calculations are shown in Table H-20.

There were no calculated carcinogenic or non-carcinogenic risk above threshold values under either the average or plausible maximum scenario for this exposure pathway.

6.6.9 Future Use (Residential) - Ingestion of Offsite Bedrock Ground Water (FS-5)

This pathway calculates the potential risk associated with the ingestion of offsite bedrock ground water as a primary drinking water source. This pathway was evaluated using three separate media: offsite upper bedrock well data, offsite deep bedrock well data, and a combination of the two bedrock zones sampled ("mixed bedrock"). The latter was examined if well casings were installed which did not separate the upper and deep bedrock zones. The wells used for this assessment were MW-7I/7D, MW-16I/16D, and MW-17D. These wells were selected since they are on the perimeter of the site in the direction where contaminants have the potential for offsite migration. Since well cluster MW-16 was used, this pathway was evaluated only for the Round 2 data. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-7. Supporting calculations are shown in Tables H-21, H-22, and H-23.

For the upper bedrock (Table H-21), a risk greater than $1\text{E-}6$ was calculated for the plausible maximum scenario but not the average exposure scenario. This was attributable to the presence of trichloroethene in MW-7I.

For the upper bedrock, a non-carcinogenic risk greater than the risk threshold of 1 was calculated under the plausible maximum scenario for adults but not the average exposure scenario. There were no calculated risks greater than 1 for children. Arsenic, *o*-toluic acid, and *m*-toluic acid contributed 24, 35, and 17 percent, respectively, of this total calculated risk, although the individual Hazard Indices were all less than 1. MW-7I showed the greatest concentrations of these chemicals for the wells used for this exposure scenario.

For the deep bedrock (Table H-22), a risk greater than $1E-6$ was calculated under both the average and plausible maximum scenarios. This was attributable to the presence of tetrachloroethene (89 percent of total risk) and trichloroethene (11 percent of total risk) which were present in MW-7D.

For the deep bedrock, a non-carcinogenic risk greater than the risk threshold of 1 was calculated under the plausible maximum scenario for adults but not the average exposure scenario. There was no calculated risk above threshold values for children. This risk was due to the presence of arsenic (60 percent of total risk), *o*-toluic acid (14 percent of total risk), and *m*-toluic acid (14 percent of total risk).

For the mixed bedrock exposure (Table H-23), a carcinogenic risk greater than $1E-6$ was calculated for both the average and plausible maximum exposure scenarios. Tetrachloroethene was responsible for 81-86 percent of this risk. Under the plausible maximum scenario, the individual risk for trichloroethene also exceeded the risk threshold.

For the mixed bedrock exposure, a non-carcinogenic risk greater than the threshold value of 1 was calculated only under the plausible maximum scenario for adults. Arsenic, *o*-toluic acid, and *m*-toluic acid contributed 25, 30, and 19 percent, respectively, of the calculated risk. The individual risks for these compounds were all greater than the threshold value. There was no calculated risk for children under the average or plausible maximum scenarios.

6.6.10 Future Use (Residential) - Dermal Contact with Offsite Bedrock Ground Water While Swimming (FS-6)

This pathway calculates the potential risk associated with the dermal contact of offsite bedrock ground water as may occur during swimming. This pathway was evaluated using onsite upper and deep bedrock well data, and a combination of the 2 bedrock zones sampled ("mixed bedrock"). The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-7. Supporting calculations are shown in Tables H-24, H-25, and H-26.

For the upper bedrock, the calculated carcinogenic risk under either the average or plausible maximum scenarios were below the $1E-6$ risk threshold. There was no calculated non-carcinogenic risk greater than the risk threshold of 1 under either the average or plausible maximum scenario.

For the deep bedrock, a risk greater than $1E-6$ was calculated under only the plausible maximum scenario. This was attributable to the presence of tetrachloroethene (89 percent of the total risk) which was present in MW-7D. There was no calculated non-carcinogenic risk greater than the risk threshold of 1 under either the plausible maximum or average exposure scenario.

Use of mixed bedrock ground water also showed a carcinogenic risk greater than $1E-6$ for both the average and plausible maximum exposure scenarios. Tetrachloroethene was principally responsible for this calculated risk. There was no calculated non-carcinogenic risk above the threshold under either the average or plausible maximum scenario.

6.6.11 Future Use (Residential) - Inhalation of Offsite Bedrock Ground Water While Showering (FS-7)

This pathway calculates the potential risk associated with inhalation of vapors from offsite bedrock ground water as may occur during showering. This pathway was evaluated using offsite upper and deep bedrock well data, and a combination of the two bedrock zones sampled ("mixed bedrock"). The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-7. Supporting calculations are shown in Tables H-27, H-28, and H-29.

For the upper bedrock (Table H-27), a risk greater than $1E-6$ was calculated for both the average and the plausible maximum exposure scenarios. This was attributable to the presence of trichloroethene in MW-7I. A non-carcinogenic risk greater than the risk threshold of 1 was calculated under the plausible maximum scenario but not the average exposure scenario. This risk was due to the presence of 1,2-dichloroethene, which was present at the highest concentration in MW-7I.

For the deep bedrock (Table H-28), a risk greater than $1E-6$ was calculated under both the average and plausible maximum scenarios. This was attributable to the presence of tetrachloroethene (15 percent of total risk) and trichloroethene (85 percent of total risk), both of which were found in MW-7D. The non-carcinogenic risk was less than the risk threshold of 1 for both adult and children, under the average or plausible maximum exposure.

Use of mixed bedrock ground water also showed a carcinogenic risk greater than $1E-6$ for both the average and plausible maximum exposure scenarios (Table H-29). Tetrachloroethene and trichloroethene were principally responsible for this calculated risk. A non-carcinogenic risk above the threshold was calculated under the plausible maximum scenario but not the average scenario; 1,2-dichloroethene was principally responsible for this calculated risk. This chemical was found in 3 of the 5 wells, with the maximum concentration in MW-7I.

6.6.12 Future Use (Residential) - Ingestion of Vegetables Watered with Offsite Bedrock Ground Water (FS-8)

This pathway calculates the risk associated with the ingestion of root (e.g., carrots) and leaf crops (e.g., lettuce) which have received water exclusively from bedrock ground-water wells. This is a conservative exposure pathway since it assumes that the SMC property will be developed for residences in the future and that the sole water source for the vegetation will be derived from the ground-water wells (i.e., no contribution of natural precipitation). The database for this assessment included the upper and deep bedrock wells, and mixed bedrock wells. The east side inorganic sludge basin wells were not included in this assessment since these wells showed no detectable organic chemicals. The two sampling rounds were evaluated separately. Analytical results from offsite well cluster MW-16I/16D were not included in this database. The calculated plant concentrations are shown in Table H-30. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-7. Supporting calculations are shown in Tables H-31 through H-33.

For the upper bedrock ground-water use (Table H-31), a carcinogenic risk less than the threshold of $1E-6$ was calculated under both the average and plausible maximum exposure scenarios for the root and leaf crops. The upper bedrock ground-water calculated non-carcinogenic risks were less than the risk threshold of 1 under both the average and plausible maximum exposure scenario for adults and children, if either root crops or leaf crops were ingested.

The use of deep bedrock ground water (Table H-32) showed no calculated carcinogenic or non-carcinogenic risk above threshold values under the average or plausible maximum exposure scenarios for either root crops or leaf crops.

The use of mixed bedrock ground water (Table H-33) also showed no calculated carcinogenic or non-carcinogenic risks above threshold values under either the average or plausible maximum scenarios from either root crops or leaf crops.

6.6.13 Future Use (Residential) - Ingestion of Onsite Bedrock Ground Water (FS-6)

This pathway calculates the risk associated with the residential use of onsite bedrock ground water as a primary drinking water source. This is a conservative exposure pathway since it assumes that if SMC property is developed for residences in the future, wells will be installed for potable uses. The database for this assessment included the upper and deep bedrock wells, a combination of the 2 bedrock wells ("mixed" bedrock), and the east side inorganic sludge basin wells. The 2 sampling rounds were evaluated separately. Analytical results from offsite well cluster MW-16I/16D were not included in this database. The risks associated with these wells were examined in the offsite exposure assessment (Section 6.6.2.9). The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-8. Supporting calculations are shown in Tables H-34 through H-40.

For the Round 1 upper bedrock ground-water use (Table H-34), a carcinogenic risk greater than $1E-6$ was calculated under both the average and plausible maximum exposure scenarios. Tetrachloroethene and total c-PAHs were principally responsible for this total calculated risk. Individual chemical risks were greater than $1E-6$ under both scenarios for vinyl chloride, trichloroethene, tetrachloroethene, and total c-PAHs.

The Round 1 upper bedrock ground-water calculated non-carcinogenic risk was greater than the risk threshold of 1 only under the plausible maximum exposure scenario for adults. This calculated risk was due to tetrachloroethene (62 percent of total risk) and arsenic (19 percent of total risk).

For the Round 2 upper bedrock ground-water use (Table H-35), a carcinogenic risk greater than $1E-6$ was calculated under both the average and plausible maximum exposure scenarios. Vinyl chloride was principally responsible for this total calculated risk. Individual chemical risks were greater than $1E-6$ for vinyl chloride, trichloroethene, benzene, and tetrachloroethene.

The Round 2 upper bedrock ground-water calculated non-carcinogenic risk was greater than the risk threshold of 1 only under the plausible maximum exposure scenario for adults. This

calculated risk was due to arsenic (28 percent of total risk), *o*-toluic acid (21 percent of total risk), *p*-toluic acid (17 percent of total risk) and 1,2-dichloroethene (15 percent of total risk), although individual risks from these chemicals were all less than 1.

For the Round 1 deep bedrock ground-water use (Table H-36), a carcinogenic risk greater than 1E-6 was calculated only under the plausible maximum exposure scenarios. This was principally due to the presence of tetrachloroethene (71 percent of total risk) and benzene (20 percent of total risk).

The Round 1 deep bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children.

For the Round 2 deep bedrock ground-water use (Table H-37), a carcinogenic risk greater than 1E-6 was calculated only under the plausible maximum exposure scenario. Tetrachloroethene was principally responsible for this total calculated risk.

The Round 2 deep bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children.

For the Round 1 mixed bedrock ground-water use (Table H-38), a carcinogenic risk greater than 1E-6 was calculated under both the average and plausible maximum exposure scenarios. Tetrachloroethene and total c-PAHs were principally responsible for this total calculated risk. Individual chemical risks were greater than 1E-6 under both scenarios for vinyl chloride, trichloroethene, benzene, tetrachloroethene, and total c-PAHs.

The Round 1 mixed bedrock ground-water calculated non-carcinogenic risk was greater than the risk threshold of 1 only under the plausible maximum exposure scenario for adults. This calculated risk was due to tetrachloroethene (57 percent of total risk), arsenic (15 percent of total risk), *p*-toluic acid (10 percent of total risk) and *o*-toluic acid (9 percent of total risk). Individual chemical risks were all less than the risk threshold of 1.

For the Round 2 mixed bedrock ground-water use (Table H-39), a carcinogenic risk greater than 1E-6 was calculated under both the average and plausible maximum exposure scenarios. Vinyl chloride was principally responsible for this total calculated risk. Individual chemical risks were greater than 1E-6 under both scenarios for vinyl chloride, trichloroethene, benzene, tetrachloroethene, and 4,4'-DDE.

The Round 2 mixed bedrock ground-water calculated non-carcinogenic risk was greater than the risk threshold of 1 only under the plausible maximum exposure scenario for adults. This calculated risk was due to arsenic (28 percent of total risk), *p*-toluic acid (16 percent of total risk), *m*-toluic acid (13 percent of total risk), and *o*-toluic acid (21 percent of total risk). Individual chemical risks were all less than the risk threshold of 1.

For the east side wells (Table H-40), there was no calculated carcinogenic risk since there were no carcinogenic chemicals present in the samples. There was no calculated non-carcinogenic risk above the threshold value of 1 for the average and plausible maximum scenarios for adults or children.

6.6.14 Future Use (Residential) - Dermal Contact with Onsite Bedrock Ground Water (FS-6)

This pathway calculates the risk associated with the residential use of onsite bedrock ground water for non-potable use such as filling swimming pools. This is a conservative exposure pathway since it assumes that if SMC property is developed for residences in the future, wells will be installed for potable uses. The database for this assessment included the upper and deep bedrock wells, a combination of the 2 bedrock wells ("mixed" bedrock), and the east side inorganic sludge basin wells. The 2 sampling rounds were evaluated separately. Analytical results from offsite well cluster MW-16I/16D were not included in this database. The risks associated with these wells were examined in the offsite exposure assessment (Section 6.6.2.9). The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-8. Supporting calculations are shown in Tables H-41 through H-46.

For the Round 1 upper bedrock ground-water use (Table H-41), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios. Benzene, vinyl chloride, and tetrachloroethene were principally responsible for this total calculated risk. Individual chemical risks were greater than $1\text{E-}6$ under both scenarios for vinyl chloride, benzene, trichloroethene, and tetrachloroethene.

The Round 1 upper bedrock ground water showed no calculated non-carcinogenic risk greater than the risk threshold of 1 under both the average and plausible maximum exposure scenarios.

For the Round 2 upper bedrock ground-water use (Table H-42), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios. Benzene and vinyl chloride were principally responsible for this total calculated risk. Individual chemical risks were greater than $1\text{E-}6$ for vinyl chloride, trichloroethene, benzene, and tetrachloroethene.

The Round 2 upper bedrock ground water showed no calculated non-carcinogenic risk greater than the risk threshold of 1 under either the average or plausible maximum scenario.

For the Round 1 deep bedrock ground-water use (Table H-43), a carcinogenic risk greater than $1\text{E-}6$ was calculated only under the plausible maximum exposure scenarios. This was principally due to the presence of benzene.

The Round 1 deep bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children.

For the Round 2 deep bedrock ground-water use (Table H-44), a carcinogenic risk greater than $1\text{E-}6$ was calculated only under the plausible maximum exposure scenario. Tetrachloroethene was principally responsible for this total calculated risk.

The Round 2 deep bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children.

For the Round 1 mixed bedrock ground-water use (Table H-45), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios.

Benzene and tetrachloroethene were principally responsible for this total calculated risk. Individual chemical risks were greater than $1\text{E-}6$ under both scenarios for vinyl chloride, trichloroethene, benzene, and tetrachloroethene.

The Round 1 mixed bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios.

For the Round 2 mixed bedrock ground-water use (Table H-46), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios. Benzene and vinyl chloride were principally responsible for this total calculated risk. Individual chemical risks were greater than $1\text{E-}6$ under both scenarios for vinyl chloride, trichloroethene, benzene, and tetrachloroethene.

The Round 2 mixed bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios.

6.6.15 Future Use (Residential) - Inhalation of Onsite Bedrock Ground Water While Showering (FS-7)

This pathway calculates the risk associated with the residential use of onsite bedrock ground water for showering. This is a conservative exposure pathway since it assumes that if the SMC property is developed for residences in the future, wells will be installed for potable uses. The database for this assessment included the upper and deep bedrock wells and mixed bedrock wells. The east side inorganic sludge basin wells were not included in this assessment since these wells showed no detectable volatile chemicals. The two sampling rounds were evaluated separately. Analytical results from offsite well cluster MW-16I/16D were not included in this database. The risks associated with these wells were examined in the offsite exposure assessment (Section 6.6.2.11). The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-8. Supporting calculations are shown in Tables H-47 through H-52.

For the Round 1 upper bedrock ground-water use (Table H-47), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios. Vinyl chloride, trichloroethene, and tetrachloroethene were principally responsible for this total calculated risk. Individual chemical risks were greater than $1\text{E-}6$ under both scenarios for vinyl chloride, benzene, trichloroethene, and tetrachloroethene.

The Round 1 upper bedrock ground-water calculated non-carcinogenic risk was greater than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children. This calculated risk was principally due to tetrachloroethene, which contributed 88-91 percent to the total risk.

For the Round 2 upper bedrock ground-water use (Table H-48), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios. Vinyl chloride was principally responsible for this total calculated risk, contributing approximately 94 percent to the total risk. Individual chemical risks were greater than $1\text{E-}6$ for vinyl chloride, trichloroethene, benzene, and tetrachloroethene.

The Round 2 upper bedrock ground-water calculated non-carcinogenic risk was greater than the risk threshold of 1 only under the plausible maximum exposure scenario for adults and children. This calculated risk was due to 1,2-dichloroethene (77 percent of total risk) and tetrachloroethene (21 percent of total risk).

For the Round 1 deep bedrock ground-water use (Table H-49), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios. This was principally due to the trichloroethene and benzene.

The Round 1 deep bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children.

For the Round 2 deep bedrock ground-water use (Table H-50), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios. Trichloroethene and tetrachloroethene were responsible for this total calculated risk.

The Round 2 deep bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children.

For the Round 1 mixed bedrock ground-water use (Table H-51), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios. Vinyl chloride, tetrachloroethene, and trichloroethene were principally responsible for this total calculated risk. Individual chemical risks were greater than $1\text{E-}6$ under both scenarios for vinyl chloride, trichloroethene, benzene, and tetrachloroethene.

The Round 1 mixed bedrock ground-water calculated non-carcinogenic risk was greater than the risk threshold of 1 only under the plausible maximum exposure scenario for adults, and the average and plausible maximum scenarios for children. This calculated risk was principally due to tetrachloroethene, which contributed approximately 93 percent to the total calculated risk.

For the Round 2 mixed bedrock ground-water use (Table H-52), a carcinogenic risk greater than $1\text{E-}6$ was calculated under both the average and plausible maximum exposure scenarios.

Vinyl chloride was principally responsible for this total calculated risk. Individual chemical risks were greater than $1\text{E-}6$ under both scenarios for vinyl chloride, trichloroethene, benzene, and tetrachloroethene.

The Round 2 mixed bedrock ground-water calculated non-carcinogenic risk was greater than the risk threshold of 1 only under the plausible maximum exposure scenario for adults and children. Approximately 77 percent of the total risk was due to 1,2-dichloroethene.

6.6.16 Future Use (Residential) - Ingestion of Vegetables Watered with Onsite Bedrock Ground Water (FS-8)

This pathway calculates the risk associated with the ingestion of root (e.g., carrots) and leaf crops (e.g., lettuce) which have received water exclusively from bedrock ground-water wells. This is a conservative exposure pathway since it assumes that the SMC property will be developed for residences in the future and that the sole water source for the vegetation will be derived from the ground-water wells (i.e., no contribution of natural precipitation). The database for this assessment included the upper and deep bedrock wells, and mixed bedrock wells. The east side inorganic sludge basin wells were not included in this assessment since these wells showed no detectable organic chemicals. The two sampling rounds were evaluated separately. Analytical results from offsite well cluster MW-16I/16D were not included in this database. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-8. Supporting calculations are shown in Tables H-53 through H-58.

For the Round 1 upper bedrock ground-water use (Table H-53), a carcinogenic risk greater than $1\text{E-}6$ was calculated only under the plausible maximum exposure scenario for the root crops. Vinyl chloride (64 percent of total risk) and trichloroethene (35 percent of total risk) were principally responsible for the calculated risk. For the exposure to leaf crops, a carcinogenic risk greater than the $1\text{E-}6$ threshold was calculated under both the average and plausible maximum scenarios. Approximately 98 percent of the risk was attributable to vinyl chloride.

The Round 1 upper bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children, if either root crops or leaf crops were ingested.

For the Round 2 upper bedrock ground-water use (Table H-54), a carcinogenic risk greater than $1\text{E-}6$ was calculated only under the plausible maximum exposure scenario for both the root crops and leaf crops. Vinyl chloride (77 percent of total risk) and tetrachloroethene (21 percent of total risk) were principally responsible the calculated risk from root crops, and vinyl chloride (38 percent of total risk) and benzene (61 percent of total risk) were responsible for the risk from leaf crops.

The Round 2 upper bedrock ground-water calculated non-carcinogenic risks was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children, if either root crops or leaf crops were ingested.

For the Round 1 deep bedrock ground-water use (Table H-55), there were no calculated carcinogenic risks greater than the $1\text{E-}6$ threshold under either the average or plausible maximum exposure scenarios for the ingestion of either root crops and leaf crops. The Round 1 deep bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children.

For the Round 2 deep bedrock ground-water use (Table H-56), there were no calculated carcinogenic risks greater than the $1\text{E-}6$ threshold under either the average or plausible maximum exposure scenarios for the ingestion of leaf crops. A carcinogenic risk above the threshold was calculated for root crops only under the plausible maximum exposure scenario. Approximately 94 percent of this risk was attributable to 4,4-DDE, which was identified in 1 of the sampled wells.

The Round 2 deep bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenarios for adults and children for the ingestion of either root crops or leaf crops.

For the Round 1 mixed bedrock ground-water use (Table H-57), a carcinogenic risk greater than $1\text{E-}6$ was calculated for both the average and plausible maximum exposure scenarios for root crops, but only under the plausible maximum exposure scenario for the leaf crops. Tetrachloroethene was principally responsible for the risks from either the root or leaf crops.

The Round 1 mixed bedrock ground-water calculated non-carcinogenic risks were less than the risk threshold of 1 under both the average and plausible maximum exposure scenario for adults and children, if either root crops or leaf crops were ingested.

For the Round 2 mixed bedrock ground-water use (Table H-58), a carcinogenic risk greater than $1\text{E-}6$ was calculated only under the plausible maximum exposure scenarios for leaf and root crops. Vinyl chloride and tetrachloroethene were principally responsible for the risk from the root crops, and tetrachloroethene was principally responsible for the risks from the leaf crops.

The Round 2 mixed bedrock ground-water calculated non-carcinogenic risk was less than the risk threshold of 1 under both the average and plausible maximum exposure scenario for adults and children if either root crops or leaf crops were ingested.

6.6.17 Future Use - Ingestion of Onsite Bedrock Ground Water by Workers (FS-9)

This pathway calculates the potential risk associated with using the upper and deep bedrock ground water at the site as a drinking water source for onsite workers. This is a conservative exposure pathway since there is an available potable water supply for potable use. This pathway was evaluated using onsite upper and deep bedrock well data, and (mixed bedrock). The latter was examined if well casings were installed which did not separate the upper and deep bedrock zones. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-9. Supporting calculations are shown in Tables H-59 through H-64.

Use of onsite upper bedrock ground water for drinking yielded a carcinogenic risk above the $1E-6$ threshold under both the average and plausible maximum exposure scenarios for both sampling rounds (Tables H-59 and H-60). This risk was attributable to the presence of chlorinated organics (trichloroethene, tetrachloroethene, and vinyl chloride) and total c-PAHs in the upper bedrock ground water. For the Round 1 samples, trichloroethene and tetrachloroethene were present in 1 and 3, respectively, of the 9 wells. For the Round 2 samples, vinyl chloride and trichloroethene were present in 1 and 5, respectively, of the 16 wells used. The offsite well (MW-16I) was not included in this compilation.

There were no calculated non-carcinogenic risk above threshold values under the average scenario for this exposure pathway. The plausible maximum exposure showed a non-carcinogenic risk for the Round 1 samples only. Tetrachloroethene contributed approximately 64 percent of the total calculated non-carcinogenic risk for this pathway, although its individual calculated risk was below the threshold value.

Use of onsite deep bedrock ground water for drinking yielded a carcinogenic risk above the $1E-6$ threshold only under the plausible maximum exposure scenario for both sampling rounds (Tables H-61 and H-62). This risk was attributable to the presence of tetrachloroethene in the deep bedrock ground water. For the Round 1 samples, tetrachloroethene was present in 3 of the wells used for this analysis. For the Round 2 samples, this compound was present in 1 of the 6 wells used for the analysis.

There were no calculated non-carcinogenic risk above threshold values under either the average or plausible maximum scenarios for this exposure pathway.

Use of onsite mixed bedrock yielded a carcinogenic risk greater than the action threshold of $1E-6$ under both the average and plausible maximum scenario using the Round 1 data (Tables H-63 and H-64). Total c-PAHs and tetrachloroethene were principally responsible for the calculated risk. The industrial chemical risk for vinyl chloride, tetrachloroethene, and total c-PAHs exceeded the $1E-6$ threshold for both exposure scenarios. There was no calculated non-carcinogenic risk above threshold values for this scenario.

6.6.18 Future Use - Incidental Ingestion of Onsite Bedrock Ground Water by Workers (FS-10)

This pathway calculates the potential risk associated with using the incidental ingestion of ground water onsite which may occur during industrial water use. This pathway was evaluated using onsite upper and deep bedrock well data, and mixed bedrock. The latter was examined if well casings were installed which did not separate the upper and deep bedrock zones. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-9. Supporting calculations are shown in Tables H-65 through H-70.

Use of onsite upper bedrock ground water for individual ingestion yielded a carcinogenic risk above the $1E-6$ threshold under both the average and plausible maximum exposure scenarios for both sampling rounds. This risk was attributable to the presence of chlorinated organics (trichloroethene, tetrachloroethene, and vinyl chloride) and total c-PAHs in the upper bedrock ground water. For the Round 1 samples, trichloroethene and tetrachloroethene were

present in 1 and 3, respectively, of the 9 wells. For the Round 2 samples, vinyl chloride and trichloroethene were present in 1 and 5, respectively, of the 16 wells used. The offsite well (MW-16I) was not included in this compilation.

There were no calculated non-carcinogenic risk above threshold values under the average scenario for this exposure pathway. The plausible maximum exposure showed a non-carcinogenic risk for the Round 1 samples only. Tetrachloroethene contributed approximately 64 percent of the total calculated non-carcinogenic risk for this pathway, although its individual calculated risk was below the threshold value.

Use of onsite deep bedrock ground water for drinking yielded a carcinogenic risk above the $1E-6$ threshold under both the average and plausible maximum exposure scenarios for both sampling rounds. This risk was attributable to the presence of chlorinated organics (trichloroethene and tetrachloroethene) and benzene in the deep bedrock ground water. For the Round 1 samples, trichloroethene and tetrachloroethene were present in 1 and 3, respectively, of the wells used for this analysis. For the Round 2 samples, these compounds were each present in 1 of the 6 wells used for the analysis.

There was no calculated non-carcinogenic risk above threshold values under either the average or plausible maximum scenarios for this exposure pathway.

Use of mixed bedrock ground water showed a carcinogenic risk above the threshold only under the plausible maximum scenario. This risk was attributable to the presence of tetrachloroethene and total c-PAHs. There was no calculated non-carcinogenic risk for this exposure scenario.

6.6.19 Future Use - Dermal Contact with Onsite Bedrock Ground Water by Workers (FS-11)

This pathway calculates the potential risk associated from dermal contact of ground water onsite which may occur during industrial water use. This pathway was evaluated using onsite upper and deep bedrock well data, and mixed bedrock. The latter was examined if well casings were installed which did not separate the upper and deep bedrock zones. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-9. Supporting calculations are shown in Tables H-71 through H-76.

Dermal contact of onsite upper bedrock ground water yielded a carcinogenic risk above the $1E-6$ threshold under both the average and plausible maximum exposure scenarios for both sampling rounds. This risk was attributable to the presence of chlorinated organics (trichloroethene, tetrachloroethene, and vinyl chloride) in the upper bedrock ground water. For the Round 1 samples, trichloroethene and tetrachloroethene were present in 1 and 3, respectively, of the 9 wells. For the Round 2 samples, vinyl chloride and trichloroethene were present in 1 and 5, respectively, of the 16 wells used. The offsite well (MW-16I) was not included in this compilation.

There was no calculated non-carcinogenic risk above threshold values under the average scenario for this exposure pathway. The plausible maximum exposure scenario showed a

non-carcinogenic risk for the Round 1 samples only. Tetrachloroethene contributed approximately 64 percent of the total calculated non-carcinogenic risk for this pathway, although its individual calculated risk was below the threshold value.

Dermal contact of onsite deep bedrock ground water yielded a carcinogenic risk above the $1E-6$ threshold under both the average and plausible maximum exposure scenarios for the Round 1 samples but not the Round 2 samples. This risk was attributable to benzene in the deep bedrock ground water. This compound was detected in only 1 of the 9 wells sampled.

There were no calculated non-carcinogenic risk above threshold values under either the average or plausible maximum scenarios for this exposure pathway.

Use of mixed bedrock ground water showed a carcinogenic risk above the threshold under both the average and plausible maximum scenarios. This risk was attributable to the presence of tetrachloroethene, benzene, and vinyl chloride. There was no calculated non-carcinogenic risk for this exposure scenario.

6.6.20 Future Use - Inhalation of Vapors from Onsite Bedrock Ground Water While Washing Vehicles (FS-12)

This pathway calculates the potential risk associated with the inhalation of vapors released from ground water onsite while washing vehicles. This pathway was evaluated using onsite upper and deep bedrock well data, and mixed bedrock. The latter was examined if well casings were installed which did not separate the upper and deep bedrock zones. The calculated carcinogenic and non-carcinogenic risks are summarized in Table 6-9. Supporting calculations are shown in Tables H-77 through H-82.

There were no calculated carcinogenic or non-carcinogenic risks above threshold values under the average or plausible maximum scenarios, for use of upper, deep, or mixed bedrock ground water.

6.6.21 Future Use - Inhalation of Vapors Entering Subsurface Structures (FS-13)

This pathway calculates the potential risk associated with the inhalation of vapors entering the basement of a structure built north of the Main Plant Building. The calculated risks are summarized in Table 6-6. Supporting calculations are provided in Table H-83.

There was no calculated carcinogenic or non-carcinogenic risks above the threshold value for this exposure pathway.

6.7 HABITAT ASSESSMENT

Data collected during the field environmental survey performed in October 1991 and the analytical data collected during the 2 rounds of sampling were used to evaluate the potential environmental health risks from the SMC site. The Biothreat Model (EA 1988) was used as a framework for the gathering of field data for this habitat assessment.

The methodology for the habitat assessment was presented in the Work Plan (BBL 1990) and includes the following components:

- Characterization of site ecology
- Selection of contaminants of concern
- Selection of receptors of concern
- Exposure assessment
- Risk characterization.

This evaluation also includes an evaluation of the recent PCB survey of Skaneateles Creek performed by NYSDEC.

6.7.1 Site Ecology

A description of the natural resources present at the SMC site was detailed in Section 3.2 of this report. The following is a brief summary of the site ecology.

The terrestrial component consisted of disturbed old field setting, except in the immediate areas of the existing Main Plant Building and abandoned building foundations. The reforested areas and hedge rows consisted of mixed hard and soft woods, and low understory typical of New York State. The presence of deer, raccoons, woodchucks, mice, rabbits, skunk, and other small mammals was evident in the extensive lawn area, hedge rows, and wooded areas of the property.

The aquatic community of Skaneateles Creek was consistent with a shallow, oxygen-rich community of benthic macroinvertebrates (e.g., mayflies, caddisflies), larger invertebrates (e.g., crayfish, beetles), and fish (e.g., spottail shiner). Brown trout are stocked in Skaneateles Creek, but none were observed in the immediate vicinity of the site during the field survey. Macrophytes (predominantly water celery [*Vallesnaria* sp.]) were found in areas of stable sediment.

6.7.2 Selection of Contaminants of Concern

For the habitat assessment, the contaminants of concern identified in the human health risk assessment were considered to be appropriate for this assessment. These include the aromatic volatiles, chlorinated aliphatics, aromatic acids and phenolics, polycyclic aromatic hydrocarbons, and inorganics.

6.7.3 Exposure Assessment

The nature and extent of contamination was detailed in Chapter 4. Analytical data were collected for Skaneateles Creek surface water, sediments, and creek seeps.

Under present site conditions, the only route of concern for direct contact by terrestrial organisms is through the ingestion of surface water and seeps. A minor indirect exposure may occur through the ingestion of plants growing within contaminated zones. Surface water

represents the principal contact pathway for aquatic and semi-aquatic organisms. Indirect exposures may occur through the ingestion of macrophytes growing within contaminated zones.

6.7.4 Risk Characterization

RfDs used in the human health risk assessment are not applicable to environmental risk assessments. Instead, comparisons between the observed contaminant concentrations and contaminant levels shown to elicit effects in organisms are made to evaluate the potential impacts of the exposure. The potential impacts will be assessed by comparison to: (1) existing state and federal water quality standards, (2) acute and chronic toxicity values, and (3) state sediment criteria.

6.7.4.1 Surface Water

Samples of Skaneateles Creek surface water were collected at 4 locations during 2 sampling rounds. There were no detectable volatiles or pesticide/PCBs in these samples. The common laboratory contaminant bis(2-ethylhexyl)phthalate was detected in 1 sample at levels comparable to laboratory background.

A total 9 water quality parameters (chloride, fluoride, ammonia, nitrate, sulfate, alkalinity, hardness, total suspended solids, and dissolved organic carbon) were analyzed in the Round 1 sampling of surface water. Fluoride, ammonia, and total suspended solids were not detected in any of the samples. Table 6-10A compares the remaining analytes to NYSDEC Class A standards for protection of animals and fish, and EPA acute and chronic criteria. A review of this table shows that the mean and maximum sulfate concentrations were less than the NYSDEC criterion upper limit, and the mean and maximum chloride concentrations were less than the EPA acute and chronic criteria upper limits. NYSDEC has not established a criterion for alkalinity, although the observed range and mean alkalinity were greater than the EPA chronic criterion. Thurston et al. (1979) have suggested that the 20 mg/L criterion is inappropriate since it does not account for the effect of local soils and geology on surface water characteristics. These authors proposed a criterion of ± 25 percent of "natural levels." Using the relative standard deviation as an index for variation, the variability of alkalinity was 8.8 percent, which is well within this proposed alternate criterion. Therefore, there is no risk for animals or fish coming in contact with the surface water based upon the water quality parameters.

Several inorganics were identified in the samples and are compared to the New York State standards or guidance values, and EPA acute and chronic criteria in Table 6-10B. Review of this table shows that all observed concentrations were less than the NYSDEC, EPA acute, and EPA chronic criteria upper limits, except for antimony. The antimony result in one sample (SW-4) from Round 1 was greater than the EPA acute criterion (88 $\mu\text{g/L}$) and all Round 1 concentrations were greater than the EPA chronic criterion (30 $\mu\text{g/L}$). The evaluation of the results presented in Section 4.11 showed that the concentration levels were comparable (relative standard deviation of 6.5 percent) at all 4 sampling locations. This analyte was not detected in the Round 2 sampling event.

Total aluminum concentrations exceeded the ionic (i.e., dissolved phase) aluminum surface water standard in 4 samples (SW-1Dup, SW-2, SW-3, and SW-4) in Round 1 but were below the standard in all of the Round 2 samples. Review of the RI data does not suggest a contribution of the site to the measured surface water aluminum concentrations.

Selenium was identified in 1 sample in Round 2 (SW-3) which exceeded the NYSDEC surface water criterion, but was below the EPA acute and chronic criterion. The selenium result in this sample was also rejected following data validation review.

The evaluation of the inorganic results suggest that there would not be a risk to animals or fish coming in contact with surface water.

NYSDEC performed a stream assessment of Skaneateles Creek in 1992 from near the Skaneateles Lake outlet dam to Jordan (Novack et al. 1993). The principal objectives were to assess stream water quality relative to the 1972 macroinvertebrate study of the creek and collect samples for PCB analyses as a follow-up to PCB results from brown trout analyses. Traveling kick samples were collected from a total of 7 stations, encompassing a total survey length of approximately 10 mi. Station 3 was located on the northwest corner of the SMC property where Skaneateles Creek passes beneath Jordan Road, just upstream of the RI surface water sampling locations SW-1. Macroinvertebrate species presence and abundance were determined at all locations. Several community indices were calculated, including species richness, biotic index, EPT value (total number of ephemeropterans, plecopterans, and trichopterans), and percent model affinity. These community indices were combined on a normalized scale (0-10; with the higher the value the lower the impact on water quality), developed by the NYSDEC Division of Water to determine surface water quality. PCB analyses were performed on caddisflies from 7 locations and crayfish from 3 locations.

The NYSDEC study reported that the benthic macroinvertebrate communities in Skaneateles Creek from all sites from Skaneateles to Jordan were "slightly impacted" (i.e., slightly altered from the pristine state) but indicative of good water quality. Water quality improved slightly from Skaneateles to Elbridge. The study reported that this was due to the contribution of flowing water species (i.e., mayflies, stoneflies, and caddisflies) which preferentially colonize the stream over the lacustrine environments. The initial kick sample from Station 3 (near the SMC site) was found to differ from the other stations, and was dominated by the aquatic worm *Nais bretcheri*. This species had exhibited very high numbers, apparently unrelated to water quality, in samples collected in May and June by the NYSDEC in New York State. This sampling station was recollected in September 1992, with the aquatic community indices found to be consistent with the other sampling stations.

The 1972 survey of Skaneateles Creek (Cooper and Neuderfer 1973) showed all sites from Skaneateles to below Jordan to be moderately to severely polluted. A total of six tolerant macroinvertebrate species were present. Sewage fungus (*Sphaerotilus*) was also identified at several of the sampling locations. Novack et al. (1993) concluded that there was significant temporal improvement in the benthic macroinvertebrate communities when the 1972 and 1992 surveys were compared.

The Novack study also reported PCBs above 0.5 mg/kg in caddisfly larvae at 4 stations (Stations 4, 5, 7, and 8), with the total PCB concentration at Station 3, located just north of the SMC site, of 0.25 mg/kg. Total PCB concentrations were above the 1 mg/kg "level of concern" provisionally established by NYSDEC at 2 stations (Stations 4 and 6; Skaneateles Junction and Elbridge). The maximum total PCB concentration was at Station 4 (Skaneateles Junction), with the total PCB concentrations gradually decreasing downstream to Jordan. NYSDEC reported that none of the crayfish collected from Stations 3, 4, and 6 showed PCBs above detection limits.

PCBs were not detected in any of the surface water, sediment, or creek seeps sampled during both rounds for this RI. Recently, a PCB survey of Skaneateles Creek was undertaken by the NYSDEC. Samples were collected using the PISCES integrated water sampler (Litten et al. 1993). The results of the PISCES study were not available at the time of preparation of this document.

6.7.4.2 Creek Seeps

Several intermittent seeps exist on the east side of Skaneateles Creek in the vicinity of the landfill, as well as near the outfall for the sanitary sewage leachfield. Samples collected showed the presence of toluic acid isomers at concentrations greater than 1 mg/L at the 3 seep locations closest to the landfill. Several volatile organic compounds (Table 4-11) and inorganics (Table 4-12) were also identified.

There were no NYSDEC standards or guidance values available for toluic acid. Table 6-11 compares the observed seep concentration ranges to the LC₅₀ data (Mayer and Ellersieck 1986). All of the observed organic concentrations, except for toluic acid, were at concentrations lower than those known to cause toxic effects in fish.

In 1986, Stauffer Chemical Company undertook a 96-hour LC₅₀ study of toluic acid toxicity to fish (SCC 1986). Rainbow trout (*Salmo gairdneri*, revised name: *Oncorhynchus mykiss*) were exposed to a toluic acid mixture (75 percent *ortho*, 20 percent *meta*, and 5 percent *para* isomers) at six concentrations (0, 2, 5, 10, 23, and 50 mg/L). Dissolved oxygen, temperature, and pH were monitored throughout the exposure period. There were no lethalties or apparent toxic effects (e.g., behavioral disturbances) at any of the exposure concentrations. The maximum tested total toluic acid concentration was equivalent to isomer concentrations of 37.5 mg/L (*ortho*), 10 mg/L (*meta*), and 2.5 mg/L (*para*). These isomer concentrations were comparable to the mean observed seep concentrations (43, 23, and 6 mg/L, respectively), but were less than the maximum observed seep concentrations for each of these isomers (86, 46, and 15 mg/L, respectively). The comparison of the observed sample result to the toxicity data suggest that this seep would not be acutely toxic to fish. However, the potential for toxicity from concentrations of toluic acid in 2 of the seeps (CS-02 and CS-03) cannot be determined since the observed isomer concentrations were greater than the maximum tested concentration from the 96-hour LC₅₀ study, assuming that the nominal isomer distribution was retained throughout the exposure period. These seeps are located in areas where significant dilution by Skaneateles Creek would occur. Samples of surface water from both sampling rounds did not show the presence of toluic acid isomers above detection limits. This suggests that the dilution is at least on the order of 10³, based

upon the maximum observed toluic acid isomer concentration in the seeps (86,000 $\mu\text{g/L}$ at CS-02) and the sample quantitation limit for toluic acid isomers in the surface water (50 $\mu\text{g/L}$).

6.7.4.3 Stream Sediments

Samples of stream sediments were collected in 2 sampling rounds from 4 locations in Skaneateles Creek. Tables 6-12A and 6-12B compare the observed organic and inorganic concentration ranges to the calculated NYSDEC sediment criteria, EPA acute and chronic criteria, and the published literature (Landrum et al. 1991; Krantzberg and Boyd 1992). The NYSDEC and EPA criteria were calculated for each organic chemical using an average organic carbon content of 1.15 percent and the following equation provided by NYSDEC (1993b):

$$SC_{org} = Std * K_{ow} * OC$$

where

$$\begin{aligned} SC_{org} &= \text{Sediment criterion } (\mu\text{g/kg}) \\ K_{ow} &= \text{Octanol-water partition coefficient for the chemical (L/kg)} \\ OC &= \text{Organic carbon content (g/kg)}. \end{aligned}$$

The inorganic criteria were taken directly from NYSDEC (1993b).

The input values and resulting sediment criteria (SC) values are shown in Table H-84.

NYSDEC sediment criteria were calculated directly from Table 1 of NYSDEC (1993b) for 11 chemicals. Acute and chronic site sediment values (SSVs) were calculated for 4 volatile organics (1,2-dichloroethene, toluene, ethylbenzene, and tetrachloroethene), 4 semi-volatile organics (naphthalene, acenaphthene, phenanthrene, and fluoranthene) and 3 pesticides (dieldrin, methoxychlor, and gamma-chlordane) using data compiled by EPA (1991c) and using the above referenced equation.

Landrum et al. (1991) calculated the LC_{50} of PAHs to amphipods (*Diporeia* sp.) following a 26-day exposure. Krantzberg and Boyd (1992) performed laboratory toxicity studies of sediments collected from Lake Ontario on mayfly nymphs (*Hexagenia limbata*) and fathead minnows (*Pimephales promelas*). Sediments were analyzed for 10 metals, PCBs, and PAHs. The SSVs for these compounds in Table 6-12A were those concentrations which showed no mortality (i.e., no lethal effect concentration [NLEC]) or mortality comparable to controls for laboratory studies.

Review of Table 6-12A shows that the observed 1,2-dichloroethene, toluene, and ethylbenzene concentrations were less than the SSVs calculated from the EPA acute and chronic toxicity values. The maximum observed tetrachloroethene concentration (present only in sample SD-03 during Round 1) exceeded the SSV calculated from the NYSDEC criterion but was well below the calculated SSVs based upon EPA acute and chronic concentrations. The maximum observed vinyl chloride concentration (present only in sample

SD-03 during Round 2) exceeded the SSV calculated from the NYSDEC criterion. The results indicate only a sporadic, localized presence of these volatile compounds.

The total PAH concentrations were less than the benthic LC₅₀ value for both rounds of samples. Only sample SD-03 from Round 1 exceeded the benthic and fathead minnow NLECs. Total PAHs from Round 2 were all below the NLECs. The maximum observed naphthalene concentration was below the SSVs calculated from NYSDEC and EPA acute and chronic values, as well as the benthic and fathead minnow NLECs. The single positive acenaphthene result (SD-03) from Round 1 was greater than the SSV calculated from NYSDEC values but less than the SSVs calculated from EPA acute and chronic criteria. Although no sediment criterion was available for fluorene, the observed concentrations were below the benthic LC₅₀ value, with only 1 sample in Round 2 (SD-02) exceeding the fathead minnow NLEC. The Round 2 result for this compound was below the benthic and fathead minnow NLECs. Two of the 4 sample results for phenanthrene from Round 1 (SD-01 and SD-03) were greater than the calculated SSVs from NYSDEC and EPA chronic criteria, and benthic and fathead minnow NLECs, but only 1 (SD-03) was greater than the EPA acute criterion. The maximum observed fluoranthene concentrations from both sampling rounds were below the NYSDEC criterion, calculated EPA acute criterion. The pyrene result in 1 sample from Round 1 (SD-02) exceeded the benthic and fathead minnow NLEC. The observed concentrations for 6 PAHs (benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, and indeno[1,2,3-cd]pyrene) were above the NYSDEC criterion but all below the benthic LC₅₀ values for both sampling rounds. Although PAHs were detected in these sediments, they may not be entirely attributable to seeps from the landfill since PAHs were also identified in areas which may be influenced by site road surface runoff.

The maximum observed concentrations of dieldrin (4.6 µg/kg) and gamma-chlordane (2.6 µg/kg) both exceeded the NYSDEC criteria and EPA chronic criteria, but not the EPA acute criteria. These compounds were present only in the Round 2 samples of stream sediments. PCBs were not detected in any of the samples in either sampling round.

Table 6-12B compares the observed inorganic concentrations in the stream sediments to NYSDEC sediment criteria and published literature (Bodek et al. 1988; Krantzberg and Boyd 1992). NYSDEC sediment criteria were available for 11 analytes, toxicity data for 10 analytes, and background concentrations for 8 analytes. The NYSDEC sediment criteria were subdivided into "Lowest Effect Levels" (LEL) (i.e., those concentrations tolerated by a majority of benthic organisms) and "Severe Effect Levels" (SEL) (i.e., those concentrations which can disturb a benthic community). These levels were based upon field data on the co-occurrence of benthic organisms and metals, and were developed by the Ontario Ministry of the Environment.

The observed aluminum results from both sampling rounds were below the benthic and fathead minnow NLEC concentrations. Antimony was not detected in the Round 2 samples but exceeded the LEL and SEL sediment criteria for the Round 1 samples. The observed cadmium concentrations from both sampling rounds fell between the LEL and SEL, but were below typical background, and benthic and fathead minnow NLECs. The chromium concentrations from Round 1 were less than the sediment criteria and NLEC, and were

within background concentrations. One sample from Round 2 (SD-03) was greater than the LEL but less than the SEL. Copper concentrations from Round 1 were all less than the NLECs, but 1 sample from Round 2 (SD-01) exceeded the NLEC. Iron concentrations were below the sediment criteria, NLEC, and within anticipated background. Three of the 4 lead samples from both sampling rounds exceeded the sediment criteria, but were less than the NLEC and within that anticipated as background. The Round 1 manganese concentrations were all below the sediment criteria and NLECs. One sample from Round 2 (SD-01 Dup) was greater than the LEL but less than the SEL. Mercury was detected only in the Round 2 samples with all samples present at concentrations greater than the LEL but less than the SEL. Four nickel results from Round 1 and 3 from Round 2 were greater than the LEL but less than the SEL, however, the maximum observed concentration was less than the NLEC. None of the silver results from the Round 2 samples were greater than the sediment criteria, although 3 of the 4 samples from Round 1 were greater than the LEL, with 3 exceeding the SEL. One zinc result from Round 1 exceeded the LEL and 3 from Round 2 exceeded the SEL. Although there were individual exceedances of metals criteria, the qualitative field survey and recent NYSDEC survey did not indicate a significant impact on the stream benthic community.

Accumulation of contaminants by biota represents a chronic effect of chemical exposure. Uptake of chemicals can occur from the water column and from sediment pore water. The latter is the more significant source for benthic invertebrates which reside within the sediments. These organisms serve as prey for fish and larger invertebrates (e.g., insects) which occupy the water column.

Surface water does not represent a source of organic chemicals for bioaccumulation at this site since there were no detectable organic compounds of concern in either sampling round. Any contaminants present in the sediment pore water (e.g., PAHs) which exchange with the overlying surface water would be rapidly diluted due to the high flow conditions of Skaneateles Creek.

Benthic invertebrates (e.g., worms and amphipods) that come in contact with contaminated sediments may accumulate some of the contaminants present in the surface water. However, field observation of the areas of known sediment contamination do not suggest that these areas are preferred habitats for these organisms (e.g., lack of macrophytes, excessive flow).

6.7.4.4 Soils

Under current undisturbed site conditions, terrestrial wildlife may come in contact with chemicals present in shallow soils. Shallow soils collected for this investigation included a sample located north of the sanitary leachfield (MW5-SB14) collected during the Phase II field program, and the soil sample SS-03 near seep CS-03 collected during the Phase I investigation. These shallow soil samples were collected from areas of suspected contamination.

Sample MW5-SB14 showed no detectable volatile organics, semi-volatile organics, or pesticides/PCBs (Table D-9A). The inorganic results (Table D-10) were within the range typically found in New York State or Eastern U.S. soils (Table 4-8). Therefore, contact with soils in this area is not anticipated to pose a threat to terrestrial wildlife.

Sample SS-03 was a saturated soil sample collected along the stream bank near a creek seep (CS-03). This sample showed evidence of staining from the seep, with the stain encompassing a total area of less than 3 ft². Chemical analysis showed the presence of 3 chlorinated volatile organics (1,2-dichloroethene, trichloroethene, and tetrachloroethene), aromatic volatiles (toluene and xylenes), and the 3 toluic acid isomers (Table D-11A). The inorganic results (Table D-12) were within those typically found in New York State or Eastern U.S. soils (Table 4-8). Therefore, contact with soils in this area is not anticipated to pose a threat from inorganic chemicals to the terrestrial wildlife. The observed toluic acid isomer concentrations were assessed using 3 organisms: short tail shrew, the american kestrel, and red fox.

Short Tail Shrew—The short tail shrew (*Blarina* sp.) is a small rodent whose diet consists of insects, invertebrates, small vertebrates, and plant material (Nowak and Paradiso 1983). The related genus *Neomys* (Old World water shrews) have similar diets but are more commonly found along streams, lakes, or marshes. Although toluic acid was identified in the creek seeps, surface water samples which are the more likely source of water for the shrew showed no detectable toluic acid. Physical contact with the seep stained soil, or uptake by food plants or prey organisms, are anticipated to be minor pathways due to the small area of surficial contamination relative to the suitable habitat. Any toluic acid contained in food which is ingested by the shrew would not be expected to bio-accumulate since the chemical structure favors conjugation and rapid elimination (Section 6.4.3.1). Therefore, it is unlikely that the observed toluic acid concentrations pose a significant threat to this organism.

American Kestrel—The American kestrel (*Falco sparverius*) is a small falcon which preys upon rodents, insects, other birds, lizards, and snakes (Nowak and Paradiso 1983). The two potential exposure pathways include ingestion of surface water and preying on other organisms (e.g., shrews) which may have come in contact with toluic acid. However, since the surface water samples showed no detectable toluic acid, this exposure pathway is incomplete. It is not expected that the prey would readily bio-accumulate toluic acid eliminating the potential for significant bio-accumulation through the food chain. Any incompletely eliminated toluic acid within the prey (e.g., partially digested food in stomachs of prey organisms) would not be expected to bio-accumulate since the chemical structure favors conjugation and rapid elimination (Section 6.4.3.1). Therefore, it is unlikely that the observed toluic acid concentrations pose a significant threat to this organism.

Red Fox—The red fox (*Vulpes vulpes*) is a terrestrial mammal which preys upon rodents, insects, and ingest fruit. The three potential exposure pathways include ingestion of surface water, preying on other organisms (e.g., shrews) which may have come in contact with toluic acid, and dermal contact with surficial soil containing toluic acid. Since the surface water samples showed no detectable toluic acid, this exposure pathway is incomplete. Any incompletely eliminated toluic acid within the prey (e.g., partially digested food in stomachs of prey organisms) would not be expected to bio-accumulate since the chemical structure

favors conjugation and rapid elimination (Section 6.4.3.1). Physical contact with the seep stained soil is anticipated to be minor pathways due to the small area of surficial contamination relative to the suitable habitat. Therefore, it is unlikely that the observed toluic acid concentrations pose a significant threat to this organism.

6.8 UNCERTAINTIES AND LIMITATIONS

The risk assessment process has been described in a systematic method and EPA risk assessment guidance documents provide methods for organizing, analyzing, and presenting information on the nature and magnitude of risks to public and environmental health from potential exposure to chemicals (U.S. EPA 1986b, 1989a,b, and 1992c). In spite of advancements in this methodology, uncertainties and limitations are an intrinsic part of the risk assessment process. While there are uncertainties in the assessment, whenever possible EA has chosen to overestimate risk to provide greater assurance of public and environmental health protection.

In general, the uncertainties and limitations can be classified in the following categories:

- Sampling and analysis
- Chemical fate and transport modeling
- Exposure assessment
- Toxicological assessment
- Environmental assessment.

6.8.1 Sampling and Analysis Uncertainties

The first step in this risk assessment was to evaluate existing sampling and analysis data and identify any data that were considered adequate for use in defining potential health risks. This risk assessment is based on soil and ground-water measurements from numerous sampling events. The termination of the SMC site to act as a continuing contaminant source and natural degradation of chemicals of concern throughout the site, it can be assumed that these soil and ground-water measurements reflect the upper bound on the concentrations of site-related chemicals that are expected to be found in the future.

6.8.2 Chemical Fate and Transport Modeling Uncertainties

The model used to predict the fate and transport of site-related chemicals in this assessment is consistent with that recommended by EPA (1988a). Because of uncertainties in modeling, EPA-recommended models are considered to be conservative and produce exposure concentrations that will not underestimate the health risks but which may overestimate the risks.

6.8.3 Exposure Assessment Uncertainties

Human health risk assessments typically require assumptions in order to assess potential human exposure because site-specific measurements are usually lacking. This risk assessment includes assumptions about general characteristics and potential patterns of human

exposure of future workers and offsite residents at or downgradient to the SMC site that were based on the guidance provided by EPA (1989b, 1991b, and 1992c) and professional judgment.

The methodology used to estimate the dermally-absorbed dose per event for dermal contact with contaminants in water is a new non-steady approach. This methodology has been proposed by EPA (1992e) with the accompanying caution that the methodology is currently being reviewed by the scientific community. Concern has been raised that the model may be overly conservative with an estimate of uncertainty of ± 0.5 order of magnitude. Currently there is very little data. Thus, validation of the model is very difficult.

6.8.4 Toxicological Assessment Uncertainties

The available scientific information, in general, is insufficient to provide a thorough understanding of all potential toxic properties of chemicals to which humans are potentially exposed. It is necessary to infer these properties by extrapolating them from data obtained under other conditions of exposure, and usually to experimental laboratory animals. This may introduce such various uncertainties as interspecies variability (e.g., variability among experimental species), intraspecies variability (e.g., variability among individuals in a human population), and route-to-route extrapolations (e.g., variability when data from ingestion are used to predict risk from inhalation).

6.8.4.1 Uncertainties Associated with Non-Carcinogenic Effects

Interspecies Extrapolation

The majority of toxicological information comes from experiments with laboratory animals. Experimental animal data has been relied on by regulatory agencies to assess the hazards and safety of human chemical exposure. Even though there has been some empirical observation, there may be interspecies differences in chemical absorption, metabolism, excretion, and toxic response. There may also be uncertainties concerning the relevance of animal studies using exposure routes which differ from human exposure routes.

The EPA often bases the RfCs for non-carcinogenic effects on the most sensitive animal species, and uses uncertainty and modifying factors as adjustments for proper interpretation.

Intraspecies Extrapolation

There are differences among humans in individual susceptibility, such as to chemical insult from differences in genetic factors (e.g., glucose-6-phosphate dehydrogenase deficiency), lifestyle factors (e.g., cigarette smoking and alcohol consumption) age, and hormonal status (e.g., pregnancy). To take into account the diversity of human populations and their differing susceptibilities to chemically-induced injury or disease, a safety factor is used. The EPA uses a factor of between 1 and 10. Where there is sufficient experience with a compound in humans to suggest that no sensitive subpopulations are likely to exist, then a smaller safety factor is used.

Exposure Routes

When experimental data available on one route of administration are different from the actual route of exposure that is of interest, route-to-route extrapolation must be performed before the risk can be assessed. Several criteria must be satisfied before route-to-route extrapolation can be undertaken. The most important assumption is that a chemical injures the same organ(s) regardless of route, even though the injury can be to varying degrees. Another assumption is that the behavior of a substance in the body is similar by all routes of contact. This may not be the case where, for example, materials absorbed via the gastrointestinal tract pass through the liver prior to reaching the systemic circulation, whereas by inhalation the same compound will reach other organs before the liver. For many compounds, the liver eliminates or changes (beneficially or detrimentally) a sizable proportion of the compound prior to its reaching the systemic circulation and other possible target organs.

Chemical Mixtures

Exposures of humans to chemicals generally are in the form of multiple chemical exposures rather than single-chemical exposures. The approach to evaluating risks from exposure to mixtures of chemicals recommended by EPA (1986b) assumes dose additivity and does not account for potential synergism, antagonism, and differences in target organ specificity and mechanism of action.

6.8.4.2 Uncertainties Associated with Carcinogenic Effects

Interspecies Extrapolation

The majority of toxicological information for carcinogenic assessments comes from experiments with laboratory animals. There is uncertainty about whether animal carcinogens are also carcinogenic in humans. While many chemical substances are carcinogenic in one or more animal species, only a small number of chemical substances are known to be human carcinogens. The fact that some chemicals are carcinogenic in some animals but not in others (or in humans) raises the possibility that not all animal carcinogens are human carcinogens. Regulatory agencies assume that humans are as sensitive to carcinogens as the most sensitive animal species. This policy decision, designed to prevent underestimation of risk, introduces the potential to overestimate carcinogenic risk.

High Dose to Low Dose Extrapolation

Typical cancer bioassays provide limited low-dose data on responses in experimental animals for chemicals being assessed for carcinogenic or chronic effects. The usual dose regime involves three dose groups per assay. The first dose group is given the highest dose that can be tolerated, the second is exposed to one-half that dose, and the third group is unexposed (control group). Because this dosing method does not reflect how animals would react to much lower doses of a chemical, a dose-response assessment normally requires extrapolation from high-to-low doses using mathematical modeling that incorporates to varying degrees information about physiologic processes in the body.

A central problem with the low-dose extrapolation models is that they all often fit the data from animal bioassays equally well, and it is not possible to determine their validity based on goodness of fit. Each model may fit experimental data equally well, but they are not all equally plausible biologically. The dose-response curves derived from different models diverge substantially in the dose range of interest. Therefore, low-dose extrapolation is more than a curve-fitting process, and considerations of biological plausibility of the models must be taken into account before choosing the best model for a particular set of data.

Use of the Linear Multi-Stage Model

The preferred EPA cancer risk model, used to calculate a slope factor, is a mechanistic type⁵, the "linearized multistage model." The key tenet of this model is the assumption that the production of a malignant cell is a multistep process. Furthermore, it assumes that, at low doses, the risk of cancer is directly proportional to the dose of the carcinogen. This model was chosen by EPA in 1986, because, at the time, its theoretical basis most closely approximated current thought on the mechanisms of cancer induction (U.S. EPA 1986c).

The EPA acknowledges that the actual slope factor is likely to be between zero and the estimate from the model. The lack of knowledge regarding the validity and accuracy of this model, however, contributes to the uncertainties and potential overestimates of cancer risks.

6.8.4.3 Toxicological Values Used in the Assessment

Additional uncertainties in the application of the RfC and slope factor to determine risks associated with the non-carcinogenic and carcinogenic effects of site-related chemicals result from uncertainty in the current status of these values within the EPA RfD/RfC Work Group or CRAVE (Carcinogen Risk Assessment Verification Endeavor), as well as uncertainty associated with several of the manipulations of the RfC. As mentioned previously, many of these site-related chemical's chronic oral RfD, and oral and inhalation slope factors are currently undergoing review by EPA for the appropriateness of the currently designated values.

The nature and extent to which these values may change in the future is not known with any certainty, but it is anticipated that even alterations as significant as an order of magnitude would not substantially alter the outcome of this risk assessment, given the conservatism in the exposure assumptions.

Additional uncertainty may arise from several numerical conversions within the formulation of certain values or within the adjustment of values to fit the specific application. For example, the conversion of an inhalation RfC from units of mg/m³ to mg/kg/day is a dose

⁵ A mechanistic model assumes that there is no threshold for carcinogenic effects and any exposure to a carcinogen results in an incremental risk of cancer. This is in contrast to a statistical model which assumes that each individual in a population has a threshold below which cancer will not occur, and the distribution of thresholds in a population is distributed as a probability function or an enhancement model which modifies the mechanistic model by incorporating experimental data on the behavior of the chemical in the body along with data on the mechanisms of carcinogenesis.

conversion that may not always be accurate, depending upon existing variations in metabolic or pharmacokinetic parameters (i.e., absorption percent) between the inhalation dose and the internal body dose. Based on the relatively high lipophilicity/hydrophilicity of certain site-related chemicals, their oral and inhalation absorption, and the systemic nature of the critical toxicity effects, it was considered that these parameters were approximately equal, and that uncertainty would be minimized.

6.9 SUMMARY

The objectives of this risk assessment were to evaluate the potential for adverse human and environmental health effects attributable to exposures to site-related chemicals at or originating at the SMC site. This report is a risk assessment that involved the use of several default assumptions because necessary site-specific data were not available.

6.9.1 Human Health Risk Assessment Summary

The human health risk assessment evaluated both present-use and potential future-use exposure scenarios for residents and onsite workers. The average and plausible maximum carcinogenic and non-carcinogenic risks were calculated.

6.9.1.1 Residential Receptor Present-Use Scenarios

Table 6-13 summarizes the residential receptor present-use exposure scenarios and shows the composite risk under both the average and plausible maximum scenarios.

A review of Table 6-13 shows that most of the total carcinogenic risk under present use conditions was calculated from the incidental ingestion of stream sediments within the site boundary, which contributed 85 percent of the total carcinogenic risk using the Round 1 data, and greater than 99 percent of the total risk using the Round 2 data. Dermal contact with the seeps located near the landfill contributed approximately 15 percent to the total calculated carcinogenic risk. Most of this dermal risk was due to the presence of the carcinogenic PAHs and chlorinated aliphatics (trichloroethene and tetrachloroethene). If contact with sediments or the seeps are avoided, inhalation of vapors from the area north of the Main Plant Building is the only viable pathway remaining.

The composite calculated risk due to site-related chemicals for nearby residents who do not enter the site and come in contact with sediments or seeps located near the landfill is well below the accepted risk threshold for both the average and plausible maximum scenarios.

The calculated non-carcinogenic risks were below the threshold values, with the exception of dermal contact with creek seeps under the plausible maximum exposure scenario. This risk was due to the toluic acid isomers present in one of the creek seeps. As with the carcinogenic risks, if contact with the creek seeps near the landfill are avoided, the calculated non-carcinogenic risk is well below the accepted threshold value.

6.9.1.2 Residential Receptor Future-Use Scenarios

Future-use scenarios included an examination of risks associated with non-remedial construction at the site, construction of a dwelling with a basement on the site, and use of onsite and offsite ground water for potable and non-potable uses. Both residential and industrial receptors were examined.

Tables 6-14, 6-15, and 6-16 summarize the residential receptor offsite future-use scenarios which included the use of upper, deep, and mixed bedrock ground water, respectively. Carcinogenic risks greater than the threshold value were calculated for the three ground-water exposure scenarios (ingestion, inhalation, and dermal contact). Most of this risk was derived from the presence of chlorinated aliphatics (vinyl chloride, trichloroethene, and tetrachloroethene) in the MW-7 cluster.

Ingestion of offsite ground water was an exposure pathway which yielded non-carcinogenic risks greater than the threshold value. This risk was attributable to the presence of arsenic and toluic acid isomers in the sampled ground water.

A review of these tables show that the inhalation of dusts entrained in the wind or vapors emanating from the landfill perimeter or area north of the Main Plant Building show no carcinogenic or non-carcinogenic risk greater than the threshold values. Thus, if offsite use of ground water in the vicinity of the site is avoided, the calculated carcinogenic and non-carcinogenic risks are below the accepted threshold values, and pose no health threat to nearby residents.

Tables 6-17, 6-18, and 6-19 summarize the residential receptor onsite future-use scenarios for the use of upper, deep, and mixed bedrock ground water, respectively. A review of these tables show that the inhalation of vapors which may enter the basement of a structure in the area north of the Main Plant Building would show no carcinogenic or non-carcinogenic risk greater than the threshold values. Carcinogenic risks greater than the threshold value were calculated for the 3 ground-water exposure scenarios (ingestion, inhalation, and dermal contact) and ingestion of garden vegetables. Most of this risk was derived from the presence of chlorinated aliphatics (vinyl chloride, trichloroethene, and tetrachloroethene) in the sampled ground water. The risk calculated for ingestion of garden vegetables is conservative since the pathway assumed that the plants' sole source of water was derived from well water and that the receptor would be exposed for most of the year.

Ingestion and inhalation of vapors from onsite ground water represented the pathways which yielded non-carcinogenic risks greater than the threshold value. This risk was attributable to the presence of chlorinated aliphatics (1,2-dichloroethene and tetrachloroethene), arsenic, and toluic acid isomers in the sampled ground water.

6.9.1.3 Industrial Receptor Future-Use Scenarios

Future-use scenarios included an examination of risks associated with non-remedial construction at the site, construction of a dwelling with a basement on the site, and use of onsite and offsite ground water for potable and non-potable uses.

Tables 6-20, 6-21, and 6-22 summarize the industrial receptor onsite future-use scenarios which included the use of upper, deep, and mixed bedrock ground water, respectively. Carcinogenic risks greater than the threshold value were calculated for 2 of the 3 ground-water exposure scenarios. These included ingestion as a drinking water source and incidental ingestion which could occur during non-potable use of the water (e.g., vehicle washing). Most of this risk was derived from the presence of chlorinated aliphatics (vinyl chloride, trichloroethene, and tetrachloroethene).

None of the pathways examined showed a calculated non-carcinogenic risk above the threshold value.

A review of these tables show that the inhalation of vapors emanating from the landfill perimeter or area north of the Main Plant Building show no carcinogenic or non-carcinogenic risks greater than the threshold values. Thus, if onsite use of contaminated ground water is avoided, the calculated carcinogenic and non-carcinogenic risks are below the accepted threshold values, and pose no health threat to industrial workers at the site.

6.9.2 Environmental Risk Characterization

The environmental risk assessment evaluated the potential risks to aquatic biota of the observed seeps and contaminated sediments within the stream. The two sampling rounds showed no detectable chemicals of concern in the surface water. Comparison of the observed seep chemical concentrations to toxicity data showed that biota contact with the seep would not result in any acutely toxic effects.

A habitat assessment was also performed, which included a qualitative survey of the aquatic community within Skaneateles Creek and the terrestrial community on the site property, and an evaluation of the observed chemical concentrations from samples of surface water, sediment, seeps, and soil. The October 1991 field survey portion of the habitat assessment indicated that the site was a typical "old field" setting, consisting of hedge and tree rows surrounding open fields. The open fields are mowed by the site caretaker. There was no apparent vegetation stress within the fields or hedge rows. Review of the shallow soil analytical results did not suggest that there would be a significant impact to terrestrial organism.

The field survey of the stream showed no evidence of stressed aquatic plants and did not suggested that the site conditions were significantly affecting the stream community. This was consistent with the quantitative stream-wide survey performed by NYSDEC in 1992 (Novack et al. 1993) which showed that the aquatic community was only slightly stressed within the stream.

Sediment organic and inorganic chemical results were compared to NYSDEC sediment criteria, as well as toxicity values reported in the literature. The PAHs concentrations of some of the sediment samples were greater than sediment criteria or EPA chronic toxicity criteria. The PAHs in the sediments may be attributable to both seeps from the landfill, as well as site road surface runoff. There were several exceedances of NYSDEC sediment

criteria for metals, although the qualitative field survey performed for this RI, and the recent NYSDEC stream survey, did not indicate a significant impact on the stream benthic community.

7. SUMMARY AND CONCLUSIONS

A remedial investigation was conducted for the SMC site located in Skaneateles Falls, New York (NYSDEC Site No. 7-34-010) in accordance with work plans reviewed and approved by NYSDEC. All objectives of the RI work plans have been met. The results of the RI at the SMC site have been presented and discussed in detail in the previous sections of this report. Following is a summary of the findings of the RI and conclusions based on these findings.

7.1 SITE DESCRIPTION

The SMC site is located in central New York State, in Skaneateles Falls, Onondaga County, approximately 3 mi north of Skaneateles Lake, and 15 mi southwest of the City of Syracuse.

The SMC facility encompasses an area of approximately 120 acres. The focus of this study is a 20-acre area which includes the areas formerly used to support production operations (including existing and former building structures located west of Skaneateles Creek and east of Jordan Road) and the landfill located east of Skaneateles Creek. Skaneateles Creek, the outlet of Skaneateles Lake, flows in a northerly direction through the western portion of the site. The SMC site is bounded by residential and commercial areas to the west and north, while undeveloped land occupies the areas immediately to the east and south.

7.2 SITE HISTORY

Facilities located on this site were formerly used to manufacture potassium and sodium silicates, detergents, and organic intermediates for other industries. The original facility was built in the mid-1920s by Draycott Mills which manufactured felt roofing materials. Cowles Chemical Company bought the property in the mid-1940s and initiated the manufacture of potassium and sodium silicates and industrial detergents. Organic compounds (principally toluic acid) were manufactured at the facility from the late 1950s to 1981. Stauffer Chemical Company purchased the facility from Cowles Chemical Company in the late 1960s and continued operations until 1985, when manufacturing activities ceased.

From the initiation of Cowles operations in the mid-1940s until 1973, an onsite landfill was operated in the area east of the former mill pond. The landfill operations ceased in 1973 and a soil cover was installed. A clay cap was subsequently installed over the landfill in 1979.

7.3 PREVIOUS INVESTIGATIONS

In 1980, an investigation (Yare 1980) of the site hydrogeology and geology was performed to evaluate whether portions of the site were suitable for a sludge disposal area to be used to contain sludges generated from settling basins located northeast of the landfill. According to this report, the sludge consisted of calcium silicates, carbonates, and sulfates generated from the inorganic manufacturing process. The area found to be suitable is located uphill and east of the landfill.

In 1986, preliminary site investigations were conducted to characterize the landfill. The field effort was in response to NYSDEC concerns regarding ground-water and surface water quality at the site. These concerns arose after dark-colored leachate was observed emanating from the north end of the landfill. Dark-colored water (seeps) was also observed in the basement of the Main Plant Building. Chemical analysis showed the presence of some organics and metals in the leachate, stream, and ditch samples. The study concluded that there was no significant metals concentrations and organic compound concentrations except for toluic acid.

7.4 SUMMARY OF REMEDIAL INVESTIGATION ACTIVITIES

The RI was conducted in two phases: an initial field RI which began in October 1991, and a subsequent Phase II field program which was completed in October 1993.

In October 1991, EA initiated the RI field program based on the NYSDEC-approved Work Plan. The original focus of the RI was the onsite landfill located east of Skaneateles Creek. As hydrogeological and chemical analytical data became available during the 1991 RI field program, it was recognized that subsurface conditions at the SMC site were more complicated than originally envisioned in the Work Plan. Adjustments to the 1991 RI field program were made during the course of the field effort to include the collection of additional samples and modifications to the drilling program. The field work for the initial phase of the RI was completed in March 1992.

The initial RI included: a magnetometer survey over the entire landfill; landfill test pits; landfill and landfill perimeter test borings; installation of 6 overburden, 11 upper bedrock, and 9 deep bedrock monitoring wells; installation of 9 piezometers (4 overburden and 5 upper bedrock); ground-water, stream surface water/sediment, soil, waste, and basement seep sampling; and a habitat assessment.

Adjustments were made during the course of the initial field program which included collection of additional samples (i.e., creek seeps and soil near the former Organics Plant) and modifications to the drilling program. The modifications included the collection of additional geologic data (i.e., rock cores and packer tests) and enhanced monitoring well/piezometer construction methods (i.e., surface casing to isolate the various ground-water zones and increased completion depths of the deep bedrock monitoring wells).

Based on results of the initial RI, it was determined that a second phase of investigation at the site was required to fill data gaps. The Phase II investigation expanded the scope of the RI beyond its original focus to include evaluation of an area of concern identified in the area north of the Main Plant Building, an evaluation of the extent of ground-water contamination west of the landfill, along the southern perimeter of the site, and from the sludge disposal area monitoring wells east of the landfill.

The Phase II investigation consisted of several field efforts; specifically, SVCA; seismic refraction survey; test borings and sampling; installation of additional onsite and offsite monitoring wells; sampling of ambient air; stream surface water/sediment, landfill leachate, creek seep, and ground-water sampling; continuous monitoring of deep ground-water

elevations; collection of Skaneateles Creek flow data; and a private well mail survey. Figure 7-1 shows the locations of the piezometers and monitoring wells installed during the RI.

7.5 SITE PHYSICAL CHARACTERISTICS

This summary of the site physical characteristics is based on review of all site-specific and other relevant regional data collected during the RI from 1991 to 1993, and all data from previous investigations at the site.

The 20-acre SMC site includes the Main Plant Building, concrete foundations of removed buildings, parking areas, access roads, a closed landfill, and an active sanitary sewage leachfield. Two former inorganic settling basins (approximately 1.5 acres) and the closed inorganic sludge disposal area (approximately 4 acres) are located to the east of this 20-acre area (northeast and east of the landfill, respectively).

7.5.1 Geology

The unconsolidated deposits overlying the site consist of unstratified glacial deposits (Pleistocene) and recent aged alluvial deposits. Two types of glacial deposits were present at the site. Over most of the site area, a red clay till was present consisting of a sticky reddish clay with no visible stratification. A brown till consisting of a poorly sorted mixture of clay, silt, sand, gravel, and boulders was present below the southern portion of the landfill and the areas immediately to the south and southwest of the landfill.

A layer of coarse sand, angular gravel, and cobbles, ranging in thickness from 4 to 7 ft, was present directly overlying bedrock south, southwest, and west of the landfill and appears to be associated with a bedrock surface low in this portion of the site.

The unconsolidated sediments at the site are underlain by Onondaga Limestone which is characterized as gray to dark gray, massive to medium bedded, and hard. The limestone is fractured, has east-west strike, and a gentle southerly stratal dip (<0.5 degrees) across the site. The majority of the fractures were horizontal (parallel to bedding). The bedrock surface is at or near ground surface in the center of the 20-acre site (at the former rock dam) and slopes downward towards both the south and north. Bedrock lows are aligned in an east-west direction and are located approximately 800 ft to the north and south of the former rock dam.

7.5.2 Hydrogeology

Based on analysis of the available data, there are three distinct zones of ground water at the SMC site: a shallow zone present in the overburden, an intermediate zone in the upper bedrock, and the phreatic ground-water zone present deeper into bedrock. Both the shallow overburden and the deep bedrock ground-water zones are under unconfined water table conditions.

The following is a summary of the aquifer characteristics of the carbonate unit underlying the site:

- The actual phreatic zone (deep bedrock ground water) is under unconfined water table conditions at considerable depth indicative of highly permeable bedrock at depths.
- The phreatic zone is variable across the site suggesting that fractures may be discontinuous locally.
- A 24- to 48-ft zone of non-water yielding, inactive bedrock separates an intermediate water-bearing zone from the deeper phreatic zone. It is common in carbonate rock with fractures for water descending through the vadose zone to become stratigraphically perched in the bedrock.
- The phreatic zone water level elevation fluctuates as much as 80 ft as a result of temporal variations in recharge rates. The fluctuations in water level elevation correlate directly with fluctuations in stream flow in Skaneateles Creek, indicating seepage from surface water through fractures in the bedrock.
- Phreatic zone water levels have been shown to react quickly across the site to changes in recharge rates (stream flow) indicating abnormally high ground-water velocities within the carbonate unit which is indicative of water movement through fractures.

Lateral migration of water through the overburden is through primary openings in the geologic material and controlled by horizontal hydraulic gradients across the site. These gradients are influenced by both the topography and surface water drainage.

A general downward vertical hydraulic gradient between the overburden and upper bedrock persists across most of the site. Hydraulic communication between overlying unconsolidated sediment and the upper bedrock exists via bedding, fractures, and/or joints in the upper rock.

In the upper bedrock, most ground-water migration is through secondary openings (bedding, fractures, joints, etc.). Ground-water movement through bedrock to the phreatic zone is inferred to be vadose flow in fractures. This flow is controlled by gravity and the structure of the rock and water moves as vertically as possible. Lateral movement in vadose flow through the bedrock is controlled by the southerly dip of the strata, with some deviation in the direction of strike (east-west).

After the ground water enters the phreatic zone through the vadose feeders, water migration changes. Horizontal flow is the primary flow component functioning in the phreatic zone. Hydraulic gradients are normally low due to the efficiency of fractures to transmit ground water. Phreatic ground-water flow at the site is expected to be generally in a northerly direction.

7.5.3 Surface Water Hydrology

Skaneateles Creek flows north through the site and can be both an effluent (gaining) and influent (losing) stream depending on stream flow, ground-water table conditions, and the segment of the stream. Both gaining and losing conditions exist in the segment of Skaneateles Creek on the SMC site west of the landfill and south of the former rock dam. This condition allows overburden ground water to pass beneath the creek during certain times of the year.

The segment of Skaneateles Creek north of the dam and culvert appears to act as a hydraulic barrier to lateral movement north of ground water the shallow overburden ground-water system from the landfill area. Shallow water table elevations in this portion of the site are at or above the elevation of Skaneateles Creek during both dry and wet times of the year. This condition restricts the migration of shallow ground-water flow past the creek to the north.

7.6 NATURE AND EXTENT OF CONTAMINATION

As part of the RI, the nature and extent of contamination at the SMC site was determined by quantifying the concentrations of TCL organics plus toluic acid and TAL inorganics plus cyanide in several matrices. These included: waste and soil from landfill test borings; soil from landfill perimeter and the area north of former Organics Plant test borings; leachate in landfill piezometers, ground water from onsite and offsite monitoring well clusters; surface water and sediment from Skaneateles Creek; seeps in the basement of the Main Plant Building, Skaneateles Creek, and the former raceway; and sewage in the sanitary sewage leachfield system. In addition, ambient air was sampled both prior to and during invasive activities to quantify VOCs emanating from the site.

7.6.1 Landfill

The onsite landfill is located southeast of the Main Plant Building immediately east of Skaneateles Creek. It is approximately 3 acres in size and covered by a 3-ft clay cap.

As part of site characterization during the RI, a magnetometer survey, test pit excavation, test borings, and piezometer installation activities were performed at the onsite landfill. Based on field observations and the findings of these activities, it was determined that the waste material within the landfill ranged from 5 to 12 ft in thickness (8 ft on average). The approximate 3-acre landfill contains an estimated quantity of 38,700 yd³ of solid waste. The waste material consisted of a mixture of numerous crushed drums, debris (wood, scrap metal, brick, concrete, etc.), general waste (plastic, paper, glass), manufacturing waste, and soil fill. The magnetometer survey indicated that large amounts of ferrous metals were present throughout much of the landfill.

Soil boring samples were collected to visually define the perimeter of the landfill. Confirmatory chemical analysis showed no detectable or low concentrations of VOCs and semi-VOCs in these samples.

The chemical analysis of landfill interior soil borings showed low or no detectable organic contamination in the soil cap or clay cap. The fill and waste, as anticipated, contained volatile (e.g., xylenes) and semi-volatiles (e.g., toluic acid isomers) contamination. The VOCs detected in the fill material consisted of chlorinated aliphatics (e.g., trichloroethene and tetrachloroethane), chlorinated aromatics (chlorobenzene), ketones (acetone, 2-butanone), and non-chlorinated aromatics (benzene, toluene, ethylbenzene, xylenes). The latter group showed the greatest overall concentration. The semi-VOCs quantified in the fill consisted of 4 phenolic compounds, 17 PAHs, 4 aromatic acids, 3 phthalate compounds, and 2 N-heterocyclic compounds. The 3 toluic acid isomers were identified in most of the fill samples. All of the inorganic analytes detected in the fill material fell within background concentrations for New York State, except for arsenic, chromium, cobalt, copper, lead, magnesium, mercury, nickel, sodium, and zinc. The clay underlying the landfill shows organic contamination derived from the fill.

The chemical analysis of landfill leachate in two piezometers installed within the landfill showed VOC and semi-VOC contamination derived from the fill. Up to 3 VOCs were identified in these samples. Ethylbenzene was detected only in LFP-02. Toluene and xylenes were detected in both samples. The only semi-VOCs identified were the toluic acid isomers. Other VOCs and semi-VOCs may have been present but could not be detected due to the large dilution factor required for these analyses. There were no detectable pesticide/PCBs in the landfill piezometers, except for 4,4'-DDE (range: from 0.053 to 0.19 $\mu\text{g/L}$; mean 0.12 $\mu\text{g/L}$). Inorganic analytes found in the landfill leachate were consistent with those observed in the fill samples. The observed concentrations for most of the identified inorganic analytes were greater than those observed for the other aqueous matrices at the site.

Dark-colored seeps emanate from the eastern bank of Skaneateles Creek, immediately west of the landfill during certain times of the year. Chemical analysis of the creek seeps showed the presence of VOCs and semi-VOCs found in landfill leachate samples and landfill waste samples. VOC classes included ketones (acetone), chlorinated aliphatics (1,2-dichloroethene, trichloroethene, and tetrachloroethene), and aromatic volatiles (toluene and xylenes). The semi-VOC classes present included phenolic compounds, phthalates, PAHs, and aromatic acids. The 3 toluic acid isomers were present in the 3 seep samples, at concentrations several orders of magnitude greater than the other semi-volatile analytes. In those creek samples which exhibited high concentrations of xylenes or toluic acid, elevated concentrations of arsenic, chromium, cobalt, copper, iron, nickel, potassium, sodium, and zinc were also present. There were no detectable pesticide/PCBs in any of the creek seep samples.

The analysis of overburden ground-water samples in the immediate vicinity of the landfill showed evidence of contamination at 3 well locations (MW-2S, MW-4S, and MW-7S). Xylene was present above New York State Class GA standards in 2 overburden monitoring wells (MW-4S and MW-7S) in at least one round of sampling. Only shallow monitoring well MW-7S had levels of other chemical constituents at elevated levels. MW-7S contained toluic acid, xylene, toluene, volatile chlorinated aliphatic compounds, and phenols in both rounds of sampling. The concentrations were relatively low compared to upper bedrock and deep bedrock ground-water samples. Upper bedrock wells in the immediate vicinity of the

landfill are contaminated with toluic acid. These wells (MW-1I, MW-2I, MW-3I, and MW-4I) also contain xylene and at least one phenolic and one volatile chlorinated aliphatic compound above NYSDEC Class GA standards. Wells located west of the landfill (i.e., MW-7I and MW-16I) also showed volatile and semi-volatile contamination but at lower levels than wells closer to the landfill.

7.6.2 Area North of Main Plant Building

The area north of the Main Plant Building is approximately 5 acres in size and is bounded by Skaneateles Creek to the east, a low-lying wooded area and Skaneateles Creek to the north, and Jordan Road to the west. Included in this portion of the site are the former Organics Plant area located northeast of the Main Plant Building and the sanitary sewage leachfield to the north of the plant.

Chemical analysis of the soil samples in the area north of the former Organics Plant showed the presence of VOCs (e.g., xylenes) and semi-VOCs (e.g., toluic acid) at several locations. These included soil samples proximal to well cluster MW-5 (located near the former Organics Plant), near the sanitary sewage leachfield north of the Main Plant Building, and near Jordan Road. Inorganics data show the presence of metals exceeding New York State background levels for 12 of 24 metals analyzed. One soil sample (MW5-SB15) exhibited the presence of 4,4'-DDD (8.7 $\mu\text{g/kg}$) and sub-SQL levels of Aroclor 1248 (59 $\mu\text{g/kg}$). This sample was located adjacent to the former railroad spur which transects the area.

Samples of the liquid present in the sanitary sewage leachfield holding tank and former mill raceway were collected during the Round 2 sampling event. Analytical results, showed the presence of toluene, chloroform, and acetone in the holding tank liquid. The holding tank liquid also showed the presence of 2 phenolic compounds, 2 toluic acid isomers, and several metals (calcium, iron, mercury, and zinc). Source of the contamination may have been from infiltration of shallow ground water.

A portion of the raceway which connected the former mill pond to the old section of the former Organics Plant can still be accessed. This raceway periodically collects fluids and may serve as a conduit for leachate migration within the building. Chloroform and acetone were qualified the raceway fluid contained trace (sub-SQL) concentrations of *m*-toluic acid (6 $\mu\text{g/L}$) and *o*-toluic acid (2 $\mu\text{g/L}$). The raceway sample also showed high concentrations of arsenic, lead, and sodium compared to background water concentrations.

The stormwater collection pit located east of the Main Plant Building is the remnant of the former mill discharge pipe and intermittently contains infiltrated ground water and/or surface runoff. A sample of the water showed the presence of 5 chlorinated aliphatics (1,1-dichloroethane, 1,2-dichloroethene, 1,1,1-trichloroethane, trichloroethane, and tetrachloroethene), 1 ketone (acetone), and 1 aromatic volatile (xylene). All chlorinated aliphatics were present at sub-SQL concentrations with the exception of 1,1-dichloroethane (28 $\mu\text{g/L}$). Two phenolic compounds (2-methyphenol and 2,4-diethylphenol) were detected at sub-SQL levels in this sample. There were no toluic acid isomers detected. There were 2 pesticides reported in this sample (endosulfan I and 4,4'-DDE), but the analysis did not meet quality control criteria and the results were rejected.

The observed copper, iron, mercury, sodium, and zinc concentrations were greater than those anticipated for background water concentrations, but were lower than observed in nearby overburden water (e.g., MW-5S). Ground water did not appear to be the sole source of water in this collection pit.

Xylene was present above New York State Class GA standards in 3 of the overburden monitoring wells in this area (MW-5S, MW-12S, and MW-18S), in at least one round of sampling. MW-5S was installed in Phase II, and Round 2 sampling of this well showed elevated levels of toluic acid, xylene, toluene, and the phenols, but the volatile chlorinated aliphatic compounds were not detected, possibly due to the large dilution factor required for this sample. Pesticide/PCBs were not detected in any of the Round 1 or Round 2 samples.

In the vicinity of the former Organics Plant, upper bedrock wells MW-5I, MW-12I, and MW-18I showed a presence of both chlorinated aliphatics and aromatic volatiles with xylene being the highest concentrated contaminant. Wells MW-5I and MW-12I also contained elevated levels of toluic acid. There were no detectable organic compounds from upper bedrock wells along the northwest or northern property boundaries.

7.6.3 Deep Ground-Water Zone

Three distinct zones of ground water at the SMC site were sampled: a shallow zone present in the overburden, an intermediate zone present in the upper bedrock, and the phreatic ground-water zone present deeper into bedrock. Both the shallow overburden and the deep phreatic zones are under unconfined conditions. The nature and extent of contamination for the overburden and shallow bedrock ground-water zones are summarized in the discussions of the landfill area and area north of Main Plant Building above.

With respect to the deep ground-water phreatic zones, 9 wells were installed as part of the Phase I investigation, 6 additional wells were installed as part of the Phase II investigation, and 3 inorganic sludge disposal area wells (installed 1980) located east of the landfill were used to characterize the deep bedrock ground water.

Eleven of the 18 deep bedrock ground-water samples, including the 3 inorganic sludge basin wells, exhibited no evidence of contamination. Six of the 9 Round 1 deep bedrock ground-water samples contained VOCs, representing the chlorinated aliphatic, ketone, and aromatic volatile classes. All 6 of these wells are located in the southern half of the site. Two of the 9 wells showed concentrations above the NYSDEC standards or guidance values for these compounds. Four of the 9 Round 1 wells showed phenolic compounds and the 3 toluic acid isomers. Two of these wells showed concentrations above the NYSDEC Class GA standards or guidance values for the phenolic compounds.

In Round 1, MW-1D and MW-2D showed elevated levels of toluic acid, and MW-4D also had toluic acid present. Several volatile aliphatic organic compounds and phenolic compounds were detected in MW-1D and MW-2D. Wells MW-1D, MW-2D, MW-3D, and MW-4D, which are immediately adjacent to the landfill on the south, west, and north sides, were dry during Round 2.

One of the 6 Round 2 wells sampled (MW-7D) (located west of the landfill, just east of Jordan Road) contained VOCs, representing the chlorinated aliphatic, ketone, and aromatic volatile classes. Concentrations above the NYSDEC Class GA standards were detected for certain of these compounds. This well also showed the presence of phenolic compounds and the 3 toluic acid isomers, as well as a low concentration of 4,4'-DDE in one of the samples. Well MW-16D, which is located west of MW-7D and off the site, showed no detectable levels of contamination.

Deep wells along the north, northwest, northeast, east, south, or southeast site boundaries exhibited no evidence of contamination.

7.6.4 Skaneateles Creek Surface Water/Sediment

Samples of surface water and sediment were obtained in two rounds from four locations in Skaneateles Creek.

Chemical analysis of the 4 surface water samples for the two rounds showed that the surface water samples were free of detectable VOCs. The single, positive semi-volatile result from the Round 1 sampling may have been false-positive since it was not detected in the second round of samples. The inorganic results showed no significant effect of the site on inorganic water quality of the stream.

The first round of samples of stream sediment samples showed the presence of 2 VOCs in one sample (SD-03) and PAHs in all downstream samples (SD-01, SD-02, and SD-03). The second round of samples showed from 1 to 8 VOCs detected in 3 of the samples (SD-02, SD-03, and SD-04).

Sample SD-04 located upstream of the landfill showed no detectable semi-VOCs. PAHs were the dominant chemical class detected in all 3 of the contaminated samples. These compounds readily adsorb and are retained by sediments. The 3 toluic acid isomers were detected in SD-03 located in the vicinity of the landfill. This sample also contained elevated xylenes, and was located near the creek seep which emanates from the rock dam remnants. Up to 4 pesticide analytes were identified in 2 of the sediment samples from Round 2 but not in Round 1. These were observed in the 2 downstream samples furthest from the landfill.

7.6.5 Basement Seep

Seeps are entering the basement of the Main Plant Building at several locations. These are collected into a sump which is periodically pumped to the onsite treatment system.

The first round of basement seeps sampled showed up to 7 VOCs. The chemical classes represented included 5 chlorinated aliphatics and 1 aromatic (xylene). The concentrations levels for the chlorinated compounds were less than 10 µg/L. Xylenes were present from 220 to 240 µg/L. There were no VOC TICs identified in these samples.

Two phenolic compounds (2,4-dimethylphenol and pentachlorophenol) and 2 toluic acid isomers (*ortho* and *meta*) were present in the basement seep. Toluic acid showed the greatest overall concentration of all the organics identified.

The second round of samples also showed the presence of 2 phenolic compounds (2,4-methylphenol and pentachlorophenol) and 2 toluic acid isomers. The observed concentrations were comparable to the phenolic compounds, but were lower for the toluic acid isomers when the two sampling rounds are compared.

There were no detectable pesticide/PCBs in the Round 1 or 2 basement seep samples.

7.7 SITE MODEL FOR CHEMICAL TRANSPORT

Based upon the contaminants' physicochemical characteristics, geologic and geohydrologic conditions of the site, and the nature and extent of contamination at the SMC site, contaminants may migrate via several pathways. These include volatilization of contaminants from soils, entrainment of soils in the overlying air, and migration of contaminants via ground water and surface water.

Dark-colored seeps have been observed entering Skaneateles Creek at several locations immediately west of the landfill, and represent a contaminant release pathway to surface water. These seeps occur at certain times of the year when the water table is high. When present, the seeps are quickly diluted by stream flow.

The principal pathway to overlying air is due to volatilization from subsurface soils, predominantly from the area north of the Main Plant building and the landfill. This is a minor pathway since calculations showed low flux rates and equivalent air concentrations at a nearby receptor. Pathways associated with air releases induced by wind or vehicular traffic are also minor under current site conditions since the site is either paved or has cover grasses, brush, and trees. Air pathways will become more important if these cover materials are removed, which can occur during site remediation.

The air and surface water pathways are less significant compared against the ground-water pathways. Lateral migration of leachate water from the landfill appears to be restricted (although not eliminated) north and northeast. Hydraulic gradients favor movement to the northwest, west, and southwest. This migration appears to be significantly slower than overburden ground-water movement in the vicinity of the site, as evidenced by the stable water elevations in the landfill piezometers compared to nearby overburden wells. The migrating overburden ground water which does not provide recharge to the underlying shallow bedrock is partially intercepted by the adjacent Skaneateles Creek. Unconsolidated deposits beneath portions of Skaneateles Creek allows some passage of overburden ground water beneath the creek, which in turn may be the source of the seeps located along the subsurface basement walls at the south end of the Main Plant Building, and the contamination observed in MW-7S.

The flow of ground water in the upper bedrock is chiefly controlled by gravity and the structure of the bedrock. Ground water descends through the upper bedrock to the deep

bedrock water table via secondary openings. These openings are commonly along bedding planes and are not steeply inclined, thus the water migrates laterally to the south along the stratal dip and to the west along the bedrock strike as it descends to the deep bedrock ground-water zone. The vadose feeders (connection between the upper bedrock and deep bedrock ground-water zones) are believed to be located south of the landfill. The most likely location is in the area of the bedrock low situated approximately 800 ft south of the former rock dam. Regionally, deep bedrock ground water migrates under unconfined water table conditions to the north-northwest, although the direction and gradient appears to vary with the time of year.

The net effect of this migratory route is that overburden ground water immediately north and east of the landfill should show low contamination by contaminants originating from the landfill, with upper bedrock ground-water concentrations increasing as the ground water migrates southerly, until the bedrock low is encountered. At that point, the contaminants can enter the deep bedrock and migrate northerly within this regional ground-water system. This model is also appropriate to explain the results from the area north of the Main Plant Building. In this case, vadose zone contamination from the former Organics Plant (near MW-5 cluster) has resulted in contamination of the overburden ground water. This area is surrounded on two sides by Skaneateles Creek. Shallow overburden ground water has both a horizontal gradient to the north and a downward vertical gradient. As a result, the migration within the overburden has resulted in contamination at the MW-12S and MW-18S clusters. Ground water whose northerly movement is impeded by the low-lying wet area and Skaneateles Creek to the north may then serve as recharge to the underlying upper bedrock. As a result, the upper bedrock in MW-12I and MW-18I also shows evidence of VOC and toluic acid contamination.

The model suggests that some overburden ground water would migrate from the landfill beneath the creek in the underlying unconsolidated silty deposits and move westerly towards MW-7S. Contaminants which have entered the upper bedrock would also migrate in a westerly direction forward to MW-7I cluster. Contaminants which have entered the deep bedrock ground water south of the landfill would migrate northwesterly towards MW-7D. In addition, any contaminants moving in a southerly direction in the upper bedrock from the area north of the Main Plant Building may also be present near MW-7I. The observed contamination of various onsite monitoring wells can be explained as a result of these different migratory pathways.

7.8 RISK ASSESSMENT

The human health risk assessment evaluated both present-use and potential future-use exposure scenarios for residents and onsite workers. The average and plausible maximum carcinogenic and non-carcinogenic risks were calculated.

The present-use scenarios included an examination of risks to residents who may be breathing any VOCs emanating from the area north of the Main Plant Building and from the landfill. The calculated flux rates, based upon observed contaminant concentrations, and equivalent air concentrations were low and do not pose any risk to the residents. This scenario did not include the evaluation of site remediation.

Dermal contact of stream sediments did show a carcinogenic risk above the risk threshold (1×10^{-6}), but only under the plausible maximum exposure scenario. This risk was due to the presence of carcinogenic polycyclic aromatic hydrocarbons. These compounds are found in association with the non-carcinogenic polycyclic aromatic hydrocarbons and can be derived from road surface runoff. Children playing in the stream were not found to be at risk.

Dermal contact with the unlimited creek seeps showed a carcinogenic risk above the risk threshold ($1E-6$) under both the average and plausible maximum exposure scenarios, and a non-carcinogenic risk above the threshold value ($HI=1$) under only the plausible maximum exposure scenario. The carcinogenic risks were attributable to the presence of chlorinated solvents and polycyclic aromatic hydrocarbons in the undiluted seeps.

Future-use scenarios included an examination of risks associated with non-remedial construction activity at the site, use of ground water for potable and non-potable uses at the site, and use of ground water offsite for potable and non-potable uses. Although a mail survey showed that most residents did not use the water within 0.5 mi of the site, the residential use of ground water was evaluated in the case where a homeowner would (in the future) supplement their municipal supply with their own well. Carcinogenic risks were calculated for both ingestion- and inhalation-based pathways. These were due to the presence of chlorinated compounds (e.g., vinyl chloride, trichloroethene, and tetrachloroethene). There were no non-carcinogenic risks calculated from these exposure pathways.

Several of the groundwater samples at the SMC site showed pH values outside the NYSDEC Class GA standard of 6.5 to 8.5. Although the pH of groundwater is not typically considered in Quantitative Risk Assessments, a preliminary assessment was incorporated into this risk assessment due to the observed standard exceedances. Potential dermal effects (e.g., erythema) to the skin, dermal contact effects to the eye (e.g., discomfort) and ingestion effects. The observed pH results were greater than 3 and less than 12, the pH values were ocular, dermal or tissue effects may occur.

A habitat assessment was also performed, which included a qualitative survey of the aquatic community within Skaneateles Creek and the terrestrial community on the site property, and an evaluation of the observed chemical concentrations from samples of surface water, sediment, seeps, and soil. The October 1991 field survey portion of the habitat assessment indicated that the site was a typical "old field" setting, consisting of hedge and tree rows surrounding open fields. The open fields are mowed by the site caretaker. There was no apparent vegetation stress within the fields or hedge rows. Review of the shallow soil analytical results did not suggest that there would be a significant impact to terrestrial organisms.

The field survey of the stream showed no evidence of stressed aquatic plants and did not suggested that the site conditions were significantly affecting the stream community. This was consistent with the quantitative stream-wide survey performed by NYSDEC in 1992 (Novack et al. 1993) which showed that the aquatic community was only slightly stressed within the stream.

Sediment organic and inorganic chemical results were compared to NYSDEC sediment criteria, as well as toxicity values reported in the literature. The PAHs concentrations of some of the sediment samples were greater than sediment criteria or EPA chronic toxicity criteria. The PAHs in the sediments may be attributable to both seeps from the landfill, as well as site road surface runoff. There were several exceedances of NYSDEC sediment criteria for metals, although the qualitative field survey performed for this RI, and the recent NYSDEC stream survey, did not indicate a significant impact on the stream benthic community.

7.9 SATISFACTION OF THE REMEDIAL INVESTIGATION OBJECTIVES

The objectives of the RI established in the various work plan documents have been addressed as summarized below. These objectives, as presented in the original Work Plan (BBL 1990), were to:

1. **"Determine the vertical and horizontal extent of landfill leachate migration on the east side of the creek."**
 - Landfill leachate migration on the east side of the creek has been determined to extend predominantly in a southerly and westerly direction in the overburden and upper bedrock ground water.
 - Dark-colored seeps (landfill leachate), present at certain times of the year, have been observed entering Skaneateles Creek at several locations immediately west of the landfill and represent a release pathway. When present, the seeps are rapidly diluted due to the high stream flow conditions.
 - Sediments which are in close proximity of the seeps release points show evidence of contamination from the landfill.
 - The landfill is a source of overburden ground-water contamination in the immediate vicinity of the landfill east of Skaneateles Creek.
 - Overburden ground water west of the landfill is believed to pass beneath the creek in a westerly direction during certain periods of the year, and appear to be the source of contamination observed at MW-7S.
 - Landfill leachate appears to have entered the upper bedrock and migrated through bedrock openings in the southerly and westerly direction, and is believed to be the source of the contamination observed in MW-1I, MW-2I, and MW-3I east of Skaneateles Creek. In addition, it is believed to be contributing to contamination observed in MW-7I and MW-16I located west of the landfill.

- Once in the upper bedrock, constituents of concern migrate with ground water as it descends to the deep ground-water zone. The connection with the deep ground-water zone appears to be located south of the landfill in the area of the bedrock low. The landfill appears to be a source of deep ground-water contamination identified in MW-1D, MW-2D, and MW-7D.
 - MW-15D, which is further south than MW-1D, is not contaminated indicating that the connection with the deep bedrock ground-water system occurs before the upper bedrock ground water reaches MW-15.
2. **"Determine if the discolored water seep in the basement of the former mill building has chemical characteristics similar to that of the landfill leachate, and if the landfill is the source of the basement seepage."**
- The dark-colored water seep in the basement of the warehouse portion of the Main Plant Building was sampled during two rounds. The basement seep has been determined to have characteristics similar to both the landfill leachate and contaminants present in the vicinity of the former Organics Plant.
 - It is believed that the principal source of the basement seep in the warehouse portion of the Main Plant Building is shallow overburden ground water migrating from the former Organics Plant area. There also appears to be a contribution from the landfill source.
 - The Main Plant Building is likely not a source area. The toluic acid manufacturing and product formulation occurred in the former Organics Plant area, with the final product stored prior to shipping in the warehouse area (northern section of the existing Main Plant Building). The close proximity of the basement slab to the overburden ground-water table does enhance the potential for seepage of contaminated ground water into the Main Plant Building). A portion of this seepage is transmitted via the floor drains to the collection sump, which is then pumped for treatment onsite.
3. **"Determine the quality of the ground water as it moves off the plant site."**
- Analysis of ground-water samples indicate that VOCs and semi-VOCs are present in the overburden and deep bedrock ground water at least as far as well cluster MW-7 located near the SMC

property boundary west of the landfill. VOCs and semi-VOCs have extended to the west at least as far as offsite well MW-16 in the upper bedrock.

- Ground-water quality along the southern boundary of the site could not be determined since well cluster MW-15 was dry at the time of the Round 2 sampling event. A Round 3 sampling event of selected well, including well cluster MW-15, was planned following submission of the draft RI report. Information from this sampling round will be integrated into the FS report.
 - No contamination was detected in the upper bedrock along the north and northwest property boundaries.
 - No contamination was detected in the deep ground water along the south, southwest, north, northwest, northeast, or east site boundaries.
- 4. "Determine the extent of the landfill area, and chemical characteristics of the landfill waste and observed leachate."**
- In order to define the lateral extent of the landfill, a total of 15 soil samples (including 1 duplicate) were collected from 14 locations on the perimeter of the landfill.
 - For the purpose of characterizing the nature of the landfill waste, a total of 15 soil/waste samples were collected from 12 test borings located within the landfill.
 - Leachate samples were collected from 2 piezometers installed within the landfill to characterize the nature of the landfill leachate. In addition, samples were collected from dark-colored seeps emanating from the Skaneateles Creek bed immediately west of the landfill.
- 5. "Determine if the existing site conditions are resulting in volatile organic chemical emissions from the site via air migratory pathways."**
- Six ambient air samples were obtained during the RI; 4 when no invasive drilling activities were occurring (2 at the edge of the landfill and 2 along Jordan Road), and 2 during invasive drilling activities. The ambient air samples showed the presence of VOCs comparable to background levels with no apparent emission of volatiles from the site during baseline conditions, from the landfill, or during conditions when drilling was occurring.

6. "Provide sufficient data to perform an environmental Risk Assessment, including a Habitat-Based Assessment of the impact on fish and wildlife."

- A habitat assessment was performed at the site during the initial RI to determine potential impacts to the local habitat. The habitat assessment was used in the performance of the environmental risk assessment to evaluate the threat to non-human biotic resources, fish, and wildlife.
- The stream surface water quality was found to be within the NYSDEC Class A surface water quality standards for most parameters indicating that there would not be a significant impact to biota resident in the water column.
- Review of the surficial soil toluic acid concentrations did not suggest that there would not be a significant impact to terrestrial organisms, such as the short tail shrew, American kestrel, or red fox.
- The stream sediment organic and inorganic concentrations were less than the NYSDEC sediment criteria and published literature toxicity data, with the exception of some PAHs and metals. PAHs were present at low concentrations in seeps entering the stream, but may also be introduced by road surface runoff.

7. "Determine any additional investigative or remedial activities which may be warranted."

- Hydrogeologic and chemical analytical data which became available during and after the initial RI field program was used to evaluate site characteristics and identify existing data gaps. The Phase II investigation was developed and implemented to fill these data gaps which expanded the scope of RI beyond its original focus.

Collection and evaluation of the first phase of field work and review of the analytical results expanded the RI objectives to include the following as described in the Work Plan Amendment (EA 1993):

1. "Provide additional information on subsurface stratigraphy relative to potential contaminant migration pathways."

- Additional information pertaining to subsurface stratigraphy was collected during field activities which included a seismic refraction survey, soil boring and rock cores, and a bedrock outcrop study in the site area.

- The bedrock surface contours and stratigraphy were found to influence contaminant migration, especially south of the landfill and west of the site boundaries.
- 2. "Provide additional hydrogeologic data for the overburden, upper bedrock, and deep bedrock east, south, north, and west of the landfill."**
- Additional hydrogeologic information was collected during the Phase II field activities which included the installation of additional bedrock monitoring well couplets south, southwest, west, and northeast of the landfill and a well cluster east of the landfill. A continuous deep ground-water level monitoring program of 4 selected onsite wells was also performed.
 - The overburden ground water exhibits a downward gradient in the area of the landfill. Vertical migration of the overburden ground water to the shallow bedrock occurs throughout the site area.
 - Ground-water flow through bedrock is controlled by the structure of the bedrock. The upper bedrock ground water is stratigraphically perched, therefore, use of the potentiometric surface map as a guide to upper bedrock ground-water movement is misleading; ground-water movement through the upper bedrock is predominantly controlled by gravity and the southerly dip of the bedrock as it descends to the deep ground-water zone.
 - In reaches of Skaneateles Creek south of where it enters the property, the creek flows over exposed bedrock and is believed to be a significant source of recharge to the deep bedrock ground-water system influencing deep ground-water flow beneath the site.
- 3. "Determine the extent of chemical constituents within upper and deep bedrock ground water south, west, and north of the landfill."**
- The nature and extent of chemical constituents within the upper and deep ground water was delineated onsite during the RI field effort.
 - VOCs and semi-VOCs were detected in the upper and deep ground water at well cluster MW-7 (west of landfill near Jordan Road).
 - VOCs and semi-VOCs were also detected at lower concentrations in the upper bedrock ground water at least as far as MW-16I located approximately 800 ft west of the landfill, in a partially wooded area, and approximately 400 ft west of the residences located along Jordan Road.

- No contamination was detected in the deep ground water along the south (MW-15D), southwest (MW-17D), northwest, north (MW-10D and MW-11D), northeast or east site boundaries, nor in MW-16D located offsite to the west.
 - The extent of contamination south of MW-11I could not be determined since the southern MW-15I was dry at the time of the Round 2 sampling event. Ground-water quality west of MW-16I could not be evaluated based upon the collected data. Based upon the data collected from this study, overburden ground-water quality west of MW-7S could not be evaluated.
4. **"Provide information to determine chemical constituents present, potential source(s) of contamination, environmental media affected, and areal extent of soil contamination north of the Main Plant Building."**
- The extent of contamination of soil and ground water in the area north of the Main Plant Building was determined and characterized through field activities which include an SVCA survey, a total of 18 test borings and soil sampling, and installation and sampling of 3 overburden and 2 upper bedrock monitoring wells.
 - Vadose zone soil contamination was detected in the vicinity of the former Organics Plant and at lower concentrations northwest of the Main Plant Building, and in the vicinity of the sanitary sewage leachfield.
 - Shallow overburden and upper bedrock ground-water contamination was detected in the vicinity of the former Organics Plant and extends to MW-18 north of the sanitary sewage leachfield and MW-12 north of the former Organics Plant. Upper and deep bedrock wells located along the property lines west (MW-8), northwest (MW-9), and north (MW-10 and MW-11) of the area were free of detectable organics.
 - Volatile chlorinated organics were observed in soil vapor collected north of the warehouse, with interpreted contour maxima less than 1 ppm., for trichloroethene and tetrachloroethene. Soil samples collected near the maximum observed soil vapor concentrations for chlorinated volatile organics showed traced concentrations (less than the sample quantitation limits of 10 µg/kg) for these compounds. These 2 compounds were not detected in the overburden ground water in this area, but 2 other chlorinated organics (1,1-dichloroethane and 1,2-dichloroethene) were present in MW-12I above NYSDEC Class GA standards. There does not appear to be a discrete source area present and the limited

contamination of these compounds which has been observed may be the result of minor spills that occurred during the loading and unloading operations.

5. "Evaluate the MW-7 area and sanitary sewage leachfield system for potential secondary onsite areas of concern."

- The potential for secondary sources in the vicinity of the sanitary sewage leachfield and MW-7 was evaluated. Contamination was detected in the sanitary sewage system holding tank liquid, but there is no evidence of a separate source in the MW-7 area. Contamination in the MW-7 area appears to be associated with both the landfill and area north of the Main Plant Building source areas.

6. "Provide additional geologic and hydrogeologic data in support of the RI/FS."

- Geologic and hydrogeologic data was collected which provided characterization of the physical features of the site and provided the support for development of the site model for chemical transport.

7. "Perform a private well use survey to support the human health risk assessment."

- A survey of private well usage in the vicinity of the site was performed in support of the human health risk assessment. The initial evaluation consisted of contacting local municipalities and public water systems to determine which residences may be on private or public water. SMC then developed a mailing list of property owners for approximately 165 properties in the vicinity of the site. A private well usage questionnaire developed by NYSDEC was then sent by SMC to each of the property owners. The questionnaires were returned to NYSDEC who tabulated the data and sent the results to SMC.
- The survey showed that there are some wells (residential and commercial) in the vicinity of the site. Most of these wells are no longer used, but some do have non-potable uses (e.g., service well for Fire Pond). All 4 wells reportedly using ground water as a drinking water source (1 on Masters Road, 2 on Vinegar Hill Road, and 1 on Stump Road) are located greater than 0.5 mi from the SMC site.

The RI objectives were established to ensure that the data collected is sufficient to provide a basis for risk management decisions and for the screening and selection of remedial alternatives to be performed as part of the feasibility study.



REFERENCES

- Baes, C.F., III, R.D. Sharp, A.J. Sjoreen, and R.W. Shor. 1984. A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture. ORNL-5786. Oak Ridge National Laboratory.
- Blasland, Bouck and Lee Engineers, P.C. (BBL). 1990. Site Investigation Work Plan. Stauffer Management Company, Skaneateles Falls, New York.
- Bodek, I., W.J. Lyman, W.F. Reehl, and D.H. Rosenblatt. 1988. Environmental Inorganic Chemistry Properties, Processes, and Estimation Methods. Pergamon Press, Elmsford, New York.
- Branson, D., G. Blau, H. Alexander, and W. Neely. 1975. Bioaccumulation of 22'44'-tetrachlorobiphenyl in rainbow trout as measured by an accelerated test. *Trans. Am. Fish. Soc.* 104:788-792.
- Briggs, G.G., R.H. Bromilow, and A.A. Evans. 1982. Relationship between lipophilicity and root uptake and translation of non-ionized chemical by barley. *Pest. Sci.* 13:49S-504.
- Buffington, B. 1992. New York State Department of Environmental Conservation. Personal communication. 10 July.
- Chute, N.E. 1964. Structural features in the Syracuse area, in Prucha, J.J. New York State Geological Assoc. 36th Annual.
- Cooper, A.L. and G.N. Neuderfer. 1973. A Macroinvertebrate Study of Skaneateles Creek. New York State Department of Environmental Conservation Technical Report, Division of Fish and Wildlife. 29 pp.
- Cowherd, J.C., G.E. Muleski, P.J. Englehart, and D.A. Grillette. 1985. Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites. EPA-600/8-86/002.
- DeGroff, E.R. 1954. Joint Pattern in Central New York: Unpublished Masters of Science Thesis. Syracuse University, Syracuse, New York.
- Di Toro, D.M. and L.M. Horzempa. 1982. Reversible and resistant components of PCB absorption-desorption: Isotherms. *Env. Sci. Technol.* 16:594-602.
- Di Toro, D.M. and L.M. Horzempa. 1983. Reversible and resistant component model of hexachlorobiphenyl absorption-desorption and dilution, in *Physical Behavior of PCBs in the Great Lakes* (D. Mackay, S. Paterson, S.J. Eisenreich, and M.S. Simmons, eds.). Ann Arbor Science, Ann Arbor, Michigan. pp. 89-113.

REFERENCES (Continued)

- Doull, J., C.D. Klaassen, and M.O. Amdur. 1980. Casarett and Doull's Toxicology. The Basic Science of Poisons. Second Edition. MacMillan Publishing Co., Inc., New York.
- EA Engineering, Science, and Technology. 1988. Biothreat Ranking Model User's Manual. Prepared for New York State Department of Environmental Conservation, Albany, New York.
- EA. 1991. Field Sampling and Analysis Plan, Stauffer Management Company Facility, Skaneateles Falls, New York. Prepared for Stauffer Management Company, Wilmington, Delaware.
- EA. 1992a. Revised Stauffer Management Company Remedial Investigation/Feasibility Study Interim Data Report. Prepared for Stauffer Management Company, Wilmington, Delaware.
- EA. 1992b. MW-5 Area Investigation Work Plan, Stauffer Management Company Remedial Investigation/Feasibility Study, Skaneateles Falls, New York. Prepared for Stauffer Management Company, Wilmington, Delaware.
- EA. 1993. Work Plan Amendment, Stauffer Management Company, Remedial Investigation/Feasibility Study, Skaneateles Falls, New York. Prepared for Stauffer Management Company, Wilmington, Delaware.
- Foster, S.A. and P.C. Chrostowski. 1987. Inhalation Exposures to Volatile Contaminants in the Shower. ICF-Clement Associates, Inc. 87-42.6. Washington, D.C.
- Frazier, W.J. and D.R. Schwimmer. 1987. Regional Stratigraphy of North America.
- Ghiorse, W.C. and J.T. Wilson. 1988. Microbial ecology of the terrestrial subsurface. *Adv. Appl. Microbiol.* 33:107-174.
- Hawley, J.K. 1985. Assessment of health risk for exposure to contaminated soil. *Risk Analysis* 5:289-302.
- Hodgson, A.T., K. Garbesi, R.G. Sextro, and J.M. Daisey. 1988. Evaluation of Soil Gas Transport of Organic Chemicals into Residential Buildings. Final Report. Prepared for the U.S. Department of Energy. 90 pp.
- Hutton F.Z. and E.C. Rice. 1977. Soil Survey of Onondaga County, New York: U.S. Department of Agriculture, Soil Conservation Service.
- Karimi, A., V. Ravindran, and M. Pirbazari. 1988. A laboratory experiment and predictive model for evaluating landfill cover controls of emissions of volatile organic chemicals to air. *Haz. Waste Haz. Matter*, 5:203-217.

REFERENCES (Continued)

- Karickhoff, S.W., V.K. McDaniel, C. Melton, A.N. Vallino, and D.E. Nute. 1991. Predicting chemical reactivity by computer. *Env. Toxic. and Chem.* Vol. 10:1405-1416.
- Knox, C.E. and T.J. Nordenson. 1961. Average Annual Runoff and Precipitation in New England-New York Area. Atlas HA7. U.S. Geological Survey.
- Krantzberg, G. and D. Boyd. 1992. The biological significance of contaminants in sediment from Hamilton Harbour, Lake Ontario. *Environ. Toxicol. Chem.* 11:1527-1540.
- Landrum, P.F., B.J. Eatie, and W.R. Faust. 1991. Toxicokinetics and toxicity of a mixture of sediment-associated polycyclic aromatic hydrocarbon to the amphipod (*Diporeia* sp.). *Environ. Toxicol. Chem.* 10:35-46.
- LeBlanc, G.A. 1980. Acute toxicity of priority pollutants to water flea (*Daphnia magna*). *Bull. Environ. Contam. Toxicol.* 24:684-691.
- Litten, S., B. Mead, and J. Hassett. 1993. Application of passive samplers (PISCES) to locating a source of PCBs on the Black River, New York. *Environ. Toxicol. Chem.* 12(4):639-647.
- Lyman, W.J., W.G. Reehl, and D.H. Rosenblatt. 1990. Handbook of Chemical Property Estimation Methods: Environmental Behavior of Organic Compounds. McGraw Hill Book Company, New York, New York.
- Mayer, Fm., Jr. and M.R. Ellersieck. 1986. Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. U.S. Department of Interior, Fish and Wildlife Service. 579 pp.
- McCall, P.J., D.A. Laskowski, R.L. Swann, and H.J. Dishburger. 1983. Estimation of environmental partitioning of organic chemicals in model ecosystems. *Res. Rev.* 85:231-244.
- McFarlane, C., T. Pfleeger, and J. Fletcher. 1990. Effect, uptake, and disposition of nitrobenzene in several terrestrial plants. *Environ. Toxicol. Chem.* 9(4): 513-520.
- McGovern, E.C. 1987. Background Concentrations of 20 Elements in Soils with Special Regard for New York State. Wildlife Pathology Unit, New York State Department of Environmental Conservation.
- Millington, R.J. and J.P. Quirk. 1961. Permeability of porous solids. *Trans. Faraday Soc.* 57:1200-1207.
- Muller, E.H. 1964. Surficial Geology of the Syracuse Field Area, in Proceedings of the New York State Geologic Association 36th Annual Meeting (Prucha, J.J. ed.). New York State Geological Survey, Albany, New York.

REFERENCES (Continued)

- National Oceanic and Atmospheric Administration (NOAA). 1982. Monthly Normals of Temperature, Precipitation, Heating, and Cooling Degree Days 1951-1980: New York. Report No. 81. NCC, Asheville, North Carolina.
- New York State Department of Environmental Conservation (NYSDEC). 1989. Sediment Criteria. Bureau of Environmental Protection, Division of Fish and Wildlife. December.
- NYSDEC. 1991. Draft New York State Air Guide-1. Guidelines for the Control of Toxic Ambient Air Contaminants. Division of Air Resources.
- NYSDEC. 1993a. Ambient Water Quality Standards and Guidance Values. Division of Water, Technical, and Operational Guidance. Series 1.1.1. 89 pp. October.
- NYSDEC. 1993b. Technical Guidance for Screening Contaminated Sediments. Division of Fish and Wildlife, Division of Marine Resources. 36 pp. November.
- Novack, M.A., R.W. Bode, and L.E. Abele. 1993. Biological Stream Assessment: Skaneateles Creek. NYSDEC, Division of Water. 29 pp.
- Nowak, R.M. and J.L. Paradiso. 1983. Walker's Mammals of the World. Fourth Edition, Vol. 1. pp. 96, 133-135, 932, 934. The Johns Hopkins University Press, Baltimore and London.
- Palmer, A.N. 1986. Prediction of Contaminant Paths in Karst Aquifers, in National Water Well Association: Proceedings of Conference on Environmental Problems in Karst Terrain. Bowling Green, Kentucky.
- Poiger, H. and C. Schlatter. 1980. Influence of solvents and adsorbents on dermal and intestinal absorption of TCPP. *Food Cosmet. Toxicol.* 18:477-481.
- Potts, A.M. and L.M. Gonasun. 1980. Toxic responses of the eye, in *Toxicology: The Basic Science of Poisons*, J. Doull, C.D. Klaassen, and M.O. Amdur (eds.). MacMillan Publishing Company, Inc. 777 pp.
- Sax, N.I. 1984. Dangerous Properties of Industrial Materials. Sixth Edition. Van Nostrand Reinhold Company, New York.
- Shah, J.J. and H.B. Singh. 1988. Distribution of volatile organic chemicals in outdoor and indoor air.
- Smith, B. 1935. Geology and Mineral Resources of the Skaneateles Quadrangle. New York State Museum Bulletin No.300.
- SRI International. 1982. Aquatic Fate Process Data for Organic Priority Pollutants. EPA 440/4-81-014. 433 pp.

REFERENCES (Continued)

- Stauffer Chemical Company (SCC). 1986. Summary Report of Site Investigation Activities at Skaneateles Falls Plant.
- Stout, N.J. 1958. Atlas of Forestry in New York. State University, College of Forestry at Syracuse University.
- Syracuse Water Department (SWD). 1993. Personal communication, Daniel Rubbino, Engineer. 18 November.
- Swindoll, C.M., M. Aelion, D.C. Dobbins, O. Jiang, S.C. Long, and P.F. Pfaender. 1988. Aerobic biodegradation of natural and xenobiotic organic compounds by subsurface microbial communities. *Environ. Toxicol. Chem.* 7:291-299.
- Thomann, R.V. 1989. Bioaccumulation model of organic chemical distributions in aquatic food chains. *Environ. Sci. Technol.* 23:699-707.
- Thurston, R.V., R.C. Russo, C.M. Fetterolf, Jr., T.A. Edsall, and J.M. Barber, Jr. 1979. A Review of the EPA Red Book: Quality Criteria for Water. *Amer. Fish. Soc.* 313 pp.
- Tracer Research Corporation. Unpublished. Soil Gas Contaminant Investigation Services. Tuscon, Arizona.
- Trapp, S., M. Matthies, I. Scheunert, and E.M. Topp. 1990. Modeling the bioconcentration of organic chemicals in plants. *Environ. Sci. Technol.* 24:1246-1252.
- U.S. Environmental Protection Agency (U.S. EPA). 1986a. Superfund Public Health Evaluation Manual. EPA 540/1-86/160.
- U.S. EPA. 1986b. Guidelines for the Health Risk Assessment of Chemical Mixtures. Federal Register 51:34014-34025. 25 September.
- U.S. EPA. 1986c. Guidance for Carcinogenic Risk Assessment. Federal Register 51:33992-34003.
- U.S. EPA. 1988a. Superfund Exposure Assessment Manual. EPA 540/1-88/001. Office of Remedial Response. Washington, D.C.
- U.S. EPA. 1988b. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (Interim Final). EPA/540/1-88/001. Office of Emergency and Remedial Response, Washington, D.C.
- U.S. EPA. 1989a. Exposure Factors Handbook. EPA 600/8-89/043. Office of Health and Environmental Assessment, Exposure Assessment Group. Washington, D.C.

REFERENCES (Continued)

- U.S. EPA. 1989b. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A) (Interim Final). EPA/540/1-89002. Office of Emergency and Remedial Response. Washington, D.C.
- U.S. EPA. 1989c. Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation Manual. EPA/540/1-89002. Office of Emergency and Remedial Response. Washington, D.C.
- U.S. EPA. 1989d. Ecological Assessments of Hazardous Waste Sites: A Field and Laboratory Reference Document. EPA/600/3-89/013. Environmental Research Lab. Corvallis, Oregon.
- U.S. EPA. 1990. Exposure Factors Handbook. EPA/600/8-89/043. Office of Health and Environmental Assessment, Exposure Assessment Group. Washington, D.C. March.
- U.S. EPA. 1991a. Health Effects Assessment Summary Tables. Annual Fiscal Year-1991. Office of Emergency and Remedial Response; Office of Research and Development. Washington, D.C. January.
- U.S. EPA. 1991b. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03. Office of Solid Waste and Emergency Response. 25 March.
- U.S. EPA. 1991c. Water Quality Criteria Summary. Office of Research and Development, Division of Water, Washington, D.C.
- U.S. EPA. 1992a. Handbook of RCRA Ground-Water Monitoring Constituents: Chemical and Physical Properties. EPA 530/R/92/022.
- U.S. EPA. 1992b. Health Effects Assessment Summary Tables (HEAST) Annual FY 1992. OERR 9200.6-303 (92-1). Office of Research and Development, Office of Emergency and Remedial Response. Washington, D.C. March.
- U.S. EPA. 1992c. Guidelines for Exposure Assessment; Notice. Federal Register 57:22887-22938. 29 May.
- U.S. EPA. 1992d. Developing a Work Scope for Ecological Assessment.
- U.S. EPA. 1992e. Dermal Exposure Assessment: Principles and Applications, Interim Report. EPA/600/8-91/011B. Office of Research and Development. Washington, D.C.
- U.S. EPA. 1993. Integrated Risk Information System (IRIS). Online computer database. National Library of Medicine, Bethesda, Maryland.
- U.S. Public Health Service (USPHS). 1989. Toxicological Profile for Toluene. 133 pp.

REFERENCES (Continued)

- Verschueren, K. 1983. Handbook of Environmental Data on Organic Chemicals. Van Nostrand Rheinhold, New York. 1,310 p.
- Voice, T.C. and W.J. Weber, Jr. 1983. Sorption of hydrophobic compounds by sediments, soils, and suspended solids - I. Theory and Background. *Water Res.* 17:1433-1441.
- Weast, R.C. 1975. Handbook of Chemistry and Physics. CRC Press, Cleveland, Ohio.
- Windholz, M., S. Budavari, L.Y. Stroumstos, and M.N. Fertig. 1976. The Merck Index. Merck and Company, Inc., Rahway, New Jersey.
- Winkley, S. 1989. The Hydrogeology of Onondaga County, New York. Prepared for Onondaga County Water Quality Management Agency, Onondaga County Health Department and Onondaga County Environmental Management Council.
- Yare, P.S. 1980. Hydrogeology and Engineering Geology, Proposed Industrial Waste Disposal Area. Stauffer Chemical Company. Skaneateles Falls, New York.

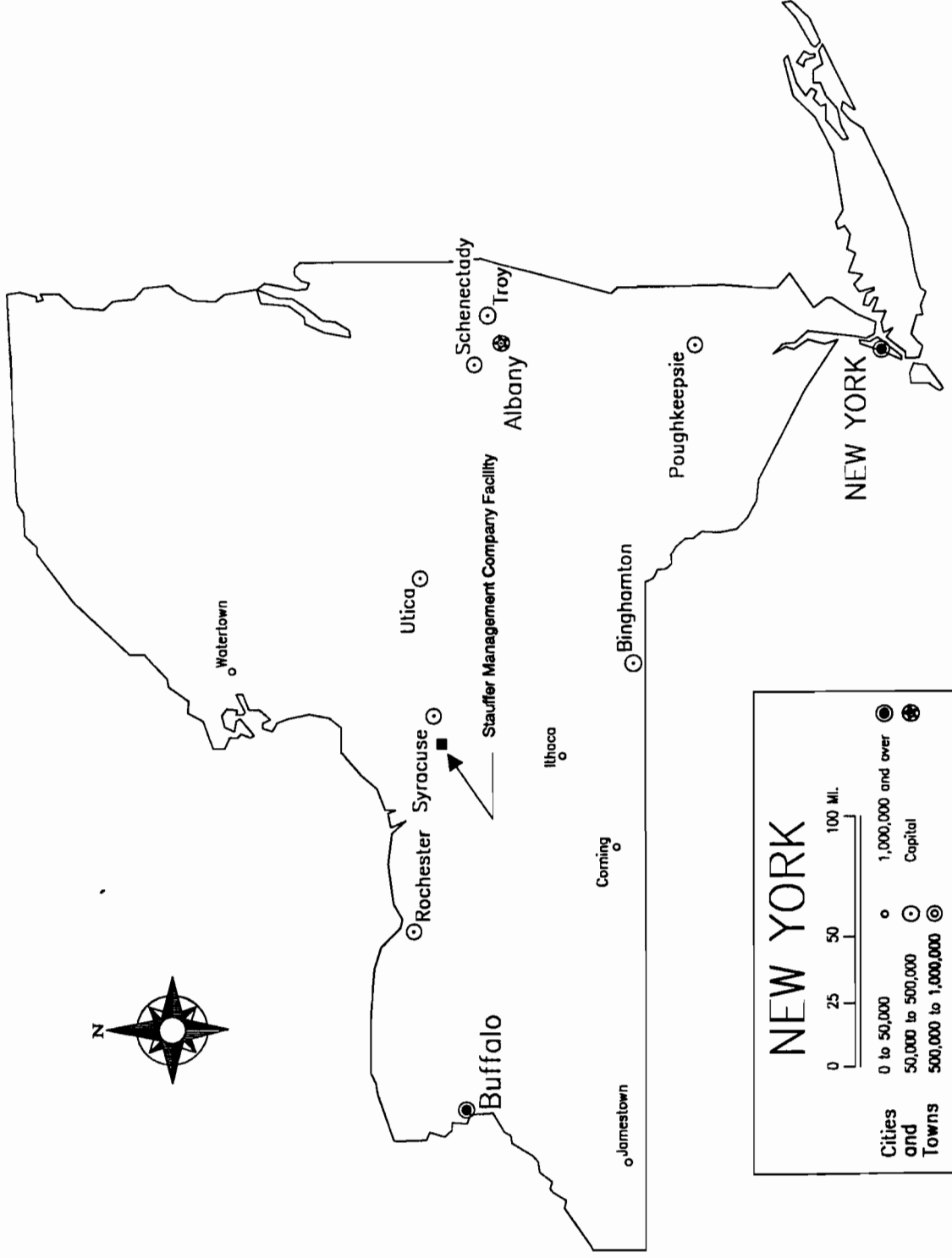


Figure 1-1. General location map, Stauffer Management Company facility, Skaneateles Falls, New York.

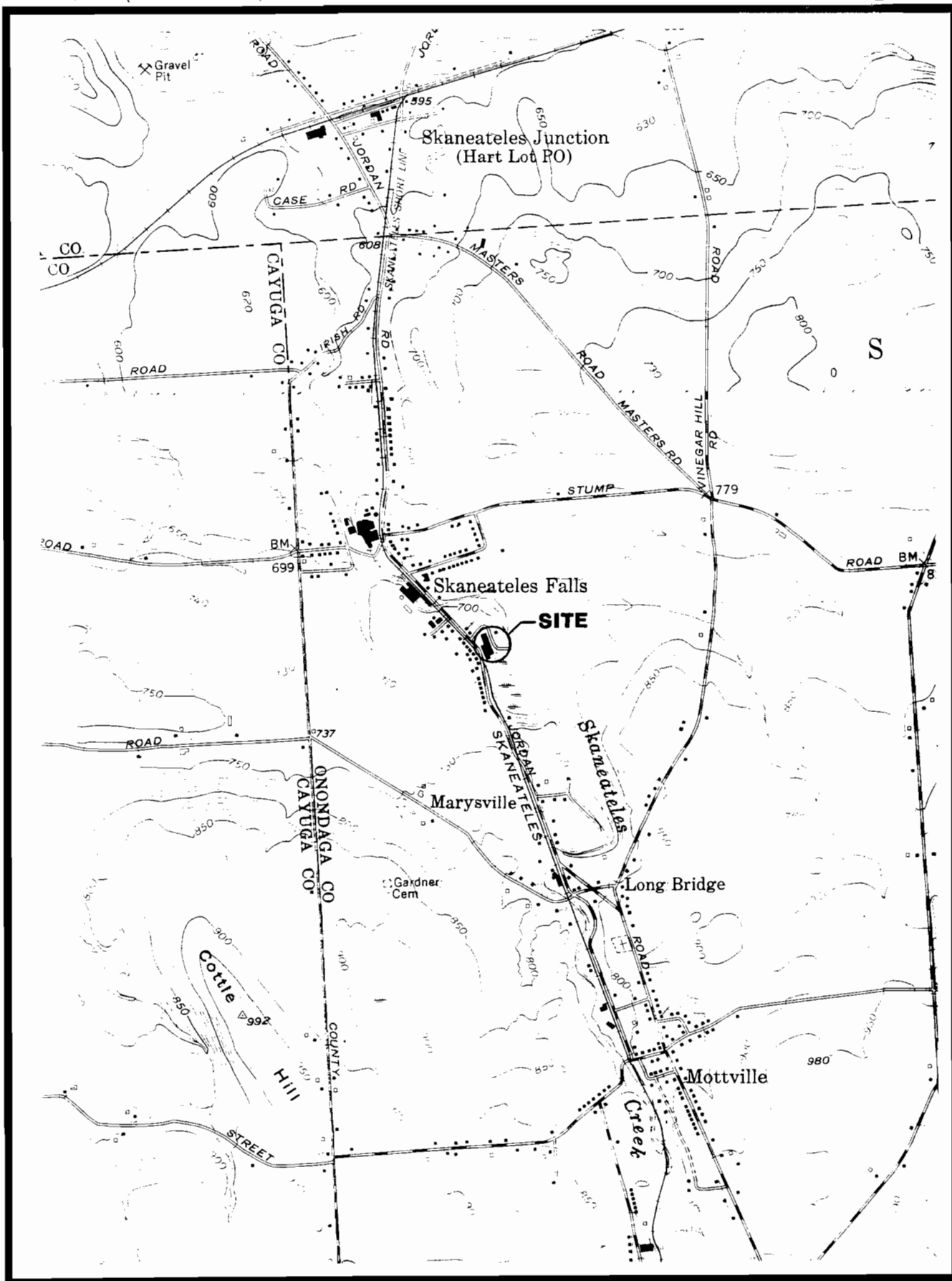


Figure 1-2. Site location map, Stauffer Management Company facility, Skaneateles Falls, New York.

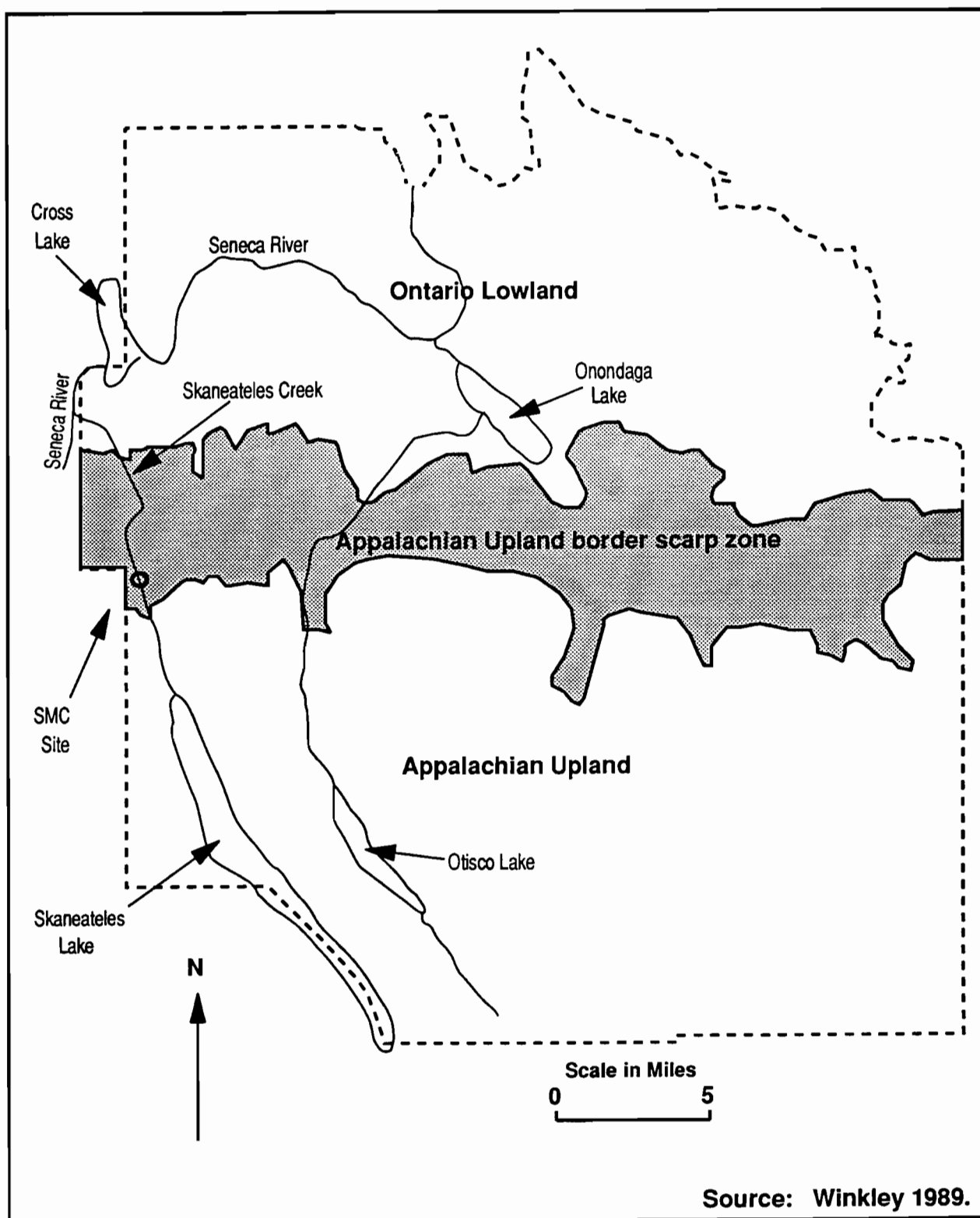


Figure 1-3. Physiographic provinces of Onondaga County.

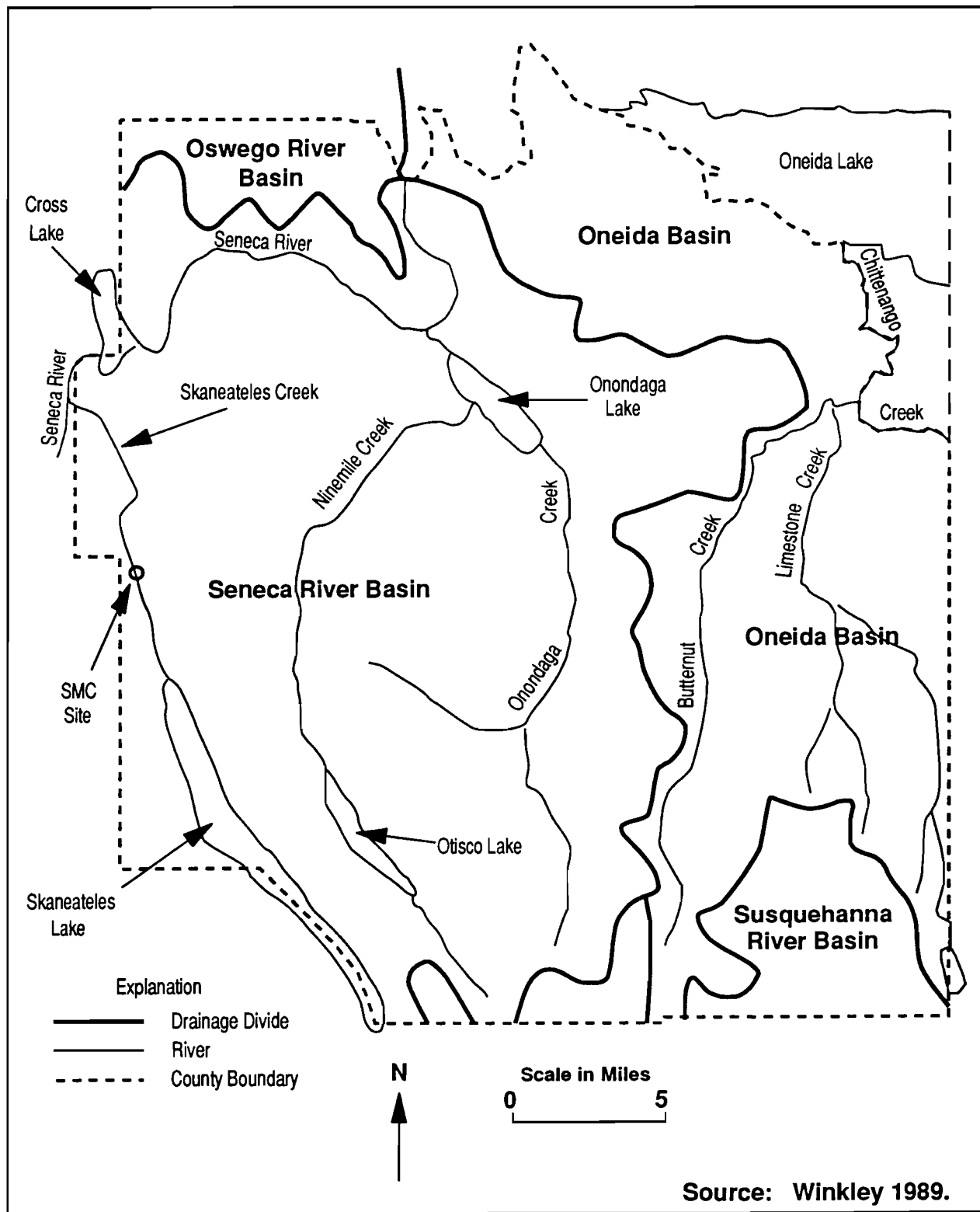


Figure 1-4. Principal surface water drainage basins of Onondaga County.



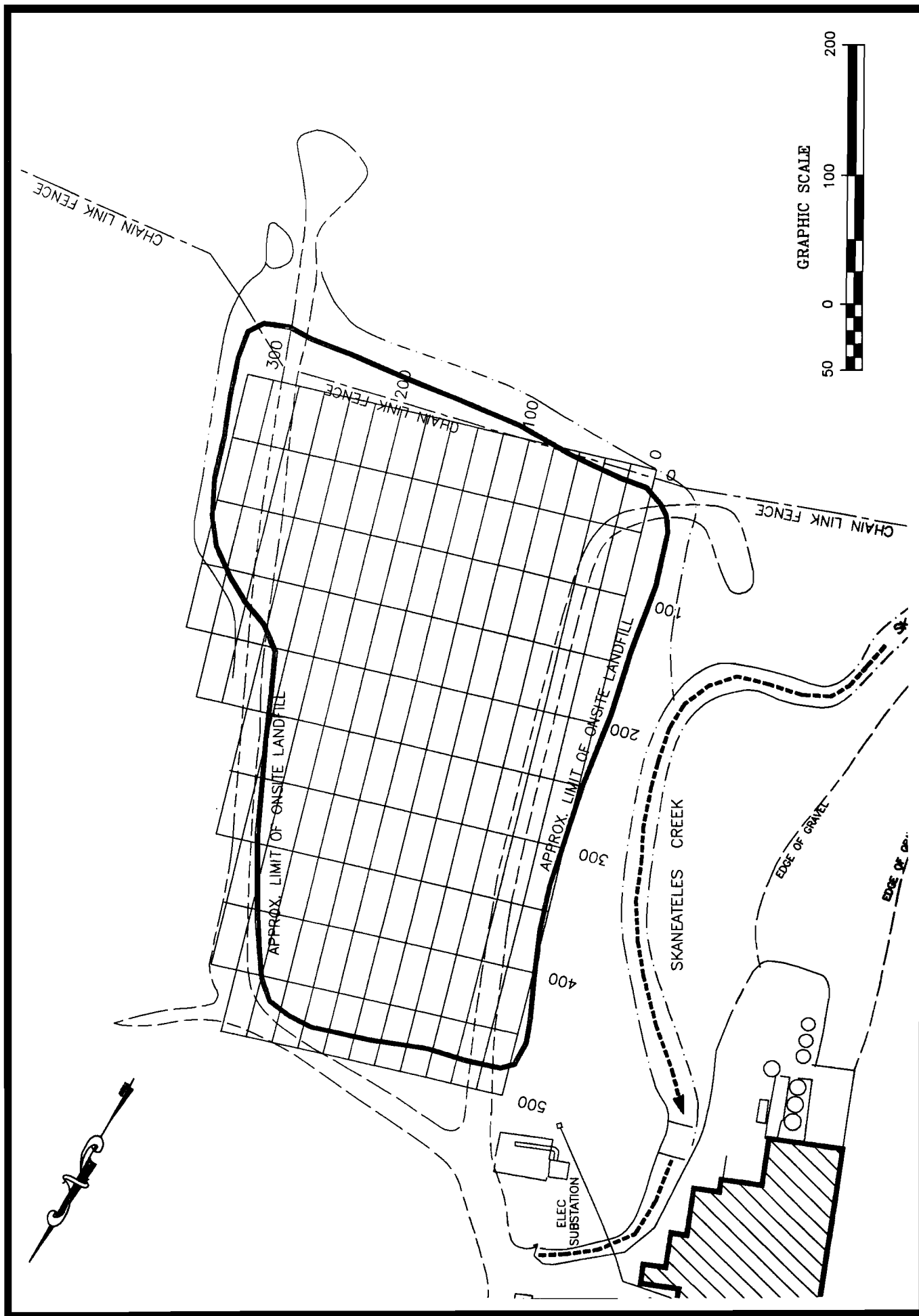


Figure 2-1. Magnetometer survey grid established at landfill.

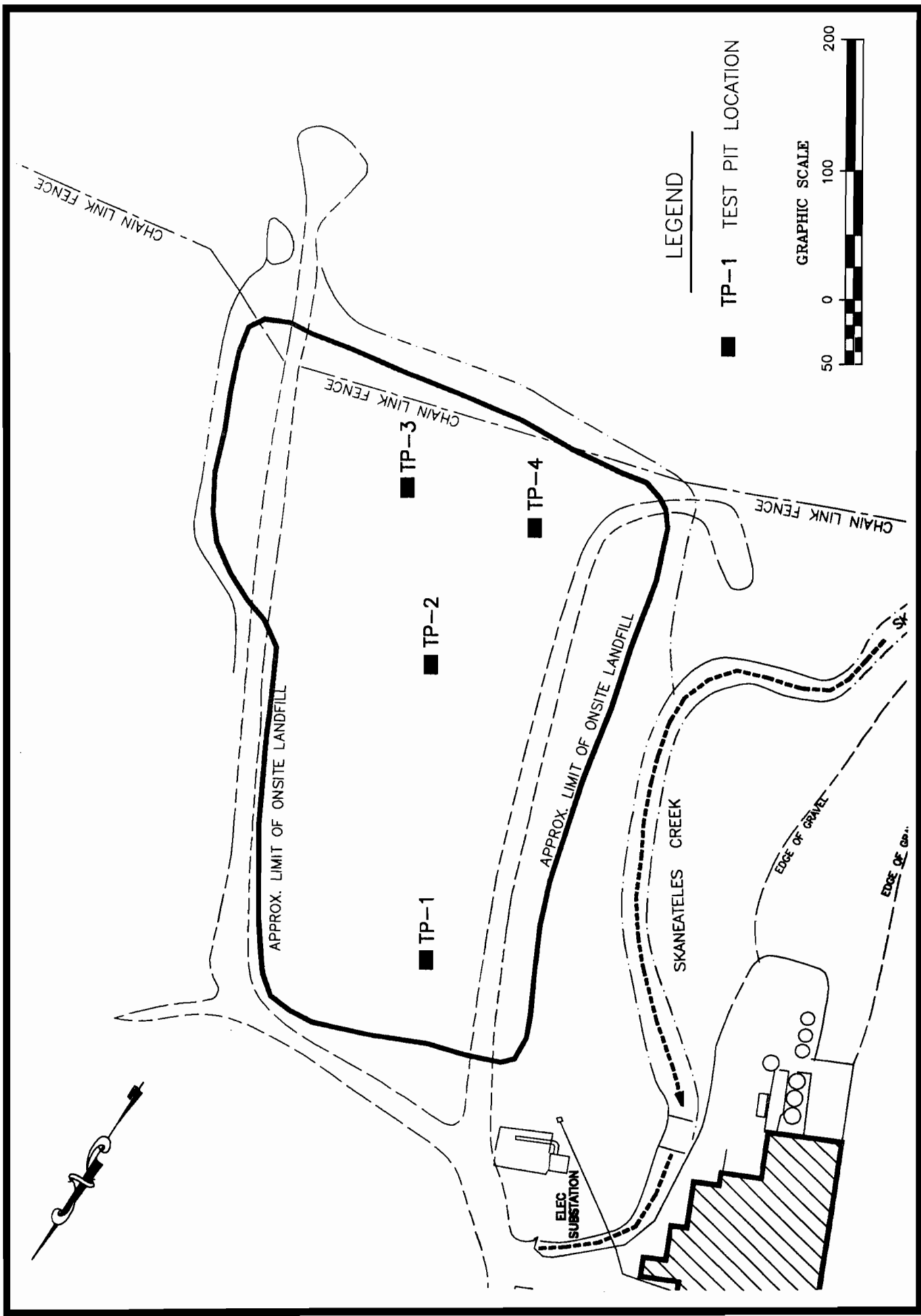


Figure 2-2. Landfill test pit locations.

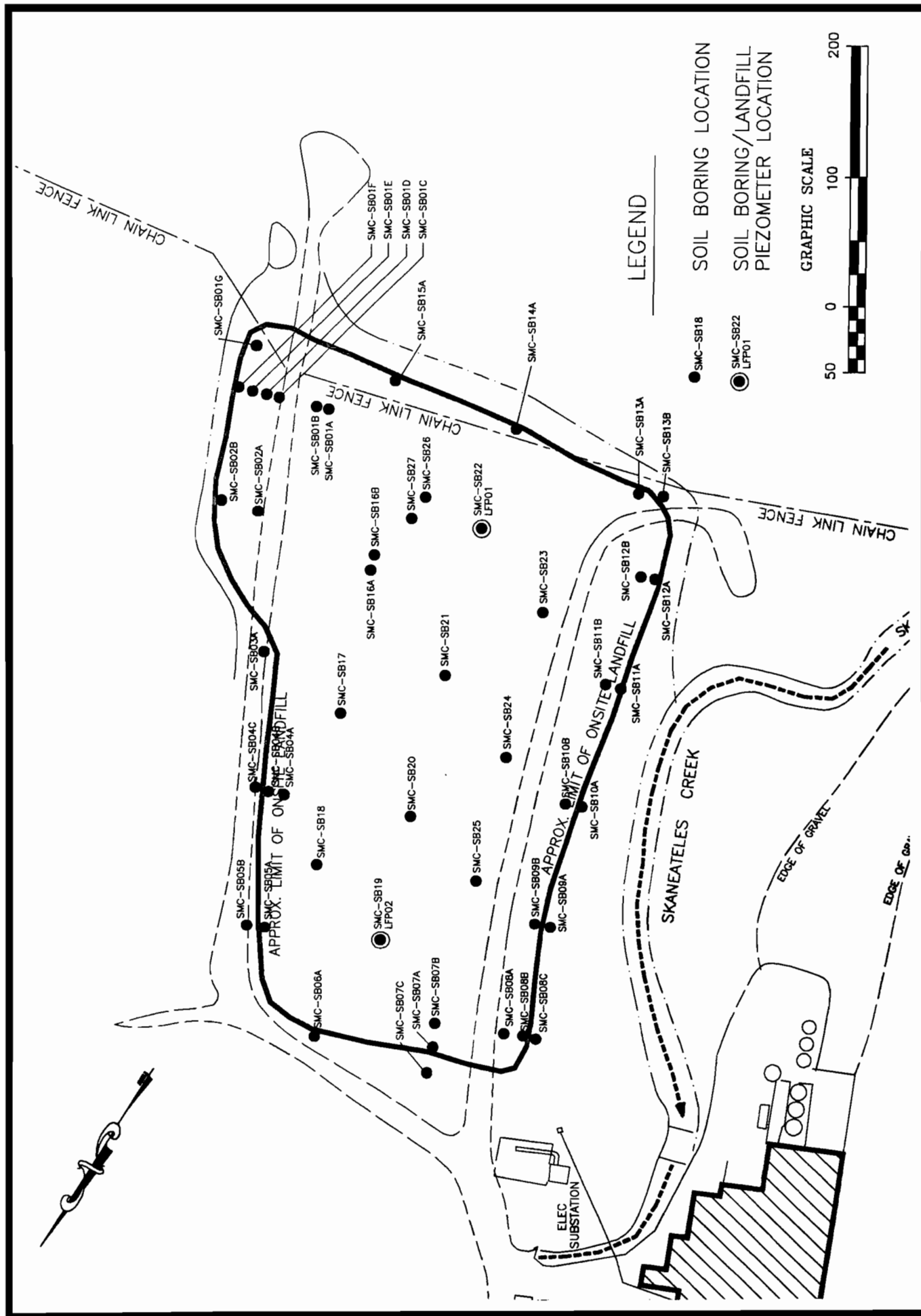


Figure 2-3. Landfill and landfill perimeter test boring locations.

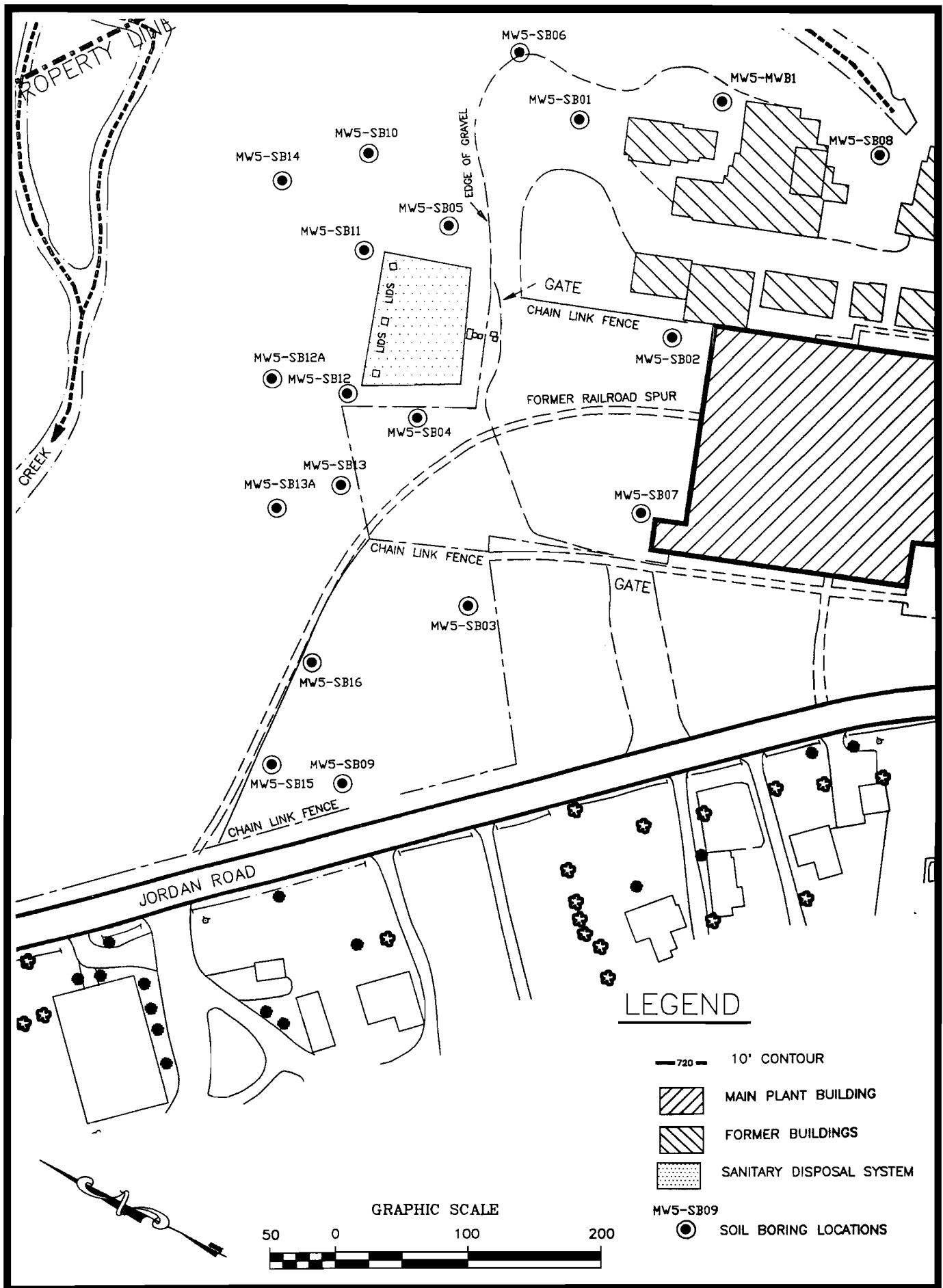


Figure 2-4. Area north of Main Plant Building test boring location.

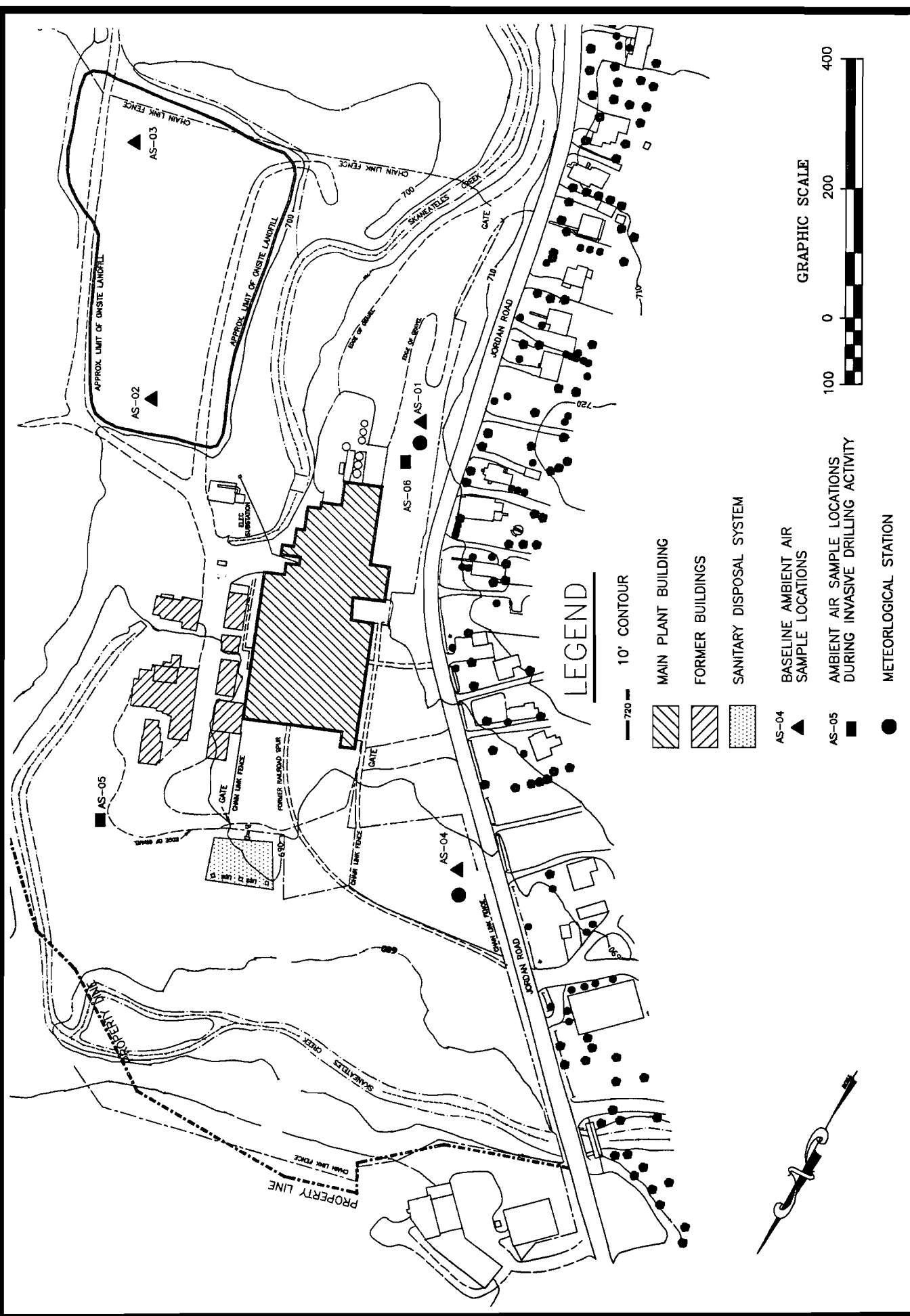


Figure 2-5. Ambient air sample locations.

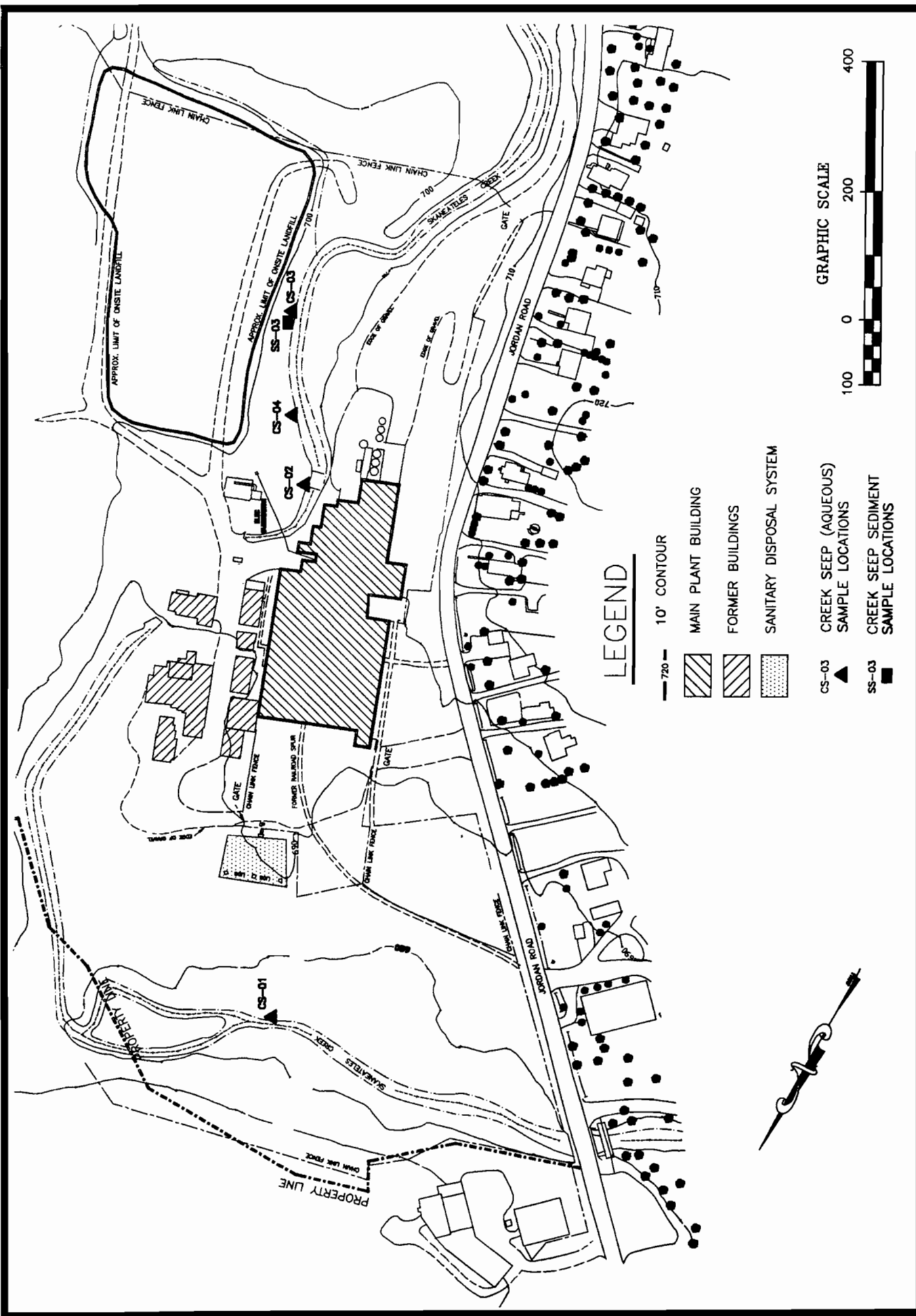


Figure 2-6. Creek seep sample locations.

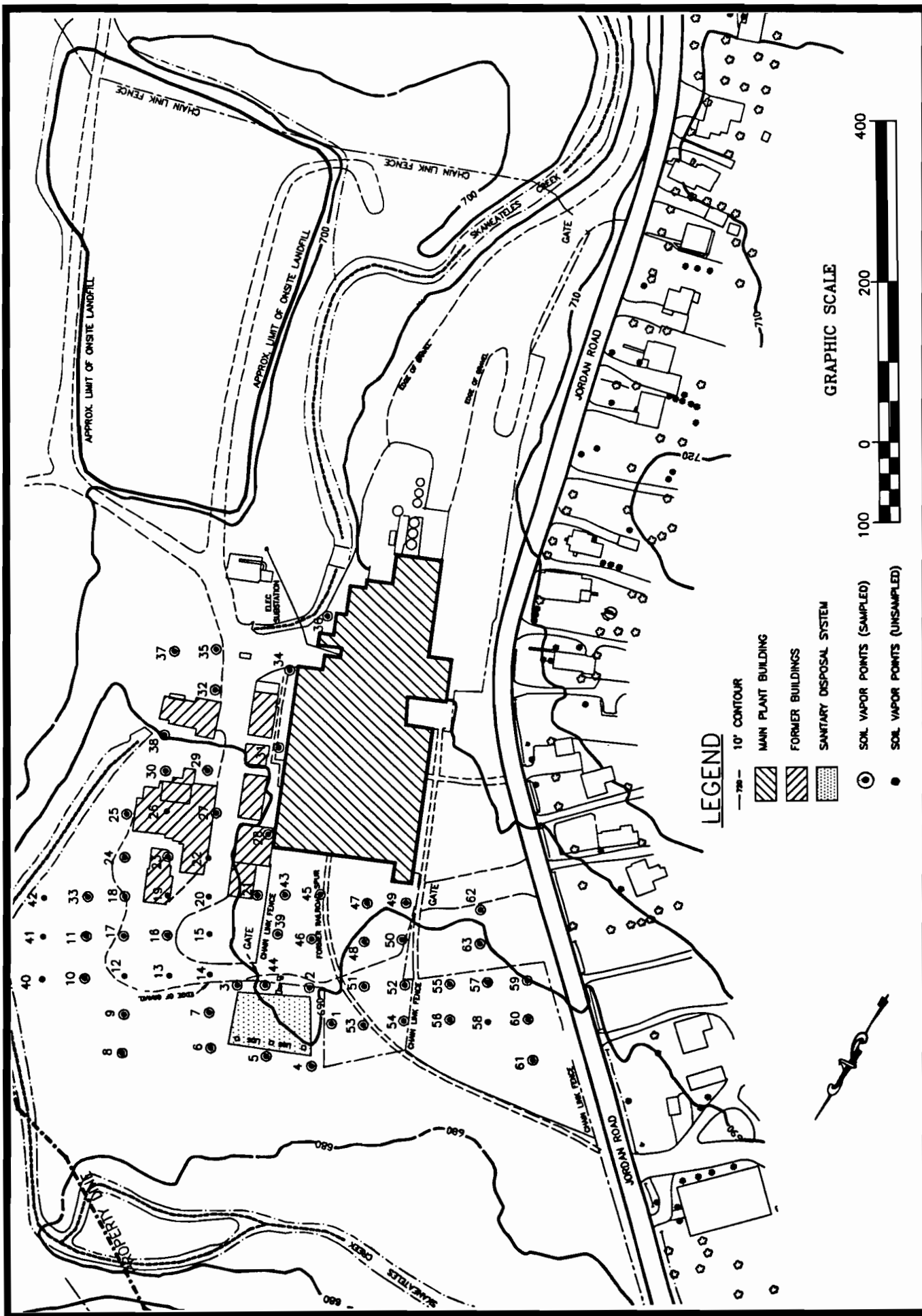
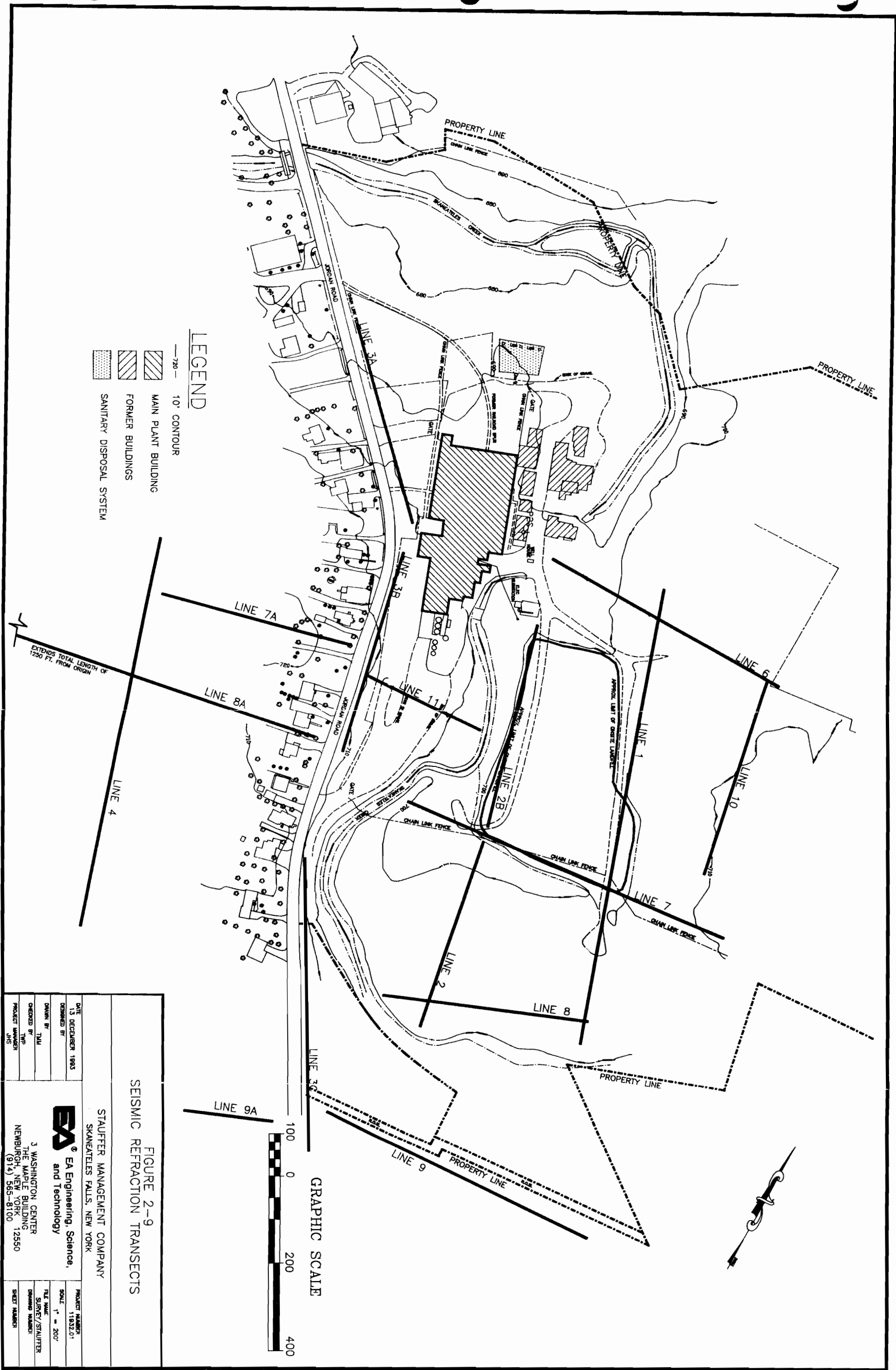


Figure 2-8. Soil vapor contaminant assessment sample locations.



DATE 13 DECEMBER 1983		PROJECT NUMBER 11832.01	
DESIGNED BY		SCALE 1" = 200'	
DRAWN BY TJM		FILE NAME SURVEY/STAUFFER	
CHECKED BY TJM		DRAWING NUMBER	
PROJECT MANAGER JHS		SHEET NUMBER	
STAUFTER MANAGEMENT COMPANY SKANEATELES FALLS, NEW YORK			
 EA Engineering, Science, and Technology			
3 WASHINGTON CENTER THE MAPLE BUILDING NEWBURGH, NEW YORK 12550 (914) 565-8100			
FIGURE 2-9 SEISMIC REFRACTION TRANSECTS			

FIGURE 2-9
SEISMIC REFRACTION TRANSECTS

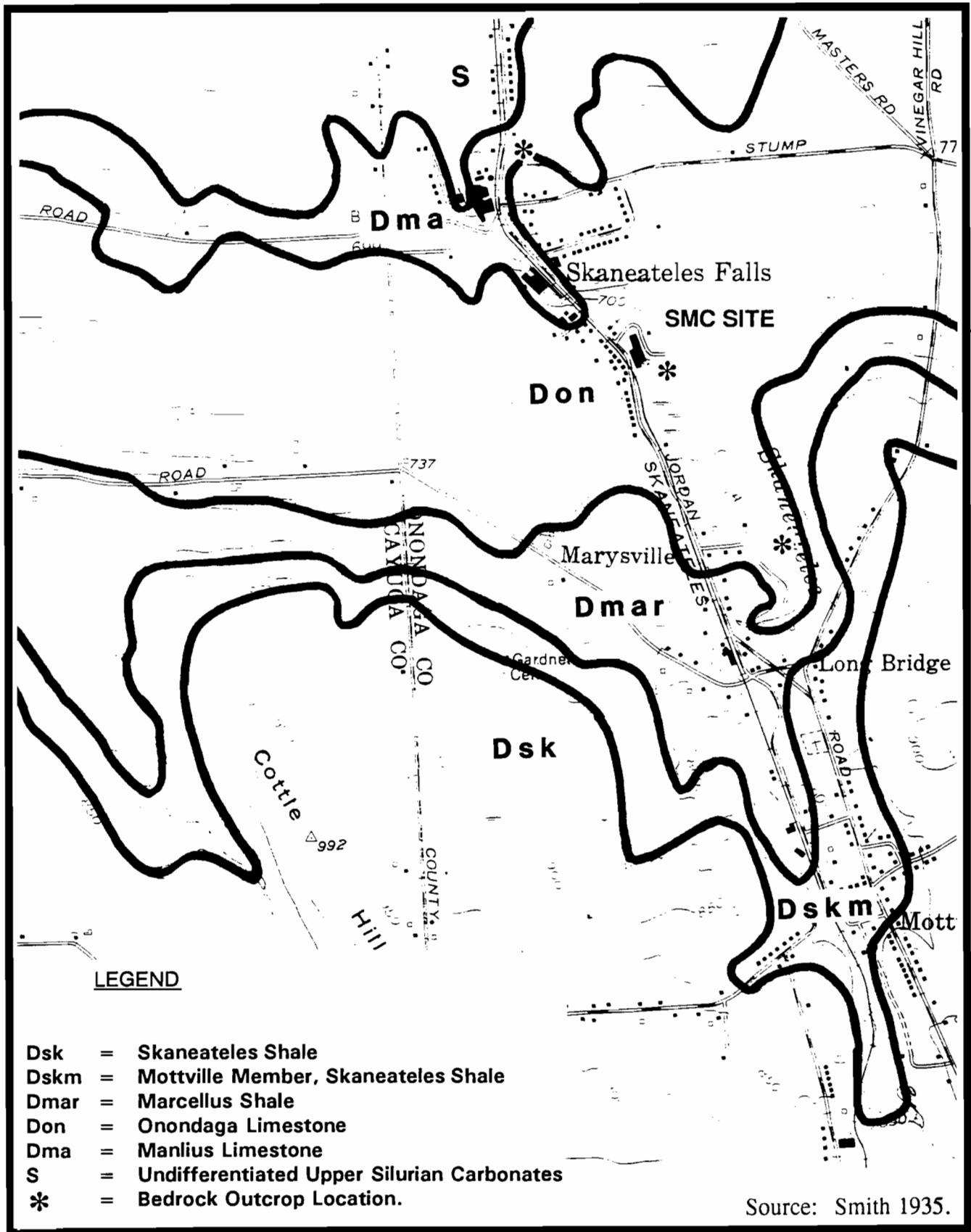
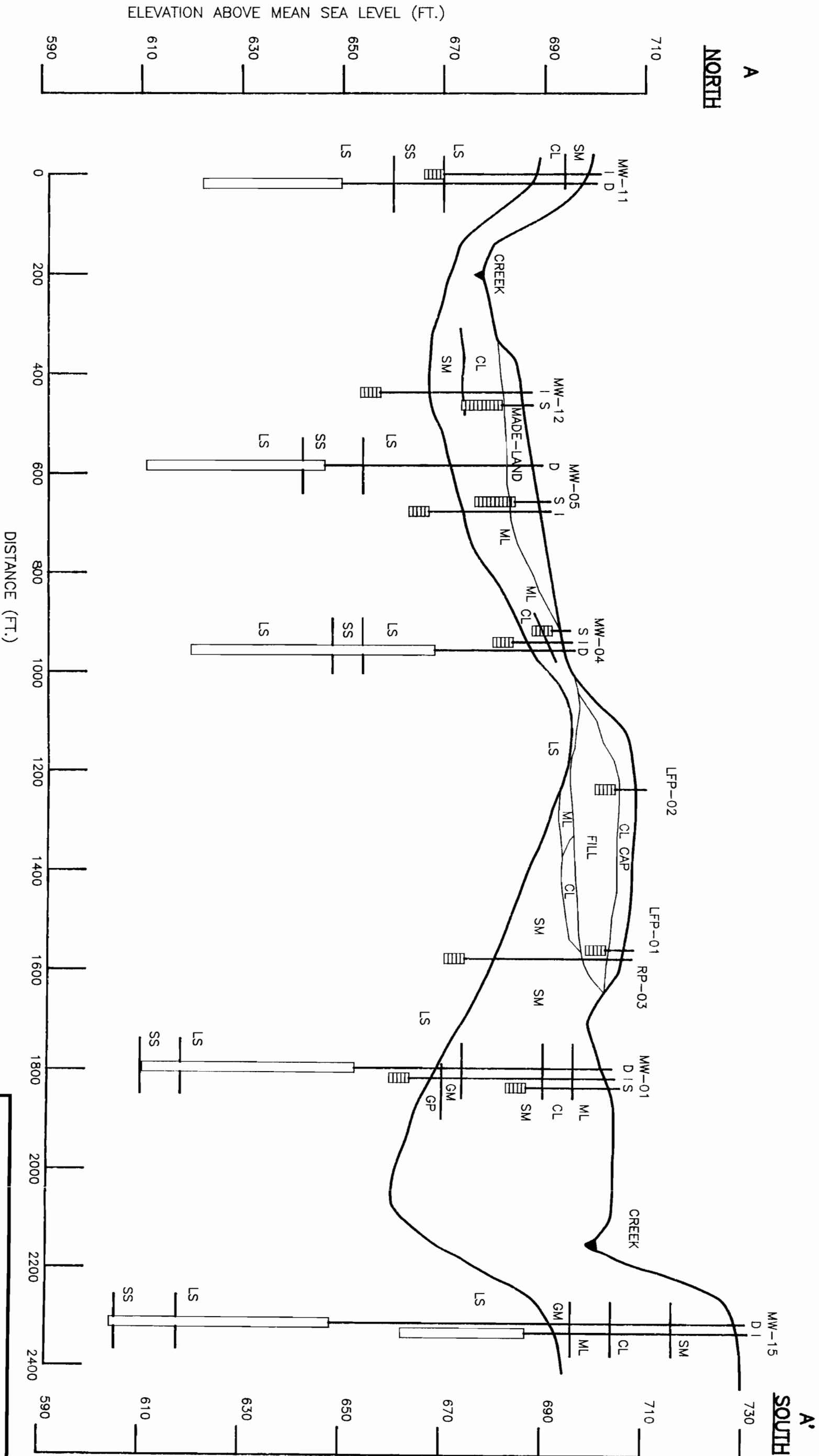


Figure 3-1. Geologic bedrock map of Stauffer Management Company site area.



VERTICAL SCALE 1" = 20'
HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE EXAGGERATED 10 TIMES

LEGEND

CL CLAY
ML SILT
SM SAND-SILT-GRAVEL MIXTURE (TILL)
GM GRAVEL-SAND MIXTURE
GP GRAVEL
LS LIMESTONE
SS SANDSTONE

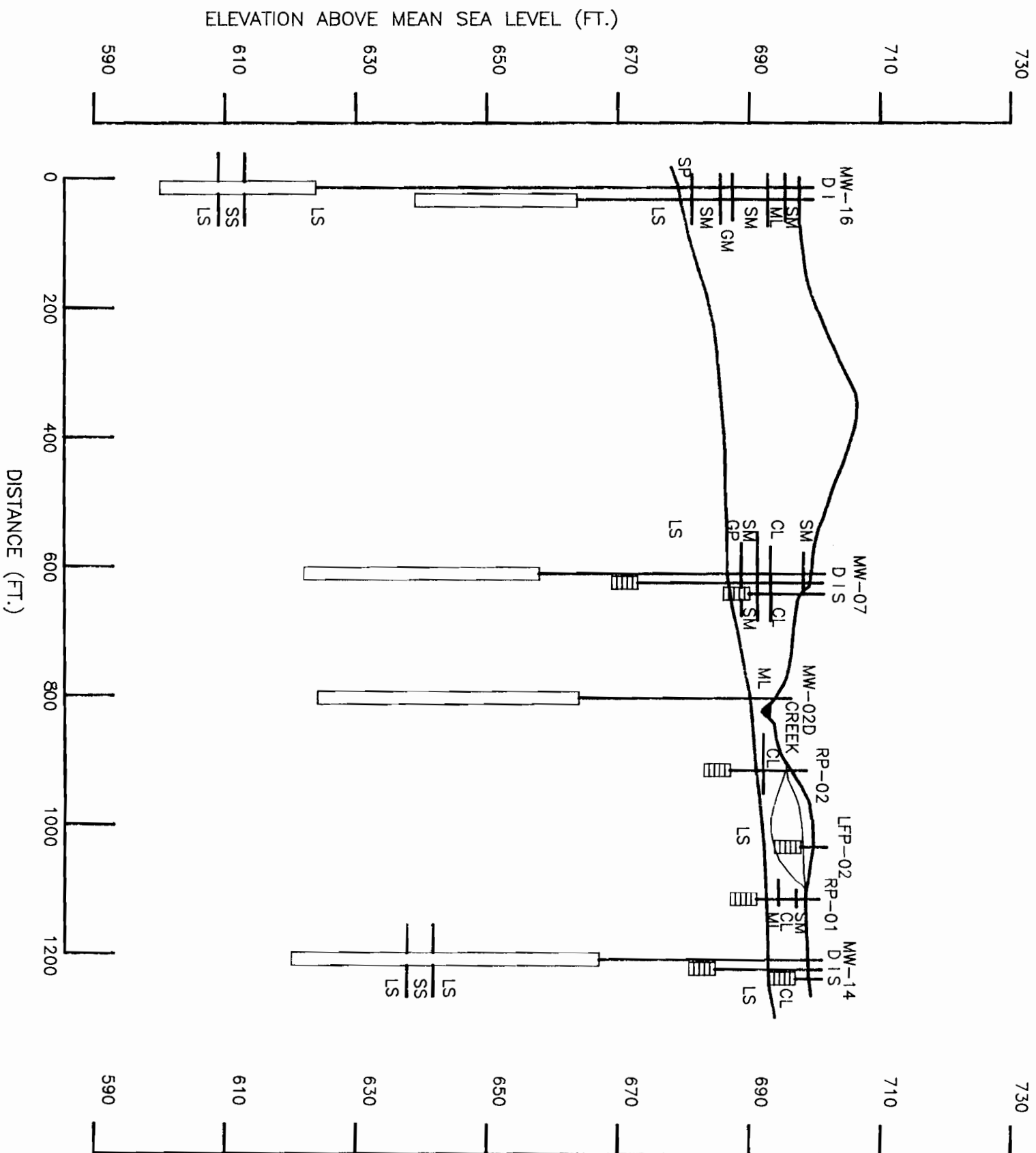
WELL SCREEN
OPEN HOLE WELL

FIGURE 3-2
INTERPRETIVE NORTH-SOUTH STRATIGRAPHIC
CROSS SECTION A-A'

STAUFFER MANAGEMENT COMPANY SKANEATELES FALLS, NEW YORK	
DATE 15 DECEMBER 1983	PROJECT NUMBER 1192201
DRAWN BY LJL	SCALE 1" = 200'
CHECKED BY JHS	FILE NAME
PROJECT MANAGER JHS	DRAWING NUMBER
3 WASHINGTON CENTER THE MAPLE BUILDING NEWBURGH, NEW YORK 12550 (914) 565-8100	
SHEET NUMBER	

B
WEST

B'
EAST



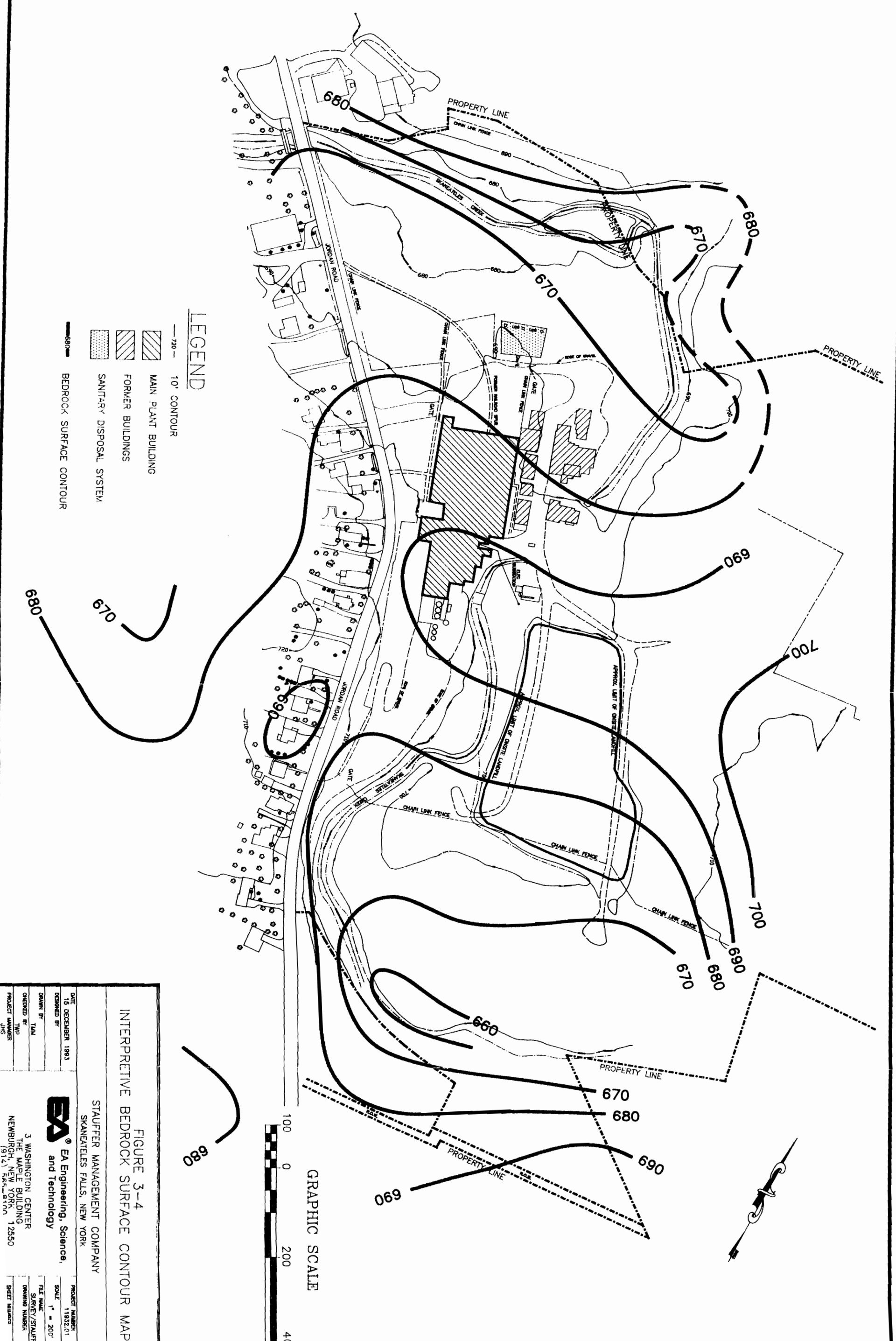
VERTICAL SCALE 1" = 20'
HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE EXAGGERATED 10 TIMES

LEGEND

- CL CLAY
- ML SILT
- SM SAND-SILT-GRAVEL MIXTURE (TILL)
- GM GRAVEL
- GP GRAVEL
- LS LIMESTONE
- SS SANDSTONE
- WELL SCREEN
- OPEN HOLE WELL

FIGURE 3-3
INTERPRETIVE EAST-WEST STRATIGRAPHIC
CROSS SECTION B-B'

DATE 15 DECEMBER 1993		PROJECT NUMBER 11932.01	
DESIGNED BY		SCALE 1" = 200'	
DRAWN BY		FILE NAME	
LPM		DRAWING NUMBER	
CHECKED BY		SHEET NUMBER	
PROJECT MANAGER JMS			
EA[®] EA Engineering, Science, and Technology 3 WASHINGTON CENTER THE MAPLE BUILDING NEWBURGH, NEW YORK 12550 (914) 565-8100			
STAUFFER MANAGEMENT COMPANY SKANEATELES FALLS, NEW YORK			
FIGURE 3-3 INTERPRETIVE EAST-WEST STRATIGRAPHIC CROSS SECTION B-B'			



LEGEND

- 10' CONTOUR
- MAIN PLANT BUILDING
- FORMER BUILDINGS
- SANITARY DISPOSAL SYSTEM
- BEDROCK SURFACE CONTOUR

FIGURE 3-4
INTERPRETIVE BEDROCK SURFACE CONTOUR MAP

STAUFFER MANAGEMENT COMPANY
SKANEATELES FALLS, NEW YORK

EA Engineering, Science,
and Technology

DATE
15 DECEMBER 1983
DESIGNED BY
DRAWN BY
CHECKED BY
PROJECT MANAGER
JMS

3 WASHINGTON CENTER
THE MAPLE BUILDING
NEWBURGH, NEW YORK 12550
(814) 735-1100

PROJECT NUMBER
11832.01
SCALE
1" = 200'
FILE NAME
SURVEY/STAUFFER
DRAWING NUMBER
SHEET NUMBER



LEGEND

- 720 — 10' CONTOUR
- MAIN PLANT BUILDING
- FORMER BUILDINGS
- SANITARY DISPOSAL SYSTEM
- EXISTING MONITORING WELL
- EXISTING PIEZOMETER
- OVERBURDEN WATER TABLE CONTOUR

FIGURE 3-5 OVERBURDEN WATER TABLE
CONTOUR MAP (3 MAY 1993)

STAUFFER MANAGEMENT COMPANY
SKANEATELES FALLS, NEW YORK

EA Engineering, Science,
and Technology

3 WASHINGTON CENTER
THE MAPLE BUILDING
NEWBURGH, NEW YORK 12550
(914) 565-8100

DATE
13 DECEMBER 1993

DRAWN BY
TMM

CHECKED BY
TMM

PROJECT NUMBER
245

PROJECT NUMBER
11832.01

SCALE
1" = 200'

FILE NAME
3WA/ST/ST/ST/ST

DRAWING NUMBER
SHEET NUMBER



LEGEND

- 10' CONTOUR
- MAIN PLANT BUILDING
- FORMER BUILDINGS
- SANITARY DISPOSAL SYSTEM
- EXISTING MONITORING WELL
- PIEZOMETER
- POTENTIOMETRIC SURFACE CONTOUR

GRAPHIC SCALE



FIGURE 3-8 UPPER BEDROCK
POTENTIOMETRIC SURFACE
CONTOUR MAP (17 JUNE 1993)

STAUFFER MANAGEMENT COMPANY
SKANEATELES FALLS, NEW YORK

EA Engineering, Science,
and Technology

DATE 15 DECEMBER 1993	PROJECT NUMBER 1103201
DRAWN BY TJM	SCALE 1" = 200'
CHECKED BY TJM	FILE NAME SURVEY/STAUFFER
PROJECT MANAGER JMS	DRAWING NUMBER 00000000
	SHEET NUMBER 00000000

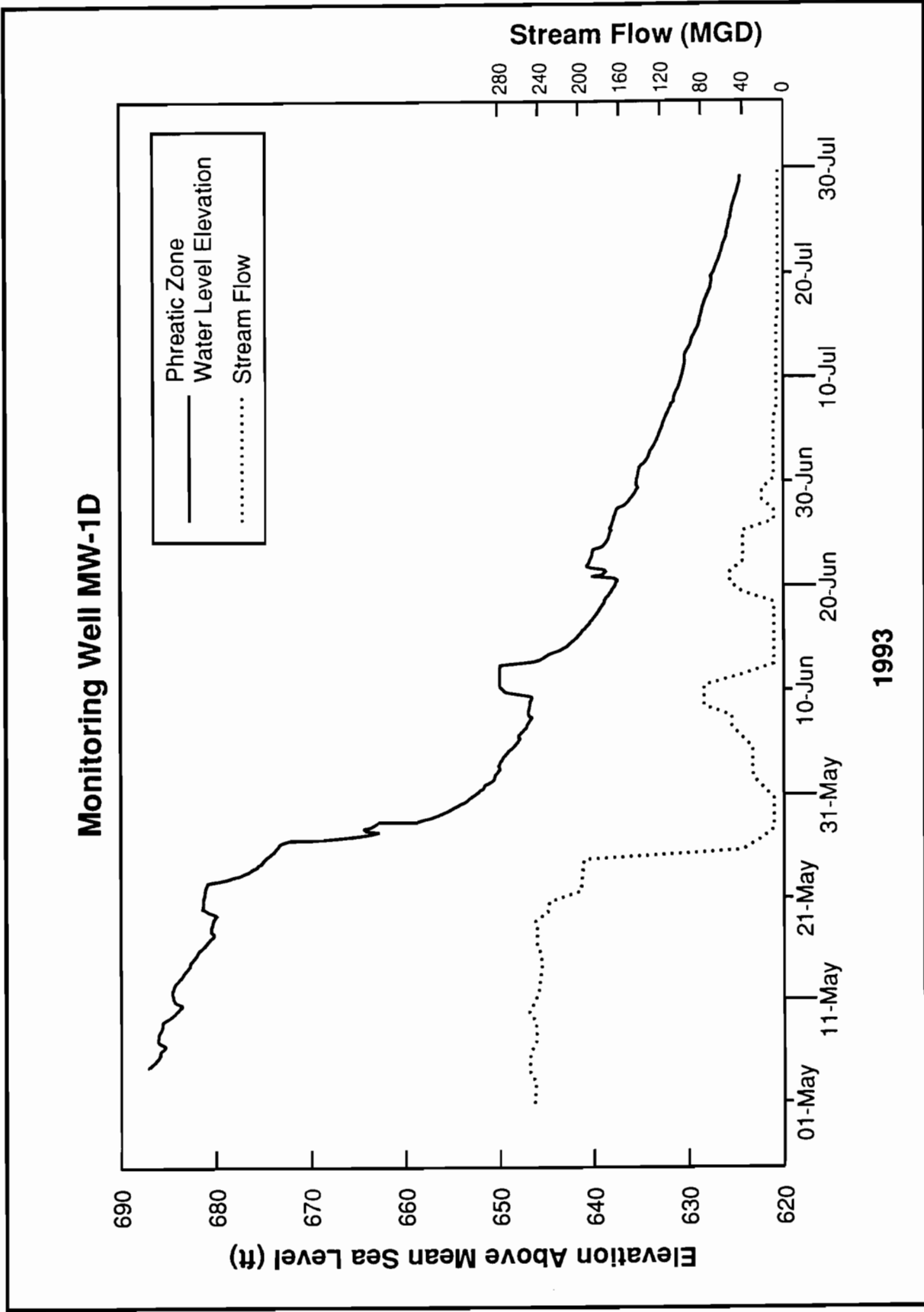


Figure 3-9. Water level elevation in MW-1D and corresponding stream flow in Skaneateles Creek.

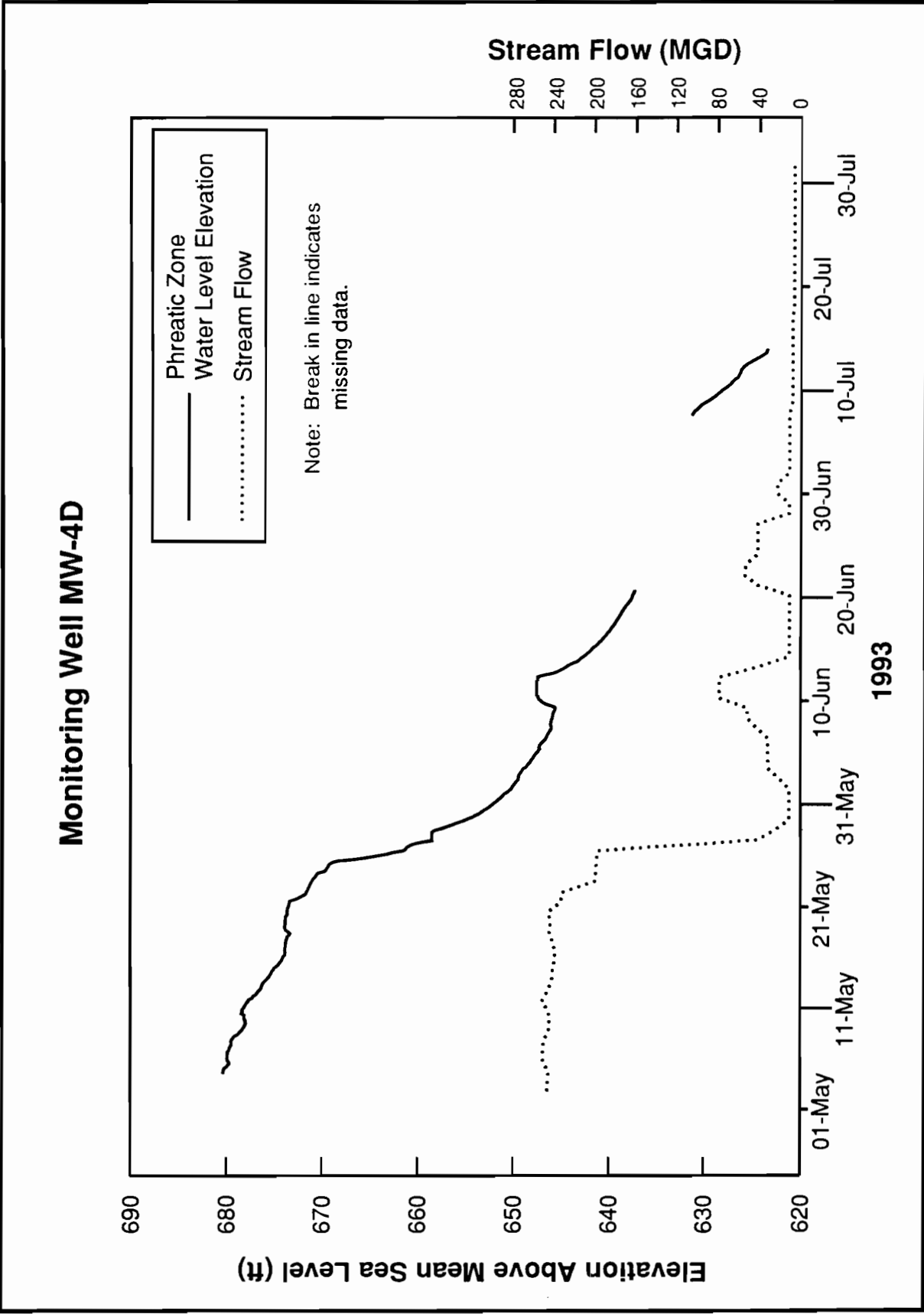


Figure 3-10. Water level elevation in MW-4D and corresponding stream flow in Skaneateles Creek.



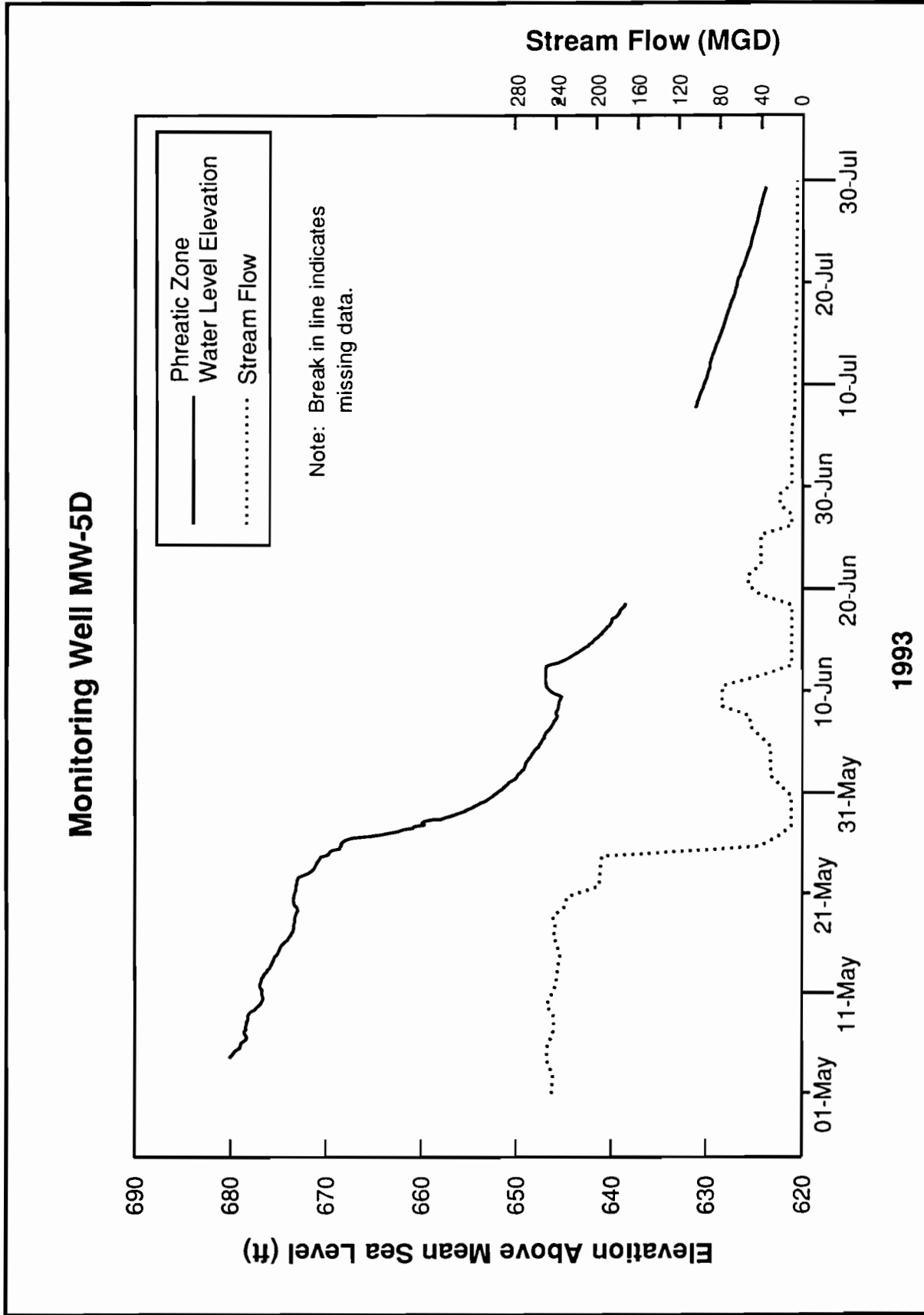


Figure 3-11. Water level elevation in MW-5D and corresponding stream flow in Skaneateles Creek.



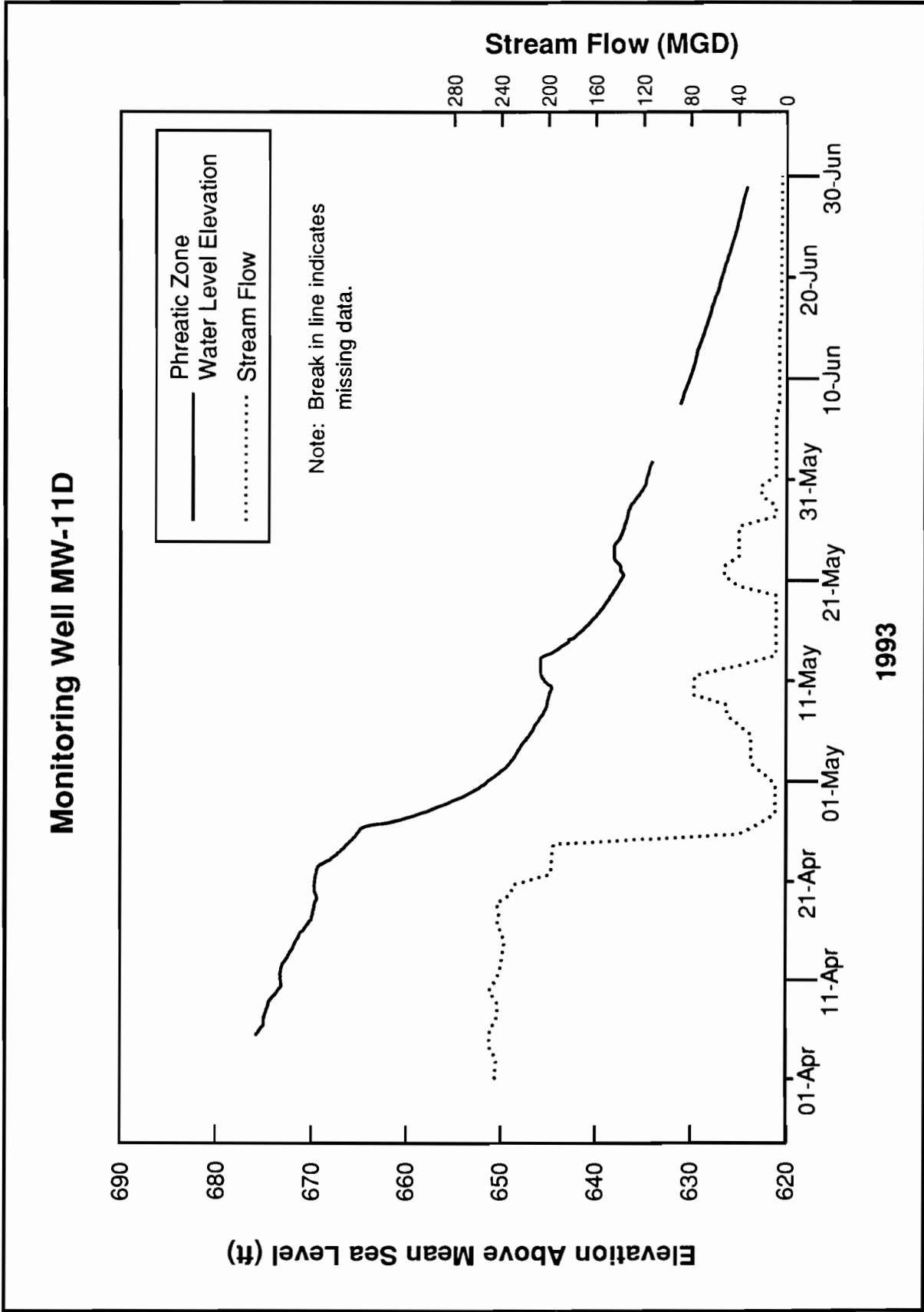


Figure 3-12. Water level elevation in MW-11D and corresponding stream flow in Skaneateles Creek.

LEGEND

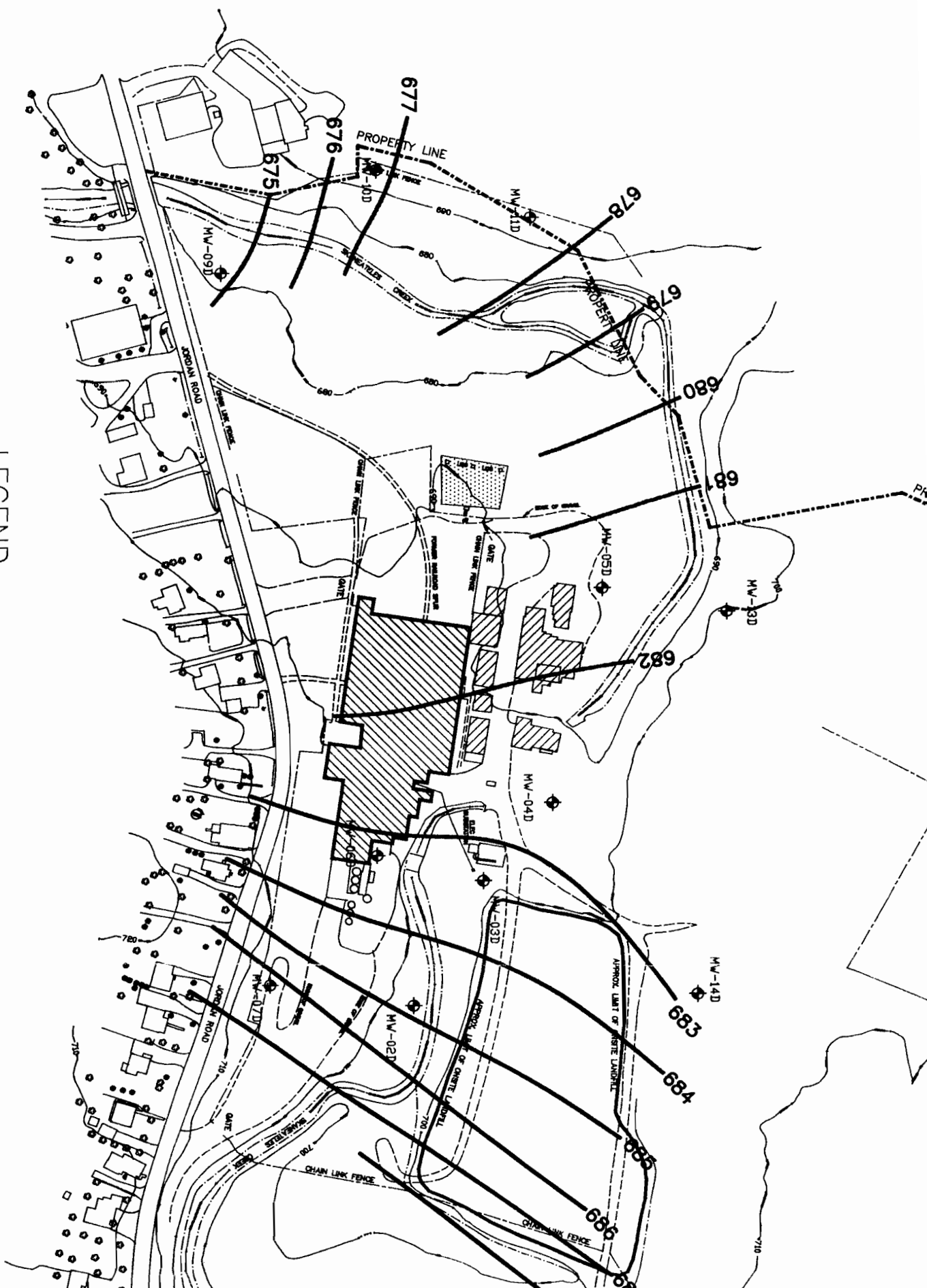
— 720 — 10' CONTOUR

MAIN PLANT BUILDING

FORMER BUILDINGS

SANITARY DISPOSAL SYSTEM

EXISTING



NORTH

C

ELEVATION ABOVE MEAN SEA LEVEL (FT.)

720
700
680
660
640
620
600

0

60

120

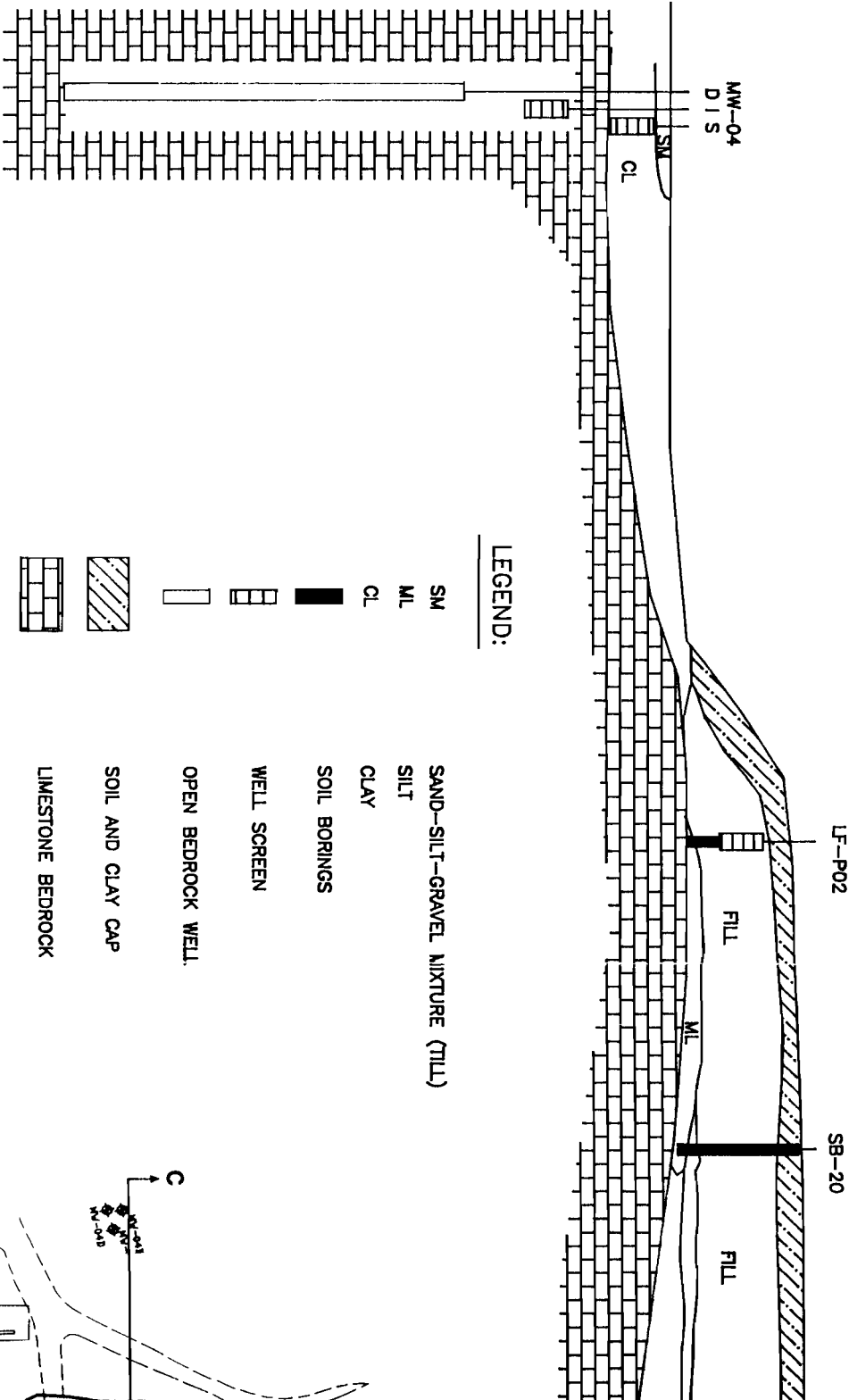
180

240

300

360

420



LEGEND:

SM

ML

CL

SOIL BORINGS

WELL SCREEN

OPEN BEDROCK WELL

SOIL AND CLAY CAP

LIMESTONE BEDROCK

SAND-SILT-GRAVEL MIXTURE (TILL)

SILT

CLAY

SOIL BORINGS

WELL SCREEN

OPEN BEDROCK WELL

SOIL AND CLAY CAP

LIMESTONE BEDROCK

LF-P02

SB-20

MW-04
DIS

FILL

FILL

C

MW-01
MW-02

DISTANCE (FT.)

HORIZONTAL SCALE 1" = 60'

VERTICAL SCALE 1" = 20'

VERTICAL EXAGGERATION = 3 TIMES

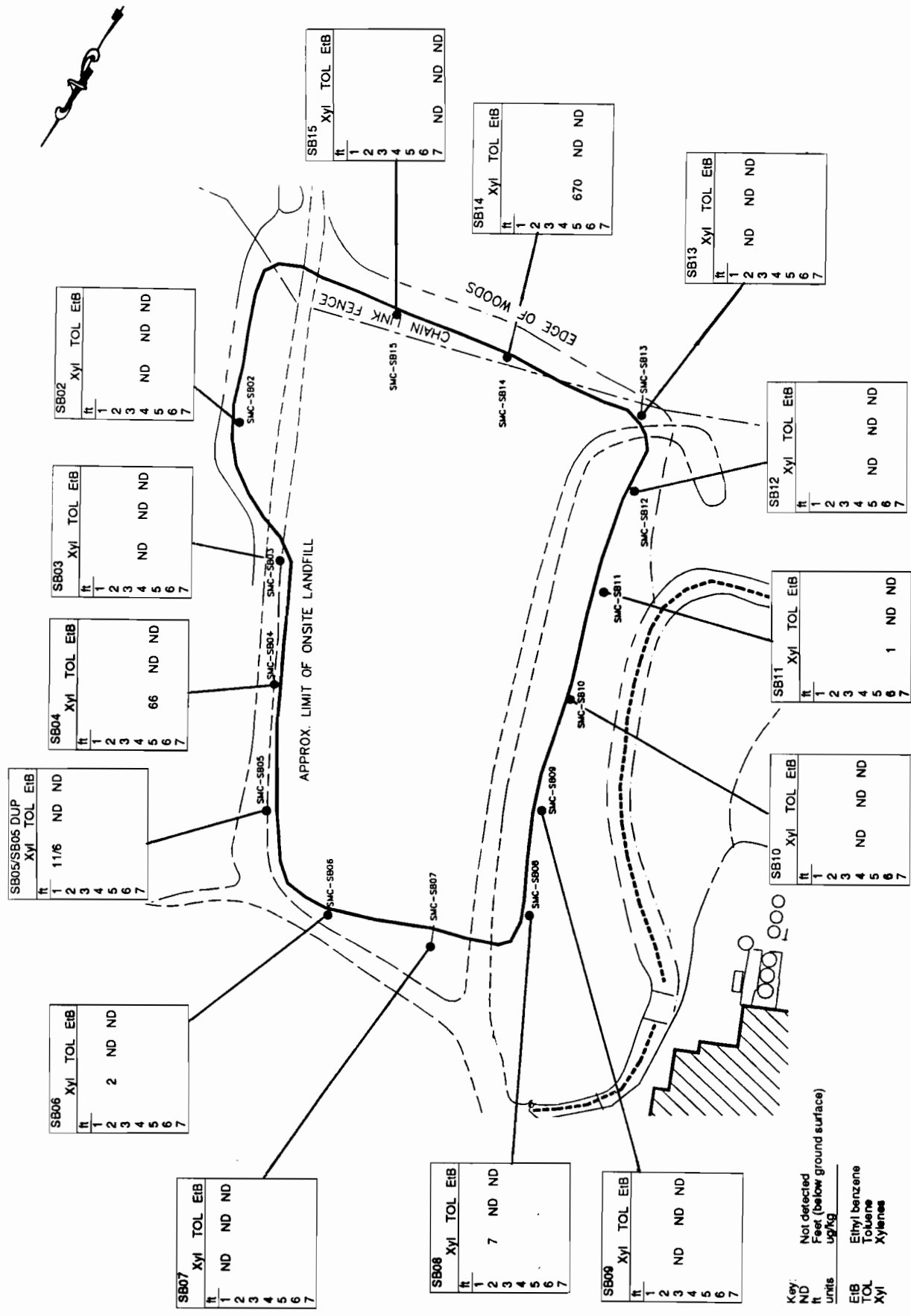


Figure 4-1. Spatial distribution of aromatic volatiles in landfill perimeter soils.

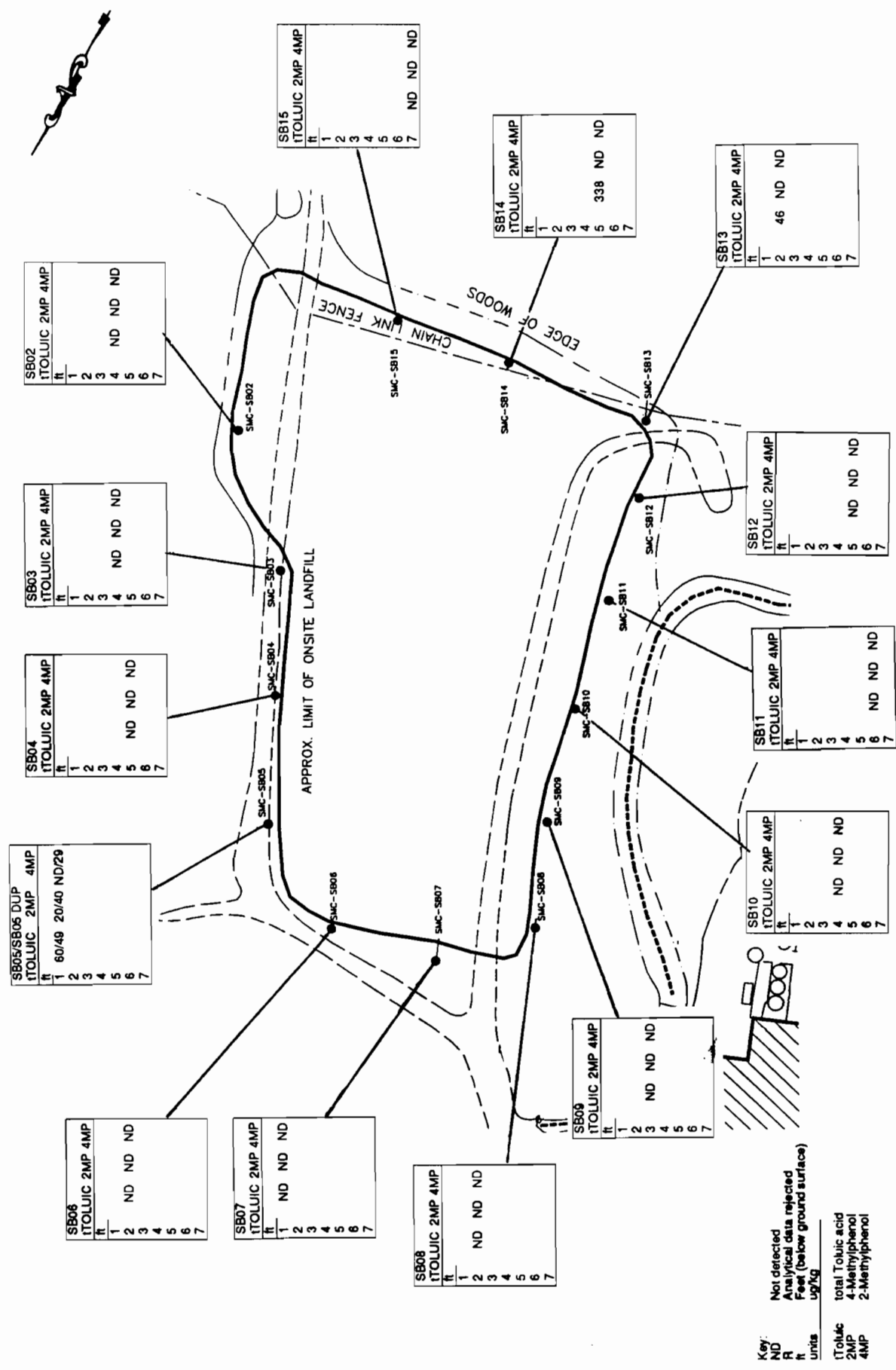
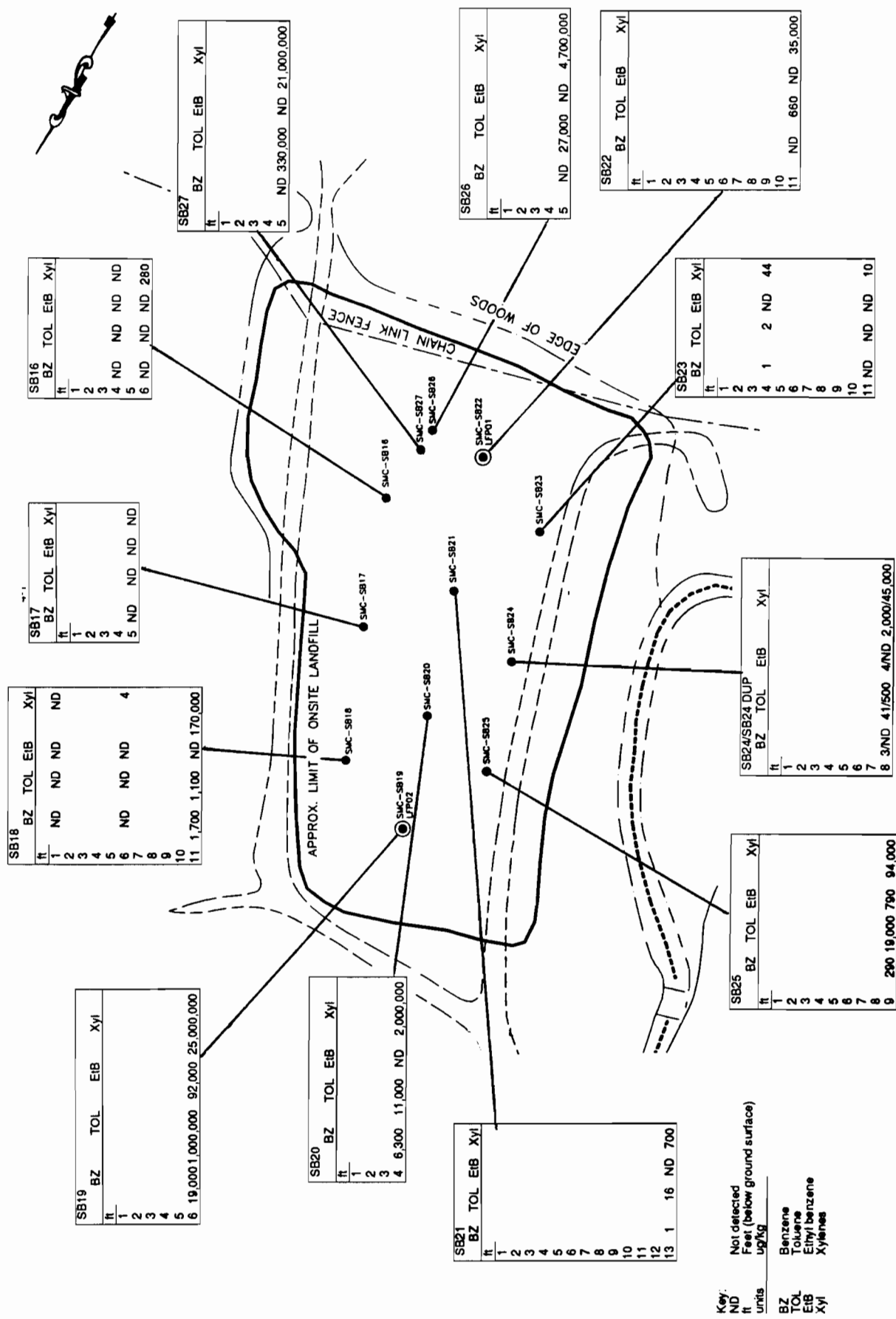


Figure 4-2. Spatial distribution of toluic acid and phenolics in landfill perimeter soils.



Key:
 ND Not detected
 ft Feet (below ground surface)
 units ug/kg
 BZ Benzene
 TOL Toluene
 EIB Ethyl benzene
 Xyl Xylenes

Figure 4.4. Spatial distribution of aromatic volatiles in landfill interior soil borings.

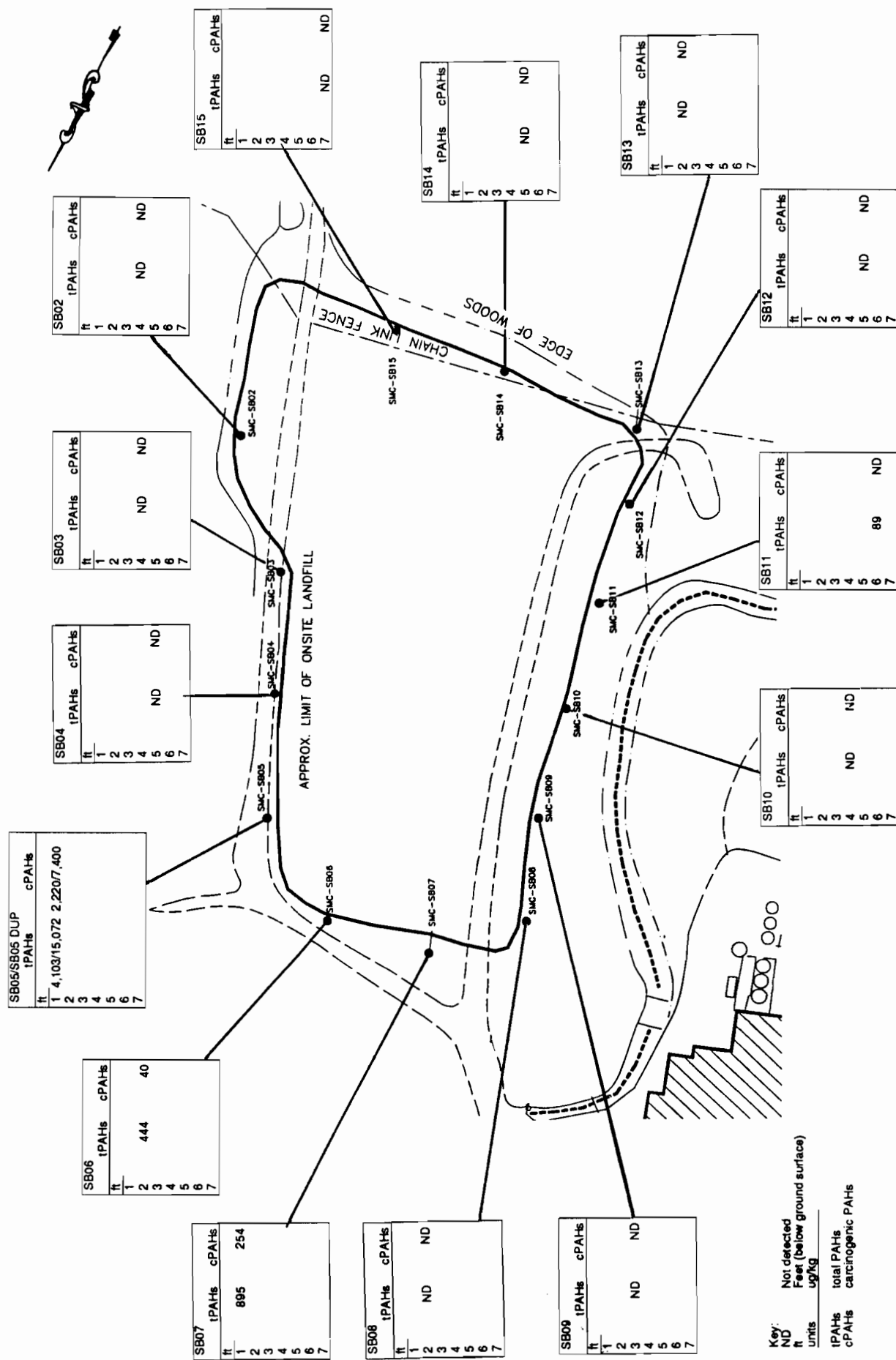


Figure 4-3. Spatial distribution of polycyclic aromatic hydrocarbons in landfill perimeter soils.



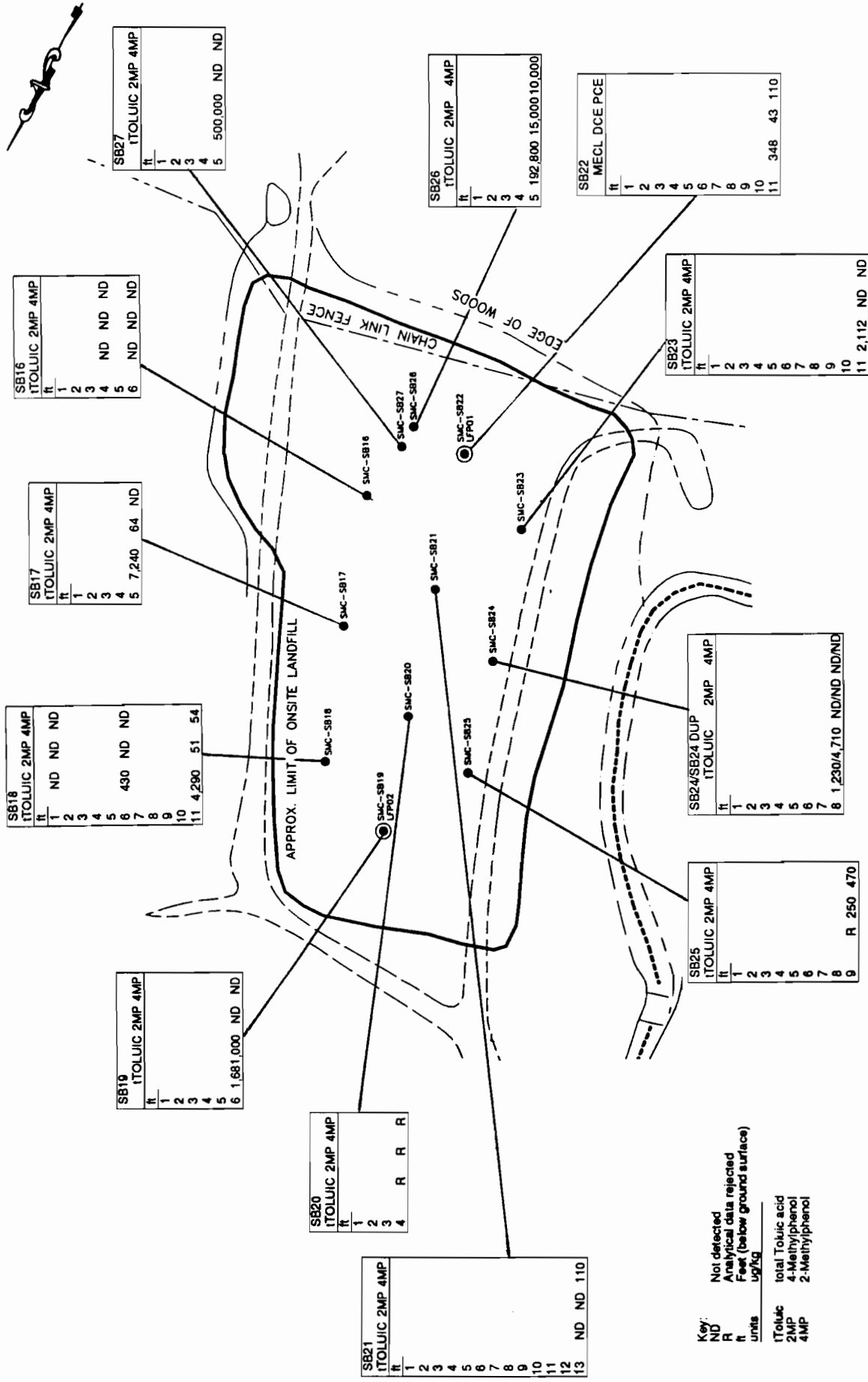


Figure 4-6. Spatial distribution of toluic acid and phenolics in landfill interior soil borings.

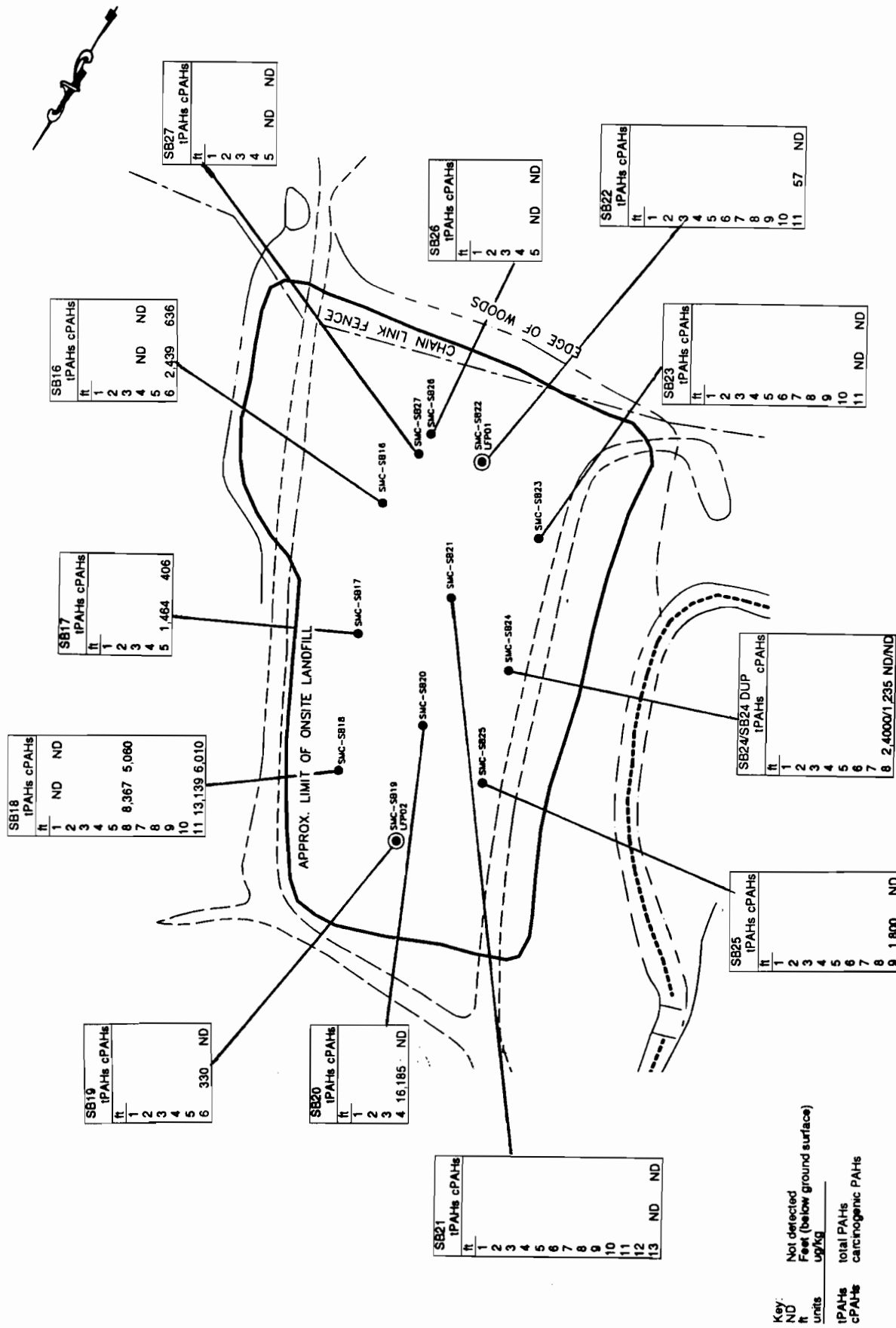


Figure 4-7. Spatial distribution of polycyclic aromatic hydrocarbons in landfill interior soil borings.

Not to scale

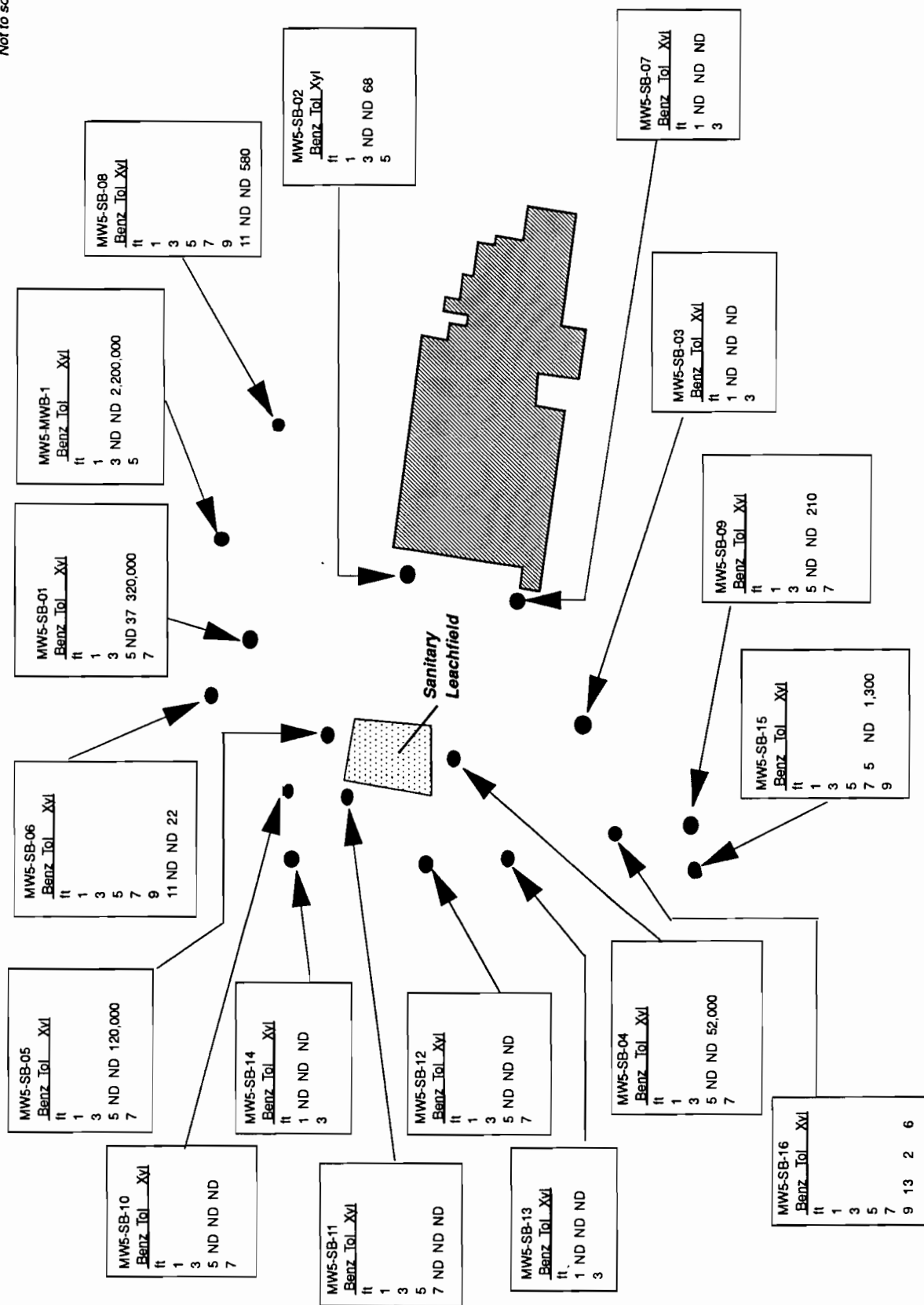


Figure 4-8. Spatial distribution of aromatic volatiles in former Organics Plant area soils.

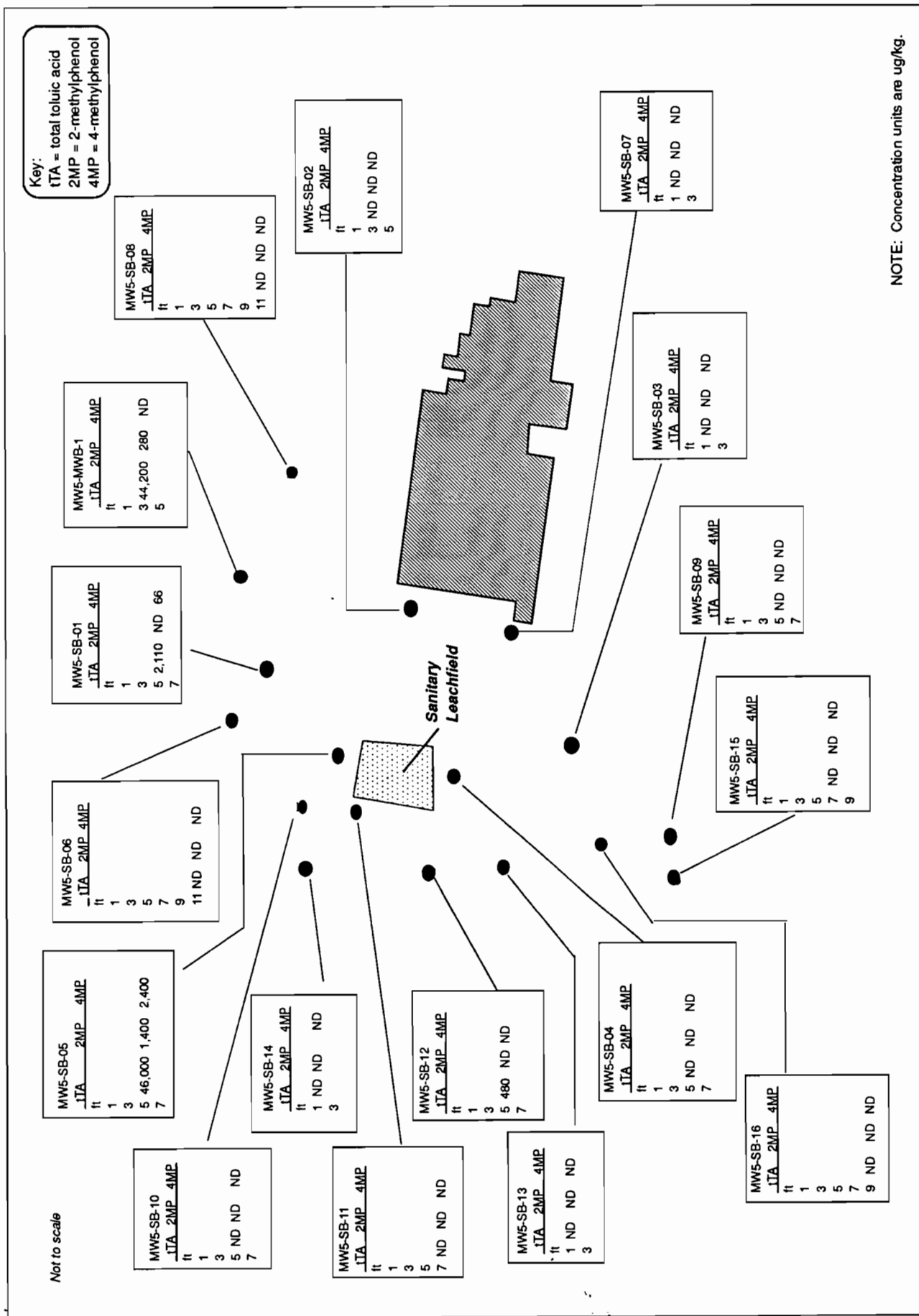


Figure 4-9. Spatial distribution of toluic acid and phenolics in former Organics Plant area soils.

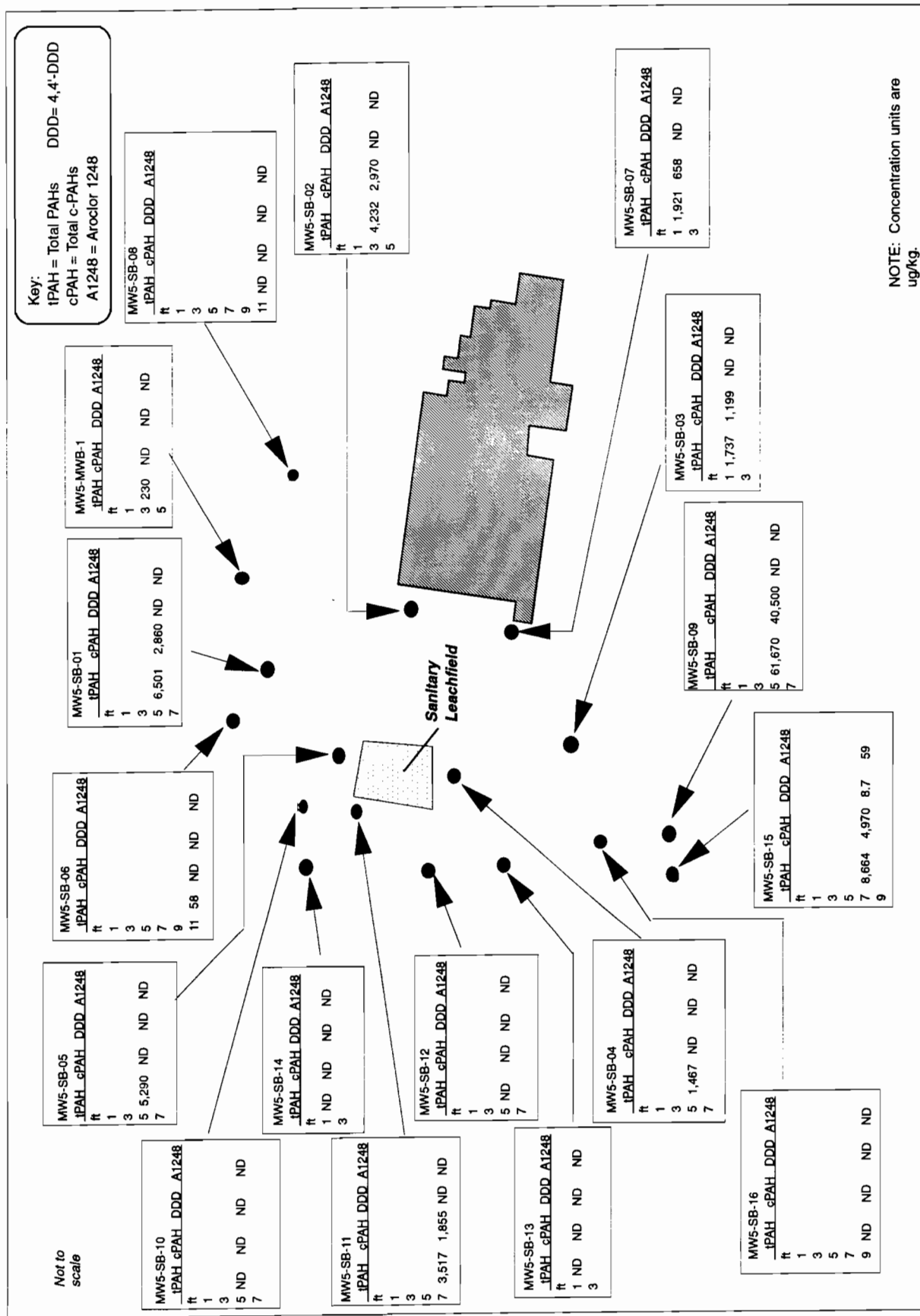
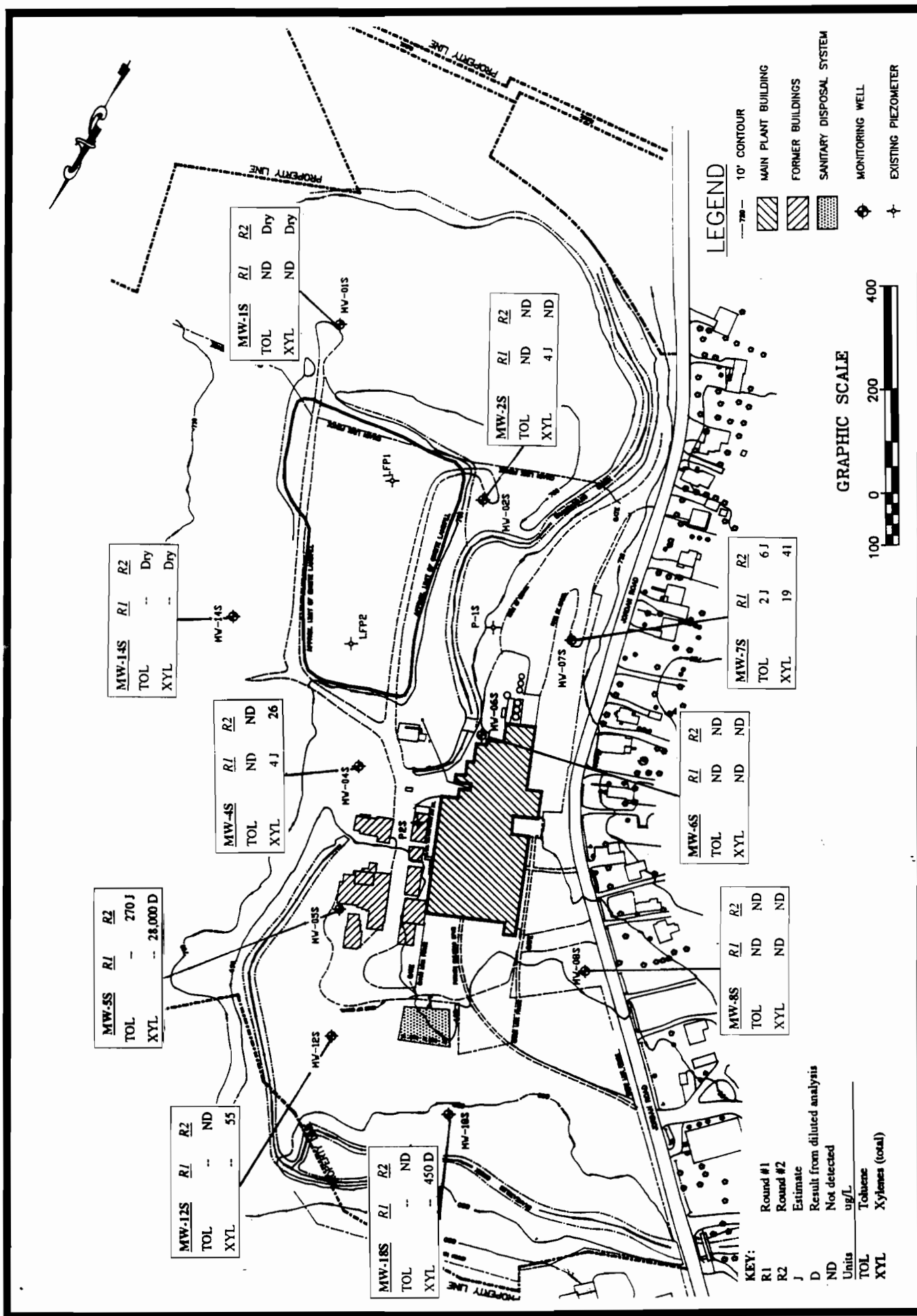


Figure 4-10. Spatial distribution of polycyclic aromatic hydrocarbons, pesticides, and PCBs in former Organics Plant area soils.





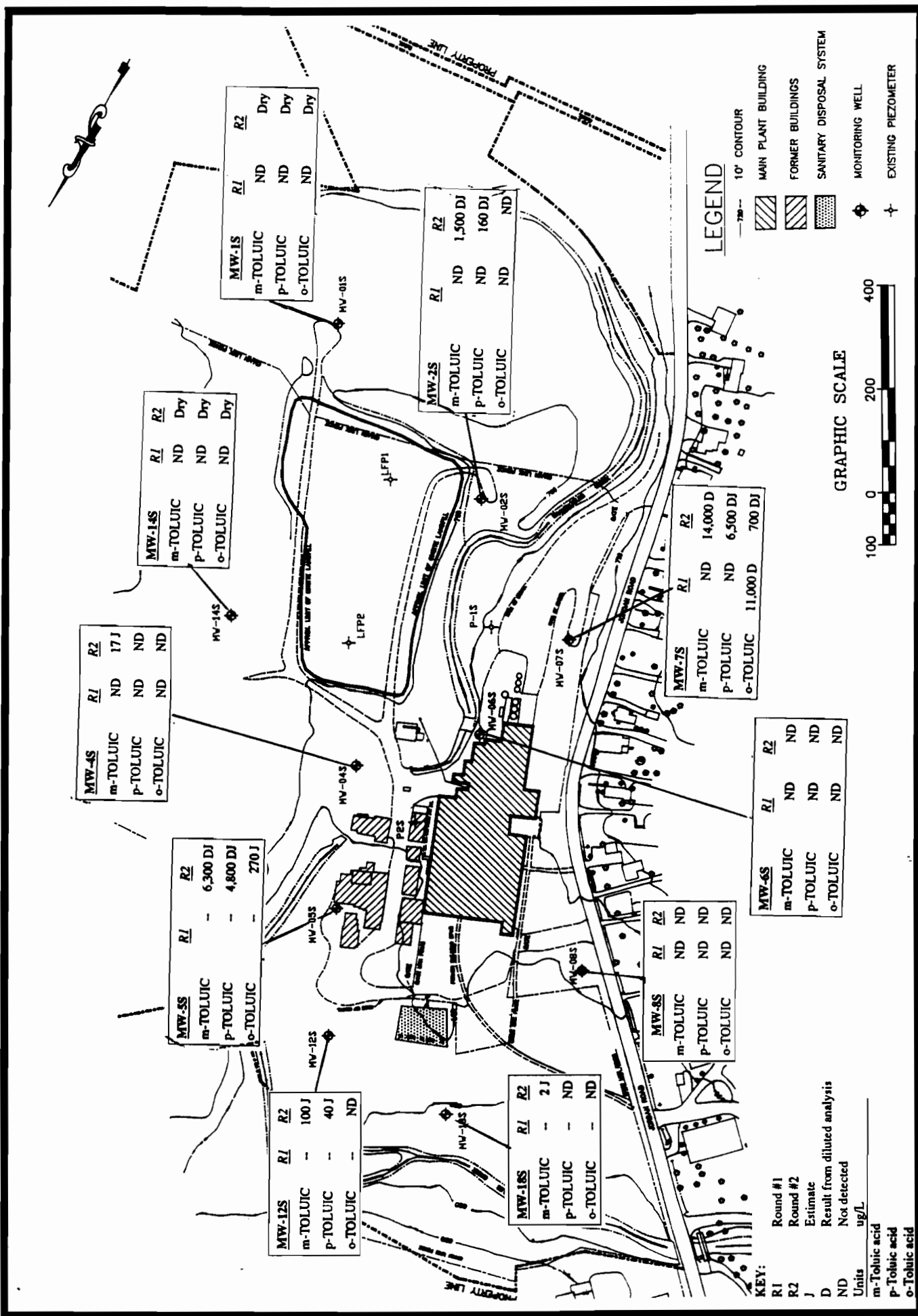


Figure 4-13. Spatial distribution of toluic acid isomers in overburden ground water.

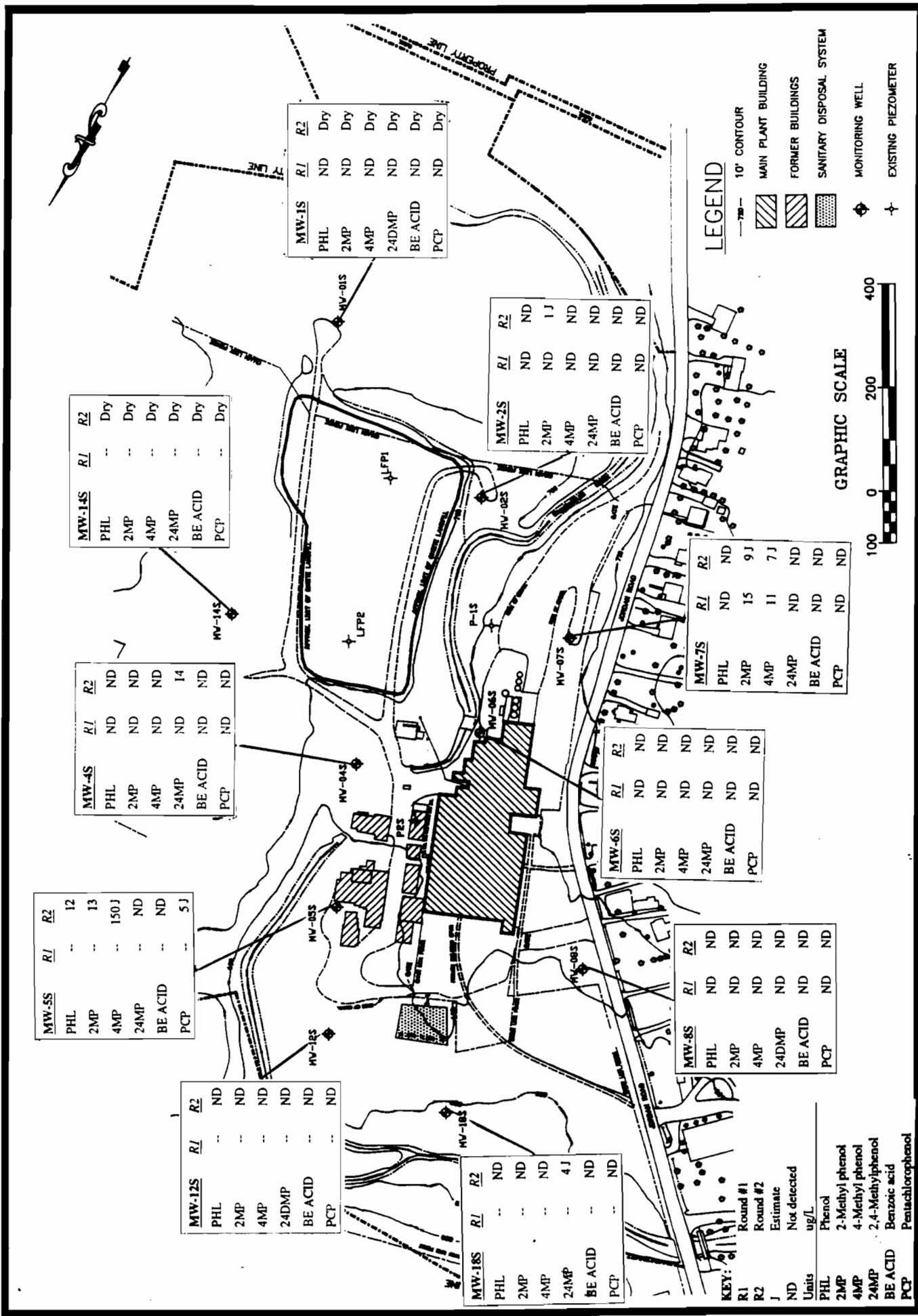


Figure 4-14. Spatial distribution of phenolics in overburden ground water.

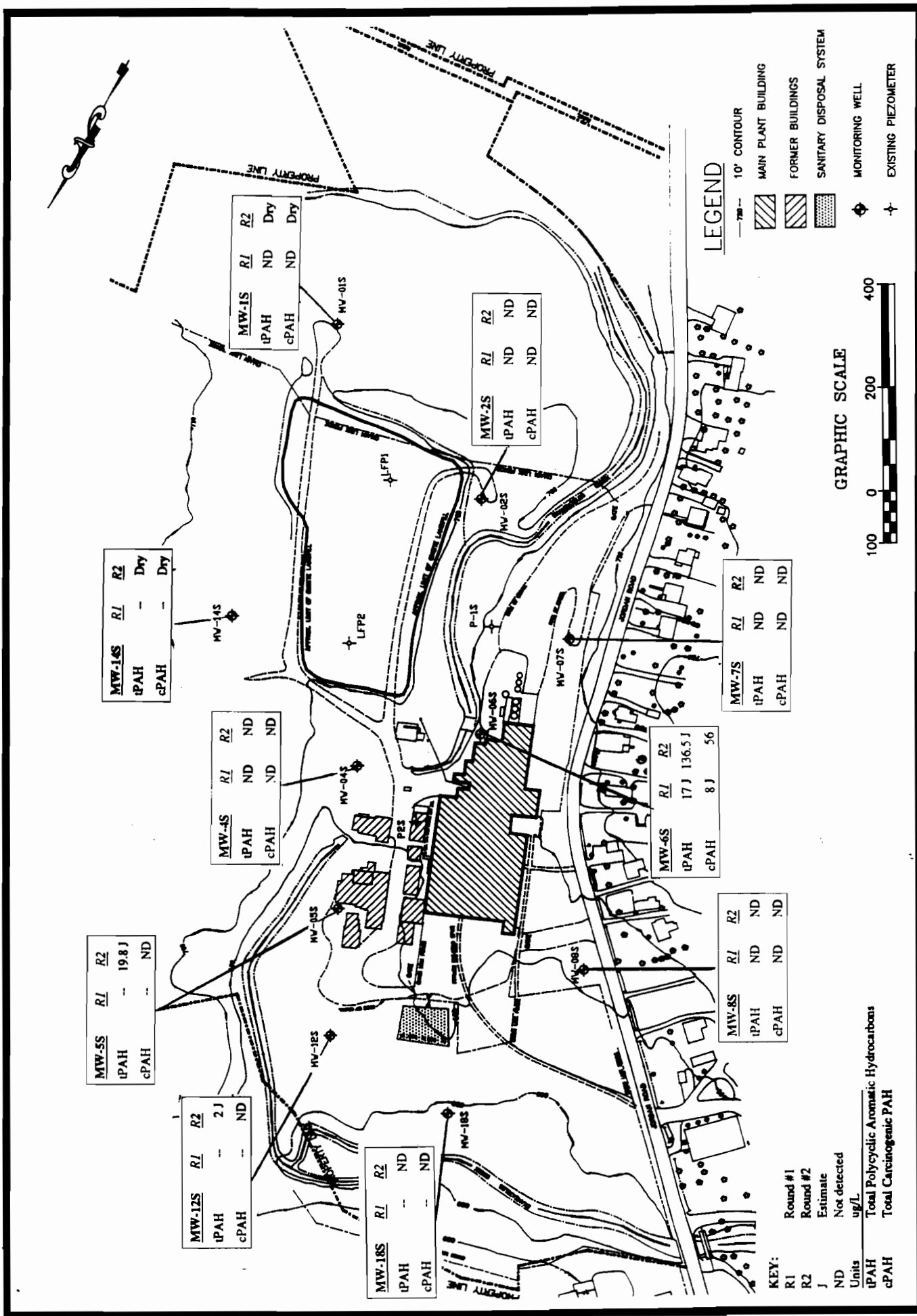


Figure 4-15. Spatial distribution of polycyclic aromatic hydrocarbons in overburden ground water.

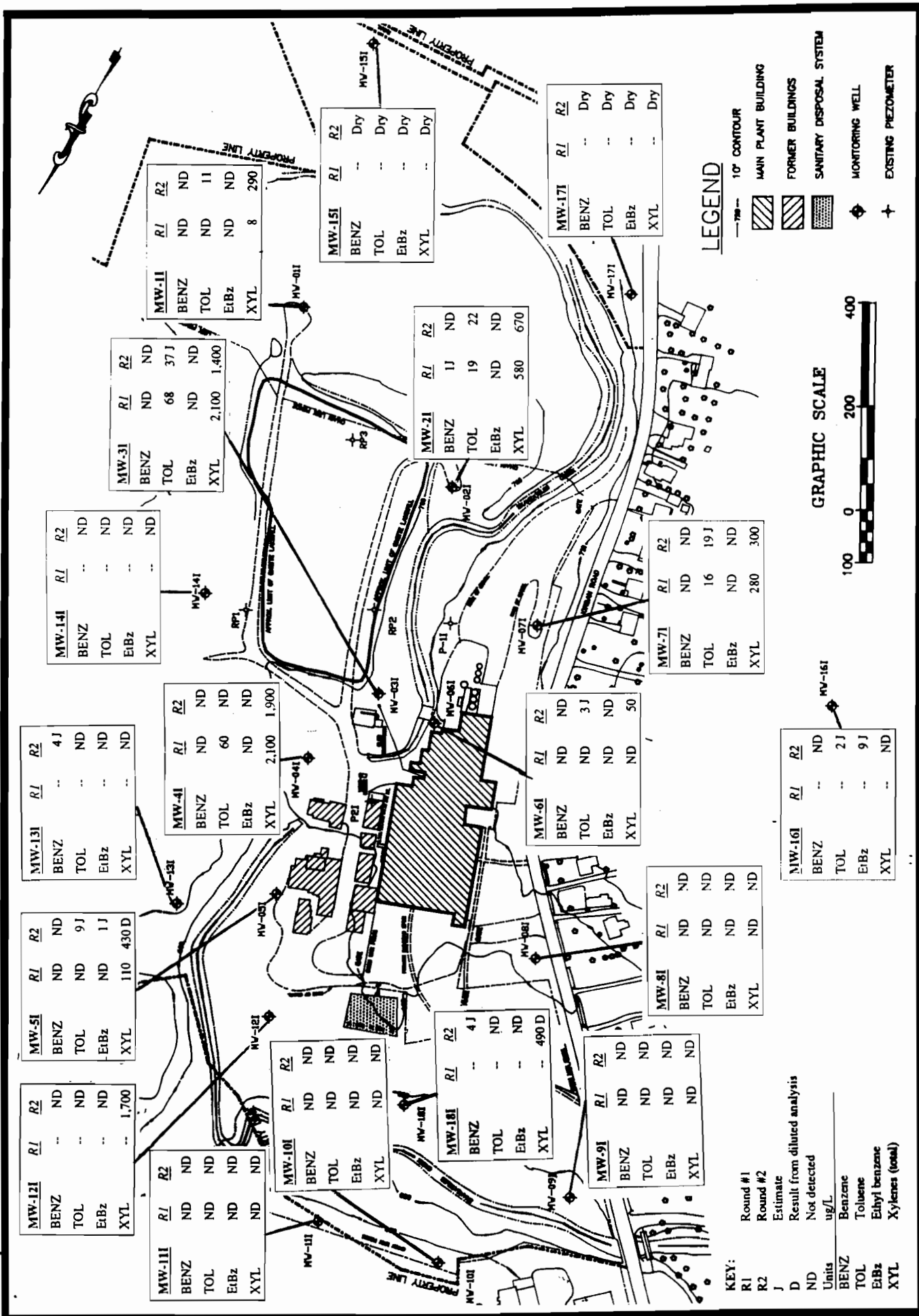


Figure 4-16. Spatial distribution of aromatic volatiles in upper bedrock ground water.

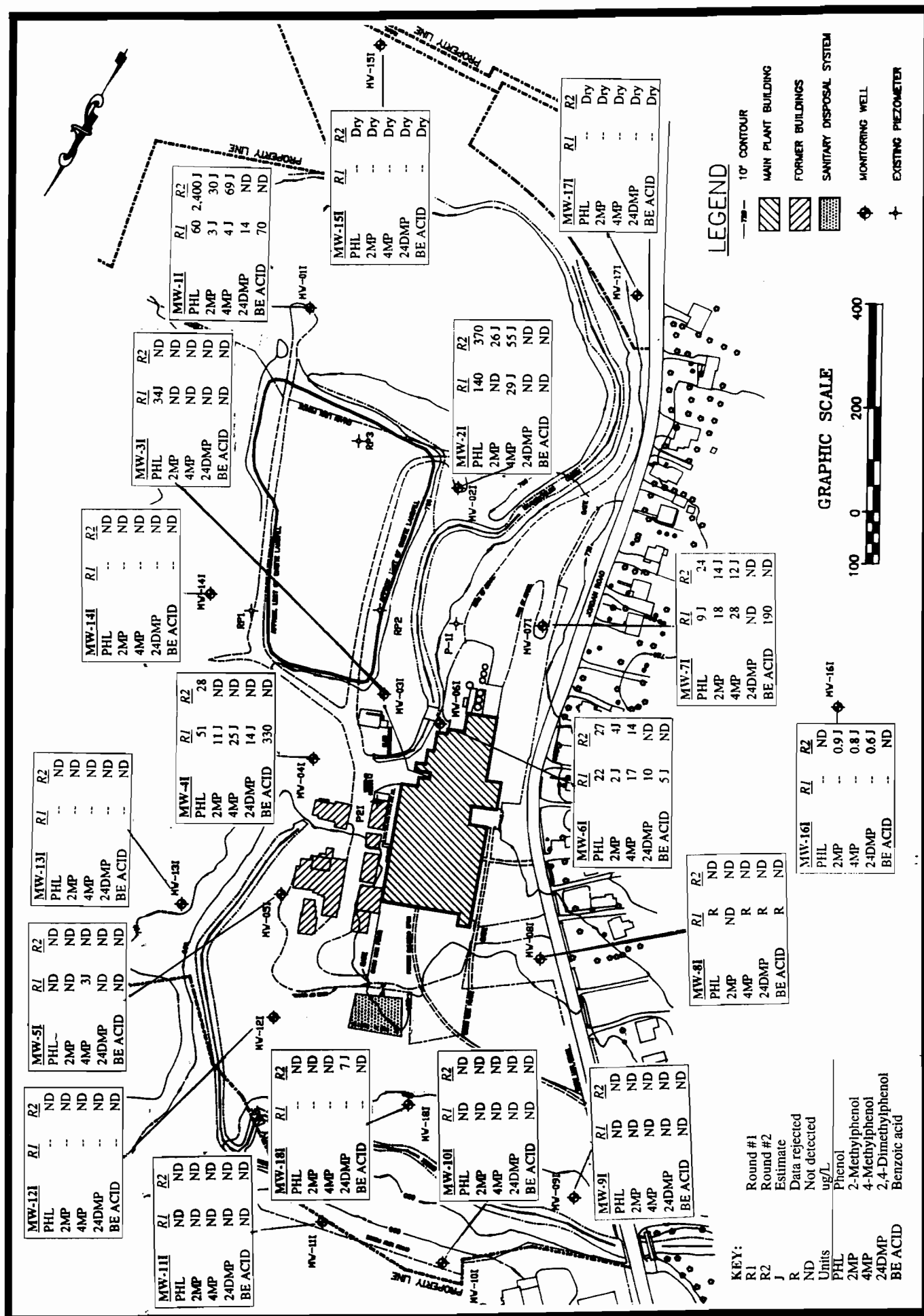


Figure 4-17. Spatial distribution of phenolics in upper bedrock ground water.



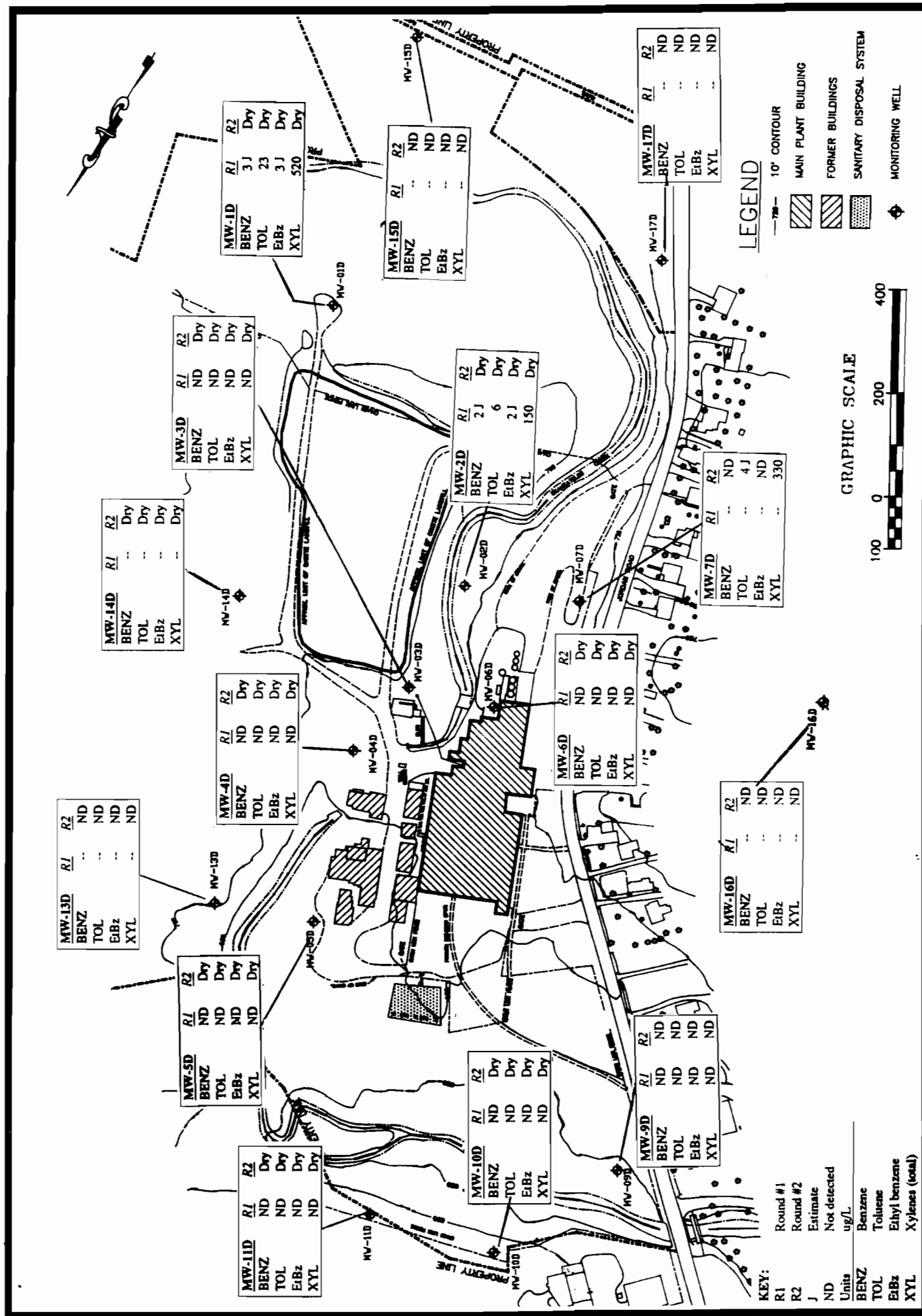




Figure 4-20. Spatial distribution of phenolics in deep bedrock ground water.



Figure 4-21. Spatial distribution of toluic acid isomers in deep bedrock ground water.

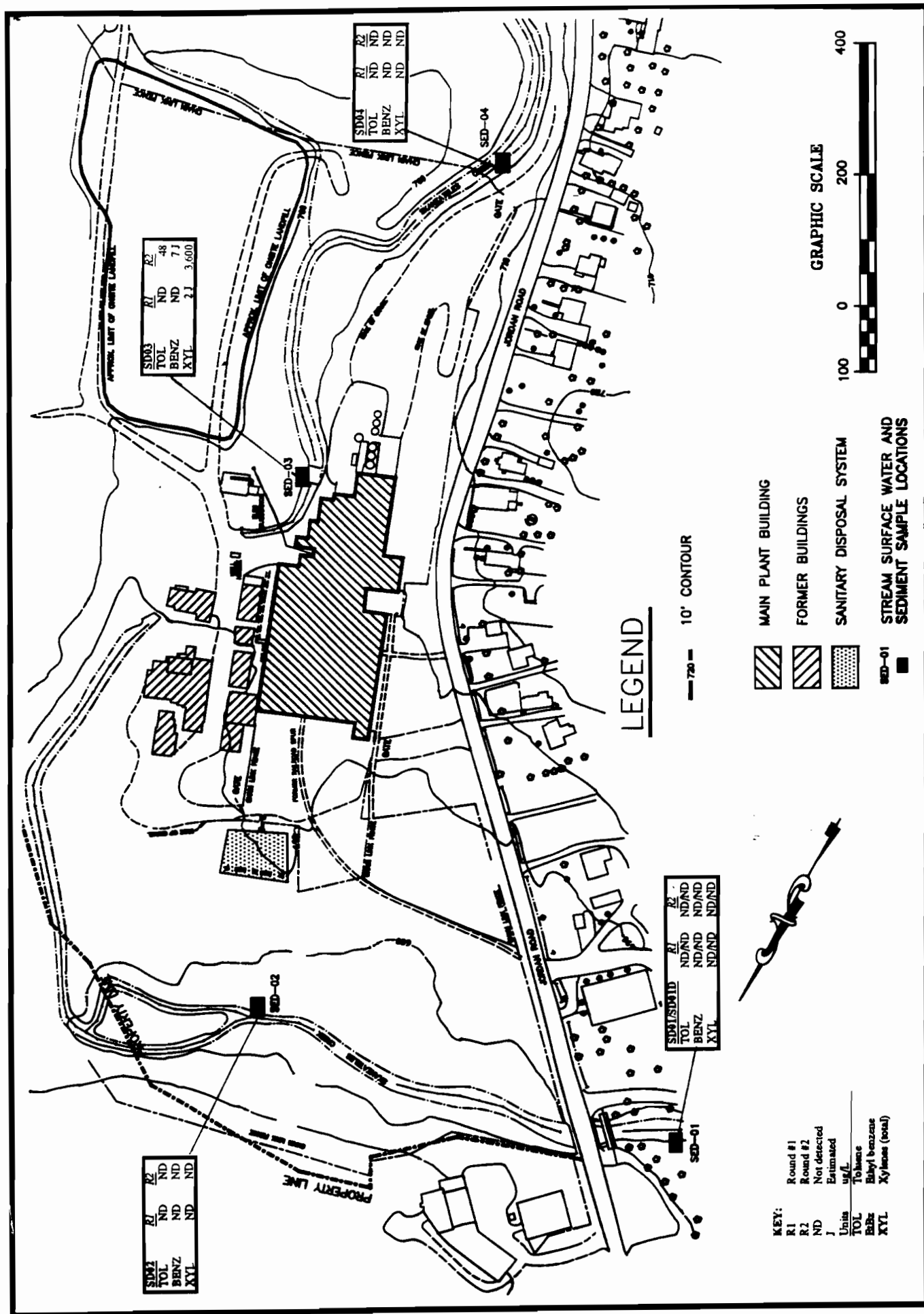


Figure 4-22. Spatial distribution of aromatic volatiles in stream sediments.

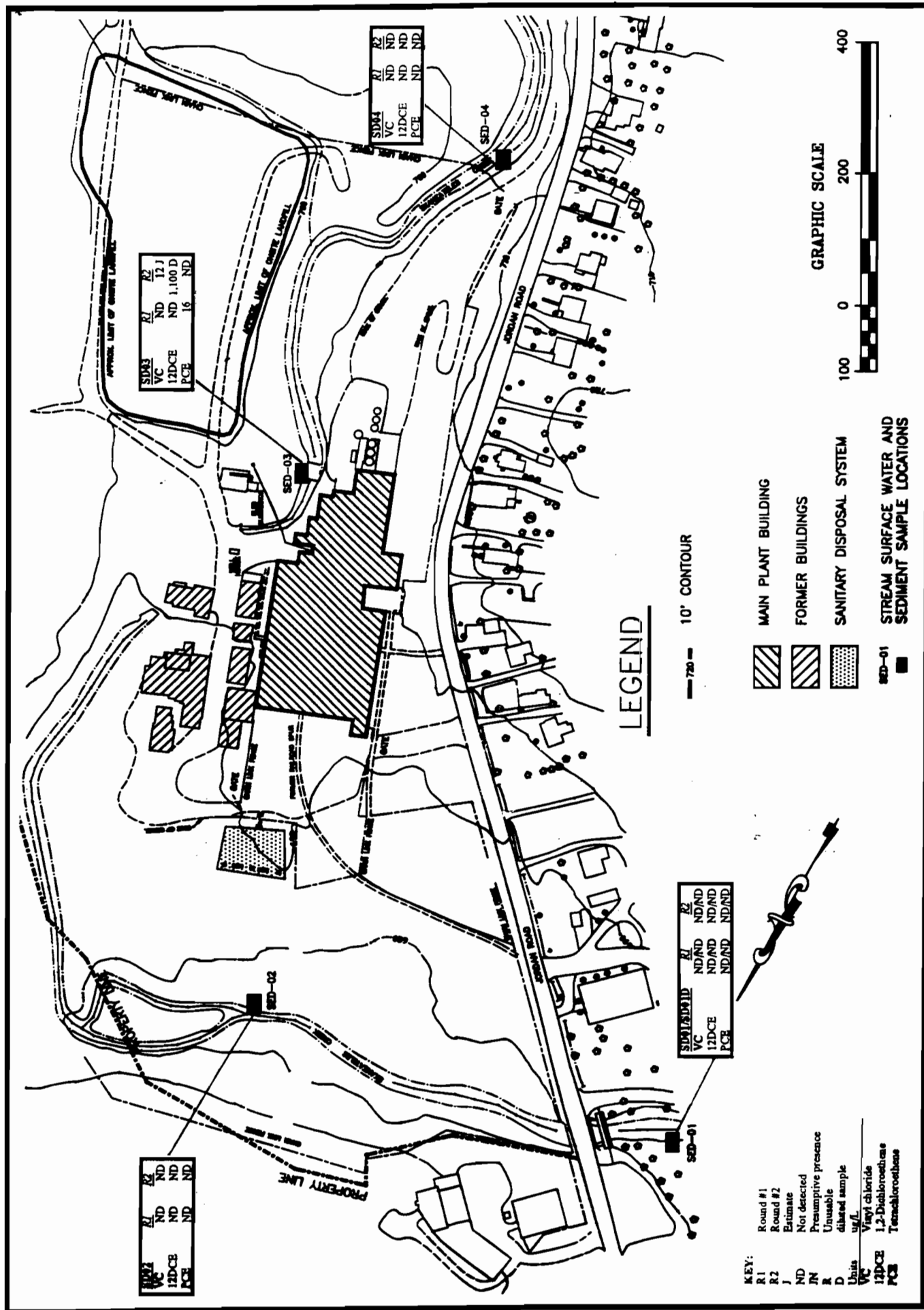


Figure 4-23. Spatial distribution of chlorinated volatiles in stream sediments.

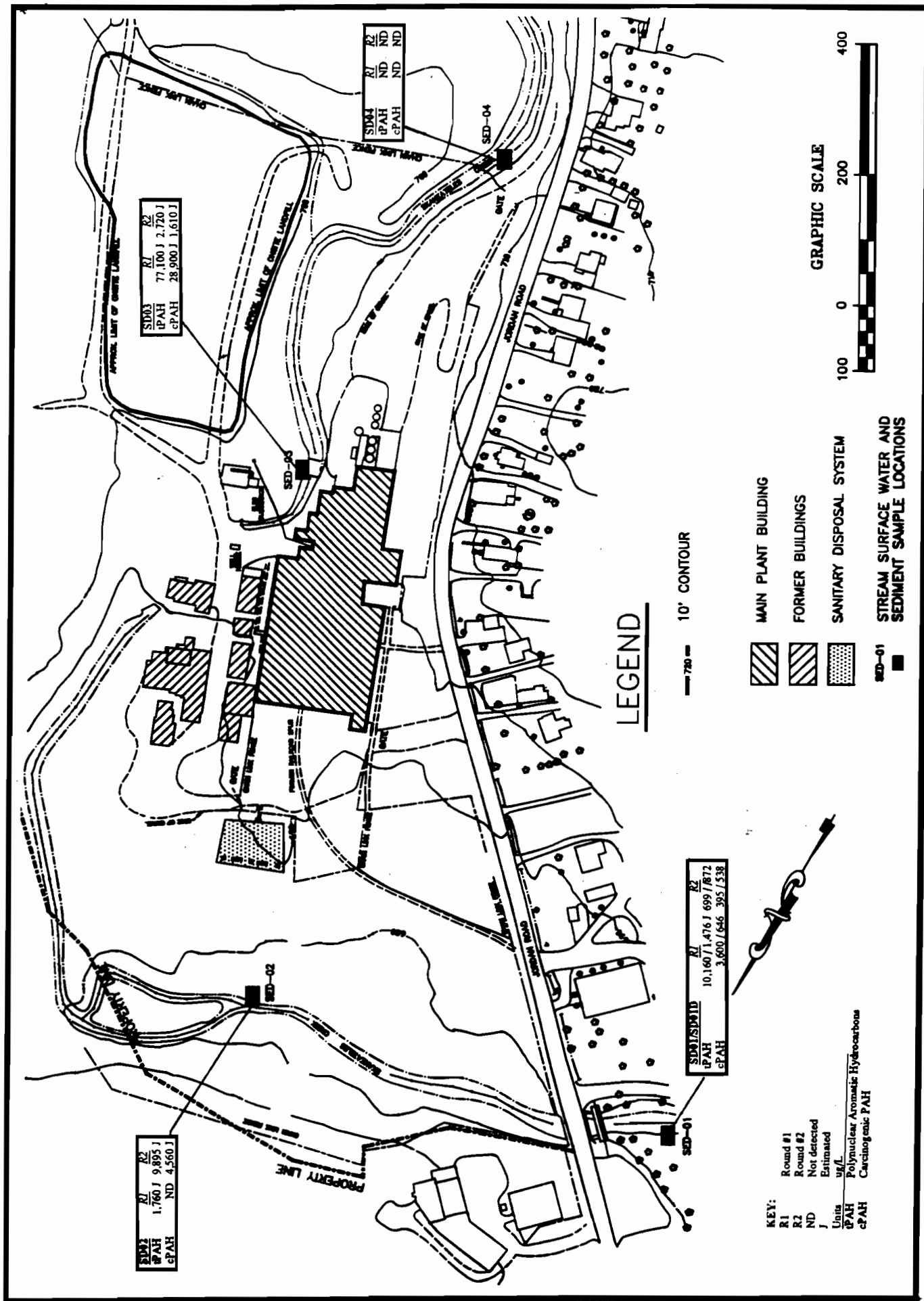


Figure 4-24. Spatial distribution of polycyclic aromatic hydrocarbons in stream sediments.

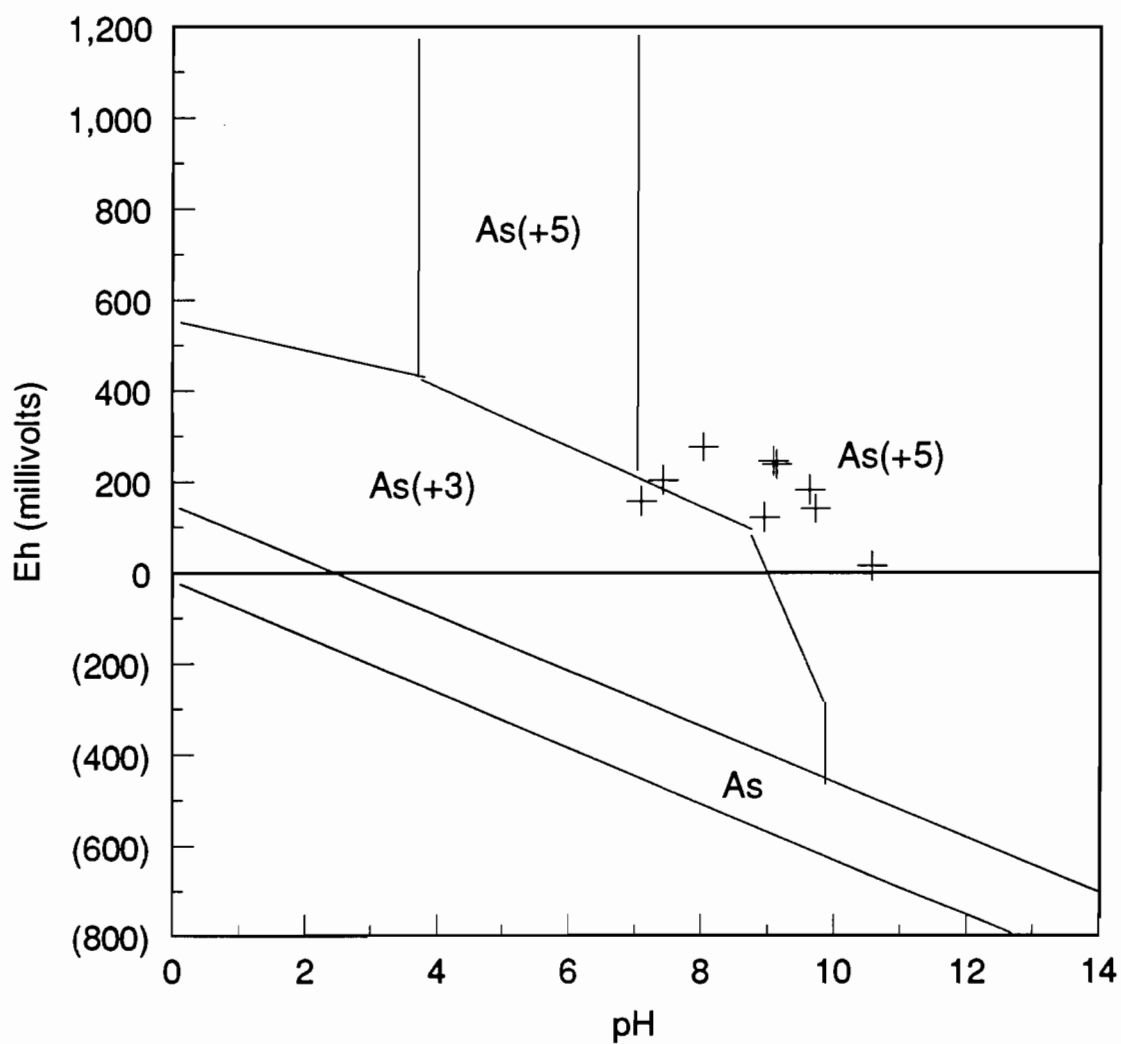


Figure 5-1. Arsenic speciation in overburden ground water.

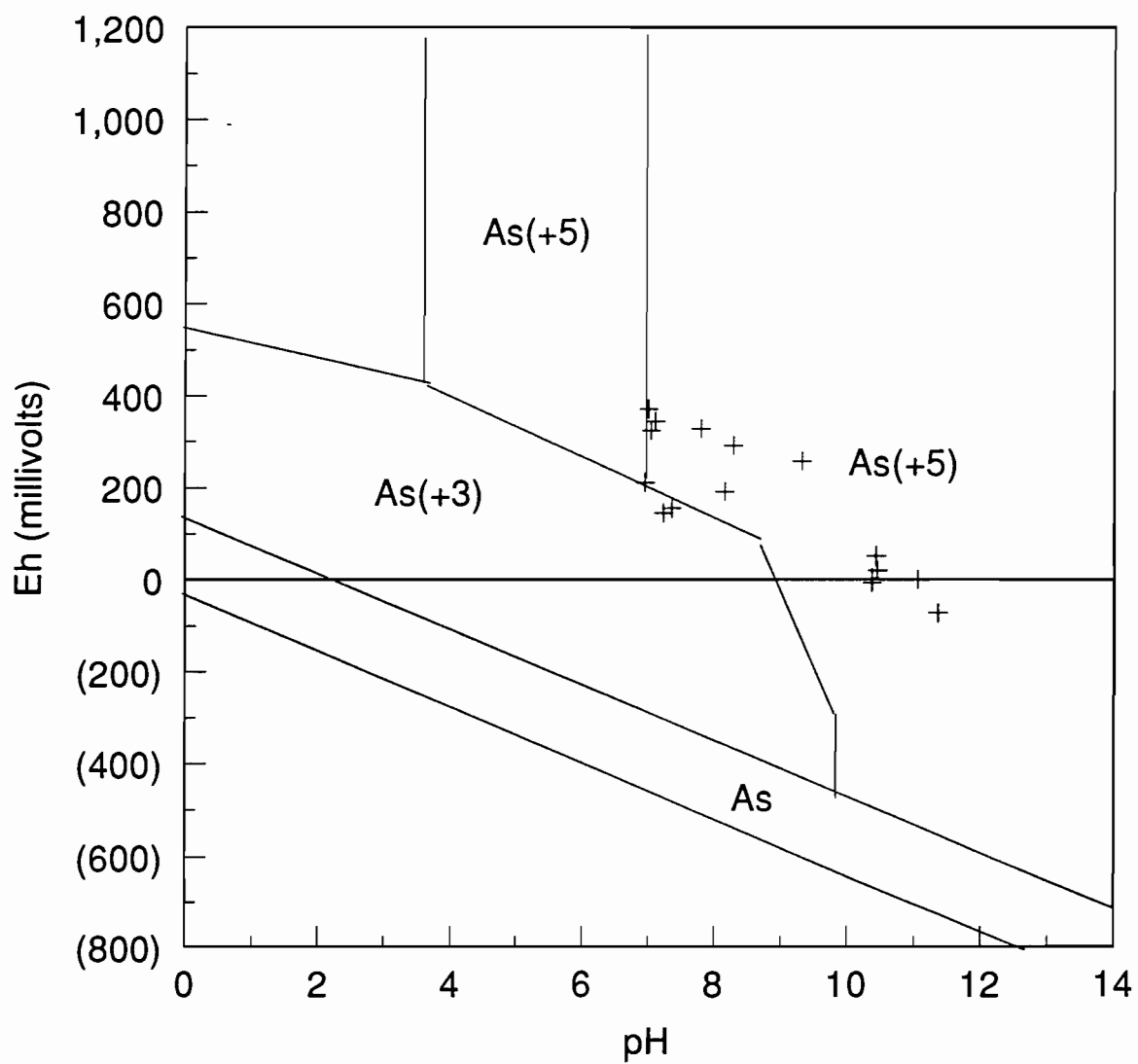


Figure 5-2. Arsenic speciation in upper bedrock ground water.

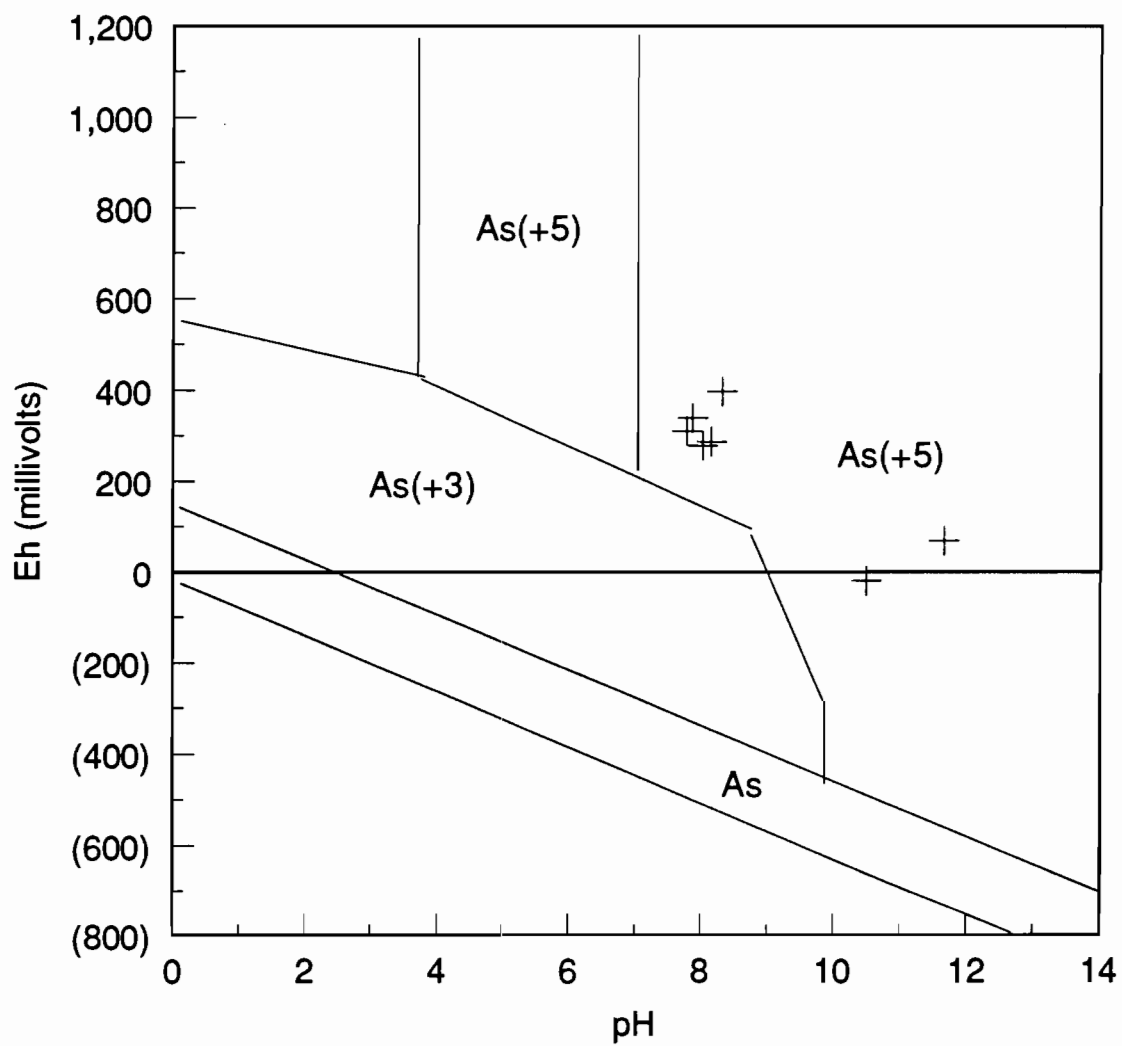


Figure 5-3. Arsenic speciation in deep bedrock ground water.

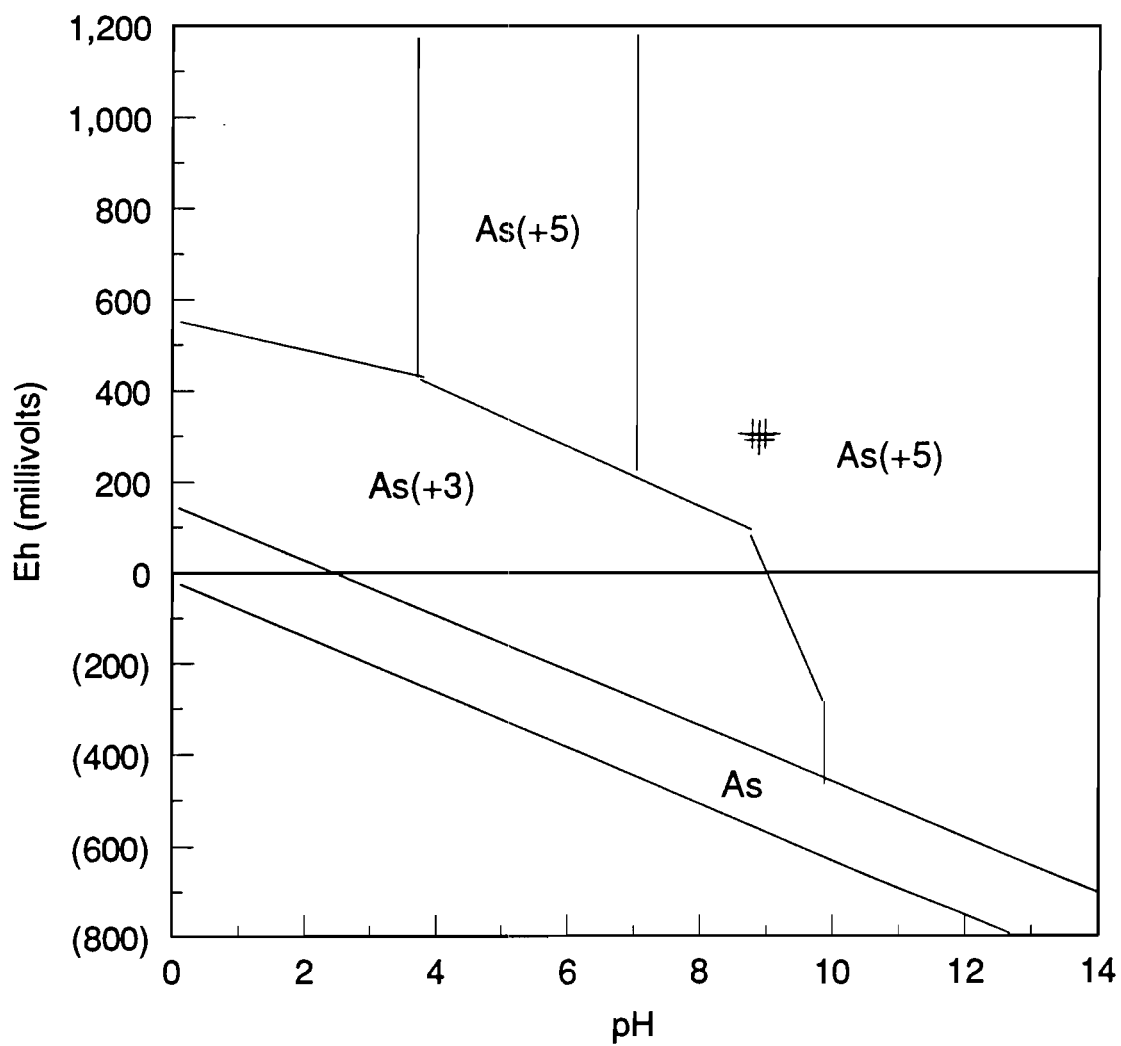


Figure 5-4. Arsenic speciation in surface water.

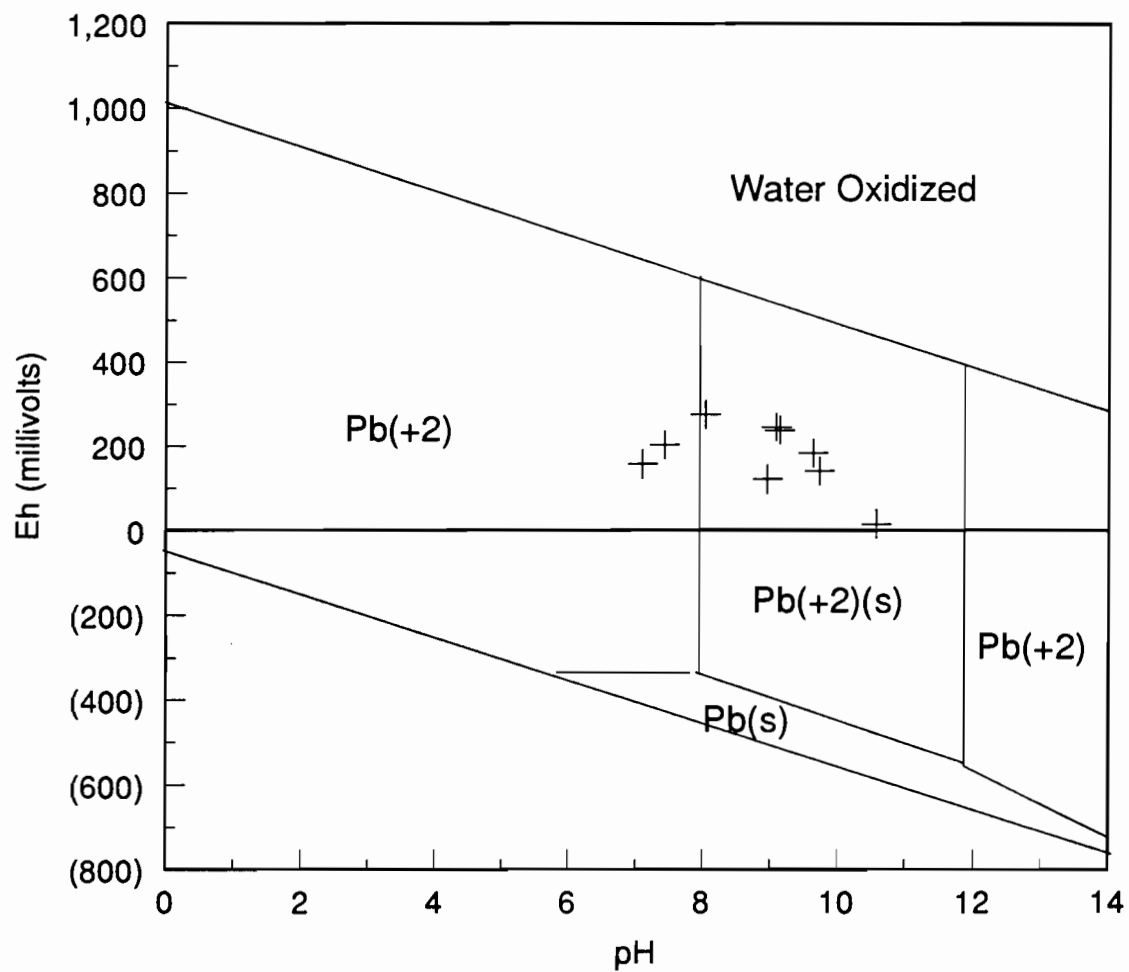


Figure 5-5. Lead speciation in overburden ground water.

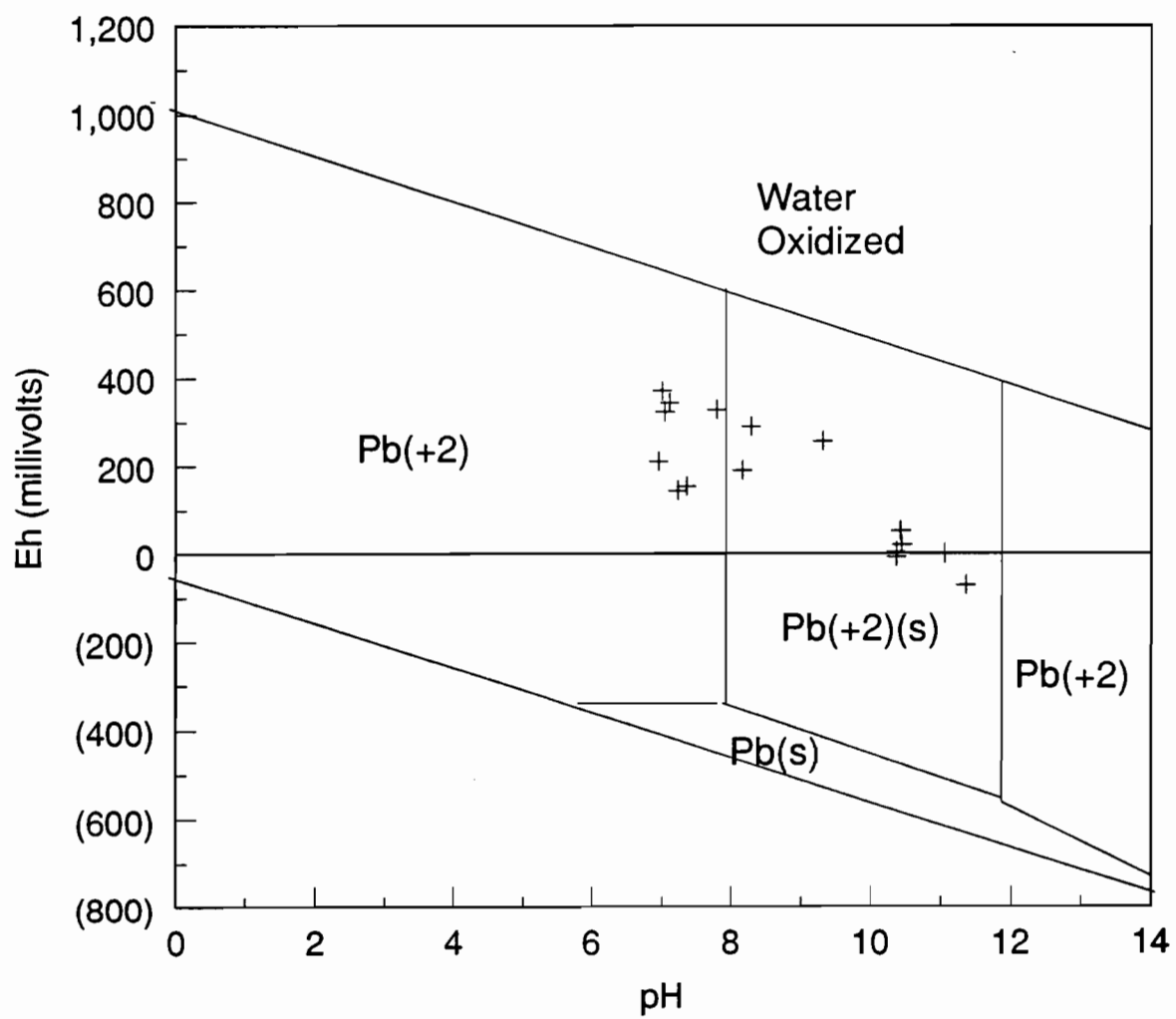


Figure 5-6. Lead speciation in upper bedrock ground water.

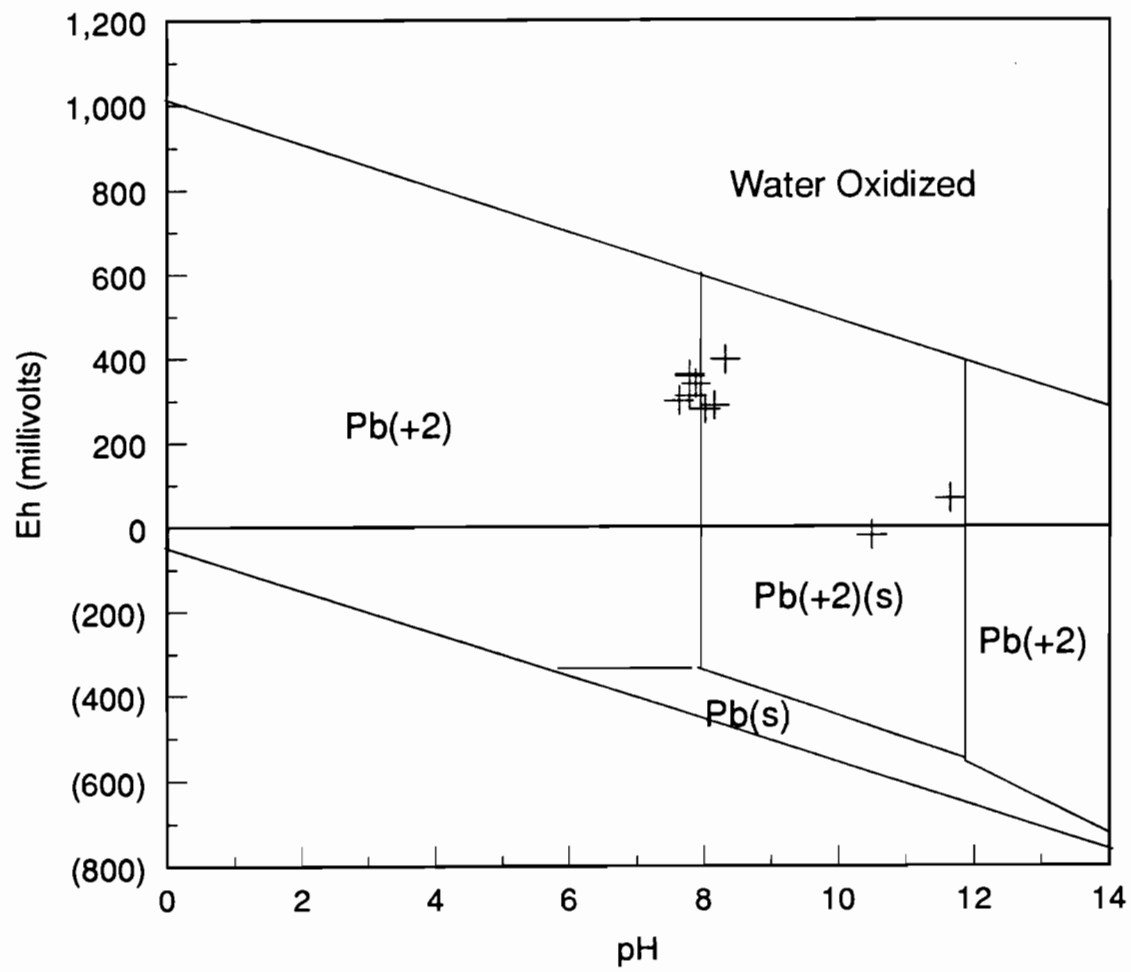


Figure 5-7. Lead speciation in deep bedrock ground water.

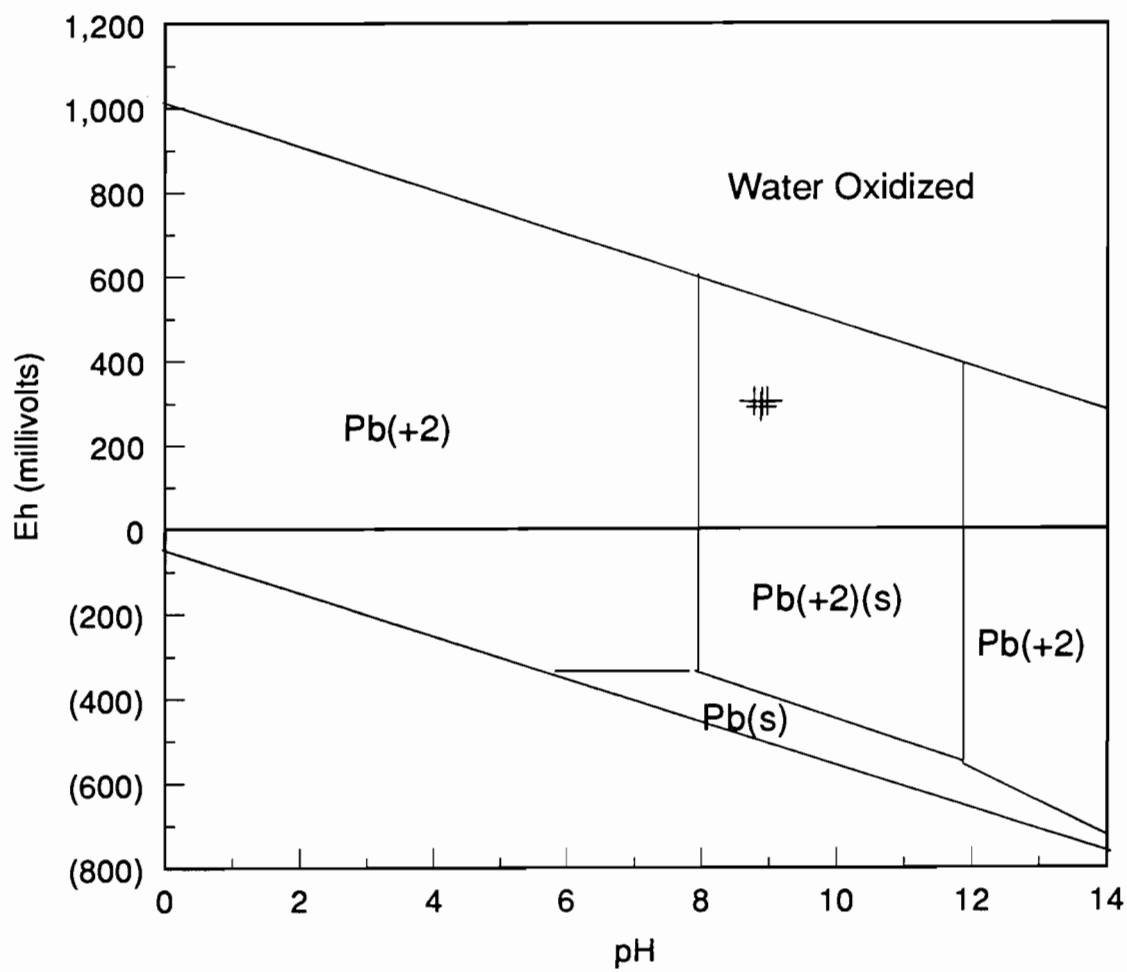


Figure 5-8. Lead speciation in surface water.

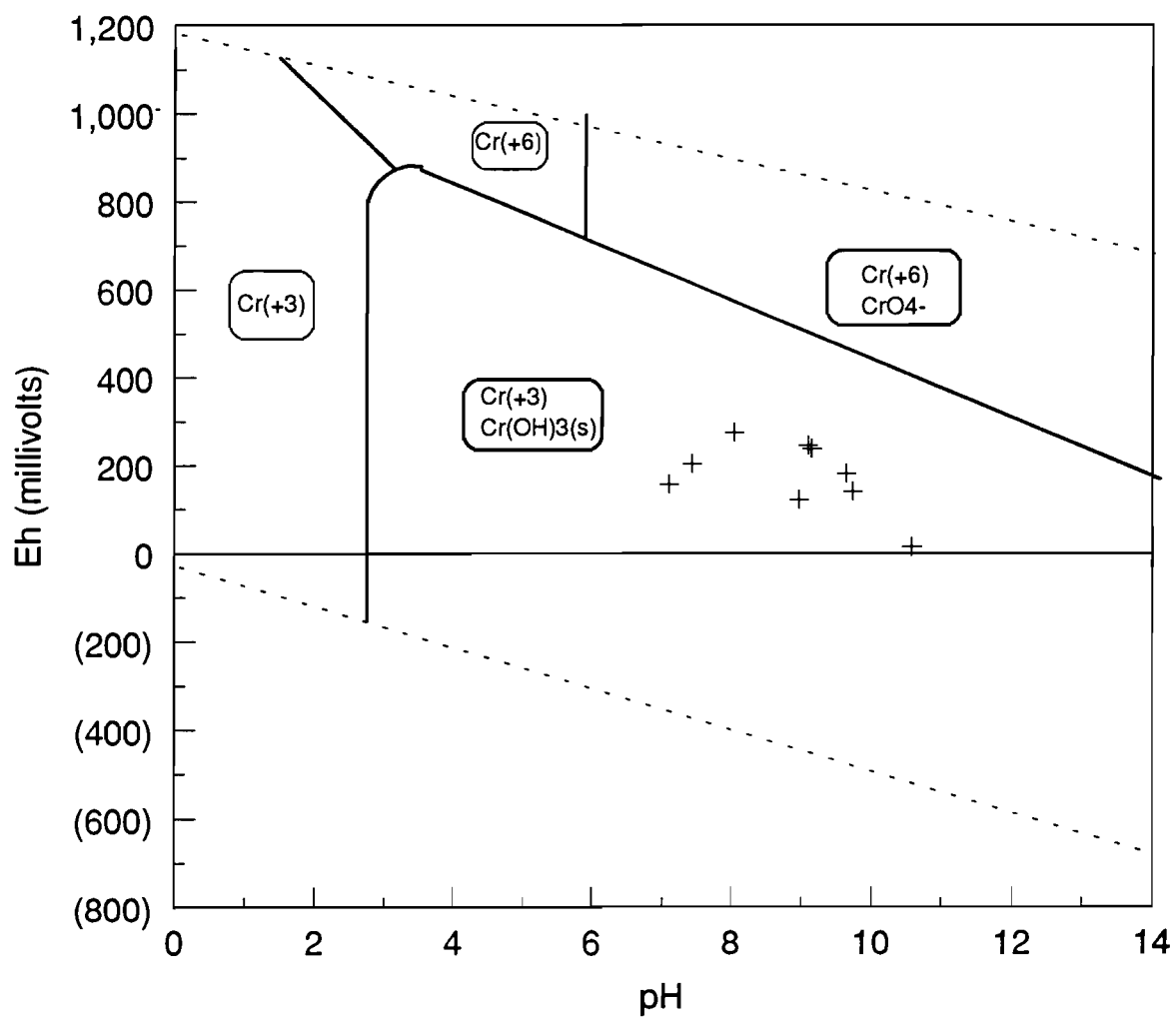


Figure 5-9. Chromium speciation in overburden ground water.

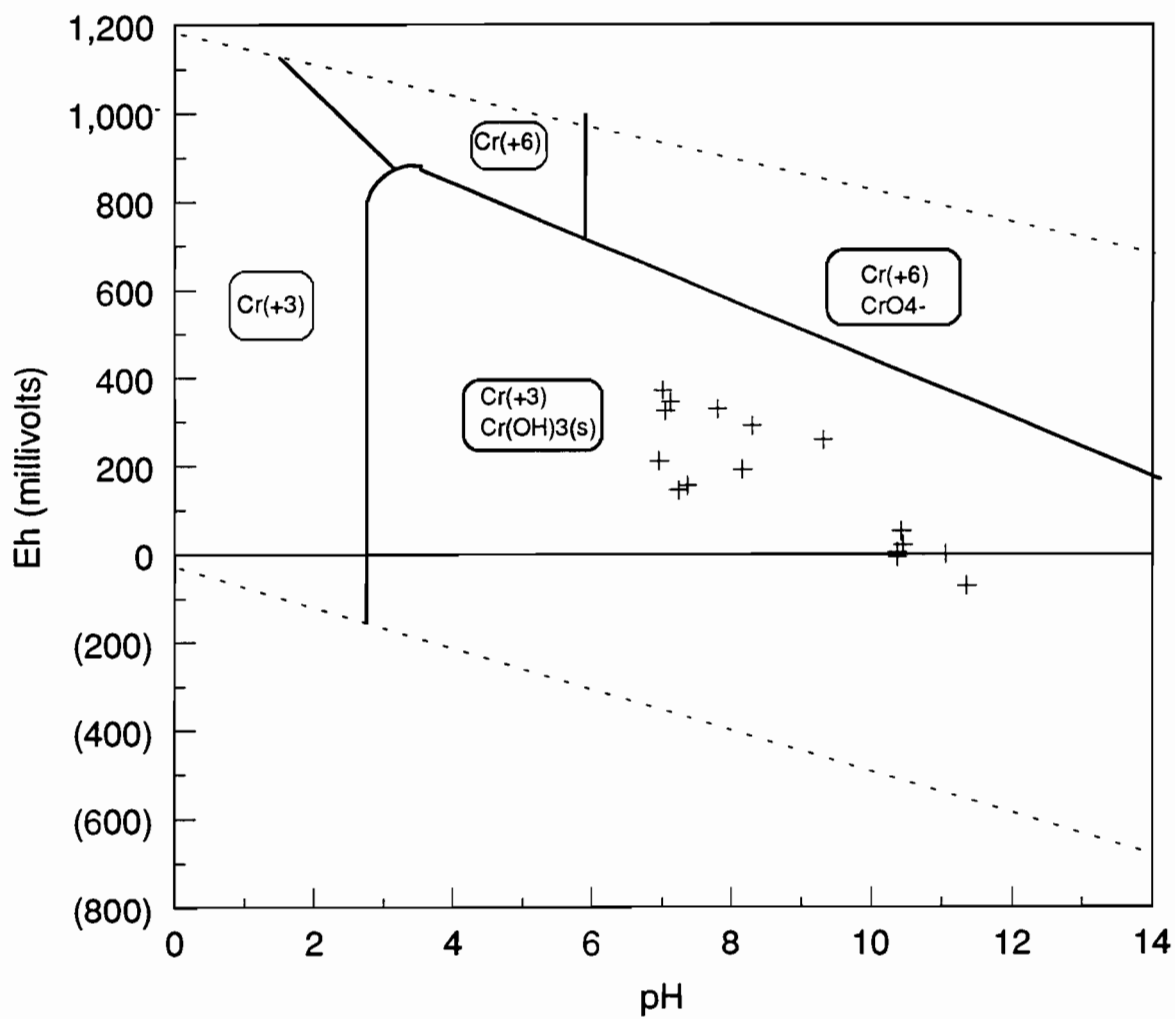


Figure 5-10. Chromium speciation in upper bedrock ground water.

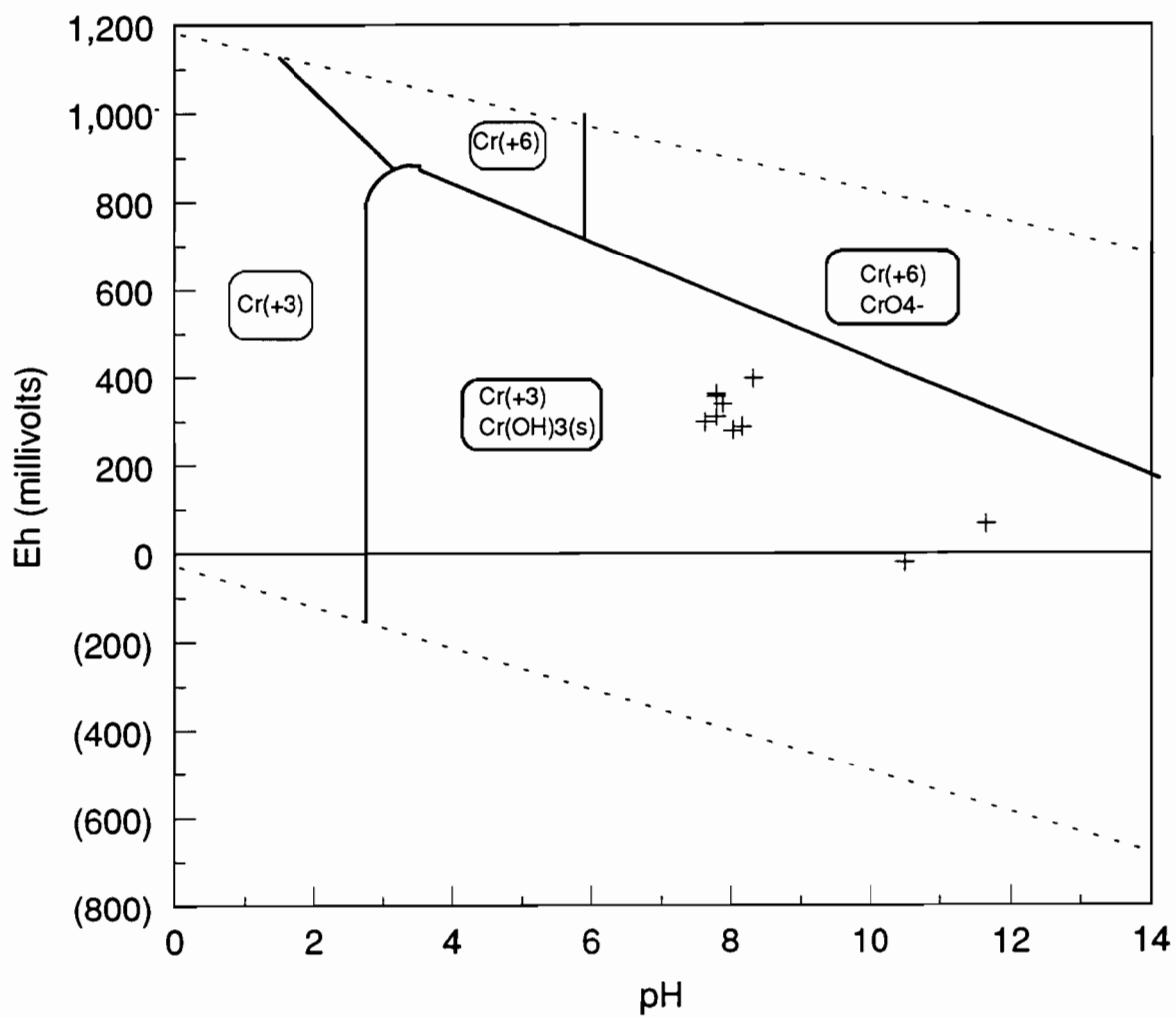


Figure 5-11. Chromium speciation in deep bedrock ground water.

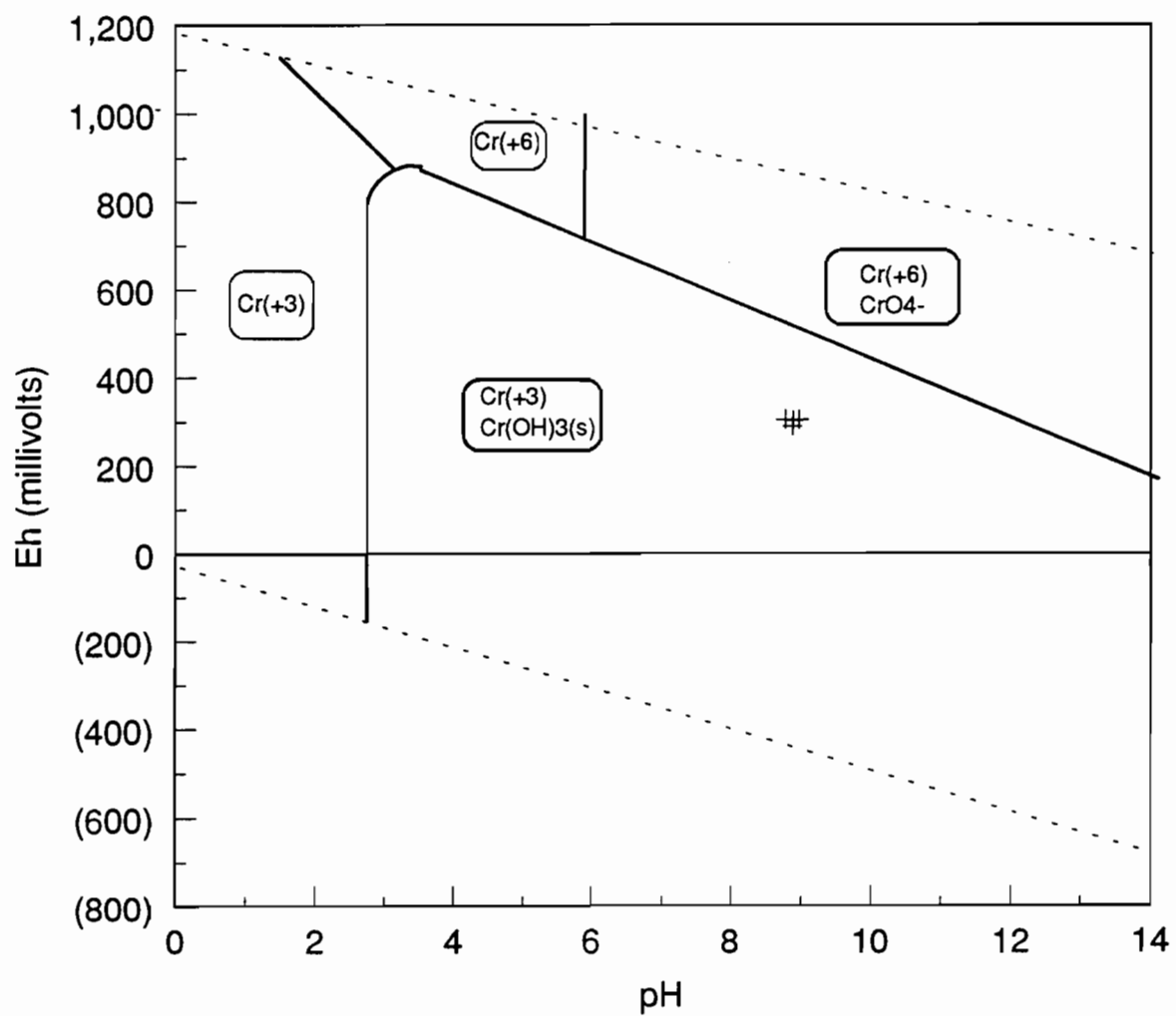


Figure 5-12. Chromium speciation in surface water.

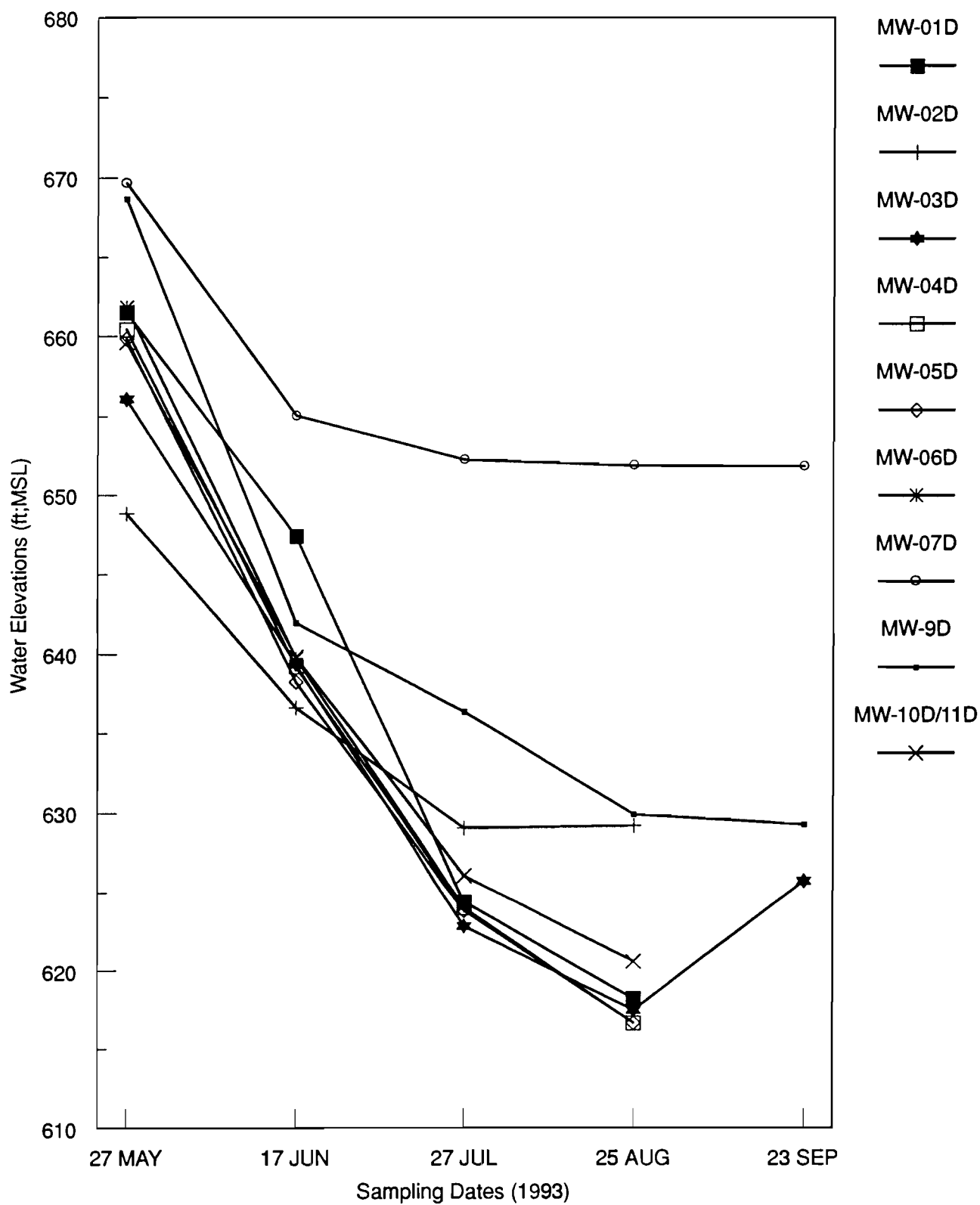
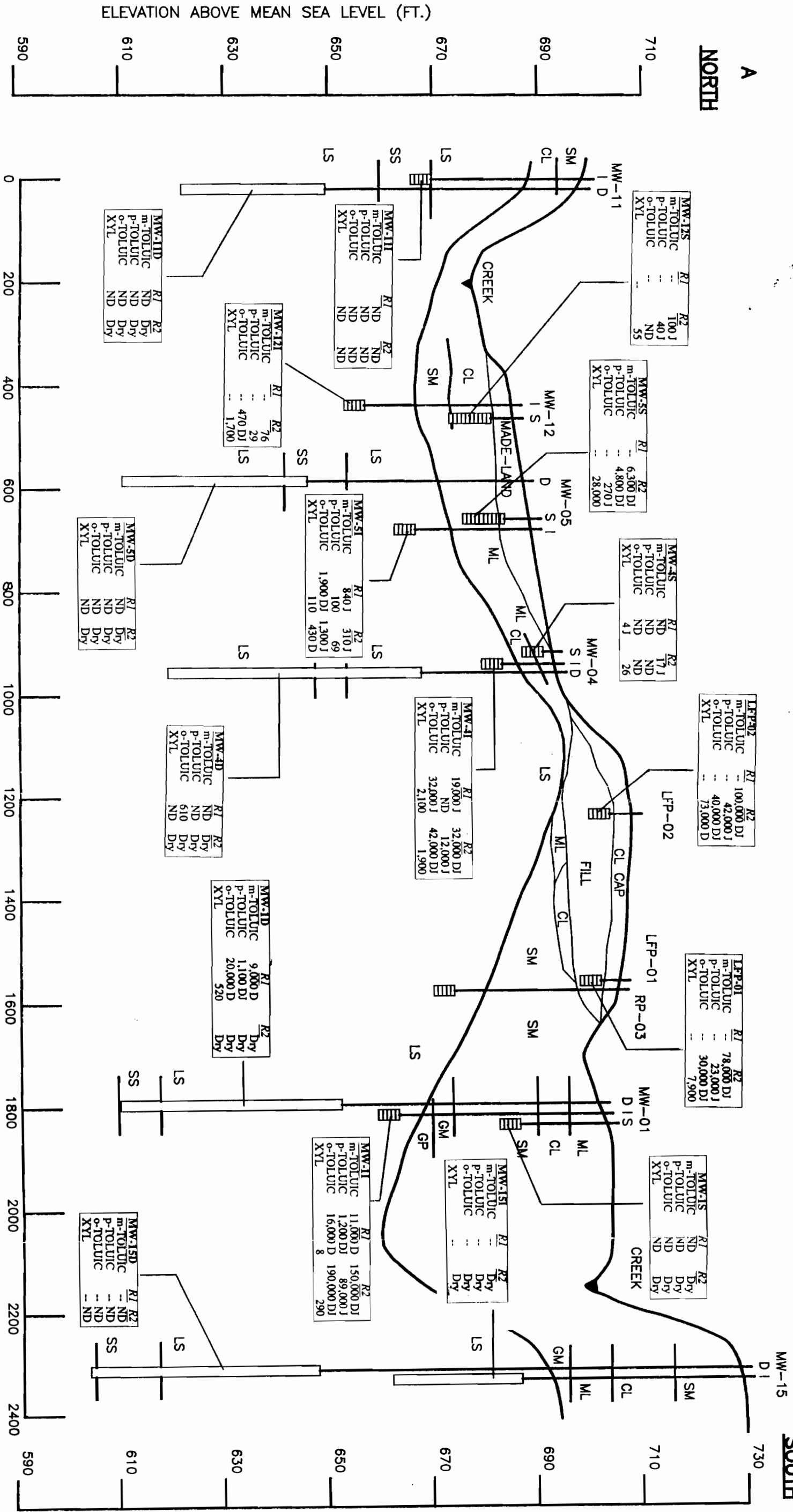


Figure 5-13. Temporal variation of water elevations in deep bedrock wells.

A
NORTH

A'
SOUTH



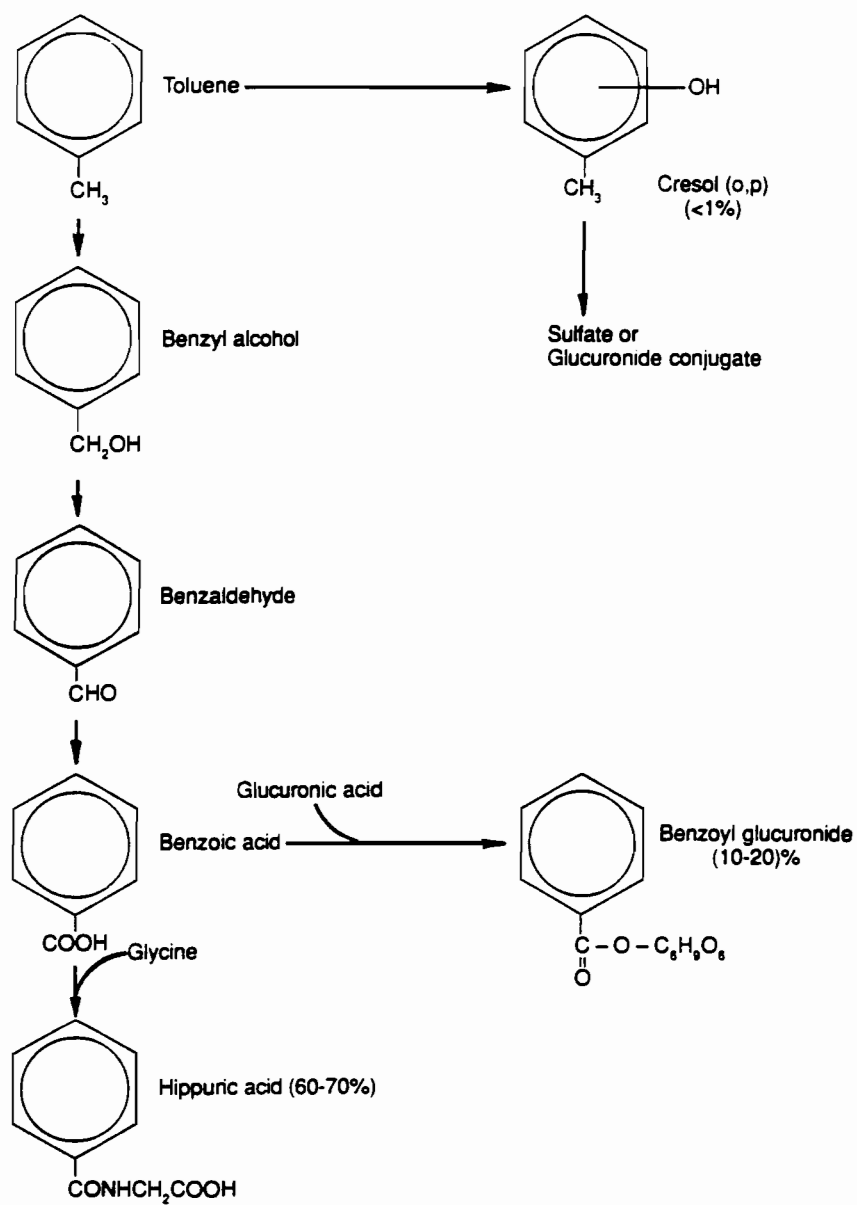


Figure 6-1. Biotransformation pathway for aromatic volatiles (USPHS 1989).

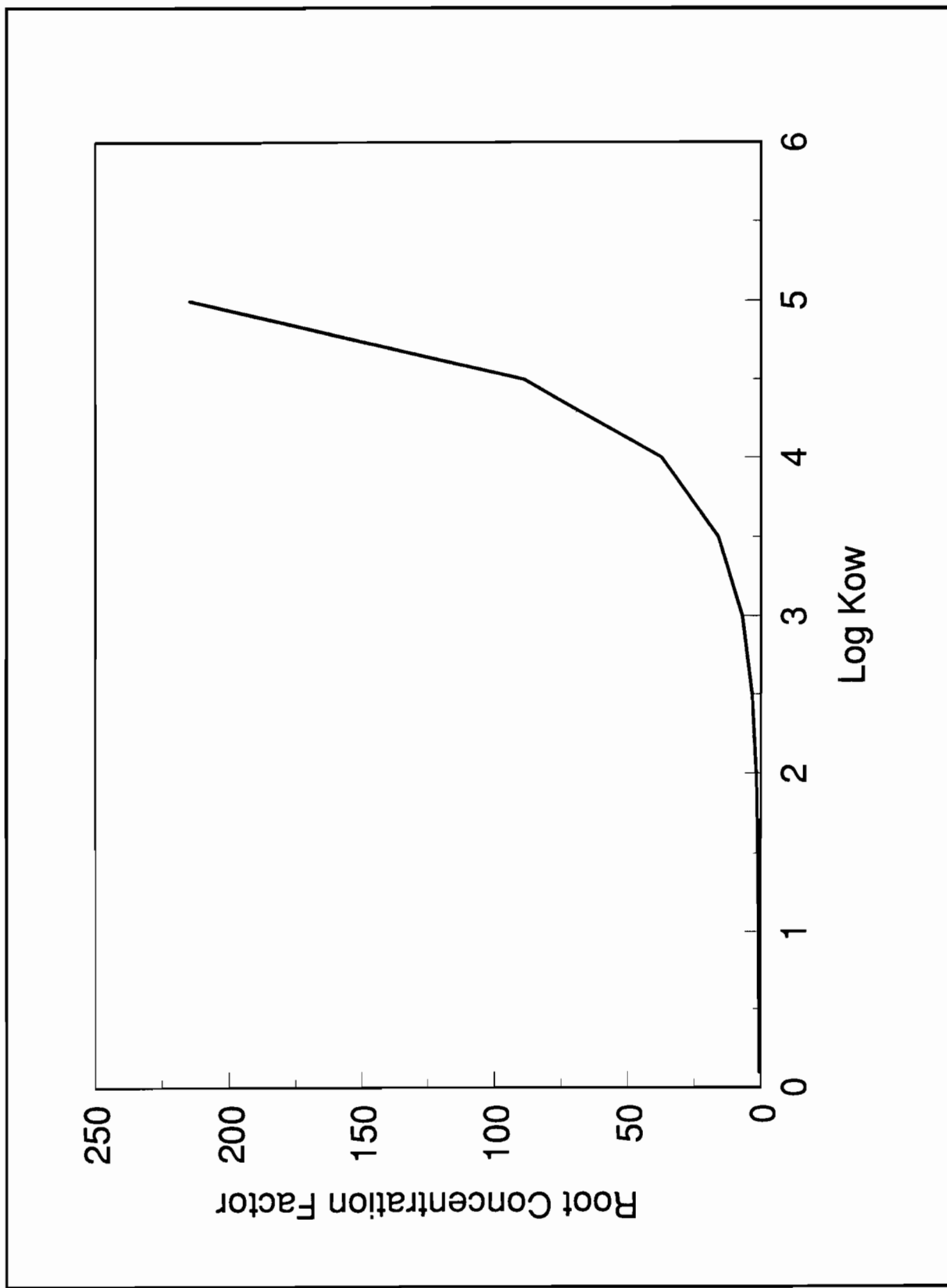


Figure 6-2. Relationship between root concentration factor and chemical log Kow.

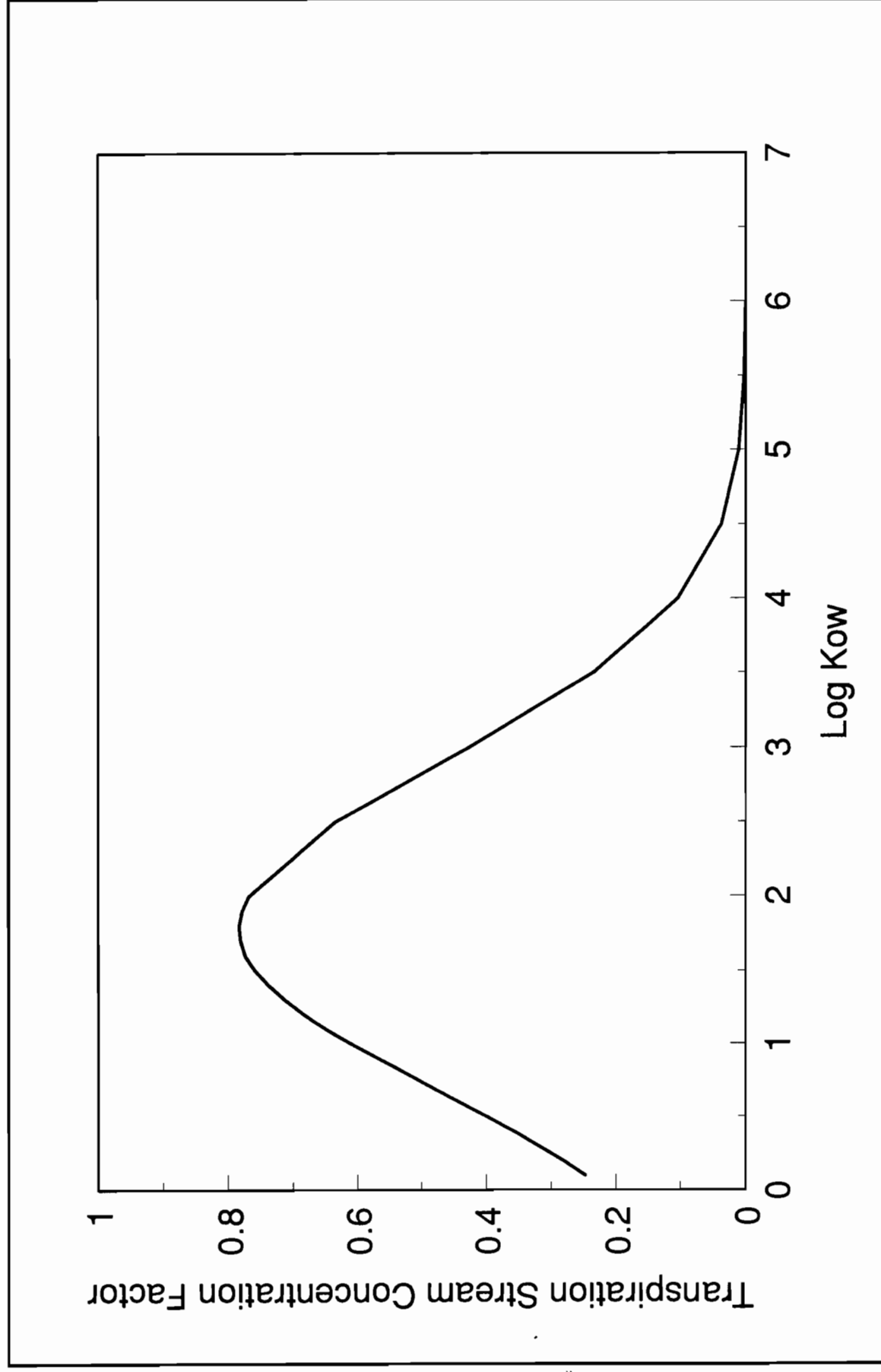


Figure 6-3. Relationship between transpiration stream concentration factor and chemical log Kow.

LEGEND

— 750 — 10' CONTOUR

MAIN PLANT BUILDING

FORMER BUILDINGS

SANITARY DISPOSAL SYSTEM

MV-160
MV-161

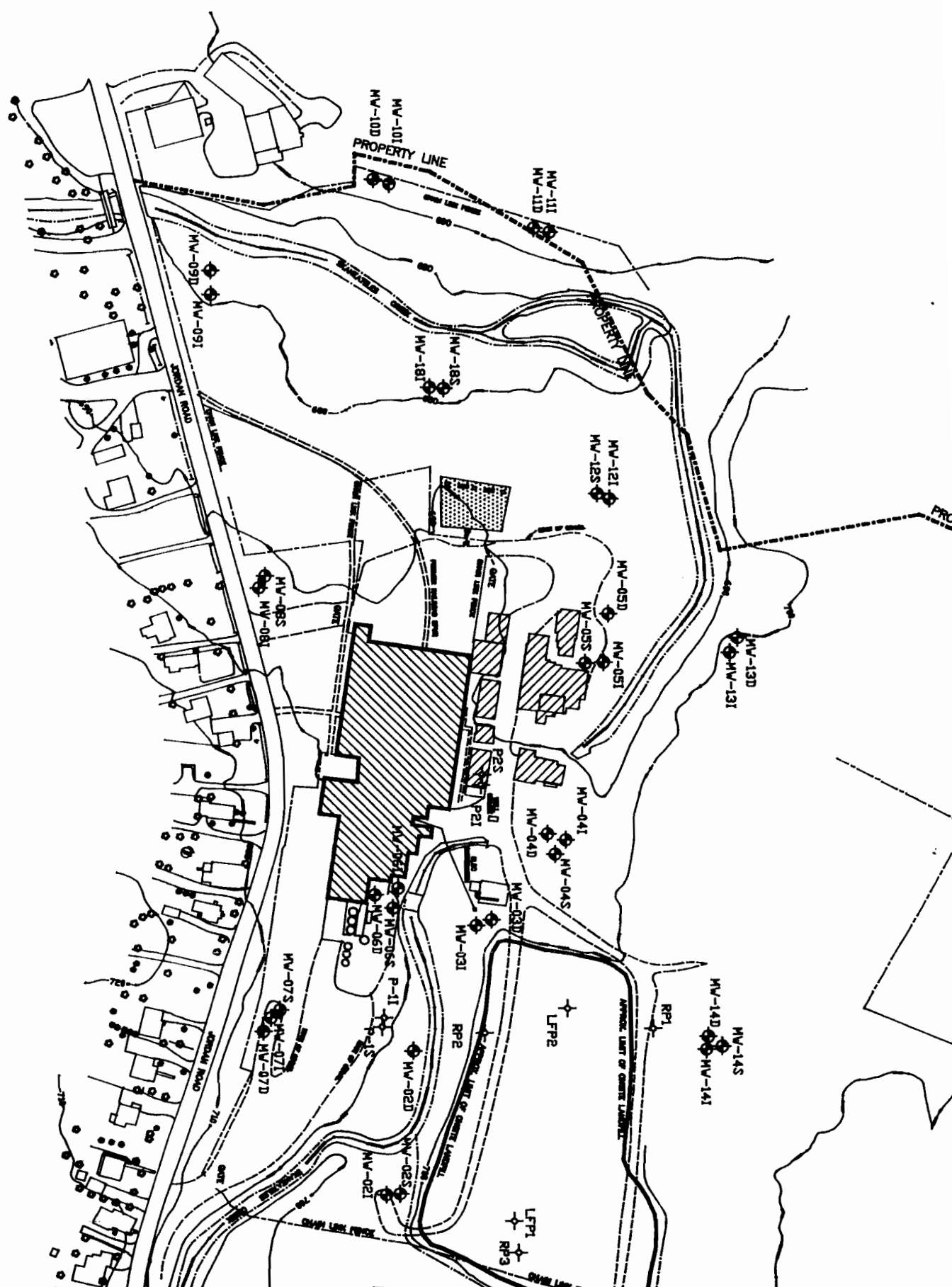


TABLE 1-1 BEDROCK STRATIGRAPHY OF ONONDAGA COUNTY
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Period	Group	Formation	Thickness (ft)	Lithology
Upper Devonian	Genessee	Sherburne	200-220	Shale and siltstone
		Genessee	70-80	Black shale
		Tully	30	Limestone
Middle Devonian	Hamilton	Moscow	190	Shale and siltstone
		Ludlowville	230-270	Shale and siltstone
		Skaneateles	290-390	Shale and siltstone
	Helderberg	Marcellus	290-360	Black shale
		Onondaga	63-88	Limestone
		Oriskany	0-20	Sandstone
		Manlius	47-129	Limestone
		Rondout	30-40	Dolostone
Upper Silurian	Salina	Cobleskill	15-25	Dolostone
Middle Silurian		Bertie	64-97	Dolostone, evaporites
		Camillus	160-190	Shale
		Syracuse	150-220	Dolostone, shale, evaporites
		Vernon	500-600	Red and green shale
		Lockport	Sconodoo	120-140
	Clinton	Rochester	120-150	Shale
		Irondequoit	0-25	Limestone
		Williamson	40-50	Green shale
		Sasquoit	30-70	Shale
NOTE: Units of interest for SMC site are shaded.				
Source: Winkley 1989.				

**TABLE 1-2 BEDROCK HYDROSTRATIGRAPHIC UNITS OF ONONDAGA COUNTY
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Hydrostratigraphic Unit	Formation	Thickness (ft)	Lithology
Devonian Shale Unit	Sherburne	200-220	Shale and siltstone
	Genesee	70-80	Black shale
	Tully	30	Limestone
	Moscow	190	Shale and siltstone
	Ludlowville	230-270	Shale and siltstone
	Skaneateles	335-435	Shale and siltstone
	Marcellus	241-318	Black shale
Silurian-Devonian Carbonate Unit	Onondaga	63-88	Limestone
	Oriskany	0-20	Sandstone
	Manlius	47-129	Limestone
	Rondout	30-40	Dolostone
	Cobleskill	15-25	Dolostone
Post-Vernon Evaporitic Unit	Bertie	64-97	Dolostone, evaporites
	Camillus	160-190	Shale
	Syracuse	150-220	Dolostone, shale, evaporites
Vernon Shale Unit	Vernon	500-600	Red and green shale
Lockport Carbonate Unit	Sconondoa	120-140	Dolostone and limestone
Clinton Shale Unit	Rochester	120-150	Shale
	Irondequoit	0-25	Limestone
	Williamson	40-50	Green shale
	Sasquoit	30-70	Shale
NOTE: Units of interest for SMC site are shaded.			
Source: Winkley 1989.			

TABLE 2-1 SUMMARY OF ROUND 1 SAMPLING LOCATIONS
AND CHEMICAL ANALYSES
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Samples	Matrix	Full TCL	Toluic Acid	Water Quality Parameter	Engineering Parameter	TOC
SOIL BORINGS						
Landfill	Soil	18	18	0	9	17
Perimeter	Soil	14	14	0	10	14
North area	Soil	1	1	0	0	0
Dups	Soil	2	4	0	0	0
FB	Aqueous	4	4	0	0	0
TB	Aqueous	0	0	0	0	0
GROUND WATER						
Overburden	Aqueous	6	6	6	0	0
Bedrock	Aqueous	20	20	20	0	0
Dups	Aqueous	2	2	2	0	0
FB	Aqueous	6	6	6	0	0
TB	Aqueous	3	3	0	0	0
NOTE: BNA = Base-Neutral/Acid Extractable Organics PCB = Polychlorinated Biphenyls TAL = Target Analyte List TCL = Target Compound List TOC = Total Organic Carbon VOA = Volatile Organic Analyte. Full TCL analysis includes TCL VOAs, TCL BNAs, TCL pesticide/PCBs, and TAL metals as per the NYSDEC Analytical Services Protocols. Water quality parameters include chloride, fluoride, ammonia, nitrate, sulfate, alkalinity, hardness, total suspended solids, and dissolved organic carbon. Engineering parameters include grain size analyses, and hydrometer; Atterberg limits if 20 percent of sample is less than a 200 sieve size. Site-specific VOAs include tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, toluene, and xylenes. Site-specific phenols include 1-phenylethanone, o-methyl benzyl alcohol, p-methylbenzyl alcohol, 4-methyl phenol, phenol, and tetramethylbutyl phenol.						

TABLE 2-1 (Continued)

Samples	Matrix	Full TCL	Toluic Acid	Water Quality Parameter	Engineering Parameter	TOC
SURFACE WATER						
Stream water	Aqueous	4	4	4	0	0
Dups	Aqueous	1	1	1	0	0
FB	Aqueous	1	1	1	0	0
TB	Aqueous	1	1	0	0	0
STREAM SEDIMENTS						
Sediments	Sediment	4	4	0	0	4
Dups	Sediment	1	1	0	0	1
FB	Aqueous	1	1	0	0	1
TB	Aqueous	0	0	0	0	0
BASEMENT SEEP - ROUND 1						
Seep fluid	Aqueous	1	1	1	0	0
Dups	Aqueous	1	1	1	0	0
DB	Aqueous	1	1	1	0	0
TB	Aqueous	1	0	0	0	0
STREAM SEEP						
Fluid	Aqueous	4	4			
Sediment	Sediment	1	1			

**TABLE 2-2 SUMMARY OF ROUND 2 SAMPLING LOCATIONS AND CHEMICAL ANALYSES
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Samples	Matrix	TCL VOA	TCL BNA	TCL Pest/PCBs	Toluic Acid	TAL Inorganics	TOC
AMBIENT AIR	Air	6 ^a					
NORTH AREA SOIL BORINGS							
Samples	Soils	16	16	16	16	16	4
FB	Aqueous	2	2	2	2	2	0
GROUND WATER							
Landfill piezometer	Aqueous	2	2	2	2	2	0
Overburden	Aqueous	7	7	7	7	7	0
Shallow Bedrock	Aqueous	16	16	16	16	16	0
Deep Bedrock	Aqueous	6	6	6	6	6	0
Sludge Basins	Aqueous	3	3	3	3	3	0
Dups	Aqueous	4	4	4	4	4	0
TBs	Aqueous	8	0	0	0	0	0
FBs	Aqueous	4	4	4	4	4	0
SURFACE WATER							
Stream water	Aqueous	4	4	4	4	4	0
Dup	Aqueous	1	1	1	1	1	0
FBs	Aqueous	1	1	1	1	1	0
TBs	Aqueous	1	0	0	0	0	0
STREAM SEDIMENT							
Sediments	Sediment	4	4	4	4	4	0
Dup	Sediment	1	1	1	1	1	0
FBs	Aqueous	1	1	1	1	1	0
CREEK SEEPS							
Seep fluid	Aqueous	4	4	4	4	4	0
Dup	Aqueous	1	1	1	1	1	0
FB	Aqueous	1	1	1	1	1	0
TB	Aqueous	1	0	0	0	0	0
BASEMENT SEEP							
Seep fluid	Aqueous	1	1	1	1	1	0
Dup	Aqueous	1	1	1	1	1	0
FB	Aqueous	1	1	1	1	1	0
TB	Aqueous	1	0	0	0	0	0
SEPTIC FLUID							
Fluid	Aqueous	1	1	1	1	1	0
RACEWAY							
Fluid	Aqueous	1	1	1	1	1	0

a. Sample analyzed by EPA Method TO-1 for TCL VOAs.

NOTE:	BNA	=	Base-Neutral/Acid Extractable Organics	TCL	=	Target Compound List
	PCB	=	Polychlorinated Biphenyls	TOC	=	Total Organic Carbon
	TAL	=	Target Analyte List	VOA	=	Volatile Organic Analyte

TABLE 2-3 TEST PIT CONSTRUCTION SUMMARY
STAUFFER MANAGEMENT COMPANY
REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Test Pit No.	Location (ft) ^a	Test Pit Dimensions			
		Length (ft)	Width (ft)	Depth (ft)	Depth to Water (ft)
TP-1	410N, 80E	12.5	5	11	7
TP-2	190N, 130E	14	7	13	5.5-6
TP-3	50N, 160E	12.5	10.5	12	6
TP-4	70N, 80E	13	5.5	9	4
a. Coordinates based on a 50 × 20 ft grid established by EA with the origin (0.0) located in the southwest corner of the landfill at the intersection of the chain-link fence and the north-south trending treeline west of the landfill.					

**TABLE 2-4 SUMMARY OF LANDFILL BORINGS PROGRAM SAMPLING SCHEME,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Boring Location	Boring Depth (ft bgs)	Depth to Water (ft bgs)	Analytical Sampling ID	Analytical Sample Interval (ft)	Sample Description
SB-16A	7	6	SMC-SB16-01A	3-4	Soil cap
SB-16B	17*	6	SMC-SB16-02A	5.5-7	Fill in vadose zone
SB-17	19.5*	7	SMC-SB17-01A	4-6	Soil cap/fill
SB-18	13.7*	7	SMC-SB18-01A	0-2	Clay cap
SB-18			SMC-SB18-02A	5-7	Fill in vadose zone
SB-18			SMC-SB18-03A	10-12	Fill below WT (HNu 20 ppm)
SB-19	14.1*		SMC-SB19-01A	5-7	Fill (sample appears to be activated carbon, HNu 120 ppm)
SB-20	14.5*	7	SMC-SB20-01A	3-5	Fill in vadose zone (sample appears to be activated carbon, HNu 12 ppm)
SB-21	15*	4	SMC-SB21-01A	12.5-14.5	Natural silty clay below fill
SB-22	13.25*	4.5	SMC-SB22-01A	10-12	Fill below WT
SB-23	16		SMC-SB23-01A	10-12	Natural silty clay below fill
SB-24	18.75*	4	SMC-SB24-01A	7-9 ^b	Fill below WT (HNu 5 ppm)
SB-25	9.7*	4.5	SMC-SB25-01A	8-10	Fill (black) below WT (HNu 13 ppm)
SB-26	6		SMC-SB26-01A	4-6	Black material (appears to be activated carbon, HNu 13 ppm)
SB-27A	6		SMC-SB27-01A	5	White material (collected for volatile analysis only, HNu 400 ppm)
SB-27A			SMC-SB27-02A	6	Black material (collected for volatile analysis only, HNu 130 ppm)
SB-27B	6		---	---	No sample collected for analysis
SB-26C	6		SMC-SB27-03A	4-6	Black material (collected for analysis other than volatiles, HNu 120 ppm)
SB-27D	6		SMC-SB27-04A	4-4.5	White material (collected for analysis other than volatiles, HNu 400 ppm)
a. Refusal encountered at the noted depth.					
b. Collected duplicate sample "SMC-SBU-02A."					
NOTE: bgs = Below ground surface; WT = Water table.					

**TABLE 2-5 SUMMARY OF LANDFILL PERIMETER BORINGS
PROGRAM SAMPLING SCHEME,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Location No.	No. of Borings	Depths (ft) at Each Boring Location							Sample Interval (ft)	Sample ID
		A	B	C	D	E	F	G		
SB-1	7	13.5	4	3	4	6.5	8	8	No Sample	---
SB-2	2	4.5	8 ^a						3.5-5.5	SMC-SB02-01A
SB-3	1	6 ^a							3.5-5.0	SMC-SB03-01A
SB-4	3	6	4	10 ^a					4.5-6.5	SMC-SB04-01A
SB-5	2	2.5	8 ^b						0-1.5	SMC-SB05-01A
SB-6	1	3 ^a							1-3	SMC-SB06-01A
SB-7	3	5	4	3 ^a					0.5-1.5	SMC-SB07-01A
SB-8	3	6.5	4	3 ^a					1-3	SMC-SB08-01A
SB-9	2	6	7 ^a						2-4	SMC-SB09-01A
SB-10	2	6	15.5 ^a						3.5-5.5	SMC-SB10-01A
SB-11	2	12 ^a	8						5-7	SMC-SB11-01A
SB-12	2	20 ^a	8						4-6	SMC-SB12-01A
SB-13	2	8	8 ^a						1.5-3.5	SMC-SB13-01A
SB-14	1	8 ^a							4-6	SMC-SB14-01A
SB-15	1	8.5 ^a							6-8	SMC-SB15-01A

a. Analytical sample collected from this boring location.
b. Collected duplicate sample "SMC-SBU-01A" for analysis from this boring location.

NOTE: There were no detectable readings on the HNu.

**TABLE 2-6 SUMMARY OF BORINGS IN AREA NORTH OF MAIN PLANT BUILDING
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Location No.	Boring Depth (ft bgs)	Analytical Soil Sample Interval (ft bgs)	HNu/OVA Reading (ppm)	Comments
MW5B-1	6	3.0-5.0	150/NA	Dark brown silt ^a
MW5SB-01	13.0	4.5-6.5	^b / > 1,000	Black stained soils ^a
MW5SB-02	6.5	2.0-4.0	1.2/2.8	Filled soil ^c
MW5SB-03	8.5	0.5-2.5	0.6/0.6	Filled soil
MW5SB-04	8.5	4.0-6.0	^b /50	Brown silt and fine sand ^a
MW5SB-05	18.0	4.5-6.5	130/ > 1,000	Black stained soil ^a
MW5SB-06	18.0	10-12	0.1/11	Brown fine sand ^a
MW5SB-07	7.0	2.5-4.5	0.0/0.1	Fine sand and silt
MW5SB-08	14.5	10-12	1.3/68	Brown sand with thin black seams ^a
MW5SB-09	12.0	4.5-6.5	4.7/120	Filled soil ^a
MW5SB-10	16	4-6	0.0	Red-brown sandy clay ^a
MW5SB-11	10.5	6-8	3.0	Brown clayey silt ^a
MW5SB-12	6.5	NA	7.0 (4-6 ft)	No sample collected for analysis
MW5SB-12A	11.0	2-4	6.0	Gray silt ^a
MW5SB-13	8.0	NA	100 (4-6 ft)	No sample collected for analysis
MW5SB-13A	5.5	2-4	0.0	Red-brown clay ^a
MW5SB-14	4.0	0-2	0.0	Brown organic silt ^a
MW5SB-15	9.7	6-8	20.0	Gray and brown filled soil ^a
MW5SB-16	10.3	8-10	0.8	Black and gray silt ^a
a. Saturated sample. b. No HNu reading due to wet, rainy weather. c. Fill soils consisted of mixed debris (cinders, brick, glass, slag, wood, and metal) in a silt, sand, and gravel matrix. Occasional rust-colored sandy layers. NOTE: bgs = Below ground surface; NA = Not applicable.				

**TABLE 2-7 OVERBURDEN MONITORING WELL/PIEZOMETER
CONSTRUCTION SUMMARY,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

[illegible]

**TABLE 2-8 UPPER BEDROCK MONITORING WELL/PIEZOMETER CONSTRUCTION SUMMARY,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Monitoring Well/Piezometer No.	Date of Completion	Well Casing Type	Well Casing Diameter (in.)	Drilling Method	Bedrock Depth (ft bgs)	Surface Casing Depth (ft bgs)	Finished Depth (ft bgs)	Screened Interval (ft bgs)
MW-01I	5 FEB 1992	CS and SS	4	AR through steel casing	35.0	39.0	46.0	40.9-45.9
MW-02I	20 JAN 1992	CS and SS	4	WR through HSA	20.0	23.0	29.8	24.0-29.0
MW-03I	31 OCT 1991	CS and SS	4	AR	4.5	2.5 ^a	11.0	6.5-11.5
MW-04I	7 NOV 1991	CS and SS	4	AR	6.5	9.0	16.0	10.5-15.5
MW-05I	14 JAN 1992	CS and SS	4	WR through HSA	15.5	20.0	27.0	21.5-26.5
MW-06I	7 NOV 1991	CS and SS	4	AR	8.5	12.0	19.0	13.6-18.6
MW-07I	27 JAN 1992	CS and SS	4	AR through steel casing	25.5	29.5	38.1	32.3-37.4
MW-08I	8 NOV 1991	CS and SS	4	AR	11.5	14.5	21.5	16.0-21.0
MW-09I	13 NOV 1991	CS and SS	4	AR	4.5	7.4	14.7	9.5-14.5
MW-10I	17 JAN 1992	CS and SS	4	AR	11.5	15.7	32.7	27.5-32.5
MW-11I	17 JAN 1992	CS and SS	4	AR	10.5	14.7	35.3	30.0-35.0
MW-12I	7 JAN 1993	CS and SS	4	AR	19.0	22.3	33.9	28.8-33.8
MW-13I	6 JAN 1993	CS and SS	4	AR	29.5	34.0	49.0	43.8-48.8
MW-14I	8 JAN 1993	CS and SS	4	AR	11.5	14.5	35.5	30.5-35.5 ^b
MW-15I	15 SEP 1993	OH	6	AR through steel casing	38.0	44.0	65.0	44-65 ^c
MW-16I	20 SEP 1993	OH	6	AR through steel casing	40.0	44.0	65.25	44-65.25 ^c
MW-17I	22 SEP 1993	OH	6	AR through steel casing	31.0	35.5	61.0	35.5-61.0 ^c
MW-18I	22 SEP 1993	CS and SS	4	AR through steel casing	11.0	15.0	22.05	17.0-22.0
EAP-01I	23 DEC 1991	CS and SS	2	HQ rock core through HSA	12.0	16.0	23.0	17.5-22.5
EAP-02I	23 DEC 1991	CS and SS	2	HQ rock core through HSA	9.0	13.0	20.0	14.5-19.5
RP-01	10 JAN 1992	CS and SS	2	Retrofit existing well	8.0	10.0	23.0	10.1-15.1
RP-02	11 NOV 1991	CS and SS	2	Retrofit existing well	10.0	12.0	20.0	13.0-18.0
RP-03	6 JAN 1992	CS and SS	2	HQ rock core through HSA	25.5	28.5	35.5	30.0-35.0

a. Surface casing was not installed into bedrock due to the overburden being entirely in the vadose zone.
b. Sand pack was installed from 17.0 to 35.5 ft bgs.
c. Well completed at 6 in. open hole, no well screen set.

NOTE: AR = Air rotary; bgs = Below ground surface; CS = Carbon steel; HSA = Hollow-stem auger;
OH = Open bedrock hole; SS = Stainless steel; WR = Water rotary.

**TABLE 2-9 DEEP BEDROCK MONITORING WELL CONSTRUCTION SUMMARY,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Monitoring Well No.	Date of Completion	Well Type	Open Hole Diameter (in.)	Drilling Method	Bedrock Depth (ft bgs)	Surface Casing Depth (ft bgs)	Finished Depth (ft bgs)
MW-01D	30 MAR 1992	Open Hole	8	AR through Spin Casing	34.0	63.0	91.0
MW-02D	6 APR 1992	Open Hole	8	AR through Spin Casing	10.5	36.0	75.0
MW-03D	3 APR 1992	Open Hole	8	AR through Spin Casing	4.5	32.0	75.0
MW-04D	1 APR 1992	Open Hole	8	WR through Spin Casing	8.0	26.0	75.0
MW-05D	4 JAN 1992	Open Hole	8	AR through Spin Casing	13.0	40.0	75.0
MW-06D	5 APR 1992	Open Hole	8	AR through Spin Casing	11.0	40.0	82.0
MW-07D	4 JAN 1993	Open Hole	8	AR through Spin Casing	25.0	51.0	78.0
MW-09D	7 APR 1992	Open Hole	8	AR through Spin Casing	5.0	32.0	62.0
MW-10D	3 JAN 1992	Open Hole	8	AR through Spin Casing	11.5	46.0	77.0
MW-11D	3 JAN 1992	Open Hole	8	AR through Spin Casing	10.5	50.0	77.0
MW-13D	21 SEP 1993	Open Hole	8	AR through Spin Casing	29.5	65.0	100.5
MW-14D	28 DEC 1992	Open Hole	8	AR through Spin Casing	11.5	41.0	87.0
MW-15D	16 SEP 1993	Open Hole	6	AR through Spin Casing	39.0	80.0	125.0
MW-16D	20 SEP 1993	Open Hole	6	AR through Spin Casing	38.0	78.8	105.5
MW-17D	21 SEP 1993	Open Hole	6	AR through Spin Casing	31.0	71.8	112.0

NOTE: AR = Air rotary; bgs = Below ground surface; WR = Water rotary.

TABLE 3-1 LIST OF COMMON AND SCIENTIFIC NAMES
OF FISHES OBSERVED DURING BAIT SEINE COLLECTION
ACTIVITIES WITHIN ONSITE PORTIONS OF THE
SKANEATELES CREEK, OCTOBER 1991

Common Name	Scientific Name
Eastern blacknose dace	<i>Rhinichthys atratulus</i>
Longnose dace	<i>Rhinichthys cataractae</i>
Fallfish	<i>Semotilus corporalis</i>
Cutlips minnow	<i>Exoglossum maxillingua</i>
Bridle shiner	<i>Notropis bifrenatus</i>
Spottail shiner	<i>Notropis hudsonius</i>
White sucker	<i>Catostomus commersoni</i>

TABLE 3-2 SUMMARY OF 1992 (PHASE I) OVERBURDEN MONITORING
WELL GROUND-WATER ELEVATION DATA,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Well No.	Well Casing Elevation (MSL)	1 MAY 1992		24 JUN 1992		1 DEC 1992	
		Water Level (ft BTOC)	Water Level Elevation (MSL)	Water Level (ft BTOC)	Water Level Elevation (MSL)	Water Level (ft BTOC)	Water Level Elevation (MSL)
MW-1S	704.98	14.98	690.00	15.90	689.08	11.07	693.91
MW-2S	700.35	3.99	696.36	5.65	694.70	3.32	697.03
MW-4S	693.89	1.98	691.91	2.25	691.64	1.40	692.49
MW-6S	701.72	8.90	692.82	8.95	692.77	8.21	693.51
MW-7S	710.72	18.94	691.78	17.37	693.35	18.90	691.82
MW-8S	693.81	10.03	683.78	9.25	684.56	10.10	683.71
EAP-1S	704.70	10.14	694.56	DRY	---	9.32	695.38
EAP-2S	693.78	6.60	687.18	6.65	687.13	6.52	687.26
LF-P1	708.48	6.34	702.14	6.65	701.83	6.70	701.78
LF-P2	709.18	6.63	702.55	6.75	702.43	6.11	703.07

NOTE: BTOC = Below top of casing; MSL = Mean sea level.
Dashes (---) indicate not calculated since piezometer was dry.

TABLE 3-3 SUMMARY OF 1992 (PHASE I) UPPER BEDROCK MONITORING
WELL GROUND-WATER ELEVATION DATA,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Well No.	Well Casing Elevation (MSL)	1 MAY 1992		24 JUN 1992		1 DEC 1992	
		Water Level (ft BTOC)	Water Level Elevation (MSL)	Water Level (ft BTOC)	Water Level Elevation (MSL)	Water Level (ft BTOC)	Water Level Elevation (MSL)
MW-1I	704.23	18.47	685.76	19.65	684.58	16.05	688.18
MW-2I	699.51	3.47	696.04	5.15	694.36	2.84	696.67
MW-3I	699.72	4.50	695.22	5.20	694.52	4.20	695.52
MW-4I	693.66	4.59	689.07	4.80	688.86	4.25	689.41
MW-5I	688.73	6.19	682.54	6.10	682.63	5.50	683.23
MW-6I	700.96	10.75	690.21	10.80	690.16	10.75	690.21
MW-7I	710.91	19.35	691.56	19.80	691.11	19.30	691.61
MW-8I	694.99	11.81	683.18	12.29	682.70	11.80	683.19
MW-9I	681.02	4.58	676.44	6.70	674.32	4.00	677.02
MW-10I	697.90	28.88	669.02	29.45	668.45	28.81	669.09
MW-11I	698.46	31.35	667.11	33.90	664.56	29.15	669.31
RP-1	704.40	7.50	696.90	8.65	695.75	6.92	697.48
RP-2	700.90	4.93	695.97	5.60	695.30	4.05	696.85
RP-3	705.40	8.02	697.38	9.48	695.92	7.27	698.13
EAP-1I	704.94	12.07	692.87	11.66	693.28	10.55	694.39
EAP-1I	694.42	6.75	687.67	6.55	687.87	6.42	688.00

NOTE: BTOC = Below top of casing; MSL = Mean sea level.

TABLE 3-4 SUMMARY OF 1993 (PHASE II) OVERBURDEN MONITORING WELL/PIEZOMETER WATER LEVEL DATA
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION, SKANEATELES FALLS, NEW YORK

Well/ Piezometer No.	Well Casing Elevation (MSL)	3 MAY 1993		27 MAY 1993		17 JUN 1993		29 JUL 1993		25 AUG 1993		23 SEP 1993	
		Water Level* (ft BTOC)	Water Level Elevation (MSL)	Water Level (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)
MW-01S	704.98	5.05	699.93	10.92	694.06	14.65	690.33	21.00 (DRY)	NA	21.00 (DRY)	NA	21.00 (DRY)	NA
MW-02S	700.35	2.20	698.15	3.45	696.90	4.77	695.58	7.30	693.05	7.18	693.17	7.78	692.57
MW-04S	693.89	1.45	692.44	2.02	691.87	2.10	691.79	3.25	690.64	3.28	690.61	3.60	690.29
MW-05S	689.47	5.17	684.30	6.15	683.32	6.56	682.91	6.92	682.55	6.63	682.84	6.94	682.53
MW-06S	701.72	7.85	693.87	8.20	693.52	8.28	693.44	8.50	693.22	8.03	693.69	8.73	692.99
MW-07S	710.72	17.52	693.20	17.80	692.92	18.90	691.82	20.00	690.72	20.05	690.67	20.20	690.52
MW-08S	693.81	10.10	683.71	10.40	683.41	10.52	683.29	10.80	683.01	11.46	682.35	10.75	683.06
MW-12S	686.63	4.56	682.07	6.15	680.48	6.66	679.97	7.10	679.53	7.05	679.58	7.15	679.48
MW-14S	709.83	7.80	702.03	12.60	697.23	14.72	695.11	(b)	(b)	14.50 (DRY)	NA	14.50 (DRY)	NA
MW-18S	684.78	(b)	(b)	(b)	(b)	6.12	678.66	6.90	677.88	6.10	678.68	6.73	678.05
LFP-01	708.48	6.55	701.93	6.75	701.73	6.85	701.63	7.05	701.43	7.10	701.38	7.15	701.33
LFP-02	709.18	5.50	703.68	6.35	702.83	6.73	702.45	7.27	701.91	7.45	701.73	7.55	701.63
EAP-01S	704.70	8.05	696.65	8.60	696.10	9.95	694.75	(DRY)	NA	(DRY)	NA	10.65	694.05
EAP-02S	693.78	5.80	687.98	6.50	687.28	6.73	687.05	6.80	686.98	6.87	686.91	6.40	687.38

a. Water level measured.

b. Well not installed during monitored period.

NOTE: BTOC = Below top of casing; MSL = Mean sea level; NA = Not applicable.

**TABLE 3-5 SUMMARY OF 1993 (PHASE II) UPPER BEDROCK MONITORING WELL/PIEZOMETER WATER LEVEL DATA
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION, SKANEATELES FALLS, NEW YORK**

Well/ Piezometer No.	Well Casing Elevation (MSL)	3 MAY 1993		27 MAY 1993		17 JUN 1993		29 JUL 1993		25 AUG 1993		23 SEP 1993	
		Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level Elevation* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)
MW-011	704.23	5.05	699.18	15.30	688.93	19.52	684.71	22.70	681.53	23.37	680.86	24.17	680.06
MW-021	699.51	1.70	697.81	2.87	696.64	4.32	695.19	6.80	692.71	6.75	692.76	7.23	692.28
MW-031	699.72	3.65	696.07	4.50	695.22	5.20	694.52	6.02	693.70	5.83	693.89	6.55	693.17
MW-041	693.66	4.00	689.66	4.60	689.06	5.05	688.61	5.80	687.86	5.50	688.16	6.10	687.56
MW-051	688.73	4.90	683.83	6.00	682.73	6.50	682.23	6.95	681.78	6.65	682.03	6.82	681.91
MW-061	700.96	10.12	690.84	10.60	690.36	10.95	690.01	11.15	689.81	10.78	690.18	11.05	689.91
MW-071	710.91	17.95	692.96	18.20	692.71	19.30	691.61	20.40	690.51	20.45	690.46	20.63	690.28
MW-081	694.99	11.15	683.84	12.25	682.74	12.41	682.58	12.75	682.24	12.33	682.66	12.70	682.29
MW-091	681.02	1.92	679.10	4.22	676.80	6.11	674.91	7.05	673.97	6.30	674.72	8.35	672.67
MW-101	697.90	16.70	681.20	24.85	673.05	29.40	668.50	30.47	667.43	30.30	667.60	31.25	666.65
MW-111	698.46	17.35	681.11	26.87	671.59	34.00	664.46	34.00	664.46	33.70	664.76	33.85	664.61
MW-121	686.47	4.00	682.47	14.45	672.02	21.95	664.52	26.10	660.37	23.80	660.67	22.45	664.02
MW-131	698.68	14.80	683.88	28.65	670.03	36.35	662.33	40.83	657.85	40.10	658.58	37.80	660.88
MW-141	707.67	10.35	697.32	16.15	691.52	20.51	687.16	23.25	684.42	23.02	684.65	24.41	683.26
MW-151	728.58	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	65.00 (DRY)	NA
MW-161	705.60	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	40.82	666.85
MW-171	712.40	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	60.00 (DRY)	NA
MW-181	684.88	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	13.25	671.63
EAP-011	704.69	9.35	695.34	6.75	697.94	11.17	693.52	12.46	692.23	(b)	704.69	12.20	692.49
EAP-021	694.42	5.92	688.50	6.55	688.07	6.80	687.62	6.90	687.52	(b)	694.42	6.55	687.87
RP-01	704.69	6.20	698.49	8.12	696.57	9.30	695.39	9.35	695.34	(b)	704.69	11.00	693.69
RP-02	700.90	3.15	697.75	4.60	696.30	5.67	695.23	6.70	694.20	(b)	700.90	6.85	694.05
RP-03	705.40	6.15	699.25	7.67	697.73	9.35	696.05	11.55	693.85	(b)	705.40	12.55	692.85

a. Water level measured.

b. Well not installed during monitored period.

NOTE: BTOC = Below top of casing; MSL = Mean sea level; NA = Not applicable.

TABLE 3-6 SUMMARY OF 1992 (PHASE I) DEEP BEDROCK MONITORING
WELL GROUND-WATER ELEVATION DATA
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Well No.	Well Casing Elevation (MSL)	1 MAY 1992		24 JUN 1992		1 DEC 1992	
		Water Level (ft BTOC)	Water Level Elevation (MSL)	Water Level (ft BTOC)	Water Level Elevation (MSL)	Water Level (ft BTOC)	Water Level Elevation (MSL)
MW-1D	704.91	64.71	640.20	75.90	629.01	50.20	654.71
MW-2D	700.40	60.88	639.52	69.35	631.05	48.15	652.25
MW-3D	699.57	60.27	639.30	70.97	628.60	48.36	651.21
MW-4D	694.02	55.47	638.55	65.80	628.22	43.95	650.07
MW-5D	688.50	50.60	637.90	60.25	628.25	39.45	649.05
MW-6D	705.80	65.82	639.26	76.50	628.58	53.87	651.21
MW-9D	681.71	38.57	643.14	44.70	637.01	30.90	650.81
MW-10D	699.18	60.25	638.93	69.55	629.63	51.15	648.03
MW-11D	698.46	60.15	638.31	69.51	628.95	51.00	647.46

NOTE: BTOC = Below top of casing; MSL = Mean sea level.

**TABLE 3-7 SUMMARY OF DEEP MONITORING WELL WATER LEVEL DATA
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Well/ Piezometer No.	Well Casing Elevation (MSL)	3 MAY 1993		17 JUN 1993		27 JUL 1993		25 AUG 1993		23 SEP 1993	
		Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)	Water Level (ft BTOC)	Water Level Elevation* (MSL)	Water Level* (ft BTOC)	Water Level Elevation* (MSL)
MW-01D	704.91	16.22	688.69	43.45	661.46	67.46	637.45	80.50	624.41	86.70	618.21
										93.00 (DRY)	NA
MW-02D	700.40	15.61	684.79	38.55	661.85	60.75	639.65	71.35	629.05	71.20	629.20
										77.00 (DRY)	NA
MW-03D	699.57	16.20	683.37	41.46	658.11	60.20	639.37	76.70	622.87	73.70	625.87
										73.82	625.75
MW-04D	694.02	11.37	682.65	32.65	661.37	54.80	639.22	70.00	624.02	76.55	617.47
										77.00 (DRY)	NA
MW-05D	688.50	7.25	681.25	27.70	660.80	49.27	639.23	64.65	623.85	71.85	616.65
										76.00 (DRY)	NA
MW-06D	705.08	21.77	683.31	44.65	660.43	65.75	639.33	80.95	624.13	84.00 (DRY)	NA
										84.00 (DRY)	NA
MW-07D	711.46	24.80	686.66	41.70	669.76	56.30	655.16	59.22	652.24	59.60	651.86
										59.65	651.81
MW-09D	681.71	7.35	674.36	23.05	658.66	39.70	642.01	45.35	636.36	51.80	629.91
										52.45	629.26
MW-10D	699.18	22.15	677.03	39.55	659.63	59.35	639.83	73.10	626.08	78.60	620.58
										79.00 (DRY)	NA
MW-11D	698.46	20.75	677.71	38.82	659.64	59.45	639.01	74.23	624.23	79.50 (DRY)	NA
										79.50 (DRY)	NA
MW-13D	699.86	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	610.11
										89.75	610.11
MW-14D	706.69	23.75	682.94	46.45	660.24	68.00	638.69	83.55	623.14	77.45	629.24
										88.00 (DRY)	NA
MW-15D	729.00	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	611.00
										118.00	611.00
MW-16D	705.64	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	612.34
										93.30	612.34
MW-17D	712.06	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	612.11
										99.95	612.11

a. Water level measured.

b. Well not installed during monitored period.

NOTE: BTOC = Below top of casing; MSL = Mean sea level; NA = Not applicable.

TABLE 4-1 SUMMARY OF ORGANIC ANALYTES IDENTIFIED IN SOIL VAPOR,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Range ^a	Frequency	Mean ^b
Toluene	ND-3.0	9/53	0.32
Ethylbenzene	ND-5.7	7/53	0.45
<i>m/p</i> -xylene	ND-91.4	23/53	3.46
<i>o</i> -xylene	ND-417.2	22/53	13.58
Methylene chloride	ND-4.9	11/53	0.39
<i>cis</i> -1,2-dichloroethene	ND-28.2	10/53	0.66
<i>trans</i> -1,2-dichloroethene	ND-6.2	5/53	1.69
Trichloroethane	ND-2.2	17/53	0.18
Trichloroethene	ND-1	11/53	0.11
Tetrachloroethene	ND-1.8	28/53	0.26
a. All concentration units are in ppm_v. b. Mean calculated by setting non-detects at 0.5*IDL. NOTE: ND = Not detected.			

TABLE 4-3 SUMMARY OF ORGANIC ANALYSIS RESULTS
OF LANDFILL PERIMETER SOIL BORINGS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analyte	Range ^a	Frequency of Detection	Mean ^{a,b}
VOLATILES			
Acetone	ND-58	12/15	15.4
Methylene chloride	ND-3	2/15	—
2-Butanone	ND-25	5/15	7.9
Tetrachloroethene	ND-2	1/15	—
Toluene	ND-4	2/15	3.1
Ethylbenzene	ND-2	1/15	—
Xylenes (total)	ND-670	7/15	52.5
SEMI-VOLATILES			
2-methyl phenol	ND-40	2/15	—
4-methyl phenol	ND-29	1/15	—
Naphthalene	ND -180	4/15	170
2-Methylnaphthalene	ND-140	3/15	—
Dimethylphthalate	ND-19	1/15	—
Acenaphthylene	ND-200	3/15	185
Acenaphthene	ND-92	3/15	—
Dibenzofuran	ND-120	3/15	—
Diethylphthalate	ND-17	1/15	—
Fluorene	ND-250	3/15	187
N-Nitrosodiphenylamine	ND-23	1/15	—
Phenanthrene	ND-1,800	5/15	302
Anthracene	ND-390	4/15	182
Di-n-butyl phthalate	ND-220	3/15	196
Fluoranthene	ND-2,300	5/15	356
Pyrene	ND-2,200	5/15	344
Benzo(a)anthracene	ND-1,500	2/15	309
Bis(2-ethylhexyl)phthalate	ND-110	1/15	—
Chrysene	ND-1,600	3/15	—
Benzo(b)fluoranthene	ND-2,000	4/15	330
Benzo(k)fluoranthene	ND-1,000	3/15	249
Benzo(a)pyrene	ND-1,300	3/15	274
<i>o</i> -Toluic acid	ND-170	3/15	—
<i>m</i> -Toluic acid	ND-120	2/15	—
<i>p</i> -Toluic acid	ND-48	1/15	—
PESTICIDE/PCBs			
4,4'-DDE	ND-36	3/15	7.3
4,4'-DDD	ND-6	1/15	5.0

a. All concentration units are in $\mu\text{g/kg}$ (dry weight)

b. Mean calculated by setting non-detects at 0.5 SQL.

NOTE: ND = Not detected. Dashes (—) indicate mean not reported since the calculated value exceeded the upper observed range due to elevated SQLs in certain samples.

TABLE 4-4 SEMI-VOLATILE TENTATIVELY IDENTIFIED COMPOUNDS
IN THE LANDFILL PERIMETER SOIL BORINGS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Benzene Derivatives and Aromatic Acids
Benzaldehyde, 4-methyl
Phenol, 4-(2,2,3,3-tetramethyl...)
Phenol, 4-nonyl
Phenol, nonyl
Benzaldehyde, 3-methyl oxime
Non-Aromatic Acids
Hexadecanoic acid, dioctyl
Tetradecanoic acid
Octadecanoic acid
Polycyclic Aromatic Hydrocarbons
Naphthalene, 2-phenyl
Phenanthrene, 2,5-dimethyl
Miscellaneous Compounds
Octane, 2,4,6-trimethyl
ethanol, 2,2'-[oxybis(2,1-ethyl ...
2-hexanone, 5-methyl

**TABLE 4-5 SUMMARY OF INORGANIC RESULTS FROM THE LANDFILL PERIMETER SOIL
BORINGS AND COMPARISON TO BACKGROUND CONCENTRATIONS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Analyte	Perimeter Soils		Background Analysis				
	Range ^a	Frequency	Mean ^b	Average Eastern United States ^c	Range United States ^d	Range New York State ^e	Frequency Above New York Background
Aluminum	4,180-19,700	15/15	13,985	33,000	10,000-300,000	1,000-25,000	0/15
Antimony	ND-6.6	8/15	3.3		0.2-10		
Arsenic	2.2-7.8	15/15	4.6	5	0.1-40	3-12	0/15
Barium	35.2-124	15/15	75.0	290	100- 3,000	15-600	0/15
Beryllium	0.31-0.89	15/15	0.63	0.6	0.01-40	0-1.75	0/15
Cadmium	1.6-6.5	15/15	4.4	0.35	0.01-2	0.001-10	0/15
Calcium	2,510-177,000	15/15	57,500	3,400	700-500,000	130-35,000	9/15
Chromium	13.1-26.3	15/15	18.7	33	5-1,500	1.5-40	0/15
Cobalt	5.7-57.7	15/15	14.3	5.9	0.05-65	2.5-60	0/15
Copper	11.8-46.2	15/15	27.3	13	2-250	2-250	0/15
Iron	13,200-36,600	15/15	25,793	14,000	2,000-550,000	2,000-550,000	0/15
Lead	9.2-20.7	12/12 [*]	14.0	14	2-300	10-37	0/15
Magnesium	3,400-30,600	15/15	15,451	2,300	400-9,000	100-5,000	13/15
Manganese	289-1,850	15/15	660	285	20-10,000	50-5,000	0/15
Mercury	ND-0.26	3/15	0.09	0.08	0.01-0.5	0.001-0.2	1/15
Nickel	14.0-48.4	15/15	27.4	12	2-750	0.5-25	10/15
Potassium	566-3,460	15/15	1,748	7,400	80-37,000	8,500-43,000	0/15
Selenium	ND-0.40	2/15	0.08	0.3	0.1-2	0.01-12	0/15
Silver	0.75-4.9	15/15	2.2		0.01-8		
Sodium	90.2-5,190	15/15	914	2,500	150-25,000	150-15,000	0/15
Thallium	ND-0.31	2/15	0.12		0.1-0.8		
Vanadium	8.4-24.3	15/15	17.5	43	3-500	2-270	0/15
Zinc	44.8	1/1 ^f	44.8	40	1-900	9-50	
TOC	2,100-29,500	15/15	9,634		3,800-18,500		
SAMPLES	SB02-01 through SB15-01						

a. Concentration units are mg/kg (ppm).

b. Mean calculated by setting non-detects at 0.5 SQL.

c. Data from McGovern (1987).

d. Data from Bodek et al. (1988).

e. Three lead samples were rejected following data validation review.

f. Remaining zinc sample results rejected following data validation review.

NOTE: TOC = Total organic carbon.

**TABLE 4-6 SUMMARY OF ORGANIC ANALYSIS RESULTS FROM LANDFILL INTERIOR SOIL BORINGS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION, SKANEATELES FALLS, NEW YORK**

Compound	Soil Cap		Clay Cap		Fill		Underlying Clay		Black Waste		White Waste	
	Range ^a	Frequency	Range	Frequency	Range	Frequency	Range	Frequency	Range	Frequency	Range	Frequency
VOLATILES												
Methylene chloride	ND	0/1	ND	0/1	ND-1,300	4/10	ND	0/2	ND-3,600	1/2	ND	0/1
Acetone	26	1/1	ND	0/1	ND-55	3/10	17-43	2/2	ND	0/2	ND	0/1
2-Butanone	12	1/1	ND	0/1	ND-7,100	3/10	ND-35	1/2	ND	0/2	ND	0/1
Benzene	ND	0/1	ND	0/1	ND-19,000	4/10	ND-1	1/2	ND	0/2	ND	0/1
Chloroform	ND	0/1	0.7	1/1	ND-1	1/10	ND-0.8	1/2	ND	0/2	ND	0/1
Chlorobenzene	ND	0/1	ND	0/1	ND-210	3/10	ND	0/2	ND	0/2	ND	0/1
1,2-Dichloroethene	ND	0/1	ND	0/1	ND- 17	1/10	ND	0/2	ND	0/2	ND	0/1
Trichloroethene	ND	0/1	ND	0/1	ND-110	2/10	ND	0/2	ND	0/2	ND	0/1
Tetrachloroethene	ND	0/1	ND	0/1	ND-4	2/10	ND-0.9	1/2	ND-2,700	1/2	ND	0/1
Toluene	ND	0/1	ND	0/1	ND-1,000,000	9/10	ND-16	1/2	27,000-51,000	2/2	330,000	1/1
Ethylbenzene	ND	0/1	ND	0/1	ND-92,000	3/10	ND	0/2	ND	0/2	ND	0/1
Xylenes	ND	0/1	ND	0/1	ND-25,000,000	9/10	10-700	2/2	1,200,000-4,700,000	2/2	21,000,000	1/1
SEMI-VOLATILES												
Phenol	ND	0/1	ND	0/1	ND-300	1/9 ^b	ND	0/2	ND	0/2	ND	0/1
Benzyl alcohol	ND	0/1	ND	0/1	ND- 2,200	3/10	ND	0/2	ND	0/2	ND	0/1
2-Methylphenol	ND	0/1	ND	0/1	ND-250	3/9 ^b	ND-67	1/2	ND-15,000	1/2	ND	0/1
4-Methylphenol	ND	0/1	ND	0/1	ND-470	3/9 ^b	99-110	2/2	ND-10,000	1/2	ND	0/1
Benzoic acid	ND	0/1	ND	0/1	ND- 3,000	1/8 ^b	ND	0/2	ND	0/2	ND	0/1
2,4-dimethylphenol	ND	0/1	ND	0/1	ND- 12,000	1/8 ^b	ND	0/2	ND-110,000	1/2	63,000	1/1
Naphthalene	ND	0/1	ND	0/1	ND-10,000	6/10	ND	0/2	ND	0/2	ND	0/1
4-Chloroaniline	ND	0/1	ND	0/1	ND-25,000	2/10	ND	0/2	ND	0/2	ND	0/1
2-Methylnaphthalene	ND	0/1	ND	0/1	ND-2,400	8/10	ND	0/2	ND	0/2	ND	0/1
Acenaphthylene	ND	0/1	ND	0/1	ND-130	2/10	ND	0/2	ND	0/2	ND	0/1
Acenaphthene	ND	0/1	ND	0/1	ND-130	2/10	ND	0/2	ND	0/2	ND	0/1
Dibenzofuran	ND	0/1	ND	0/1	ND-140	1/10	ND	0/2	ND	0/2	ND	0/1
Fluorene	ND	0/1	ND	0/1	ND-3,600	3/10	ND	0/2	ND	0/2	ND	0/1
N-nitrosodiphenylamine	ND	0/1	ND	0/1	ND-490	1/10	ND	0/2	ND	0/2	ND	0/1
Phenanthrene	ND	0/1	ND	0/1	ND-2,600	6/10	ND	0/2	ND	0/2	ND	0/1
Anthracene	ND	0/1	ND	0/1	ND-250	5/10	ND	0/2	ND	0/2	ND	0/1

a. Concentrations units are µg/kg (ppb).

b. Phenolic results rejected in some samples following data validation review.

NOTE: ND = Not detected.

TABLE 4-6 (Continued)

TABLE 4-7 SEMI-VOLATILE TENTATIVELY IDENTIFIED COMPOUNDS
IN LANDFILL INTERIOR SOIL BORINGS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Benzene Derivatives and Aromatic Acids
Benzamine,N,N-diethyl-3-methyl Benzene,1,1'-(1,2-ethanediyl 1(3H)-Isobenzofuranone Benzene,1,1'-oxybis Benzene,1,2-dimethyl-4-(phenyl Benzaldehyde,4-methyl Benzenemethanol,2-methyl Phenol,2,6-bis(1,1-dimethylene Benzene,1,2,4,5-tetramethyl Benzene,1,4-dichloro-isocyanato 1,4-Benzenedicarboxaldehyde Benzenemethanol,4-methyl-(9c ... Toluic acid, methyl ester isomer Benzenemethanimine
Non-Aromatic Acids
Hexadecanoic acid Octadecanoic acid 9-Hexadecanoic acid Hexadecanoic acid Phosphoric acid,tris(2-ethyl Heptadecane 15-Tetracosenoic acid,methyl Octadecanoic acid Tetradecanoic acid Pentadecanoic acid Octadecanoic acid
Miscellaneous Compounds
Ethanol,2-(hexyloxy) Dodecanamide,N,N-bis(2-hydro 1,2-Propanediol 3-Pentamine 2-Propen-1-one,2-(4-methyl 2-Propen-1-one,3-(4-methyl

**TABLE 4-8 SUMMARY OF INORGANIC RESULTS FROM INTERIOR LANDFILL
SOIL BORINGS AND COMPARISON TO BACKGROUND CONCENTRATIONS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION, SKANEATELES FALLS, NEW YORK**

Compound	Soil Cap		Clay Cap		Fill		Underlying Clay		Black Waste		White Waste		Average Eastern United States ^a	Range United States ^a	Range New York State ^a
	Range ^d	Frequency	Range	Frequency	Range	Frequency	Range	Frequency	Range	Frequency	Range	Frequency			
Aluminum	13,900	1/1	6,330	1/1	4,140-43,900	11/11	7,170-8,310	2/2	1,160-19,100	2/2	55.2	1/1	33,000	10,000-300,000	1,000-25,000
Antimony	3.1	1/1	ND	0/1	ND-10.3	5/9	ND	0/2	ND-13.5	1/2	ND	0/1	d	d	d
Arsenic	5.7	1/1	8.6	1/1	2-18.5	11/11	4.4-6.3	2/2	0.78-11.7	2/2	1	1/1	5	0.1-40	3-12
Barium	64.3	1/1	105	1/1	45.8-157	11/11	59.1-62.9	2/2	51.1-175	2/2	6.6	1/1	290	100-3,000	15-600
Beryllium	0.57	1/1	0.69	1/1	0.32-0.82	11/11	0.37-0.58	2/2	ND-1.1	1/2	ND	0/1	0.6	0.01-40	0-1.75
Cadmium	4.1	1/1	3.5	1/1	1.8-9.5	11/11	3.1-3.3	2/2	8.9-20.5	2/2	1.6	1/1	0.35	0.01-2	0.001-10
Calcium	67,400	1/1	8,790	1/1	3,960-50,500	11/11	14,100-83,000	2/2	6,060-83,300	2/2	1,570	1/1	3,400	700-500,000	130-35,000
Chromium	18	1/1	16.9	1/1	15.2-164	11/11	13.6-18.7	2/2	11-13.7	2/2	4.2	1/1	33	5-1,500	1.5-40
Cobalt	8.2	1/1	10.1	1/1	8-1,260	11/11	5.9-9.7	2/2	710-1,020	2/2	4,230	1/1	5.9	0.05-65	2.5-60
Copper	20.8	1/1	23.8	1/1	20.2-458	11/11	19.1-25.3	2/2	26-82.5	2/2	6.4	1/1	13	2-250	2-250
Iron	26,200	1/1	10,100	1/1	5,020-57,000	11/11	10,400-20,100	2/2	59,300-124,000	2/2	8,530	1/1	14,000	2,000-550,000	2,000-550,000
Lead	15.1	1/1	12.1	1/1	11-141	11/11	8.8-13.2	2/2	2.4-160	2/2	1.9	1/1	14	2-300	10-37
Magnesium	35,300	1/1	7,390	1/1	5,010-14,000	11/11	8,640-38,600	2/2	1,520-14,900	2/2	725	1/1	2,300	400-9,000	100-5,000
Manganese	599	1/1	635	1/1	299-826	11/11	400-674	2/2	411-1,360	2/2	45.9	1/1	285	20-10,000	50-5,000
Mercury	ND	0/1	0.11	1/1	0.13-17.2	11/11	ND	0/2	0.24-0.82	2/2	ND	0/1	0.08	0.01-0.5	0.001-0.2
Nickel	24.7	1/1	23.9	1/1	15.4-44.5	11/11	18.1-22.1	2/2	19.7-99.2	2/2	20.6	1/1	12	2-750	0.5-25
Potassium	2,460	1/1	1,850	1/1	1,390-11,600	11/11	1,540-1,810	2/2	342-8,560	2/2	146	1/1	7,400	80-37,000	8,500-43,000
Selenium	ND	0/1	ND	0/1	ND-0.13	2/11	ND	0/2	ND	0/2	ND	0/1	0.3	0.1-2	0.01-12
Silver	2.8	1/1	1.6	1/1	0.45-3.8	11/11	1.5-2.9	2/2	0.98-3.6	2/2	ND	0/1	d	d	d
Sodium	3,280	1/1	156	1/1	388-67,900	11/11	6,310-7,010	2/2	1,160-6,010	2/2	90.1	1/1	2,500	150-25,000	150-15,000
Thallium	ND	0/1	R	0/0	ND-0.32	1/6	ND	0/2	ND	0/2	ND	0/1	d	d	d
Vanadium	16.2	1/1	17.8	1/1	7.8-18.7	11/11	12-17.4	2/2	ND-25	1/2	0.61	1/1	43	3-500	2-270
Zinc	R	0/0	45.2	1/1	38.5-1,170	11/11	37.7-41.9	2/2	73.2-725	2/2	26.4	1/1	40	1-900	9-50
Cyanide	ND	0/1	ND	0/1	ND-3.6	2/11	ND	0/2	ND-1.4	1/2	ND	0/1	d	d	d
TOC	11,000	1/1	15,000	1/1	6,960-28,100	11/11	2,700-6,960	2/2	8,780-141,000	2/2	8,780	1/1	d	3,800-18,500	d
SAMPLES	SB16-01A		SB18-01A		SB16-02 SB17-01 SB18-02 SB18-03 SB19-01 SB20-01 SB22-01 SB23-01 SB24-01 SB24-01 Dup SB25-01		SB21-01 SB23-02		SB26-01 SB27-02 SB27-03		SB27-01 SB27-04				

a. Concentration units are mg/kg (ppm).

b. Data from McGovern (1987).

c. Data from Bodek et al. (1988).

d. Well not installed during monitored period.

NOTE: ND = Not Detected; R = Data was unusable following data validation review; TOC = Total organic carbon.

TABLE 4-9 SUMMARY OF ORGANIC ANALYSIS RESULTS OF SOILS
FROM THE FORMER ORGANICS PLANT AREA,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Range ^a	Frequency of Detection	Mean ^{a,b}
VOLATILES			
Acetone	ND-140	8/17	---
1,1-Dichloroethane	ND-4	1/17	---
1,2-Dichloroethene	ND-2	1/17	---
2-Butanone	ND-59	4/17	---
Benzene	ND-5	1/17	---
Tetrachloroethene	ND-1	1/17	---
Toluene	ND-37	3/17	---
Xylenes (total)	ND-2,200,000	10/17	158,484
SEMI-VOLATILES			
1,4-Dichlorobenzene	ND-220	1/17	---
Phenol	ND-270	1/17	---
2-methylphenol	ND-1,400	2/17	719
4-methylphenol	ND-2,400	2/17	807
2,4-Dimethylphenol	ND-3,700	3/17	1,004
Naphthalene	ND-2,100	7/17	425
2-Methylnaphthalene	ND-1,400	6/17	642
Acenaphthylene	ND-770	4/17	604
Acenaphthene	ND-64	4/17	---
Dibenzofuran	ND-75	3/17	---
Fluorene	ND-4,100	6/17	889
Phenanthrene	ND-1,300	9/17	672
Anthracene	ND-140	6/17	---
a. All concentration units are in $\mu\text{g/kg}$ (dry weight). b. Mean calculated by setting non-detects at 0.5 SQL. NOTE: ND = Not detected. Dashes (---) indicate mean not reported since the calculated value exceeded the upper observed range due to elevated SQLs in certain samples.			

TABLE 4-9 (Continued)

Parameter	Range ^a	Frequency of Detection	Mean ^{a,b}
SEMI-VOLATILES (Continued)			
Carbazole	ND-130	5/17	---
Di-n-butyl phthalate	ND-90	3/17	---
Fluoranthene	ND-7,800	10/17	873
Pyrene	ND-7,800	9/17	1,158
Benzo(a)anthracene	ND-6,700	6/17	1,053
Chrysene	ND-6,600	7/17	1,094
Di-n-octyl phthalate	ND-37	1/17	---
Benzo(b)fluoranthene	ND-5,600	7/17	992
Benzo(k)fluoranthene	ND-6,100	7/17	977
Benzo(a)pyrene	ND-7,900	7/17	1,144
Indeno(1,2,3-cd)pyrene	ND-3,800	7/17	821
Dibenzo(a,h)anthracene	ND-170	3/17	1,015
Benzo(ghi)perylene	ND-3,800	6/17	847
<i>o</i> -Toluic acid	ND-19,000	3/17	5,943
<i>m</i> -Toluic acid	ND-46,000	4/17	6,368
<i>p</i> -Toluic acid	ND-14,000	1/17	5,721
PESTICIDE/PCBs			
4,4'-DDD	ND-8.7	1/17	2.1
Aroclor 1248	ND-59	1/17	28

**TABLE 4-10 SUMMARY OF INORGANIC ANALYSIS RESULTS OF SOILS
FROM THE FORMER ORGANICS PLANT AREA
AND COMPARISON TO BACKGROUND CONCENTRATIONS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Analyte	Perimeter Soils			Background Analysis		Range New York State ^c	Frequency Above New York Background
	Range ^a	Frequency	Mean ^b	Average Eastern United States ^c	Range United States ^d		
Aluminum	2,150-16,500	17/17	8,489	8,489	10,000-300,000	1,000-25,000	0/17
Antimony	ND-30.2	8/17	6.9	e	0.2-10	e	e
Arsenic	2.9-33.1	17/17	10.8	5	0.1-40	3-12	2/17
Barium	26-1,380	17/17	291	290	100- 3,000	15-600	3/17
Beryllium	0.26-0.95	17/17	0.50	0.6	0.01-40	0-1.75	0/17
Cadmium	1.1-39.6	17/17	6.4	0.35	0.01-2	0.001-10	1/17
Calcium	2,080-161,000	17/17	41,440	3,400	700-500,000	130-35,000	8/17
Chromium	9.0-162	17/17	43.2	33	5-1,500	1.5-40	6/17
Cobalt	4.2-30.3	17/17	13.6	5.9	0.05-65	2.5-60	0/17
Copper	15.2-22,300	17/17	1,735	13	2-250	2-250	6/17
Iron	11,400-134,000	17/17	32,147	14,000	2,000-550,000	2,000-550,000	0/17
Lead	5.6-3,030	17/17	634	14	2-300	10-37	12/17
Magnesium	1,240-18,800	17/17	7,725	2,300	400-9,000	100-5,000	13/17
Manganese	76.8-6,130	17/17	824	285	20-10,000	50-5,000	1/17
Mercury	ND-25.2	12/16 ^f	3.4	0.08	0.01-0.5	0.001-0.2	11/16
Nickel	13.5-166	17/17	42	12	2-750	0.5-25	13/17
Potassium	252-3,080	17/17	1,251	7,400	80-37,000	8,500-43,000	0/17
Selenium	ND-0.49	6/17	0.14	0.3	0.1-2	0.01-12	0/17
Silver	ND-2.6	1/17	0.45		0.01- 8	e	e
Sodium	73.4-1,570	17/17	389	2,500	150-25,000	150-15,000	0/17
Thallium	ND-0.43	6/17	0.19		0.1-0.8	e	e
Vanadium	5.6-26.6	17/17	15.3	43	3-500	2-270	0/17
Zinc	22.5-15,600	17/17	1,653	40	1-900	9-50	15/17
Cyanide	ND-0.48	4/15 ^g	0.13		e	e	e
TOC	8,050-26,600	3/3 ^h	18,283		3,800-18,500	e	e

SAMPLES MWB-1 and MW5SB-01 through MW5SB-16

- a. Concentration units are mg/kg (ppm).
- b. Mean calculated by setting non-detects at 0.5 SQL.
- c. Data from McGovern (1987).
- d. Data from Bodek et al. (1988).
- e. No data.
- f. Mercury was rejected in 1 sample (MWB-1).
- g. Cyanide was not analyzed in 2 samples.
- h. TOC performed on 3 samples only.

NOTE: TOC = Total organic carbon.

TABLE 4-11 SUMMARY OF ORGANIC ANALYSIS RESULTS OF
CREEK SEEPS AND SEEP SEDIMENT,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Creek Seeps			Creek Seep Sediment	
	Round 1			Round 1	
	Range ^a	Frequency	Mean ^b	Range ^c	Frequency
VOLATILES					
Acetone	ND-49	1/4	26	ND	0/1
1,2-Dichloroethene (total)	ND-880	3/4	249	84	1/1
Trichloroethene	ND-380	3/4	116	54	1/1
Tetrachloroethene	ND-560	3/4	176	34	1/1
Toluene	ND-95	3/4	31	13	1/1
Xylenes (total)	ND-790	3/4	378	200	1/1
SEMI-VOLATILES					
Phenol	ND-47	1/4	---	ND	0/1
2-Methyl phenol	ND-11	3/4	---	ND	0/1
4-Methyl phenol	ND-9	1/4	---	ND	0/1
2,4-Dimethylphenol	ND	0/4	---	190	1/1
Bis(2-ethylhexyl)phthalate	ND-2	2/4	---	ND	0/1
Naphthalene	ND-2	1/4	---	ND	0/1
Phenanthrene	ND-15	1/4	---	ND	0/1
Anthracene	ND-3	1/4	---	ND	0/1
Fluorene	ND-2	1/4	---	ND	0/1
Fluoranthene	ND-28	1/4	---	ND	0/1
Pyrene	ND-18	1/4	---	ND	0/1
Benzo(a)anthracene	ND-10	1/4	---	ND	0/1
Chrysene	ND-11	1/4	---	ND	
Benzo(b)fluoranthene	ND-19	1/4	---	ND	0/1
Benzo(k)fluoranthene	ND-19	1/4	---	ND	0/1
Benzo(a)pyrene	ND-8	1/4	---	ND	0/1
<i>o</i> -Toluic acid	ND-510,000	3/4	150,806	420	1/1
<i>m</i> -Toluic acid	ND-250,000	3/4	72,206	3,400	1/1
<i>p</i> -Toluic acid	ND-71,000	3/4	21,684	2,200	1/1
SAMPLES	CS-01-01A, CS-02-01A, CS-03-SPLIT, CS-04-01A			SS-03-01	
a. Concentration units are in µg/L. b. Mean calculated by setting non-detects at 0.5 SQL. c. Concentration units are µg/kg. d. Value not required.					
NOTE: ND = Not detected. Dashes (---) indicate calculated mean exceeded maximum value due to elevated SQLs in certain samples.					

TABLE 4-12 SUMMARY OF INORGANIC ANALYSIS RESULTS
OF CREEK SEEPS AND SEEP SEDIMENT,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Creek Seeps			Creek Seep Sediment	
	Round 1			Round 1	
	Range ^a	Frequency	Mean ^{a,b}	Range ^a	Frequency
Aluminum	1,710-23,500	4/4	9,555	8,610	1/1
Antimony	ND-150	3/4	93	ND	0/1
Arsenic	5.7-144	4/4	69	2.2	1/1
Barium	70.8-402	4/4	195	119	1/1
Beryllium	ND-1.4	1/4	0.7	0.49	1/1
Cadmium	ND	0/4	---	2.2	1/1
Calcium	19,600-72,200	4/4	43,700	11,600	1/1
Chromium	8.0-61	4/4	35	18	1/1
Cobalt	ND-27	2/4	12	8.1	1/1
Copper	29.1-135	4/4	82	29.8	1/1
Iron	8,840-32,100	4/4	15,065	16,000	1/1
Lead	87.8-117	4/4	98	24	1/1
Magnesium	5,550-14,100	4/4	10,410	7,680	1/1
Manganese	271-785	4/4	469	185	1/1
Mercury	0.53-1.1	4/4	0.7	0.14	1/1
Nickel	ND-199	3/4	86	18.8	1/1
Potassium	2,450-22,700	4/4	10,150	926	1/1
Selenium	ND	0/4	---	0.25	1/1
Sodium	31,300-2,180,000	4/4	1,132,825	4,810	1/1
Thallium	ND-1.0	1/4	0.6	0.23	1/1
Vanadium	ND-142	3/4	68	13.1	1/1
Zinc	51.4-171	4/4	111	52.2	1/1
Cyanide	ND-25.5	1/4	10	2.2	1/1
SAMPLES	CS-01 through CS-04			SS-03	
a. Concentration units are in µg/L.					
b. Mean calculated by setting non-detects at 0.5SQL.					
NOTE: A second round of seep and seep sediments for inorganic analysis was not possible due to insufficient seep volume.					
ND = Not detected.					
Dashes (---) indicate mean not calculated since analytical result was a non-detect.					

TABLE 4-13 SUMMARY OF ORGANIC ANALYTES IDENTIFIED IN
OVERBURDEN GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

Parameter	Round 1			Round 2			NYSDEC Standards ^c	
	Range ^a	Frequency	Mean ^b	Range	Frequency	Mean ^b	Class A	Class GA
VOLATILES								
Vinyl chloride	ND-5	1/6	5.0	ND-5	1/8	67 ^d	0.3	2
Acetone	ND-19	1/6	7.3	ND	0/8	—		
1,1-Dichloroethane	ND	0/6	—	ND-3	1/8	67 ^d		
1,2-Dichloroethene (total)	ND-18	1/6	5.1	ND-85	1/8	77	5	5
Trichloroethene	ND-2	1/6	2.4	ND	0/8	—	3	5
Tetrachloroethene	ND-2	1/6	2.4	ND	0/8	—	0.7	5
Toluene	ND-2	1/6	2.4	ND-270	2/8	38	5	5
Xylenes (total)	ND-19	3/6	5.8	ND-28,000	5/8	3,573	5	5
SEMI-VOLATILES								
Phenol	ND	0/6	—	ND-12	1/8	6	1	1
1,3-Dichlorobenzene	ND	0/6	—	ND-1	1/7	5 ^d		
2-Methyl phenol	ND-15	1/6	8	ND-13	3/8	6	5	
4-Methyl phenol	ND-11	1/6	7	ND-150	2/8	23	5	
2,4-Dimethylphenol	ND	0/6	—	ND-14	2/8	6		
Pentachlorophenol	ND	0/6	—	ND-2	1/8	11 ^d		
Benzoic acid	ND-4	1/6	22 ^d	—	—	—		
Dimethyl phthalate	ND-21	1/6	8	ND	0/8	—	50	
Naphthalene	ND	0/6	—	ND-11	3/7	5		
2-methyl naphthalene	ND	0/6	—	ND-0.8	1/7	4.3 ^d		
Acenaphthene	ND	0/6	—	ND-1	1/7	4.4 ^d		
Dibenzofuran	ND	0/6	—	ND-0.7	1/7	4.4 ^d		
Fluorene	ND	0/6	—	ND-2	1/7	4.5 ^d		
Phenanthrene	ND-2	1/6	5 ^d	ND-15	2/7	6.4	50	
Anthracene	ND	0/6	—	ND-5	2/7	4.4		
Carbazole	—			ND-3	1/7	4.7 ^d		
Fluoranthene	ND-4	2/6	6 ^d	ND-27	2/7	7.7	50	
Pyrene	ND-3	2/6	6 ^d	ND-27	2/7	7.6	50	
Benzo(a)anthracene	ND-2	1/6	5 ^d	ND-14	1/7	6.3	0.002	
Bis(2-ethylhexyl)phthalate	ND-3	2/6	5 ^d	ND-4	2/8	4	4	
Chrysene	ND-2	1/6	5 ^d	ND-13	1/7	6.1	0.002	
Benzo(b)fluoranthene	ND-1	1/6	5 ^d	ND-19	1/7	7	0.002	
Benzo(k)fluoranthene	ND-1	1/6	5 ^d	ND	0/8	—	0.002	
Benzo(a)pyrene	ND-2	1/6	5 ^d	ND-10	1/7	5.7		
<i>o</i> -Toluic acid	ND-11,000	1/6	1,858	ND-14,000	5/8	2,746	50 ^e	
<i>m</i> -Toluic acid	ND	0/6	—	ND-6,500	4/8	1,450	50 ^e	
<i>p</i> -Toluic acid	ND	0/6	—	ND-700	2/8	140	50	
SAMPLES	MW-1S, MW-2S, MW-4S, MW-6S, MW-7S, MW-8S			MW-2S, MW-4S, MW-5S, MW-6S, MW-7S, MW-8S, MW-12S, MW-18S				
a. All concentration units are in µg/L. b. Mean calculated by setting non-detects at 0.5 SQL. c. Class A and Class GA standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a). d. Mean exceeded maximum value due to elevated SQLs in certain samples. e. Default value based upon classification as "Unspecified Organic Compound."								
NOTE: ND = Not detected. Dashes (---) indicate mean not calculated since analytical result was a non-detect.								

**TABLE 4-14 SUMMARY OF INORGANIC ANALYTES AND WATER QUALITY
PARAMETERS IDENTIFIED IN OVERBURDEN GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Parameter	Round 1			Round 2			NYSDEC Standards ^c	
	Range ^a	Frequency	Mean ^b	Range ^a	Frequency	Mean ^b	Class A	Class GA
Aluminum	885-19,300	6/6	6,095	508-42,800	8/8	12,877	100	
Antimony	ND-22.2	2/3	17.7	ND-34.9	2/8	9.2	3	
Arsenic	ND-21.8	2/3	8.6	4.7-46.3	8/8	22.4	50	25
Barium	50.2-385	6/6	179	ND-490	6/8	258	1,000	1,000
Beryllium	ND-0.58	1/5	0.52	ND-2.7	3/8	1.1		
Cadmium	ND	0/6	—	ND-11.4	2/8	2.9		
Calcium	20,600-504,000	6/6	153,733	35,800-243,000	8/8	97,713		
Chromium	5.6-2,550	6/6	444	ND-6,870	7/8	911	50	50
Cobalt	ND-27.3	4/6	13.9	ND-57.2	4/8	23.0	5	
Copper	15-458	6/6	116	9.2-1,320	8/8	336	200	200
Iron	1,970-69,800	6/6	21,852	7,350-76,200	6/6	26,292	300	300
Lead	ND-15	1/4	8	3.7-1,370	8/8	334	50	25
Magnesium	ND-11	1/6	7	11,000-50,520	8/8	26,663	35,000	35,000
Manganese	159-1,460	6/6	566	245-7,460	8/8	1,441	300	300
Nickel	20.3-923	6/6	186	13-1,090	8/8	212	16	21
Potassium	2,910-71,100	6/6	15,485	3,610-85,800	8/8	19,348		
Selenium	ND	0/6	—	ND-2.5	3/8	1.0		
Sodium	268,000-529,000	3/3	357,667	50,100-714,000	8/8	425,888		20,000
Vanadium	ND-31.9	4/5	16.7	4.1-107	8/8	45.9	14	
Zinc	26.1-643	6/6	202	23.8-1,140	8/8	439	300	300
Cyanide	ND-13	1/6	6.3	ND-28	2/8	8.9	100	100
Chloride	4.8-344 ^d	6/6	89.7 ^d	NR			250 ^d	250 ^d
Fluoride	ND-2.2 ^d	4/6	0.97 ^d	NR			1.5 ^d	1.5 ^d
Ammonia	ND-8 ^d	4/6	1.8 ^d	NR			2 ^d	2 ^d
Nitrate	ND-3.9 ^d	2/6	0.8 ^d	NR				
Sulfate	ND-22.8 ^d	1/6	185 ^e	NR			250 ^d	250 ^d
Alkalinity	395-4,770 ^d	6/6	1,350 ^d	NR				
Hardness	69.4-1,750 ^d	6/6	526 ^d	NR				
TSS	57-742 ^d	6/6	374 ^d	NR				
DOC	25.8-149 ^d	6/6	58.6 ^d	NR				
pH ^f	8.05-10.45	4/4 ^g	9.88	7.10-9.73	8/8	9.25		6.5-8.5
Eh ^f				141-275	8/8	206		
Conductivity ^f	350-1,500	6/6	842	785-2,440	8/8	1,745		

a. Concentration units are in $\mu\text{g/L}$, unless otherwise noted.

b. Mean calculated by setting non-detects at 0.5 SQL.

c. Class A and Class GA standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a).

d. Concentration units are in mg/L .

e. Mean value exceeds maximum due to elevated SQLs in certain samples.

f. pH is unitless; Eh has units of millivolts; conductivity has units of $\mu\text{mhos/cm}$.

g. pH not determined in 2 samples.

NOTE: DOC = Dissolved organic carbon; ND = Not detected; NR = Analysis not required for Round 2 samples;

TSS = Total suspended solids.

Dashes (---) indicate mean not calculated since analytical result was a non-detect.

TABLE 4-15 SUMMARY OF ORGANIC ANALYTES IDENTIFIED IN
UPPER BEDROCK GROUND WATER,
TAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Round 1			Round 2			NYSDEC Standards ^c	
	Range ^a	Frequency	Mean ^b	Range ^a	Frequency	Mean ^b	Class A	Class GA
VOLATILES								
Vinyl chloride	ND-3	2/13	17 ^d	ND-21	1/17	14	0.3	2
Chloroethane	ND-31	1/13	8	ND-49	3/17	17		50
Acetone	ND-130	3/13	30	ND-39	1/16	15		
1,1-Dichloroethane	ND	0/13	---	ND-150	3/17	22		
1,1-Dichloroethene	ND-10	1/13	11 ^d	ND	0/17	---		50
1,2-Dichloroethene (total)	ND-160	8/13	51	ND-1,500	8/17	137	5	5
Trichloroethene	ND-180	7/13	35	ND-54	5/17	11	3	5
Benzene	ND-1	1/13	11 ^d	ND-4	1/17	13 ^d	0.7	0.7
4-methyl-2-pentanone	ND-71	1/13	21	ND	0/17	---		
Tetrachloroethene	ND-2,900	6/13	414	ND-190	3/17	27	0.7	5
Toluene	ND-63	6/13	20	ND-37	3/17	15	5	5
Ethylbenzene	ND	0/13	---	ND-1	1/17	13 ^d		
Xylenes (total)	ND-2,100	8/13	559	ND-1,900	10/17	428	5	5
SEMI-VOLATILES								
Phenol	ND-140	7/13	34	ND-2,400	6/17	171	1	1
2-Methyl phenol	ND-19	6/13	11	ND-30	5/17	8	5	
4-Methyl phenol	ND-31	8/13	16	ND-69	5/17	12	5	
Benzyl alcohol	ND-26	2/13	25	ND	0/17	---		
Bis(2-chloroethyl)methane	ND-150	1/13	35	ND	0/17	---	0.03	1
Nitrobenzene	ND-18	2/13	9	ND	1/17	---	30	5
2,4-Dimethylphenol	ND-320	4/13	37	ND-0.6	0/17	10.3 ^d		
Benzoic acid	ND-330	6/12	64	ND	0/17	---		
Naphthalene	ND-9	1/13	10 ^d	ND-8	3/17	11 ^d	10	10
Pentachlorophenol	ND-20	2/12	29.4 ^d	ND	0/17	---		
Phenanthrene	ND-1	1/13	9 ^d	ND	0/17	---	50	
Benzo(a)anthracene	ND-5	1/13	7 ^d	ND	0/17	---	0.002	
Fluorene	ND	0/13	---	ND-2	1/17	10 ^d		
Di-n-butyl phthalate	ND	0/13	---	ND-2	1/17	10 ^d		
Bis(2-ethylhexyl)phthalate	ND-160	8/13	21	ND-49	4/17	13	4	
<i>o</i> -Toluic acid	ND-690,000	9/12	76,690	ND-220,000	10/17	32,845		
<i>m</i> -Toluic acid	ND-450,000	9/12	47,681	ND-150,000	9/17	20,557		
<i>p</i> -Toluic acid	ND-32,000	6/12	3,840	ND-240,000	9/17	21,623		
PESTICIDE/PCBs								
4,4'-DDE	ND	0/13	---	ND-0.61	2/17	0.10		
SAMPLES								
	MW-011, MW-021, MW-031 Split, MW-031 Dup, MW-041, MW-051, MW-061, MW-071, MW-071 Dup, MW-81, MW-091, MW-101, MW-111			MW-011, MW-021, MW-031, MW-041, MW-051, MW-061, MW-071, MW-081, MW-081 Dup, MW-091, MW-101, MW-111, MW-121, MW-131, MW-141, MW-161, MW-181				
a. All concentration units are in $\mu\text{g/L}$. b. Mean calculated by setting non-detects at 0.5 SQL. c. Class A and Class GA standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a). d. Mean exceeded maximum value due to elevated SQLs in certain samples.								
NOTE: ND = Not detected. Dashes (---) indicate mean not calculated since analytical result was a non-detect.								

TABLE 4-16 SUMMARY OF INORGANIC ANALYTES IDENTIFIED
IN UPPER BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Round 1			Round 2			NYSDEC Standards ^c	
	Range ^a	Frequency	Mean ^b	Range ^a	Frequency	Mean ^b	Class A	Class GA
Aluminum	107-10,700	13/13	1,433	36-32,500	17/17	2,658	100	
Arsenic	ND-910	7/9	124	ND-631	11/17	84	50	25
Barium	34.9-326	13/13	134	ND-653	10/17	155	1,000	1,000
Beryllium	ND	0/13	---	ND-2.5	1/17	0.6	3	3
Cadmium	ND	0/13	---	ND-12.1	5/17	3	10	10
Calcium	6,180-142,000	13/13	54,950	6,140-666,000	17/17	89,174		
Chromium	ND-53.2	10/13	24	ND-60.4	13/17	24.6	50	50
Cobalt	ND-42.4	8/13	14	ND-73	8/17	19.5	5	
Copper	10.6-87.2	12/12	50	ND-167	12/17	589	200	200
Iron	1,670-24,100	13/13	9,278	1,970-44,500	16/16	19,555	300	300
Lead	ND-122	5/8	26	ND-128	15/17	25.3	50	25
Magnesium	201-25,800	13/13	9,745	73-82,400	17/17	17,314	35,000	35,000
Manganese	23-690	13/13	209	30.2-2,270	17/17	443	300	300
Mercury	ND-0.65	3/8	0.28	ND-0.52	4/17	0.17	2	2
Nickel	ND-254	12/13	77	ND-441	11/17	94.3	100	
Potassium	802-54,900	13/13	22,135	2,310-52,800	17/17	15,052		
Selenium	ND	0/13	---	ND-6.4	2/17	1.9	10	10
Sodium	7,670-1,260,000	8/8	482,396	30,800-4,770,000	17/17	922,494		20,000
Vanadium	ND-343	8/12	74	ND-206	9/17	49.4	14	
Zinc	ND-59	11/13	30	21.2-303	17/17	73.2	300	300
Cyanide	ND-79	5/13	18	ND-36	3/17	8.6	100	100
Chloride	12.9-340 ^d	13/13	123 ^d	NR			250 ^d	250 ^d
Fluoride	ND-32.9 ^d	10/13	9 ^d	NR			1.5 ^d	1.5 ^d
Ammonia	ND-15 ^d	10/13	5.5 ^d	NR			2 ^d	2 ^d
Nitrate	ND-4.4 ^d	5/13	0.8 ^d	NR				
Sulfate	ND-42.5 ^d	3/13	224 ^{d,e}	NR			250 ^d	250 ^d
Alkalinity	132-15,800 ^d	13/13	2,942 ^d	NR				
Hardness	19.4-704 ^d	13/13	206 ^d	NR				
TSS	19-362 ^d	13/13	81 ^d	NR				
DOC	35.9-726 ^d	13/13	104 ^d	NR				
pH ^f	7.69-10.38	9/13	9.84	6.95-11.35	17/17	10.44		6.5-8.5
Eh ^f				-71-371	17/17	164		
Conductivity ^f	420-13,000	13/13	2,909	513-16,940	17/17	3,786		
SAMPLES	MW-1I, MW-2I, MW-3I Split, MW-3I Dup, MW-4I, MW-5I, MW-6I, MW-7I, MW-7I Dup, MW-8I, MW-9I, MW-10I, MW-11			MW-1I, MW-2I, MW-3I, MW-4I, MW-5I, MW-6I, MW-7I, MW-8I, MW-8I Dup, MW-9I, MW-10I, MW-11I, MW-12I, MW-13I, MW-14I, MW-16I, MW-18I				

a. All concentration units are in µg/L.
b. Mean calculated by setting non-detects at 0.5 SQL.
c. Class A and Class GA standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a).
d. Concentration units are mg/L.
e. Calculated mean exceeds maximum value due to elevated SQLs in certain samples.
f. pH is unitless; Eh has units of millivolts; conductivity has units of µmhos/cm.

NOTE: DOC = Dissolved organic carbon; ND = Not detected; NR = Analysis not required for Round 2 samples;
TSS = Total suspended solids.
Dashes (---) indicate mean not calculated since analytical result was a non-detect.

TABLE 4-17 SEMI-VOLATILE TENTATIVELY IDENTIFIED
COMPOUNDS IN UPPER BEDROCK,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Benzene Derivatives
Benzenemethanol, 4-methyl Benzamide, N,N-diethyl-methyl Benzomethanol <i>alpha</i> Ethanol, 2-phenoxy- 1(3H)-Isobenzofuranone Hexanoic acid, 2-methyl
Aliphatic Acids
Butanoic acid Pentanoic acid Propanoic acid, 2-methyl Hexanoic acid Hexadecanoic acid Hexanedioic acid 9-Octadecanoic acid Decanoic acid 9-Hexadecanoic acid 10-Octadecanoic acid, methyl Hexanoic acid, 2-ethyl
Miscellaneous Compounds
1-Hexanol, 2-ethyl Bicyclo[2.2.1]heptan-1-ol 2,4-pentanediol, 2-methyl 2,5-Furandione, 3,4-diethyl Butanamide, N-(oxypropyl) Phenol, 4,4'-Butylidenebis[2-

TABLE 4-18 SUMMARY OF ORGANIC ANALYTES IDENTIFIED IN
DEEP BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Round 1			Round 2			NYSDEC Standards ^c	
	Range ^a	Frequency	Mean ^b	Range ^a	Frequency	Mean ^b	Class A	Class GA
VOLATILES								
Acetone	ND-21	2/9	8	ND-47	1/6	12		
1,1-Dichloroethane	ND-2	2/9	3	ND-5	1/6	5		
1,2-Dichloroethene (total)	ND-94	2/9	13	ND-4	1/6	5 ^d	5	5
Trichloroethene	ND-3	1/9	3	ND-4	1/6	5 ^d	3	5
Benzene	ND-3	1/9	3	ND	0/6	---		
4-methyl-2-pentanone	ND-2	2/9	4 ^d	ND	0/6	---		
Tetrachloroethene	ND-6	3/9	3	ND-11	1/6	6	0.7	5
Toluene	ND-23	2/9	5	ND-4	1/6	5 ^d	5	5
Ethylbenzene	ND-3	2/9	3	ND	0/6	---		
Xylenes (total)	ND-520	2/9	73	ND-330	1/6	59	5	5
SEMI-VOLATILES								
Phenol	ND-22	1/9	---	ND-35	1/6	10	1	1
2-Methyl phenol	ND-7	1/9	---	ND-10	1/6	6	5	
4-Methyl phenol	ND-9	1/9	---	ND	0/6	---	5	
2,4-Dimethylphenol	ND-29	1/9	---	ND	0/6	---		
Benzoic acid	ND-76	1/9	31	---				
Naphthalene	ND	0/9	---	ND-1	1/6	4 ^d		
Bis(2-ethylhexyl)phthalate	ND-14	1/9	7	ND	0/6	---	4	
<i>o</i> -Toluic acid	ND-47,000	3/9	7,529	ND-17,000	1/6	2,854	50	
<i>m</i> -Toluic acid	ND-37,000	2/9	5,137	ND-17,000	1/6	2,854	50	
<i>p</i> -Toluic acid	ND-3,900	2/9	578	ND-1,300	1/6	238	50	
PESTICIDE/PCBs								
4,4'-DDE	ND	0/9	---	ND-0.14	1/6	0.07		
SAMPLES	MW-01D, MW-02D Split, MW-03D, MW-04D, MW-05D, MW-06D, MW-09D Split, MW-10D, MW-11D			MW-07D, MW-09D, MW-13D, MW-15D, MW-16D, MW-17D				
a. All concentration units are in µg/L. b. Mean calculated by setting non-detects at 0.5 SQL. c. Class A and Class GA standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a). d. Mean exceeded maximum value due to elevated SQLs in certain samples.								
NOTE: ND = Not detected. Dashes (---) indicate mean not calculated since analytical result was a non-detect.								

TABLE 4-19 SUMMARY OF INORGANIC ANALYTES IDENTIFIED IN
DEEP BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Round 1			Round 2			NYSDEC Standard ^c	
	Range ^a	Frequency	Mean ^b	Range ^a	Frequency	Mean ^b	Class A	Class GA
Aluminum	ND-289	5/6	150	789-2,420	6/6	1,340	100	
Antimony	ND-55.6	1/9	29	ND-3.9	1/6	1.5		
Arsenic	ND-90.5	3/9	19	ND-149	2/6	25.8	50	25
Barium	36.7-123	6/6	83	ND-188	4/6	100	1,000	1,000
Cadmium	ND	0/9	---	ND-9.1	2/6	3.2		
Calcium	4,700-86,100	9/9	59,000	16,100-122,000	6/6	72,367		
Chromium	ND-18.6	2/9	4	ND-32.5	2/6	11	50	50
Cobalt	ND-16.1	1/9	5	ND	0/6	---	5	
Copper	9.8-18	5/5	9	ND-10.5	3/6	5.4	200	200
Iron	223-1,600	9/9	754	2,110-26,000	4/4	12,865	300	300
Lead	ND-5.8	3/8	2	1.8-11	6/6	4.8	50	25
Magnesium	517-24,600	9/9	16,424	999-46,000	6/6	21,033	35,000	35,000
Manganese	4-139	9/9	29	53.3-589	6/6	210	300	300
Mercury	ND-0.21	1/8	0.5	ND-0.36	1/6	0.14	2	2
Nickel	ND-134	7/9	25	ND-68	1/6	22	16	21
Potassium	2,360	1/1		1,890-27,000	6/6	8,550		
Sodium	20,000-1,530,000	9/9	319,944	10,800-4,220,000	6/6	729,250		20,000
Thallium	ND-1.2	1/9	0.6	ND	0/6	---		
Vanadium	ND-58.5	2/9	12	ND-5	1/6	2	14	
Zinc	ND-31.8	2/9	10	39.8-99.3	6/6	66	300	300
Cyanide	ND-14	1/9	2	ND-27	2/6	10		
Chloride	27-92.5 ^d	9/9	44 ^d				250 ^d	250 ^d
Fluoride	ND-10 ^d	6/9	1.5 ^d				1.5 ^d	1.5 ^d
Ammonia	ND-38 ^d	4/9	0.6 ^d				2 ^d	2 ^d
Nitrate	ND-3.4 ^d	8/9	1.9 ^d					
Sulfate	ND-62.9 ^d	8/9	34.7 ^d				250 ^d	250 ^d
Alkalinity	70.2-3,160 ^d	9/9	858 ^d					
Hardness	13.9-298.6 ^d	9/9	215 ^d					
TSS	7-114 ^d	9/9	49 ^d					
DOC	17.1-677 ^d	9/9	166 ^d					
pH ^e	6.89-10.42	9/9	9.67	7.79-11.65	6/6	10.84		6.5-8.5
Eh ^e				-20-397	6/6	237		
Conductivity ^e	350-3,800	9/9	1,144	348-13,040	6/6	3,221		
SAMPLES	MW-1D, MW-2D Split, MW-3D, MW-4D, MW-5D, MW-6D, MW-9D Split, MW-10D, MW-11D			MW-7D, MW-9D, MW-13D, MW-15D, MW-16D, MW-17D				

a. All concentration units are in µg/L.
b. Mean calculated by setting non-detects at 0.5 SQL.
c. Class A and class GA standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a).
d. Concentration units are mg/L.
e. pH is unitless; Eh has units of millivolts; conductivity has units of µmhos/cm.

NOTE: DOC = Dissolved organic carbon; ND = Not detected; TSS = Total suspended solids.
Dashes (---) indicate mean not calculated since analytical result was a non-detect.

TABLE 4-20 SUMMARY OF ORGANIC AND INORGANIC ANALYTES
IDENTIFIED IN SLUDGE PIT WELLS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

[illegible]

TABLE 4-21 SUMMARY OF ORGANIC ANALYTES MEASURED
IN LANDFILL PIEZOMETERS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analytes	LFP-01-01B ($\mu\text{g/L}$)	LFP-02-01B ($\mu\text{g/L}$)
VOLATILES		
Toluene	140 J	1,600
Ethylbenzene	(< 1,000U)	160 J
Xylenes (Total)	7,900	73,000 D
TICs - Known	---	---
TICs - Unknown;n	---	---
Level (Low or Medium)	L	L
Dilution Factor	100	100/500+
SEMI-VOLATILES		
<i>o</i> -Toluic acid	30,000 DJ	40,000 DJ
<i>m</i> -Toluic acid	78,000 DJ	100,000 DJ
<i>p</i> -Toluic acid	23,000 J	42,000 J
TICs - Known	---	---
TICs - Unknown;n	8,790 J;20	15,540 J;20
Level (Low or Medium)	L	L
Dilution Factors	1/5,000*	1/10,000*
PESTICIDES		
4,4'-DDE	0.053 J	0.19
Level (Low or Medium)	L	L
Dilution Factors	1	1
NOTE: U = Not detected. Sample quantitation limits are shown as (<__U). J = Reported concentration is an estimated value. D = Data reported from diluted analysis. + = Dilution factor for xylene results labeled "D" or "DJ." * = Dilution factor for toluic acid results labeled "D" or "DJ." Values shown for unknown TICs are the total concentration and total number of unknowns. Dashes (---) indicate no detected TICs.		

TABLE 4-22 SUMMARY OF INORGANIC ANALYTES MEASURED
IN LANDFILL PIEZOMETERS
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analytes	LFP-01-01B (µg/L)	LFP-02-01B (µg/L)
Aluminum	5,550	7,000
Arsenic	33.2	3.8 B
Cadmium	4.5 B	(<3U)
Calcium	13,200	31,900
Chromium	76.7	21.3
Cobalt	50.6	992
Copper	611	30.6
Iron	7,000	15,400
Magnesium	2,650 B	13,700
Manganese	299	441
Mercury	1.6	(<0.2U)
Nickel	73.4	29.0 B
Potassium	466,000 B	78,200
Sodium	3,290,000	641,000
Vanadium	51.2	11.4 B
Zinc	747	146
Cyanide	(<10U)	45
pH ^a	10.58	8.96
Eh ^a	15	122
Conductivity ^a	2,290	8,930
a. pH is unitless; Eh has units of millivolts; conductivity has units of µmhos/cm. NOTE: B = Reported concentration is below the CRDL. U = Not detected. Sample quantitation limits are shown as (<__U).		

TABLE 4-23 SUMMARY OF ORGANIC ANALYTES IDENTIFIED
IN SKANEATELES CREEK SURFACE WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Round 1			Round 2			NYSDEC Class A°
	Range ^a	Frequency	Mean ^b	Range	Frequency	Mean ^b	
VOLATILES	ND	0/5	---	ND	0/5	---	
SEMI-VOLATILES							
Bis(2-ethylhexyl)phthalate	ND-210	1/5	17	ND	0/5	---	4

a. All concentration units are in µg/L.
b. Mean calculated by setting non-detects at 0.5 SQL.
c. Class A standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a).

NOTE: ND = Not detected. Dashes (---) indicate mean not calculated since analytical result was a non-detect.

TABLE 4-24 SUMMARY OF INORGANIC ANALYTES IDENTIFIED IN SKANEATELES CREEK SURFACE WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Surface Water						NYSDEC Class A ^c			Background Range ^d
	Round 1			Round 2			Standard	Guidance		
	Range ^a	Frequency	Mean ^b	Range ^a	Frequency	Mean ^b				
Aluminum	81-164	5/5	114	72-91	5/5	86	100		8-3,500	
Antimony	76.8-90.8	5/5	84	ND	0/5	---		3	0.01-5	
Arsenic	ND-1.2	1/5	0.6	ND	0/5	---	50		0.2-230	
Barium	66.1-102	5/5	81	ND	0/5	---	1,000		<3-150	
Calcium	52,800-60,300	5/5	56,760	38,100-40,500	5/5	39,280			2,000-120,000	
Copper	R	0/0	---	3.6-14.5	5/5	7.4	200		0.2-30	
Iron	91.2-278	5/5	153	73.4-133	5/5	93.7	300		10-1,400	
Lead	ND-3.4	1/5	1.4	ND-1.1	1/3	0.7	50		0.06-120	
Magnesium	11,400-12,900	5/5	12,180	7,920-8,410	5/5	8,160	35,000		400-6,000	
Manganese	14.1-24.6	5/5	18	7.2-7.8	5/5	7.5	300		0.02-130	
Potassium	1,390-1,660	5/5	1,512	1,430-1,570	5/5	1,492			500-10,000	
Sodium	28,300-30,400	5/5	29,360	8,800-9,480	5/5	9,022			700-25,000	
Zinc	ND-9.9	4/5	6.3				300		0.2-100	
Chloride	53.6-57.0 ^e	5/5	54.8				250			
Nitrate	1.1-1.2 ^e	5/5	1.1				10			
Sulfate	14.1-20.9 ^e	5/5	18.9				250			
Alkalinity	135-165 ^e	5/5	150.8							
Hardness	178.8-203.7 ^e	5/5	191.9							
Dissolved Organic Carbon	13.8-52.5 ^e	5/5	32.3							
pH ^f	8.78-8.97	5/5	8.89							
Eh ^f	290-304	5/5	300							
Conductivity ^f	295-310	5/5	300							

a. Concentration units are in µg/L, unless otherwise noted.

b. Mean calculated by setting non-detects at 0.5 SQL.

c. Class A standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a).

d. Data from Bodek et al. (1988).

e. Concentration units are mg/L.

f. pH is unitless; Eh has units of millivolts; conductivity has units of µmhos/cm.

NOTE: ND = Not detected. R = Data was rejected following data validation review.

TABLE 4-25 SUMMARY OF ORGANIC ANALYTES IDENTIFIED
IN SKANEATELES CREEK SEDIMENTS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analyte	Round 1			Round 2			NYSDEC Sediment Criteria ^c	
	Range ^a	Frequency	Mean ^b	Range ^a	Frequency	Mean ^b	µg/gOC	µg/kg ^d
VOLATILES								
Vinyl chloride	ND	0/5	—	ND-12	1/5	8.3		
Acetone	ND	0/5	—	ND-330	3/5	109		
Carbon disulfide	ND	0/5	—	ND-9	1/5	7.7		
1,2-Dichloroethene	ND	0/5	—	ND-1,100	1/5	226		
2-Butanone	ND	0/5	—	ND-62	2/5	22		
Tetrachloroethene	ND-16	1/5	5.9	ND	0/5	—	0.8	9
Toluene	ND	0/5	—	ND-48	1/5	15		
Ethylbenzene	ND	0/5	—	ND-7	1/5	7		
Xylenes (total)	ND-2	1/5	3.1 ^e	ND-3,600	1/5	726		
SEMI-VOLATILES								
2-Methylphenol	ND	0/5	—	ND-200	1/5		254 ^e	
Naphthalene	ND-1,100	1/5	1,255 ^e	ND-86	1/5		235 ^e	
2-Methylnaphthalene	ND-700	1/5	1,175 ^e	ND	0/5	—		
Acenaphthene	ND-1,900	1/5	1,415	ND-130	1/5	244 ^e	730	8,366
Dibenzofuran	ND-2,500	1/5	1,535	ND-89	1/5		236 ^e	
Fluorene	ND-2,400	4/5	1,515	ND-140	1/5		246 ^e	
Phenanthrene	ND-11,000	2/5	2,836	ND-1,300	4/5	368		
Anthracene	ND-3,600	2/5	1,427	ND-230	1/5		264 ^e	
Carbazole	—			ND-160	1/5		250 ^e	
Fluoranthene	ND-10,000	4/5	2,706	ND-1,800	4/5	552		
Pyrene	ND-15,000	4/5	3,676	ND-1,400	4/5	452		
Benzo(a)anthracene	ND-4,700	3/5	1,678	ND-980	4/5	342	1.3	15
Chrysene	ND-4,500	3/5	1,642	ND-750	4/5	285	1.3	15
Benzo(b)fluoranthene	ND-3,800	3/5	1,380	ND-1,100	4/5	424	1.3	15
Benzo(k)fluoranthene	ND-3,500	3/5	1,346	ND-490	3/5	256	1.3	15
Benzo(a)pyrene	ND-4,600	3/5	1,573	ND-780	4/5	301	1.3	15
Indeno(1,2,3-cd)pyrene	ND-3,000	1/5	1,635	ND-230	2/5	212	1.3	15
Dibenzo(a,h)anthracene	ND-1,600	1/5	1,355	ND	0/5	—	1.3	15
Benzo(ghi)perylene	ND-3,200	1/5	1,675	ND-230	2/5	210	1.3	15
<i>o</i> -Toluic acid	ND	0/5	—	ND-630	1/5	1,006 ^e		
<i>m</i> -Toluic acid	ND	0/5	—	ND-240	1/5	988 ^e		
<i>p</i> -Toluic acid	ND	0/5	—	ND-42	1/5	948 ^e		
PESTICIDES								
Dieldrin				ND-4.6	2/5	3.5		
Gamma chlordane				ND-2.6	1/5	1.8		
Methoxychem				ND-21	1/4	16.5		
Endrin ketone				ND-12	1/3	5.6		
4,4'-DDE				ND-2.6	1/4	2.4		
Endosulfan sulfate				ND-3.1	1/4	2.5		

SAMPLES SD-01, SD-01Dup, SD-02, SD-03, SD-04 SD-01, SD-01Dup, SD-02, SD-03, SD-04

- a. Concentration units are in µg/kg.
b. Mean calculated by setting non-detects at 0.5 SQL.
c. NYSDEC BEP/DFW Sediment Criteria, December 1989.
d. Calculated value based upon average observed total organic carbon of 1.15 percent.
e. Mean exceeded maximum value due to elevated SQLs in certain samples.

NOTE: ND = Not detected. Dashes (—) indicate mean not calculated since analytical result was a non-detect.

**TABLE 4-26 SUMMARY OF INORGANIC ANALYTES IDENTIFIED IN
SKANEATELES CREEK SEDIMENTS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Parameter	Round 1			Round 2			NYSDEC Criteria ^c	Sediment Background ^d
	Range ^a	Frequency	Mean ^b	Range ^a	Frequency	Mean ^b		
Aluminum	3,270-6,690	5/5	4,336	3,110-6,260	5/5	4,494		
Antimony	60.4-91.7	5/5	73	ND	0/5	---	2-25	
Arsenic	1.2-3.2	5/5	2.5	2.1-6.5	5/5	3.9	6-33	
Barium	36.9-97.1	5/5	67	49.7-193	5/5	95.6		
Beryllium	0.20-0.37	5/5	0.27	0.21-0.33	5/5	0.27		
Cadmium	1.3-1.9	5/5	1.7	1.4-2.2	5/5	1.9	0.6-9.0	ND-9.3
Calcium	3,950-88,400	5/5	48,610	20,300-58,900	5/5	41,300		
Chromium	6.9-12	5/5	9.5	8.1-30.1	5/5	16.9	26-110	7-560
Cobalt	4.1-9	5/5	5.2	3.8-5.7	5/5	5.0		
Copper	16.7-56.8	5/5	38	52.9-351	5/5	122.6	19	11-18
Iron	11,300-12,400	5/5	11,780	9,730-13,900	5/5	12,026	20,000,000	20,700-126,000
Lead	12.8-293	5/5	121	28.4-215	5/5	107.4	31-110	16-246
Magnesium	3,310-32,200	5/5	12,208	7,940-11,900	5/5	10,588		
Manganese	98.1-239	5/5	198	148-500	5/5	340	460-1,100	
Mercury	ND	0/5	---	0.19-2.0	5/5	0.97	0.15-1.3	
Nickel	15.8-23.6	5/5	17.5	14.3-48.7	5/5	23.1	16-50	21-66
Potassium	368-604	5/5	455	350-700	5/5	543		
Selenium	ND	0/5	---	ND-0.68	1/5	0.26		
Silver	ND-3.4	4/5	2.4	ND-0.37	1/5	0.16	1.0-2.2	
Sodium	90-334	5/5	167	61.8-1,670	4/4	497		
Vanadium	5-9.5	5/5	7.1	6.1-10.2	5/5	7.9		
Zinc	44.1-155	5/5	95.6	44.5-229	5/5	140.1	120-270	64-6,600
Cyanide	0.11-0.13	5/5	0.12	DATA REJECTED				
TOC	4,300-16,400	5/5	11,460	NR				100-36,600

a. Concentration units are in mg/kg.
b. Mean calculated by setting non-detects at 0.5 SQL.
c. NYSDEC Sediment Criteria (NYSDEC 1993b).
d. Data from Bodek et al. (1988).

NOTE: ND = Not detected; TOC = Total organic carbon; NR = TOC not required for Round 2 samples.
Dashes (---) indicate mean not calculated since analytical result was a non-detect.



TABLE 4-28 SUMMARY OF INORGANIC ANALYTES IDENTIFIED
IN BASEMENT SEEP,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

[illegible]

TABLE 4-29 SUMMARY OF ORGANIC ANALYTES MEASURED IN
RACEWAY AND HOLDING TANK LIQUID,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analyte Units	(Raceway) BR-01B (µg/L)	(Holding Tank Liquid) SF-01B (µg/L)
VOLATILES		
Chloroform	0.4 J	1 J
Acetone	16	130
Toluene	(<10U)	180
TICs-known	---	---
TICs-unknown	---	---
Level (low or medium)	L	L
Dilution factor	1	1
SEMI-VOLATILES		
Phenol	(<10U)	72
4-methyl phenol	(<10U)	150 J
Di-ethyl phthalate	(<10U)	12
Bis(2-ethylhexyl)phthalate	(<10U)	23
Di-n-octyl phthalate	(<10U)	4 J
<i>o</i> -Toluic acid	2 J	1,600 DJ
<i>m</i> -Toluic acid	6 J	4,100 DJ
<i>p</i> -Toluic acid	(<50U)	(<50U)
TICs-known	---	---
TIC-unknown;n	7 J;1	4,834 J;20
Level (low or medium)	L	L
Dilution factor	1	1
PESTICIDE/PCB		
None Detected		
NOTE: J = Reported concentration is an estimated value; U = Not detected. Sample quantitation limits are shown as (<_U). Values shown for unknown TICs are the total concentration and total number of unknowns. Dashes (---) indicate no detectable TICs.		

TABLE 4-30 SUMMARY OF INORGANIC ANALYTES MEASURED IN
RACEWAY AND HOLDING TANK LIQUID,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analyte	(Raceway) BR-01B ($\mu\text{g/L}$)	(Holding Tank Liquid) SF-01B ($\mu\text{g/L}$)
Aluminum	320	3,520
Arsenic	79.2	5.3 B
Barium	(< 89U)	201
Calcium	9,100	32,200
Cadmium	(< 3U)	9.4
Chromium	13.23	21.9
Copper	101	544
Iron	907	44,900
Lead	102	29.4
Magnesium	1,260	11,300
Manganese	38.6	238
Mercury	2.0	7.4
Nickel	(< 26U)	26.3 B
Potassium	62,000	15,300
Sodium	619,000	33,700
Vanadium	40.0 B	8.8 B
Zinc	47.1	1,280
NOTE: B = Reported value is below the CRQL; U = Not detected. Sample quantitation limits are shown as (<_U).		

TABLE 5-1 ENVIRONMENTAL FATE AND TRANSPORT PARAMETERS FOR ORGANIC CONTAMINANTS
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analyte	Water Solubility (mg/L) ^a	Vapor Pressure (mm Hg) ^a	Henry's Law Constant (atm-m ³ /mol)	Kow (L/kg) ^a	Koc (L/kg) ^a	pK _a	Direct Photolysis (hr ⁻¹) Rate Constants ^b	Natural Hydrolysis (hr ⁻¹) Rate Constants ^b
BENZENE DERIVATIVES								
Benzene	1.75 x 10 ³	9.52 x 10 ¹	5.59 x 10 ⁻³	8.3 x 10 ¹	1.32 x 10 ²	NA	NA	0
Toluene	5.35 x 10 ²	2.81 x 10 ¹	6.37 x 10 ⁻³	3 x 10 ²	5.37 x 10 ²	NA	NA	0
Chlorobenzene	4.66 x 10 ²	1.17 x 10 ¹	3.72 x 10 ⁻³	3.3 x 10 ²	6.92 x 10 ²	NA	NA	0
Ethylbenzene	1.52 x 10 ²	7 x 10 ⁰	6.43 x 10 ⁻³	1.1 x 10 ³	1.41 x 10 ³	NA	NA	0
Xylene	1.98 x 10 ²	1.0 x 10 ¹	7.04 x 10 ⁻³	2.4 x 10 ²	1.82 x 10 ³	NA	NA	NA
CHLORINATED ALKANES AND ALKENES								
Chloroform	8.20 x 10 ³	1.51 x 10 ²	2.87 x 10 ⁻³	3.1 x 10 ¹	9.3 x 10 ¹	NA	NA	2.5 x 10 ⁻⁹
Vinyl chloride	1.1 x 10 ⁻³	2.58 x 10 ³	2.78 x 10 ⁻⁴	3.98 x 10 ⁰	2.45 x 10 ^{0a}			
1,2-dichloroethene	7.0 x 10 ²	2.65 x 10 ²	5.33 x 10 ⁻³	3.02 x 10 ¹⁶	1.86 x 10 ^{1b}			
1,1,1-trichloroethane	1.50 x 10 ³	1.23 x 10 ²	1.44 x 10 ⁻²	1.52 x 10 ²	3.16 x 10 ²	NA	NA	1.0 x 10 ⁻⁴
1,1,2,2-tetrachloroethane	2.9 x 10 ³	5 x 10 ⁰	3.8 x 10 ⁻⁶	2.45 x 10 ^{2b}	1.18 x 10 ^{3b}	NA	NA	0 ^b
1,2-dichloroethane	8.52 x 10 ³	6.40 x 10 ¹	9.78 x 10 ⁻⁴	1.4 x 10 ¹	3.0 x 10 ¹	NA	NA	1.8 x 10 ⁻⁹
Trichloroethene	1.1 x 10 ³	5.79 x 10 ¹	9.10 x 10 ⁻³	1.26 x 10 ²	2.4 x 10 ²	NA	NA	0
Tetrachloroethene	1.5 x 10 ²	1.78 x 10 ¹	2.59 x 10 ⁻²	3.64 x 10 ²	4.57 x 10 ²	NA	NA	0

- a. Data from U.S. EPA (1986a).
b. Data from SRI International (1982).
c. Data from Verschuere (1983).
d. Calculated from equation of McCall et al. (1983).
e. Data from Windholz et al. (1976).
f. Data from Lyman et al. (1990).
g. Data from U.S. EPA (1992a).
h. Calculated from equation of Lyman et al. (1990).
i. Data from Karickhoff et al. (1991).

NOTE: NA = Not applicable.

TABLE 5-1 (Continued)

Analyte	Water Solubility (mg/L) ^a	Vapor Pressure (mm Hg) ^a	Henry's Law Constant (atm-m ³ /mol)	K _{ow} (L/kg) ^a	K _{oc} (L/kg) ^a	pK _a	Direct Photolysis (hr ⁻¹) Rate Constants ^b	Natural Hydrolysis (hr ⁻¹) Rate Constants ^b
NON-CHLORINATED ALKANES								
Acetone	1.0 x 10 ⁶	2.7 x 10 ²	2.06 x 10 ⁻⁵	5.8 x 10 ⁻¹	2.2 x 10 ⁰	NA	NA	NA
Methyl ethyl ketone	2.68 x 10 ⁵	7.8 x 10 ¹	2.74 x 10 ⁻⁵	1.8 x 10 ⁰	4.5 x 10 ⁰	NA	NA	NA
Carbon disulfide	2.9 x 10 ³	2.98 x 10 ²	1.92 x 10 ⁻²	1.45 x 10 ²	8.94 x 10 ^{1h}			
AROMATIC ACIDS								
<i>o</i> -toluic acid	1.18 x 10 ^{3c}	NA	NA	3.47 x 10 ^{2c}	2.04 x 10 ^{2h}	3.91 ⁱ	NA	NA
<i>m</i> -toluic acid	8.5 x 10 ^{2c}	NA	NA	2.34 x 10 ^{2c}	1.45 x 10 ^{2h}	4.20 ⁱ	NA	NA
<i>p</i> -toluic acid	3.4 x 10 ^{2c}	NA	NA	1.86 x 10 ^{2c}	1.15 x 10 ^{2h}	4.40 ⁱ	NA	NA
2-methyl phenol	3.1 x 10 ^{4c}	2.4 x 10 ^{1c}	8.41 x 10 ^{-7c}	8.91 x 10 ^{1c}	5.50 x 10 ^{1h}	9.92 ^h	NA	NA
3-methyl phenol	2.5 x 10 ^{4c}	1.1 x 10 ^{1c}	7.09 x 10 ^{-7c}			9.82 ^h		
2,4-dimethyl phenol	7.9 x 10 ^{3c}	9.8 x 10 ^{1c}	6.55 x 10 ^{-6c}	2.57 x 10 ^{2c}	9.6 x 10 ^{1b}	10.60 ^b	NA	0(b)
Benzoic acid	2.9 x 10 ^{3c}	NA	NA	7.41 x 10 ^{1c}	4.57 x 10 ^{1h}	4.21 ^f	NA	NA
Phenol	8.0 x 10 ⁴	3.5 x 10 ^{1c}	1.30 x 10 ^{-6c}	2.88 x 10 ^{1c}	1.42 x 10 ¹	9.99 ^f	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS								
Fluoranthene	2.06 x 10 ¹	5.0 x 10 ⁻⁶	6.46 x 10 ⁻⁶	3.8 x 10 ⁴	7.94 x 10 ⁴	NA	NA	0
Pyrene	1.32 x 10 ⁻¹	2.50 x 10 ⁻⁶	5.04 x 10 ⁻⁶	3.8 x 10 ⁴	7.58 x 10 ⁴	NA	NA	0
Acenaphthene	3.42 x 10 ⁰	1.55 x 10 ⁻³	9.20 x 10 ⁻⁵	4.6 x 10 ³	1 x 10 ⁴	NA	NA	0
Fluorene	1.69 x 10 ⁰	7.10 x 10 ⁻⁴	6.42 x 10 ⁻⁵	7.3 x 10 ³	1.58 x 10 ⁴	NA	NA	0
Phenanthrene	1.0 x 10 ⁰	6.80 x 10 ⁻⁴	1.59 x 10 ⁻⁴	1.4 x 10 ⁴	2.88 x 10 ⁴	NA	NA	0
Benzo(a)pyrene	1.20 x 10 ⁻³	5.6 x 10 ⁻⁹	1.55 x 10 ⁻⁶	5.5 x 10 ⁶	1.15 x 10 ⁶	NA	0.58	0
Benzo(a)anthracene	5.00 x 10 ⁻³	2.2 x 10 ⁻⁸	1.16 x 10 ⁻⁶	1.38 x 10 ⁶	3.98 x 10 ⁵	NA	1.39	0
Chrysene	1.80 x 10 ⁻³	6.3 x 10 ⁻⁹	1.05 x 10 ⁻⁶	2.0 x 10 ⁵	4.07 x 10 ⁵	NA	NA	0
Benzo(b)fluoranthene	1.4 x 10 ⁻²	5.0 x 10 ⁻⁷	1.19 x 10 ⁻⁵	5.5 x 10 ⁵	1.15 x 10 ⁶	NA	NA	0

TABLE 5-1 (Continued)

Analyte	Water Solubility (mg/L) ^a	Vapor Pressure (mm Hg) ^a	Henry's Law Constant (atm-m ³ /mol)	Kow (L/kg) ^a	Koc (L/kg) ^a	pK _a	Direct Photolysis (hr ⁻¹) Rate Constants ^b	Natural Hydrolysis (hr ⁻¹) Rate Constants ^b
POLYCYCLIC AROMATIC HYDROCARBONS (Continued)								
Benzo(k)fluoranthene	4.3 x 10 ⁻³	5.1 x 10 ⁻⁷	3.94 x 10 ⁻⁵	5.5 x 10 ⁵	1.15 x 10 ⁶	NA	NA	0
Indeno(1,2,3-cd)pyrene	5.3 x 10 ⁻⁴	1.0 x 10 ⁻¹⁰	6.86 x 10 ⁻⁸	1.6 x 10 ⁶	3.16 x 10 ⁶	NA	NA	0
Benzo(ghi)perylene	7.0 x 10 ⁻⁴	1.03 x 10 ⁻¹⁰	5.34 x 10 ⁻⁸	1.6 x 10 ⁶	3.24 x 10 ⁶	NA	NA	0
Naphthalene	3.17 x 10 ^{1b}	8.7 x 10 ^{-2b}	4.6 x 10 ^{-4b}	1.95 x 10 ^{3b}	9.4 x 10 ^{3b}	NA	1.5 x 10 ^{-2b}	0 ^b
Acenaphthylene	3.93 x 10 ^{2b}	2.9 x 10 ^{-2b}	1.45 x 10 ^{-3b}	5.3 x 10 ^{3b}	2.5 x 10 ^{3b}	NA	5 x 10 ^{-3b}	0 ^b
2-methylnaphthalene	2.8 x 10 ^{1c}				6.98 x 10 ^{2b}			
Dibenzofuran	1.0 x 10 ^{1e}	NA	NA	1.32 x 10 ^{4e}	8.13 x 10 ^{3b}			
Anthracene	1.29 x 10 ^{9e}	1.95 x 10 ^{-4e}	8.6 x 10 ^{-5e}	2.82 x 10 ^{4e}	1.74 x 10 ^{4e}			
Dibenz(g,h)anthracene	5.0 x 10 ^{-4e}	1.0 x 10 ^{-10e}	7.3 x 10 ^{-8e}	9.33 x 10 ^{4e}	5.75 x 10 ^{4e}			
Carbazole	6.25 x 10 ^{1h}			1.95 x 10 ^{3e}	1.20 x 10 ^{3b}			
PHTHALATE COMPOUNDS								
Bis(2ethylhexyl)phthalate	4.0 x 10 ⁻¹	2.0 x 10 ⁻⁷	3.0 x 10 ⁻⁷	2.0 x 10 ⁹	4.1 x 10 ⁹	NA	NA	0
Di-n-butyl phthalate	1.3 x 10 ¹	1.0 x 10 ⁻⁵	2.82 x 10 ⁻⁷	1.70 x 10 ⁵	3.98 x 10 ⁵	NA	NA	0
Butylbenzyl phthalate	2.9 x 10 ^{2b}	6 x 10 ^{-5b}	8.3 x 10 ^{-6b}	3.6 x 10 ^{5b}	1.7 x 10 ^{5b}	NA	NA	7.92 x 10 ^{-3b}
PESTICIDES/POLYCHLORINATED BIPHENYLS								
DDE	4.0 x 10 ⁻²	6.5 x 10 ⁻⁶	6.80 x 10 ⁻⁵	4.4 x 10 ⁶	1 x 10 ⁷	NA	NA	<6.6 x 10 ⁻⁷
DDT	5.0 x 10 ⁻³	5.5 x 10 ⁻⁶	5.13 x 10 ⁻⁴	2.43 x 10 ⁵	1.55 x 10 ⁶	NA	<5 x 10 ⁻⁷	6.8 x 10 ⁻⁶
DDD	1.0 x 10 ⁻¹	1.89 x 10 ⁻⁶	7.96 x 10 ⁻⁶	7.7 x 10 ⁵	1.58 x 10 ⁶	NA	<5 x 10 ⁻⁷	4.0 x 10 ⁻⁷
Chlordane	5.6 x 10 ^{-2b}	1 x 10 ^{-5b}	9.4 x 10 ^{-8b}	3 x 10 ^{5b}	1.4 x 10 ^{5b}	NA	NA	NA
Dieldrin	1.95 x 10 ^{-1b}	1.78 x 10 ^{-7b}	4.57 x 10 ^{-10b}	3.5 x 10 ^{3b}	1.7 x 10 ^{3b}	NA	NA	NA
Methoxychlor	4.0 x 10 ^{-2e}			4.8 x 10 ^{4e}		NA	NA	NA
Aroclor 1248	5.4 x 10 ^{-2b}	4.94 x 10 ^{-6b}	3.6 x 10 ^{-3b}	5.75 x 10 ^{5b}	2.77 x 10 ^{5b}	NA	NA	NA

TABLE 5-2 SOIL-WATER PARTITION COEFFICIENTS
FOR INORGANICS IDENTIFIED AT THE SITE
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analyte	Kd ^a
Aluminum	1,500
Arsenic	200
Barium	60
Cadmium	6.5
Calcium	4.0
Chromium	850
Cobalt	45
Copper	35
Iron	25
Lead	900
Magnesium	4.5
Manganese	65
Mercury	10
Nickel	150
Potassium	5.5
Sodium	100
Vanadium	1,000
Zinc	40
a. Data from Baes et al. (1984).	

TABLE 5-3 MEASURED pH, Eh, AND CONDUCTIVITY IN SITE
GROUND WATER AND SURFACE WATER
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

Sample	pH	Eh	Conductivity	Date
OVERBURDEN WELLS				
MW-2S	9.09	245	1,960	10-8-93
MW-4S	8.04	275	1,065	10-7-93
MW-5S	9.64	182	2,430	9-3-93
MW-6S	9.14	238	1,377	10-6-93
MW-7S	9.73	141	2,440	10-5-93
MW-12S	7.10	157	2,160	9-3-93
MW-18S	7.43	203	785	10-1-93
LANDFILL PIEZOMETERS				
LFP-01	10.58	15	8,930	9-3-93
LFP-02	8.96	122	2,290	9-3-93
SHALLOW BEDROCK WELLS				
MW-1I	11.05	1	15,030	9-2-93
MW-2I	11.35	-71	16,940	9-2-93
MW-3I	10.37	5	4,420	9-1-93
MW-4I	10.43	53	3,560	9-1-93
MW-5I	8.16	191	1,750	9-1-93
MW-6I	10.45	21	2,310	9-1-93
MW-7I	10.37	-6	5,070	9-2-93
MW-8I	7.00	371	2,260	9-1-93
MW-9I	6.95	211	1,590	9-1-93
MW-10I	8.29	291	513	8-26-93
MW-11I	7.11	344	874	8-26-93
MW-12I	7.23	145	1,960	9-1-93
NOTE: Units for Eh = millivolts; units for conductivity = μ mhos/cm.				

TABLE 5-3 (Continued)

Sample	pH	Eh	Conductivity	Date
SHALLOW BEDROCK WELLS (Continued)				
MW-13I	7.04	324	624	8-27-93
MW-14I	7.80	328	722	9-1-93
MW-16I	9.31	257	1,940	10-7-93
MW-18I	7.36	155	1,018	10-1-93
DEEP BEDROCK WELLS				
MW-2D	10.50	-20	6,590	10-7-93
MW-7D	11.65	68	13,040	10-5-93
MW-9D	7.88	339	348	10-5-93
MW-13D	8.16	287	635	10-6-93
MW-15D	8.32	397	387	10-6-93
MW-16D	7.79	310	854	10-6-93
MW-17D	8.03	278	692	10-7-93
SLUDGE PIT WELLS				
SPW-01	7.63	298	647	9-30-93
SPW-02	7.79	361	526	9-30-93
SPW-03	7.79	356	469	9-30-93
SURFACE WATER SAMPLES				
SW-1	8.88	290	310	10-8-93
SW-2	8.89	302	298	10-8-93
SW-3	8.97	304	298	10-8-93
SW-4	8.78	304	295	10-8-93

**TABLE 5-4 CALCULATED IONIZATION OF ORGANIC ACIDS AND PHENOLICS IN
SITE GROUND WATER AND SURFACE WATER
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Sample	pH	<i>o</i> -Toluic Acid % Ionized	<i>m</i> -Toluic Acid % Ionized	<i>p</i> -Toluic Acid % Ionized	Benzoic Acid % Ionized	2-Methylphenol % Ionized	4-Methylphenol % Ionized	Phenol % Ionized
OVERBURDEN WELLS								
MW-2S	9.09	100.00	100.00	100.00	100.00	12.89	15.70	11.18
MW-4S	8.04	99.99	99.99	99.98	99.99	1.30	1.63	1.11
MW-5S	9.64	100.00	100.00	100.00	100.00	34.42	39.78	30.88
MW-6S	9.14	100.00	100.00	100.00	100.00	14.23	17.28	12.38
MW-7S	9.73	100.00	100.00	100.00	100.00	39.23	44.84	35.46
MW-12S	7.10	99.94	99.87	99.80	99.87	0.15	0.19	0.13
MW-18S	7.43	99.97	99.94	99.91	99.94	0.32	0.41	0.27
LANDFILL PIEZOMETERS								
LFP-01	10.58	100.00	100.00	100.00	100.00	82.05	85.19	79.55
LFP-02	8.96	100.00	100.00	100.00	100.00	9.88	12.13	8.54
SHALLOW BEDROCK WELLS								
MW-1I	11.05	100.00	100.00	100.00	100.00	93.10	94.44	91.99
MW-2I	11.35	100.00	100.00	100.00	100.00	96.42	97.13	95.82
MW-3I	10.37	100.00	100.00	100.00	100.00	73.81	78.01	70.58
MW-4I	10.43	100.00	100.00	100.00	100.00	76.39	80.29	73.36
MW-5I	8.16	99.99	99.99	99.98	99.99	1.71	2.14	1.46
MW-6I	10.45	100.00	100.00	100.00	100.00	77.21	81.01	74.25
MW-7I	10.37	100.00	100.00	100.00	100.00	73.81	78.01	70.58
MW-8I	7.00	99.92	99.84	99.75	99.84	0.12	0.15	0.10
MW-9I	6.95	99.91	99.82	99.72	99.82	0.11	0.13	0.09

TABLE 5-4 (Continued)

Sample	pH	<i>o</i> -Toluic Acid % Ionized	<i>m</i> -Toluic Acid % Ionized	<i>p</i> -Toluic Acid % Ionized	Benzoic Acid % Ionized	2-Methylphenol % Ionized	4-Methylphenol % Ionized	Phenol % Ionized
MW-10I	8.29	100.00	99.99	99.99	99.99	2.29	2.87	1.96
MW-11I	7.11	99.94	99.88	99.81	99.87	0.15	0.19	0.13
MW-12I	7.23	99.95	99.91	99.85	99.90	0.20	0.26	0.17
MW-13I	7.04	99.93	99.86	99.77	99.85	0.13	0.17	0.11
MW-14I	7.80	99.99	99.97	99.96	99.97	0.75	0.95	0.64
MW-16I	9.31	100.00	100.00	100.00	100.00	19.71	23.61	17.28
MW-18I	7.36	99.96	99.93	99.89	99.93	0.27	0.35	0.23
DEEP BEDROCK WELLS								
MW-2D	10.50	100.00	100.00	100.00	100.00	79.17	82.72	76.39
MW-7D	11.65	100.00	100.00	100.00	100.00	98.17	98.54	97.86
MW-9D	7.88	99.99	99.98	99.97	99.98	0.90	1.14	0.77
MW-13D	8.16	99.99	99.99	99.98	99.99	1.71	2.14	1.46
MW-15D	8.32	100.00	99.99	99.99	99.99	2.45	3.07	2.09
MW-16D	7.79	99.99	99.97	99.96	99.97	0.74	0.92	0.63
MW-17D	8.03	99.99	99.99	99.98	99.98	1.27	1.60	1.08
SLUDGE PIT WELLS								
SPW-01	7.63	99.98	99.96	99.94	99.96	0.51	0.64	0.43
SPW-02	7.79	99.99	99.97	99.96	99.97	0.74	0.92	0.63
SPW-03	7.79	99.99	99.97	99.96	99.97	0.74	0.92	0.63
SURFACE WATER SAMPLES								
SW-1	8.88	100.00	100.00	100.00	100.00	8.36	10.30	7.20
SW-2	8.89	100.00	100.00	100.00	100.00	8.54	10.51	7.36
SW-3	8.97	100.00	100.00	100.00	100.00	10.09	12.38	8.72
SW-4	8.78	100.00	100.00	100.00	100.00	6.76	8.36	5.81

TABLE 5-5 EMISSION RATES OF VOLATILE ORGANIC COMPOUNDS FROM
SOIL VAPOR IN THE FORMER ORGANICS PLANT AREA
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Compounds	Mean Soil Vapor Concentration (ppm _v)	Mean Emission Rate (g/sec)	UCL Soil Vapor Concentration (ppm _v)	UCL Emission Rate (g/sec)
Toluene	0.32	2.71E-7	0.54	7.71E-7
Ethylbenzene	0.45	5.25E-7	0.91	2.15E-6
<i>m/p</i> -xylenes	3.46	3.34E-5	9.92	2.74E-4
<i>o</i> -xylene	13.58	5.14E-4	43.04	5.17E-3
Methylene chloride	0.39	4.29E-7	0.79	1.76E-7
<i>trans</i> -1,2-dichloroethene	0.66	1.21E-6	1.15	3.70E-6
<i>cis</i> -1,2-dichloroethane	1.69	8.00E-6	3.99	4.47E-5
Trichloroethane	0.18	1.32E-7	0.39	5.89E-7
Trichloroethene	0.11	4.33E-8	0.22	1.89E-7
Tetrachloroethene	0.26	2.97E-7	0.47	1.00E-6
NOTE: UCL = Upper Confidence Limit.				

TABLE 5-6 CALCULATED VOLATILIZATION RATES FROM LANDFILL
AND AREA NORTH OF MAIN PLANT BUILDING SOIL BORINGS
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

Analyte	Mean Concentration ($\mu\text{g/kg}$)	Mean Flux Rate ($\text{g/m}^2\text{-sec}$)	UCL Concentration ($\mu\text{g/kg}$)	UCL Flux Rate ($\text{g/m}^2\text{-sec}$)
LANDFILL SOIL BORINGS				
Methylene choride	1.30E+03	1.21E-08	1.30E+03	1.22E-08
Acetone	5.50E+01	3.77E-12	5.50E+01	3.77E-12
2-Butanone	7.10E+03	5.62E-10	7.10E+03	5.62E-10
Benzene	2.82E+03	4.43E-08	6.21E+03	9.76E-08
Chloroform	1.00E+00	8.22E-12	1.00E+00	8.22E-12
Chlorobenzene	2.10E+02	1.81E-09	2.10E+02	1.81E-09
1,2-Dichloroethene	1.70E+01	1.77E-10	1.70E+01	1.77E-10
Trichloroethene	1.53E+04	4.68E-07	3.53E+04	1.08E-05
Tetrachloroethene	4.00E+00	2.57E-10	4.00E+00	2.57E-10
Toluene	1.01E+05	1.52E-06	2.80E+05	4.19E-06
Ethylbenzene	1.73E+04	3.00E-07	3.74E+04	6.48E-07
Xylenes	2.72E+06	4.43E-05	7.16E+06	1.17E-04
AREA NORTH OF MAIN PLANT BUILDING SOIL BORINGS				
Acetone	1.40E+02	1.45E-11	1.40E+02	1.45E-11
1,1-Dichloroethane	4.00E+00	1.04E-10	4.00E+00	1.04E-10
1,2-Dichloroethene	2.00E+00	6.14E-11	2.00E+00	3.14E-11
2-Butanone	5.90E+01	1.20E-11	5.90E+01	1.20E-11
Benzene	5.00E+00	1.18E-10	5.00E+00	1.18E-10
Tetrachloroethene	5.00E+00	4.84E-10	5.00E+00	4.84E-10
Toluene	3.70E+01	8.35E-10	3.70E+01	8.35E-10
Xylenes	1.58E+05	3.89E-06	4.41E+05	1.08E-05
NOTE: UCL = Upper Confidence Limit.				

TABLE 5-8 RELATIVE MIGRATION RATES OF SITE CONTAMINANTS
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Organic Compounds	Relative Flow ^a
Benzene	0.9132
Toluene	0.7212
Chlorobenzene	0.6674
Ethylbenzene	0.4962
Xylenes	0.4328
Chloroform	0.9372
1,1,1-Trichloroethane	0.8147
1,1,2,2-Tetrachloroethane	0.9217
1,2-Dichloroethane	0.9789
1,1-Dichloroethane	0.9789
Trichloroethene	0.8527
Tetrachloroethene	0.7524
Acetone	0.9984
2-Butanone	0.9968
<i>o</i> -Toluic acid	0.8719
<i>m</i> -Toluic acid	0.9055
<i>p</i> -Toluic acid	0.9235
2-methyl phenol	0.9619
3-methyl phenol	0.9619
2,4-Dimethyl phenol	0.9353
Benzoic acid	0.9681
Phenol	0.9899
Fluoranthene	0.0172
Pyrene	0.0180
Acenaphthene	0.1220
Fluorene	0.0808
Phenanthrene	0.0460
Benzo(a)pyrene	0.0012
Benzo(a)anthracene	0.0035
Chrysene	0.0034
Benzo(b)fluoranthene	0.0012
Benzo(k)fluoranthene	0.0012
Indeno(1,2,3-cd)pyrene	0.0004
Benzo(ghi)perylene	0.0004
Naphthalene	0.5964
Acenaphthylene	0.3571
4,4'-DDE	0.0001
4,4'-DDT	0.0009
4,4'-DDD	0.0009
a. Ground-water flow velocity set at 1 ft/day.	

TABLE 5-9 RELATIVE MIGRATION RATES OF INORGANIC ANALYTES AT
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Analyte	Relative Rate
Arsenic	0.0012
Barium	0.0041
Cadmium	0.0370
Chromium	0.0003
Cobalt	0.0055
Copper	0.0071
Iron	0.0099
Lead	0.0003
Magnesium	0.0526
Manganese	0.0038
Mercury	0.0244
Nickel	0.0017
Potassium	0.0435
Sodium	0.0025
Vanadium	0.0002
Zinc	0.0062

TABLE 5-10 COMPARISON OF NORMALIZED RATIOS OF TOLUIC ACID
ISOMERS AT SELECTED LOCATIONS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Compound	Range - Potential Source(s)		Basement Seeps	MW-6I	MW-7I
	Landfill	Area North of Main Plant Building			
<i>o</i> -Toluic acid	1	1	1	1	1
<i>m</i> -Toluic acid	0.93-2.5	0.03-0.76	0.07-2.94	0.64-0.97	0.04-0.66
<i>p</i> -Toluic acid	0.77-1.05	0.0-0.05	0.0	0.05-0.12	0.0-0.25

**TABLE 6-1A ORGANIC CHEMICAL EXPOSURE POINT CONCENTRATIONS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
LANDFILL PERIMETER SOIL BORINGS (µg/kg)				
Acetone	ND-58	12/15	15.4	23.9
Tetrachloroethene	ND-2	1/15	(3.0) ^b	(3.2) ^b
Toluene	ND-4	2/15	3.1	3.3
Ethylbenzene	ND-2	1/15	(3.0) ^b	(3.2) ^b
Xylenes (total)	ND-670	7/15	52.5	144.5
2-methyl phenol	ND-40	2/15	(182) ^b	(217) ^b
4-methyl phenol	ND-29	1/15	(191) ^b	(218) ^b
Naphthalene	ND-200	4/15	170	(204) ^b
Fluorene	ND-250	3/15	187	222
Anthracene	ND-390	4/15	182	229
Fluoranthene	ND-2,300	5/15	356	565
Pyrene	ND-2,200	5/15	344	629
Bis(2-ethylhexyl)phthalate	ND-110	1/15	(196) ^b	(213) ^b
Benzo(a)pyrene	ND-1,300	3/15	274	430
<i>o</i> -Toluic acid	ND-170	3/15	(892) ^b	(1,142) ^b
<i>m</i> -Toluic acid	ND-120	2/15	(941) ^b	(1,162) ^b
<i>p</i> -Toluic acid	ND-48	1/15	(1,000) ^b	(1,184) ^b
4,4'-DDE	ND-36	3/15	7.3	11.6
4,4'-DDD	ND-6	1/15	5.0	5.4
Total c-PAHs	ND-254	2/15	(346) ^b	(627) ^b
NORTH AREA SOIL BORINGS (µg/kg)				
Acetone	ND-140	8/17	(242) ^b	(740) ^b
1,1-Dichloroethane	ND-4	1/17	(234) ^b	(728) ^b
1,2-Dichloroethene	ND-2	1/17	(234) ^b	(728) ^b
Benzene	ND-5	1/17	(233) ^b	(727) ^b
Tetrachloroethene	ND-1	1/17	(233) ^b	(727) ^b
Toluene	ND-37	3/17	(236) ^b	(729) ^b
a. Mean calculated by setting non-detects at one-half the sample quantitation limit. b. Value exceeds upper limit of observed range. Maximum observed values used for risk assessed.				
NOTE: ND = Not detected.				

TABLE 6-1A (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean*	Upper Confidence Limit
NORTH AREA SOIL BORINGS ($\mu\text{g}/\text{kg}$) (Continued)				
Xylenes (total)	ND-2,200,000	10/17	158,484	440,573
Phenol	ND-270	1/17	(989) ^b	(2,147) ^b
2-methylphenol	ND-1,400	2/17	719	(1,658) ^b
4-methylphenol	ND-2,400	2/17	807	(1,767) ^b
2-4-dimethylphenol	ND-3,700	3/17	1,004	2,046
Naphthalene	ND-2,100	7/17	425	701
Fluorene	ND-4,100	6/17	889	1,926
Anthracene	ND-140	6/17	(982) ^b	(2,161) ^b
Carbazole	ND-130	5/17	(983) ^b	(2,161) ^b
Di-n-butyl phthalate	ND-90	3/17	(1,001) ^b	(2,175) ^b
Fluoranthene	ND-7,800	10/17	873	1,858
Pyrene	ND-7,800	9/17	1,158	2,345
Total c-PAHs	ND-40,500	7/17	3,745	8,913
<i>o</i> -Toluic acid	ND-19,000	3/17	5,943	12,061
<i>m</i> -Toluic acid	ND-46,000	4/17	6,368	13,672
<i>p</i> -Toluic acid	ND-14,000	1/17	5,721	11,662
4,4'-DDD	ND-8.7	1/17	2.1	3.0
Aroclor 1248	ND-59	1/17	37	48
SKANEATELES CREEK SEDIMENTS - ROUND 1 ($\mu\text{g}/\text{kg}$)				
Tetrachloroethene	ND-16	1/5	5.9	9.8
Xylenes	ND-2	1/5	(3.1)	(3.6) ^b
Naphthalene	ND-1,100	1/5	(1,255) ^b	(1,836) ^b
Fluorene	ND-2,400	4/5	1,515	2,188
Anthracene	ND-3,600	2/5	1,427	2,391
Fluoranthene	ND-10,000	4/5	2,706	5,579
Pyrene	ND-15,000	4/5	3,676	8,086
Benzo(a)pyrene	ND-4,600	3/5	1,573	2,854
Total c-PAHs	ND-28,900	3/5	7,139	15,626

TABLE 6-1A (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
SKANEATELES CREEK SEDIMENTS - ROUND 2 (µg/kg)				
Vinyl chloride	ND-12	1/5	8.3	9.9
Acetone	ND-330	3/5	100	194
1,2-Dichloroethene	ND-1,100	1/5	226	565
Toluene	ND-48	1/5	15	28
Ethylbenzene	ND-7	1/5	(7.3) ^b	(7.9) ^b
Xylenes (total)	ND-3,600	1/5	726	1,841
2-methylphenol	ND-200	1/5	(254) ^b	(305) ^b
Naphthalene	ND-86	1/5	(235) ^b	(313) ^b
Fluorene	ND-140	1/5	(246) ^b	(313) ^b
Anthracene	ND-230	1/5	(264) ^b	(318) ^b
Carbazole	ND-160	1/5	(250) ^b	(313) ^b
Fluoranthene	ND-1,800	4/5	552	1,041
Pyrene	ND-1,400	4/5	452	826
Benzo(a)pyrene	ND-780	4/5	301	498
Total c-PAHs	ND-4,560	4/5	1,407	2,723
<i>o</i> -Toluic acid	ND-630	1/5	(1,088) ^b	(1,258) ^b
<i>m</i> -Toluic acid	ND-240	1/5	(988) ^b	(1,292) ^b
<i>p</i> -Toluic acid	ND-42	1/5	(948) ^b	(1,311) ^b
SOIL VAPOR (NORTH AREA) ppm,				
Toluene	ND-3.0	9/53	0.32	0.54
Ethylbenzene	ND-5.7	7/53	0.45	0.91
<i>m/p</i> -Xylene	ND-91.4	23/53	3.46	9.92
<i>o</i> -Xylene	ND-417.2	22/53	13.58	43.0
<i>cis</i> -1,2-dichloroethene	ND-28.2	10/53	1/69	3.99
<i>trans</i> -1,2-dichloroethene	ND-6.2	5/53	0.66	1.15
Trichloroethane	ND-2.2	17/53	0.18	0.39
Trichloroethene	ND-1	11/53	0.11	0.22
Tetrachloroethene	ND-1.8	28/53	0.26	0.47

TABLE 6-1A (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean*	Upper Confidence Limit
CREEK SEEPS - ROUND 1 ($\mu\text{g/L}$)				
Acetone	ND-49	1/4	26	40
1,2-Dichloroethene	ND-670	3/4	196	449
Trichloroethene	ND-260	3/4	86	182
Tetrachloroethene	ND-560	3/4	166	378
Toluene	ND-53	3/4	21	39
Xylenes	ND-570	3/4	323	555
Phenol	ND-81	2/4	34	64
2-methylphenol	ND-16	3/4	11	14
4-methylphenol	ND-11	2/4	7	9.5
Naphthalene	ND-2	1/4	(4)	(5)
Anthracene	ND-15	1/4	7.5	11.5
Fluorene	ND-2	1/4	(4)	(5)
Fluoranthene	ND-28	1/4	11	20
Pyrene	ND-18	2/4	8	13
Benzo(a)pyrene	ND-8	1/4	6	7
Total c-PAHs	ND-66	1/4	20.3	44.5
<i>o</i> -Toluic acid	ND-86,000	3/4	43,056	74,860
<i>m</i> -Toluic acid	ND-46,000	3/4	22,706	41,513
<i>p</i> -Toluic acid	ND-15,000	3/4	6,134	11,805
UPPER BEDROCK GROUND WATER - ROUND 1 ($\mu\text{g/L}$)				
Vinyl chloride	ND-3	1/13	(21)	(40)
Acetone	ND-130	3/13	34	58
1,2-dichloroethene	ND-160	8/13	54	90
Trichloroethene	ND-190	7/13	38	74
Benzene	ND-1	1/13	(11)	(20)
Tetrachloroethene	ND-2,300	6/13	368	839
Toluene	ND-68	6/13	20	34
Xylenes	ND-2,100	7/13	582	1,063
Benzyl alcohol	ND-26	3/13	24	26
Phenol	ND-140	8/12	35	56

TABLE 6-1A (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean*	Upper Confidence Limit
UPPER BEDROCK GROUND WATER - ROUND 1 (µg/L) (Continued)				
2-methylphenol	ND-19	6/13	11	15
4-methylphenol	ND-31	8/12	16	23
2,4-diethylphenol	ND-320	3/12	37	84
Benzoic acid	ND-330	6/12	64	116
Napthalene	ND-9	1/13	(10)	(14)
Pentachlorophenol	ND-20	2/12	(38)	(57)
Total c-PAHs	ND-5	1/12	(65)	(96)
<i>o</i> -Toluic acid	ND-87,000	9/12	22,773	39,441
<i>m</i> -Toluic acid	ND-50,000	9/12	10,331	18,916
<i>p</i> -Toluic acid	ND-5,400	6/12	1,184	2,247
UPPER BEDROCK GROUND WATER - ROUND 2 (µg/L)				
Vinyl chloride	ND-21	1/17	14	22
Acetone	ND-39	1/16	15	24
1,2-Dichloroethene	ND-1,500	9/17	137	329
Trichloroethane	ND-54	5/17	11	18
Benzene	ND-4	1/17	(13)	(21)
Tetrachloroethene	ND-190	3/17	27	54
Toluene	ND-37	4/17	15	23
Ethylbenzene	ND-1	1/17	(13)	(21)
Xylene	ND-1,900	10/17	428	772
Phenol	ND-2,400	5/17	171	479
2-methylphenol	ND-30	6/17	8	12
4-methylphenol	ND-69	6/17	12	22
2,4-dimethylphenol	ND-0.6	1/17	10	18
Napthalene	ND-8	3/17	11	18
<i>o</i> -Toluic acid	ND-220,000	11/17	32,845	68,617
<i>m</i> -Toluic acid	ND-150,000	10/17	20,557	42,895
<i>p</i> -Toluic acid	ND-240,000	10/17	21,623	53,549
4,4'-DDE	ND-0.23	1/17	0.09	0.17

TABLE 6-1A (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
DEEP BEDROCK GROUND WATER - ROUND 1 (µg/L)				
Acetone	ND-20	2/9	8	11
1,2-Dichloroethane	ND-94	2/9	13	30.2
Trichloroethane	ND-4	1/9	2.7	3.0
Benzene	ND-3	2/9	2.5	2.6
Tetrachloroethene	ND-9	3/9	3.8	5.1
Toluene	ND-23	2/9	5.2	9.1
Ethylbenzene	ND-3	2/9	2.5	2.6
Xylenes	ND-520	2/9	76.4	176.3
Phenol	ND-22	1/9	6.9	10.2
2-methylphenol	ND-7	1/9	5.2	5.6
4-methylphenol	ND-9	1/9	5.4	6.2
2,4-dimethylphenol	ND-29	1/9	7.7	12.3
Benzoic acid	ND-76	1/9	30.7	40.5
Pentachlorophenol	ND-5	1/9	23	26.4
<i>o</i> -Toluic acid	ND-20,000	3/9	2,907	6,739
<i>m</i> -Toluic acid	ND-9,000	2/9	1,422	3,196
<i>p</i> -Toluic acid	ND-1,100	2/9	189	398
DEEP BEDROCK GROUND WATER - ROUND 2 (µg/L)				
Acetone	ND-47	1/6	12.0	23.0
1,2-Dichloroethene	ND-4	1/6	(4.8)	(5.1)
Trichloroethene	ND-4	1/6	(4.8)	(5.1)
Tetrachloroethene	ND-11	1/6	6.0	7.6
Toluene	ND-4	1/6	(4.8)	(5.1)
Xylenes	ND-330	1/6	59.2	144.4
Phenol	ND-35	1/6	10.0	17.9
2-methylphenol	ND-10	1/6	5.8	7.1
Pentachlorophenol	ND-60	1/6	20.4	32.9
Naphthalene	ND-1	1/6	(4.3)	(5.4)
<i>o</i> -Toluic acid	ND-17,000	1/6	2,854	7,308
<i>m</i> -Toluic acid	ND-17,000	1/6	2,854	7,308
<i>p</i> -Toluic acid	ND-1,300	1/6	238	572
4,4'-DDE	ND-0.14	1/6	0.07	0.09

TABLE 6-1A (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
OFFSITE UPPER BEDROCK GROUND WATER ($\mu\text{g/L}$)				
1,2-Dichloroethene	23-200	2/2	112	(509)
Trichloroethene	ND-12	1/2	8.5	(24.2)
Toluene	ND-19	1/2	12	(43)
Xylenes	300-490	2/2	395	(822)
Phenol	ND-24	1/2	14.5	(57.2)
2-methylphenol	0.9-14	2/2	7.5	(36.9)
4-methylphenol	0.8-12	2/2	6.4	(31.6)
2,4-Dimethylphenol	ND-0.6	1/2	(5.3)	(26.4)
<i>o</i> -Toluic acid	4,500-84,000	2/2	34,250	(167,894) ^b
<i>m</i> -Toluic acid	1,200-42,000	2/2	21,600	(113,242) ^b
<i>p</i> -Toluic acid	180-18,000	2/2	8,095	(43,606) ^b
OFFSITE DEEP BEDROCK GROUND WATER ($\mu\text{g/L}$)				
Acetone	ND-47	1/3	19	45
1,2-Dichloroethene	ND-4	1/3	(4.7) ^b	(5.3) ^b
Trichloroethene	ND-4	1/3	(4.7) ^b	(5.3) ^b
Tetrachloroethene	ND-11	1/3	7.0	10.7
Toluene	ND-4	1/3	(4.7)	(5.3)
Xylenes	ND-330	1/3	113	315
Phenol	ND-35	1/3	15.0	33.6
2-methylphenol	ND-10	1/3	6.7	9.0
Pentachlorophenol	ND-60	1/3	28.3	57.8
Napthalene	ND-1	1/3	(4) ^b	(6) ^b
<i>o</i> -Toluic acid	ND-17,000	1/3	5,683	16,226
<i>m</i> -Toluic acid	ND-17,000	1/3	5,683	16,226
<i>p</i> -Toluic acid	ND-1,300	1/3	450	1,242
4,4'-DDE	ND-0.14	1/3	0.08	0.14

TABLE 6-1A (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean*	Upper Confidence Limit
OFFSITE MIXED BEDROCK GROUND WATER ($\mu\text{g/L}$)				
Acetone	ND-47	1/5	27.5	49.6
1,2-Dichloroethene	ND-200	3/5	111.5	198.4
Trichloroethene	ND-12	2/5	8.5	11.9
Tetrachloroethene	ND-11	1/5	15.2	(28.8) ^b
Toluene	ND-19	2/5	7.6	12.0
Xylenes	ND-490	4/5	323.0	460.7
Phenol	ND-35	2/5	14.8	24.5
2-methylphenol	ND-14	4/5	6.2	10.2
4-methylphenol	ND-12	4/5	5.5	9.0
2,4-Dimethylphenol	ND-0.6	2/5	4.2	6.9
Napthalene	ND-1	1/5	(5.2) ^b	(7.4) ^b
<i>o</i> -Toluic acid	ND-64,000	4/5	16,006	(102,116) ^b
<i>m</i> -Toluic acid	ND-42,000	4/5	12,285	(69,578) ^b
<i>p</i> -Toluic acid	ND-16,000	4/5	3,541	(25,724) ^b

**TABLE 6-1B INORGANIC CHEMICAL EXPOSURE CONCENTRATIONS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
LANDFILL PERIMETER BORING (mg/kg)				
Antimony	ND-6.6	8/15	3.3	4.3
Arsenic	2.2-7.8	15/15	4.6	5.4
Barium	35.2-124	15/15	75.0	88.6
Beryllium	0.31-0.89	15/15	0.63	0.72
Cadmium	1.6-6.5	15/15	4.4	5.0
Chromium	13.1-26.3	15/15	18.7	20.9
Lead	9.2-20.7	12/12	14.0	16.1
Mercury	ND-0.26	3/15	0.09	0.12
Nickel	14.0-48.4	15/15	27.4	31.7
Selenium	ND-0.40	2/15	0.08	0.14
Silver	0.75-4.9	15/15	2.2	2.8
Thallium	ND-0.31	2/15	0.12	0.16
Vanadium	8.4-24.3	15/15	17.5	19.9
Zinc	44.8	1/1	44.8	44.8
NORTH AREA SOIL BORINGS (mg/kg)				
Antimony	ND-30.2	8/17	6.9	11.1
Arsenic	2.9-33.1	17/17	10.8	14.9
Barium	26-1,380	17/17	291	501
Beryllium	0.26-0.95	17/17	0.50	0.59
Cadmium	1.1-39.6	17/17	6.4	11.1
Chromium	9.0-162	17/17	43.2	65.1
Lead	5.6-3,039	17/17	634	1,159
Mercury	ND-25.2	12/16	3.4	6.8
Nickel	13.5-166	17/17	42	61
Selenium	ND-0.49	6/17	0.14	0.21
a. Mean calculated by setting non-detects at one-half the sample quantitation limit.				
NOTE: ND = Not detected.				

TABLE 6-1B (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
NORTH AREA SOIL BORINGS (mg/kg) (Continued)				
Silver	ND-2.6	1/17	0.45	0.76
Thallium	ND-0.43	6/17	0.19	0.22
Vanadium	5.6-26.6	17/17	15.3	18.7
Zinc	22.5-16,600	17/17	1,653	3,680
Cyanide	ND-0.48	4/15	0.13	0.20
SKANEATELES CREEK SEDIMENTS - ROUND 1 (mg/kg)				
Antimony	60.4-91.7	5/5	73.0	82.4
Arsenic	1.2-3.2	5/5	2.5	3.1
Barium	36.9-97.1	5/5	67.0	82.0
Beryllium	0.20-0.37	5/5	0.27	0.31
Cadmium	1.3-1.9	5/5	1.7	1.8
Chromium	6.9-12.0	5/5	9.5	11.1
Lead	12.8-293	5/5	121	201
Nickel	15.8-23.6	5/5	17.5	19.9
Vanadium	5.0-9.5	5/5	7.1	8.4
Zinc	44.1-155	5/5	95.6	133.6
Cyanide	0.11-0.13	5/5	0.12	0.13
SKANEATELES CREEK SEDIMENTS - ROUND 2 (mg/kg)				
Arsenic	2.1-6.5	5/5	3.9	5.1
Barium	49.7-193	5/5	95.6	140.6
Beryllium	0.21-0.33	5/5	0.27	0.31
Cadmium	1.4-2.2	5/5	1.9	2.2
Chromium	8.1-30.1	5/5	16.9	22.9
Lead	28.4-215	5/5	107	156
Mercury	0.19-2.00	5/5	0.97	1.52
Nickel	14.3-48.7	5/5	23.1	33.2
Selenium	ND-0.68	3/5	0.26	0.44
Vanadium	6.1-10.2	5/5	7.9	9.0
Zinc	44.5-229	5/5	140	189

TABLE 6-1B (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
SURFACE WATER - ROUND 1 (µg/L)				
Antimony	77-91	5/5	84	88
Arsenic	ND-1	1/5	0.6	0.9
Barium	66-102	5/5	81	90
Lead	91-278	5/5	153	208
Zinc	ND-10	4/5	6.3	8.5
SURFACE WATER - ROUND 2 (µg/L)				
Lead	ND-1	1/3	0.7	0.9
CREEK SEEPS - ROUND 1 (µg/L)				
Antimony	99-269	4/4	158	219
Arsenic	5.7-170	4/4	75	134
Barium	71-491	4/4	218	366
Beryllium	ND-1.8	1/4	0.8	1.3
Cadmium	ND-8.7	1/4	4.1	6.5
Chromium	8-92	4/4	43	71
Lead	87.8-194	4/4	128	164
Mercury	0.53-1.30	4/4	0.93	1.20
Nickel	ND-238	3/4	95	185
Thallium	ND-1.3	2/4	0.8	1.1
Vanadium	ND-172	3/4	74	131
Zinc	51.4-244	4/4	129	195
UPPER BEDROCK GROUND WATER - ROUND 1 (µg/L)				
Arsenic	ND-910	7/9	124	149
Barium	34.9-326	13/13	134	188
Chromium	ND-53.2	10/13	25	35
Lead	ND-122	5/13	26	50
Mercury	ND-0.65	3/8	0.28	0.40

TABLE 6-1B (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean*	Upper Confidence Limit
UPPER BEDROCK GROUND WATER - ROUND 2 (µg/L)				
Arsenic	ND-631	11/17	84	179
Barium	ND-653	10/17	155	236
Cadmium	ND-12.1	5/17	2.6	4.0
Chromium	ND-60.4	13/17	24.6	34.5
Lead	ND-128	15/17	25.3	46
DEEP BEDROCK GROUND WATER - ROUND 1 (µg/L)				
Antimony	ND-55.6	1/9	29.3	36.0
Arsenic	ND-90.5	3/9	19.1	39.8
Barium	ND-123	6/6	77.2	182.4
Chromium	ND-18.6	1/9	4.1	7.2
Lead	ND-5.8	3/9	2.0	3.1
Mercury	ND-1.20	2/8	0.65	0.93
Thallium	ND-1.3	2/9	0.7	0.8
Vanadium	ND-58.5	2/9	11.2	22.0
Zinc	ND-31.8	2/9	12.0	16.9
DEEP BEDROCK GROUND WATER - ROUND 2 (µg/L)				
Antimony	ND-3.9	1/6	1.5	2.2
Arsenic	ND-149	2/6	25.8	64.6
Barium	ND-188	4/6	99.5	133.6
Cadmium	ND-9.1	2/6	3.2	5.1
Chromium	ND-32.5	2/6	11.0	15.4
Lead	1.8-11.0	6/6	4.8	7.0
Mercury	ND-0.36	1/6	0.14	0.21
Nickel	ND-68.0	1/6	22.2	36.6
Vanadium	ND-5.0	1/6	2.2	3.1
Zinc	39.8-99.3	6/6	66.0	81.6
Cyanide	ND-27.0	2/6	9.8	15.5

TABLE 6-1B (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
INORGANIC SLUDGE BASIN WELLS (µg/L)				
Arsenic	ND-6	1/3	2.8	6.1
Barium	ND-91	1/3	61	89
Lead	ND-3.5	3/3	2.5	(3.8) ^c
Nickel	ND-37.3	1/3	21.1	36.2
Zinc	18.5-54.6	3/3	39.3	(59.4) ^c
OFFSITE UPPER BEDROCK GROUND WATER (µg/L)				
Arsenic	41.6-114.0	2/2	77.8	(240.4) ^b
Barium	107-653.0	2/2	380	(1,606) ^b
Beryllium	ND-2.5	1/2	1.5	(6.0) ^b
Cadmium	ND-12.1	1/2	6.8	(31) ^b
Chromium	30.3-60.4	2/2	45.4	(113.0) ^b
Lead	17.8-31.7	2/2	25	56
Nickel	77.8-1367.0	2/2	122.4	322.8
Selenium	ND-20	1/2	1.3	4.6
Vanadium	76.3-136.0	2/2	106.2	240.2
Zinc	72-303	2/2	187.5	(706.4) ^b
Cyanide	20-36	2/2	28.0	(63.9) ^b
OFFSITE DEEP BEDROCK GROUND WATER (µg/L)				
Arsenic	ND-149	1/3	50.3	142.3
Barium	ND-188	2/3	114.2	191.4
Cadmium	ND-9.1	1/3	4.0	8.8
Chromium	ND-32.5	2/3	18.4	(34) ^b
Lead	1.8-11.0	3/3	5.3	10.6
Mercury	ND-0.36	1/3	0.19	0.35
Nickel	ND-68	1/3	31.3	65.5
Zinc	39.8-99.3	3/3	77.6	(111.8) ^b
Cyanide	ND-12.0	1/3	7.3	11.7
b. Value exceeds upper limit of observed range. Maximum observed value used for risk assessment.				

TABLE 6-1B (Continued)

Matrix/Analyte	Range	Frequency of Detection	Mean ^a	Upper Confidence Limit
OFFSITE MIXED BEDROCK GROUND WATER (µg/L)				
Arsenic	2.0-149	5/5	62.4	108.3
Barium	ND-653	3/5	207	385
Beryllium	ND-2.5	1/5	0.9	1.5
Cadmium	ND-12.1	2/5	5.1	8.7
Chromium	ND-60.4	4/5	29.2	43.7
Lead	1.8-32	5/5	13	22
Mercury	ND-0.36	1/5	0.2	0.2
Nickel	ND-107	3/5	67.8	111.6
Selenium	ND-2.0	1/5	0.8	1.3
Vanadium	ND-136	4/5	62.2	102.4
Zinc	49.3-303	5/5	123.1	194.2
Cyanide	ND-36	3/5	15.6	24.6

TABLE 6-2A CARCINOGENIC (SLOPE FACTORS) AND NON-CARCINOGENIC
(REFERENCE DOSE, RfDs) TOXICITY VALUES,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Chemical	Oral Slope Factor (mg/kg/day) ⁻¹	Dermal Slope Factor (mg/kg/day) ⁻¹	Inhalation Slope Factor (mg/kg/day) ⁻¹	Chronic Oral RfD (mg/kg/day)	Chronic Dermal RfD (mg/kg/day)	Chronic Inhalation RfD (mg/kg/day)
Acetone				0.1	0.1	
Aldrin	17	17	17	0.00003	0.00003	
Anthracene				0.3	0.3	
Antimony				0.0004		
Aroclor 1248	7.7	7.7				
Arsenic	1.8		50	0.0003		
Barium				0.07		0.0001
Benzene	0.029	0.029	0.029			
Benzo(a)pyrene	7.3	7.3	6.1			
Benzoic acid				4	4	
Benzyl alcohol				0.3	0.3	
Beryllium	4.3		8.4	0.005		
g-BHC				0.0003	0.0003	
Bis(2-ethylhexyl) phthalate	0.014	0.014		0.02	0.02	
Cadmium			6.1	0.0005		
Carbazole	0.02	0.02				
Carbon disulfide				0.1	0.1	
Chloroethane						2.9
Chloroform	0.0061	0.0061	0.081	0.01	0.01	
Chromium				1		
Copper						
Cyanide				0.02	0.02	
DDD	0.24	0.24				
DDE	0.34	0.34				
DDT	0.34	0.34	0.34	0.0005	0.0005	
1,1-Dichloroethane				0.01	0.01	0.0029
1,2-Dichloroethene				0.02	0.02	
Dieldrin	16	16	16	0.00005	0.00005	
2,4-Dimethylphenol				0.02	0.02	
Dimethyl phthalate				10	10	
Di-n-butyl phthalate				0.1	0.1	

TABLE 6-2A (Continued)

Chemical	Oral Slope Factor (mg/kg/day) ⁻¹	Dermal Slope Factor (mg/kg/day) ⁻¹	Inhalation Slope Factor (mg/kg/day) ⁻¹	Chronic Oral RfD (mg/kg/day)	Chronic Dermal RfD (mg/kg/day)	Chronic Inhalation RfD (mg/kg/day)
Endrin				0.0003	0.0003	
Ethylbenzene				0.1	0.1	0.29
Fluorene				0.04	0.04	
Fluoranthene				0.04	0.04	
Heptachlor	4.5	4.5	4.6	0.0005	0.0005	
Lead						
Manganese				0.005		0.000014
Mercury				0.0003		0.000086
2-Methyl phenol				0.05	0.05	
Naphthalene				0.04	0.04	
Nickel				0.05		
Pentachlorophenol				0.03	0.03	
Phenol				0.6	0.6	
Pyrene				0.03	0.03	
Selenium				0.005		
Silver				0.005		
Tetrachloroethene	0.051	0.051	0.0018	0.01	0.01	
Thallium				0.00008		
Toluene				0.2	0.2	0.11
<i>m</i> -Toluic acid				3	3	
<i>o</i> -Toluic acid				3	3	
<i>p</i> -Toluic acid				3	3	
Trichloroethene	0.011	0.011	0.017			
Vanadium				0.007		
Vinyl chloride	1.9	1.9	0.3			
Xylenes (total)				2	2	
Zinc				0.3		

**TABLE 6-2B SUMMARY OF TOXICITY VALUES FOR CHEMICALS IDENTIFIED IN SITE MATRICES
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK**

Class	Chemical	Matrix						Toxicity Values			
		Soil Vapor	Air	Soil	Creek Seep	Ground Water	Surface Water	Sediment	Reference Dose	Slope Factor	None Available
Volatiles	Acetone		X	X	X	X		X	X		
	Benzene		X	X		X				X	
	2-Butanone		X	X				X	X		
	Bromomethane		X								X
	Carbon disulfide							X	X		
	Chlorobenzene			X							X
	Chloroethane			X		X			X		X
	Chloroform			X							X
	Chloromethane		X								
	1,1-Dichloroethane		X	X		X			X		
	1,1-Dichloroethene			X		X				X	
	1,2-Dichloroethene	X		X		X		X	X		
	Ethylbenzene	X		X	X	X		X	X		
	4-Methyl-2-pentanone			X		X					X
	Methylene chloride	X		X					X	X	
	Tetrachloroethene	X		X	X	X		X	X	X	
	Toluene	X	X	X	X	X		X	X		
	Trichloroethane	X	X								
	Trichloroethene	X		X	X	X			X	X	
	Trichlorofluoromethane		X								X
Vinyl chloride						X		X	X		
Xylenes		X	X	X		X		X			

a. Chemical results used to calculate total c-PAH concentrations.
b. Reference dose derived for this project.

TABLE 6-2B (Continued)

Class	Chemical	Matrix						Toxicity Values			
		Soil Vapor	Air	Soil	Creek Seep	Ground Water	Surface Water	Sediment	Reference Dose	Slope Factor	None Available
Semi-Volatiles	Acenaphthene			X	X	X		X			X
	Acenaphthylene			X							X
	Anthracene			X	X	X		X	X		
	Benzo(a)anthracene*			X	X	X		X		X	
	Benzo(b)fluoranthene*			X	X	X		X		X	
	Benzo(k)fluoranthene*			X	X	X		X		X	
	Benzo(ghi)perylene*			X				X		X	
	Benzo(a)pyrene*			X	X	X		X		X	
	Benzoic acid			X					X		
	Benzyl alcohol			X					X		
	Bis(2-chloroethyl)methane			X		X					X
	Bis(2-ethylhexyl)phthalate			X	X	X	X		X	X	
	Butylbenzyl phthalate			X					X		
	Carbazole			X		X		X			
	4-Chloroaniline			X				X			X
	Chrysene			X	X	X		X			
	Dibenzo(a,h)anthracene*			X				X		X	
	Dibenzofuran			X		X		X			X
	Dibutylphthalate			X					X		
	1,3-Dichlorobenzene					X					X
	1,4-Dichlorobenzene			X					X		X
	Diethylphthalate			X					X		
	2,4-Dimethylphenol			X	X	X			X		
	Dimethylphthalate			X		X			X		
	Fluoranthene			X	X	X		X			
	Fluorene			X	X	X		X			
	Indeno(123-cd)pyrene*			X				X		X	
	2-Methylnaphthalene			X		X		X			X

TABLE 6-2B (Continued)

Class	Chemical	Matrix						Toxicity Values			
		Soil Vapor	Air	Soil	Creek Seep	Ground Water	Surface Water	Sediment	Reference Dose	Slope Factor	None Available
Semi-Volatiles (Continued)	2-Methyl phenol	X		X	X		X	X			
	4-Methylphenol			X	X	X			X		
	Naphthalene			X	X	X		X	X		
	Nitrobenzene					X					X
	N-Nitrosodiphenylamine			X						X	
	Pentachlorophenol					X			X		
	Phenanthrene			X	X	X		X	X		X
	Phenol			X	X	X		X	X		
	Pyrene			X	X	X		X	X		
	<i>o</i> -Toluic acid ^b			X	X	X		X	X		
	<i>m</i> -Toluic acid ^b			X	X	X		X	X		
	<i>p</i> -Toluic acid ^b			X	X	X		X	X		
	Aroclor 1248			X						X	
Pesticides/PCBs	Aroclor 1254			X						X	
	<i>gamma</i> -Chlordane							X			
	4,4'-DDE			X		X		X		X	
	4,4'-DDD			X						X	
	4,4'-DDT			X						X	
	Dieldrin							X	X		
	Endosulfan sulfate							X			X
	Endrin ketone							X			X
	Methoxychlor							X			X
	Aluminum			X	X	X	X	X			X
	Antimony			X	X	X	X	X			X
	Arsenic			X	X	X	X	X	X	X	
	Inorganics	Barium			X	X	X	X	X		
Beryllium				X	X	X	X	X	X	X	
Cadmium				X	X	X	X	X	X	X	

TABLE 6-2B (Continued)

Class	Chemical	Matrix						Toxicity Values			
		Soil Vapor	Air	Soil	Creek Seep	Ground Water	Surface Water	Sediment	Reference Dose	Slope Factor	None Available
Inorganics (Continued)	Calcium			X	X	X	X	X			X
	Chromium			X	X	X		X	X		
	Cobalt			X	X	X	X	X		X	X
	Copper			X	X	X	X	X			X
	Iron			X	X	X	X	X			X
	Lead			X	X	X	X	X	X		
	Magnesium			X	X	X	X	X			X
	Manganese			X	X	X	X	X	X		
	Mercury			X	X	X		X	X		
	Nickel			X	X	X		X	X		
	Potassium			X	X	X	X	X			X
	Selenium			X	X	X		X	X		
	Silver			X				X	X		
	Sodium			X	X	X	X	X			X
	Thallium			X	X	X			X		
	Vanadium			X	X	X		X	X		
	Zinc			X	X	X	X	X	X		
	Cyanide			X	X	X		X	X		

**TABLE 6-3 PATHWAY PARAMETERS TO ESTIMATE EXPOSURES,
SKANEATELES MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Pathway	Average Case	Plausible Maximum Case
INHALATION OF VOLATILE ORGANICS FROM SOILS (PS-1)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Inhalation rate, adult	0.8 m ³ /hour	1.25 m ³ /hour
Body weight, adult	70 kg	70 kg
Years exposed, adult	9	30
Weeks exposed/year, adult	19	19
Weeks exposed/year, child	19	19
Hours exposed/week, adult	7	7
Hours exposed/week, child	21	21
Uptake efficiency, organics	100 percent	100 percent
DERMAL CONTACT WITH STREAM SEDIMENT (PS-2)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Skin deposition	0.5 mg/cm ²	1.0 mg/cm ²
Skin surface area, adult	2,900 cm ²	3,500 cm ²
Skin surface area, child	3,300 cm ²	3,920 cm ²
Days exposed/year, adult	15	30
Days exposed/year, child	15	60
Fraction absorbed	0.6 percent	1.2 percent
Years exposed, adult	9	30
DERMAL CONTACT WITH CREEK SEEPS (PS-3)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Dermal permeability	8.0 E-4 cm/hour	8.00 E-4 cm/hour
Skin surface area, adult	2,900 cm ²	3,500 cm ²
Hours exposed/day	2	8
Days exposed/year	15	30
Years exposed	9	30
Skin surface areas	2,900 cm ²	3,500 cm ²
Body weight	70 kg	70 kg

TABLE 6-3 (Continued)

Pathway	Average Case	Plausible Maximum Case
INGESTION OF STREAM SEDIMENTS (PS-4)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Ingestion rate, adult (mg/day)	100 mg	480 mg
Ingestion rate, child (mg/day)	200 mg	800 mg
Days exposed/year, adult	15	30
Days exposed/year, child	30	60
Body weight, adult	70	70
Body weight, child	35	35
Years exposed, adult	9	30
Years exposed, child	9	9
Fraction absorbed, organics	15 percent	15 percent
Fraction absorbed, inorganics	0.75 percent	0.75 percent
INHALATION OF VAPORS DURING NON-REMEDIAL CONSTRUCTION RESIDENTIAL (FS-1)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Inhalation rate, adult	0.8 m ³ /hour	1.25 m ³ /hour
Inhalation rate, child	0.9 m ³ /hour	1.25 m ³ /hour
Body weight, adult	70 kg	70 kg
Body weight, child	35 kg	35 kg
Days exposed/week	5	5
Weeks exposed/year	1	1
Hours exposed/week	50	50
Uptake efficiency	100 percent	100 percent
DERMAL CONTACT WITH SOILS EXPOSED DURING NON-REMEDIAL CONSTRUCTION - INDUSTRIAL (FS-2)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Skin deposition	0.5 mg/cm ²	1.0 mg/cm ²
Skin surface area	2,900 cm ²	3,500 cm ²
Days exposed/year	5	5
Fraction absorbed	0.6 percent	1.2 percent
Years exposed	1	1

TABLE 6-3 (Continued)

Pathway	Average Case	Plausible Maximum Case
INHALATION OF SOILS ENTRAINED IN WIND DURING NON-REMEDIAL CONSTRUCTION - RESIDENTIAL/INDUSTRIAL (FS-3)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Inhalation rate, adult	0.8 m ³ /hour	1.25 m ³ /hour
Inhalation rate, child	0.9 m ³ /hour	1.25 m ³ /hour
Body weight, adult	70 kg	70 kg
Body weight, child	35 kg	35 kg
Weeks exposed/year	1	1
Hours exposed/week	50	50
Uptake efficiency	100 percent	100 percent
INGESTION OF GROUND WATER (FS-4)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Intake rate, adult	1.4 L/day	2 L/day
Intake rate, child	1.5 L/day	2 L/day
Body weight, adult	70 kg	70 kg
Body weight, child	35 kg	35 kg
Days exposed/week (resident)	7	7
Days exposed/week (worker)	5	5
Years exposed, adult (resident)	9	30
Years exposed, adult (worker)	9	20
Years exposed, child	9	9
Fraction absorbed, organics	100 percent	100 percent
Fraction absorbed, metals	5 percent	5 percent
DERMAL CONTACT WITH GROUND WATER WHILE SWIMMING - RESIDENTIAL (FS-5)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Dermal permeability	8.0E-4 cm/hour	8.0E-4 cm/hour
Hours exposed/day	2.6	2.6
Days exposed/year, adult	26	26
Days exposed/year, child	91	91
Skin surface area, adult	18,150 cm ²	18,150 cm ²
Skin surface area, child	9,400 cm ²	9,400 cm ²
Body weight, adult	70 kg	70 kg
Body weight, child	35 kg	35 kg
Years exposed, adult	9	30
Years exposed, child	9	9

TABLE 6-3 (Continued)

Pathway	Average Case	Plausible Maximum Case
ACCIDENTAL INGESTION OF GROUND WATER WHILE SWIMMING - RESIDENTIAL (FS-6)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Intake rate, adult	50 ml/event	100 ml/event
Intake rate, child	50 ml/event	100 ml/event
Weeks exposed/year, adult	13	13
Weeks exposed/year, child	13	13
Events/week, adult	2	2
Events/week, child	7	7
Uptake efficiency, organics	100 percent	100 percent
Uptake efficiency, metals	1 percent	1 percent
INHALATION OF VOLATILE ORGANICS FROM GROUND WATER WHILE SHOWERING - RESIDENTIAL (FS-7)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Inhalation rate, adult	0.83 m ³ /hour	1.25 m ³ /hour
Inhalation rate, child	0.9 m ³ /hour	1.25 m ³ /hour
Years exposed, adult	9	30
Years exposed, child	9	9
Body weight, adult	70	70
Body weight, child	35	35
INGESTION OF HOMEGROWN GARDEN VEGETABLES - RESIDENTIAL (FS-8)		
Exposure concentration	Table H-30	Table H-30
Intake rate, root crops, adult	15 g/day	24 g/day
Intake rate, root crops, child	15 g/day	24 g/day
Intake rate, leaf crops, adult	25 g/day	40 g/day
Intake rate, leaf crops, child	25 g/day	40 g/day
Body weight, adult	70 kg	70 kg
Body weight, child	35 kg	35 kg
Years exposed, adult	9	30
Years exposed, child	9	9
Days exposed/year	125	125

TABLE 6-3 (Continued)

Pathway	Average Case	Plausible Maximum Case
INCIDENTAL INGESTION OF GROUND WATER WHILE WASHING TRUCKS - INDUSTRIAL (FS-9)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Intake rate, adult	25 ml/day	50 ml/day
Body weight, adult	70 kg	70 kg
Years exposed, adult	9	20
Days exposed/week	3	3
Weeks exposed/year	50	50
Uptake efficiency, organics	100 percent	100 percent
Uptake efficiency, metals	5 percent	5 percent
DERMAL CONTACT WITH GROUND WATER - INDUSTRIAL (FS-10)		
Exposure concentration	Tables 6-1A and 6-1B	Tables 6-1A and 6-1B
Dermal permeability	8.0E-4 cm/hr	8.0E-4 cm/hr
Hours exposed/day	5	5
Days exposed/year	125	125
Skin surface areas	3,000 cm ²	3,000 cm ²
Body weight	70 kg	70 kg
Years exposed	9	20
INHALATION OF VOLATILE ORGANICS WHILE WASHING TRUCKS - INDUSTRIAL (FS-11)		
Exposure concentration	Tables H-77 through H-82	Tables H-77 through H-82
Inhalation rate	0.8 m ³ /hour	1.25 m ³ /hour
Body weight	70 kg	70 kg
Years exposed	9	20
Days/year	125	125
Body weight	70 kg	70 kg

TABLE 6-4 RESIDENTIAL RECEPTORS - CARCINOGENIC AND NON-CARCINOGENIC RISKS FOR

CARCINOGENIC ^a							
Exposure Route	Soil Vapor		Stream Sediments Round 1		Stream Sediments Round 2		Creek Seep
	Adult	Child	Adult	Child	Adult	Child	Adult
Inhalation of Vapors (PS-1)							
Average	8.8E-12	---					
Maximum	1.7E-10	---					
Dermal Contact (PS-2, PS-3)							
Average			3.4E-8	---	7.1E-9	---	2.03E-5 ^b
Maximum			2.4E-6 ^b	---	4.2E-7	---	2.12E-3 ^b
Ingestion of Sediments (PS-4)							
Average			2.2E-5 ^b	---	4.4E-6 ^b	---	
Maximum			1.5E-3 ^b	---	2.6E-4 ^b	---	
NON-CARCINOGENIC ^c							
Exposure Route	Soil Vapor		Stream Sediments Round 1		Stream Sediments Round 2		Creek Seep
	Adult	Child	Adult	Child	Adult	Child	Adult
Inhalation of Vapors (PS-1)							
Average	2.5E-6	1.6E-5					
Maximum	1.8E-4	3.2E-4					
Dermal Contact (PS-2, PS-3)							
Average			5.8E-8	6.6E-8	3.4E-8	3.8E-8	1.29E-2
Maximum			1.9E-6	1.9E-6	2.0E-6	2.7E-6	1.52E+0 ^d
Ingestion of Sediments (PS-4)							
Average			3.2E-4	2.6E-3	3.7E-4	3.0E-3	
Maximum			1.4E-2	2.8E-2	1.5E-2	3.1E-2	
a. The carcinogenic risk threshold = 1E-6. b. Calculated risk is greater than the carcinogenic risk threshold. c. The non-carcinogenic risk threshold = 1E+0. d. Calculated risk is greater than the non-carcinogenic risk threshold.							
NOTE: Shaded areas indicate pathway incomplete. Dashes (---) indicate evaluation not required.							

TABLE 6-5 RESIDENTIAL RECEPTORS - CARCINOGENIC AND
NON-CARCINOGENIC RISKS FOR FUTURE-USE
SOIL-BASED EXPOSURE PATHWAYS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

CARCINOGENIC RISKS ^a				
Exposure Route	North Area Soils		Landfill Perimeter Soils	
	Adult	Child	Adult	Child
Inhalation of Vapors (FS-1)				
Average	1.0E-13	---	8.79E-15	---
Maximum	1.1E-11	---	9.26E-13	---
Inhalation of Exposed Soils (FS-3)				
Average	7.3E-13	---	4.7E-14	---
Maximum	2.7E-12	---	7.6E-14	---
Inhalation of Vapors in Basement (FS-4)				
Average	3.4E-15	---		
Maximum	4.3E-14	---		
NON-CARCINOGENIC RISKS^b				
Exposure Route	North Area Soils		Landfill Perimeter Soils	
	Adult	Child	Adult	Child
Inhalation of Vapors (FS-1)				
Average	4.9E-8	1.1E-7	5.2E-10	1.1E-9
Maximum	2.1E-7	4.1E-7	8.3E-10	1.7E-9
Inhalation of Exposed Soils (FS-3)				
Average	1.2E-11	2.6E-11	3.3E-14	7.1E-14
Maximum	4.7E-11	9.8E-11	5.6E-14	1.3E-13
Inhalation of Vapors in Basement (FS-4)				
Average	1.1E-9	2.4E-9		
Maximum	5.2E-8	3.1E-1		
a. Carcinogenic risk threshold is 1E-6.				
b. Non-carcinogenic risk threshold is 1E+0.				
NOTE: Shaded areas indicate pathway incomplete.				
Dashes (---) indicate evaluation not required.				

**TABLE 6-6 INDUSTRIAL RECEPTORS - CARCINOGENIC AND
NON-CARCINOGENIC RISKS FOR FUTURE-USE
SOIL-BASED EXPOSURE PATHWAYS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

CARCINOGENIC RISKS^a				
Exposure Route	North Area Soils		Landfill Perimeter Soils	
	Adult	Child	Adult	Child
Inhalation of Vapors (FS-1)				
Average	4.2E-14	---	3.4E-14	---
Maximum	4.4E-11	---	3.9E-12	---
Inhalation of Vapors, Basement (FS-13)				
Average	1.2E-15			
Maximum	1.4E-14			
Dermal Contact with Soils (FS-2)				
Average	6.7E-10	---	2.7E-10	---
Maximum	7.7E-9	---	2.7E-11	---
NON-CARCINOGENIC RISKS^b				
Exposure Route	North Area Soils		Landfill Perimeter Soils	
	Adult	Child	Adult	Child
Inhalation of Vapors (FS-1)				
Average	2.0E-7	---	2.0E-9	---
Maximum	8.1E-7	---	3.2E-9	---
Inhalation of Vapors, Basement (FS-13)				
Average	3.8E-8			
Maximum	1.2E-6			
Dermal Contact with Soils				
Average	5.4E-8		7.4E-10	
Maximum	6.9E-8		5.8E-9	
a. Carcinogenic risk threshold is 1E-6. b. Non-carcinogenic risk threshold is 1E+0.				
NOTE: Shaded areas indicate pathway incomplete. Dashes (---) indicate evaluation not required.				

**TABLE 6-8 RESIDENTIAL RECEPTOR - CARCINOGENIC AND NON-CARCINOGENIC RISKS CALCULATED
FOR FUTURE-USE ONSITE GROUND-WATER EXPOSURE SCENARIOS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

CARCINOGENIC RISKS ^a													
Exposure Route	Onsite Deep Bedrock Ground Water				Onsite Upper Bedrock Ground Water				Onsite Mixed Bedrock Ground Water				Onsite Deep (East) Bedrock Ground Water
	Adult		Child		Adult		Child		Adult		Child		Adult
	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Child
Ingestion as Drinking Water (FS-5)													
Average	7.3E-7	8.93E-7			1.5E-4 ^b	7.2E-5 ^b			1.3E-4 ^b	6.1E-5 ^b			c
Maximum	4.5E-6 ^b	5.6E-6 ^b			1.1E-3 ^b	5.7E-4 ^b			8.8E-4 ^b	4.5E-4 ^b			c
Dermal Contact While Swimming (FS-6)													
Average	6.7E-5 ^b	6.5E-7			7.2E-5 ^b	1.6E-4 ^b			1.1E-4 ^b	1.5E-4 ^b			d
Maximum	2.3E-4 ^b	2.8E-6 ^b			4.7E-4 ^b	6.2E-4 ^b			4.8E-4 ^b	5.9E-4 ^b			d
Inhalation of Vapors While Showering (FS-7)													
Average	4.8E-6 ^b	2.4E-6 ^b			7.45E-5 ^b	1.8E-4 ^b			6.2E-5 ^b	1.6E-4 ^b			d
Maximum	1.21E-8	6.49E-9			2.07E-7	7.16E-7			3.1E-5 ^b	7.9E-4 ^b			d
Ingestion of Root Crops (FS-8)													
Average	2.5E-8	4.8E-7			1.8E-7	8.1E-7			1.2E-6 ^b	6.8E-7			d
Maximum	1.7E-7	3.6E-6 ^b			1.1E-6 ^b	6.7E-6 ^b			1.5E-6 ^b	5.8E-6 ^b			d
Ingestion of Leaf Crops (FS-8)													
Average	8.5E-9	9.9E-9			4.4E-6 ^b	3.0E-7			4.3E-7	4.9E-7			d
Maximum	5.6E-8 ^b	6.7E-8			4.0E-5 ^b	2.6E-6 ^b			4.9E-6 ^b	4.1E-6 ^b			d
^a Carcinogenic risk threshold is 1E-6. ^b Carcinogenic risk is above risk threshold. ^c No carcinogenic chemicals detected. ^d No organic compounds detected.													

NOTE: Shaded areas indicate pathway incomplete. Dashes (—) indicate evaluation not required.

TABLE 6-8 (Continued)



d. No organic compounds detected.
e. Non-carcinogenic risk threshold is 1E+0.
f. Non-carcinogenic risk above risk threshold.

TABLE 6-10B SUMMARY OF INORGANIC ANALYTES IDENTIFIED IN SKANEATELES CREEK
SURFACE WATER AND COMPARISON TO NEW YORK STATE STANDARDS
AND GUIDANCE VALUES AND EPA ACUTE AND CHRONIC CRITERIA
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Parameter	Observed Range		NYSDEC Class A ^b		EPA ^e		Background Range ^d	LC ₅₀ ^e (µg/L)	MATC (µg/L)
	Round 1 ^a	Round 2 ^a	Standard	Guidance	Acute	Chronic			
Aluminum	81-164	72-91	100				8-3,500		
Antimony	76.8-90.8	ND		3 ^f	88	30	0.01-5		
Arsenic	ND-1.2	ND	190		850		0.2-230		
Barium	66.1-102	ND	1,000 ^g				<3-150		
Calcium	52,800-60,300	38,100-40,500					2,000-120,000		
Copper	R	3.6-14.5	20.6 ^h		33 ^h	21	0.2-30	20-3,289 ^h	
Iron	91.2-278	73.4-133	300			1,000	10-1,400	900-2,000	
Lead	ND-3.4	ND-1.1	7.4 ^h		188 ^h	7 ^h	0.06-120	1,200-471,000	4-360
Magnesium	11,400-12,900	7,920-8,410	35,000				400-6,000		
Manganese	14.1-24.6	7.2-7.8	300				0.02-130		
Potassium	1,390-1,660	1,430-1,570					500-10,000		
Selenium	ND	ND-1.2 ^h	1		20	5	0.02-1	2,100-28,000	
Sodium	28,300-30,400	8,800-9,480					700-25,000		
Zinc	ND-9.9		30		203 ^h	184 ^h	0.2-100	160-9,200	30-1,368

- a. Concentration units are in µg/L.
b. Class A standards obtained from TOGS 1.1.1, dated October 1993 (NYSDEC 1993a).
c. Data from U.S. EPA (1991c).
d. Data from Bodek et al. (1988).
e. Data from Mayer and Ellersieck (1986).
f. No value for fish or animal protection. Value shown is for human health.
g. Value calculated from average hardness of 191.9 mg/L.
h. Single positive selenium result was rejected following data validation review.

NOTE: ND = Not detected; R = Data was unusable following data validation review.



TABLE 6-12A SUMMARY OF ORGANIC ANALYTES IDENTIFIED IN SKANEATELES CREEK SEDIMENT AND COMPARISON TO SEDIMENT CRITERIA AND SITE SEDIMENT VALUES, STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION, SKANEATELES FALLS, NEW YORK

Analyte	Observed Range		NYSDEC Sediment Criteria ^(a)	Site Sediment Values		Benthic LC ₅₀ ^(d) (µg/kg)	Benthic No Effect ^(e) (µg/kg)	Fathead Minnow No Effect ^(e) (µg/kg)
	Round 1 (µg/kg)	Round 2 (µg/kg)		EPA Acute ^(b,c) (µg/kg)	EPA Chronic ^(b,c) (µg/kg)			
VOLATILES								
Vinyl chloride	ND	ND-12	0.8					
Acetone	ND	ND-330						
Carbon disulfide	ND	ND-9						
1,2-Dichloroethene	ND	ND-1,100		4,030				
Chloroform	ND	2-4						
2-Butanone	ND	ND-62						
Tetrachloroethene	ND-16	ND	9.2	22,100	3,520			
Toluene	ND	ND-48		60,400				
Ethylbenzene	ND	ND-7		405,000				
Xylenes (total)	ND-2	ND-3,600						
SEMI-VOLATILES								
2-methylphenol	ND	ND-200						
Naphthalene	ND-1,100	ND-86		51,600	13,900	3,600	650-3,600	
2-methylnaphthalene	ND-700	ND						
Acenaphthene	ND-1,900	ND-130	1,610	89,900	27,500			250-1,540
Dibenzofuran	ND-2,500	ND-89						1,200-4,100
Fluorene	ND-2,400	ND-140						
Phenanthrene	ND-11,000	ND-1,300	1,380	9,830	1,010	17,300	1,540	
Anthracene	ND-3,600	ND-230			18,500		4,100	
Carbazole	---	ND-160						
Fluoranthene	ND-10,000	ND-1,800	11,700	1,740,000				
Pyrene	ND-15,000	ND-1,400				14,200	12,600	2,500-12,600
Benzo(a)anthracene	ND-4,700	ND-980	15.0				6,300	2,000-6,300

a. NYSDEC Sediment Criteria, November 1993 (NYSDEC 1993b).
 b. Calculated value based upon average observed TOC of 1.15 percent.
 c. Data from U.S. EPA (1991e).
 d. Data from Landrum et al. (1991)
 e. Data from Krantzberg and Boyd (1992).

NOTE: ND = Not detected; see Table H-84 for calculations.

TABLE 6-12A (Continued)

Analyte	Observed Range		NYSDEC Sediment Criteria ^(w)	Site Sediment Values		Benthic LC ₅₀ ^(d) (µg/kg)	Benthic No Effect ^(e) (µg/kg)	Fathead Minnow No Effect ^(e) (µg/kg)
	Round 1 (µg/kg)	Round 2 (µg/kg)		EPA Acute ^(b,c) (µg/kg)	EPA Chronic ^(b,c) (µg/kg)			
Chrysene	ND-4,500	ND-750	15.0			17,000		
Benzo(b)fluoranthene	ND-3,800	ND-1,100	15.0			16,000		
Benzo(k)fluoranthene	ND-3,500	ND-490	15.0			16,000		
Benzo(a)pyrene	ND-4,600	ND-780	15.0			17,600		
Indeno(1,2,3-cd)pyrene	ND-3,000	ND-230	15.0					
Dibenzo(a,h)anthracene	ND-1,600	ND						
Benzo(ghi)perylene	ND-3,200	ND-230				13,700		
<i>o</i> -Toluic acid	ND	ND-630						
<i>m</i> -Toluic acid	ND	ND-240						
<i>p</i> -Toluic acid	ND	ND-42						
Total PAHs	ND-77,100	ND-9,895				132,000	28,000	6,600-28,000
Dieldrin	ND	ND-4.6	1.2	101	0.08			
Methoxychlor	ND	ND-21	6.9		16.5			
Gamma-chlordane	ND	ND-2.6	0.01	14	0.55			
PCBs	ND	ND	0.01					

**TABLE 6-12B SUMMARY OF INORGANIC ANALYTES IDENTIFIED IN SKANEATELES CREEK SEDIMENT
AND COMPARISON TO SEDIMENT CRITERIA AND SITE SEDIMENT VALUES,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION, SKANEATELES FALLS, NEW YORK**

Parameter	Round 1			Round 2			NYSDEC Criteria ^(c)			Fathead Minnow No Effect ^(d)	Sediment Background ^(e)
	Range ^(a)	Frequency	Mean ^(b)	Range ^(a)	Frequency	Mean ^(b)	Lowest Effect Level	Severe Effect Level	Benthic No Effect ^(d)		
Aluminum	3,270-6,690	5/5	4,336	3,110-6,260	5/5	4,494			26,000-41,000	26,000-41,000	
Antimony	60.4-91.7	5/5	73	ND	0/5	---	2	25	11.2-33.0	11.2-33.0	
Arsenic	1.2-3.2	5/5	2.5	2.1-6.5	5/5	3.9	6	33			
Barium	36.9-97.1	5/5	67	49.7-193	5/5	95.6					
Beryllium	0.20-0.37	5/5	0.27	0.21-0.33	5/5	0.27					
Cadmium	1.3-1.9	5/5	1.7	1.4-2.2	5/5	1.9	0.6	9.0	9-15	9-15	ND-9.3
Calcium	3,950-88,400	5/5	48,610	20,300-58,900	5/5	41,300					
Chromium	6.9-12	5/5	9.5	8.1-30.1	5/5	16.9	26	110	125-490	125-490	7-560
Cobalt	4.1-9	5/5	5.2	3.8-5.7	5/5	5.0					
Copper	16.7-56.8	5/5	38	52.9-351	5/5	122.6			85-206	85-206	11-18
Iron	11,300-12,400	5/5	11,780	9,730-13,900	5/5	12,026	20,000,000	40,000,000	64,000-150,000	64,000-150,000	20,700-126,000
Lead	12.8-293	5/5	121	28.4-215	5/5	107.4	31	110	150-508	150-508	16-246
Magnesium	3,310-32,200	5/5	12,208	7,940-11,900	5/5	10,588					
Manganese	98.1-239	5/5	198	148-500	5/5	340	460	1,100	1,800-2,800	1,800-2,800	
Mercury	ND	0/5	---	0.19-2.0	5/5	0.97	0.15	1.3			
Nickel	15.8-23.6	5/5	17.5	14.3-48.7	5/5	23.1	16	50	37-73	37-73	21-66
Potassium	368-604	5/5	455	350-700	5/5	543					
Selenium	ND	0/5	---	ND-0.68	1/5	0.26					
Silver	ND-3.4	4/5	2.4	ND-0.37	1/5	0.16	1.0	2.2			
Sodium	90-334	5/5	167	61.8-1,670	4/4	497					
Vanadium	5-9.5	5/5	7.1	6.1-10.2	5/5	7.9					
Zinc	44.1-155	5/5	95.6	44.5-229	5/5	140.1	120	270	2,050-4,600	2,050-4,600	64-6,600
Cyanide	0.11-0.13	5/5	0.12								
TOC	4,300-16,400	5/5	11,460	NR							100-36,600

a. Concentration units are in mg/kg.
b. Mean calculated by setting non-detects at 0.5 SQL.
c. NYSDC Sediment Criteria (NYSDEC 1993b).

NOTE: ND = Not detected; TOC = Total organic carbon; NR = TOC not required for Round 2 samples.
Dashes (—) indicate mean not calculated since analytical result was a non-detect.

**TABLE 6-13 RESIDENTIAL RECEPTOR - COMPOSITE RISKS FROM PRESENT-USE EXPOSURE SCENARIOS,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Pathway	Average Exposure - Round 1 Data						Average Exposure - Round 2 Data						
	Carcinogenic ^a			Non-Carcinogenic ^b			Carcinogenic ^a			Non-Carcinogenic ^b			
	Adult	% Total		Adult	% Total	Child	% Total	Adult	% Total	Adult	% Total	Child	% Total
Inhalation of Vapors	8.8E-12	0.00	2.5E-06	0.18	1.6E-05	0.62							
Sediment Contact	3.4E-08	0.14	5.8E-08	0.00	6.6E-08	0.00	7.1E-09	0.16	5.8E-08	0.02	6.6E-08	0.00	0.00
Seep Contact	3.7E-06	14.54	1.1E-03	76.33									
Sediment Ingestion	2.2E-05	85.33	3.2E-04	23.48	2.6E-03	99.38	4.5E-06	99.84	3.7E-04	99.98	3.0E-03	100.00	
Total	2.5E-05		1.4E-03		2.6E-03		4.5E-06		3.7E-04		3.0E-03		
Pathway	Plausible Maximum Exposure - Round 1 Data						Plausible Maximum Exposure - Round 2 Data						
	Carcinogenic ^a			Non-Carcinogenic ^b			Carcinogenic ^a			Non-Carcinogenic ^b			
	Adult	% Total		Adult	% Total	Child	% Total	Adult	% Total	Adult	% Total	Child	% Total
Inhalation of Vapors	1.7E-10	0.00	1.8E-04	0.19	3.2E-04	1.13							
Sediment Contact	2.4E-06	0.14	1.9E-06	0.00	1.9E-06	0.01	4.2E-07	0.16	1.9E-06	0.01	1.9E-06	0.01	0.01
Seep Contact	2.6E-04	14.67	7.7E-02	84.50									
Sediment Ingestion	1.5E-03	85.19	1.4E-02	15.30	2.8E-02	98.86	2.6E-04	99.84	1.5E-02	99.99	3.1E-02	99.99	
Total	1.8E-03		9.1E-02		2.8E-02		2.6E-04		1.5E-02		3.1E-02		
a. Carcinogenic risk threshold is 1E-6.													
b. Non-carcinogenic risk threshold is 1E+0.													

TABLE 6-14 RESIDENTIAL RECEPTOR - COMPOSITE RISKS FROM FUTURE-USE OFFSITE
EXPOSURE SCENARIOS, UPPER BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

[illegible]

TABLE 6-14 (Continued)

Pathway	Plausible Maximum Exposure - Round 1 Data						Plausible Maximum Exposure - Round 2 Data					
	Carcinogenic ^a			Non-Carcinogenic ^b			Carcinogenic ^a			Non-Carcinogenic ^b		
	Adult	% Total	Child	% Total	Adult	% Total	Adult	% Total	Child	% Total	Adult	% Total
Inhalation of Vapors												
Landfill Perimeter	9.2E-13	92.34	8.3E-10	99.99	1.7E-09	99.99						
North Area Soils							1.1E-11	0.00	2.1E-07	0.00	4.1E-07	0.00
Inhalation of Dusts												
Landfill Perimeter	7.6E-14	7.66	6.1E-14	0.01	1.3E-13	0.01						
North Area Soils							2.7E-12	0.00	4.7E-11	0.00	9.8E-11	0.00
Ingestion of Ground Water												
Upper Bedrock							1.6E-06	7.07	2.3E+00	66.79	6.0E-01	43.66
Inhalation of Ground Water												
Upper Bedrock							2.1E-05	89.47	1.1E+00	32.82	7.4E-01	53.93
Dermal Contact												
Upper Bedrock							7.9E-07	3.46	1.4E-02	0.39	3.3E-02	2.41
Ingestion of Vegetables												
Root Crops							6.5E-8	0.28	2.1E-2	0.61	1.3E-2	0.92
Leaf Crops							1.9E-8	0.08	8.5E-3	0.24	5.1E-3	0.37
Total	9.9E-13		8.3E-10		1.7E-09		2.3E-05		3.5E+00		1.4E+00	

TABLE 6-15 (Continued)

Pathway	Plausible Maximum Exposure - Round 1 Data					Plausible Maximum Exposure - Round 2 Data				
	Carcinogenic*		Non-Carcinogenic ^b			Carcinogenic*		Non-Carcinogenic ^b		
	Adult	% Total	Adult	% Total	Child	% Total	Adult	% Total	Adult	% Total
Inhalation of Vapors										
Landfill Perimeter	9.2E-13	92.34	8.3E-10	99.99	1.7E-09	99.99				
North Area Soils							1.1E-11	0.00	2.1E-07	0.00
Inhalation of Dusts										
Landfill Perimeter	7.6E-14	7.66	6.1E-14	0.01	1.3E-13	0.01				
North Area Soils							2.7E-12	0.00	4.7E-11	0.00
Ingestion of Ground Water										
Deep Bedrock							4.9E-06	31.21	1.1E+00	85.59
Inhalation of Ground Water										
Deep Bedrock							8.0E-06	50.62	1.7E-01	12.91
Dermal Contact										
Deep Bedrock							2.4E-06	15.29	1.2E-02	0.91
Ingestion of Vegetables										
Root Crops							3.7E-7	2.33	5.8E-3	0.44
Leaf Crops							8.6E-8	0.55	2.0E-3	0.15
Total	9.9E-13		8.3E-10		1.7E-09		1.6E-05		1.3E+00	

**TABLE 6-16 RESIDENTIAL RECEPTOR - COMPOSITE RISKS FROM FUTURE-USE OFFSITE EXPOSURE SCENARIOS,
MIXED BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

[illegible]

TABLE 6-16 (Continued)

Pathway	Plausible Maximum Exposure - Round 1 Data						Plausible Maximum Exposure - Round 2 Data					
	Carcinogenic ^a			Non-Carcinogenic ^b			Carcinogenic ^a			Non-Carcinogenic ^b		
	Adult	% Total	Adult	% Total	Child	% Total	Adult	% Total	Adult	% Total	Child	% Total
Inhalation of Vapors												
Landfill Perimeter	9.2E-13	92.34	8.3E-10	99.99	1.7E-09	99.99						
North Area Soils							1.1E-11	0.00	2.1E-07	0.00	4.1E-07	0.00
Inhalation of Dusts												
Landfill Perimeter	7.6E-14	7.66	6.1E-14	0.01	1.3E-13	0.01						
North Area Soils							2.7E-12	0.00	4.7E-11	0.00	9.8E-11	0.00
Ingestion of Ground Water												
Mixed Bedrock							8.5E-06	23.85	2.1E+00	60.56	5.5E-01	38.88
Inhalation of Ground Water												
Mixed Bedrock							2.2E-05	62.15	1.2E+00	36.63	8.0E-01	57.35
Dermal Contact												
Mixed Bedrock							4.2E-06	11.70	6.6E-02	1.95	3.6E-02	2.54
Ingestion of Vegetables												
Root Crops							3.4E-7	0.96	2.1E-2	0.61	1.2E-2	0.88
Leaf Crops							4.8E-7	1.34	8.2E-3	0.24	4.9E-3	0.35
Total	9.9E-13		8.3E-10		1.7E-09		3.6E-05		3.4E+00		1.4E+00	

**TABLE 6-18 RESIDENTIAL RECEPTOR - COMPOSITE RISKS FROM FUTURE-USE
ON-SITE EXPOSURE SCENARIOS, DEEP BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

Pathway	Average Exposure - Round 1 Data						Average Exposure - Round 2 Data					
	Carcinogenic ^a			Non-Carcinogenic ^b			Carcinogenic ^a			Non-Carcinogenic ^b		
	Adult	% Total		Adult	% Total	Child	% Total	Adult	% Total	Child	% Total	
Inhalation of Vapors												
Soil Vapor	3.4E-15	0.00	1.1E-09	0.00	2.4E-09	0.00						
Ingestion of Ground Water												
Deep Bedrock	7.3E-07	13.06	2.6E-02	38.92	5.5E-02	38.61	8.9E-07	23.80	2.4E-02	35.24	5.1E-02	35.03
Inhalation of Ground Water												
Deep Bedrock	4.8E-06	86.35	4.0E-02	60.58	8.7E-02	60.93	2.4E-06	63.10	4.3E-02	64.21	9.3E-02	64.46
Ingestion of Root Crops												
Deep Bedrock	2.5E-08	0.44	2.6E-04	0.39	5.1E-04	0.36	4.8E-07	12.83	2.8E-04	0.41	5.5E-04	0.38
Ingestion of Leaf Crops												
Deep Bedrock	8.5E-09	0.15	7.2E-05	0.11	1.4E-04	0.10	9.9E-09	0.26	9.7E-05	0.14	1.9E-04	0.13
Total	5.6E-06		6.6E-02		1.4E-01		3.7E-06		6.7E-02		1.4E-01	
a. Carcinogenic risk threshold is 1E-6.												
b. Non-carcinogenic risk threshold is 1E+0.												

TABLE 6-18 (Continued)

Pathway	Plausible Maximum Exposure - Round 1 Data						Plausible Maximum Exposure - Round 2 Data					
	Carcinogenic ^a			Non-Carcinogenic ^b			Carcinogenic ^a			Non-Carcinogenic ^b		
	Adult	% Total		Adult	% Total	Child	Adult	% Total		Adult	% Total	Child
Inhalation of Vapors												
Soil Vapor	4.3E-14	0.00	5.2E-08	0.00	3.1E-08	0.00						
Ingestion of Ground Water												
Deep Bedrock	4.5E-06	21.04	2.1E-01	45.73	1.3E-01	43.71	5.6E-06	32.17	2.5E-01	59.01	1.5E-01	57.28
Inhalation of Ground Water												
Deep Bedrock	1.7E-05	77.92	2.5E-01	53.71	1.6E-01	55.76	8.2E-06	46.94	1.7E-01	39.97	1.1E-01	41.73
Ingestion of Root Crops												
Deep Bedrock	1.7E-07	0.78	2.0E-03	0.43	1.2E-03	0.41	3.6E-06	20.51	3.2E-03	0.76	1.9E-03	0.74
Ingestion of Leaf Crops												
Deep Bedrock	5.6E-08	0.26	5.9E-04	0.13	3.5E-04	0.12	6.7E-08	0.38	1.1E-03	0.26	6.7E-04	0.25
Total	2.1E-05		4.6E-01		2.9E-01		1.7E-05		4.3E-01		2.6E-01	

TABLE 6-19 RESIDENTIAL RECEPTOR - COMPOSITE RISKS FROM FUTURE-USE
ON-SITE EXPOSURE SCENARIOS, MIXED BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Pathway	Average Exposure - Round 1 Data						Average Exposure - Round 2 Data					
	Carcinogenic ^a			Non-Carcinogenic ^b			Carcinogenic ^a			Non-Carcinogenic ^b		
	Adult	% Total		Adult	% Total		Adult	% Total		Adult	% Total	
Inhalation of Vapors												
Soil Vapor	3.4E-15	0.00	1.1E-09	0.00	2.4E-09	0.00						
Ingestion of Ground Water												
Mixed Bedrock	1.3E-04	67.71	1.1E-01	13.49	2.3E-01	13.32	6.1E-05	27.93	1.0E-01	28.65	2.2E-01	28.39
Inhalation of Ground Water												
Mixed Bedrock	6.2E-05	31.46	6.8E-01	86.05	1.5E+00	86.26	1.6E-04	71.54	2.6E-01	70.53	5.5E-01	70.85
Ingestion of Root Crops												
Mixed Bedrock	1.2E-06	0.61	2.7E-03	0.34	5.4E-03	0.32	6.8E-07	0.31	2.1E-03	0.58	4.2E-03	0.54
Ingestion of Leaf Crops												
Mixed Bedrock	4.3E-07	0.22	8.7E-04	0.11	1.7E-03	0.10	4.9E-07	0.23	8.7E-04	0.24	1.7E-03	0.22
Total	2.0E-04		7.9E-01		1.7E+00		2.2E-04		3.6E-01		7.8E-01	

a. Carcinogenic risk threshold is 1E-6.
b. Non-carcinogenic risk threshold is 1E+0.

TABLE 6-19 (Continued)

Pathway	Plausible Maximum Exposure - Round 1 Data						Plausible Maximum Exposure - Round 2 Data					
	Carcinogenic ^a			Non-Carcinogenic ^b			Carcinogenic ^a			Non-Carcinogenic ^b		
	Adult	% Total	Adult	% Total	Child	% Total	Adult	% Total	Adult	% Total	Child	% Total
Inhalation of Vapors												
Soil Vapor	4.3E-14	0.00	5.2E-08	0.00	3.1E-08	0.00						
Ingestion of Ground Water												
Mixed Bedrock	8.8E-04	72.59	1.2E+00	17.09	7.1E-01	15.96	4.5E-04	35.73	1.1E+00	35.18	6.3E-01	33.36
Inhalation of Ground Water												
Mixed Bedrock	3.1E-04	25.74	5.7E+00	82.24	3.7E+00	83.41	7.9E-04	63.47	1.9E+00	63.66	1.2E+00	65.56
Ingestion of Root Crops												
Mixed Bedrock	1.5E-05	1.26	3.6E-02	0.52	2.2E-02	0.48	5.8E-06	0.46	2.4E-02	0.80	1.4E-02	0.74
Ingestion of Leaf Crops												
Mixed Bedrock	4.9E-06	0.41	1.1E-02	0.15	6.4E-03	0.15	4.1E-06	0.33	1.1E-02	0.35	6.3E-03	0.33
Total	1.2E-03		6.9E+00		4.4E+00		1.3E-03		3.0E+00		1.9E+00	

**TABLE 6-20 INDUSTRIAL RECEPTOR - COMPOSITE RISKS FROM FUTURE-USE
EXPOSURE SCENARIOS, UPPER BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

[illegible]

TABLE 6-20 (Continued)

Pathway	Plausible Maximum Exposure - Round 1 Data				Plausible Maximum Exposure - Round 2 Data			
	Carcinogenic ^a		Non-Carcinogenic ^b		Carcinogenic ^a		Non-Carcinogenic ^b	
	Adult	% Total	Adult	% Total	Adult	% Total	Adult	% Total
Inhalation of Vapors								
Landfill Perimeter	3.6E-12	0.00	8.3E-10	0.00				
North Area Soils					4.4E-11	0.00	2.1E-07	0.00
Dermal Contact								
Landfill Perimeter	3.1E-09	0.00	5.8E-09	0.00				
North Area Soils					7.7E-09	0.00	6.9E-08	0.00
Ingestion of Ground Water								
Upper Bedrock	4.8E-04	96.44	7.5E-01	98.40	2.4E-04	97.92	6.3E-01	99.30
Incidental Ingestion								
Upper Bedrock	1.8E-05	3.52	5.6E-03	0.74	4.4E-06	1.78	2.5E-03	0.40
Inhalation of Vapors								
Upper Bedrock	2.1E-07	0.04	6.6E-03	0.86	7.2E-07	0.29	1.9E-03	0.30
Inhalation of Vapors								
Basement					1.4E-12	0.00	1.2E-06	0.00
Total	5.0E-04		7.6E-01		2.5E-04		6.3E-01	

**TABLE 6-21 INDUSTRIAL RECEPTOR - COMPOSITE RISKS FROM FUTURE-USE EXPOSURE SCENARIOS
DEEP BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK**

[illegible]

TABLE 6-21 (Continued)

Pathway	Plausible Maximum Exposure - Round 1 Data				Plausible Maximum Exposure - Round 2 Data			
	Carcinogenic ^a		Non-Carcinogenic ^b		Carcinogenic ^a		Non-Carcinogenic ^b	
	Adult	% Total	Adult	% Total	Adult	% Total	Adult	% Total
Inhalation of Vapors								
Landfill Perimeter	3.6E-12	0.00	8.3E-10	0.00				
North Area Soils					4.4E-11	0.00	2.1E-07	0.00
Dermal Contact								
Landfill Perimeter	3.1E-09	0.15	5.8E-09	0.00				
North Area Soils					7.7E-09	0.29	6.9E-08	0.00
Ingestion of Ground Water								
Deep Bedrock	2.1E-06	97.82	1.0E-01	98.35	2.6E-06	98.06	1.1E-01	98.48
Incidental Ingestion								
Deep Bedrock	3.1E-08	1.46	1.5E-03	1.47	3.6E-08	1.39	1.5E-03	1.44
Inhalation of Vapors								
Deep Bedrock	1.2E-08	0.57	1.9E-04	0.18	6.5E-09	0.25	8.5E-05	0.08
Inhalation of Vapors								
Basement					1.4E-12	0.00	1.2E-06	0.00
Total	2.1E-06		1.0E-01		2.6E-06		1.1E-01	

TABLE 6-22 INDUSTRIAL RECEPTOR - COMPOSITE RISKS FROM FUTURE-USE EXPOSURE SCENARIOS,
MIXED BEDROCK GROUND WATER,
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION,
SKANEATELES FALLS, NEW YORK

Pathway	Average Exposure - Round 1 Data			Average Exposure - Round 2 Data		
	Carcinogenic ^a		Non-Carcinogenic ^b	Carcinogenic ^a		Non-Carcinogenic ^b
	Adult	% Total	Adult	% Total	Adult	% Total
Inhalation of Vapors						
Landfill Perimeter	3.4E-14	0.00	2.0E-09	0.00		
North Area Soils					4.2E-13	0.00
Dermal Contact						
Landfill Perimeter	2.7E-10	0.00	7.4E-10	0.00		
North Area Soils					6.7E-10	0.00
Ingestion of Ground Water						
Mixed Bedrock	9.5E-05	98.89	7.6E-02	98.25	4.4E-05	98.61
Incidental Ingestion						
Mixed Bedrock	1.0E-06	1.06	8.1E-04	1.05	4.7E-07	1.06
Inhalation of Vapors						
Mixed Bedrock	5.0E-08	0.05	5.4E-04	0.70	1.5E-07	0.33
Inhalation of Vapors						
Basement					1.2E-13	0.00
Total	9.6E-05		7.7E-02		4.4E-05	
a. Carcinogenic risk threshold is 1E-6. b. Non-carcinogenic risk threshold is 1E+0.						

TABLE 6-22 (Continued)

Pathway	Plausible Maximum Exposure - Round 1 Data			Plausible Maximum Exposure - Round 2 Data			
	Carcinogenic ^a		Non-Carcinogenic ^b	Carcinogenic ^a		Non-Carcinogenic ^b	
	Adult	% Total	Adult	Adult	% Total	Adult	% Total
Inhalation of Vapors							
Landfill Perimeter	3.6E-12	0.00	8.3E-10	0.00			
North Area Soils				4.4E-11	0.00	2.1E-07	0.00
Dermal Contact							
Landfill Perimeter	3.1E-09	0.00	5.8E-09	0.00			
North Area Soils				7.7E-09	0.00	6.9E-08	0.00
Ingestion of Ground Water							
Mixed Bedrock	4.0E-04	98.48	5.6E-01	97.74	2.2E-04	98.31	5.0E-01
Incidental Ingestion							
Mixed Bedrock	6.1E-06	1.48	8.5E-03	1.47	3.2E-06	1.47	7.5E-03
Inhalation of Vapors							
Mixed Bedrock	1.7E-07	0.04	4.6E-03	0.79	4.8E-07	0.22	2.0E-03
Inhalation of Vapors							
Basement				1.4E-12	0.00	1.2E-06	0.00
Total	4.1E-04		5.8E-01		2.2E-04	5.0E-01	





LEGEND

- 720 10' CONTOUR
- 714 2' CONTOUR
- MAIN PLANT BUILDING
- FORMER BUILDINGS
- SANITARY DISPOSAL SYSTEM

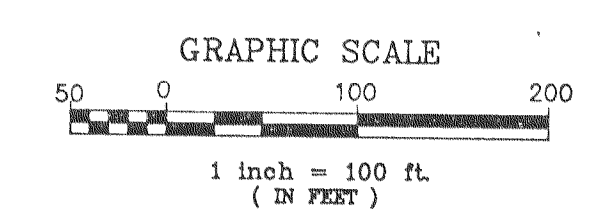


PLATE 1 SITE MAP TOPOGRAPHIC SURVEY		
STAUFFER MANAGEMENT COMPANY SKANEATELES FALLS, NEW YORK		
DATE 13 DECEMBER 1993 DESIGNED BY TWP DRAWN BY TMM CHECKED BY TWP PROJECT MANAGER JHS	EA EA ENGINEERING, PC 3 WASHINGTON CENTER THE MAPLE BUILDING NEWBURGH, NEW YORK 12550 (914) 565-8100	PROJECT NUMBER 11932.01 SCALE 1"=100' FILE NAME SURVEY/STAUFFER DRAWING NUMBER SHEET NUMBER

Appendix A

Grain-Size Analysis

APPENDIX A

NOTE: USCS = Unified Soil Classification System; LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index.

LABORATORY DATA REPORT

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March 1992

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ANALYTICAL NARRATIVE

Client: **Tom Porter**
Site: **ICI SMC RI/FS**
Project number: **11932.01**

Laboratory Project Manager: **J. Heffleger**
EA Laboratories Report: **920297**
Date: **12 March 1992**

This report contains the results for grain size analysis, plus hydrometer and Atterberg limits for nineteen (19) samples. The samples were collected between 16-23 October 1991 at the Stauffer Management Company Facility at Skaneateles Falls.

Sample List

<u>Client Sample Name</u>	<u>EA Lab Number</u>
SMC-SB02-02A	1537
SMC-SB04-02A	1538
SMC-SB07-02A	1539
SMC-SB09-02A	1540
SMC-SB10-02A	1541
SMC-SB11-02A	1542
SMC-SB12-02A	1543
SMC-SB12-03A	1544
SMC-SB13-02A	1545
SMC-SB14-02A	1546
SMC-SB16-03A	1547
SMC-SB16-04A	1548
SMC-SB17-02A	1549
SMC-SB19-02A	1550
SMC-SB20-02A	1551
SMC-SB21-02A	1552
SMC-SB23-03A	1553
SMC-SB24-02A	1554
SMC-SB24-03A	1555

Methodology

Grain size and hydrometer analyses were performed by ASTM method D422-63. The liquid limit, plastic limit, and plasticity index readings were performed according to ASTM method

EA Laboratories
ANALYTICAL NARRATIVE

Client: **Tom Porter**
Site: **ICI SMC RI/FS**
Project number: **11932.01**

Laboratory Project Manager: **J. Heffleger**
EA Laboratories Report: **920297**
Date: **12 March 1992**

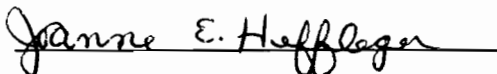
D4318-84. Procedure B was used for the Atterberg limits except where there wasn't enough soil for a three point liquid limit determination. In this case, procedure D was followed.

Results

The grain size results are reported in a graph format. The liquid limit (LL), plastic limit (PL), and plasticity index (PI) are reported on the right hand side of the graph. Analysis and computation sheets are included in the section following the sample results.

Certification of Results

The Laboratory certifies that this report meets the project requirements for analytical data as stated in the Analytical Task Order (ATO) and the chain-of-custody. In addition, the Laboratory certifies that the data as reported meet the Data Quality Objectives for precision, accuracy, and completeness specified for this project or as stated in EA Laboratories Quality Assurance program for other than the conditions detailed above. Release of the data contained in this report has been authorized by the appropriate Laboratory Manager as verified by the following signature.

 12 March 1992
Joanne E. Heffleger

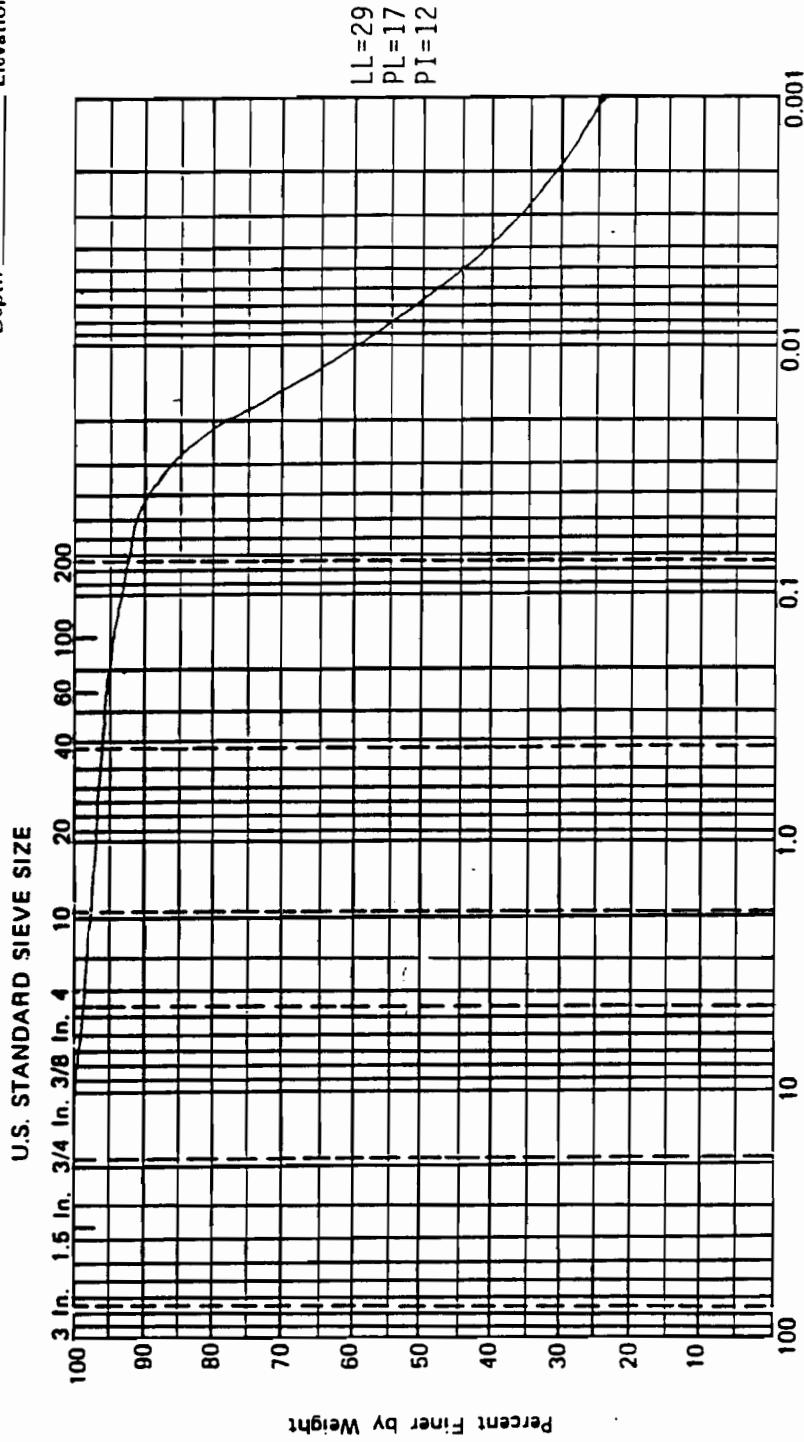
SAMPLE RESULTS

GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/FS

Station No. SB02-02A Lab No. _____

Depth 3.5 ft Elevation _____

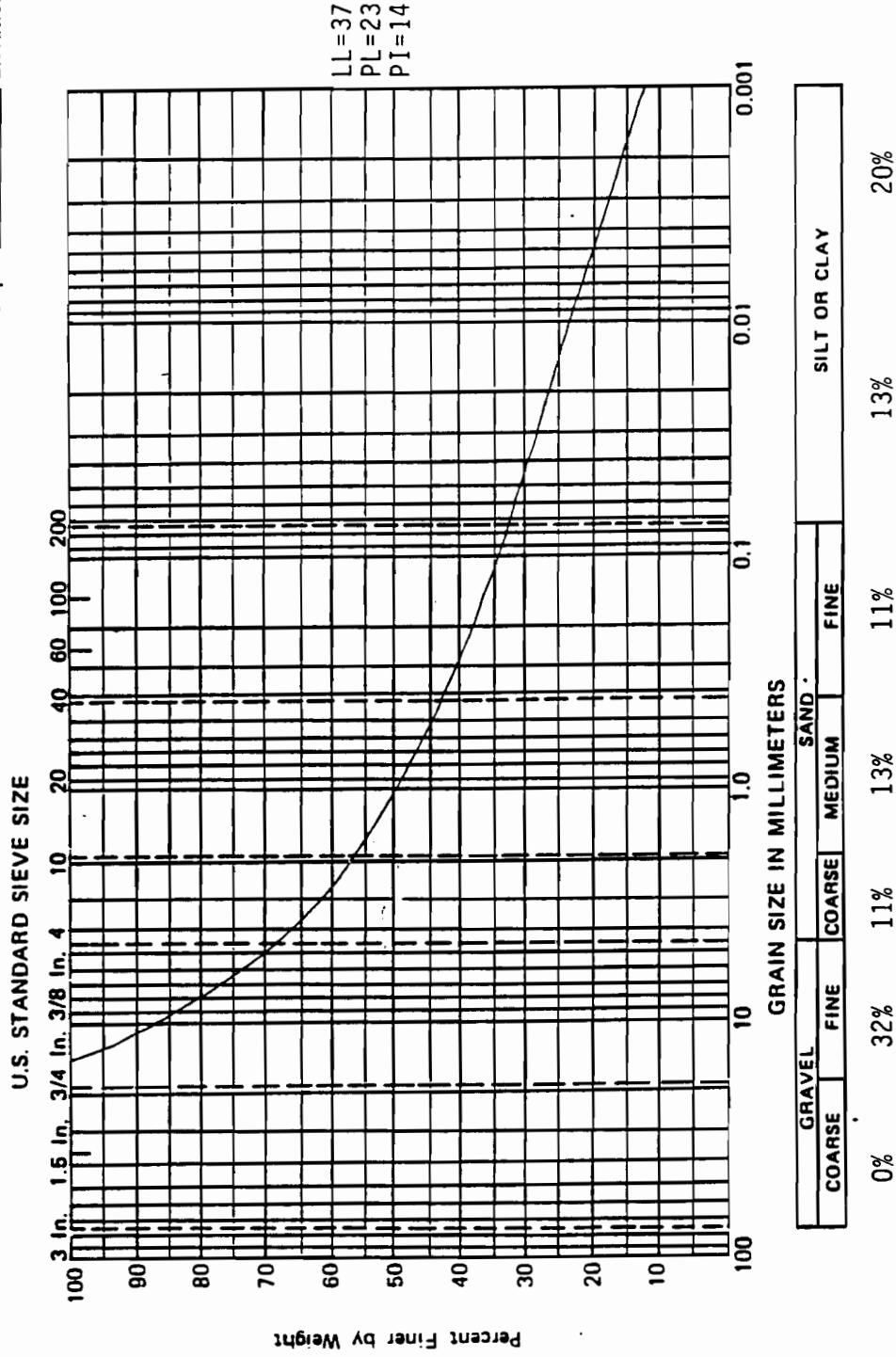


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/ES

Station No. SB04-02A Lab No. _____

Depth 6.0 Elevation _____

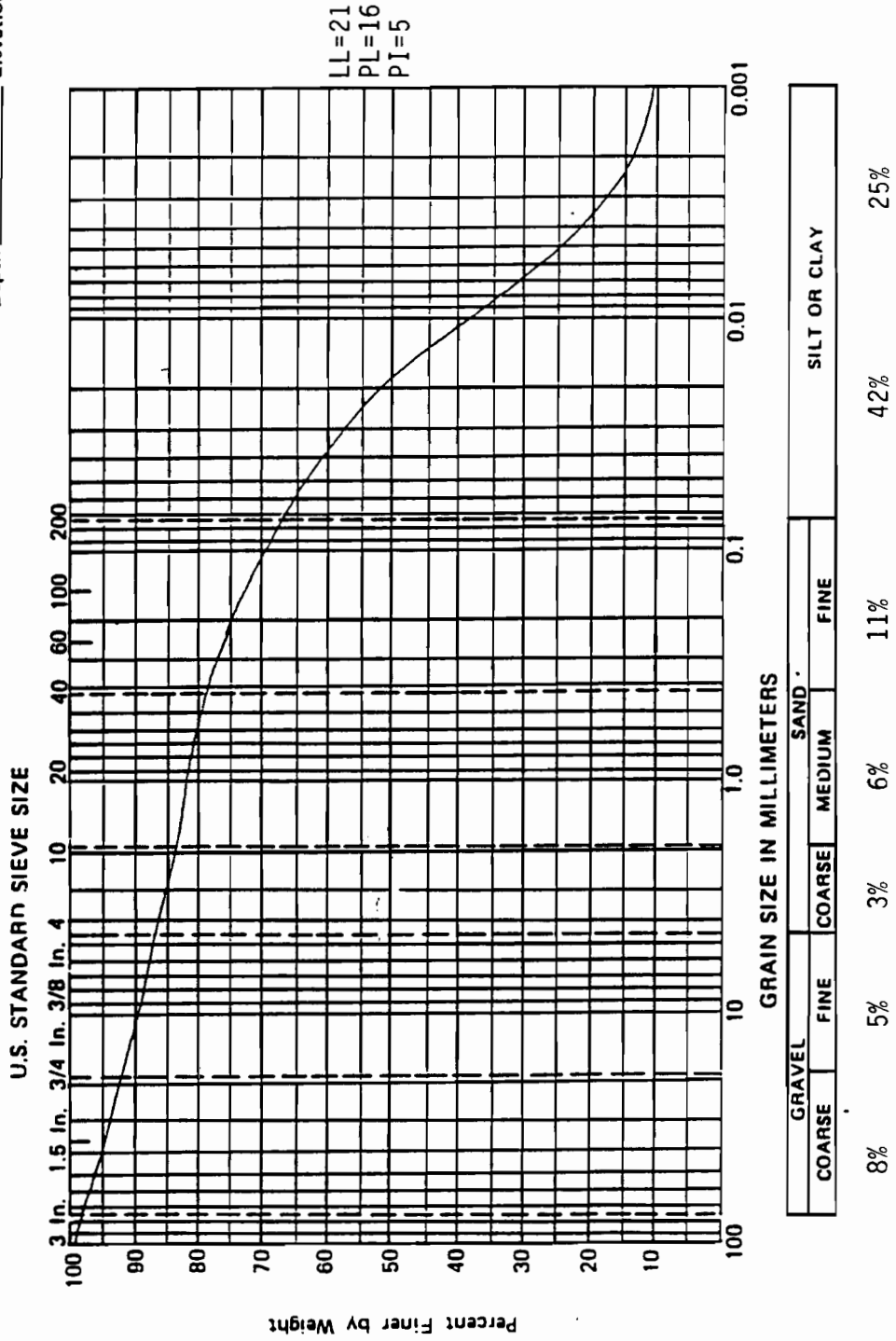


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/FS

Station No. SB07-02A Lab No. _____

Depth 5.2 Elevation _____

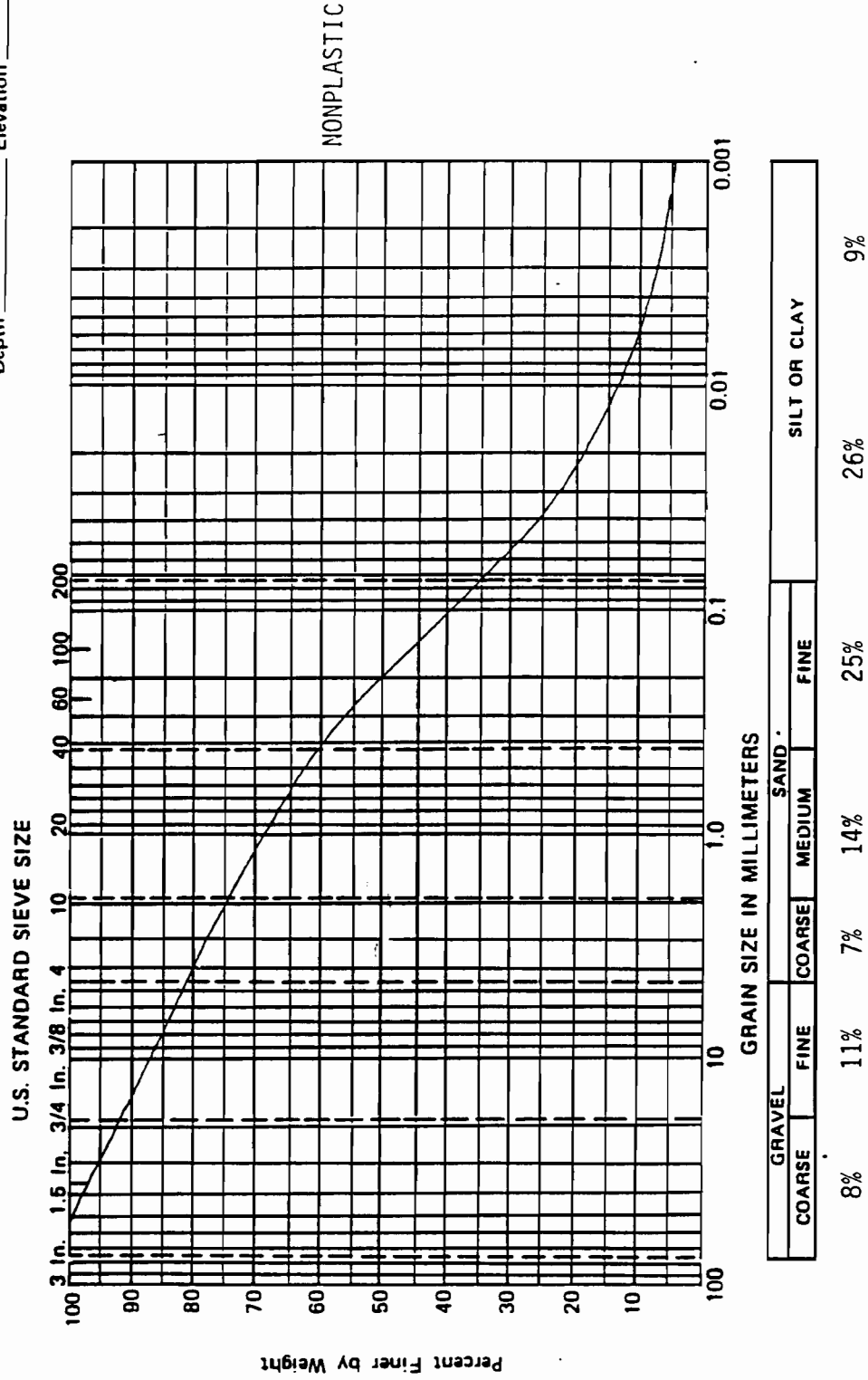


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/ES

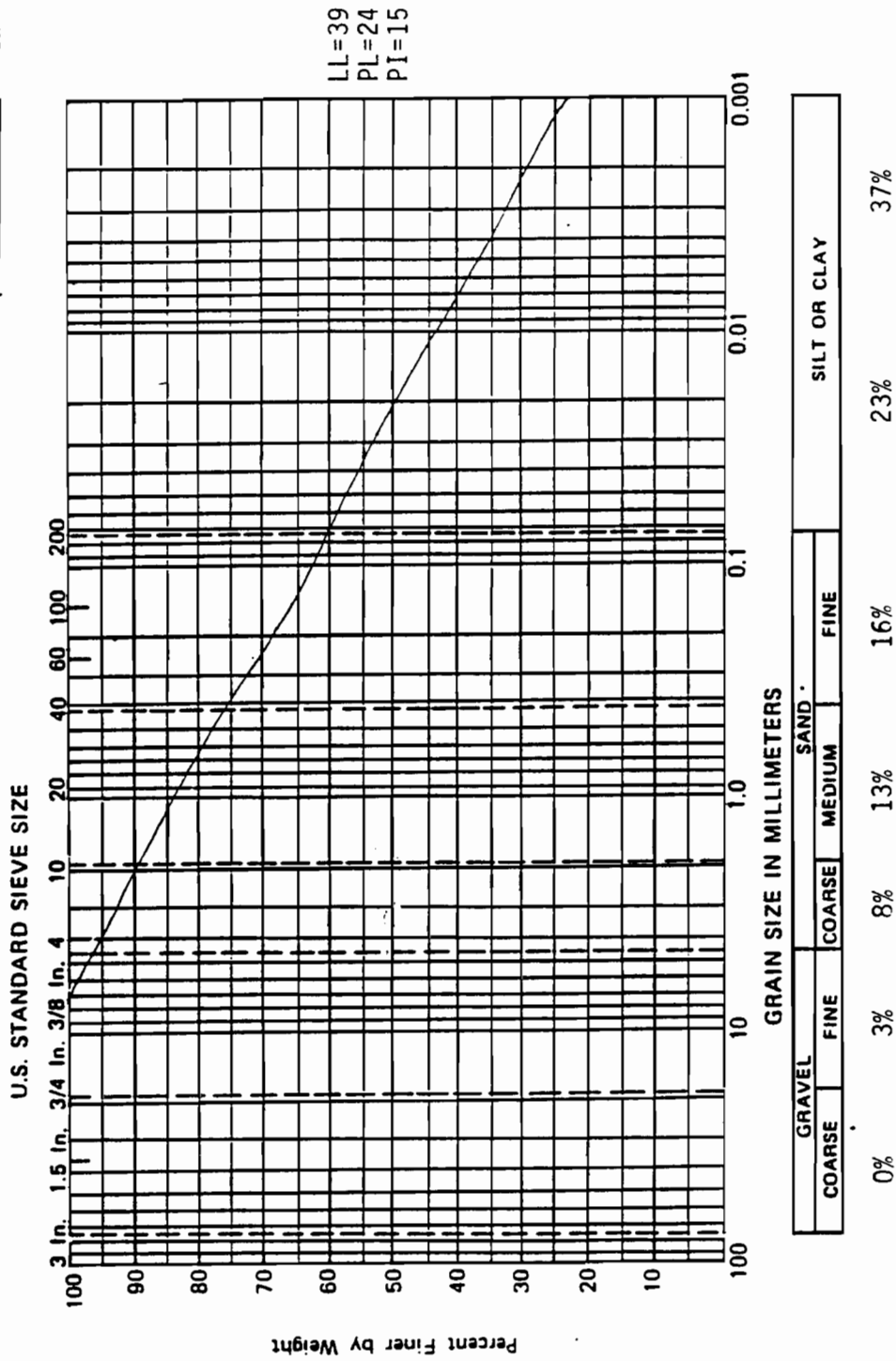
Station No. SB09-02A Lab No. _____

Depth 6.17 Elevation _____



Project ICI SMC RI/FS

Depth _____ Elevation _____



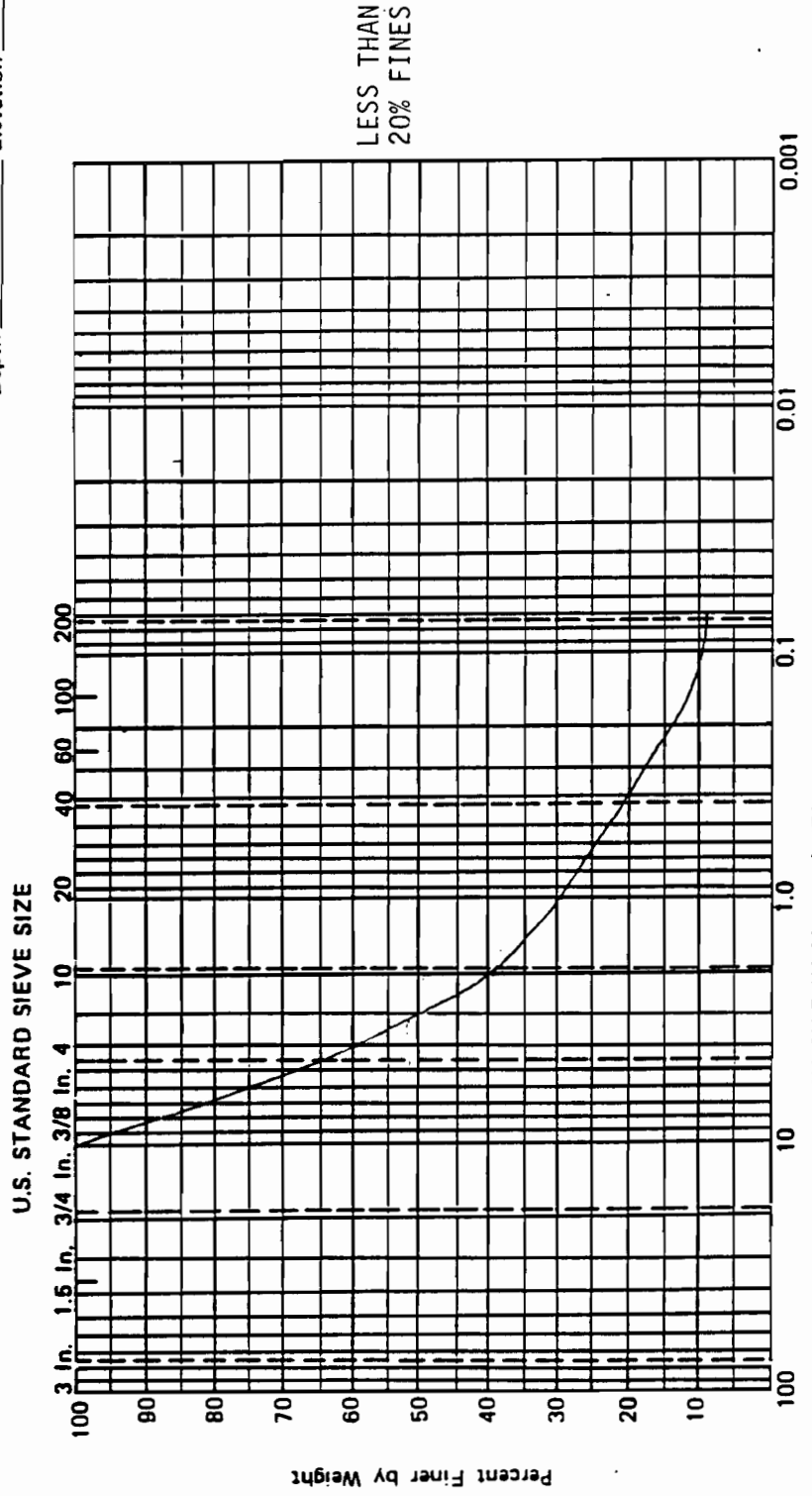


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/FS

Station No. SB11-02A Lab No. _____

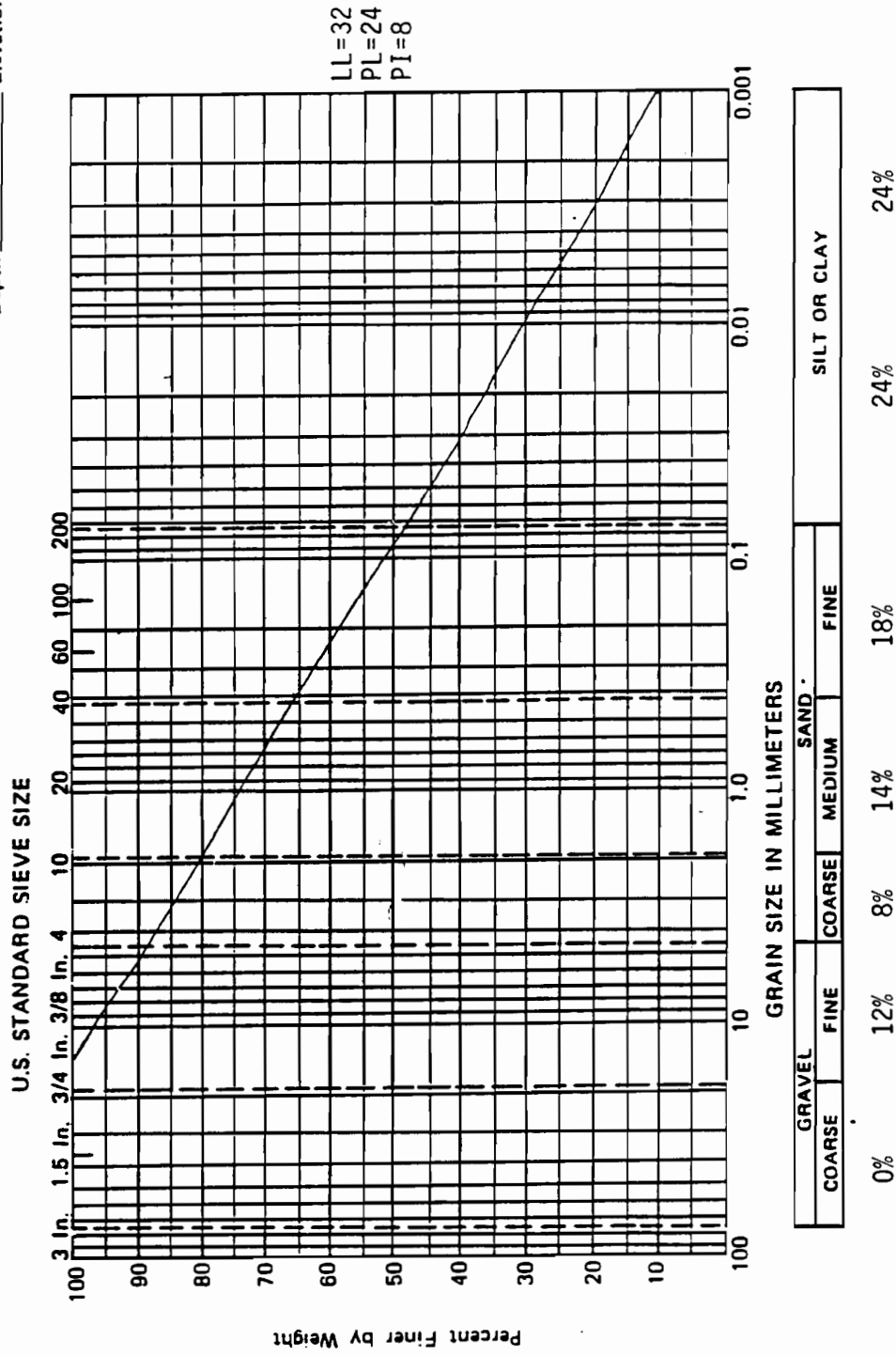
Depth 10.0 Elevation _____



GRAVEL		SAND			SILT OR CLAY	
COARSE	FINE	COARSE	MEDIUM	FINE		
0%	36%	26%	17%	12%		

Project ICI SMC RI/FS

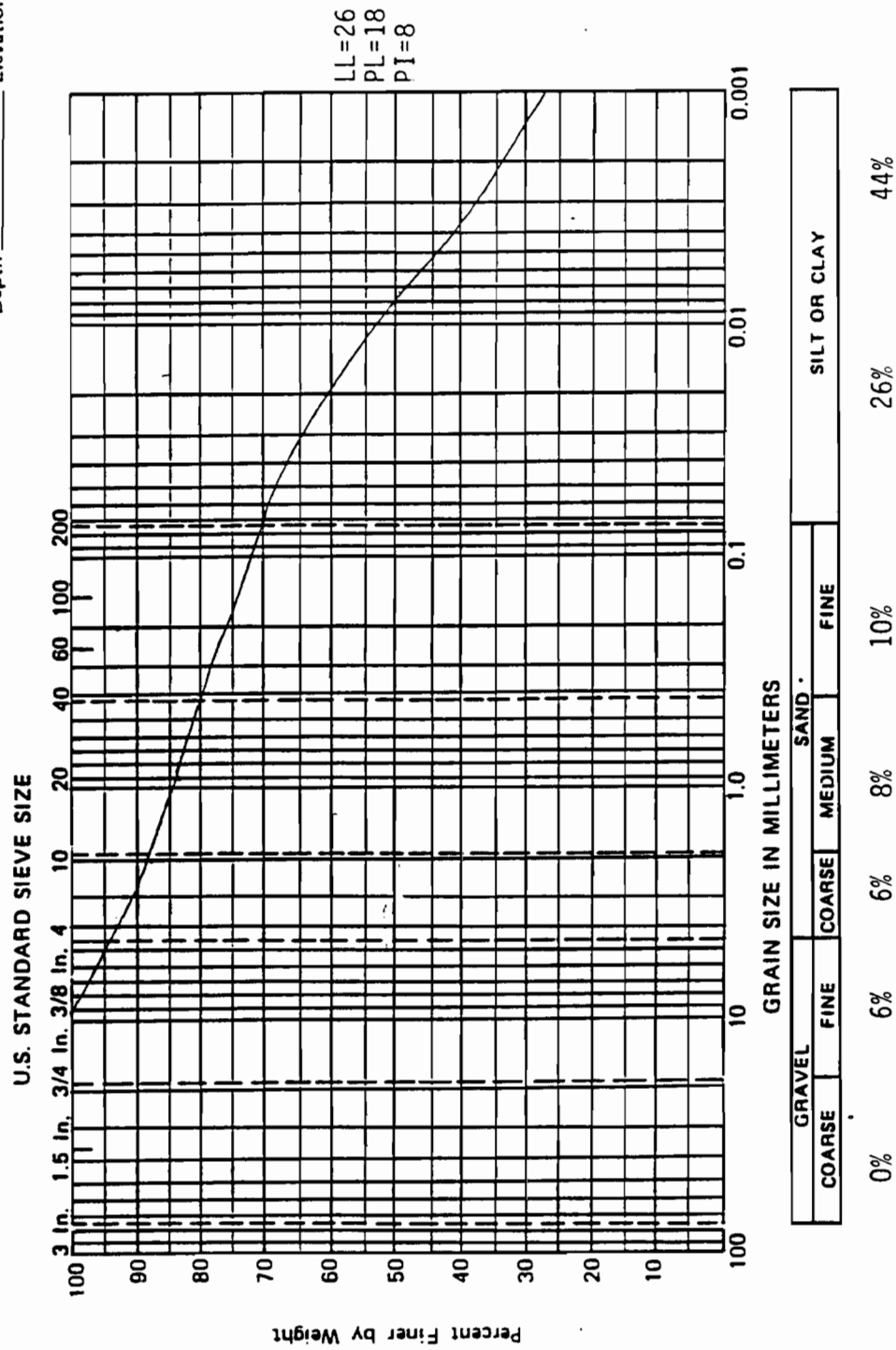
Depth 4.5 Elevation



Project ICI SMC RI/FS

Lab No.

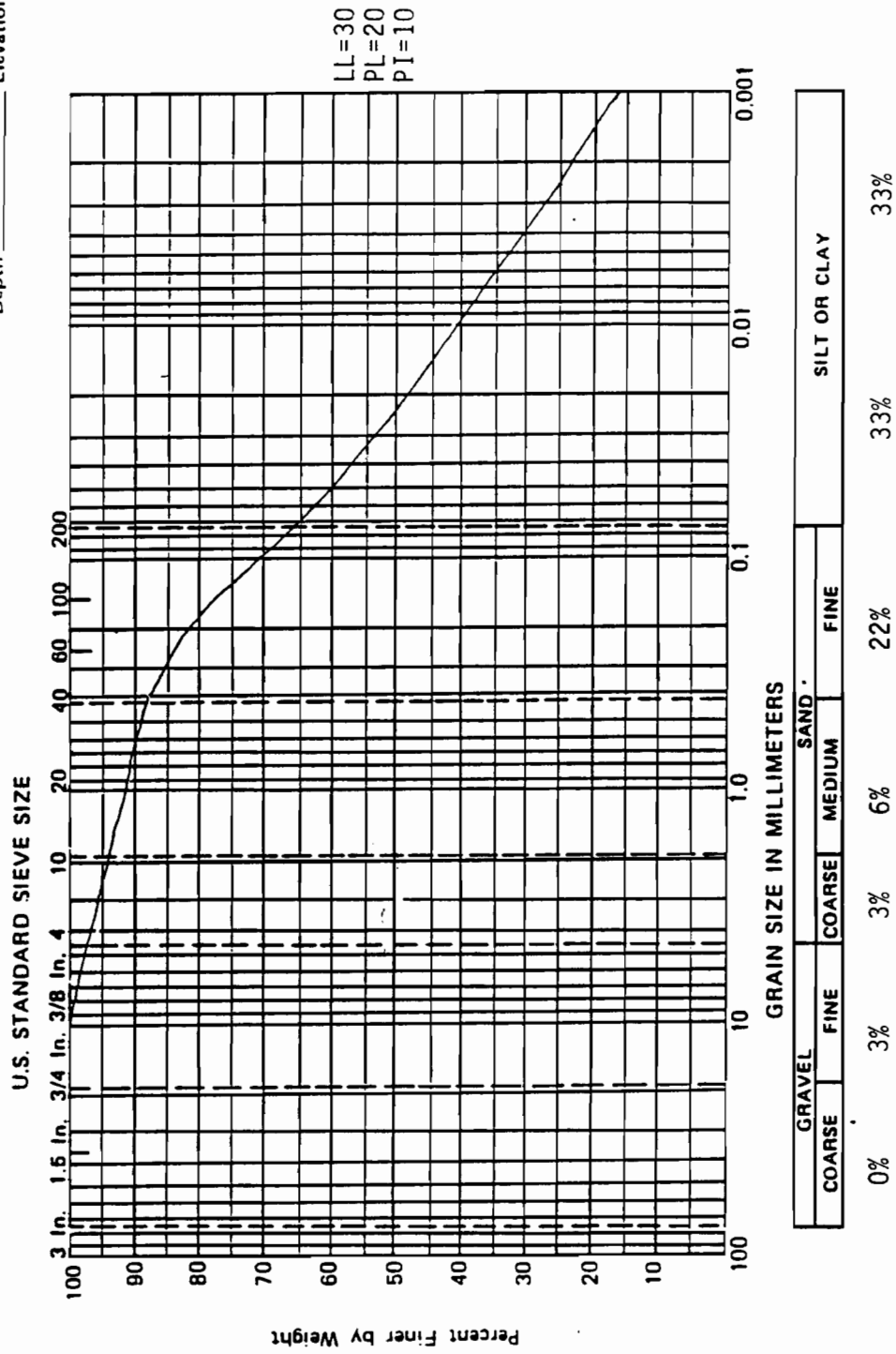
elevation _____





Project ICI SMC RI/ES____.

Depth 6' 11" Elevation 100.00

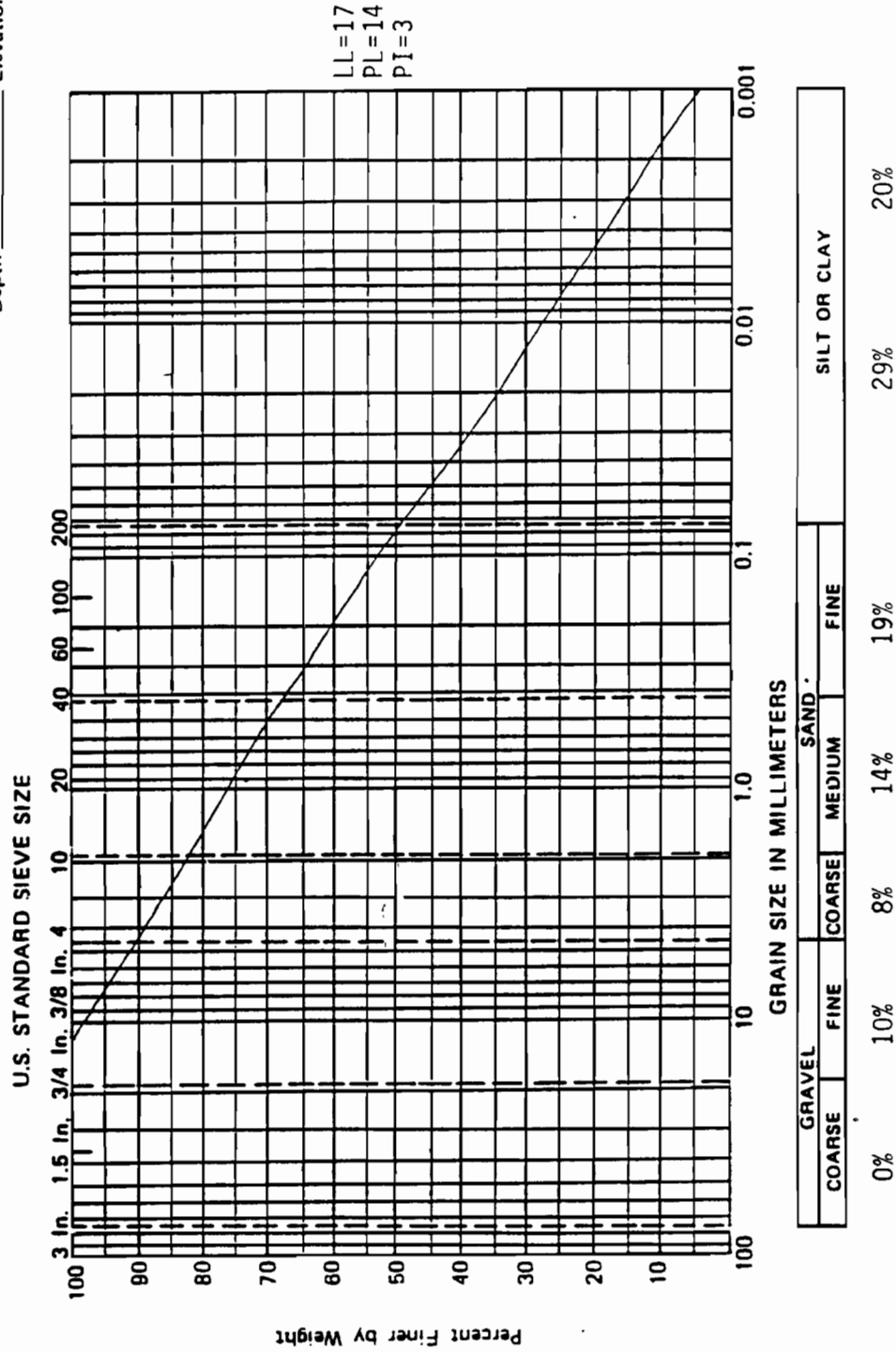


GRAIN SIZE DISTRIBUTION CURVE

Project ICL SMC RI/ES

Station No. SB14-02A Lab No. _____

Depth 6.5 Elevation _____

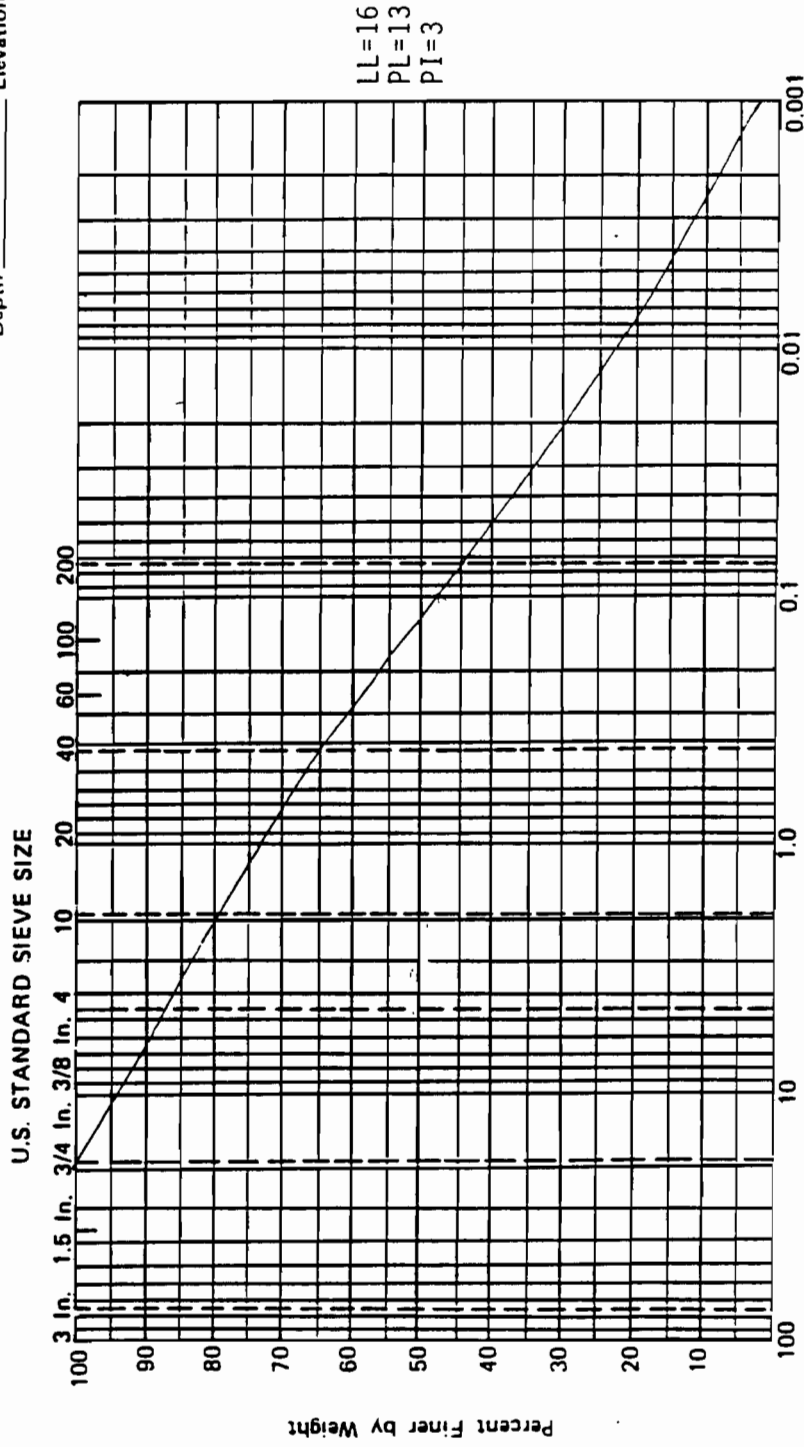


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/FS

Station No. SB16-03A Lab No. _____

Depth 5' 10" Elevation _____



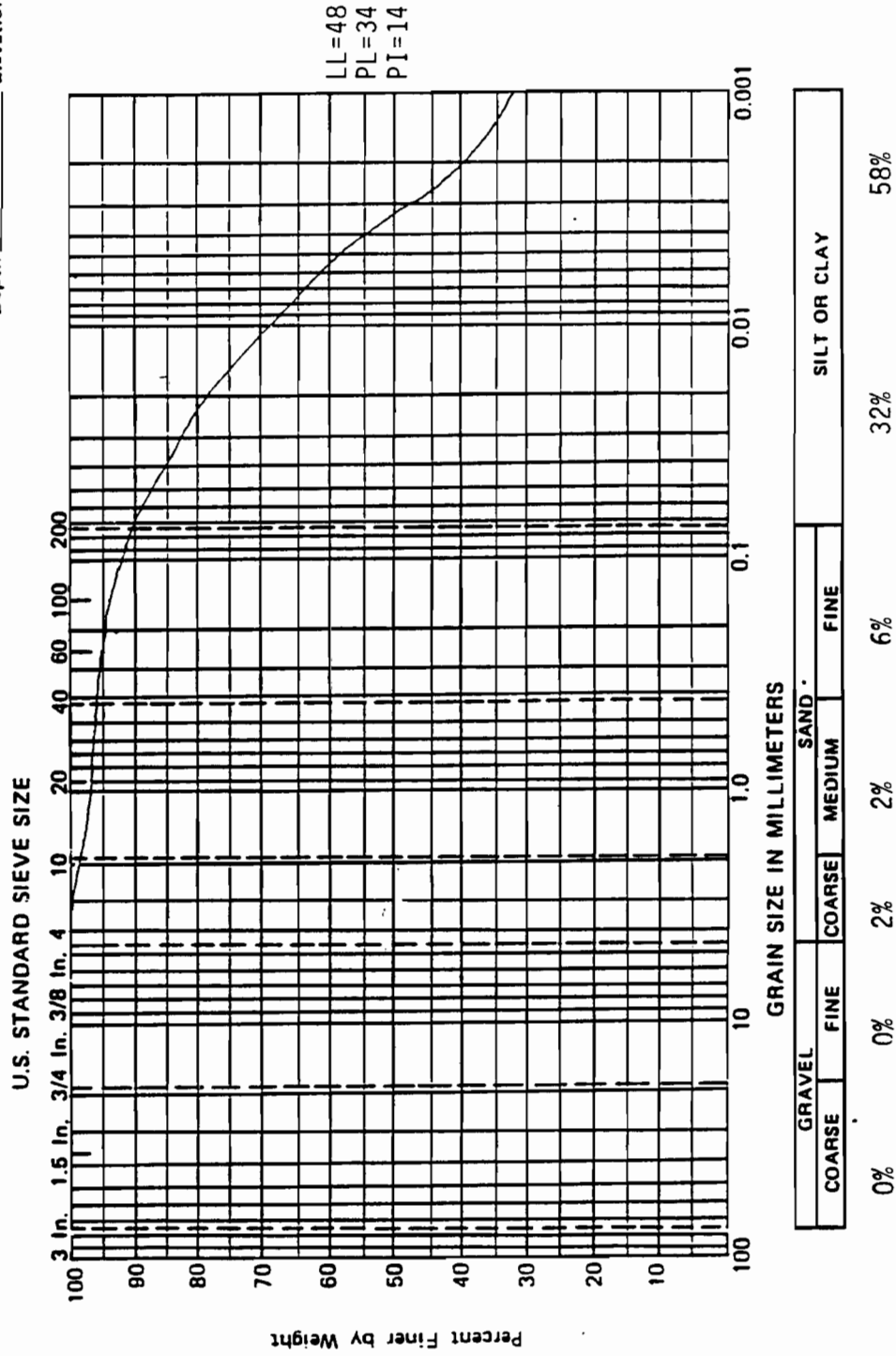


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/ES

Station No. SB16-04A Lab No. _____

Depth 11-13 Elevation _____

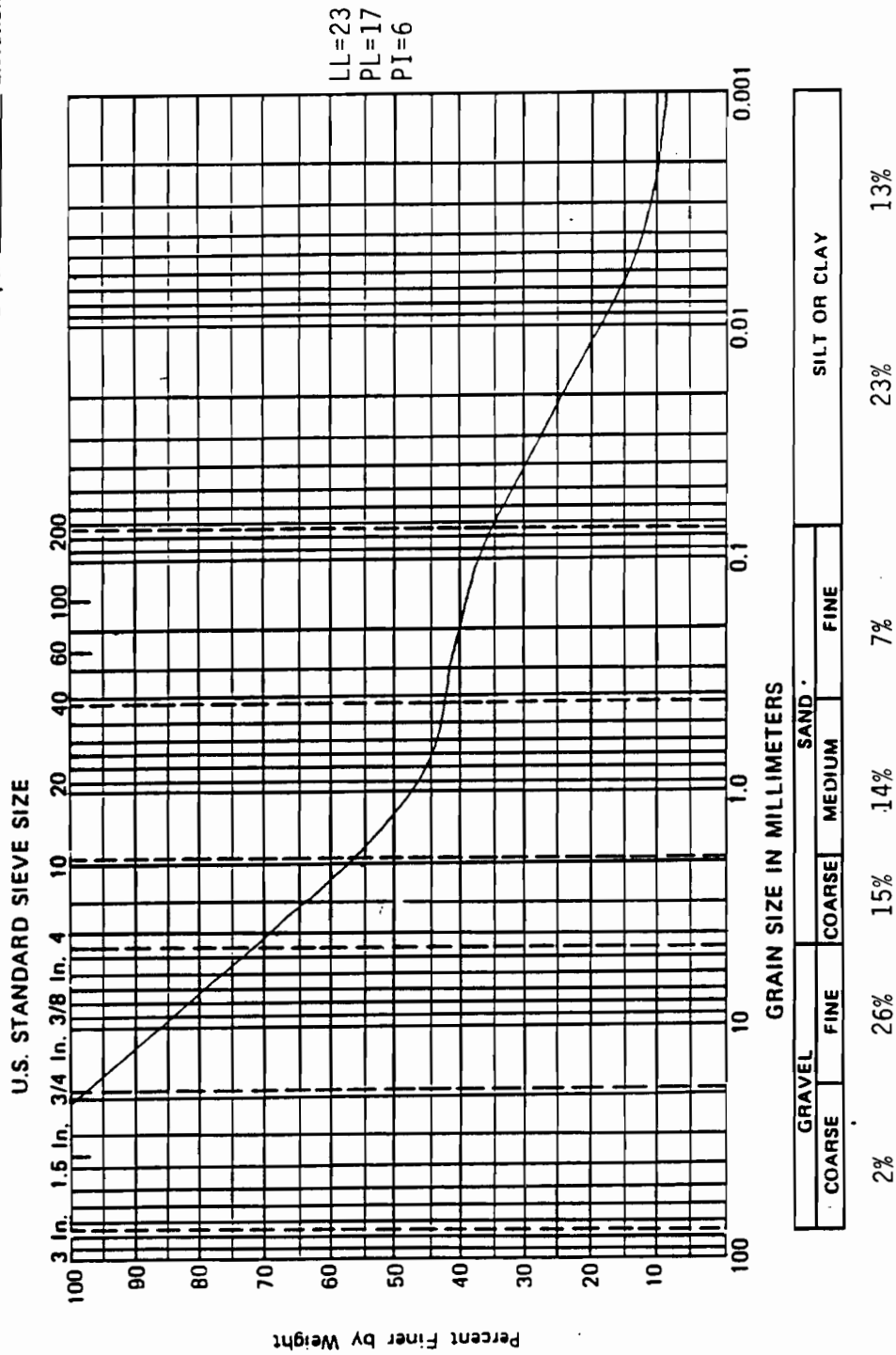


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/ES

Station No. SB17-02A Lab No. _____

Depth 1.0 Elevation _____



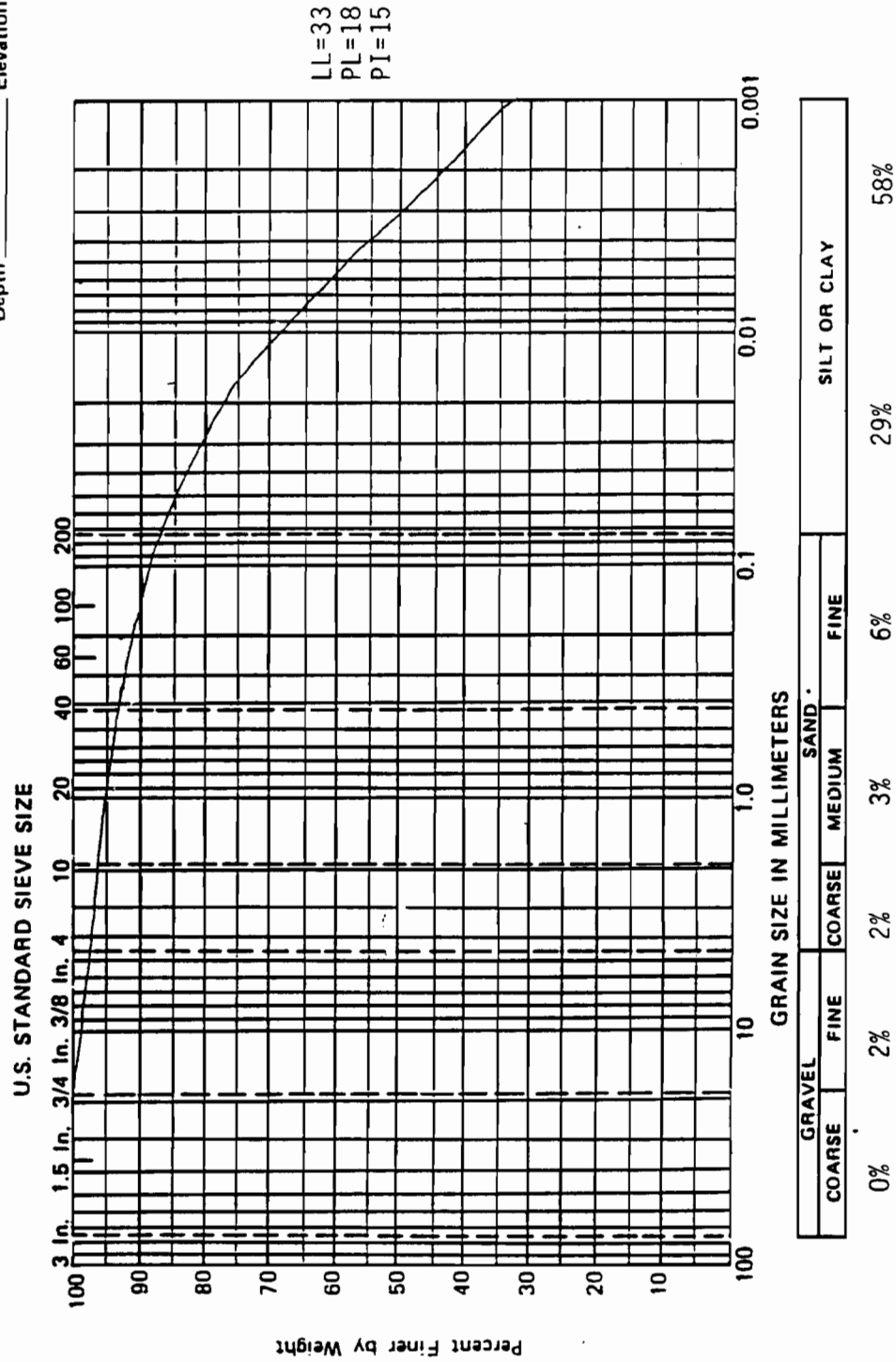


Project ICI SMC RI/FS

Station No. SB19-02A Lab No. _____

Depth 1-3 Elevation _____

GRAIN SIZE DISTRIBUTION CURVE

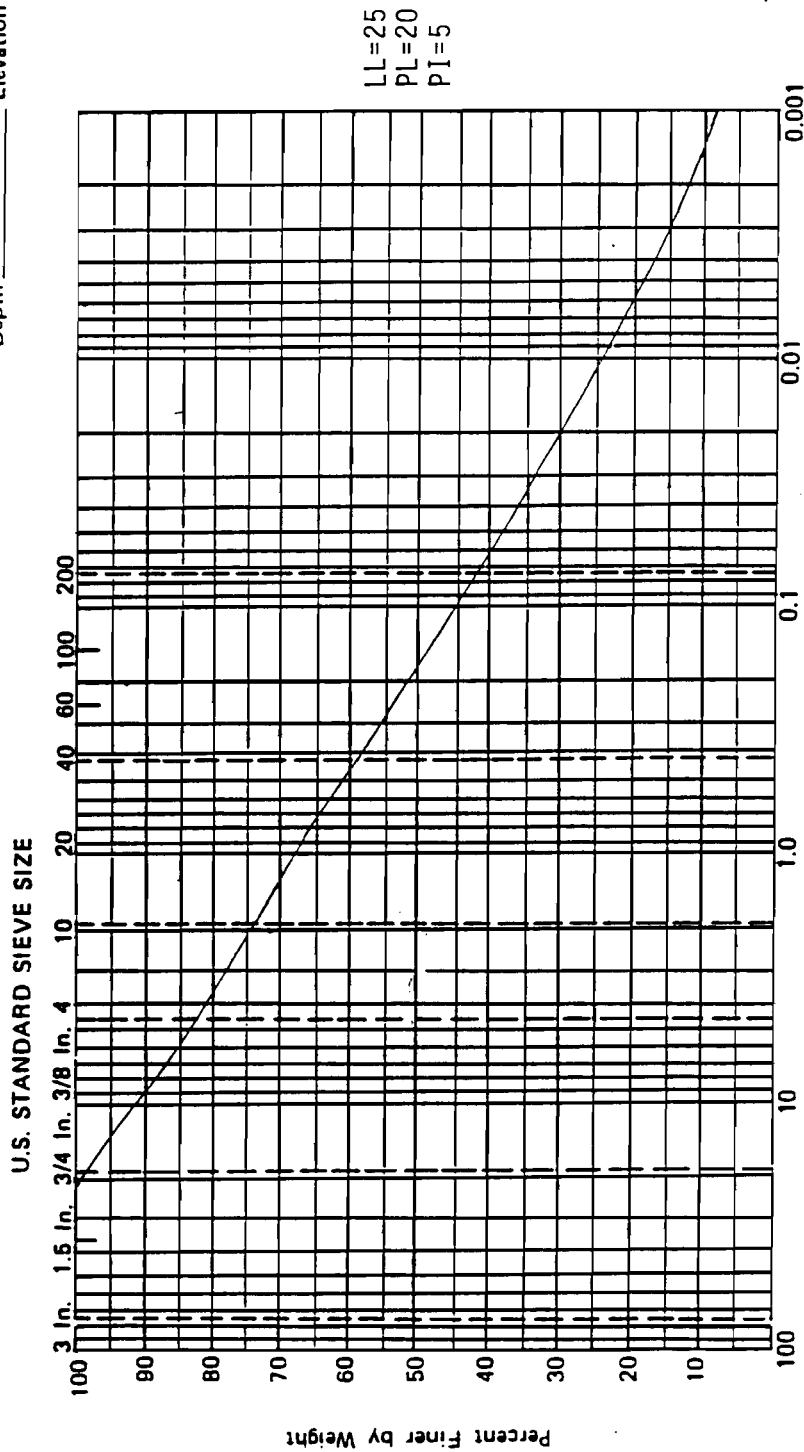


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/ES

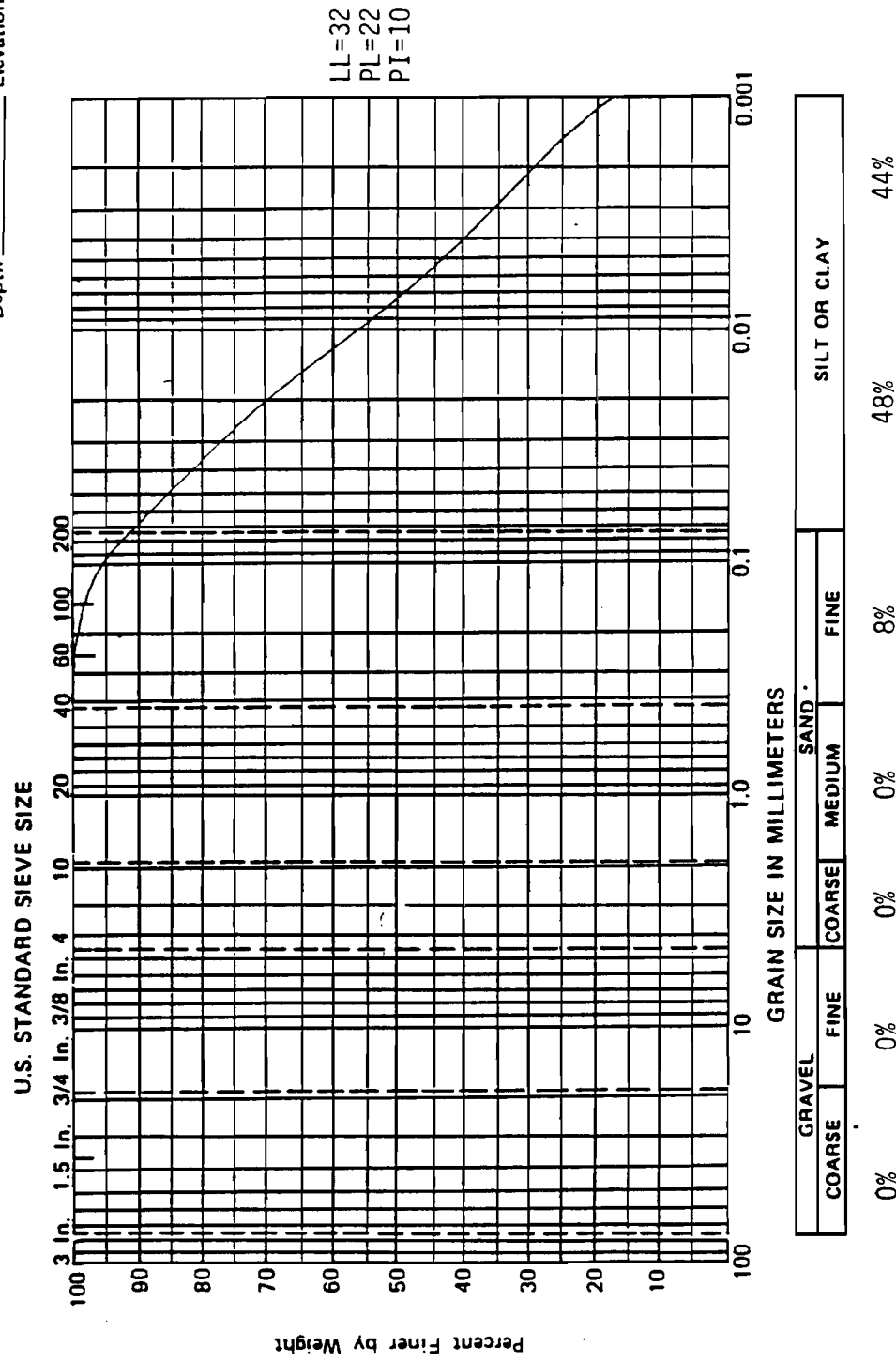
Station No. SB20-02A Lab No. _____

Depth 11-13 Elevation _____



Project ICI SMC RI/FSStation No. SB 21-02A Lab No. _____

Depth 10.1 Elevation 10.1

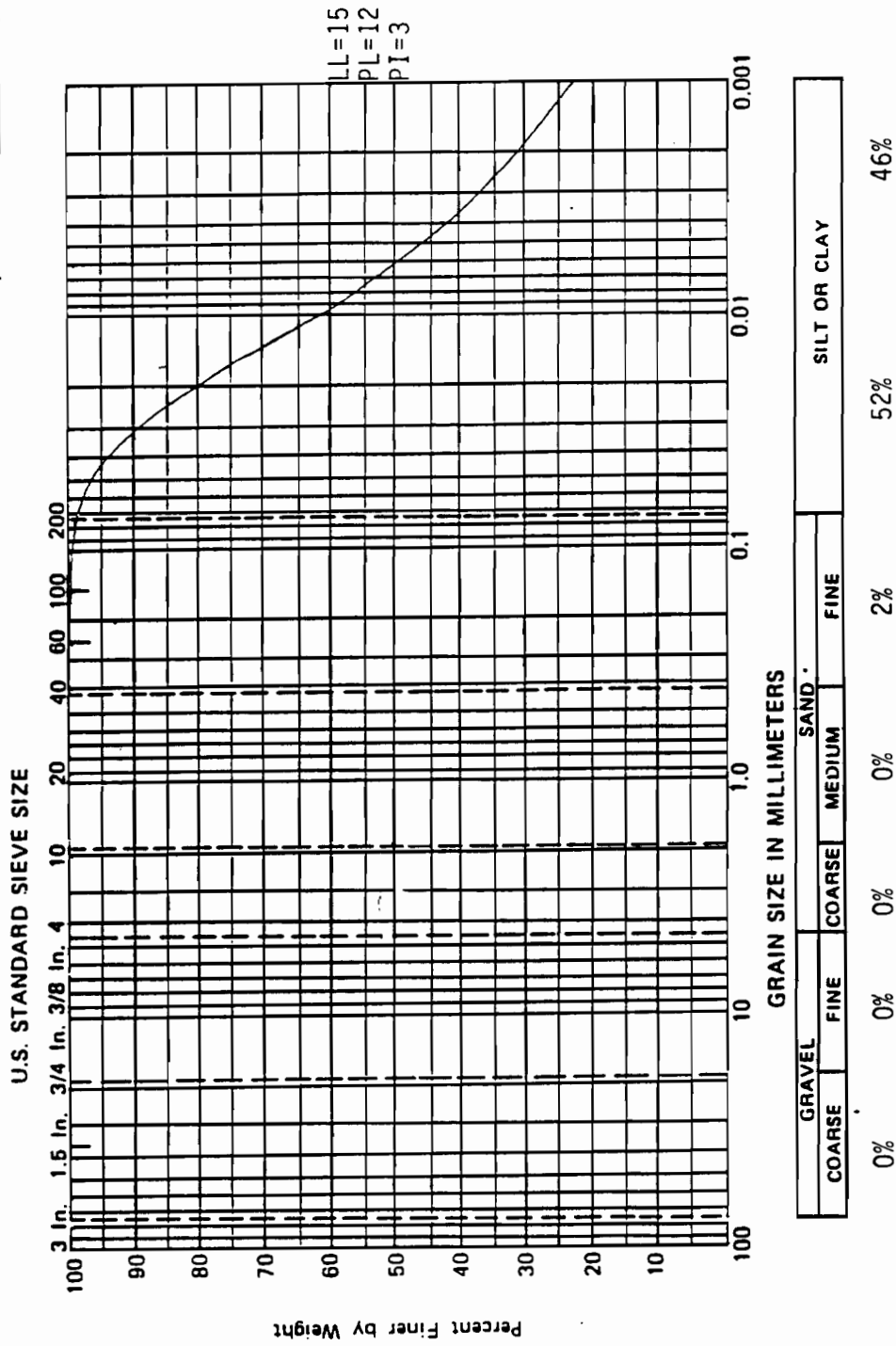


GRAIN SIZE DISTRIBUTION CURVE

Project ICI SMC RI/ES

Station No. SB23-03A Lab No. _____

Depth 10.0 ft Elevation _____



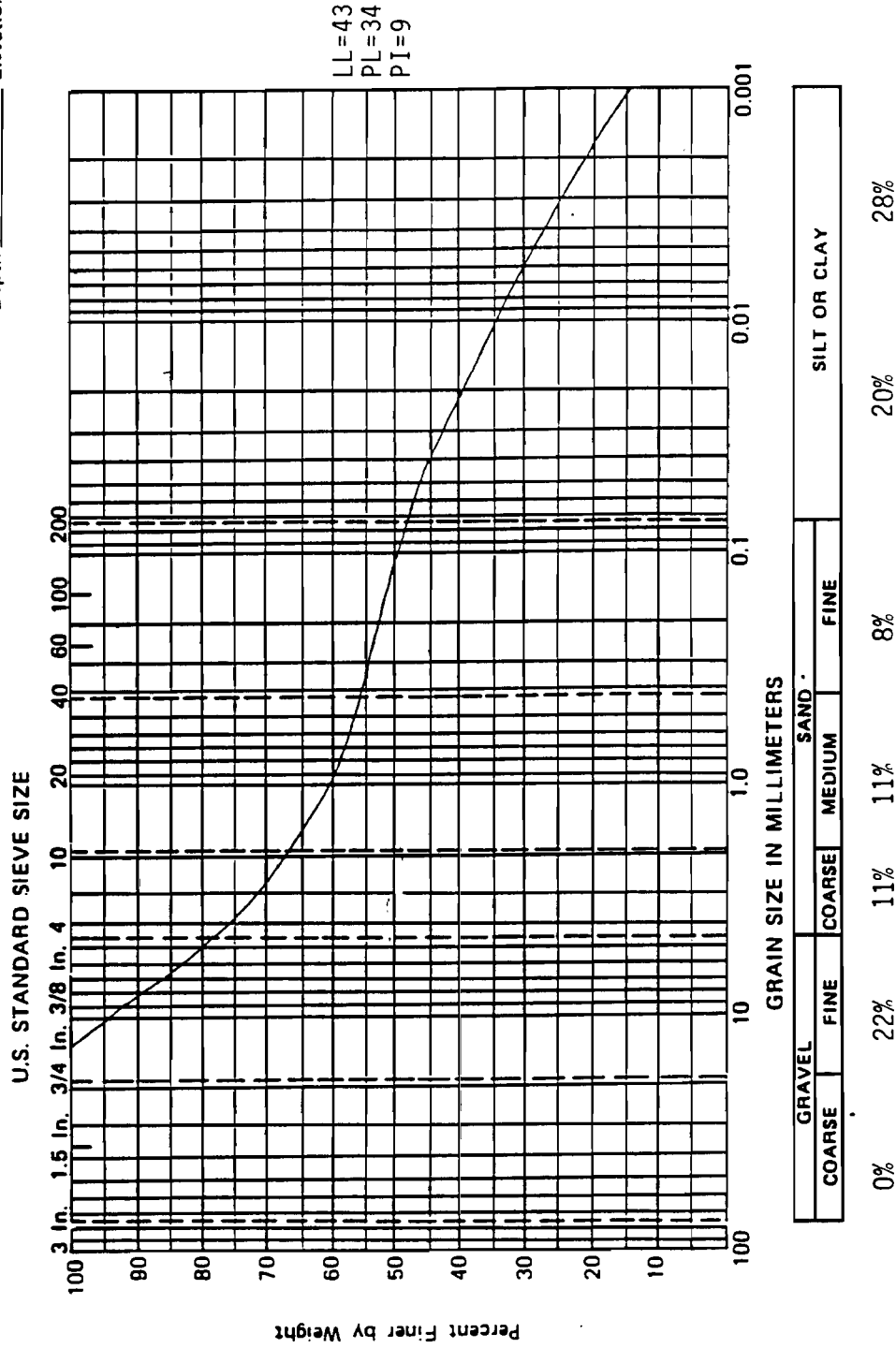


GRAIN SIZE DISTRIBUTION CURVE

Project LCI_SMC_RI/FS

Station No. SB24-02A Lab No.

Depth 11.00' Elevation

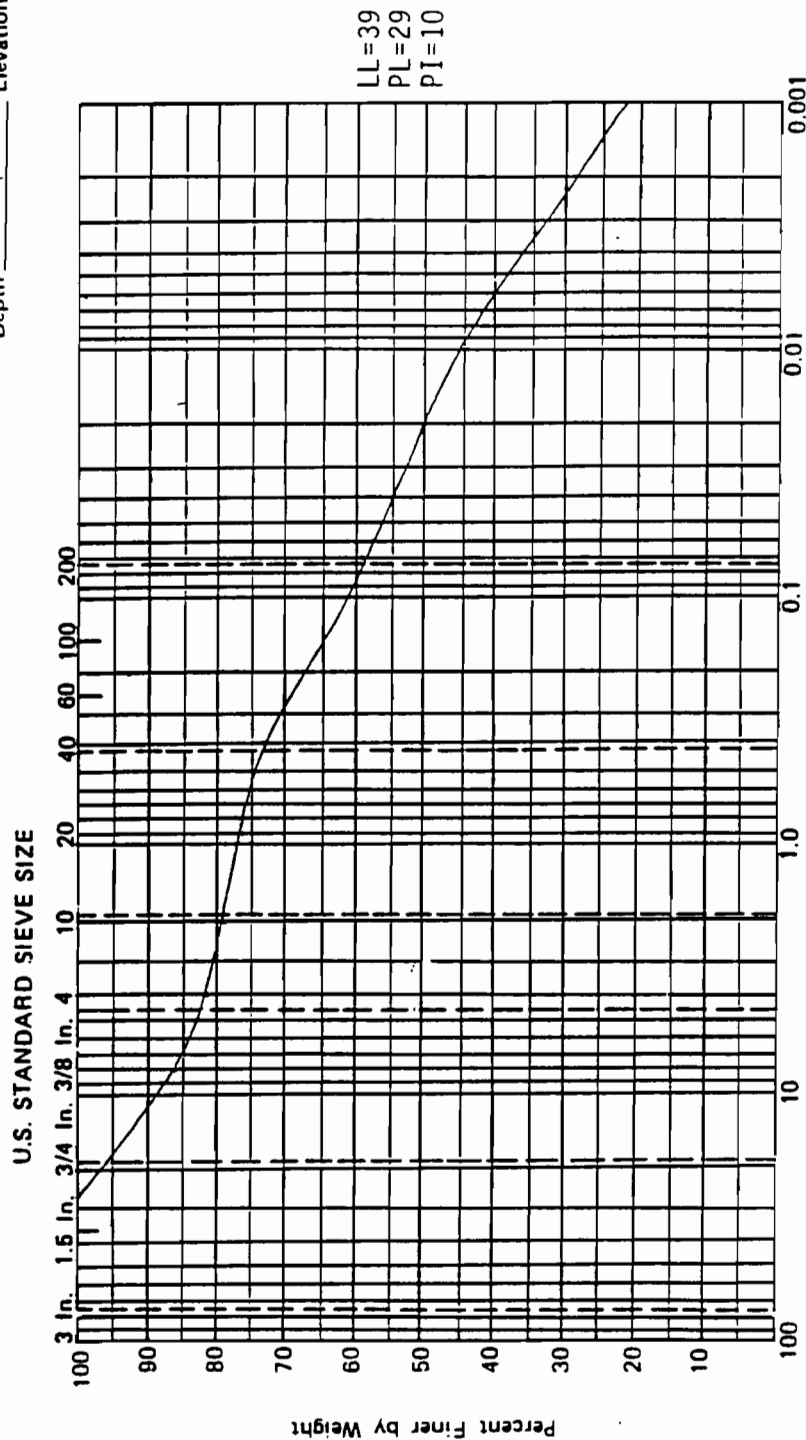


GRAIN SIZE DISTRIBUTION CURVE

Project LCI SMC RI/ES

Station No. SB24-03A Lab No.

Depth 11.0' Elevation



GRAIN SIZE IN MILLIMETERS			
GRAVEL		SAND	
COARSE	FINE	COARSE	FINE

4% 13% 4% 5% 15% 21% 38%

ANALYSIS AND COMPUTATION SHEETS



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 14-1537

Job No. EA NB. ICI CMC 121/ES

Dry Sample Weight 106.07

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-5-92		Start			
1034			5		21.5
1035	1	70		65	
1036	2	70		65	
1039	5	70		65	
1049	15	65		60	
1104	30	55.5		53.5	
1134	60	51.5		46.5	
1444	250	41		36	
3-6-92 1034	1440	33	5	28	21.5

Calculations: CF=1.0

$$P_1 = [65/106.07] \times 100 = 61.3$$

$$P_2 = [65/106.07] \times 100 = 61.3$$

$$P_5 = [65/106.07] \times 100 = 61.3$$

$$P_{15} = [60/106.07] \times 100 = 56.6$$

$$P_{30} = [53.5/106.07] \times 100 = 50.4$$

$$P_{60} = [46.5/106.07] \times 100 = 43.8$$

$$P_{250} = [36/106.07] \times 100 = 33.9$$

$$P_{1440} = [28/106.07] \times 100 = 26.4$$

$$D_1 = 0.01332 \sqrt{5.6/1} = 0.0$$

$$D_2 = \sqrt{5.6/2} = 0$$

$$D_5 = \sqrt{5.6/5} = 0$$

$$D_{15} = \sqrt{6.5/15} = 0$$

$$D_{30} = \sqrt{7.5/30} = 0$$

$$D_{60} = \sqrt{8.7/60} = 0$$

$$D_{250} = \sqrt{10.4/250} = 0$$

$$D_{1440} = \sqrt{11.7/1440} = 0$$

Name: _____ Sample and Test Number 1537

Date: _____ Sheet Number _____

**SIEVE ANALYSIS
DATA AND COMPUTATION SHEET**

Weight of Sample 166.07 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4	1.17	1.1	98.7
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	1.45	1.4	97.5
0.046	1.168	14			
0.0328	0.833	20	1.60	0.8	96.7
0.0232	0.589	28			
0.0164	0.417	35 110	0.79	0.7	96.0
0.0116	0.295	48 120	0.95	0.9	95.1
0.0082	0.208	65 60	0.49	0.5	94.6
0.0058	0.147	100	0.47	0.4	94.2
0.0041	0.104	150			
0.0029	0.074	200	1.45	1.4	92.6
0.0018	0.046	300	0.18		
Passed Mesh Sieve					
TOTAL			7.67	99.5% recovery	

REMARKS: _____

Name: _____ Sample Number 1537

Date: 6-92 Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		8A	8B	8C		
Number of Blows	~~X~~	42	23	14		
Wt. Sample + Tare Wet		7.73	7.85	9.67		
Wt. Sample + Tare Dry		6.41	6.42	7.75		
Wt. of Water		1.32	1.43	1.92		
Tare		1.52	1.56	1.58		
Wt. of Dry Soil		4.89	4.86	6.17		
Water Content		27.0	29.4	31.1		

Type of Test			PL	PL	PL	
Container Number			8D			
Number of Blows			~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet			12.09			
Wt. Sample + Tare Dry			10.54			
Wt. of Water			1.55			
Tare			1.52			
Wt. of Dry Soil			9.02			
Water Content			17.2			

FLOW CURVE



RESULTS

Liquid Limit = 29 %

Plastic Limit = 17 %

Plasticity Index = 12 %

Flow Index = — %

Toughness Index = — %

Remarks: _____



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15 Loveton Circle
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Hydrometer Data Sheet

Sample No. 1538

Job No. EA NB ICE SINKER/FS

Dry Sample Weight 62.66

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-5-92		Start			
1021					
1022	1	23.5	5	18.5	21.5
1023	2	22.5		17.5	
1026	5	21.5		16.5	
1030	15	20.5		15.5	
1051	30	19.5		14.5	
1121	60	18		13	
1431	250	16		11	
3-6-92 1021	1440	14.40 14	5	9	21.5

Specific
Gravity

Calculations:

$$\begin{aligned} & [18.5/62.66] \times 100 = 29.5 \\ & [17.5/62.66] \times 100 = 27.9 \\ & [16.5/62.66] \times 100 = 26.3 \\ & [15.5/62.66] \times 100 = 24.7 \\ & [14.5/62.66] \times 100 = 23.1 \\ & [13/62.66] \times 100 = 20.7 \\ & [11/62.66] \times 100 = 17.6 \\ & [9/62.66] \times 100 = 14.4 \end{aligned}$$

$$D_1 = 0.01332 \sqrt{13.3/1} = 0.0486$$

$$\sqrt{13.4/2} = 0.0345$$

$$\sqrt{13.6/5} = 0.0220$$

$$\sqrt{13.8/15} = 0.0128$$

$$\sqrt{13.9/30} = 0.0091$$

$$\sqrt{14.2/60} = 0.0065$$

$$\sqrt{14.5/250} = 0.0032$$

$$\sqrt{14.8/1440} = 0.0014$$



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Name: _____ Sample and Test Number 1538

Date: 3-10-92 Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 62.66 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli- meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		11.09	17.7	82.3
0.263	6.680	3			
0.185	4.699	4	9.62	15.4	66.9
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	6.64	9.6	57.3
0.046	1.168	14			
0.0328	0.833	20	4.91	7.6	49.5
0.0232	0.589	28			
0.0164	0.417	35 40	3.91	6.2	43.3
0.0116	0.295	48 60	2.57	4.1	39.2
0.0082	0.208	65 80	0.82	1.3	37.9
0.0058	0.147	100	0.61	1.0	36.9
0.0041	0.104	150			
0.0029	0.074	200	1.59	2.5	34.4
0.0018	0.046	300 PAN	0.44		
Passed		Mesh Sieve			
TOTAL			41.60	96.27 recovery	

REMARKS: Time: 1015



Re: _____ Sample Number 1538
te: _____ Sheet Number _____

QUID AND PLASTIC LIMIT
TERMINATIONS
TA AND COMPUTATION SHEET

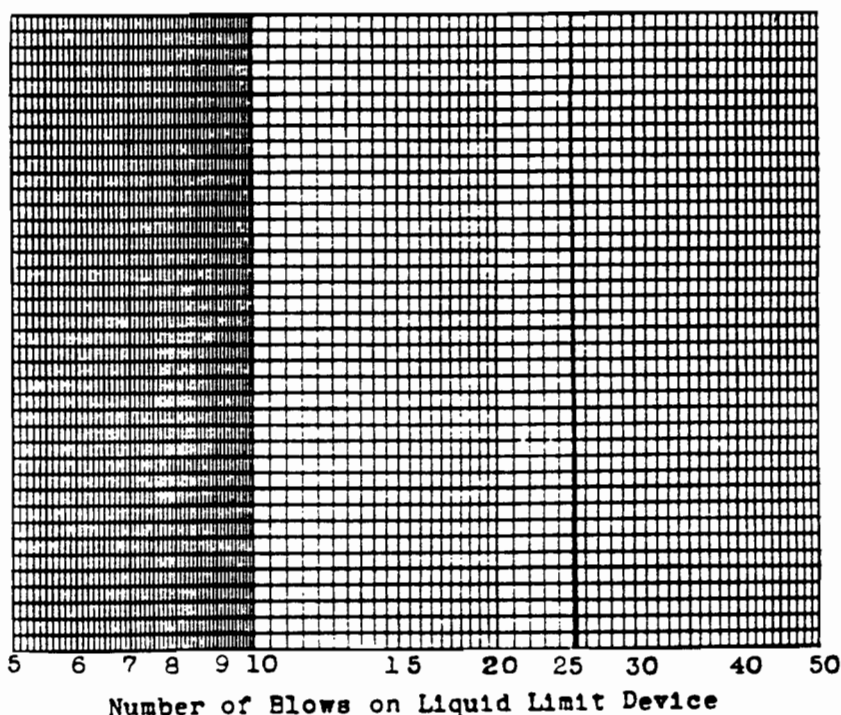
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		13A	13B			
Number of Blows		28	26			
Wt. Sample + Tare Wet		6.62	7.26			
Wt. Sample + Tare Dry		5.25	5.72			
Wt. of Water		1.37	1.54			
Tare		1.50	1.50			
Wt. of Dry Soil		2.75	4.22			
Water Content		36.5	36.5			
		37.0	36.7			

Type of Test			PL	PL	PL	
Container Number			13C			
Number of Blows						
Wt. Sample + Tare Wet			11.43			
Wt. Sample + Tare Dry			9.61			
Wt. of Water			1.82			
Tare			1.54			
Wt. of Dry Soil			8.07			
Water Content			22.6			

FLOW CURVE



RESULTS

Liquid Limit = 37 %

Plastic Limit = 23 %

Plasticity Index = 14 %

Flow Index = _____ %

Toughness Index = _____ %

Remarks: NOT ENOUGH

SAMPLE TO DO 3PT

LIM LIMIT.



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15 Loveton Circle
Sparks, Maryland 21152
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Hydrometer Data Sheet

Sample No. 11539

Job No. EA NR TCI DMC RI/ES

Dry Sample Weight 104.40

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-4-92		Start	7.5		
1026					
1027	1	22.67	7	22.60	21.5
1028	2	22.67		22.60	
1031	5	56.5		53.5	
1041	15	51.5		44.5	
1056	30	42.5		35.5	
1126	60	37		30	
1430	250	26.5		19.5	
3-5-92 1026	1440	20.5	7	13.5	21.5

Calculations:

$$\begin{aligned} P_1 &= [100 - 104.4] \times 100 = 57.5 \\ P_2 &= [60 / 104.40] \times 100 = 57.5 \\ P_5 &= [53.5 / 104.40] \times 100 = 51.2 \\ P_{15} &= [44.5 / 104.4] \times 100 = 42.6 \\ P_{30} &= [35.5 / 104.4] \times 100 = 34.0 \\ P_{60} &= [30 / 104.4] \times 100 = 28.7 \\ P_{250} &= [19.5 / 104.4] \times 100 = 18.7 \\ P_{1440} &= [13.5 / 104.4] \times 100 = 12.9 \end{aligned}$$

$$\begin{aligned} D_1 &= 0.01332 \sqrt{6.5/1} = 0.003 \\ \sqrt{6.5/2} &= 0.02 \\ \sqrt{7.5/5} &= 0.01 \\ \sqrt{9.0/15} &= 0.0 \\ \sqrt{10.5/30} &= 0.0 \\ \sqrt{11.4/60} &= 0.0 \\ \sqrt{13.1/250} &= 0.0 \\ \sqrt{14.1/1440} &= 0.0 \end{aligned}$$

Name: _____ Sample and Test Number 1539

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 104.46 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4			
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	18.37	17.6	82.4
0.046	1.168	14			
0.0328	0.833	20	2.29	2.2	80.2
0.0232	0.589	28			
0.0164	0.417	35.40	2.45	2.3	77.9
0.0116	0.295	48.60	0.38	0.4	77.5
0.0082	0.208	63.80	4.62	4.4	73.1
0.0058	0.147	100	1.82	1.7	71.4
0.0041	0.104	150			
0.0029	0.074	200	4.57	4.4	67.0
0.0018	0.046	300 PAN	0.166		
Passed Mesh Sieve					
TOTAL 35.27			35.16	79.7 % recovered	

REMARKS: TIME 0856

Name: _____ Sample Number 1539
Date: 2-6-92 Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

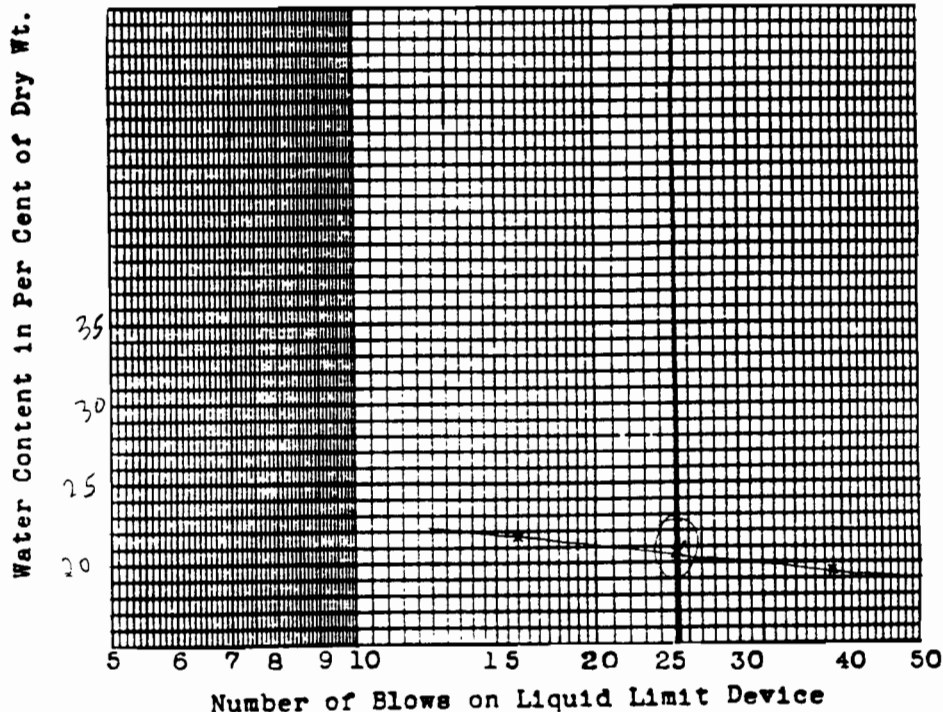
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		7A	7B	7C		
Number of Blows		39	25	10		
Wt. Sample + Tare Wet		11.01	8.16	8.31		
Wt. Sample + Tare Dry		9.46	7.02	7.10		
Wt. of Water		1.55	1.14	1.21		
Tare		1.53	1.53	1.53		
Wt. of Dry Soil		7.93	5.49	5.57		
Water Content		19.5	20.8	21.7		

Type of Test		PL	PL	PL
Container Number		7D		
Number of Blows				
Wt. Sample + Tare Wet		10.49		
Wt. Sample + Tare Dry		9.27		
Wt. of Water		1.22		
Tare		1.52		
Wt. of Dry Soil		7.75		
Water Content		15.7		

FLOW CURVE



RESULTS

Liquid Limit = 21 %

Plastic Limit = 16 %

Plasticity Index = 5 %

Flow Index = - %

Toughness Index = - %

Remarks: _____



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15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 1540

Job No. _____

Dry Sample Weight 100.26

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-5-92		Start			
1014					
1015	1	32	5	27	21.5
1016	2	28.5		23.5	
1019	5	23.5		18.5	
1029	15	20.0		15.0	
1044	30	17.5		12.5	
1114	60	15.5		10.5	
1425	250	12.5	N	7.5	
3-6-92 1014	1440	10.5	5	5.5	21.5

Specific
Gravity

Calculations: $CF=1.0$

$$\begin{aligned} [27/100.26] \times 100 &= 26.9 \\ [23.5/100.26] \times 100 &= 23.4 \\ [18.5/100.26] \times 100 &= 18.4 \\ [15/100.26] \times 100 &= 15.0 \\ [12.5/100.26] \times 100 &= 12.5 \\ [10.5/100.26] \times 100 &= 10.5 \\ [7.5/100.26] \times 100 &= 7.5 \\ [5.5/100.26] \times 100 &= 5.5 \end{aligned}$$

$$\begin{aligned} D_1 &= 0.01332 \sqrt{11.9/1} = 0.0459 \\ \sqrt{12.5/2} &= 0.0333 \\ \sqrt{13.3/5} &= 0.0217 \\ \sqrt{13.8/15} &= 0.0128 \\ \sqrt{14.3/30} &= 0.0092 \\ \sqrt{14.6/60} &= 0.0066 \\ \sqrt{15.1/250} &= 0.0033 \\ \sqrt{15.4/1440} &= 0.0014 \end{aligned}$$



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Name: _____ Sample and Test Number 1540

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 100.26 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		15.23	15.2	84.8
0.263	6.680	3			
0.185	4.699	4	5.79	5.8	79.0
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	6.24	6.2	72.8
0.046	1.168	14			
0.0328	0.833	20	5.97	6.0	66.8
0.0232	0.589	28			
0.0164	0.417	35-40	5.99	6.0	60.8
0.0116	0.295	48-60	7.47	7.5	53.3
0.0082	0.208	65-80	4.19	4.2	49.1
0.0058	0.147	100	3.96	3.9	45.2
0.0041	0.104	150			
0.0029	0.074	200	10.18	10.2	35.0
0.0018	0.046	300 (Ft.)	1.96		
Passed Mesh Sieve					
TOTAL 67.41			66.78	99.48 retained	

REMARKS: Time 11/23



me: _____ Sample Number 1540
te: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
TERMINATIONS
DATA AND COMPUTATION SHEET

NONPLASTIC

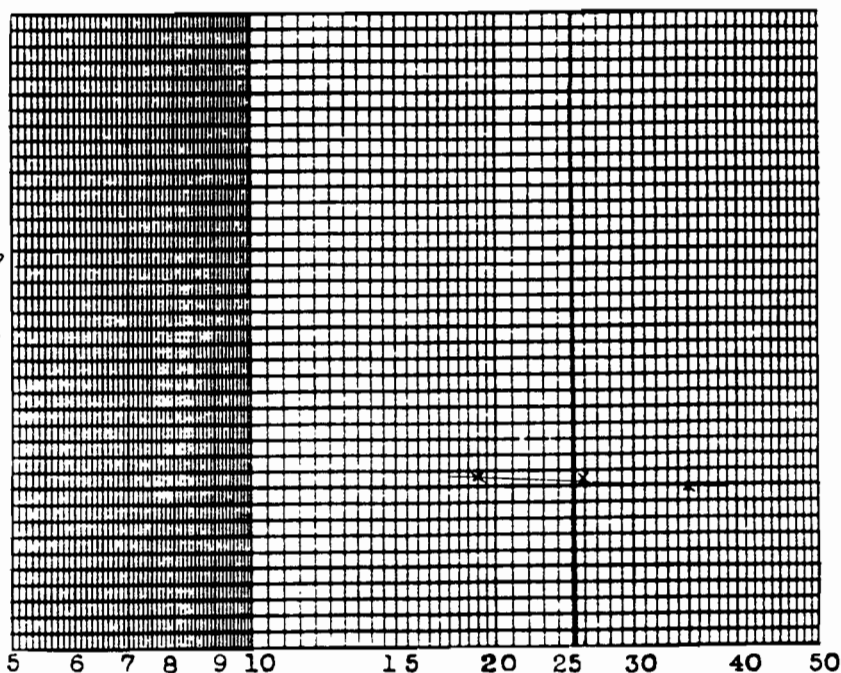
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		18A	18B	18C		
Number of Blows		19	21	35		
Wt. Sample + Tare Wet		17.37	9.25	7.44		
Wt. Sample + Tare Dry		10.52	7.95	6.47		
Wt. of Water		1.85	1.30	0.97		
Tare		1.22	1.54	1.51		
Wt. of Dry Soil		9.0	6.41	4.96		
Water Content		20.6	20.3	19.6		

Type of Test			PL	PL	PL	
Container Number						
Number of Blows						
Wt. Sample + Tare Wet						
Wt. Sample + Tare Dry						
Wt. of Water						
Tare						
Wt. of Dry Soil						
Water Content						

FLOW CURVE



RESULTS

Liquid Limit = 20 %

Plastic Limit = — %

Plasticity Index = — %

Flow Index = — %

Toughness Index = — %

Remarks: Soil had tendency

to slide on Afterburner device

Soil must not be rolled

for plastic test.

non plastic



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15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 1541

Job No. ANB ICI SMC PI/FS

Dry Sample Weight 87.98

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-5-92		Start			
0931			5		21.5
0932	1	56		51	
0933	2	52.5		47.5	
0936	5	49.5		44.5	
0946	15	46.5		41.5	
1001	30	43		38	
1031	60	40		35	
1341	250	33	✓	28	
0931	1440	29	5	24	

3-6-92

Calculations: CF=1.0

$$D_1 = 0.01332 \sqrt{7.91} = 0.037$$

$$18.5/2 = 0.027$$

$$17.0/5 = 0.017$$

$$17.5/15 = 0.011$$

$$10.1/30 = 0.003$$

$$11.0/60 = 0.005$$

$$11.7/250 = 0.002$$

$$12.4/440 = 0.003$$

$$P_1 = [51/87.98] \times 100 = 56.7$$

$$P_2 = [47.5/87.98] \times 100 = 52.8$$

$$P_5 = [44.5/87.98] \times 100 = 49.5$$

$$P_{15} = [41.5/87.98] \times 100 = 46.1$$

$$P_{30} = [38/87.98] \times 100 = 42.2$$

$$P_{60} = [35/87.98] \times 100 = 38.9$$

$$P_{250} = [28/87.98] \times 100 = 31.1$$

$$P_{1440} = [29/87.98] \times 100 = 26.7$$

Name: _____ Sample and Test Number 1541

Date: _____ Sheet Number _____

**SIEVE ANALYSIS
DATA AND COMPUTATION SHEET**

Weight of Sample 89.98 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		2.37	2.6	97.4
0.263	6.680	3			
0.185	4.699	4	3.41	3.8	96.6
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	5.66	6.2	87.4
0.046	1.168	14			
0.0328	0.833	20	5.31	5.9	81.5
0.0232	0.589	28 40	4.31	4.8	76.7
0.0164	0.417	35 60	5.03	5.6	71.1
0.0116	0.295	48 80	2.12	2.4	68.7
0.0082	0.208	65	4.03 SMS		
0.0058	0.147	100	4.03	4.5	64.2
0.0041	0.104	150			
0.0029	0.074	200	5.35	5.9	58.3
0.0018	0.046	300	0.99		
Passed Mesh Sieve					
TOTAL 38.60			38.56	99.7 Percent	

REMARKS: Time: 1145

Name: _____ Sample Number 1541
Date: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		11A	11B	11C		
Number of Blows	~~X~~	30	23	17		
Wt. Sample + Tare Wet		9.50	8.50	8.50		
Wt. Sample + Tare Dry		7.31	6.55	6.53		
Wt. of Water		2.19	1.95	1.97		
Tare		1.54	1.50	1.51		
Wt. of Dry Soil		5.77	5.05	4.56		
Water Content		37.9	38.6	42.2		

26.7

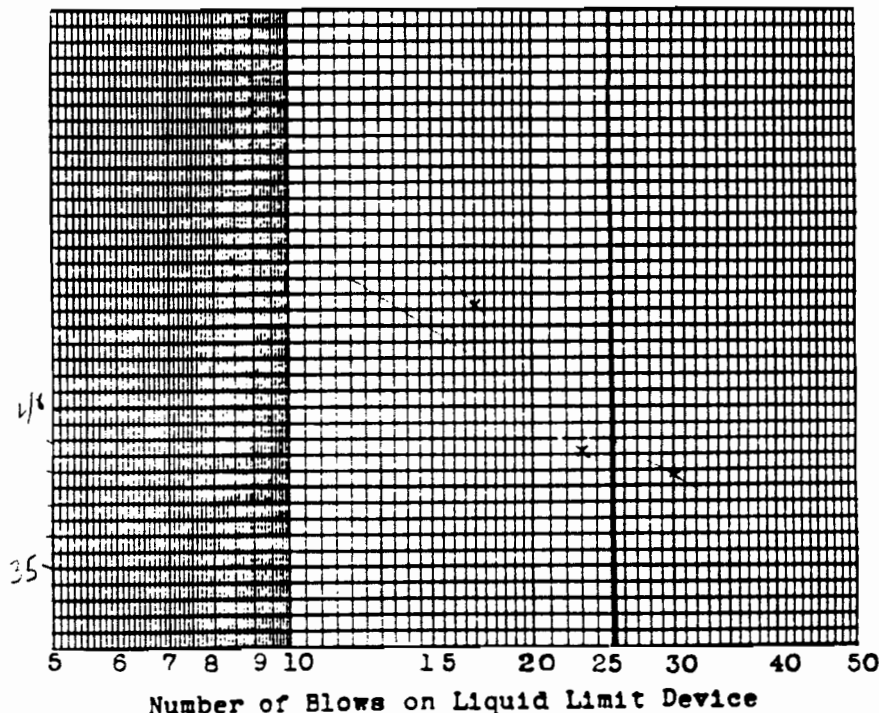
38.2

61

Type of Test			PL	PL	PL	
Container Number			11D			
Number of Blows			~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet			12.53			
Wt. Sample + Tare Dry			10.40			
Wt. of Water			2.13			
Tare			1.54			
Wt. of Dry Soil			8.86			
Water Content			24.0			

FLOW CURVE

Water Content in Per Cent of Dry Wt.



RESULTS

Liquid Limit = 39 %

Plastic Limit = 24 %

Plasticity Index = 15 %

Flow Index = _____ %

Toughness Index = _____ %

Remarks: _____

Name: _____ Sample and Test Number 1542

Date: _____ Sheet Number _____

**SIEVE ANALYSIS
DATA AND COMPUTATION SHEET**

Weight of Sample 131.53 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		1746	13.3	86.7
0.263	6.680	3			
0.185	4.699	4	36.25	27.6	59.1
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	2640	20.1	39.0
0.046	1.168	14			
0.0328	0.833	20	1296	9.9	29.1
0.0232	0.589	28			
0.0164	0.417	3540	9.23	7.0	22.1
0.0116	0.295	4860	0.81	6.2	15.9
0.0082	0.208	6580	5.56	4.2	11.7
0.0058	0.147	100	0.95	0.7	11.0
0.0041	0.104	150			
0.0029	0.074	200	2.22	1.7	9.3
0.0018	0.046	300 PM	0.37		
Passed Mesh Sieve					
TOTAL			112.21	99.79% recovered	

REMARKS: TIME 9:12



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Hydrometer Data Sheet

Sample No. 1 1543

Job No. EA NR SMC RJ/FS

Dry Sample Weight 61.28

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-4-92		Start			
0930			7		21.5
0931	1	33		24	
0932	2	31.5		24.5	
0935	5	29.5		22.5	
0945	15	26.5		19.5	
1000	30	24.5		17.5	
1030	60	22.5		15.5	
1340	250	19.0	✓	12	
0930	1440	15.0	7	8	21.5

3-5-92

Calculations: CF 1.0

$$\begin{aligned}P_1 &= [24.5 / 61.28] \times 100 = 40.0 \\P_2 &= [24.5 / 61.28] \times 100 = 40.0 \\P_5 &= [22.5 / 61.28] \times 100 = 36.7 \\P_{15} &= [19.5 / 61.28] \times 100 = 31.8 \\P_{30} &= [17.5 / 61.28] \times 100 = 28.6 \\P_{60} &= [15.5 / 61.28] \times 100 = 25.3 \\P_{250} &= [12 / 61.28] \times 100 = 19.6 \\P_{1440} &= [8 / 61.28] \times 100 = 13.1\end{aligned}$$

$$\begin{aligned}D_1 &= 0.01332 \quad \sqrt{12.1} = 0.024 \\&\quad \sqrt{12.3/2} = 0.024 \\&\quad \sqrt{12.6/5} = 0.024 \\&\quad \sqrt{13.1/15} = 0.024 \\&\quad \sqrt{13.4/30} = 0.024 \\&\quad \sqrt{13.8/60} = 0.024 \\&\quad \sqrt{14.3/250} = 0.024 \\&\quad \sqrt{15/1440} = 0.024\end{aligned}$$

1543 SEN 3/11/92

Name: _____ Sample and Test Number _____

Date: _____ Sheet Number _____

**SIEVE ANALYSIS
DATA AND COMPUTATION SHEET**

Weight of Sample 61.28 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4	6.99	11.3	88.7
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	6.43	10.5	78.2
0.046	1.168	14			
0.0328	0.833	20	4.01	6.5	71.7
0.0232	0.589	28			
0.0164	0.417	35 40	3.47	5.7	66.0
0.0116	0.295	48 60	3.86	6.3	59.7
0.0082	0.208	65 80	1.55	2.4	57.3
0.0058	0.147	100	1.26	2.1	55.2
0.0041	0.104	150			
0.0029	0.074	200	2.20	5.2	50.0
0.0018	0.046	300 (PP)	0.62		
Passed Mesh Sieve					
TOTAL			31.39	79.2% recovered	

REMARKS: Time 10:34

Name: _____ Sample Number 1543
Date: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

LL = Liquid Limit Test

PL = Plastic Limit Test

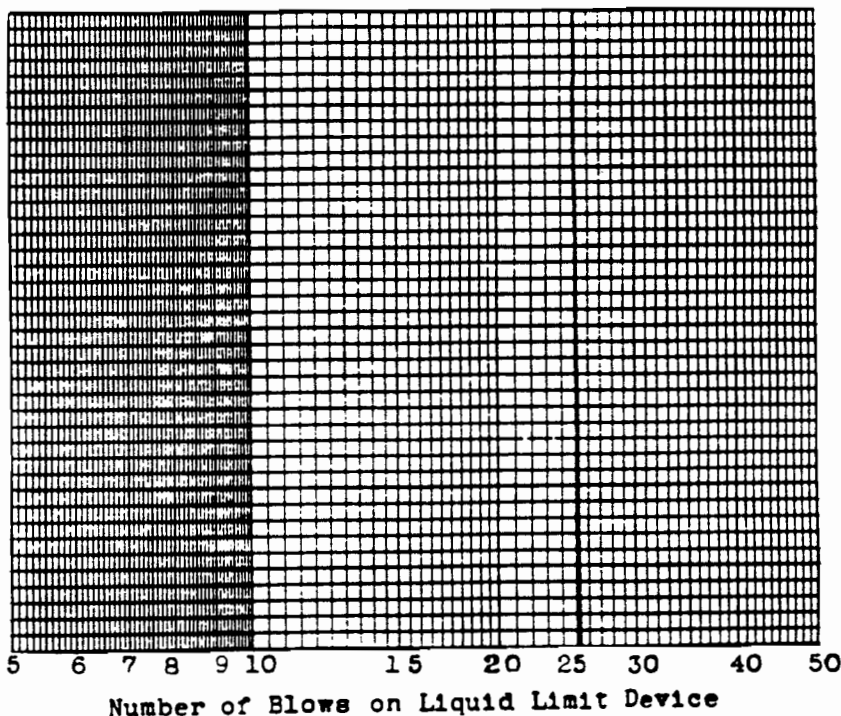
Type of Test		LL	LL	LL	LL	LL
Container Number		10A	10B			
Number of Blows		24	24			
Wt. Sample + Tare Wet		12.19	10.23			
Wt. Sample + Tare Dry		9.59	8.11			
Wt. of Water		2.60	2.12			
Tare		1.52	1.49			
Wt. of Dry Soil		8.07	6.62			
Water Content		32.2	32.0			

X 0.75 = 24 = 21.6

Type of Test			PL	PL	PL	
Container Number			10D			
Number of Blows						
Wt. Sample + Tare Wet			8.85			
Wt. Sample + Tare Dry			7.42			
Wt. of Water			1.43			
Tare			1.51			
Wt. of Dry Soil			5.91			
Water Content			24.2			

FLOW CURVE

Water Content in Per Cent of Dry Wt.



RESULTS

Liquid Limit = 32 %

Plastic Limit = 24 %

Plasticity Index = 8 %

Flow Index = — %

Toughness Index = — %

Remarks: NOT ENOUGH SAMPLE
TO DO A THREE PT TEST -
PROCEDURE 2 WAS USED.



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15 Loveton Circle
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Hydrometer Data Sheet

Sample No. 1544

Job No. EANB ICE SMC RJ-FS

Dry Sample Weight 92.62

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C	Specific Gravity
3-5-92		Start				
0942			5		21.5	
0943	1	± 65		± 60		
0944	2	± 65		± 60		
0947	5	59		54		
0957	15	54.5		49.5		
1012	30	51		46		
1042	60	46.5		41.5		
1352	250	39	↓	34		
3-6-92 0942	1440	32	5	27	21.5	

Calculations: CF=10

$$\begin{aligned} [60/92.62] \times 100 &= 64.8 \\ [66/92.62] \times 100 &= 64.8 \\ [54/92.62] \times 100 &= 58.3 \\ [49.5/92.62] \times 100 &= 53.4 \\ [46/92.62] \times 100 &= 49.7 \\ [41.5/92.62] \times 100 &= 44.8 \\ [34/92.62] \times 100 &= 36.7 \\ [27/92.62] \times 100 &= 29.2 \end{aligned}$$

$$\begin{aligned} D_1 &= 0.01332 \sqrt{6.5/1} = 0.0340 \\ \sqrt{6.5/2} &= 0.0240 \\ \sqrt{7.4/5} &= 0.0162 \\ \sqrt{8.2/15} &= 0.0078 \\ \sqrt{8.8/30} &= 0.0072 \\ \sqrt{9.5/60} &= 0.0053 \\ \sqrt{10.7/250} &= 0.0028 \\ \sqrt{11.9/1440} &= 0.0012 \end{aligned}$$



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Name: _____ Sample and Test Number 1540

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 9262 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli- meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		2.08	2.2	97.8
0.263	6.680	3			
0.185	4.699	4	4.27	4.16	93.2
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	5.25	5.7	87.5
0.046	1.168	14			
0.0328	0.833	20	3.58	3.9	83.6
0.0232	0.589	28			
0.0164	0.417	35 ~~40~~	3.05	3.3	80.3
0.0116	0.295	48 ~~60~~	3.63	3.9	76.4
0.0082	0.208	65 ~~80~~	1.50	1.6	74.8
0.0058	0.147	100	1.18	1.3	73.5
0.0041	0.104	150			
0.0029	0.074	200	3.09	3.3	70.2
0.0018	0.046	300 ~~400~~	0.62		
Passed Mesh Sieve					
TOTAL			28.25	99.2 %	99.2 %

REMARKS: Time 1129



ae: _____ Sample Number 1544
te: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
TERMINATIONS
DATA AND COMPUTATION SHEET

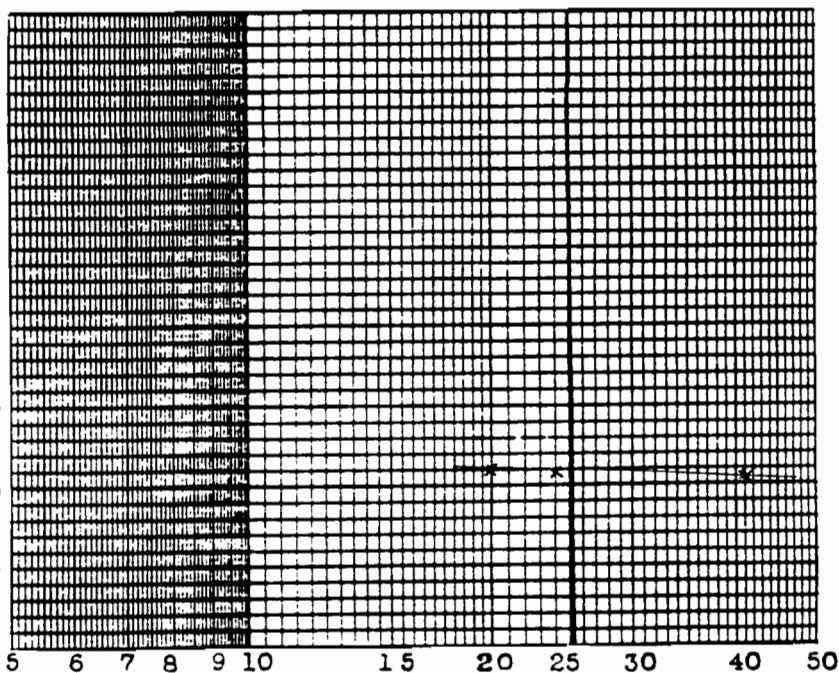
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		2A	2B	2C		
Number of Blows		20	24	41		
Wt. Sample + Tare Wet		7.67	8.26	7.38		
Wt. Sample + Tare Dry		6.36	6.83	6.15		
Wt. of Water		1.31	1.43	1.23		
Tare		1.32	1.30	1.33		
Wt. of Dry Soil		5.04	5.53	4.82		
Water Content		26.0	25.9	25.5		

Type of Test			PL	PL	PL	
Container Number			2D			
Number of Blows						
Wt. Sample + Tare Wet			7.62			
Wt. Sample + Tare Dry			6.68			
Wt. of Water			0.94			
Tare			1.33			
Wt. of Dry Soil			5.35			
Water Content			17.6			

FLOW CURVE



RESULTS

Liquid Limit = 26 %

Plastic Limit = 18 %

Plasticity Index = 8 %

Flow Index = — %

Toughness Index = — %

Remarks: _____

Number of Blows on Liquid Limit Device



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15 Loveton Circle
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Hydrometer Data Sheet

Sample No. 11545
Dry Sample Weight 9581

Job No. 1110101, ICI INC
C 12 FS

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-5-92		Start			
1108 ²⁷			5		21.5
1109	1	58		53	
1110	2	54		49	
1113	5	49.5		44.5	
1123	15	45		40	
1130	30	41		36	
1208	60	37.5		32.5	
1518	250	29.5		25.5	
3-6-92 1108	1440	25	5	20	21.5

Specific
Gravity

Calculations: CF=1.0

$$\begin{aligned}P_1 &= [50/9581] \times 100 = 55.3 \\&= [119/9581] \times 100 = 51.1 \\P_5 &= [44.5/9581] \times 100 = 46.4 \\P_{15} &= [40/9581] \times 100 = 41.7 \\P_{30} &= [36/9581] \times 100 = 37.6 \\P_{60} &= [32.5/9581] \times 100 = 33.9 \\P_{250} &= [25.5/9581] \times 100 = 26.6 \\P_{1440} &= [20/9581] \times 100 = 20.9\end{aligned}$$

$$\begin{aligned}D_1 &= 0.0332 \times 17.691 = 0.00588 \\D_{25} &= 0.0332 \times 16.372 = 0.00543 \\D_{50} &= 0.0332 \times 14.015 = 0.00465 \\D_{15} &= 0.0332 \times 12.715 = 0.00422 \\D_{30} &= 0.0332 \times 10.4/30 = 0.00332 \\D_{60} &= 0.0332 \times 11.0/60 = 0.00617 \\D_{250} &= 0.0332 \times 12.1/250 = 0.00162 \\D_{1440} &= 0.0332 \times 13/1440 = 0.00301\end{aligned}$$

Name: _____ Sample and Test Number 1545

Date: _____ Sheet Number _____

**SIEVE ANALYSIS
DATA AND COMPUTATION SHEET**

Weight of Sample 75.81 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4	3.93	4.1	95.9
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	3.09	3.2	92.7
0.046	1.168	14			
0.0328	0.833	20	1.91	2.0	90.7
0.0232	0.589	28			
0.0164	0.417	35 40	2.72	2.8	87.9
0.0116	0.295	48 60	4.14	4.3	83.6
0.0082	0.208	65 80	2.57	2.7	80.9
0.0058	0.147	100	3.05	3.2	77.7
0.0041	0.104	150			
0.0029	0.074	200	12.43	13.0	64.7
0.0018	0.046	300	2.37	2.5	
Passed Mesh Sieve					
TOTAL 36.56			36.21	79.0 % recovery	

REMARKS: _____



Name: _____ Sample Number 1545

Date: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

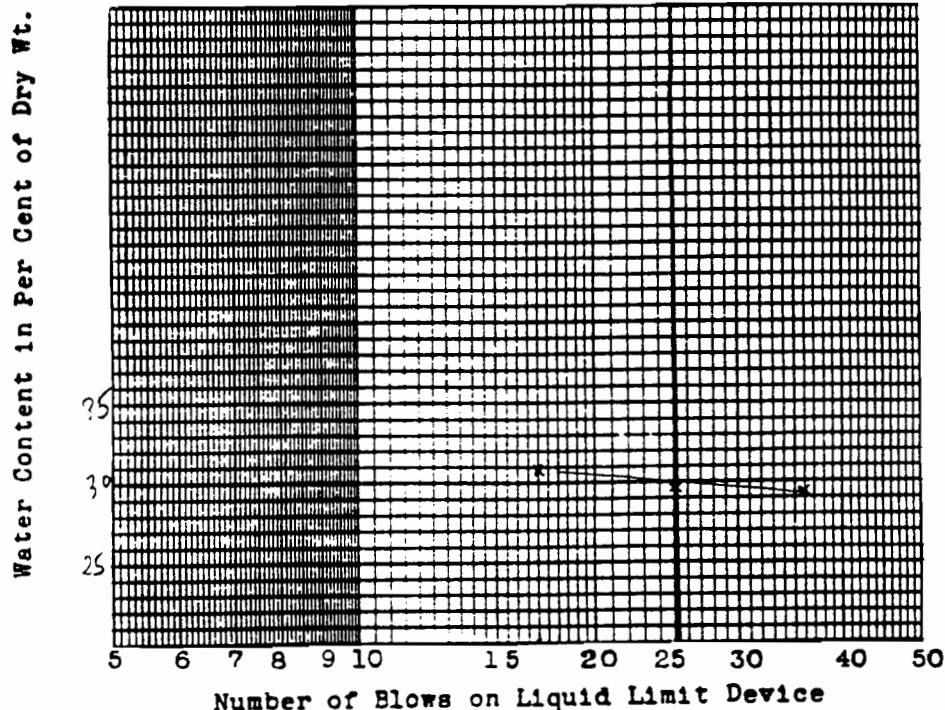
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		16A	16B	16C		
Number of Blows	~~X~~	25	17	36		
Wt. Sample + Tare Wet		5.32	7.84	7.81		
Wt. Sample + Tare Dry		4.46	6.36	6.38		
Wt. of Water		0.86	1.48	1.43		
Tare		1.55	1.56	1.52		
Wt. of Dry Soil		2.91	4.8	4.86		
Water Content		29.6	30.8 27.4	29.4 30.5		

Type of Test		PL	PL	PL	
Container Number		16D			
Number of Blows	~~X~~	~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet		13.80			
Wt. Sample + Tare Dry		11.77			
Wt. of Water		2.03			
Tare		1.52			
Wt. of Dry Soil		10.25			
Water Content		19.8			

FLOW CURVE



RESULTS

Liquid Limit = 30 %

Plastic Limit = 20 %

Plasticity Index = 10 %

Flow Index = — %

Toughness Index = — %

Remarks: _____



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(301) 771-4950

Hydrometer Data Sheet

Sample No. 1546

Job No. 1A NB TCT CMC RTFS

Dry Sample Weight 93.37

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-4-92		Start			
0955			7		21.5
0956	1	47		110	
0957	2	43.5		36.5	
1000	5	38.5		31.5	
1010	15	34		27	
1025	30	32		25	
1055	60	28		21	
1405	250	21		14	
0955	1440	15.5	7	8.5	21.5

Specific
Gravity

Calculations:

$$\begin{aligned} p_1 &= [40 / 93.37] \times 100 = 42.8 \\ p_2 &= [36.5 / 93.37] \times 100 = 39.1 \\ p_5 &= [31.5 / 93.37] \times 100 = 33.7 \\ p_{15} &= [27 / 93.37] \times 100 = 28.9 \\ p_{30} &= [25 / 93.37] \times 100 = 26.8 \\ p_{60} &= [21 / 93.37] \times 100 = 22.5 \\ p_{250} &= [14 / 93.37] \times 100 = 15.0 \\ p_{1440} &= [8.5 / 93.37] \times 100 = 9.1 \end{aligned}$$

$$D_1 = 0.01332 \sqrt{9.7/1} = 0.0415$$

$$\sqrt{10.3/2} = 0.0302$$

$$\sqrt{11.2/5} = 0.0199$$

$$\sqrt{11.9/15} = 0.0177$$

$$\sqrt{12.2/30} = 0.0085$$

$$\sqrt{12.9/60} = 0.0062$$

$$\sqrt{14/250} = 0.0032$$

$$\sqrt{14.6/1440} = 0.0014$$



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Name: _____ Sample and Test Number 1546

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 73.37 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4	10.94	11.7	88.3
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	8.03	8.6	79.7
0.046	1.168	14			
0.0328	0.833	20	5.88	6.3	73.4
0.0232	0.589	28			
0.0164	0.417	35 40	4.82	5.2	68.2
0.0116	0.295	48 60	4.85	5.2	63.0
0.0082	0.208	65 80	2.52	2.7	60.3
0.0058	0.147	100	2.48	2.7	57.6
0.0041	0.104	150			
0.0029	0.074	200	7.23	7.7	49.9
0.0018	0.046	300 PAN	1.24		
Passed		Mesh Sieve			
TOTAL		48.17	47.99	99.6% recovered	

REMARKS: TIME: 1020

me: _____ Sample Number 1546
 te: 3-6-92 Sheet Number _____

**LIQUID AND PLASTIC LIMIT
TERMINATIONS
DATA AND COMPUTATION SHEET**

LL = Liquid Limit Test

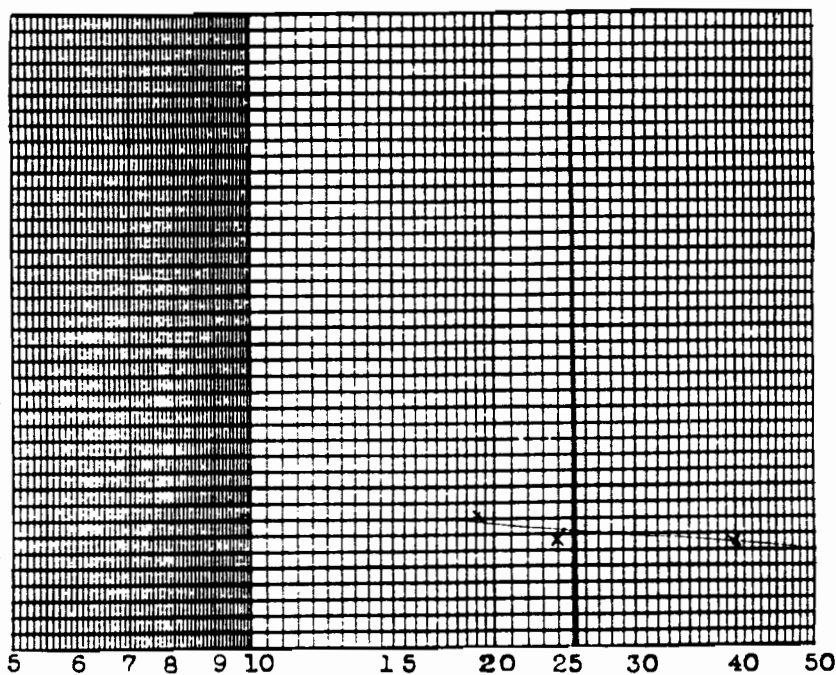
PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		6A	6B	6C		
Number of Blows	~~XXXX~~	24	40	19		
Wt. Sample + Tare Wet		8.69	8.51	7.67		
Wt. Sample + Tare Dry		7.66	7.53	6.72		
Wt. of Water		1.03	0.98	0.95		
Tare		1.50	1.55	1.53		
Wt. of Dry Soil		6.16	5.98	5.19		
Water Content		16.7	16.4	18.3		

16.6

Type of Test			PL	PL	PL	
Container Number			6D			
Number of Blows			~~XXXX~~	~~XXXX~~	~~XXXX~~	
Wt. Sample + Tare Wet			9.10			
Wt. Sample + Tare Dry			8.18			
Wt. of Water			0.92			
Tare			1.53			
Wt. of Dry Soil			6.65			
Water Content			13.8			

FLOW CURVE



RESULTS

Liquid Limit = 17 %

Plastic Limit = 14 %

Plasticity Index = 3 %

Flow Index = — %

Toughness Index = — %

Remarks: _____

Number of Blows on Liquid Limit Device



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 1547

Job No. ICE JACKETS

Dry Sample Weight 112.99

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-4-72		Start			
0942 ³⁰			7		21.5
0943	1	49		42	
0944	2	45.5		38.5	
0947	5	40		33	
0957	15	35		28	
1012	30	32		25	
1042	60	28.5		21.5	
1352	250	21		14	
0942	1440	15	7	8	21.5

Calculations: CF = 1.0

$$\begin{aligned}
 P_1 &= [42 / 112.99] \times 100 = 37.2 \\
 P_2 &= [38.5 / 112.99] \times 100 = 34.1 \\
 P_5 &= [33 / 112.99] \times 100 = 29.2 \\
 P_{15} &= [28 / 112.99] \times 100 = 24.8 \\
 P_{30} &= [25 / 112.99] \times 100 = 22.1 \\
 P_{60} &= [21.5 / 112.99] \times 100 = 19.0 \\
 P_{250} &= [14 / 112.99] \times 100 = 12.4 \\
 P_{1440} &= [8 / 112.99] \times 100 = 7.1
 \end{aligned}$$

$$D_1 = 0.01332 \sqrt{9.41} = 0.0$$

$$\sqrt{10.0/2} = 0.0$$

$$\sqrt{10.9/5} = 0.0$$

$$\sqrt{11.7/15} = 0.0$$

$$\sqrt{12.2/30} = 0.0$$

$$\sqrt{12.8/60} = 0.0$$

$$\sqrt{14/250} = 0.0$$

$$\sqrt{15/1440} = 0.0$$

Name: _____ Sample and Test Number 47

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 112.99 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		11.11	9.8	90.2
0.263	6.680	3			
0.185	4.699	4	6.06 17.17	5.4	84.8
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	9.94 27.11	8.8	76.0
0.046	1.168	14			
0.0328	0.833	20	6.88 33.99	6.1	69.9
0.0232	0.589	28			
0.0164	0.417	35 40	5.70 39.89	5.2	64.7
0.0116	0.295	48 50	6.30 46.09	5.5	59.2
0.0082	0.208	65 80	3.29 49.38	2.9	56.3
0.0058	0.147	100	3.25 52.62	2.9	53.4
0.0041	0.104	150			
0.0029	0.074	200	9.27 61.92	8.2	45.2
0.0018	0.046	300 325	1.20		
Passed Mesh Sieve					
TOTAL			63.12	99.6% recovery	

REMARKS: Sample 47



Name: _____ Sample Number 1547
Date: 3-6-92 Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

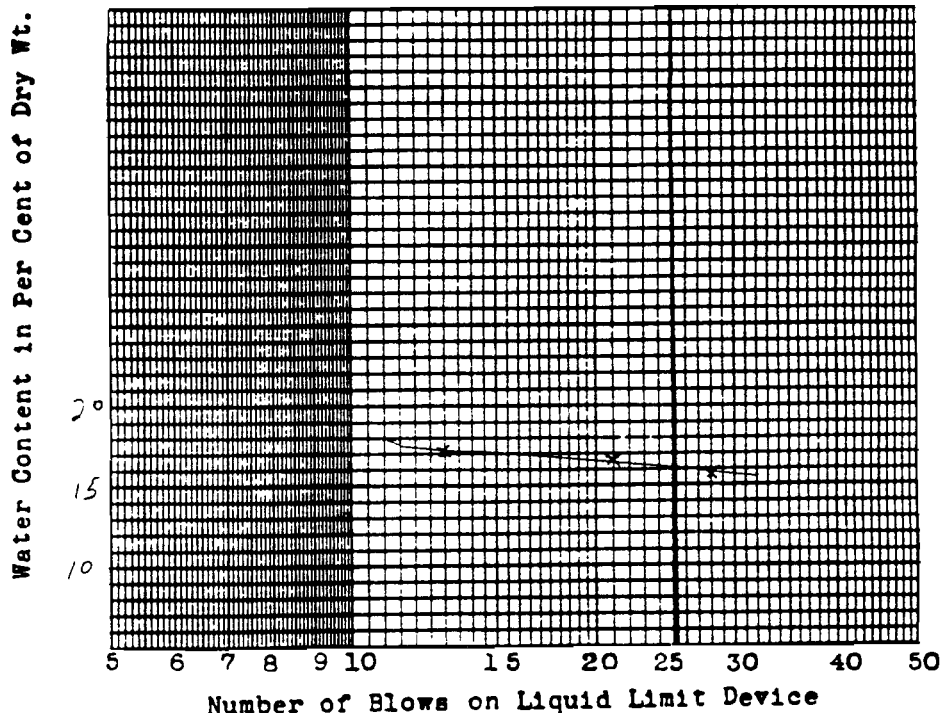
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		5A	5B	5C		
Number of Blows	~~X~~	13	21	28		
Wt. Sample + Tare Wet		10.76	11.85	10.50		
Wt. Sample + Tare Dry		9.41	10.38	9.28		
Wt. of Water		1.35	1.47	1.22		
Tare		1.52	1.50	1.53		
Wt. of Dry Soil		7.89	8.88	7.75		
Water Content		17.1	16.6	15.7		

Type of Test		PL	PL	PL
Container Number		5D		
Number of Blows	~~X~~	~~X~~	~~X~~	~~X~~
Wt. Sample + Tare Wet		16.93		
Wt. Sample + Tare Dry		15.10		
Wt. of Water		1.83		
Tare		1.53		
Wt. of Dry Soil		13.57		
Water Content		13.5		

FLOW CURVE



RESULTS

Liquid Limit = 16 %

Plastic Limit = 13 %

Plasticity Index = 3 %

Flow Index = _____ %

Toughness Index = _____ %

Remarks: _____



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 1548

Job No. EA Newburg ICI
Sinc RI/FS

Dry Sample Weight 71.16

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-6-92		Start			
1214 ⁵⁰			5		22
1215	1	61		56	
1216	2	60		55	
1219	5	58.5		53.5	
1229	15	53.5		48.5	
1244	30	50.5		45.5	
1314	60	47.5		42.5	
1624	250	36.5		31.5	
3-7-92 1214	1440	28.5	5	23.5	22

Specific
Gravity

Calculations:

$$\begin{aligned} [56/71.16] \times 100 &= 78.7 \\ [55/71.16] \times 100 &= 77.3 \\ [53.5/71.16] \times 100 &= 75.2 \\ [48.5/71.16] \times 100 &= 68.2 \\ [45.5/71.16] \times 100 &= 63.9 \\ [42.5/71.16] \times 100 &= 59.7 \\ [31.5/71.16] \times 100 &= 44.3 \\ [23.5/71.16] \times 100 &= 33.0 \end{aligned}$$

$$D_1 = 0.01332 \sqrt{7.11} = 0.0355$$

$$D_2 = \sqrt{7.3/2} = 0.0254$$

$$D_3 = \sqrt{7.5/5} = 0.0163$$

$$D_4 = \sqrt{8.4/15} = 0.0070$$

$$D_5 = \sqrt{8.9/30} = 0.0073$$

$$D_6 = \sqrt{9.5/60} = 0.0052$$

$$D_7 = \sqrt{11.2/250} = 0.0020$$

$$D_8 = \sqrt{12.5/1440} = 0.0012$$



EA ENGINEERING,
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Name: _____ Sample and Test Number 1548

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 71.16 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4			
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	0.98	1.4	98.6
0.046	1.168	14			
0.0328	0.833	20	0.88	1.2	97.4
0.0232	0.589	28			
0.0164	0.417	33 40	0.02	1.2	96.2
0.0116	0.295	48 60	0.73	1.0	95.2
0.0082	0.208	65 80	0.31	0.4	94.8
0.0058	0.147	100	0.27	0.4	94.4
0.0041	0.104	150			
0.0029	0.074	200	0.04	1.2	93.2
0.0018	0.046	300 325	0.12		
Passed		Less Sieve			
TOTAL		5.08	4.95	97.4 % recovery	

REMARKS: _____

e: _____ Sample Number 1548
e: _____ Sheet Number _____

**UID AND PLASTIC LIMIT
ERMINATIONS
A AND COMPUTATION SHEET**

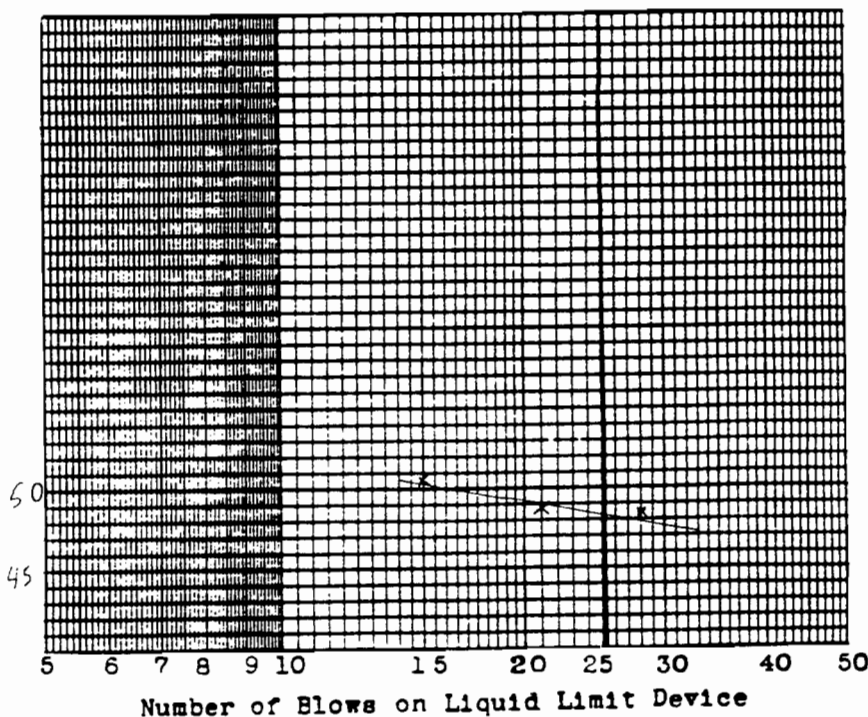
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		14A	14B	14C		
Number of Blows	~~X~~	28	21	15		
Wt. Sample + Tare Wet		6.63	7.19	7.01		
Wt. Sample + Tare Dry		4.97	5.33	5.17		
Wt. of Water		1.66	1.86	1.84		
Wt. of Dry Soil		1.53	1.51	1.51		
Water Content		48.3	48.1	50.3		
		47.7	47.7	47.7		

Type of Test			PL	PL	PL	
Container Number			14D			
Number of Blows			~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet			12.42			
Wt. Sample + Tare Dry			9.65			
Wt. of Water			2.77			
Wt. of Dry Soil			1.58			
Water Content			8.07			
			34.3			

FLOW CURVE



RESULTS

Liquid Limit = 48 %

Plastic Limit = 34 %

Plasticity Index = 14 %

Flow Index = _____ %

Toughness Index = _____ %

Remarks: _____



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4960

Hydrometer Data Sheet

Sample No. 11549

Job No. TANB ICI SMC RTES

Dry Sample Weight 138.51

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-4-92		Start			
1009			7		21.5
1010	1	47		40	
1011	2	45		38	
1014	5	40.5		33.5	
1024	15	35.5		28.5	
1039	30	32.5		25.5	
1109	60	27.5		20.5	
1419	250	22.5		15.5	
2-5 92 1009	1440	1440 17.5	7	12.5	21.5

Calculations: $CF = 1.0$

$$\begin{aligned}
 P_{10} &= [40 / 138.51] \times 100 = 28.9 \\
 P_{20} &= [38 / 138.51] \times 100 = 27.4 \\
 P_{40} &= [33.5 / 138.51] \times 100 = 24.2 \\
 P_{60} &= [28.5 / 138.51] \times 100 = 20.6 \\
 P_{100} &= [25.5 / 138.51] \times 100 = 18.4 \\
 P_{200} &= [20.5 / 138.51] \times 100 = 14.8 \\
 P_{400} &= [15.5 / 138.51] \times 100 = 11.2 \\
 P_{1000} &= [12.5 / 138.51] \times 100 = 9.0
 \end{aligned}$$

$$D = 0.01332 \sqrt{9.7/1} = 0.041$$

$$\sqrt{10.1/2} = 0.03$$

$$\sqrt{10.6/5} = 0.01$$

$$\sqrt{11.6/15} = 0.01$$

$$\sqrt{12.1/30} = 0.00$$

$$\sqrt{13/60} = 0.00$$

$$\sqrt{13.9/250} = 0.00$$

$$\sqrt{14.3/1440} = 0.00$$



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Name: _____ Sample and Test Number 1549

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 138.51 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		26.65	19.2	80.8
0.263	6.680	3			
0.185	4.699	4	18.03	13.0	67.8
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	16.68	12.0	55.8
0.046	1.168	14			
0.0328	0.833	20	12.65	9.1	46.7
0.0232	0.589	28			
0.0164	0.417	35 40	6.07	4.4	42.3
0.0116	0.295	48 60	3.26	2.4	39.9
0.0082	0.208	65 80	1.22	0.9	39.0
0.0058	0.147	100	1.06	0.8	38.2
0.0041	0.104	150			
0.0029	0.074	200	3.38	2.4	35.8
0.0018	0.046	300 PAN	0.99		
Passed Mesh Sieve					
TOTAL 90.36			89.99	99.670 recovery	

REMARKS: Time: 0935

Name: _____ Sample Number 1549
Date: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

LL = Liquid Limit Test

PL = Plastic Limit Test

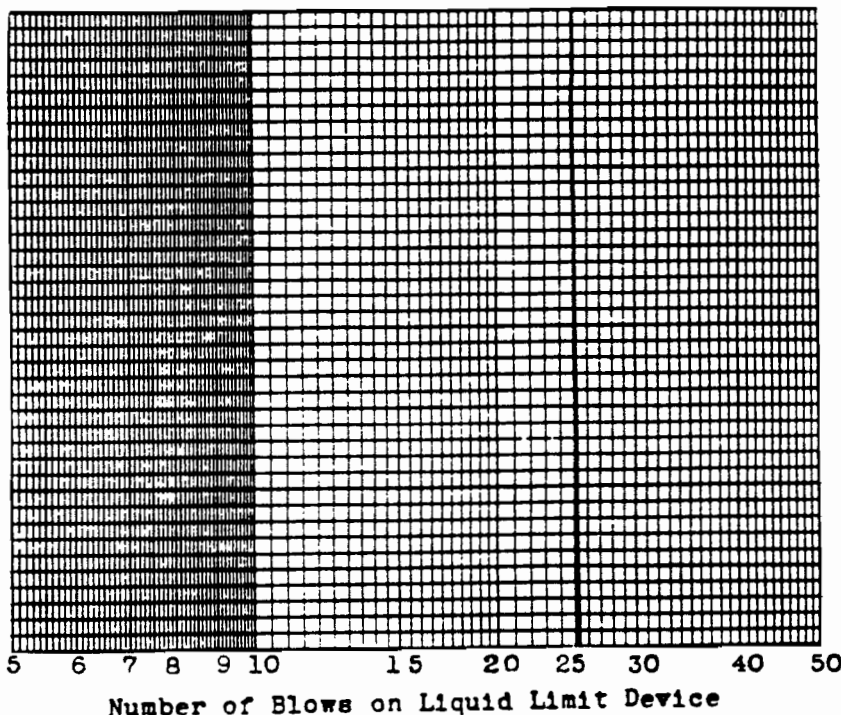
Type of Test		LL	LL	LL	LL	LL
Container Number		3A	3B			
Number of Blows	~~X~~	23	24			
Wt. Sample + Tare Wet		7.15	7.27			
Wt. Sample + Tare Dry		6.07	6.18			
Wt. of Water		1.08	1.09			
Tare		1.32	1.34			
Wt. of Dry Soil		4.75	4.84			
Water Content		22.7	22.5			

$\times K =$ 22.5 22.4

Type of Test		PL	PL	PL	
Container Number		3D			
Number of Blows	~~X~~	~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet		9.17			
Wt. Sample + Tare Dry		8.00			
Wt. of Water		1.11			
Tare		1.32			
Wt. of Dry Soil		6.74			
Water Content		16.5			

FLOW CURVE

Water Content in Per Cent of Dry Wt.



RESULTS

Liquid Limit = 23 %

Plastic Limit = 17 %

Plasticity Index = 6 %

Flow Index = - %

Toughness Index = - %

Remarks: One pt. liquid
limit test done. not
enough sample for 3
pt. Procedure D was used



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 11550

Job No. ICI IMC RI/FS

Dry Sample Weight 27.33

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-6-92		Start			
1148 ²⁰			5		22
1149	1	70		65	
1150	2	70		65	
1153	5	70		65	
1203	15	65		60	
1218	30	59.5		54.5	
1248	60	55		50	
1558	250	46		41	
1148	1440	36.5	5	31.5	22

Specific
Gravity

Calculations: $CF = 1.0$

$$\begin{aligned} [65/87.33] \times 100 &= 74.4 \\ [70/87.33] \times 100 &= 74.4 \\ [65/87.33] \times 100 &= 74.4 \\ [60/87.33] \times 100 &= 68.7 \\ [54.5/87.33] \times 100 &= 62.4 \\ [50/87.33] \times 100 &= 57.3 \\ [41/87.33] \times 100 &= 46.7 \\ [31.5/87.33] \times 100 &= 36.1 \end{aligned}$$

$$\begin{aligned} D_1 &= 6.01332 \sqrt{5.6/1} = 0.0315 \\ D_2 &= \sqrt{5.6/2} = 0.0223 \\ D_5 &= \sqrt{5.6/5} = 0.0141 \\ D_{15} &= \sqrt{6.5/5} = 0.0688 \\ D_{30} &= \sqrt{7.4/30} = 0.0666 \\ D_{60} &= \sqrt{8.1/60} = 0.0049 \\ D_{250} &= \sqrt{9.6/250} = 0.0026 \\ D_{1440} &= \sqrt{11.2/1440} = 0.0012 \end{aligned}$$

Name: _____ Sample and Test Number 1550

Date: _____ Sheet Number _____

**SIEVE ANALYSIS
DATA AND COMPUTATION SHEET**

Weight of Sample 87.33 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4			
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	3.83	4.4	95.6
0.046	1.168	14			
0.0328	0.833	20	1.39	1.6	94.0
0.0232	0.589	28			
0.0164	0.417	35 ⁴⁰	1.22	1.4	92.6
0.0116	0.295	48 ⁶⁰	1.52	1.7	90.9
0.0082	0.208	65 ⁸⁰	0.85	1.0	89.9
0.0058	0.147	100	0.78	0.9	89.0
0.0041	0.104	150			
0.0029	0.074	200	2.52	2.9	86.1
0.0018	0.046	300 ³²⁵	0.17		
Passed Mesh Sieve					
TOTAL			12.28	98.8% recovery	

REMARKS: _____



ae: _____ Sample Number 1550
te: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
TERMINATIONS
DATA AND COMPUTATION SHEET

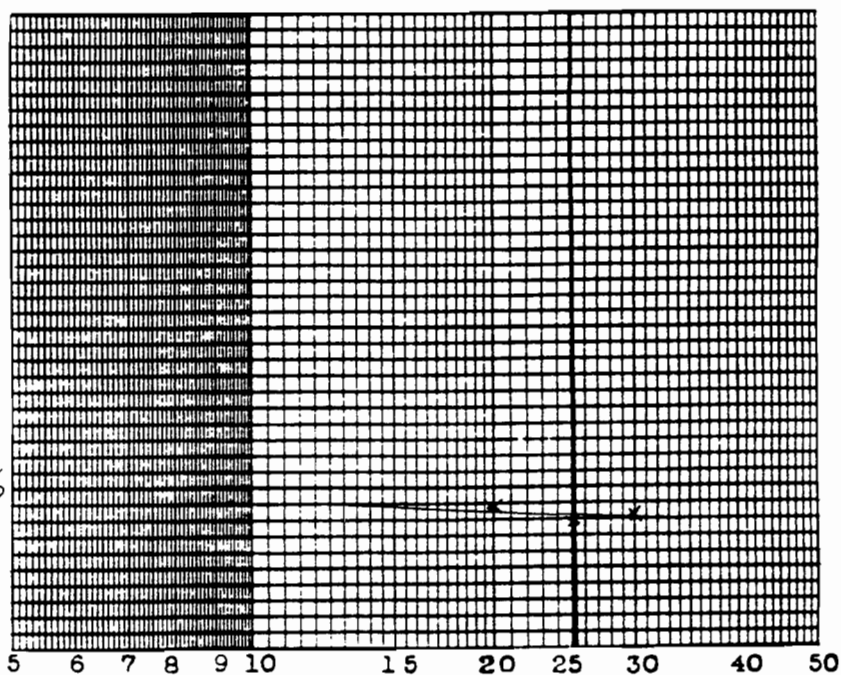
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		12A	12B	12C		
Number of Blows	~~X~~	30	25	20		
Wt. Sample + Tare Wet		8.76	8.48	6.98		
Wt. Sample + Tare Dry		10.96	6.76	5.60		
Wt. of Water		1.80	1.72	1.38		
Tare		1.53	1.54	1.53		
Wt. of Dry Soil		5.43	5.22	4.07		
Water Content		33.1	32.9	33.9		
		34	32.7	33.0		

Type of Test			PL	PL	PL	
Container Number			12D			
Number of Blows			~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet			13.67			
Wt. Sample + Tare Dry			11.81			
Wt. of Water			1.86			
Tare			1.52			
Wt. of Dry Soil			10.29			
Water Content			18.1			

FLOW CURVE



RESULTS

Liquid Limit = 33 %

Plastic Limit = 18 %

Plasticity Index = 15 %

Flow Index = - %

Toughness Index = - %

Remarks: _____

Number of Blows on Liquid Limit Device



EA ENGINEERING,
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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 1551

Job No. EANB JCI SMC DT/FC

Dry Sample Weight 15.1g

REMARKS - Mixture contained foam & air bubbles which restricted the immersion of the

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-4-92		Start			
0917			7		21.5
0918	1	28.5		21.5	
0919	2	28.5		21.5	
0922	5	28		21	
0932	15	24		17	
0947	30	22.5		15.5	
1017	60	20		13	
1327	250	16.5	↓	9.5	
3-5-92 0917	1440	14	7	7	21.5

Speci
Gravi

Calculations: $CF = 1.0$

$D_{15} = 0.01332 \sqrt{12.8/1} = 0.0$

$\sqrt{12.8/2} = 0.0$

$\sqrt{12.8/5} = 0.02$

$\sqrt{13.5/15} = 0.0$

$\sqrt{13.8/30} = 0.0$

$\sqrt{14.2/60} = 0.0$

$\sqrt{14.8/250} = 0.0$

$\sqrt{15.2/1440} = 0.0$

$$P_1 = [21.5/65.6] \times 100 = 32.8$$

$$P_2 = [21.5/65.6] \times 100 = 32.8$$

$$P_5 = [21/65.6] \times 100 = 32.0$$

$$P_{15} = [17/65.6] \times 100 = 25.9$$

$$P_{30} = [15.5/65.6] \times 100 = 23.6$$

$$P_{60} = [13/65.6] \times 100 = 19.8$$

$$P_{250} = [9.5/65.6] \times 100 = 14.5$$

$$P_{1440} = [7/65.6] \times 100 = 10.7$$



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Name: _____ Sample and Test Number 1551

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 65.61 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		6.23	9.5	90.5
0.263	6.680	3			
0.185	4.699	4	6.39	9.7	80.8
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	5.77	8.9	71.9
0.046	1.168	14			
0.0328	0.833	20	4.40	6.7	65.2
0.0232	0.589	28			
0.0164	0.417	35 40	3.91	6.0	59.2
0.0116	0.295	48 60	4.17	6.4	52.8
0.0082	0.208	65 80	1.87	2.8	50.0
0.0058	0.147	100	1.59	2.4	47.6
0.0041	0.104	150			
0.0029	0.074	200	4.31	6.6	41.0
0.0018	0.046	300 PM	1.08		
Passed Mesh Sieve					
TOTAL 37.85			39.72	79.7% retained.	

REMARKS: TIME 0.58

Name: _____ Sample Number 1551
Date: 3-6-92 Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

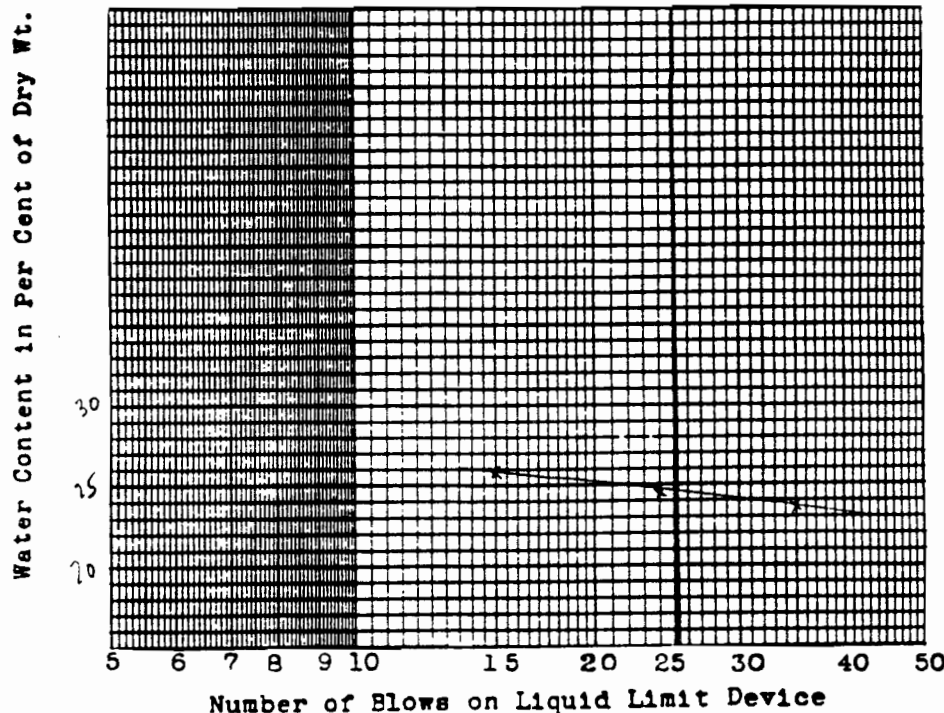
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		4A	4B	4C		
Number of Blows	~~X~~	15	24	25		
Wt. Sample + Tare Wet		9.19	8.38	10.09		
Wt. Sample + Tare Dry		7.58	6.99	8.45		
Wt. of Water		1.61	1.39	1.64		
Tare		1.33	1.33	1.51		
Wt. of Dry Soil		6.25	5.66	6.94		
Water Content		25.8	24.6	23.6		

Type of Test			PL	PL	PL	
Container Number			4D			
Number of Blows			~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet			10.83			
Wt. Sample + Tare Dry			9.28			
Wt. of Water			1.55			
Tare			1.51			
Wt. of Dry Soil			7.77			
Water Content			19.9			

FLOW CURVE



RESULTS

Liquid Limit = 25 %

Plastic Limit = 20 %

Plasticity Index = 5 %

Flow Index = — %

Toughness Index = — %

Remarks: _____



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4960

Hydrometer Data Sheet

Sample No. 1552

Job No. EA NB ICE FSLR

Dry Sample Weight 57.53

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-4-92		Start	7		
0908			7		21.5
0909	1	52.5		45.5	
0910	2	50		43	
0913	5	47		40	
0923	15	42		35	
0938	30	37.5		30.5	
1008	60	34		27	
1318	250	26.5	✓	19.5	
0908	1440	21	7	14	21.5

Specific
Gravity

Calculations:

$$\begin{aligned} & 45.5 / 57.53 \times 100 = 79.1 \\ & [43 / 57.53] \times 100 = 74.7 \\ & [40 / 57.53] \times 100 = 69.5 \\ & [35 / 57.53] \times 100 = 60.8 \\ & [30.5 / 57.53] \times 100 = 53.0 \\ & [27 / 57.53] \times 100 = 46.9 \\ & [19.5 / 57.53] \times 100 = 33.9 \\ & [14 / 57.53] \times 100 = 24.3 \end{aligned}$$

$$D_1 = 0.01332 \sqrt{8.9/1} = 0.0397$$

$$\sqrt{9.2/2} = 0.0286$$

$$\sqrt{9.7/5} = 0.0186$$

$$\sqrt{10.6/15} = 0.0112$$

$$\sqrt{11.3/30} = 0.0082$$

$$\sqrt{11.9/60} = 0.0059$$

$$\sqrt{13.1/250} = 0.0030$$

$$\sqrt{14.0/1440} = 0.0013$$



EA ENGINEERING,
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Name: _____ Sample and Test Number 1552

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 57.53 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4			
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	0.18	0.3	99.7
0.046	1.168	14			
0.0328	0.833	20	0.15	0.3	99.4
0.0232	0.589	28			
0.0164	0.417	35 40	0.12	0.2	99.2
0.0116	0.295	48 60	0.04	0.1	99.1
0.0082	0.208	65 80	0.30	0.5	98.6
0.0058	0.147	100	0.22	0.4	98.2
0.0041	0.104	150			
0.0029	0.074	200	1.90	3.3	94.9
0.0018	0.046	300 PAN	1.06		
Passed Mesh Sieve				= 78.3% recovered	
TOTAL		3.04	2.99		

REMARKS: Test 0835



me: _____ Sample Number 1552
te: 3-6-72 Sheet Number _____

QUID AND PLASTIC LIMIT
TERMINATIONS
TA AND COMPUTATION SHEET

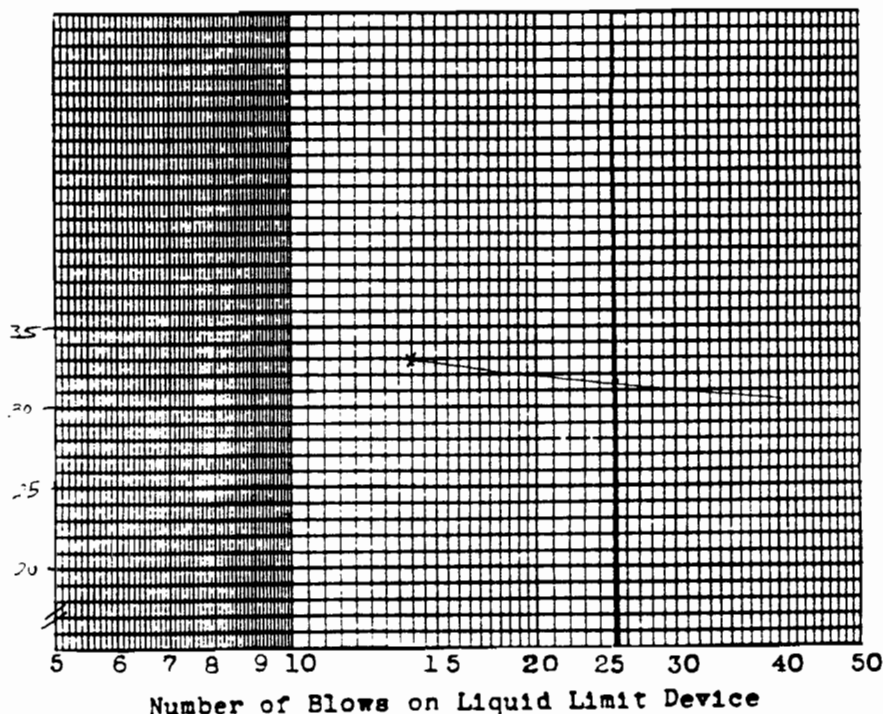
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		9A	9B	9C		
Number of Blows	~~X~~	25	33	14		
Wt. Sample + Tare Wet		9.09	9.22	8.53		
Wt. Sample + Tare Dry		7.28	7.40	6.80		
Wt. of Water		1.81	1.82	1.73		
Tare		1.54	1.53	1.53		
Wt. of Dry Soil		5.74	5.87	5.27		
Water Content		31.5	31.0	32.8		

Type of Test			PL	PL	PL	
Container Number			9D			
Number of Blows		~~X~~	~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet			9.23			
Wt. Sample + Tare Dry			7.84			
Wt. of Water			1.49			
Tare			1.52			
Wt. of Dry Soil			6.32			
Water Content			22.0			

FLOW CURVE



RESULTS

Liquid Limit = 32 %

Plastic Limit = 22 %

Plasticity Index = 10 %

Flow Index = — %

Toughness Index = — %

Remarks: _____



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
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Hydrometer Data Sheet

Sample No. 11553

Job No. EANB ICI EMPIRE

Dry Sample Weight 130.22

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-6-92		Start			
1158 ³⁰			5		22
1159	1	770		765	
1200	2	770		765	
1203	5	770		765	
1213	15	765		760	
1228	30	765		760	
1258	60	765		760	
1608	250	290 50.5	✓	45.5	
3-7-92 1158	1440	1440 38.5	5	33.5	22

Calculations: $C = 1.0$

$$\begin{aligned} & \rightarrow \left[\frac{65}{130.22} \right] \times 100 > 49.9 \\ & 62 \rightarrow \left[\frac{65}{130.22} \right] \times 100 > 49.9 \\ & 55 \rightarrow \left[\frac{65}{130.22} \right] \times 100 > 49.9 \\ & 5 \rightarrow \left[\frac{10}{130.22} \right] \times 100 > 46.1 \\ & 12 \rightarrow \left[\frac{60}{130.22} \right] \times 100 > 46.1 \\ & 100 \rightarrow \left[\frac{60}{130.22} \right] \times 100 \sim 46.1 \\ & 100 \sim \left[\frac{60}{130.22} \right] \times 100 = 349 \\ & 100 \sim \left[\frac{45.5}{130.22} \right] \times 100 = 25.7 \\ & 100 \sim \left[\frac{33.5}{130.22} \right] \times 100 = 25.7 \end{aligned}$$

$$\begin{aligned} D_1 &= 0.01332 \sqrt{5.6/1} = 0.031 \\ D_2 &= \sqrt{5.6/2} = 0.022 \\ D_5 &= \sqrt{5.6/5} = 0.014 \\ D_{15} &= \sqrt{5.6/15} = 0.009 \\ D_{30} &= \sqrt{5.6/30} = 0.007 \\ D_{60} &= \sqrt{5.6/60} = 0.005 \\ D_{100} &= \sqrt{5.6/100} = 0.004 \\ D_{250} &= \sqrt{5.6/250} = 0.002 \\ D_{1440} &= \sqrt{5.6/1440} = 0.001 \end{aligned}$$



EA ENGINEERING,
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Name: 09 Sample and Test Number 1553

Date: _____ Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 130.22 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli- meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423				
0.263	6.680	3			
0.185	4.699	4			
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	0.40	0.3	99.7
0.046	1.168	14			
0.0328	0.833	20	0.24	0.2	99.5
0.0232	0.589	28			
0.0164	0.417	35 40	0.18	0.1	99.4
0.0116	0.295	48 60	0.21	0.2	99.2
0.0082	0.208	65 80	0.16	0.1	99.1
0.0058	0.147	100	0.26	0.2	98.9
0.0041	0.104	150			
0.0029	0.074	200	3.85	0.3	98.6
0.0018	0.046	300	1.45	0.1	
Passed Mesh Sieve					
TOTAL 6.82			6.75	98.7% recovery	

REMARKS: Time 0930



Name: _____ Sample Number 1553

Date: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

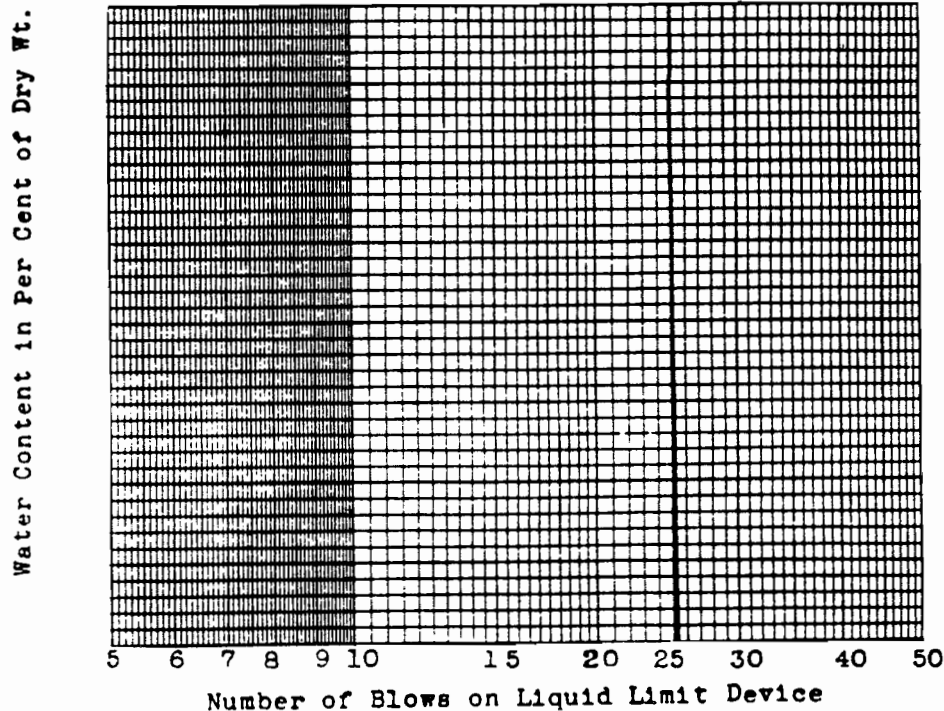
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		1A	1B	1C		
Number of Blows	~~X~~	15	23	41		
Wt. Sample + Tare Wet		7.72	10.90	9.13		
Wt. Sample + Tare Dry		6.88	9.64	8.11		
Wt. of Water		0.84	1.26	1.02		
Tare		1.33	1.31	1.32		
Wt. of Dry Soil		5.55	8.33	6.79		
Water Content		15.1	15.1	15.0		

Type of Test			PL	PL	PL	
Container Number			1D			
Number of Blows			~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet			9.27			
Wt. Sample + Tare Dry			8.41			
Wt. of Water			0.86			
Tare			1.32			
Wt. of Dry Soil			7.09			
Water Content			12.1			

FLOW CURVE



RESULTS

Liquid Limit = 15 %

Plastic Limit = 12 %

Plasticity Index = 3 %

Flow Index = — %

Toughness Index = — %

Remarks: Non-plastic -

1.0% water content

classification



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 1554

Job No. EANB IGTOMIC BIF

Dry Sample Weight 78.15

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3.5-72		Start			
1054			5		21.5
1055	1	41.5		36.5	
1056	2	38.5		33.5	
1059	5	36.5		31.5	
1109	15	33.5		28.5	
1124	30	31.5		26.5	
1154	60	29.5		24.5	
1504	250	24	✓	19	
1054	1440	1440 19	5	14	21.5

Specific
Gravity

Calculations: CF=1.0

$$\begin{aligned} (36.5 / 78.15) \times 100 &= 46.7 \\ [33.5 / 78.15] \times 100 &= 42.9 \\ [31.5 / 78.15] \times 100 &= 40.3 \\ [28.5 / 78.15] \times 100 &= 36.5 \\ [26.5 / 78.15] \times 100 &= 33.9 \\ [24.5 / 78.15] \times 100 &= 31.3 \\ [19.0 / 78.15] \times 100 &= 24.3 \\ [14.0 / 78.15] \times 100 &= 17.9 \end{aligned}$$

$$D_1 = 0.01332 \sqrt{10.3/1} = 0.0427$$

$$D_2 = \sqrt{110.8/2} = 0.0310$$

$$D_5 = \sqrt{11.2/5} = 0.0200$$

$$D_{15} = \sqrt{11.6/15} = 0.0117$$

$$D_{30} = \sqrt{12.7/30} = 0.0084$$

$$D_{60} = \sqrt{14.5/60} = 0.0060$$

$$D_{250} = \sqrt{15.7/250} = 0.0031$$

$$D_{1000} = \sqrt{17.9/1000} = 0.0013$$



EA ENGINEERING,
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Name: _____ Sample and Test Number 1554

Date: 3-6-92 Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 78.15 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
0.371	9.423		7.76	7.9	90.1
0.263	6.680	3			
0.185	4.699	4	11.90	15.2	74.9
0.131	3.327	6			
0.093	2.362	8			
0.065	1.651	10	7.85	10.0	64.9
0.046	1.168	14			
0.0328	0.833	20	4.19	5.4	59.5
0.0232	0.589	28			
0.0164	0.417	35 40	2.80	3.6	55.9
0.0116	0.295	48 60	2.14	2.7	53.2
0.0082	0.208	65 80	0.92	1.2	52.0
0.0058	0.147	100	0.82	1.0	51.0
0.0041	0.104	150			
0.0029	0.074	200	2.83	3.6	47.4
0.0018	0.046	300 PAN	1.35		
Passed		Mesh Sieve			
TOTAL 42.94			42.56	99.170 recovery	

REMARKS: 0949



Case: _____ Sample Number 1554
Date: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
TERMINATIONS
DATA AND COMPUTATION SHEET

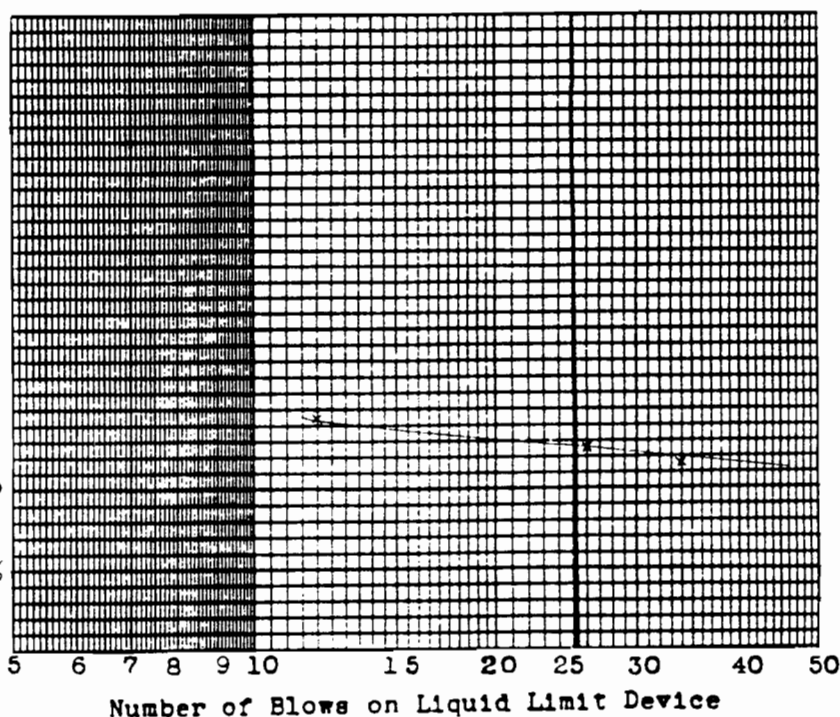
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		15A	15B	15C		
Number of Blows		34	26	12		
Wt. Sample + Tare Wet		60.42	7.61	8.06		
Wt. Sample + Tare Dry		4.99	5.79	6.06		
Wt. of Water		1.43	1.82	2.00		
Tare		1.55	1.52	1.56		
Wt. of Dry Soil		3.44	4.27	4.50		
Water Content		41.6	42.6	44.4		
		43.2	42.8	40.1		

Type of Test			PL	PL	PL	
Container Number			15D			
Number of Blows						
Wt. Sample + Tare Wet			12.94			
Wt. Sample + Tare Dry			10.02			
Wt. of Water			2.92			
Tare			1.53			
Wt. of Dry Soil			8.49			
Water Content			34.4			

FLOW CURVE



RESULTS

Liquid Limit = 43 %

Plastic Limit = 34 %

Plasticity Index = 9 %

Flow Index = — %

Toughness Index = — %

Remarks: _____



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Hunt Valley/Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(301) 771-4950

Hydrometer Data Sheet

Sample No. 1555

Job No. EA NB ICI SMC RI/PS

Dry Sample Weight 106.61

From

Actual Time Day/Hr/Min.	Elapsed Time (Min.)	Hydrometer Reading	Composite Correction	Actual Reading	Temp °C
3-5-92		Start			
0958			5		21.5
0959	1	2 63		2 58	
1000	2	2 60		55	
1001	5	5 58		53	
1011	15	15 55.5		50.5	
1028	30	30 51		46	
1058	60	60 47.5		42.5	
1408	250	250 31		34	
3-6-92 0958	1440	1440 31	5	26	21.5

Calculations:

$$P_1 = [58/106.61] \times 100 = 54.4$$

$$P_2 = [55/106.61] \times 100 = 51.6$$

$$P_5 = [53/106.61] \times 100 = 49.7$$

$$P_{15} = [50.5/106.61] \times 100 = 47.4$$

$$P_{30} = [46/106.61] \times 100 = 43.1$$

$$P_{60} = [42.5/106.61] \times 100 = 39.9$$

$$P_{250} = [34/106.61] \times 100 = 31.9$$

$$P_{1440} = [26/106.61] \times 100 = 24.4$$

$$D_1 = 0.01332 \sqrt{6.8/1} = 0.00033$$

$$\sqrt{7.3/2} = 0.00033$$

$$\sqrt{7.6/5} = 0.00033$$

$$\sqrt{8.0/15} = 0.00033$$

$$\sqrt{8.8/30} = 0.00033$$

$$\sqrt{9.3/60} = 0.00033$$

$$\sqrt{10.7/250} = 0.00033$$

$$\sqrt{12.0/1440} = 0.00033$$



EA ENGINEERING,
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TECHNOLOGY, INC.

Name: _____ Sample and Test Number 1555

Date: 2-10-82 Sheet Number _____

SIEVE ANALYSIS
DATA AND COMPUTATION SHEET

Weight of Sample 106.61 gm.

Sieve Openings		Sieve Mesh	Weight Retained in Grams	Percent Retained	Cumulative Percent Finer
Inches	Milli-meters				
2.00					
1.50					
1.050	26.67				
0.742	18.85				
0.525	13.33				
C.371	9.423		14.30	13.4	86.6
0.263	6.680	3			
0.185	4.699	4	4.93	4.6	82
C.131	3.327	6			
C.093	2.362	8			
0.065	1.651	10	3.30	3.1	78.9
0.046	1.168	14			
0.0328	0.833	20	2.51	2.4	76.5
0.0232	0.589	28			
C.0164	0.417	35-40	3.15	3.0	73.5
C.0116	0.295	48-60	4.84	4.5	69.0
0.0082	0.208	65-80	2.42	2.3	66.7
0.0058	0.147	100	2.15	2.0	64.7
0.0041	0.104	150			
0.0029	0.074	200	6.01	5.6	59.1
0.0018	0.046	360 (PM)	1.06		
Passed Mesh Sieve					
TOTAL 44.71			44.67	99.72 percent	

REMARKS: Thru 100

Name: _____ Sample Number 1555

Date: _____ Sheet Number _____

LIQUID AND PLASTIC LIMIT
DETERMINATIONS
DATA AND COMPUTATION SHEET

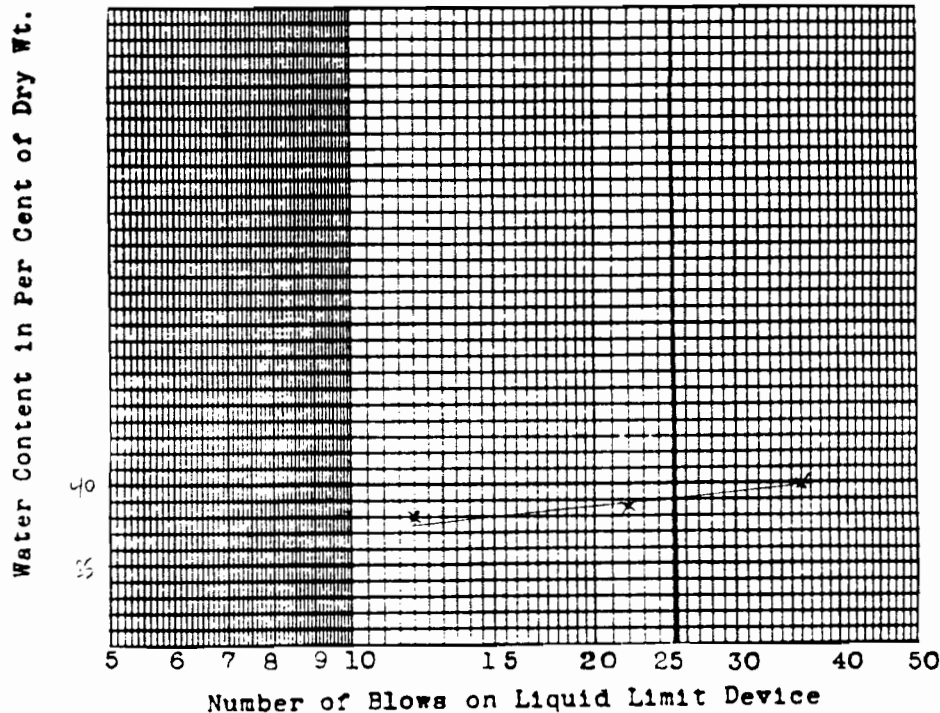
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		17A	17B	17C		
Number of Blows	~~X~~	12	20	36		
Wt. Sample + Tare Wet		9.20	9.51	7.84		
Wt. Sample + Tare Dry		6.94	7.26	6.10		
Wt. of Water		2.26	2.25	1.74		
Tare		1.51	1.51	1.53		
Wt. of Dry Soil		5.43	5.75	4.57		
Water Content		41.6	39.1	38.1		
		33	38.5	3		

Type of Test			PL	PL	PL	
Container Number			17D			
Number of Blows			~~X~~	~~X~~	~~X~~	
Wt. Sample + Tare Wet			8.63			
Wt. Sample + Tare Dry			7.02			
Wt. of Water			1.61			
Tare			1.53			
Wt. of Dry Soil			5.49			
Water Content			29.3			

FLOW CURVE



RESULTS

Liquid Limit = 39 %

Plastic Limit = 29 %

Plasticity Index = 10 %

Flow Index = %

Toughness Index = %

Remarks: _____



EA Laboratories
15 Loveton Circle
Sparks, MD 21152
(301) 771-4950

EA 11/16/2017
Phone: 914 565 8100
Project No.: JCI
Sinc R1/P5

Sample Storage Location: 16
Batch ID: 0312

Page	of	Date	Time	Water	Soil	Sample Identification (ID and Matrix) 19 Characters	No. of Containers
10-16-91	0822	X	SMC-51802-1021A				1
10-16-91	1220	X	SMC-51804-1021A				1
10-16-91	1450	X	SMC-51807-1021A				1
10-17	0850	X	SMC-51809-1021A				1
10-17	1330	X	SMC-51811-1021A				1
10-17	1450	X	SMC-51812-1021A				1
10-17	1600	X	SMC-51813-1021A				1
10-17	1630	X	SMC-51814-1021A				1
10-18	0915	X	SMC-51815-1021A				1
10-18	1040	X	SMC-51816-1021A				1
10-21	1040	X	SMC-51817-1021A				1
10-21	1145	X	SMC-51818-1021A				1
10-21	1645	X	SMC-51819-1021A				1
10-28	1205	X	SMC-51820-1021A				1
10-22	1400	X	SMC-51821-1021A				1
10-22	1650	X	SMC-51822-1021A				1
10-23	1010	X	SMC-51823-1021A				1
10-23	1140	X	SMC-51824-1021A				1
10-25	1215	X	SMC-51825-1021A				1

Sampled by: (Signature) Date/Time 10-23-17 1700
Received by: (Signature) Date/Time

Relinquished by: (Signature) Date/Time
Received by: (Signature) Date/Time

Cooler Temp.: 2.0 pH: ☒ Yes ☒ No Comments: Soil stored in walk-in
*NOTE: Please indicate method number for analyses requested. This will help clarify any questions with laboratory technicians.

EA Labs Accession Number	Remarks
1537	* Grain Size per
1538	ASTM D422-G3
1539	method
1540	
1541	if 20% of sample
1542	passes No 200
1543	Screen Size than
1544	Analysis for
1545	Hydrometer And
1546	Atterberg Limits
1547	
1548	
1549	2/28/12 Samples
1550	off hold per Joanne
1551	R 2/28/12
1552	
1553	
1554	
1555	

Received by: (Signature) Date/Time 12-4-91 1700
Holding Times for VOAs

Sample Shipped by: (Circle)
Fed. Ex. Puro. UPS
Other:

Air Bill Number:
Shaded Area for Lab Use Only

Reports/Deliverables Only
Norma Turnground
SA Standard Report

EA Laboratories
15 Loveton Circle
Sparks, MD 21152
(301) 771-4950

1

APPENDIX B

Appendix B

Boring Logs

LOG OF BORING MW5-SBB1

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted mobile B-61 with 4.25-in. hollow-stem auger

Sampling Method: 2-in. split-spoon driven 24 in. by 140-lb hammer falling 30 in.

Surface Conditions: Gravel

Start Date: 22 April 1992

Completion Date: 22 April 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		2.0	0	13	0		FILL	Dark brown fine to coarse sand and silt, traces of fine to coarse gravel, moist.
				22		0.2		
				14				
				8				
S-2		2.0	2	7	2			Dark brown silt, wet. area of pinkish, viscous liquid.
				7		150		
				7				
				5				
S-3		2.0	4	3	4			Dark brown silt, soft, wet.
				3		50		
				3				
				2				
					6			Ended boring at 6 ft.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB01

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted mobile B-61 with 4.25-in. hollow-stem auger

Sampling Method: 2-in. split-spoon driven 24 in. by a 140-lb hammer falling 30 in.

Surface Conditions: 2-3 in. asphalt, slight slope to the north

Start Date: 19 November 1992

Completion Date: 19 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.7	0	15	0		FILL	Brown, fine sand, some fine gravel dry.
				20		7		
				13				
				19				
S-2		0.7	0	15	2			Dark brown to blackish-brown, fine sand, some fine to coarse gravel, some silt, trace slag, wet.
				10		85		
				11				
				7				
S-3		1.7	4.5	1	4			Blackish-brown, fine sand and silt, trace of fine gravel, wet.
				2		1000		
				3				
				3				
S-4		1.3	4.5	2	6			Blackish-brown fine sand and silt, wet.
				2		260		
				3				
				100/3				
S-5		2.0	9	2	8			Blackish-brown, wet, fine sand, some silt, some fine to coarse gravel.
				5		5		
				11				
				108				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		1.0	9	1	10	6.5		Blackish-brown, fine sand, some silt.
				11	10.5			
				12	11			
				100/1	11.5			
					12			
					12.5			
					13			
					13.5			
					14			
					14.5			
					15			
					15.5			
					16		Auger refusal at 13 ft, ended boring.	
					16.5			
					17			
					17.5			
					18			
					18.5			
					19			
					19.5			
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					39.5			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW5-SB02

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted mobile B-61 with 4.25-in. hollow-stem auger

Sampling Method: 2-in. split-spoon driven 24 in. by a 140-lb hammer falling 30 in.

Surface Conditions: 3-in. asphalt, slight slope to the north

Start Date: 19 November 1992

Completion Date: 19 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		0.8	0	20	0	0	FILL	Brown, dry, fine to medium to coarse sand and fine gravel, trace of silt.
				70				
				69				
				67				
S-2		0.0	0	61	2			No recovery
				27				
				11				
				10				
S-3		1.1	4.5	12	4	1		Medium brown, silt, some fine sand, little fine gravel, trace ash, cinders, and brick.
				14				
				51/2				Auger refusal at 5 ft, 2 in., ended boring.
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB02B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted mobile B-61 with 4.25-in. hollow-stem auger

Sampling Method: 2-in. split-spoon driven 24 in. by a 140-lb hammer falling 30 in.

Surface Conditions: 3-in. asphalt, slight slope to the north

Start Date: 19 November 1992

Completion Date: 19 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	2	28	0			
				27	2			Grayish-brown, moist silt, some fine sand.
				17				Reddish-brown fine sand and fill, dry. Fill consisting of ash, cinders, brick, glass, metal, and rusted metal.
				14	4			Collected 2-4 ft soil sample for further analysis. Ended boring at 4.0 ft.
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB03

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted mobile B-61 with 4.25-in. hollow-stem auger

Sampling Method: 2-in. split-spoon driven 24 in. by a 140-lb hammer falling 30 in.

Surface Conditions: 2-in. asphalt, level with 4 in. of gravel beneath

Start Date: 19 November 1992

Completion Date: 19 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.2	0	8	0		FILL	Blackish-brown, moist, silty sand, little fine gravel.
				9		0.6		
				4				
				1				Reddish-brown, dry, fine sand and fill to tan, moist, fine sand and some silt, cinders, coal, rusted metal, and metal.
S-2		0.7	9	6	2			Blackish-brown, moist, silt, some fine gravel, little fine sand.
				5		0.2		
				4				
				5				
S-3		1.0	4.5	4	4			Dark brown to blackish-brown, moist, fine sand, little silt, some fine to coarse gravel, little fill consisting of cinders and coal.
				5		0		
				8				
				7				Blackish-brown, wet, silt and fine gravel, little fine sand.
S-4		0.7	6.5	12	6			Blackish-brown, wet silt and fine sand to coarse gravel, little fine sand.
				100/2		260		
								Spoon refusal at 6 ft, 7 in., ended boring.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB04

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted mobile B-61 with 4.25-in. hollow-stem auger

Sampling Method: 2-in. split-spoon driven 24 in. by a 140-lb hammer falling 30 in.

Surface Conditions: Level, grassy

Start Date: 22 November 1992

Completion Date: 22 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.7	0	2	0	0.2	FILL	Topsoil.
				6				Grayish-brown, moist silt and fine sand, little fine gravel with medium brown silty clay lenses.
				13				
				18				
S-2		0.8	0	13	2	0		Brown, moist silt and fine sand, little fine gravel, trace of tile and brick fragments.
				23				
				19				
				20				
S-3		1.8	4	5	4	750		Grayish-brown, moist/wet silt and fine sand, little fine gravel.
				9				
				6			ML	Grayish-brown silt and fine sand, little fine gravel with medium brown silty clay lenses.
				15				
S-4		0.3	4	45	6	150		Grayish-light brown, moist/wet silt and fine sand, little fine gravel.
				100/2				Fractured limestone; refusal augered to 7.5 ft.
S-5		0.8	7.5	2	8	180		Silty gravel, wet.
				100/4				Medium brown, wet silt and fine sand, trace of fine gravel.
								Auger refusal at 8.5 ft, ended boring.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB05

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		1.4	10	1	10			Grayish-brown, wet fine sand, some fine gravel, trace of coarse gravel, streaks of blackish stained throughout.
				1		1.2		
				1				
				2				
S-7		2.0	10	2	12			
				3		0.8		Gray-brown fine sand with some gravel.
				6				
				2				
S-8		2.0	10	1	14			Grayish-brown, clayey silt, streaks of blackish staining throughout.
				2		0.5		
				4				
				13				
S-9		0.3	10	100/3.5	16			Spoon refusal at 16 ft 3 in., ended boring.
					18			
					20			
					22			
					24			

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF BORING MW5-SB05

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted mobile B-61 with 4.25-in. hollow-stem auger

Sampling Method: 2-in. split-spoon driven 24 in. by a 140-lb hammer falling 30 in.

Surface Conditions: Level, grassy

Start Date: 22 November 1992

Completion Date: 22 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.7	0	7	0	0.2	FILL	Topsoil.
					20			Grayish-brown, moist silty fine sand and fine gravel, reddish-brown silty fine sand and trace of coal and tile.
					25			Tannish-pale-yellow, moist, brick, and tile.
					55			
S-2		0.7	2.0	10	2	0.2		
					21			
					21			
					36			
S-3		1.7	4.0	2	4	130		Black, wet, fine sand and silt, some fine sand, trace of fine gravel.
					4			Medium brown, wet, silt, some fine sand, trace of gravel.
					11			Black, wet fine sand and silt, some fine to coarse gravel, soil stained black.
					17			
S-4		0.8	4.0	18	6	50		
					24			
					10			
					7			
S-5		0.3	4.0	1	8	54		Black fine sand and silt.
					1			
					1			
					1			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB06

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted mobile B-61 with 4.25-in. hollow-stem auger

Sampling Method: 2 ft x 2-in. and 3 in. split-spoons driven by a 140-lb hammer falling 30 in.

Surface Conditions: Relatively level, grassy, wet (snowed/rained previously) ground surface

Start Date: 20 November 1992

Completion Date: 20 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.0	0	11	0	0	FILL	Topsoil.
				15				Silty sand and fine-coarse gravel, trace brick and coal, dry.
				13				
				10				
S-2		0.2	0	7	2	0		Silty sand, wood, moist.
				3				
				9				
				5				
S-3		2.0	4	2	4	0		Dark brown to blackish-brown, moist, fine sand and silt, trace coal and wood.
				2				
				2				
				3				
S-4		2.0	4	4	6	0		Dark brown fine sand and silt, coal and wood.
				5				
				5				
				4				
S-5		1.7	4	1	8	0.2		Grayish-brown, wet/moist, fine sand and silt, trace organic matter (peat).
				2				
				3				
				3				

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB06

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		1.2	10	5	10	0.1		Grayish-brown, wet, fine sand and silt, lower 3-in. gravelly.
				18				
				23				
				27				
S-7		1.4	10	15	12	0.2		Grayish-brown, wet, fine sand, little silt, some fine-coarse gravel.
				16				
				12				
				54				
S-8		0.3	14	100/3	14	0.2		Grayish-brown, wet, fine sand and fine-coarse gravel, little silt.
S-9		0.8	14	100/3	16	0		Grayish-brown, wet, silty gravel.
								Refusal at 16 ft 3 in., ended soil boring.
					18			
					20			
					22			
					24			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW5-SB08

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile drill rig B-61, 4.25-in. hollow-stem augers

Sampling Method: 2 ft x 2 in. and 3 in. split-spoons, 140-lb hammer falling 30 in.

Surface Conditions: Gravel and grass covered ground surface

Start Date: 21 November 1992

Completion Date: 22 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	0	3	0	0	FILL	Grayish brown to brown, moist, fine sand, little silt, little coal, slag, refractory tile, brick, glass, wood, trace coarse gravel.
				4				
				9				
				3				
S-2		1.7	0	3	2	0		Grayish brown to brown, moist, fine sand, little silt, little fine slag, refractory tile, brick, glass, wood.
				11		0		
				7				Gray fine sand.
				4				
S-3		1.5	4	3	4			Grayish brown to blackish brown, wet fine sand, little organic silt, little slag, wood, organic matter (peat), wood, glass, refractory tile.
				2				
				6				
				2				
S-4		1.6	4	2	6	0		Brown to blackish brown, wet fine-medium sand and organic matter (peat), trace fill of slag.
				10				
				21				Black, wet, fine to coarse sand, little silt, trace organic matter.
				18				
S-5		2.0	4	3	8	0.3		Blackish brown, wet, fine sand, little silt, and fine gravel, trace slag.
				6				
				14			SM	Brown, wet, fine sand and silt, pieces of limestone.
				60/5				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB08

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 In.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		1.7	10	22	10	1.3		Greenish/blueish brown, wet fine sand and silt, blackish streaks.
				35	-			
				38	-			Lower few inches same color, wet, fine silty sand and coarse gravel (possible limestone).
		1.3	10	33	12	0.6		Grayish brown, wet, blackish streaks, fine sand and silt, little fine to coarse gravel.
S-7				6	-			
				5	-			
				34	-			
				100/3	-			
				14	-			Spoon refusal at 13 ft 9 in., ended boring.
					-			
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S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW5-SB09

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile drill rig B-61, 4.25-in. hollow-stem augers

Sampling Method: 2 ft x 2 in. and 3 in. split-spoon, 140-lb hammer falling 30 in.

Surface Conditions: Relatively level, asphalt pavement

Start Date: 21 November 1992

Completion Date: 21 November 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.6	0	23	0	0	FILL	Brown, moist gravelly silt.
				19				Reddish-brown, dry, fill of broken brick and slag.
				9				
				6				Blackish brown, moist fine sand, little silt, little coal, slag, cinder, ash, and brick.
S-1		1.1	0	8	2	0		
				10				
				10				Medium brown, clayey silt, little fine gravel and coal.
				7				
S-3		1.0	4.5	4	4	11		Black, wet, silty sand, fill of coal, slag, cinder ash, glass, fibrous layered brown material (cardboard?), rubber, organic matter (leaves, twigs).
				2				
				3				
				5				
S-4		1.1	4.5	5	6	40		Black silty sand, coal, slag, cinder ash.
				10				
				16				
				23				
S-5		0.3	4.5	9	8	8		Medium brown, clayey silt.
				8				
				2				ML
				3				Black, gray-brown silt, some fine sand, gravel and trace clay, wet.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB09

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		1.8	10	2	10	110		Blackish gray-brown, wet, silt, some fine sand, seams of black fine sand and silt, some fine gravel, trace slag.
				1	11			
				100/5	11.5			Refusal at 11 ft 5 in.
					12			
					14			
					16			
					18			
					20			
					22			
					24			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW5-SB10

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Hollow-stem auger

Sampling Method: Split-spoon

Surface Conditions: Grass

Start Date: 3 June 1993

Completion Date: 3 June 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.0	0	7	0		FILL	Brick and fill material
				24				0-6 - Brown sand, fine to medium, dry.
				13		0		6-12 - Refractory brick.
				9				
S-1		0.7	0	4	2			Silt, brown, moist, some brick fill material.
				9		0		
				5				
				4				
S-2		1.0	4	2	4			Silt, brown, moist.
				2		0		
				3			SM	Sand, coarse, brown.
				1				
S-3		0.8	4	4	6			Sandy clay, some gravel, wet.
				8				
				7			CL	Gray, sandy clay, wet.
				12		0		
S-4		0.7	8	3	8		SM	Dark gray and black, medium, some gravel and silt, loose wet.
				4		0		
				5				
				7				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB10

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-5		0.3	8	4	10		SM	Sandy gravel, some silt, wet.
				7		0		
				6				
				9				
S-6		0.8	10	14	12			Sandy gravel, some silt, wet.
				15		0		
				16				
				18				
S-7		0.5	10	6	14		GM	Coarse gravel, stones to 0.5 in., medium to coarse sand, wet.
				26		0		
				23				
				25				
					16			End of boring at 16 ft.
					18			
					20			
					22			
					24			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW5-SB11

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Hollow-stem auger

Sampling Method: Split-spoon

Surface Conditions: Grass

Start Date: 3 June 1993

Completion Date: 3 June 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		0.5	0	8	0		ML	Topsoil to 3 in., silty sand.
				15		0		
				8				Brown silt, some fine sand.
				6				Dry to moist.
S-2		1.0	0	3	2			Brown, silt, moist, trace fine to medium sand.
				5		0		Trace gravel, moist.
				6				
				6				
S-3		0.3	4	5	4		SM	Sand, brown fine to coarse
				5		0		Trace angular gravel, trace silt, moist.
				3				
				3				
S-4		0.8	4	5	6		CL/ML	Clay and silt, olive brown, wet.
				7		3		
				13				
				11				
S-5		0.5	8	9	8			Clay and silt.
				7		0		
				7				
				7				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB11

[illegible]

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW5-SB12

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Hollow-stem auger

Sampling Method: 24-in. split-spoon

Surface Conditions: Grass

Start Date: 2 June 1993

Completion Date: 2 June 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	0	6	0		FILL	Topsoil, roots to 2 in., sand medium to fine, fill.
				6		0		Material, stones to 0.25 in., dry, loose, trace silt.
				6				
				4				
S-2		1.0	0	4	2			Coarse sand.
				8		0		Brown silty sand, trace clay, small orange fragments.
				8				
				10				
S-3		0.8	4	8	4		SM	Sandy silt, brown, trace gravel, wet, some clay.
				3		1.8		
				1				
				4				
S-4		0.3	4	125/6	6		CL	Clay, gray-brown, saturated, some silt.
						7		Refusal at 6 ft 6 in.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB12A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted drill rig using 4.25-in. hollow-stem augers

Sampling Method: 2-in. split-spoon driven 24 in. with 140-lb hammer falling 30 in.

Surface Conditions: Low-lying wet area

Start Date: 2 June 1993

Completion Date: 2 June 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.7			0		0 FILL	Built roadway fill - no sample.
S-2		0.3	2	5	2		0 ML	Brown silt, trace clay and sand, dry to moist.
S-3		1.0	4	5	4		0	Brown silt, trace clay and sand, dry to moist.
S-4		1.3	4	11	6		6	Gray silt, trace gravel, saturated.
S-5		1.0	8	1	8		0	Gray silt, trace gravel, saturated.
				10	10			Ended boring at 10.0 ft.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB13

EA Engineering, Science, and Tecnology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. split-spoon driven by 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 2 June 1993

Completion Date: 2 June 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		0.8	0	5	0		FILL	Topsoil. Roots.
				10		0		Brown coarse sand, some angular gravel, some silt, dry.
				10				
				4				
S-2		0.5	2	3	2	0		Brown coarse sand, some silt, dry.
				3				
				4				
				7				
S-3		0.5	4	10	4	100		Brown fine sand and angular gravel, some black staining, wet.
				12				
				15				
				17				
				6				Auger refusal at 6 ft, ended boring.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB13A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Tri-pod

Sampling Method: 2-in. split-spoon driven 24 in. with 140-lb hammer falling approximately 15 in.

Surface Conditions: Low-lying wet area

Start Date: 3 June 1993

Completion Date: 3 June 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.7	0	3	0	0	Topsoil	Topsoil, roots.
				6			CL	
				6				Clay, reddish brown, moist, dense.
S-2		0.5	0	13	2	0		
				9				Clay, reddish brown, moist, dense.
				7				Collected laboratory sample from 2-4 ft.
				7				
S-3		0.0	0	16	4	0		
				18				
				28				
				45/2				No recovery.
								Refusal at 5 ft 2 in.
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB14

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Tri-pod

Sampling Method: 2-in. split-spoon driven 24 in. with 16-lb hammer

Surface Conditions: Low-lying wet area

Start Date: 3 June 1993

Completion Date: 3 June 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		1.3	0		0	0	PEAT	Dark brown peat.
							ML	Brown sandy silt with root, trace gravel and broken angular rock.
							CL	Reddish brown clay with little silt, dense, wet at surface.
S-2		1.5	0		2	0		
								Red-brown clay, stiff, dense.
					4			Ended boring at 4 ft.
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB15

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-mounted drill rig using 4.25-in. ID hollow-stem augers

Sampling Method: 2-in./3-in. split-spoon sampler driven 24 in. with a 140-lb hammer falling 30 in.

Surface Conditions: Grass and gravel area

Start Date: 3 August 1993

Completion Date: 3 August 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		0.8	NA	6	0		FILL	Dark brown to gray coarse to fine sand, little to and gravel, cobbles, some rust staining noted, some silt - fill, moist.
				16		0		
				10				
				12				
S-2		0.0	NA	5	2			No recovery.
				5				
				3				
				3				
S-3		1.0	4	1	4			Water at approximately 4 ft. Coarse gravel and dark brown silt, some sand, organics, wood, roots, saturated.
				1				
				2		2		
				3				
S-4		1.0	4	3	6			Gray/dark brown silt, some organics, roots.
				2				
				5		20		
				3				
S-5		1.2	6	5	8			Dark brown gray silt, pieces of bricks, saturated.
				6				
				100/3		4		Refusal at 9 ft 8 in.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB16

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: 4.25 in. ID hollow-stem augers - Mobile 59

Sampling Method: 2 in./3 in. split-spoon sampler

Surface Conditions: Grass and gravel area

Start Date: 3 August 1993

Completion Date: 3 August 1993

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6-In.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		2.0	0	6	0		FILL	0-6 in. loam, 6-24 in. black and brown coarse sand, gravel and cobbles, moist.
				8				
				8		0		
				11				
S-2		0.0	2	11	2			No recovery.
				13				
				1/12				
					4			
S-3		1.7	4	3			0	Brown to dark brown silt, some cobble, crushed cobble, moist.
				3				
				9				
				7				
S-4		1.7	4	6	6			Crushed cobble, some silt, wet to saturated.
				3		0.5		
					8			
S-5		0.6	8					Black to gray silt, some cobble.
						0.8		
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW5-SB16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		0.8	8	17	10			
				100/3				Refusal at 10 ft 9 in. ended boring.
					12			
					14			
					16			
					18			
					20			
					22			
					24			

S = Split-Spoon

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LOG OF BORING MW-01

EA Engineering, Science, and Technology

MW-01 located approximately 200 ft south of gate at southeast corner of landfill

Surface Elevation: 703.0 ft above mean sea level

Reference Elevation: 706.40 ft above mean sea level

Reference Description: Bench mark; metal plate located 100 ft northeast of landfill

Start Date: 29 October 1991/16 March 1992

Completion Date: 1 November 1991/19 March 1992

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. ID hollow-stem augers for soil boring; 4-in. spin casing for coring

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in. for soil boring; NQ core barrel for rock coring

Surface Conditions: Wooded area

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		1.5	0	3	0	0	ML	Sandy Gravelly Silt
				4				
				4				
				6				
S-2		0.4	2	6	2	0		Brown silt with some sand and gravel, occasional rust colored inclusions, dry.
				52				
				50/1				Spoon and auger refusal at 3.1 ft BGS.
					4			
S-3		1.3	4	9		0		Dark brown silt with little sand and gravel.
				9				
				13			CL	Clay
				22				Reddish brown clay with trace gravel, moist, stiff.
S-4		2.0	6	6	6	0		Reddish brown clay with trace gravel, stiff, moist.
				10				
				14				
				25				
S-5		0.2	8	25	8	0		Gravelly Clay
				18				Reddish brown clay as above. Cobble in bottom of spoon, wet.
				11				
				11				
					10			

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LOG OF BORING MW-01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description		
S-6		1.0	10	4	10	0	CL	Gravelly Clay	Reddish brown clay with occasional inclusions of dark gray sand and little angular limestone gravel, moist, firm, semi-plastic.	
				7						
				9						
				11						
S-7		2.0	12	8	12	0		Sandy Clay	Maroon fine sandy clay, plastic, moist to wet, soft.	
				8						
				10						
				12						
S-8		1.2	14	4	14	0	CL	Clay	Reddish brown clay with occasional rust colored sand stringers.	
				12						
				19						
				36						
S-9		1.2	16	14	16	0	SM	Silty, Gravelly Sand	Grey silty sand with some angular limestone gravel, wet zones. Light brown medium to coarse sand with some silt, angular gravel, limestone and quartzite rock fragments, wet zones.	
				10						
				12						
				9						
S-10		1.3	18	8	18	0			Light brown medium to coarse sand with some silt, angular gravel, limestone and quartzite rock fragments. Saturated beginning at 19 ft BGS.	
				16						
				9						
				8						
S-11		1.0	20	6	20	0			Light brown sand with some silt and angular gravel, wet.	
				52						
				50/0		0				Spoon and auger refusal at 21 ft BGS. Used chisel to break through boulder.
				22		0				Grayish brown sand with some silt, some angular gravel, stiff, hard.
S-12		1.2	22	14		0				
				23						
				22						
				28						
S-13		1.3	24	26	24	0			Brown silty sand with some angular gravel.	
				36						

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LOG OF BORING MW-01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-14		1.3	26	39	26	0	SM	Brown silty sand with some angular gravel.
				63				
				25			ML/SM	Brown fine sand and silt interbedded with zones of fractured limestone, cobbles, moist to wet.
				25				
S-15		1.2	28	49		0		
				50				
				23	28			Brown fine sand and silt interbedded with zones of fractured limestone, cobbles, moist to wet.
				20				
S-16		1.0	30	18		0		
				10				
				6			SM	Brown fine to coarse sand with some silt and fine to coarse angular limestone gravel and angular limestone cobbles, moist to dry, wet beginning at 31 ft BGS.
				16				
S-17		0.7	32	18	32	0		
				18				
				12			GM	Bluish gray angular fine to coarse limestone gravel with some brown fine to coarse sand and silt, wet.
				23				
S-18		0.4	34	50/5	34	0	GP	Bluish gray limestone cobble.
							Fractured Limestone	Fractured limestone, dry.
					36		Competent Limestone Bedrock	Auger refusal and limestone bedrock at 35 ft BGS, ended soil boring.
					38			
					40			

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LOG OF CORE MW-01

Sample Type & No.	Sample Interval	Recovery (ft.)	Casing Depth	Rqd %	Depth (ft.)	Fract	Rock Class	Rock Description
					26			
					28			
					30			
					32			
					34			Set spin casing at top of rock 34.0 ft BGS. Start rock core 16 March 1992.
R-1		2.5		20%	34	*	LS	Broken dark gray limestone with chert layers, very fractured.
						X		Advanced 4-in. spin casing to 36.5 ft BGS.
						*		
					36			3-in. void at 36.5 ft.
R-2		4.29		78%				Medium to dark gray, fine-grained, massive limestone, dense. Contains white pellets, occasional secondary pyrite deposits. Fractures mostly horizontal (parallel to bedding).
					38			
								2-in. clay fill fracture, several small voids (<3 in.) 39-41 ft.
					40			

S = Split-Spoon

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LOG OF CORE MW-01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract	Rock Class	Rock Description
R-2 (Cont.)		4.29		78%	40			
R-3		4.88		52%	42	+		
					44	X		
					46	—		
R-4		10.00		64%	48	—		
					50	—		
					52	—		
					54	—		
							LS	0.5-in. clay-filled fracture. Light to dark gray limestone, faintly laminated, fine-grained, with occasional areas of shell fragments and secondary pyrite deposits. Several small zones of black shale and mudstone.

S = Split-Spoon
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LOG OF CORE MW-01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract	Rock Class	Rock Description
R-4 (Cont.)		10.00		64%				
R-5		9.83		85%	56	==		Reamed hole to 56.0 ft BGS, set 3-in. spin casing in bentonite.
					58	==	LS	Light to medium gray limestone, laminated, some white shell fragments, occasional secondary pyrite deposits. Areas of irregular shaped inclusions of black shale and sandstone.
					60	==		
					62	==		
					64	==		
					66	==		
R-6		9.92		87%	68	==		
					70	==		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract	Rock Class	Rock Description
R-6 (Cont.)		9.92		87%	70			
					72			
					74			
					76			
R-7		9.92		73%	78			
					80		LS	Medium to dark gray limestone, coarse-grained, laminated, some quartz grains and shell fragments.
					82			0.75 in. gray silty clay layer at 82 ft 8 in.
					84		SS	Light gray, coarse-grained, calcareous sandstone.

S = Split-Spoon

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BGS = Below Ground Surface

LOG OF CORE MW-01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract	Rock Class	Rock Description
R-7 (Cont.)		9.92		73%				
R-8		4.42		62%	86			
								4-in. void at 87.2 ft BGS.
					88			
							SS	Irregular shaped inclusions of (angular) sandstone and shale in a coarse white sandstone matrix.
					90	X		White coarse-grained sandstone.
								End core at 91.0 ft BGS.
					92			
					94			
					96			
					98			
					100			

S = Split-Spoon
 R = Rock Coring
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LOG OF BORING MW-02I

EA Engineering, Science, and Technology

MW-2I located approximately 50 ft west of southwest corner of landfill.

Surface Elevation: 698.50 ft above mean sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Bench mark; metal plate located 100 ft northeast of landfill
Start Date: 30 October 1991
Completion Date: 30 October 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Mobile B-57/61 drill rig with 4.25-in. ID hollow-stem augers for soil borings; 4-in. spin casing for rock coring.
Sampling Method: 2-in. ID split-spoon driven 2-ft by a 140-lb hammer falling 30-in. for soil boring; NQ core barrel for rock coring.
Surface Conditions: Low lying grassy area

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description	
S-1		0.3	0	1	0	0	OL	Sandy Organic Silt	Black silt with little fine to coarse sand, trace roots, moist.
				3					
				4					
				4					
S-2		0.7	0	4	2	0		Clayey Organic Silt	Black clayey silt, moist, loose.
				4					
				3					
				6					
S-3		0.8	0	5	4	0			Black clayey silt, moist, loose.
				6					
				8					
				8					
S-4		0.7	0	5	6	0			Dark brownish gray clayey silt, soft, wet, loose, grades to dark brown fine sand and silt, trace medium to coarse sand and fine to coarse gravel, wet, loose.
				10					
				11					
				8					
S-5		0.8	0	5	8	0		Clayey Silt and Sand	Brown fine sand and silt, wet, little clay.
				6					
				12					
				10					
					10				

S = Split-Spoon
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LOG OF BORING MW-02I

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-6		1.0	10	2	10	0	ML/SM	Silt and Sand
				4	10			
				6	10			
				10	10			
S-7		0.2	12	50/4	12	0	Limestone Boulder	Dark gray fractured limestone boulder. Auger refusal at 12 ft BGS. Spoon refusal at 12.3 ft BGS.
						GP	Gravel and Sand	Advanced augers to top of rock, unable to obtain split-spoon samples. Observations from auger cuttings. Angular gravel and coarse sand with some cobbles.
					14			
					16			
						GM	Silty Gravel	Silty gravel and sand with boulders.
					18			
					20			
								Auger refusal at 20.5 ft, ended soil boring.
					22			
					24			

S = Split-Spoon
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BGS = Below Ground Surface

LOG OF BORING MW-02D

EA Engineering, Science, and Technology

MW-02D located west of Skaneateles Creek
approximately 100 ft west of the landfill.

Surface Elevation: 698.40 ft above mean sea level.
Reference Elevation: 706.40 ft above mean sea level.
Reference Description: Bench mark; metal plate located
100 ft northeast of landfill.

Start Date: 30 October 1991
Completion Date: 30 October 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. ID
hollow-stem augers for soil boring; 4-in. spin casing for rock coring.
Sampling Method: 2-in. ID split-spoon driven 2 ft 14 by a 140-lb
hammer falling 30-in. for soil boring; NQ core barrel for rock coring.
Surface Conditions: Low-lying wet grassy area.

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		0.3	0	1	0	0	ML	Sandy Silt
				3				
				4				
				4				
S-2		0.7	0	4	2	0	OL	Organic Clayey Silt
				4				
				3				
				6				
S-3		0.8	4	5	4	0		Black clayey silt, moist, loose.
				6				
				8				
				8				
S-4		0.7	6	5	6	0		Dark brownish gray clayey silt, streaks of light brown, moist, plastic.
				10				
				11				
				8				
S-5		0.8	8	5	8	0	ML/SM	Silty Sand
				6				
				12				
				10				
S-6		0.2	10	50/3	10			Limestone
								Broken dark gray limestone. Auger refusal, ended soil boring.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-02D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
					10			Set spin casing at 10.5 ft BGS. Start rock core on 24 March 1992.
R-1		0.79		0%			LS	Dark grey, fine grained, chert bearing, massive limestone with very slight weathering and thin lenses of shaley limestone. Fractures mostly horizontal.
R-2		3.14		84%	12			3-in. clay filled fracture at 11.5 ft.
					14			
R-3		1.48		73%				
					16			
R-4		5.16		81%				
					18			
					20			
R-5		4.71		79%	22			
					24			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-02D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-5 (con't)		4.71		79%	26			
R-6		5.14		98%	28			
					30			2-in. silt filled fracture.
							LS	Limestone- cherty, fine grained, faintly bedded and hard. Fractures mostly horizontal.
R-7		5.00		100%	32			
					34			
					36			Reamed hole to 36.5 ft, set 3-in. spin casing in bentonite.
R-8					38			
					40			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-02D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rcd %	Depth (ft)	Fract.	Rock Class	Rock Description	
R-8 (con't)					40				
R-9					42				
					44				
					46				
					48				
					50				
R-10					52				
					54				

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-02D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-10 (con't)					56			
R-11					58			
					60			
					62			
					64			
					66			
R-12					68			
					70			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-02D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-12 (con't)					70			
					72			
					74			
R-13					76			
					78			
					80			
					82			Ended coring at 81.5 ft.
					84			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-03

EA Engineering, Science, and Technology

MW-03 located approximately 25 ft northwest of landfill.

Surface Elevation: 698.57 ft above mean sea level.
Reference Elevation: 706.40 ft above mean sea level.
Reference Description: Bench mark; metal plate located 100 ft northeast of landfill.

Start Date: 29 October 1991
Completion Date: 29 October 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. ID hollow-stem augers for soil boring; 4-in. spin casing for coring.
Sampling Method: 2-in. ID split-spoon driven 2 ft by a 140-lb hammer falling 30-in for soil boring; NQ core barrel for rock coring.
Surface Conditions: Grassy area.

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 In.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description	
S-1		1.4	0	6	0	0	ML	Silt	Dark brown silt with trace roots, moist.
					6		CL	Sandy Clay	Light brown clay with little fine to coarse sand, trace fine to coarse gravel, trace black silt, moist.
					6				
S-2		1.6	0	6	2	0		Clay	Light brown clay with trace fine to coarse sand and fine to coarse limestone gravel, small orange streaks, moist.
				7					
				9					
S-3		0.2	0	100/2	4	0			Light brown silty clay with trace fine to coarse sand and fine to coarse limestone gravel, moist. Spoon refusal at 4.2 ft BGS. Auger refusal at 4.9 ft BGS, ended soil boring.
					6				
					8				
					10				

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-03

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
					0			
					2			
					4			
R-1		2.58		67%			LS	Set spin casing at 4.5 ft. Start rock coring 6 March 1992. Medium to dark gray, fine-grain, massive to faintly bedded chert-bearing limestone. Zones of white pellets and shell fragments.
					6			2-in. clay seam at 6.0 ft.
					7			4-in. silt seam at 7.0 ft.
R-2		3.00		55%	8			3-in. void at 8.3 ft.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-03

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-2 (Cont.)					10			
R-3		3.83		39%				
					12			
					14			
R-4		5.17		80%				
					16		LS	
					18			
					20			
R-5		5.00		98%				
					22			
					24			

Medium to dark gray, fine-grained, faintly bedded limestone. Shell fragments throughout. Occasional thin layer of shaley limestone.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-03

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description	
R-6		0.92		52%					
R-7		1.92		44%	26				
R-8		2.79		83%	28				Reamed hole to 28.0 ft, set 3-in. spin casing in bentonite.
					30		LS		Light to dark gray, fine-grained medium bedded limestone with thin layers of shaley limestone.
R-9		2.00		98%	32				
R-10		3.00		89%	34				
R-11		4.92		96%	36				
					38				
					40				

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-03

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-11 (Cont.)					40			
R-12		10.00		89%	42			
					44			
					46			
					48			
					50			
R-13		10.00		28%	52	X	SS	Light gray, medium-grained calcareous sandstone.
					54		LS	Medium gray, fine-grained, medium bedded limestone.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-03

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-13 (Cont.)					56	—		
					58	—		
					60	—		
					62	—		
R-14		10.00		88%	64	—	LS	Medium gray, fine-grained limestone with thin layers of shaley limestone.
					66	—		
					68	—		
					70	—		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-03

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-14 (Cont.)					70	—		
R-15		0.42		80%		—		
R-16		3.58		85%	72	—		
					74	—		
R-17		4.50		55%		—		
					76	*		1-2 in. void at 75.5 ft.
						—		
					78	—		
						—		
					80	—		Ended rock core at 80.0 ft.
					82			
					84			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-04

EA Engineering, Science, and Technology

MW-04 located approximately 150 ft north of the lan

Surface Elevation: 691.70 ft above mean sea level.
Reference Elevation: 706.40 ft above mean sea level.
Reference Description: Bench mark; metal plate located 100 ft northeast of landfill.

Start Date: 29 October 1991
Completion Date: 29 October 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. ID hollow-stem augers for the soil boring; 4-in. spin casing for coring.
Sampling Method: 2-in. I.D. split-spoon driven 2 ft by a 140-lb hammer falling 30-in for soil boring; NQ core barrel for rock cores.
Surface Conditions: Grassy area

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description			
S-1		1.1	0	5	0	0	SP	Sand	Dark brown sand with trace silt, roots, moist.		
				10							
				10							
				10							
S-2		1.0	0	9	2	0	ML	Clayey Silt	Dark brown clayey silt with trace roots and fine to coarse sand.		
				8							
				8							
				8							
S-3		0.3	0	7	4	0	CL	Silty Clay	Dark brownish gray silty clay with trace fine to coarse sand, moist. Dark brownish gray silty clay with trace fine to coarse sand and fine to coarse gravel, wet.		
				7							
				7							
				5							
S-4		0.5	0	4	6	0	CL	Silty Clay	Dark brown silty clay with little fine to coarse sand and trace fine to coarse gravel, wet. Spoon refusal at 7 ft BGS, ended boring.		
				15/5							
				8							
											10

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-04

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
					0			
					2			
					4			
					6			
					8			
R-1		1.25		83%	10	—	LS	Limestone
								Set spin casing at 9 ft 3 in. Start rock coring 20 February 1992. Limestone is medium to dark gray, cherty, fine grained, with zones of white shell fragments.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-04

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description	
R-1 (Cont')		9.75		86%	10	—	LS	Light, medium and dark gray, line-grained, massive to faintly bedded limestone with white pellets and shell fragments.	
R-2						—			
					12	*			
						—			
					14	+			
						—			
						—			
					16	—			
						+			
					18	—			
R-3		5.00		88%		—			
					20	—			
						—			
					22	—			
						—			
					24	—			

S = Split-Spoon
R = Rock coring
BGS = Below Ground Surface

LOG OF CORE MW-04

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-3 (Cont.)								
R-4		9.75		67%	26			
					28			
					30			
					32		LS	
					34			
					36			
R-5		8.90		67%	38			
					40			

Reamed 10-in. hole to 26.0ft, set 8-in. casing in grout.

Medium gray and light gray fine-grained, faintly bedded limestone.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-04

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-5 (Cont.)					40		SS	Light to medium gray, medium-grained calcareous sandstone with irregular inclusion of black sandstone.
					42			
R-6		6.00		87%	44		LS	Dark gray, fine-grained, medium bedded limestone.
					46			
R-7		7.75		67%	48			
					50			
					52			
					54			

S = Split-Spoon

R = Rock coring

BGS = Below Ground Surface

LOG OF CORE MW-04

Sample Type & No.		Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-7 (Cont.)					56			
					58			
					60			
R-8		10.00		62%	62		LS	Light to dark gray, fine-grained, bedded limestone.
					64			
					66			
					68			
					70			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-04

[illegible]

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-05I

EA Engineering, Science, and Technology

MW-05 located approximately 450 ft north of landfill
off northeast corner of former Organics Plant.

Surface Elevation: 687.73 ft above mean sea level.
Reference Elevation: 706.40 ft above mean sea level.
Reference Description: Bench mark; metal plate located
100 ft northeast of landfill.

Start Date: 29 October 1991
Completion Date: 29 October 1991

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Truck-Mounted Mobile B-57/B-61 drill rig with 4.25-in.
ID hollow-stem augers for soil boring; spin casing for coring.
Sampling Method: 2-in. ID split-spoon driven 2 ft by a 140-lb hammer
falling 30-in. for soil boring; NQ core barrel for rock coring.
Surface Conditions: Gravel area.

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description	
S-1		0.4	0	40	0	0	FILL	Sandy Silt	Dark brownish gray silt with some fine to coarse sand, moist. Limestone rock fragments, dry.
				25				Cobbles	
				26					
				50/3	19			Silt and Fill	
S-2		1.6	2	6	2	11			Brownish red silt and metal fragments, moist. Black silt with trace fine to coarse sand, moist. Green very hard granular solid, discolored.
				7					
				8					
				12					
S-3		0.5	4	13	4	5	ML	Silt	Black silt with trace fine to coarse sand and cobbles, moist to wet.
				2					
				2					
				3					
S-4		0.0	6	3	6				No sample return, piece of wood in end of spoon.
				4					
				100/1					
				8					
					10				Spoon refusal at 7.1 ft BGS. During advancement of casing to set upper bedrock well MW-5I, refusal determined to be fill material and not bedrock. Split-spoon samples were not obtained because elevated volatile organic readings (40 - 50 ppm) were encountered during drilling. Bedrock encountered at 15.5 ft below ground surface.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

Surface Conditions: Gravel area

Completion Date: 22 April 1992

LOG OF BORING MW-05D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-3		0.0	10	2 2 2 4	10 12			No recovery.
S-4		0.7	15	50 10 18 45/3*	16 18 20 22 24	0		Dark brown clayey silt and little shale gravel. Auger refusal at 16.75 ft, ended soil boring.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-05D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
					10			
					12			
R-1		2.60		89%			LS	
					14		Limestone	Set spin casing at 13.0 ft BGS. Start rock coring 23 April 1992. Medium gray fine grain, moderately hard, massive to faintly bedded limestone. Occasional layers of dark gray shaley limestone and chert. Secondary pyrite deposits. Secondary pyrite deposits.
R-2		9.20		82%	16			
					18			
					20			Medium light gray to dark gray fine-grained limestone. Occasional shell fragments. Zones of shaley limestone.
					22			
					24			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-05D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description	
R-2 (Cont.)		9.20		82%					
R-3		10.00		87%	26	—			
						—			
					28	—			
						—			
					30	—			
						—			
					32	—	LS	Light to dark gray, fine-grained, medium bedded limestone.	
						—			
					34	—			
						—			
R-4		9.50		45%	36	—	SS	Sandstone	Reamed hole to 36.0 ft, set 3-in. spin casing in bentonite. Light gray, fine-medium grained sandstone.
						—			
					38	—			
						—			
					40	—			

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF CORE MW-05D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-4 (Cont.)		9.50		45%	40	---	SS	Dark gray calcareous sandstone.

					42	---	LS	Yellow-brown sandstone.

R-5		9.90		59%	44	---	LS	Dark gray, fine grained, medium bedded limestone.

					46	---		

					48	/		

					50	---		

					52	---		Medium gray to light olive gray dolostone, faintly bedded.

					54	---		

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-05D

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-6		8.00		71%	56			Light to dark gray, fine-grained medium bedded limestone.
					58			
					60			
					62			
					64			Ended core at 65.0 ft.
					66			
					68			
					70			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-06

EA Engineering, Science, and Technology

MW-06 located off southeast corner of former Operations Plant.

Surface Elevation: 698.50 ft above mean sea level

Reference Elevation: 706.40 ft above mean sea level.

Reference Description: Bench mark; metal plate located 100 ft northeast of landfill.

Start Date: 29 October 1991

Completion Date: 29 October 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. ID hollow-stem augers for soil boring; spin casing for rock cores.

Sampling Method: 2-in. ID split-spoon driven 2 ft by a 140-lb hammer falling 30-in. for soil boring; NQ core barrel for rock coring.

Surface Conditions: Asphalt pavement.

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		0.5	0	1	0	0	FILL	Asphalt pavement.
							Asphalt	
							Sandy Silty Clay	Brown clay with some to little fine to coarse silty sand, moist.
							Gravelly Silt and Fill	Dark brownish black silt with some fine to coarse limestone gravel, trace wood, moist.
S-2		0.7	0	6	2	0	Silty Gravelly Sand	Dark brown fine to coarse sand with some silt, little fine to coarse gravel, streaks of reddish brown, moist.
S-3		1.0	0	30	3	0		Dark brown fine to coarse sand with some silt, little fine to coarse gravel, streaks of reddish brown, moist.
S-4		0.3	0	4	4	0	Concrete	Dark brown fine to coarse sand with some silt and fine to coarse gravel, Moist to wet.
S-5		0.0	0	100/5"	6	0	Silty Gravelly Sand	Dark brown fine to coarse sand with some silt and fine to coarse gravel, wet.
					8			No sample return.
								Refusal at 9 ft BGS, ended soil boring.
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-06

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
					10			
								Set 3-in. spin casing at 12.0 ft. Start rock coring 20 March 1992.
R-1		1.60		0%	12	—	LS	Limestone
						—		
						—		
R-2		2.25		24%	14	—		
						—		
						—		
R-3		5.00		62%	16	—		
						—		2-in. void at 16 ft 4 in.
						—		
						—		
					18	—		
						—		
						—		
						—		
					20	—	LS	
						—		Light gray and dark gray fine-grained, medium bedded limestone with secondary pyrite deposits and zones of white pellets shell fragments.
R-4		9.90		93%	22	—		
						—		
						—		
						—		
					24	—		
						—		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-06

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-4 (Cont.)					26	—		
					28	—		2-in. void at 28.5 ft.
					30	—		1-in. black clay seam at 29.0 ft.
R-5		5.00		93%	32	/	LS	Light gray fine-grained, medium bedded limestone with zones of shaley limestone. Occasional zones of shell fragments and secondary pyrite deposits.
					34	/		
R-6		2.25		82%	36	—		
					38	—		Reamed hole to 36.5 ft, set 3-in. spin casing in bentonite.
R-7		2.30		75%	40	—		

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-06

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-7 (Cont.)					40		LS	Dark gray massive limestone with occasional layers of black shaley limestone.
R-8		1.50		60%	42			
R-9		3.40		90%	44			
R-10		10.00		52%	46			
					48			
					50			
					52			
					54		LS	Dark gray, medium to coarse grained, massive to medium bedded limestone.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-06

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Soil Description
R-10 (Cont.)					56			
R-11		5.00		50%	58		SS	Light gray coarse-grained calcareous sandstone with inclusion of irregular shaped pieces of limestone.
					60			Light gray to white medium to coarse-grained sandstone.
R-12		1.30		97%	62			
R-13		8.40		72%	64		LS	Dark gray fine-grained bedded limestone with layers of light gray and tan dolostone.
					66			
					68			
					70			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-06

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-13 (Cont.)					70			
R-14		10.00		89%	72		LS	Dark gray fine-grained, medium bedded limestone with layers of light brown fine-grained, compact, massive dolostone.
					74			
					76			
					78			
					80			
					82			Ended core at 81.5 ft.
					84			

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF BORING MW-07

EA Engineering, Science, and Technology

MW-07 located west of Skaneateles Creek
approximately 300 ft west of the landfill.

Reference Elevation: 706.40 above mean sea level

Reference Description: Bench mark; metal plate located
100 ft northeast of landfill.

Start Date: 29 October 1991

Completion Date: 20 October 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57/B-61 drill rig with 4.25-in. ID
hollow-stem augers for soil boring; spin casing for coring.

Sampling Method: 2-in. I.D. split-spoon driven 2 ft by a 140-lb hammer
falling 30-in. for soil boring; NQ core barrel for rock coring.

Surface Conditions: Gravel

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description	
S-1		1.3	0	30	0	1	Road Base	Gravelly Silty Sand	Dark brown fine to coarse sand with little fine to coarse gravel and silt, dry.
				40					
				30					
				17					
S-2		2.0	0	20	2	0	CL	Silty Clay	Brown to dark brown silty clay with trace fine to coarse sand and fine to coarse gravel, moist to dry, tight.
				20					
				21					
				30					
S-3		2.0	0	10	4	0			Brown to dark brown silty clay with trace fine to coarse sand, moist to dry.
				11					
				18					
				17					
S-4		2.0	0	30	6	0			Brown to dark brown silty clay with trace fine to coarse sand, moist.
				11					
				13					
				15					
S-5		2.0	0	12	8	0	Clay		Brown clay, moist, soft.
				13					
				13					
				12					
					10				

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-07

S-6		0.5	0	9	10	0		Brown clay, moist, soft.
S-7		2.0	12	9	12	0		Brown clay, moist, soft.
S-8		2.0	14	1	14	0		Brown clay, moist, soft.
S-9		1.0	16	5	16	0	SM	Silty Gravelly Sand Brown clay, moist, soft. Dark brown fine to coarse sand with some to and fine to coarse gravel, little to some silt, wet.
S-10		1.5	18	8	18	0		Dark brown fine to coarse sand with some to and fine to coarse gravel, little to some silt, wet.
S-11		1.0	20	2	20	0	GM	Sandy Silty Gravel Brown and dark grey fine to coarse angular limestone gravel with little fine to coarse sand and silt, wet.
S-12		0.7	22	12	22	0		Dark brownish blue fine to coarse angular limestone gravel with little fine to coarse sand and silt, wet.
S-13		0.0	24	26	24			No sample return.
				50/2				Auger refusal at 24.7 ft BGS, ended soil boring

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-07

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1		6.00		70%	26	— #	LS Limestone Bedrock	Set spin to 25.0 ft. Start rock coring 7 December 1992. Medium to dark gray, fine-grained, massive to medium bedded limestone. Chert layers and zones of white pellets and shell fragments. 2-in. void at 25.5 ft.
R-2		1.90		92%	32	—		
R-3		7.90		93%	34	—		
					36	—		
					38	—		
					40	—		

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-07

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-3 (Cont.)					40			
R-4		5.00		94%				
					42		LS	Medium gray, fine-grained, medium bedded limestone.
					44			
R-5		4.80		71%	46			
					48			
					50			
R-6		9.50		84%				
					52			Reamed hole to 51.5 ft, set 3-in. spin casing in bentonite.
					54			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-07

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-6 (Cont.)					56			
					58			
					60			
R-7		9.90		84%	62		LS	Medium to dark gray, fine-grained, medium limestone. Occasional thin layers of shaley limestone.
					64			
					66			
					68			
					70			

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF CORE MW-07

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-7 (Cont.)					70			Ended rock core at 71.2 ft.
					72			
					74			
					76			
					78			
					80			
					82			
					84			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-08

EA Engineering, Science, and Technology

MW-08 located along Jordan Road northwest of the former Operations Plant.

Surface Elevation: 692.50 ft above mean sea level.

Reference Elevation: 706.40 ft above mean sea level.

Reference Description: Bench mark; metal plate located 100 ft northeast of landfill.

Start Date: 30 October 1991

Completion Date: 30 October 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57/B-61 drill rig with 4.25-in. ID hollow-stem augers for soil boring; spin casing for coring.

Sampling Method: 2-in. ID split-spoon driven 2 ft by a 140-lb hammer falling 30-in. for soil boring; NQ core barrel for rock coring.

Surface Conditions: Grassy area

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6-in	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		1.8	0	3	0	0	ML	Topsoil
				2				
				3		0	SM	Silty Sand
S-2		1.0	0	3	2	0		Brown fine sand with some to little silt, trace medium to coarse sand, moist to wet.
				1				
				12		0	CL	Silty Clay
S-3		0.7	0	4	4	0		Black silty clay with trace fine to coarse sand, wet.
				5				
				4				
S-4		1.0	0	5	6	0	ML	Silty Sandy Clay
				8				
				14				
S-5		0.7	0	14	8	19		Brown silt with little to some fine to coarse gravel and angular limestone cobbles, trace fine to coarse sand, moist to wet.
				22				
				50/4"				
					10			Spoon refusal at 9.3 ft BGS, ended soil boring.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-09

EA Engineering, Science, and Technology

Mw-09 located near Jordan Road and Skaneateles Creek
in northwest corner of property.

Surface Elevation: 678.70 ft above mean sea level.
Reference Elevation: 706.40 ft above mean sea level.
Reference Description: Bench mark; metal plate located
100 ft northeast of landfill.

Start Date: 7 November 1991
Completion Date: 7 November 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Truck-Mounted Mobile B-57/B-61 drill rig with 4.25-in.
ID hollow-stem augers for soil boring; spin casing for coring.
Sampling Method: 2-in. ID split-spoon driven 2 ft by a 140-lb hammer
falling 30-in. for soil boring; NQ core barrel for rock coring.
Surface Conditions: Wooded area.

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 In.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description	
S-1		1.3	0	8	0	0	ML	Clayey Sandy Silt	Dark brown clayey silt with little fine to coarse sand and fine to coarse gravel, trace roots and red clay, black streaks of organic silt, moist.
				10					
				9					
				16					
S-2		1.2	0	30	2	0	SM	Gravelly Silty Sand	Brown fine to coarse sand with some fine to coarse gravel and silt, wet.
				39					
				22					
				36					
S-3		0.3	4	15	4	0	LS	Limestone Bedrock	Brown fine to coarse sand with some fine to coarse gravel and silt, and gray angular limestone fragments, wet. Auger refusal at 4.5 ft, ended soil boring.
				50/4					
S-4		0.2	5	50/2					
				6					
				8					

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-09

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1		9.52		81%	0			
					2			
					4			
					6			Set spin casing at 6.5 ft. Start rock coring on 1 April 1992.
					8	= = *		Light to dark gray, fine-grained, massive to medium bedded limestone.
					10	- -		

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-09

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1 (Cont.)		9.52		81%	10	/	LS	Light gray and dark gray, massive, fine-grained limestone.
R-2		10.12		70%	12	/		
					14	/		
					16	≡		
					18	/		
					20	≠	SS	Light gray to white, fine to medium-grained sandstone with irregular inclusions of black shale and mudstone.
					22	-		
					24	✱		

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-09

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description	
R-2 (Cont.)		10.12		70%		—	SS	Grades to dark gray, medium-grained sandstone.	
					26	)			
R-3		4.96		88%					
						28			
							LS	Limestone	Medium to dark gray, fine-grained, medium bedded limestone.
					30				
						≡			
R-4	5.16		69%		32				
						/			
					34	X			Medium gray, massive limestone with layers of light olive gray fine-grained compact dolostone.
						I			
					36	+ +			Reamed hole to 36.5 ft, set 3-in. spin casing in bentonite.
R-5	4.79		95%		38	+			
						+			
					40				

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-09

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-5 (Cont.)		4.79		48%	40			
R-6		5.08		95%	42			
					44		LS	Dark gray, fine-grained, massive to faintly bedded, dense limestone.
R-7		4.83		95%	46			
					48			
					50			
R-8		5.17		59%	52			
					54			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-09

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-8 (Cont.)		5.17		59%	56	+	LS	Medium to dark gray fine-grained, medium bedded limestone.
R-9		5.04		27%	58	/		
					60	+		
					62	+		Ended core at 61.5 ft.
					64			
					66			
					68			
					70			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-10

EA Engineering, Science, and Technology

MW-10 located along north property boundary.

Location: Stauffer Management Co., Skaneateles Falls, New York

Surface Elevation: 696.90 ft above mean sea level.

Reference Elevation: 706.40 ft above mean sea level.

Reference Description: Bench mark; metal plate located 100 ft northeast of landfill.

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57/B-61 drill rig with 4.25-in. ID hollow-stem augers for soil boring; spin casing for coring.

Sampling Method: 2-in. ID split-spoon driven 2 ft by a 140-lb hammer falling 30-in. for soil boring; NQ core barrel for rock coring.

Surface Conditions: Wooded area.

Start Date: 12 November 1991

Completion Date: 12 November 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Soil Description			
S-1		2.0	0	4	0	0	CL	Silty Clay	Brown silty clay with little lensed of very hard brown silt, trace fine to coarse gravel and fine to coarse sand, moist, tight.		
				7							
				10							
				12							
S-2		0.7	0	7	2	0	SM	Silty Sand	Brown and orange mottled fine sand and silt with little medium to coarse sand, trace fine to coarse gravel and green coarse gravel, moist, loose.		
				13							
				21							
				14							
S-3		1.2	4	4	4	0	ML	Silt	Light brown and dark brown laminated layers of silt with trace fine to medium sand and layers of clayey silt, dry, very stiff.		
				11							
				14							
				14							
S-4		2.0	6	9	6	0	CL	Clay	Reddish brown clay, very stiff, dry, well sorted.		
				15							
				24							
				21							
S-5		2.0	8	13	8	0			Reddish brown clay, very stiff, dry.		
				15						Silty Clay	Light brown silty clay, moist, medium dense.
				20							
				19						Silty Clay	Reddish brown silty clay, very stiff, dry.
					10						

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-10

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-6		1.3	10	9	10	0	Clayey Silt	Reddish brown silty clay, very stiff, dry to moist.
				16				
				25			GP	Black fine to coarse gravel, moist.
				50/4"	12		Limestone Bedrock	Auger refusal at 11.9 ft BGS, ended soil boring.
					14			
					16			
					18			
					20			
					22			
					24			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-10

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1		4.2		62%	10			
					12		LS	Limestone
					14			
R-2		4.92		91%	16			
					18			
					20			
R-3		5.00		75%	22		SS	Calcareous Sandstone
					24			

Set spin casing at 11.5 ft.
 Start rock coring 14 April 1992.
 Dark gray, fine-grained, faintly bedded limestone with some white shell fragments and secondary pyrite deposits.

Light to medium gray fine-medium grain calcareous quartz sandstone.

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF CORE MW-10

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-3 (Cont.)		5.00		75%	26	+	SS	Light gray to white medium to coarse quartz sandstone.
R-4		4.87		75%	28	\\		
R-5		5.00		77%	30	-		
					32	=	SS	Black medium-grained calcareous sandstone.
					34	=		Light gray and white sandstone.
R-6		4.71		62%	36	-	LS	Dark gray, fine-grained massive to faintly bedded limestone with some white pellets.
					38	-		
					40			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-10

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-6 (Cont.)		4.71		62%	40	+	LS	Dark gray, medium-grained, massive limestone with occasional layers of tan fine-grained, compact dolostone.
R-7		5.00		84%	42	-		
					44	-		
R-8		5.00		92%	46	-		Reamed hole to 46.0 ft, set 3-in. spin casing in betonite.
					48	+		
					50	-		
R-9		9.79		97%	52	-	LS	Medium to dark gray faintly bedded limestone with shell fragments and layers of tan fine-grained dolostone.
					54	-		

S = Split-Spoon

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BGS = Below Ground Surface

LOG OF CORE MW-10

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-9 (Cont.)		9.79		97%	56	—	LS	Medium gray, medium bedded limestone, with layers of light and dark gray limestone. Shell fragments and secondary pyrite present.
R-10		3.67		22%	62	+		Medium to dark gray, fine-grained, bedded limestone.
R-11		10.00		28%	66	+		0.5-in. clay-filled fracture.

S = Split-Spoon

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LOG OF CORE MW-10

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-11 (Cont.)		3.17		28%	70	—		
R-12		3.20		21%	71	+		
					72	—		
					73	+		
					74	X		
					75			Ended core at 74 ft 2 in. 15 April 1992.
					76			
					77			
					78			
					79			
					80			
					81			
					82			
					83			
					84			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-11

EA Engineering, Science, and Technology

MW-11 located along north property boundary
approximately 250 ft east of MW-10.

Surface Elevation: 696.98 ft above mean sea level.
Reference Elevation: 706.40 ft above mean sea level.
Reference Description: Bench mark; metal plate located
100 ft northeast of landfill.

Start Date: 12 November 1991
Completion Date: 12 November 1991

Location: Stauffer Management Co., Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Truck-Mounted Mobile B-57/B-61 drill rig with 4.25-in.
ID hollow-stem augers for soil boring; spin casing for coring.
Sampling Method: 2-in. ID split-spoon driven 2 ft by a 140-lb hammer
falling 30-in. for soil boring; NQ core barrel for rock coring.
Surface Conditions: Wooded area.

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description	
S-1		2.0	0	3	0	0	ML	Silt	Black silt with trace fine to coarse sand, moist.
				6					
				6			SM	Silty Sand	Dark brown fine to coarse sand with little to some silt, trace fine to coarse gravel.
S-2		0.3	0	9	2	0			Light brown silt with trace fine to coarse sand, dry.
				10					
				10					
S-3		0.7	0	13	4	0	ML/SM	Silt and Sand	Light brown fine to coarse sand and silt, dry, very stiff.
				25					
				25					
S-4		1.0	6	40	6	0	CL	Silty Clay	Reddish brown and light brown silty clay with trace fine to coarse sand, very stiff, dry.
				11					
				12					
S-5		0.7	8	22		0			Reddish brown silty clay with trace fine to coarse sand and coarse limestone gravel, black vertical streaks, dry, very stiff.
				26					
				9	8				
				11					
				18					
				20					
					10				

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-11

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-6		0.6	10	7	10	0	SP	Gravelly Sand
				13				
				50/2				
					12			
					14			
					16			
					18			
					20			
					22			
					24			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-11

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1		1.33		0%	10	—	LS	Start spin casing at 10.5 ft. Start rock core 16 April 1992. Medium to dark gray, fine-grained, medium bedded limestone. Occasional zones of black shaley limestone, some shell fragments, and secondary pyrite deposits.
R-2		1.58		28%	12	≡		
R-3		4.90		84%	14	—		
					16	—		
					18	—		
					20	≡		
R-4		9.82		71%	22	—		
					24	—		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-11

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-4 (Cont.)		9.82		71%	26	+		
					28	+		
					30	+	SS Sandstone	Light gray to white medium to coarse-grained sandstone.
R-5		3.45		43%	32	+		
					34	+		
R-6		3.41		19%	36	+		Dark gray and white calcareous sandstone.
					38	+		
R-7		0.63		0%	40	+	LS Limestone	Dark gray, fine-grained crystalline limestone.
R-8		2.08		25%		+		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-11

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-8 (Cont.)		2.08		25%	40	/		
					42	/		
R-9		1.10		0%		/		
R-10		2.54		19%		/		
					44	/		
					46	/		
R-11		10.00		72%		/	LS	
					48	/		
					50	/		
R-12		2.83		61%		/		
					52	/		
					54	/		
R-13		1.75		33%		/		

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-11

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-13 (Cont.)		1.75		33%				
R-14		4.50		86%	56			
					58			
					60			
R-15		7.90		56%			LS	Medium gray, massive to faintly bedded limestone.
					62			
					64			
					66			
					68			
R-16		6.80		32%				Medium to dark gray, fine-grained, medium bedded limestone.
					70			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-11

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-16 (Cont.)		6.80		32%	70	—		
					72	—		
					74	—		
					76	—		
					78			Ended boring at 77.0 ft.
					80			
					82			
					84			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-12

EA Engineering, Science, and Technology

MW-12 is located approximately 250 ft north of
MW-05S and the former Organics Plant

Surface Elevation: 684.93 ft above mean sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Benchmark; metal plate
located 100 ft northeast of landfill

Start Date: 17 November 1992
Completion Date: 17 November 1992

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem
augers for soil boring; 4-in. spin casing for coring
Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer
falling 30 in. for soil boring; NQ core barrel for rock coring
Surface Conditions: Relatively level, grassy ground surface,
snow covered

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		1.3	0	3	0	1.5		Brown to dark brown, silty fine sand and fine-coarse gravel.
				6				
				7				
				14				
S-2		0.6	0	14	2	2.0		Brown silty sand with white granular waste, refractory brick and tile, wet.
				7				
				4				
				4				
S-3		1.8	0	1	4	0.2		Lower 20 in. blackish-brown, organic silt, moist/wet (peat).
				3				
				2				
				4				
S-4		1.4	5	1	6	1.0		Blackish-brown, organic silt (peat), wet.
				1				
				1				
				1				
S-5		1.3	5	1	8	1.0		Brown, fine sandy organic silt (peat), wet.
				2				
				2				
				22				
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-12

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Soil Description
S-6		2.0	10	1	10	0.2		Upper 20 in. reddish-brown, clay with fine-coarse gravel, wet.
				2				
				3				
				4				
S-7		1.5	10	6	12	0.4		Reddish-brown, wet clay.
				20				
				54				
				24				
S-8		0.6	10	11	14	0		Brown, fine sand and silt, with sme fine gravel.
				15				
				13				
				8				
S-9		0.8	15	10	16	0.2		Blackish-brown, fine to coarse sand, little silt, little coarse gravel, wet.
				10				
				34				Auger refusal at 17.0 ft, end soil boring.
				50/1				
					18			
					20			
					22			
					24			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-12

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
					10			
					12			
					14			
					16			
					18			
R-1		1.80		83%			LS	Set spin casing at 19.0 ft. Start rock core 18 November 1992. Medium gray, fine-grained, medium bedded limestone.
					20			
R-2		9.90		77%				
					22			
					24			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-12

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-2 (Cont.)					26	—	LS	Medium to dark gray, fine-grained bedded limestone.
					28	—		
					30	—		
R-3		2.80		57%	32	—		
					34	—		Ended rock core at 34.0 ft.
					36	—		
					38	—		
					40	—		

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-13

EA Engineering, Science, and Technology

MW-13 is located east of Skaneateles Creek
approximately 500 ft northeast of the landfill

Surface Elevation: 696.63 ft above mean sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Benchmark; metal plate
located 100 ft northeast of landfill

Start Date: 30 November 1992
Completion Date: 30 November 1992

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem
augers for soil boring; 4-in. spin casing for coring
Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer
falling 30 in. for soil boring; NQ core barrel for rock coring
Surface Conditions: Top of hill on west side of creek, moist ground
surface, wooded area, cut down path

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 In.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		1.7	0	2	0	0		Dark to medium brown, moist, fine sand, little organic matter, little fine to coarse gravel.
				6			Topsoil	
				8			ML/SM	Lower 4-in. medium brown, moist, fine sand and silt.
S-2		1.7	0	9		0	CL	
				8	2			Medium to reddish-brown, moist, silt.
				15				Lower 9 in. medium brown silty clay, dry.
				20				
S-3		1.3	0	31		0		
				7	4			Medium reddish-brown silty clay, dry to moist.
				8				
				17				
S-4		2.0	0	27		0		
				6				Red-brown silty clay, similar to S-3.
				23				
				31				
S-5		2.0	0	32		0		
				31				
				8				Red-brown silty clay, similar to S-3.
				28				
				23				
				21				
				26				
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-13

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description	
S-6		2.0	10	10	10	0	CL		Reddish-brown clay, highly plastic with trace fine gravel and trace gray silt.
				21				Gravelly Clay	
				20					
				22					
S-7		2.0	10	22	12	0			Red-brown clay with gravel layer approximately 2 in.
				26					
				59					
				56/1					
S-8		1.5	10	63	14	<1	ML	Sandy Silt	Light to medium brown, moist, sandy silt and fine-coarse gravel. Upper 5 in. fractured (cobble).
				41					
				47					
				43					
S-9		1.6	10	39	16	<1			Brown sandy silt, similar to S-8.
				20					
				37					
				39					
S-10		1.8	10	30	18	1			Brown sandy silt, similar to S-8.
				39					
				38					
				53					
S-11		1.2	20	39	20	1.8			Brown sandy silt similar to S-8.
				65					
				49					
				48					
S-12		0.0	20	100/5	22				No recovery.
S-13		1.7	23	25		7			Light to medium brown sandy silt, with some fine to coarse gravel.
				21					
				30	24				
				53					

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-13

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-14		1.5	23	23	23			
				27	26			
				34		8		Brown sandy silt as above.
				32				
				26				Gray silty sand with some gravel.
				82				
S-1		1.3	23	100/4	28	12		
								Auger refusal at 29.5 ft, ended boring.
					30			
					32			
					34			
					36			
					38			
					40			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-13

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1		5.90		37%	26			
					28			
					30			
					32			
					34			
					36			
R-2		5.00		80%	38			
					40			

Set spin casing at 30.5 ft.

Start rock core 1 December 1992.

Light to dark, fine-grained, faintly bedded limestone with occasional chert beds.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-13

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-2 (Cont.)					40	—		
					—	—		
					—	—		
R-3		10.00		64%	42	//		
					—	—		
					—	—	LS	Medium gray, fine-grained, medium bedded limestone.
					44	—		
					—	—		
					46	—		
					—	—		
					48	—	SS	Sandstone
					—	—		Light gray, fine to medium grained, sandstone.
					50	—		
					—	—		
R-4		9.80		55%	52	—	SS	
					—	—		Light gray medium to coarse sandstone with irregular inclusion of black mudstone.
					54	—		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-13

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-4 (Cont.)					56	 X + X 		
					58	/		Light gray to yellow-brown sandstone.
						*	LS	Medium to dark gray, fine-grained, bedded limestone.
					60	 		
					62	/		Reamed hole to 62.0 ft, set 3-in. casing in bentonite.
R-5		6.00		69%	64	 		
					66	 X X X 		
					68	 + 		
R-6		2.50		94%	70	 		

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LOG OF CORE MW-13

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-6 (Cont.)					70			2-3 in. void at 70.0 ft.
						/		
						—		
						—		
					72			Ended rock core at 71.5 ft.
					74			
					76			
					78			
					80			
					82			
					84			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-14

EA Engineering, Science, and Technology

MW-14 is located 100 ft east of the landfill

Location: Stauffer Management Company, Skaneateles Falls, New York

Surface Elevation: 706.50 ft above mean sea level

Reference Elevation: 706.40 ft above mean sea level

Reference Description: Benchmark; metal plate
located 100 ft northeast of landfill

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem
augers for soil boring; 4-in. spin casing for coring

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer
falling 30 in. for soil boring; NQ core barrel for rock coring

Surface Conditions: Relatively flat, grassy, wet ground surface

Start Date: 17 December 1992

Completion Date: 17 December 1992

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		1.3	0	1	0	0	ML	5-in. topsoil wet.
				3				Lower 9 in. reddish-brown sandy silt, some fine gravel, wet.
				4				
				5				
S-2		1.4	0	5	2	0.5	CL	Reddish-brown silty clay, moist/dry, trace coarse gravel.
				11				
				11				
				15				
S-3		2.0	4	8	4	0.7		Reddish to dark brown silty clay, trace organic matter (peat) at approximately 4-5 ft, dry to moist.
				20				
				25				
				33				
S-4		2.0	4	80	6	0.5		Reddish to dark brown clay, dry to moist.
				81				
				89				
				77				
S-5		2.0	4	11	8	1.2		Reddish-brown to dark brown clay, piece of fractured bedrock, dry to moist.
				24				
				33				
				37				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-14

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-6		1.2	10	10	10	0.5		Reddish-brown to dark brown clay, wet.
				37				
				29				
				25				
S-7		0.5	10	100/6	12	0.5		Reddish-brown to brown silty clay and fine-coarse gravel - fractured bedrock.
								Auger refusal at 12.5 ft, end soil boring.
					14			
					16			
					18			
					20			
					22			
					24			

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF CORE MW-14

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description	
R-4 (Cont.)					26				
					28				
					30				
R-5		1.30		72%	32				
R-6		8.40		92%	34		LS	Medium gray fine-grained, faintly bedded limestone with layers of chert and thin layers of shaley limestone.	
					36				
					38				
					40				

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF CORE MW-14

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description	
R-6 (Cont.)					40				
R-7		8.90		78%	42			Reamed hole to 41.5 ft, set 3-in. spin casing in bentonite.	
					44				
					46				
					48				
					50				
R-8		9.70		86%	52		LS	Medium to dark gray fine-grained, medium bedded limestone.	
					54				

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-14

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-8 (Cont.)					56			
					58			
					60			
R-9		8.40		36%			SS	Sandstone
					62			Light gray and whitish, medium-grained sandstone.
					64		LS	
					66			Medium to dark gray, fine-grained, bedded limestone with layers of tan to olive gray fine-grained dolostone.
					68			
					70			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-14

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-10		1.50		30%	70			
R-11		5.50		38%	72		LS	Light to medium gray, fine-grained bedded limestone with layers of tan dolostone.
R-12		7.50		61%	74			
					76			
					78			
					80			
					82			
					84			
								Ended rock core at 85.5 ft.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING MW-15

EA Engineering, Science, and Technology

MW-15 is located south of Skaneateles Creek along south property boundary approximately 700 ft south of landfill

Surface Elevation: 728.0 ft above mean sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Benchmark; metal plate located 100 ft northeast of landfill

Start Date: 4 August 1993
Completion Date: 20 August 1993

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01
Client: ZENECA Inc.
Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem augers for soil boring; 4-in. spin casing for coring
Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in. for soil boring; NQ core barrel for rock coring
Surface Conditions: Grassy, brush

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		1.5		2	0	0		
							Topsoil	0-8 in. loam.
					3		SM	Silty Sand
S-2		1.3		3	7	0		
					8			
					2			
					3			
S-3		1.4	4	4	4	0		
					6			
					7			
					11			
S-4		1.6	4	6	14	0		
					10			
					5		ML	Clayey Silt
					4			
S-5		1.7	8	8	5	0		
					4			
					4		SM	Silty Sand
					3			
					5			
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-15

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-6		1.3	8	3	10		SW Gravelly Sand	Brown sand, coarse to fine sand, some gravel, trace silt, well sorted, cobble at bottom of spoon.
				6		0		
				12				
				17				
S-7		0.5	12	12	12		CL Silty Clay	Red-brown silty clay, medium stiff, wet.
				10				
				7		0.2		
				5				
S-8		2.0	12	4	14			Brown to gray clay, some silt, medium stiff, moist to wet.
				7		0		
				9				
				8				
S-9		1.7	16	3	16			Brown/gray, clay some silt, medium stiff, moist to wet.
				5		0		
				9				
				10				
S-10		1.8	16	4	18			Brown/gray clay, some silt, medium stiff, wet.
				6				
				10		0.4		
				10				
S-11		2.0	20	6	20			Gray and brown silty clay, medium stiff, wet.
				8				
				10		0.4		
				13				
S-12		2.0	20	4	22			Gray/brown clay, some silt, medium stiff, wet, little crushed cobble, coarse sand and gravel, moist.
				5				
				35		0		
				36				
S-13		0.5	24	100/6	24		ML Gravelly Silt	Tan silt, some coarse sand, gravel, very compact, moist (0-3 in.).

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF BORING MW-15

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-14		1.7	27	17	26	2		Tan/brown gravelly silt, crushed cobble, compact.
				19	28	0.8	CL	Red-brown silty clay, stiff, moist.
				16				
S-15		2.0	27	8	30	1.2		Brown/gray clay, some silt, medium stiff.
				13				
				23				
S-16		2.0	31	37	32	0.4	ML	Gray/brown silt, trace clay, slightly dense, wet.
				14				
				19				
S-17		2.0	31	1	34	0.6		Gray/brown silt, trace clay, wet.
				10				
				15				
S-18		1.7	35	WOR	36	0.4	SM	Gray coarse sand, some gravel, cobble, some silt, medium compact, wet.
				46				
				31				
S-19		1.3	35	31	38	0.6	ML	Gray silt, some coarse to fine sand, angular gravel, cobble, compact.
				60				
				40				
				90				Auger refusal at 39 ft, end soil boring.
					40			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-15

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1		6.90		89%	40			
					42			
					44			
					46			
					48			
					50			
					52			
R-2		8.70		78%	54			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-15

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-2 (Cont.)					56			
					58		LS	Dark gray, fine-grained, medium bedded limestone. with layers of shaley limestone.
					60			
R-3		5.80		69%	62			
					64			2-in. void.
					66		LS	Light gray, fine-grained limestone with layers of chert.
					68			
R-4		3.20		72%	70			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-15

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-4 (Cont.)					70			
R-5		5.00		64%	72		LS	Dark-gray, fine-grain, medium bedded limestone.
					74			
					76			Reamed hole to 76.0 ft, set 3-in. spin casing in bentonite.
R-6		4.20		53%	78			
					80			
					82			
R-7		3.30		76%	84			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-15

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-7 (Cont.)					86	—		Lost section of core downhole; drillers having problems with core barrel. Used roller bit from 86.0 to 110 ft 11 in.
					88			
					110			Resumed rock coring at 110 ft 11 in.
R-8		9.00		94%	112	—	SS Sandstone	Light gray, medium to coarse-grain sandstone.
					114	—		
					116	—		
					118	—		
					120	—	LS	Medium to dark gray, fine-grained, medium bedded limestone.
								End rock core at 119 ft 10 in.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-16

EA Engineering, Science, and Technology

MW-16 is located off site west of Jordan Road
approximately 850 ft west of the landfill

Surface Elevation: 704.50 ft mean sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Benchmark; metal plate
located 100 ft northeast of landfill

Start Date: 25 August 1993
Completion Date: 25 August 1993

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem
augers for soil boring; 4-in. spin casing for coring

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer
falling 30 in. for soil boring; NQ core barrel for rock coring

Surface Conditions:

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		0.8	0	4 5 5 7	0 — — — 2	0		Dark brown fine sand, some silt, poorly sorted, moist.
S-2		1.7	5	0 0 0 0	— — 6 — — 8 — — 10	0		Brown silt, some clay.

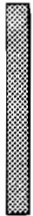
S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Soil Description
S-3		0.0	10	4	10	0		No recovery. Cobble on bottom of spoon.
				3				
				7				
				13				
					12			
					14			
S-4		0.5	15	23	16	0	SM	Brown coarse sand and gravel, some silt, poorly sorted.
				100/3				
					18			
S-5		0.5	20	57	20	0		Brown sand and gravel, some silt, poorly sorted.
				100/6				
					22			
					24			

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF BORING MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-6		0.5	25.3	47 38 26 30 35	25.3 26 30 35	0		Brown coarse sand and gravel with some silt.
S-7		0.8	30	34 56 55 100/4	30 34 56 55 100/4 32	0	SM	Brown coarse sand and gravel, poorly sorted, some silt, boulder and cobbles.
S-8		0.5	34	10 10 10 40	34 34 36 40	0		Brown coarse to fine sand, some gravel, some silt, poorly sorted.
					36 38 40			Auger refusal at 36 ft, ended soil boring.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
					26			
					28			
					30			
					32			
					34			
					36			
					38			Set spin casing at 38.5 ft. Start rock core 30 August 1993.
R-1		0.25		0%	38	X	LS	Broken dark gray limestone bedrock.
R-2		4.00		63%			Limestone Bedrock	Light to dark gray, fine-grained, medium bedded limestone. Shell fragments throughout, occasional thin layers of shaley limestone.
					40			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-2 (Cont.)					40	*		
						+		
R-3		10.00		65%	42			2-in. void at 43.2 ft.
					44			
					46	+/		
					48			
					50		LS	Medium to dark gray, medium bedded, fine-grained limestone, occasional layers of black shaley limestone.
R-4		10.00		70%	52	/		
						*		
					54			
						*		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract	Rock Class	Rock Description
R-4 (Cont.)					56	X		
					58	X		
					60	LS		Light to dark gray, medium bedded limestone. Shell fragments throughout. Occasional secondary pyrite.
R-5		5.00		60%	62			
					64	X		
					66	X		
R-6		7.00		68%	68			
					70			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-6 (Cont.)					70			
						+		
					72			
						+		
R-7		6.00		84%	74			
						/		
					76			
					78			
R-8		5.00		75%	80			Reamed hole to 80 ft, set 3-in. spin casing in bentonite.
						/	LS	Medium to dark gray, fine-grained limestone, with thin zones of shaley limestone.
					82			
					84			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-8 (Cont.) R-9		4.50		90%	86	*		
					88	-		
					90	-		
R-10		5.00		93%	92		SS	Calcareous Sandstone
					94	-		
					96	-		
					98	-		
					100	-		
R-11		5.00		85%	96	-	LS	Limestone
					98	-		
					100	-		

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-11 (Cont.) R-12		9.90		94%	100	—		
					102	—		
					104	—		
					106	—		
					108	—	LS	Medium to dark gray, bedded limestone.
					110	—		
R-13		10.00		90%	112	—		
					114	—		

S = Split-Spoon

R = Rock Core

BGS = Below Ground Surface

LOG OF CORE MW-16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rod %	Depth (ft)	Fract	Rock Class	Rock Description
R-13 (Cont.)					116	+		
					118	X		
					120	/		
R-14		10.00		88%	122	X	LS	Medium to dark gray, fine-grained, medium bedded limestone.
					124	I		
					126	/		
					128	+		
					130	-		
Ended rock core at 130.5 ft.								

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF BORING MW-17

EA Engineering, Science, and Technology

MW-12 is located along Jordan Road right-of-way
approximately 500 ft southwest of the landfill

Surface Elevation: 712.3 ft above sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Benchmark; metal plate
located 100 ft northeast of landfill

Start Date: 15 September 1993
Completion Date:

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem
augers for soil boring; 4-in. spin casing for coring

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer
falling 30 in. for soil boring; NQ core barrel for rock coring

Surface Conditions: Gravel driveway

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
					0		FILL	Railroad Spur Base
					2			Former railroad spur base; no split-spoon samples obtained from 0-3 ft.
S-1		1.3	3	19	4	0	CL	Silty Clay
				16				Red-brown silty clay, stiff dry.
S-2		1.7	5	9	6	0		Red-brown silty clay, medium stiff dry-moist.
				17				
				19				
S-3		2.0	7	6	8	0		Red-brown clayey silt, moist, 0.5 in. fine sand layer with some silt.
				8				
				11				
				9				
S-4		2.0	7	6			ML/CL	Silt and Clay
				7				Brown silt and clay, trace-little fine sand, trace angular gravel, mottled, moist-wet.
					10			

S = Soil Boring
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-4 (Cont.)				8	10	0		
				8				
S-5		2.0	91	3			CL	Brown silty clay, moist to wet.
				3				
					12	0		
				5				
				7				
S-6		2.0	11	7				Brown silty clay, coarse.
				7				1 in. coarse sand and gravel layer (14 ft).
					14	0		Maroon clay with silt, wet.
				7				
				5				
S-7		2.0	15	3				Maroon clay with some silt, trace sand, moist.
				6				
					16	0		
				7				
				5				
S-8		2.0	17	3				Maroon clay with some silt, trace sand, moist.
				3				
					18	0		
				5				
				7				
S-9		2.0	17	3				
				5				
					20	0		
				6				
				7				
S-10		2.0	21	4				Maroon clay with some silt, trace sand, moist.
				5				
					22	0		
				5				
				8				
S-11		2.0	21	5				Maroon clay with some silt, trace to little sand, trace angular gravel.
				5				
					24	0		
				8				
				8				

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-12		2.0	25	5	26	0	CL	Maroon clay with some silt, some angular gravel, moist.
S-13		1.3	25	9	28	0		
				8	28	0		
				45				
				100/3			SP	6 in. medium sand, damp.
								Auger refusal at 29.0 ft BGS, ended soil boring.
					30			
					32			
					34			
					36			
					38			
					40			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
					26			
					28			
								Set spin casing at 29.5 ft. Start rock core 8 September 1993.
R-1		1.80		0%	30	X	LS	Broken, highly fractured, dark gray limestone. Occasional chert layers.
						X		
						X		
R-2		1.90		0%	32	+		
						+		
						*		
						+		
R-3		6.40		73%	34	X	LS	Medium to dark gray, fine-grained, massive to faintly bedded, limestone, chert layers. Occasional thin layers of shaley limestone
						X		
						X		
					36	X		
						X		
					38	+		
						+		
						+		
					40	+		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-3 (Cont.) R-4		9.90		96%	40			
					42			
					44			
					46		LS	Light to dark gray, fine-grained medium bedded limestone.
					48			
					50			
R-5		9.70		88%	52			
					54			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-5 (Cont.)					56	—		
					58	—	LS	Medium gray, fine-grained, medium bedded limestone.
					60	—		
R-6		9.70		94%	62	—		
					64	—		
					66	—		
					68	—		Reamed hole to 67.5 ft, set 3-in. spin casing in bentonite.
					70	—		

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-6 (Cont.) R-7		4.90		70%	70			
					72	/		
							LS	
					74			
						—		
						—		
R-8		10.00		78%	76			
					78			
					80			
					82			
					84			

Medium gray, fine-grained, medium bedded limestone. Occasional zones of black shaley limestone.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-8 (Cont.)								
R-9		10.00		50%	86		LS	Dark gray, fine-grained, bedded limestone. Occasional areas of secondary pyrite and thin shaley limestone.
					88			
					90			
					92			
					94			
R-10		2.00		85%	96		SS	Calcareous Sandstone
								Light gray, medium to coarse-grained calcareous sandstone.
R-11		8.00		89%	98			
					100			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF CORE MW-17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description	
R-11 (Cont.)					100		SS	Light gray to whitish fine medium-grained sandstone.	
					102				
					104				
					106				Ended rock core at 105.5 ft.
					108				
110									
112									
114									

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING MW-18

EA Engineering, Science, and Technology

MW-18 is located approximately 125 ft north of
sanitary sewer leachfield

Surface Elevation: 679.50 ft above mean sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Benchmark; metal plate
located 100 ft northeast of landfill

Start Date: 7 June 1993
Completion Date: 7 June 1993

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem
augers for soil boring; 4-in. spin casing for coring

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer
falling 30 in. for soil boring; NQ core barrel for rock coring

Surface Conditions: Road built into low-lying wet area

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
					0		ROAD BASE	Gravel road to 2 ft; no split-spoon obtained from 0-2 ft.
S-1		1.0	2	3	2	0	SM	Silty Sand
				5				Silty sand, light brown mottled dark brown, trace clay and gravel, wet to moist.
				3				
S-2		1.3	4	2	4	0		Silty sand from 4 to 5 ft as above, wet.
				3				
				4			CL	Clay
				5				Clay, reddish brown, dense.
S-3		1.5	6	2	6		ML	Gravelly Silt
				2		1		Gravelly silt, brown, loose, trace clay, saturated.
				8/30				
S-4		2.0	8	4	8	3	GM	Silty Gravel
				12				Gravel, gray brown, silty loose, saturated.
				18/32				
					10			Split-spoon refusal at 9.6 ft, ended soil boring.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-18

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1		4.75		63%	10			
					12		LS	Set spin casing at 11.5 ft. Start rock core 9 June 1993. Medium to dark gray, fine-grained, medium bedded limestone.
					14			
					16			
R-2		4.60		82%	18			
					20			
R-3		4.25		70%	22			Light to medium gray, fine-grained limestone.
					24			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE MW-18

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-3 (Cont.)					26			Ended rock core at 26.5 ft.
					28			
					30			
					32			
					34			
					36			
					38			
					40			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING EAP-01

EA Engineering, Science, and Technology

EAP-01 is located west of Skaneateles Creek and approximately 50 ft northwest of MW-02D

Surface Elevation: 702.70 ft above mean sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Benchmark; metal plate located 100 ft northeast of landfill

Start Date: 18 December 1991

Completion Date: 23 December 1991

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem augers for soil boring; 4-in. spin casing for coring

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in. for soil boring; NQ core barrel for rock coring

Start Date: 13 December 1991

Surface Conditions: Grass

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description	
S-1		0.7	0	4	0	0	FILL	Sandy Silty Gravel	Brown gravel, little sandy silt, dry.
				4					
				6					
				8					
S-2		1.2	0	4	2	2	CL	Gravelly Clay	Brown clay, little fine gravel, dry.
				6					
				7					
				7					
S-3		0.0	0	3	4	4			No sample recovery.
				1					
				2					
				2					
S-4		1.8	0	1	6	3.4	ML	Silt	Dark brown silt, very soft, moist to wet.
				1					
				1					
				2					
S-5		1.9	0	3	8	4.6			Dark brown silt, moist to wet.
				2					
				1					
				2					
				2	10		OL	Organic Silt	Dark brown silt and wood, peaty mixture, very soft, moist to wet.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING EAP-01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6-in	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-6		0.3	0	4	10	0	ML	Silt
				3	11			
				3	12			
				12	12			
					12.5		Limestone	Auger refusal at approximately 12.5 ft BGS, ended soil boring.
					14			
					16			
					18			
					20			
					22			
					24			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING RP-03

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Fract.	Rock Class	Rock Description
R-1		0.75		0%	22			
					24			
R-1		0.75		0%	26	* X	LS	Limestone bedrock encountered at 25.5 ft BGS. Set spin casing at 25.5 ft, start rock coring 6 January 1992.
					28			Cherty, fine-grained, dark gray, moderately hard, very slight weathering.
R-2		4.80		80%	30			Reamed borehole to 30 ft BGS to set 4-in casing.
					32	 =		Dark gray, fine grained, massive limestone.
		4.80		80%	34			
								Ended rock coring at 35.5 ft BGS.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE EAP-01

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Rock Class	Rock Description
R-1		2.92	12	87%	10		
					12	Limestone	Cherty, fine-grained, dark gray, compact, massive limestone, very slight weathering, brown silt in fractures, small amounts of chert throughout. Fractures mainly horizontal.
R-2		3.67		86%	14		
					16		
					18		Water bearing fracture at 17.5 ft BGS 4-in in length.
R-3		2.58		86%	20		Cherty, fine-grained, dark gray, compact, massive limestone, brown silt in fractures. Fractures mainly horizontal.
					22		
					24		Ended coring at 23 ft BGS.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING EAP-02

EA Engineering, Science, and Technology

EAP-02 is located west of Skaneateles Creek and immediately east of the former Operations Plant

Surface Elevation: 691.20 ft above mean sea level
Reference Elevation: 706.40 ft above mean sea level
Reference Description: Benchmark; metal plate located 100 ft northeast of landfill

Start Date: November 1991
Completion Date: November 1991

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Mobile B-57/B-61 drill rig with 4.25-in. hollow-stem augers for soil boring; 4-in. spin casing for coring

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in. for soil boring; NQ core barrel for rock coring

Surface Conditions: 4-in. concrete pad

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
S-1		0.4	0	9	0		FILL Gravelly Silt and Fill	Reddish brown silt and fill, fine to coarse gravel, moist, medium dense.
				11				
				13				
				16	2			
S-2		0.6	0	7			Sandy Gravelly Cobbley Silt and Fill	Dark brown sandy silt with coarse fractured gravel/cobbles, little red fractured brick, medium dense, moist.
				8				
				10				
				5	4			
S-3		0.3	0	13			Gravelly Sand	Black fine to coarse sand and fine gravel, wet, loose.
				3				
				3				
				4	6			
S-4		0.2	0	5			Silty Gravelly Sand	Dark brown fine to coarse sand with some silt and fine gravel, very loose, wet.
				0				
				0				
				1	8			
S-5		0.0	0	100/0				Spoon refusal, no sample return.
								Auger refusal at 9 ft BGS, ended soil boring.
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF CORE EAP-02

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Rqd %	Depth (ft)	Rock Class	Rock Description
R-1		3.33		75%	8		
					10	Limestone	Limestone - Cherty, hard, fine-grained, massive dark gray, brown silt in fractures, fractures mainly horizontal, lenses of chert. Vertical fracture at 10.5 ft BGS. Solid rock for 1.5 ft beginning at 10.5 ft BGS.
R-2		3.00		89%	12		
					14		Limestone - Cherty, hard, fine-grained, massive dark gray, brown silt in fractures, fractures mainly horizontal, lenses of chert.
R-3		3.58		80%	16		
					18		Water bearing zone at 16.5 ft BGS with moderately severe weathering.
					20		Ended rock coring at 20 ft BGS.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING RP-03

EA Engineering, Science, and Technology

RP-03 located immediately north of chain link fence
in south central portion of landfill.

Surface Elevation: 703.89 ft above mean sea level.

Reference Elevation: 706.40 ft above mean sea level.

Reference Description: Bench mark; metal plate located
100 ft northeast of landfill.

Start Date: 19 December 1991

Completion Date: 6 January 1992

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 6.25-in. I.D.
hollow-stem augers for soil boring and 4-in. spin casing for coring.

Sampling Method: 2-in. I.D. split-spoon driven by a 140-lb hammer
falling 30-in. for soil boring, HQ core barrel spin casing for coring.

Surface Conditions: Grassy area

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/ft-in	Depth (ft)	HNu (ppm)	Soil Class	Soil Description
					10			No split spoon samples taken from 0-10 ft BGS due to previous sampling done in the original RP-3.
S-1		0.8	10	27		3	FILL	Medium brown silty clay, trace coarse sand and fine gravel and thin piece of metal, wet, hard.
				50/5				
S-2		0.9	10	10		2.6		Brown silty clay and fill similar to S-1.
				12				
S-3		0.4	12	21	12	3.8		Medium brown silty clay, trace coarse sand and fine gravel and organic matter, wet, hard.
				57/6			ML	Gravelly Silt
								Gray silt and fine to coarse gravel, little fractured boulders, very dense.
S-4		2.0	14	63	14	15.2		Gray silt fine to coarse gravel, little fractured boulders, very dense.
				44				
				56				
				45				
S-5		0.0	16		16	10.4		No sample obtained, sandy gravel blow-in inside of augers.
					18			Split-spoon sampling attempted as augers advanced to top of rock, however, no representative sample obtained because of sandy material inside of augers.
					19			
					20			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB26

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 23 October 1991

Completion Date: 23 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 In.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.7	4	20	0	0	CL CAP	No split-spoon collected clay cap (0-4 ft).
					2			
					4			
					42			
S-2		0.3	4	3	25	130	Silt and fill	Black silt with trace fine to coarse sand, moist.
					18		Fill	Black granular waste, moist.
					3			Black stained silty gravel, wet.
					30			
				26	8			Ended boring at 8 ft BGS.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB27

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 23 October 1991

Completion Date: 23 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		1.2	4	12	0	400	CL CAP Clay	No split-spoon sample collected in clay cap from 0-4 ft.
					2			
					4			
					15		FILL Fill	Pinkish white powdery substance contained in a half-crushed steel drum, dry.
					26		300	Black granular waste.
				32	6			Ended boring at 6 ft BGS.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB24

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		1.2	11	13	10			
				20				
				11		0		Dark brownish black wet silt with some white and orange dry granular powder.
				13		3	ML	Sandy silt
S-7		1.0	13	20	12			Brown silt with some fine to coarse sand, little fine to coarse gravel, moist.
				32				
				7		0	CL	Clayey silt
				15				Maroonish brown clayey silt, dry.
S-8		1.0	13	10	14			
				6		0	SM	Silty sand
				8				Brown fine sand and silt with little medium to coarse sand, trace fine to coarse gravel, wet.
				11		0	ML	Sandy silt
S-9		1.0	13	8	16			Brown silt with some fine to coarse sand, trace fine gravel, wet.
				10				
				8		0		Brown clayey silt with trace fine to coarse sand, wet to moist.
				11				
				20	18			
				50/3				Spoon refusal at 18.75 ft BGS, ended boring.
					20			
					21			
					22			
					23			
					24			
					25			

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF BORING SMC-SB25

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25 in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 23 October 1991

Completion Date: 23 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.1	0	3	0	0	Topsoil	Dark brown silt with trace roots, moist.
				10				
				15		0	CL CAP	Maroon silty clay with trace fine to coarse sand, moist.
				14				
S-2		1.5	0	10	2	0		Maroon silty clay with trace fine to coarse sand, moist.
				17				
				15				
				58		0	FILL	Dark brown clayey silt to silt with trace to little fine to coarse sand, moist discolored.
S-3		0.2	4	12	4	0	Clayey silt	Cobbles
				50/0				
S-4		0.0	5	100/3				No sample recovery.
S-5		0.3	6	85	6	6	Sandy gravelly silt	Black silt with some fine to coarse sand, little fine to coarse gravel, wet.
				100/0				
S-6		0.5	7	5		13	Silty gravel	Black silty gravel, very wet, highly saturated, loose.
				4				
				7	8			
				50/2				
S-7		0.3	7	25		3	Gravelly silt and fill	Black silt and gravel and waste, very wet, highly saturated.
				50/2				
					10			Spoon refusal at 9.7 ft BGS, ended boring.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB23

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description	
S-7		2.0	10	15	10	0	CL	Silty clay	Maroonish brown silty clay, tight, moist to dry.
				32					
				41					
				30					
S-8		2.0	10	23	12	0			Maroonish brown silty clay with trace coarse sand, tight, moist to dry.
				27					
				36					
				31					
S-9		1.5	10	21	14	0			Maroonish brown silty clay with trace coarse sand, tight, moist to dry.
				28					
				26					
				26					
					16				Ended boring at 16 ft BGS.
					18				
					20				
					21				
					22				
					23				
					24				
					25				

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF BORING SMC-SB24

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 23 October 1991

Completion Date: 23 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	0	3	0	0	Topsoil	Dark brown silty loam with trace roots, moist.
				7				
				8			CL CAP Silty clay	Maroonish brown silty clay with trace fine to coarse sand, stiff, moist.
S-2		1.0	0	8	2	0		
				6				Maroonish brown silty clay with trace fine to coarse sand, stiff, moist.
				10				
				13			0 FILL Sandy silt	Brownish gray silt with some fine to coarse sand, moist, discolored.
S-3		0.4	5	13	4	0	Fill	Wood at 4 ft BGS.
				23			Silt and fill	Black silt and wood, wet.
				16	6			
S-4		2.0	5	10		3		
				5				
				8				Black silt with little wood splinters, white granular powder, plastic, trace fine to coarse sand, wet.
				13	8			
S-5		0.3	9	7		0		
				10	10			Dark brownish black wet silt with some white and orange dry granular powder.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

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LOG OF BORING SMC-SB22

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	H _{Nu} (ppm)	Soil Class	Description
S-7		1.0	10	42	10	0	ML	Brown clayey silt with little to some fine to coarse sand, little fine to coarse gravel, stiff, moist to dry.
				21				
				30				
				49				
S-8		0.0	12	77	12	0		No sample recovery
				49				
				50/3				Ended boring at 13.25 ft BGS.
					14			Installed landfill piezometer LFP-01. 2-in. stainless steel well screen set from 4.0 to 9.0 ft BGS.
					16			
					18			
					20			
					21			
					22			
					23			
					24			
					25			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB23

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

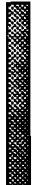
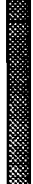
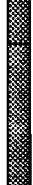
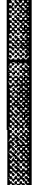
Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 23 October 1991

Completion Date: 23 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		1.3	0	5	0	0	Topsoil	Dark brown silty loam with trace fine to coarse sand and roots, moist.
				11	1		CL CAP Silty clay	Maroonish brown silty clay with trace fine to coarse sand, moist.
				12	2			
S-2		1.0	0	6	2			Maroonish brown silty clay with trace fine to coarse sand, moist.
				7	3			
				11	4	0	FILL Sandy silt	Dark brown and green mottled silt with little to some fine to coarse sand, moist, tight.
S-3		1.3	4	12	4	0	Silty clay and sandy gravel	Dark brownish ^a gray silt with little fine to coarse sand interbedded with brown silty clay, moist, wet at 6 ft BGS, stained.
				12	5			
				13	6			
S-4		0.6	6	22	6	0		Brown silty clay interbedded with cobbles and fine to coarse gravel, some fine to coarse sand, wet.
				31	7			
				100/3	8			
S-5		0.5	8	10	8	1	Fill and sandy silt	Fibrous wood and silt and fine to coarse sand, wet.
				12	9			
				13	10	0	Silty gravel	Dark brown fine to coarse gravel and fine to coarse sand with little to some silt, wet.
				32	10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB21

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu ppm	Soil Class	Description
S-7		0.8	11.5	13	10	0.2	FILL	
				20				
				30				
				13	12			
				22				
S-8		2.0	12.5	38		0	CL Silty clay	Maroon silty clay, dry, stiff.
				46				
				36	14			
S-9		0.3	12.5	42		0		Maroon silty clay, dry, stiff.
				35				
				100/0				Spoon refusal at 15 ft BGS, ended boring.
					16			
					18			
					20			
					21			
					22			
					23			
					24			
					25			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB22

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb h

Surface Conditions: Landfill

Start Date: 25 October 1991

Completion Date: 25 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		1.2	0	4	0	0	Topsoil	Dark brown silt with trace roots, moist.
				7		0	CL CAP Silty clay	Brown silty clay with trace fine to coarse sand, moist.
				8				
S-2		1.5	0	7				
				2		0		Maroonish brown silty clay with trace fine to coarse sand, moist.
				9				
S-3		0.8	4	10				
				11				
				21				
S-4		0.7	4	4		0.5	FILL Silt	Dark brown and gray mottled silt with trace fine to coarse sand, moist.
				5			Silty gravelly sand	Dark brown fine to coarse sand with some silt and little fine to coarse gravel, moist, wet beginning at 5 ft BGS.
				16				
S-5		0.3	7	11				
				9				
				6		1	Silty sand	Dark brownish black fine to coarse sand with some silt, trace fine gravel and debris, wet.
S-6		0.3	9	32				
				154				
				8		0	Silt and fill	Black silt and wood and white soft powder, wet.
S-6		0.3	9	5				
				8				
				4				
S-6		0.3	9	15				
				22		0		Black silt and wood and white soft powder, wet.
				120				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB20

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-7		0.5	11	2	10	7	FILL	Silt and fill
				1				
				11				
				96				
S-8		0.8	13	26	12	0	SM	Silty sand
				41				
				37				
				85				
S-9		0.5	14	50	14	0		
				100/0				
					16			
					18			
					20			
					21			
					22			
					23			
					24			
					25			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB21

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 22 October 1991

Completion Date: 22 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	0	4	0	0	topsoil	Dark brown silty loam, moist.
				6			CL CAP Silty clay	Maroonish brown silty clay with trace fine to coarse sand, moist.
S-2		1.3	0	5		0		
				5	2			Maroonish brown silty clay with trace fine to coarse sand, moist.
S-3		0.3	4	7		0		
				8				
S-4		0.3	5.5	14		1		
				26	4		FILL Silt	Dark brown and green mottled silt with trace fine to coarse sand, moist, discolored.
S-5		0.2	7.5	1		1	Silt and fill	Augers hit piece of steel from 5-5.5 ft BGS.
				14	6		Silt	Dark brown and green mottled silt with trace fine to coarse sand, moist, discolored.
S-6		0.3	9.5	39		0.5		
				10				
				11	8		Sandy silt	Black silt with little fine to coarse sand, wet.
				10				
				13				
				22				
				12				
				10				Black silt with little fine to coarse sand, wet.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB20

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 22 October 1991

Completion Date: 22 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		1.8	0	2	0	0	Topsoil	Dark brown silt with trace fine to coarse sand and roots, moist.
				3			CL CAP Silty clay	Maroonish brown silty clay with trace fine to coarse sand, moist.
				4				
				6				
S-2		1.2	0	12	2	0		Maroonish brown silty clay with trace fine to coarse sand, moist.
				11				
				19				
				26			FILL Silt and fill	Grayish black silt with some wood, trace fine to coarse sand, color grades to completely black, discolored, moist.
S-3		0.2	3	23	4	12		Wood and black silt, glass, plastic sheets, moist.
				100/0				
S-4		1.0	5	14		12	Sand and fill	White fine to medium sand with trace black cloth, moist to wet.
				27				
				18	6			
				10				
S-5		0.1	7	10		8		Black silt.
				11				
				27	8			
				100/4			Silt	Black silt, wet.
S-6		1.1	9	2		7	Silt and fill	Black silt with trace plastic and rags and other debris, stained, wet, soft.
				2				
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB18

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-7		0.5	10	11	10	9.0	FILL	Silty sand and fill
				30				
				16				
				32				
S-8		1.0	12	50	12	3.0		Dark brown silt with some fine to coarse sand and little fine to coarse gravel, wet.
				46				
				41				
				50/2				
					14			Spoon refusal at 13.7 ft BGS, ended boring.
					16			
					18			
					20			
					21			
					22			
					23			
					24			
					25			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB19

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 28 October 1991

Completion Date: 28 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.0	0	3	0	0	Topsoil	Dark brown silt with trace roots, moist.
				4				
				5		0	CL CAP	Brown clay with trace fine to coarse sand, moist, tight.
S-2		0.7	0	5				
				5	2			
				8		0		Brown clay with trace fine to coarse sand, moist, tight.
				10				
S-3		0.8	4	10				
				10	4	140	FILL	Black granular waste, moist.
				11				
				11				
S-4		0.0	4	9				
				6		21		No sample return.
				47				Metal fragment from steel drum came out of borehole.
				5				
S-5		0.0	8	8				
				12				No sample return, wet.
				5				
				27				
				50/2				Split spoon bouncing on spongy substance (spoon refusal).
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB17

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		0.5	10	17	10		FILL	Black silt, stained, wet.
				13		3.0		
				15				
				24				
S-7		1.2	12	8	12		CL	Maroonish brown clay with trace fine to coarse gravel.
				6		0	Clay	
				8				
				6				
S-8		1.0	12	5	14		SM	Grayish brown coarse to fine sand with some fine to coarse gravel, some silt, wet.
				9		0	Gravelly silty sand	
				24				
				12				
S-9		0.0	12	6	16			No sample return.
				9				
				8		0		
				15				
S-10		1.0	12	3	18			Grayish brown coarse to fine sand and fine to coarse gravel, little to some silt, wet.
				5		0		
				10				
				100/0				Spoon refusal at 19.5 ft BGS, ended boring.
					20			
					21			
					22			
					23			
					24			
					25			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB18

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 22 October 1991

Completion Date: 22 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.7	0	5	0		Topsoil	Dark brown silt with trace fine to coarse sand and roots, moist.
				12		0		
				22			CL CAP	
				32			Silty clay	Maroonish brown silty clay with trace fine to coarse sand, moist.
S-2		1.2	0	8	2		Clayey silt	Maroonish brown clayey silt and fine to coarse sand, moist.
				16		0		
				15				
				23				
S-3		0.5	4	1	4		FILL	Dark brown fine to coarse sand and clayey silt, trace fine to coarse gravel, moist, discolored.
				2		1.0	Clayey silty sand	
S-4		0.7	5	3			Silty sand and fill	Dark brown fine to coarse sand and silt with trace fine to coarse gravel and wood, moist, discolored.
				2				
				2	6			
				28		2.0		
S-5		0.2	5	10				Dark brown sand and silt with trace fine to coarse gravel, wet.
				36				
				100/0	8			
S-6		1.3	9	13		20.0		Dark brown fine to coarse sand and silt, wet.
				15				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB16

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	Soil Class	Description
S-7		0.2	11	29	10	0 CL	Silty clay
				52	2.0		
				17			
				27			
				33	12		
S-8		2.0	11	16		0 GM	Silty sandy gravel
				27			
				43			
				13	14		
				17			
S-9		1.2	11	15		SM	Silty sand
				12			
				12	16		
				11			
				15/0			
S-10		0.0	11				Spoon refusal at 17.1 ft BGS, ended boring.
					18		
					20		
					21		
					22		
					23		
					24		
					25		

S = Split-Spoon
 R = Rock Coring
 BGS = Below Ground Surface

LOG OF BORING SMC-SB17

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 21 October 1991

Completion Date: 21 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description	
S-1		1.2	0	3	0	0			
				5			Topsoil	Dark brown silt with trace fine to medium sand and roots, moist.	
				7			CL CAP	Clay	Maroonish brown clay with trace fine to coarse sand, moist.
				7					
S-2		1.7	0	6	2	0		Maroonish brown clay with trace fine to coarse sand, moist.	
				13					
				13					
				14			FILL	Sandy gravelly silt	Grayish green silt with some fine to coarse sand, little fine to coarse gravel, moist, stained.
S-3		1.1	4	6	4	0		Grayish green silt with some fine to coarse sand, little fine to coarse gravel, moist, stained.	
				6					
				5			Silt and fill	Black silt, plastic, debris, wet beginning at 5.5 ft BGS.	
				10					
S-4		0.3	6	8	6	0		Gray silt with some fine to coarse sand, trace fine to coarse gravel, stained, wet.	
				2					
				2					
				4					
S-5		0.7	8	3	8	2.0		Black silt, stained, wet.	
				8					
				63					
				34					
					10				

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB15A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENEC Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grass

Start Date: 18 October 1991

Completion Date: 18 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		2.0	0	5	0		FILL	Topsoil
				8				
				8				
				10				
S-2		1.0	0	5	2		SM	Sandy, gravelly silt
				4				
				4				
				3				
S-3		0.5	0	3	4		ML	Gravelly, clayey silt
				3				
				5				
				5				
S-4		0.5	0	5	6			
				6				
				14				
				26				
S-5		0.5	30	24	8		GP	Gravel
				29/3				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB16

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Landfill

Start Date: 18 October 1991

Completion Date: 18 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	NHu (ppm)	Soil Class	Description
S-1		1.2	0	2	0	0	Topsoil	Dark brown silty loam, roots, trace gravel.
				8				
				7			CL CAP Silty clay	Reddish brown silty clay with trace to little gravel, stiff, moist to dry.
S-2		1.5	0	6	2	0		
				4				Reddish brown silty clay with trace to little gravel, stiff, moist to dry.
				5				
S-3		0.4	4	14		0	Clayey silt and fill	Dark green/gray mottled clayey silt with some gravel and cobbles, piece of pale yellow granular solid, stiff, dry.
				21	4			
				10			FILL Silty clay	Brown silty clay with little fine to coarse sand, trace fine gravel, moist.
S-4		0.4	4	18		0		
				28				
				28	6		Silty sand and fill	Dark brown fine to coarse sand with some silt, plastic, white granular solid, trace fine gravel, wet
S-5		0.3	7	50/0		0		
				17			Silty clay and fill	Dark brown silty clay with some glass, trace fine to coarse sand, wet, tight.
				98	8			
S-6		0.2	9	4		3.0		
				14				
				25			Silt and fill	Dark brown silt with wood and waste.
				23				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB13B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. I.D. split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		0.5	0	3	0	0	Topsoil	Dark brownish maroon silt with trace roots, moist.
				5	1			
				5	2	0	CL CAP	Maroonish brown silty clay with trace fine to coarse sand, moist
				5	3	0	Silt	Dark brown silt with trace fine to coarse sand, moist.
S-2		1.3	0	4	2	0	SM	Dark brown fine sand and silt with trace medium to coarse sand and fine to coarse gravel, wet from 3.5 to 4 ft BGS.
				4	3			
				4	4			
				5	5			
S-3		1.1	0	4	4	0		Dark brown fine sand and silt with trace medium to coarse sand and fine to coarse gravel, wet.
				4	5			
				7	6			
				8	7			
S-4		1.3	0	7	6	0	ML	Grey/green clayey silt, wet.
				8	7			
				8	8			
				12	8			Ended boring at 8 ft BGS.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB14A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. I.D. split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 18 October 1991

Completion Date: 18 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		0.1	0	4	0		Topsoil	Dark brown silt with trace roots.
				4			CL CAP Clay	Red brown silty clay.
				3				
				4				
S-2		0.8	0	3	2	0	FILL	Brownish gray clayey silt with trace fine to coarse sand and brick fragments and glass and black granular fill, moist.
				3				
				1				
				7				
S-3		1.3	0	7	4	0.5	Silt	Brownish gray silt, wet.
				9		1	Silty sand	Dark brown fine to coarse sand and clayey silt with trace fine to coarse gravel, trace limestone, brick and cobbles, moist.
				9				
				15				
S-4		1.3	0	7	6	0		Dark brown fine to coarse sand and clayey silt with trace fine to coarse gravel, trace limestone and brick cobbles, moist to wet.
				15				
				48				
				50/4	8			Spoon refusal at 8 ft BGS.
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB12B

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		1.7	0	7	10	0	ML/CL	Clayey silt
				9				Dark brown clayey silt with little fine to coarse sand and trace fine to coarse gravel interbedded with brown clay, non-vertical bedding planes, tight, moist to wet.
				12				
				13				
S-7		1.0	0	35	12	0		Dark brown clayey silt with little fine to coarse sand and trace fine to coarse gravel interbedded with brown clay, non-vertical bedding planes, tight, moist to wet.
				19				
				24				
				26				
S-8		0.2	0	8	14	0	GM	Sandy, silty gravel
				9				Dark brown fine to coarse angular gravel with little fine to coarse sand and silt, wet, loose.
				7				
				8				
S-9		0.7	0	7	16	0		Dark brown fine to coarse angular gravel with some coarse to fine sand, little silt, wet, loose.
				9				
				6				
				6				
S-10		0.7	0	13	18	0	GP	Dark gray fine to coarse angular limestone gravel.
				16				
				31				
				23				
					20			Ended boring at 20 ft BGS.
					21			
					22			
					23			
					24			
					25			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description	
S-1		0.9	0	5	0				
							Topsoil	Dark brown silt with trace roots, moist.	
				5		CL CAP	Silty clay	Maroonish brown silty clay with trace fine to coarse sand, tight, moist.	
5									
S-2		1.1	0	7			FILL	Silt	Dark brown silt with trace fine to medium sand, trace roots, moist.
				9	2				Dark brown silt with trace fine to medium sand, trace roots, moist.
				39					
				13			Cobble	Cobble of limestone	
				11			Silt	Dark brown silt with trace fine to medium sand, trace roots, moist.	
S-3		0.8	0	7	4			Silty sand	Dark brown fine to coarse sand with little to some silt, moist, slightly stained.
	7								
	5					Clayey silt	Dark brown silty clay with trace fine sand, stained black, wet.		
	5								
S-4	1.3	0	2	6		CL	Silty clay	Dark brown silty clay with trace fine sand, wet.	
			3						
			7						
			5						
			8			Clay	Maroonish brown clay, tight, wet.		
							Ended boring at 8 ft BGS.		
					10				

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EA Engineering, Science, and Technology

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

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S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB12B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		0.7	0	4	0	0	Topsoil	Dark brown silt with trace fine to coarse sand, moist.
				4				
				5			CL CAP Silty clay	Maroonish brown silty clay with trace fine to coarse sand, moist, tight.
S-2		1.2	0	7				
				4	2	0		Maroonish brown silty clay with trace fine to coarse sand, moist, tight.
				5				
S-3		1.2	0	6				
				8	4	0	Silty sand	Dark brown silty clay with trace fine to coarse sand, moist.
				4				Dark brownish grey fine to coarse sand with little to some silt and fine gravel, moist.
S-4		1.3	0	3				
				3				
				4	6	0	Silty sand	Dark brown/green/yellow mottled fine to coarse sand with some silt, moist, stained.
S-5		1.6	0	6				
				6				
				6	8	0	Sandy, clayey silt	Dark brown/brown mottled clayey silt and fine to coarse sand with trace fine to coarse gravel, stained, wet at 7 ft BGS.
				5				
				9				
				10				
				11				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB11B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01.03NY

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.0	0	3	0			
					5		Topsoil	Dark brown silt with trace roots, moist.
					6		CL CAP Clay	Maroon/dark brown mottled clayey silt to silt with trace fine to coarse sand, moist.
S-2		1.1	0	4	2			
					7			
					8			
					13			
S-3		0.9	0	12	4		SM Silty sand	Dark brown fine to coarse sand with little to some silt, trace fine to coarse gravel and cobbles, moist.
					11			
					7			
					9			
S-4		1.1	0	8	6			
					8			Dark brown fine to coarse sand with little to some silt, trace fine to coarse gravel and cobbles, moist.
					8		ML Clayey silt	Dark brown clayey silt with trace fine to coarse sand, wet.
					8			
S-5		1.0	0	5	8			
					8			Dark brown clayey silt with trace fine to coarse sand, wet.
					7		CL Clay	Maroonish brown clay, tight, moist.
					8			

R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB11B

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		0.5	0	6	10		GM	Dark brown fine to coarse gravel with some fine to coarse sand, little silt, wet, loose.
				7				
				8				
				12				
				12				
				14				
				16				
				18				
20								
21								
22								
23								
24								
25								Ended boring at 12 ft BGS.

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB10B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		0.7	0	4	0	0	Topsoil	Dark brown silt with trace fine to coarse sand and fine to coarse gravel, moist, tight.
				4			CL CAP	Maroonish brown silty clay with trace fine to coarse sand, moist, tight.
				5				
				5				
S-2		0.8	0	7	2	0		Maroonish brown silty clay with trace fine to coarse sand, moist, tight.
				12				
				12				
				7				
S-3		0.8	0	4	4	0	FILL	Dark brown fine to coarse sand and silt, moist, stained.
				4		0	Fill	White granular powder, moist, loose.
				15				
				13	6			Ended boring at 6 ft BGS.
					8			
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB11A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 In.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.0	0	3	0		Topsoil	Dark brown silt with trace roots, moist
				8				
				6			CL CAP Silty clay	Maroon silty clay with trace fine to coarse sand, moist.
S-2		0.5	0	12	2			
				6				Maroon silty clay with trace fine to coarse sand, moist.
				10				
S-3		0.5	0	11	4		FILL Gravelly sand	Cobble at 3.5-4 ft BGS.
				9				Dark brown fine to coarse sand with little fine to coarse gravel and silt, moist.
				6				
S-4		1.3	0	5	6			
				4			Silty, gravelly sand	Dark brownish gray fine to coarse sand and silt with trace fine to coarse gravel and metal and debris, moist, wet beginning at 8 ft BGS.
				18				
				9				
				9				
					8			Ended boring at 8 ft BGS.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB10A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30-in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		2.0	0	4	0	0		
							Topsoil	Dark brown silt with trace fine to coarse sand and fine to coarse gravel, moist, tight.
					6		CL CAP Silty clay	Maroonish brown silty clay with trace fine to coarse sand, moist, tight.
S-2		0.9	0	10	2	0		
					9			
					8			Maroonish brown silty clay with trace fine to coarse sand, moist, tight.
S-3		0.9	0	6	4	0		
					7			
					9			Maroonish brown silty clay with trace fine to coarse sand, moist, tight.
S-4		0.7	0	9	6	0	ML	
					9		Silt	Dark brown silt, wet, stained.
					7			Dark brown clayey silt with trace fine to coarse sand and fine gravel, wet.
S-5		1.2	0	5	8	0		
					7			
					11			Dark brown/green/maroon mottled clayey silt with little to some fine to coarse sand, trace fine gravel, trace wood, wet.
				21				
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB10A

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		0.3	0	12	10	0	CL	Sandy, silty clay
				8				Dark brown silty clay and fine to coarse sand with little fine to coarse gravel, wet.
				7				
				15				
S-7		1.2	0	13	12	0		Dark brown silty clay with some fine to coarse sand and little fine to coarse gravel, wet.
				12				
				14				
				16				
S-8		0.5	0	11	14	0		Dark brown silty clay with some fine to coarse sand and little fine to coarse gravel, wet.
				17				
				22				
				100/0				Spoon refusal at 15.5 ft BGS, ended boring.
					16			
					18			
					20			
					21			
					22			
					23			
					24			
					25			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB09B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.2	0	2	0	0	CL CAP	Topsoil
				3				Silty clay
				4				
				5				
				6				
S-2		1.2	0	3	2	0		Maroonish brown clay with trace fine to coarse sand, trace fine to coarse gravel from 3.5-4 ft BGS, moist.
				8				
				9				
				6				
				4				
S-3		0.2	0	11	4	3.0	FILL	Sand and fill
				12				Dark brown fine to coarse sand with some silt, little black and white granular solid waste, loose, wet.
				7				
				5				
				6				
					8			Ended boring at 6 ft BGS.
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

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LOG OF BORING SMC-SB08C

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		2.0	0	6	0	0	Topsoil	Dark brown silt and fine sand with trace medium to coarse sand, moist.
				8				
				13			CL	Maroonish brown silty clay with trace fine to coarse sand and fine to coarse gravel, moist.
				16				
S-2		0.7	0	21	2	0		Maroonish brown silty clay with trace fine to coarse sand and fine to coarse gravel and limestone cobbles, moist.
				28				Dark brown and maroon mottled clay with trace fine to coarse gravel, moist.
				50/2				Spoon refusal at 3.2 ft BGS, ended boring.
					4			
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB09A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ICI Americas Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25 in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 17 October 1991

Completion Date: 17 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	0	3	0	0	Topsoil	Dark brown silt, moist.
				3		0	CL	Maroonish brown silty clay with trace fine to coarse sand, moist.
				3				
S-2		1.3	0	2	2			
				5		0		Maroonish brown silty clay with trace fine to coarse sand, moist, wet, firm.
				6				
S-3		0.5	0	8				
				6	4	0		Maroonish brown silty clay with trace fine to coarse sand, moist.
				7				
S-4		1.0	0	9		0	ML	Sandy, clayey silt
				6	6			Dark brown clayey silt with some fine to coarse sand, moist.
				6				Dark brown clayey silt with little fine to coarse sand, wet, loose.
				8		0	SM	Silty sand
				100/0				Dark brown fine sand with some silt, trace medium to coarse sand, wet.
								Spoon refusal at 7 ft BGS, ended boring.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB08A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	0	2	0	0	Topsoil	Dark brown silt with trace fine to coarse sand, moist.
				3				
				5		0	CL CAP	Clay
				8				
S-2		0.5	0	12	2	0	FILL	Silty sand
				6				
				7				
				11				
S-3		1.0	0	8	4	5		Dark brown fine to coarse sand with little to some silt, trace wood and roots and fine gravel, moist, loose.
				3				
				4				
				25				
S-4		1.3	0	28	6	0	SM	Silty sand
				100/1				Brown fine to coarse sand with some silt, trace fine to coarse gravel, wet.
								Spoon refusal at 6.5 ft BGS, ended boring.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB07B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.1	0	3	0	0	FILL	
							Topsoil	Black silt, moist.
				5			Clay	Maroonish brown clay with trace fine to coarse sand, moist.
S-2		1.7	0	14		3		
				5	2			Maroonish brown clay with trace fine to coarse sand, moist.
				3				
				5			Silty sand	Dark brown fine to coarse sand and silt, wet.
				8			Fill	Black waste, stained, wet.
				5	4			Ended boring at 4 ft BGS.
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB07C

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.5	0	4	0			Dark brown silt, moist.
							0 FILL Topsoil 0 CL Silty clay	Maroonish brown silty clay with trace fine to coarse sand, moist to dry.
S-2		0.2	0	10	2			Brown silt and fine to coarse sand with trace fine to coarse gravel, moist.
							0 ML Sandy silt 0 GM Gravel	Dark brown fine to coarse gravel with trace fine to coarse sand and silt, wet
				12/6				Spoon refusal at 3 ft BGS, ended boring.
					4			
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB06A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.4	0	4	0	0	ML	Clayey silt
				4				
				14			SP	Gravelly sand
S-2		1.0	0	30	2	0		
				14				
				17				
				20/1				
					4			
					6			
					8			
					10			
								Spoon refusal at 3.1 ft BGS, ended boring.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB07A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25 in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer driven 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	0	3	0	0	FILL	Maroonish brown silty clay with trace fine to coarse sand, moist.
				3				
				7				
				7				
S-2		0.8	0	6	2	0		Maroonish brown silty clay with trace fine to coarse sand, moist.
				10				
				5				
				7			ML	Dark brown and black mottle silt with trace fine to medium sand, moist to wet.
S-3		0.5	0	6	4	0	Sandy silt	Dark brownish black silt with some fine to coarse sand, wet.
				4				
				12/0				Spoon refusal at 5 ft BGS, ended boring.
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB05A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. I.D. split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.3	0	10	0	0	FILL	Dark brown fine to coarse sand with some fine to coarse gravel and little silt, moist to wet, stained black at 4 ft BGS.
				19			Gravelly, silty sand	
				13				
				14				
S-2		0.5	0	103/5*	2	0	Sandy silt	Dark brownish black silt and fine to coarse sand with trace fine to coarse gravel, stained, wet.
								Ended boring at 2.5 ft BGS.
					4			
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB04B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25 in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		1.9	0	32	0	0	Topsoil	Dark brown silt with trace fine to coarse sand, moist.
				60		0	FILL (road bed)	Dark brown coarse to fine gravel with some coarse to fine sand, little silt and cobbles, dry to moist.
				62				
				49				
S-2		1.8	0	19	2	0		Dark brown coarse to fine gravel with some coarse to fine sand, little silt and cobbles, dry to moist.
				15			Silt	Black silt, moist.
				14		3		
				16	4			Brownish black silt with trace fine to coarse sand, moist.
								Ended boring at 4 ft BGS.
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB04C

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description	
S-1		1.3	0	7	0	0	ROAD BASE	Sandy gravel	Dark brown fine to coarse sand with little to some silt, little fine to coarse gravel, wet.
				27			Clay	Brownish maroon clay, moist.	
				28			Gravelly sand	Brownish gray fine to coarse sand with some fine to coarse gravel, (limestone fragments), trace silt, moist.	
				9					
S-2		0.6	0	7	2	0	ML	Silt	Dark brownish black silt to clayey silt with trace fine to coarse sand and fine to coarse gravel, moist.
				8					
				8					
				9					
S-3		1.0	0	8	4	0		Clayey silt	Dark brownish black clayey silt with trace fine to coarse sand, moist.
				8					
				7			CL	Silty clay	Maroonish brown silty clay with trace fine to coarse sand, moist.
				10					
S-4		1.1	0	10	6	0	SM	Silty sand	Dark brown fine to coarse sand with little silt, moist to wet.
				6					
				5					
				5					
S-5		0.4	0	4	8	0		Clayey silty sand	Dark brown fine to coarse sand with some clayey silt, wet.
				4					
				5					
				7					
				10	0				Dark brown line to coarse sand with little silt, trace fine gravel, wet. Ended boring at 10 ft BGS.

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB03A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 15 October 1991

Completion Date: 15 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		1.4	0	30	0	0	Topsoil	Dark brown clayey silt to silty clay with trace fine to coarse sand and roots, moist.
				32			SM	Dark brown fine to coarse gravel and coarse to fine sand with little to some silt, moist.
				17			CL	Brown clay with trace fine to coarse sand, dry.
				27			SM	Dark brown fine sand with trace silt.
S-2		1.6	0	18	2	0	CL	Brown clay with trace fine to coarse sand.
				37				
				40				
				42				
S-3		2.0	0	38	4	0	ML	Brown/gray clayey silt with little coarse to fine gravel and trace coarse to fine sand.
				30				
				26				
				21	6			
								Ended boring at 6 ft BGS.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB04A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 16 October 1991

Completion Date: 16 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.5	0	15	0		FILL (road bed)	Topsoil
				27				Gravelly sand
				28				
				26	2			
S-2		1.0	0	18		0	SM	Silty sand
				9				
				11				
				15	4			
S-3		1.3	0	9		0		Dark brown fine to coarse sand with little to some silt, moist.
				18				
				12		0	CL	Maroon silty clay with trace fine to coarse sand, moist.
				15	6			Ended boring at 6 ft BGS.
					8			
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB02A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENeca Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 15 October 1991

Completion Date: 15 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.5	0	3	0	0	Topsoil	Topsoil, dark brown, sandy silty loam.
				3			CL CAP Clay	Clay cap.
				9				Dark gray silt with gravel and cobbles.
				40	2		FILL Gravelly silt	
S-2		1.5	0	20		0		Gray clay silt, stiff, fill mixture.
				22				Rusted metal and angular rock.
				21			Silt	Gray silt fill.
S-3		0.8	0	34	4		ML Silt	Red-brown fine sandy silt, dry.
				50		0		
				50/3"				Spoon refusal at 4 ft 9 in. (end boring).
					8			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB02B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. or 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 15 October 1991

Completion Date: 15 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		1.5	0	5	0	0	Topsoil	Topsoil.
				19			ML Gravelly, Silt	Gray silt with gravel, clay, fine sand.
				22			SP Gravelly Sand	Coarse red-brown sand with gravel.
				19			ML Clayey silt	Gray clayey silt with cobbles.
S-2		1.3	0	16	2	0		Gray and brown silt with cobbles, fine-coarse sand, clay, gravel, stiff, dry
				19				
				21				Red-brown clayey silt with trace gravel, stiff.
				32				
S-3		1.5	0	13	4	0		Red-brown clayey silt, stiff, hard, trace to little gravel, moist.
				18				
				29				
				41				
S-4		1.7	0	9	6	0	CL Clay	Red-brown to maroon clay, stiff, plastic.
				12				
				17				
				26				
					8			Ended boring at 8 ft BGS.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB01G

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 18 October 1991

Completion Date: 18 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		2.0	0	7	0	0	FILL	Topsoil, dark brown silt with trace roots, moist.
				9				
				11				Brown silty clay and fill orange/white powder, dry.
				11				
S-2		0.1	0	7	2	0		Brown and purple clay and fill orange/brown powder, dry.
				7				
				7				
				7				
S-3		1.1	0	12	4	0	Silt	Dark brown/black clayey silt, wet on bottom.
				5				
				4				
				8				
S-4		1.0	0	7	6	0	CL	Maroon clay, moist, natural, tight.
				8				
				12				
				21				
					8			Ended boring at 8 ft.
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB01D

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 15 October 1991

Completion Date: 15 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.7	0	5	0	0	FILL	Silty loam
					9			
					13			
S-2		0.5	0	16	2	0		Clay
					26			
					16			Gravelly Silt
					18			
					16			
				16	4	0		Silt and Fill
					6			
					8			
					10			

S = Split-Spoon
R = Rock Coring
BGS = Below Ground Surface

LOG OF BORING SMC-SB01E

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 15 October 1991

Completion Date: 15 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		2.0	0	3	0	0	FILL	
				10			Topsoil	Brown topsoil.
				15			Clay	Reddish brown clay.
				34			Cobbly Silt and Fill	Gray silt with cobbles, white and rust color solid (fill material).
S-2		2.0	0	21	2	0	Fill	Fill material.
				12				
				14				
				21				
S-3		1.5	0	8	4	0	Silt	Gray and black silt, soft, wet.
				10				
				50				
					6			Spoon refusal at 5.5 ft BGS, ended boring.
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB01B

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 1193201

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 3-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 15 October 1991

Completion Date: 15 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNU (ppm)	Soil Class	Description
S-1		2.0	0	5	0	0	FILL	Topsoil
				8				
				22			0	Silty Gravelly Clay
S-2		2.0	0	12		0		
				14	2		0	Cobbley Silt
				31				
				34				
				29		0		Silt and Wood
					4			Black silt with some wood, soft, moist to wet.
								Ended boring at 4 ft BGS.
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB01C

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25-in. ID hollow-stem augers

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 15 October 1991

Completion Date: 15 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.5	0	3	0	0	FILL	Topsoil.
				7			Silty loam	
				11			Clay	Reddish brown clay, stiff.
				11				
S-2		0.7	0	32	2	0	Silt and C&D Fill	Brown silt with clay, glass, slag, cobbles, brick.
				57				
				100/1				Ended boring at 3.1 ft BGS.
					4			
					6			
					8			
					10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB01A

EA Engineering, Science, and Technology

Location: Stauffer Management Company, Skaneateles Falls, New York

Job No.: 11932.01

Client: ZENECA Inc.

Drilling Method: Truck-Mounted Mobile B-57 drill rig with 4.25 in. ID hollow-stem augers

Sampling Method: 2-in. ID split-spoon driven by a 140-lb hammer falling 30 in.

Surface Conditions: Grassy area

Start Date: 14 October 1991

Completion Date: 14 October 1991

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in.	Depth (ft)	HNu (ppm)	Soil Class	Description
S-1		1.5	0	4	0		CL CAP	Dark brown topsoil sandy loam grass and roots.
				7				Red-brown clay with some silt trace gravel, trace sand, firm-stiff moist.
				8		0		
				7	2			
S-2		1.4	0	12				Red brown clay as above.
				21				
				14		0	FILL	Gray-brown sand (medium-coarse) with some silt, loose-medium dense, dry-moist.
				14				Black silty fine sand dry.
S-3		0.5	0	2	4			Black sandy silt with some gravel.
				1				
				3		0		
				8	6			
S-4		0.0	0	9				Brown silt with some sand in shoe, wet.
				6				
				7		0		
				8				
S-5		0.7	0	6	8		CL	Red-brown clay with some silt trace gravel. Stiff, moist.
				10				
				14		0		
				18	10			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

LOG OF BORING SMC-SB01A

Sample Type & No.	Sample Interval	Recovery (ft)	Casing Depth	Blows/6 in	Depth (ft)	HNu (ppm)	Soil Class	Description
S-6		1.0	0	12	10			Red-brown clay as above.
				18				
				19		0		
				22	12			
S-7		0.7	0	17				Red-brown clay as above, some black gray limestone rock fragment.
				23				
				22		0		
				50				
					14			Refused at 13 ft 7 in.
					16			
					18			
					20			
					22			

S = Split-Spoon

R = Rock Coring

BGS = Below Ground Surface

ZENECA

ZENECA Inc.

Wilmington, DE 19897 USA

ENVIRONMENTAL SERVICES

& OPERATIONS

Telephone: (302) 886-4548

Facsimile: (302) 886-5933

August 25, 1994

Mr. Salvatore F. Priore, P.E.
New York State Department
of Environmental Conservation
50 Wolf Road
Albany, NY 12233

Re: Stauffer Management Company
Skaneateles Falls, NY
Site No. 734010

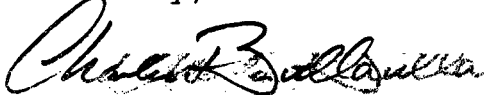
Dear Mr. Priore:

In response to your letter of July, 28, 1994, please find enclosed the Final Remedial Investigation (RI) Report, Volumes 1 & 2, dated August 23, 1994, for the Stauffer Management Company Site at Skaneateles Falls, NY. The document has been revised in accordance with submittals reviewed and approved by New York State Department of Environmental Conservation.

By copy of this letter, one copy of the RI report is being distributed to each of the two public document repositories that you identified during our recent telephone conversation, Town of Skaneateles Town Hall (in care of Mr. John Angyal), and NYSDEC Region 7 (in care of Mr. Charles Branagh).

Please contact me at (302) 886-4548 if there are any questions concerning this matter.

Sincerely,



Charles A. Bula
Environmental Engineering Associate
Environmental Services & Operations

CDB/ahz/B/atz

Enclosure

2A082594/cdb

CC: John Angyal, Skaneateles Town Hall
Charles Branagh, NYSDEC Region 7
Henriette Hamel, NYSDOH
✓ C. Jackson, NYSDEC
Joe Kelleher, NYSDEC
M. Kelly, Zeneca Inc.
L. Letteney, County of Onondaga
Dave Mayhew, NYSDEC
W. Palomino, EPA
J. F. Peter, Zeneca Inc.

Final

**Remedial Investigation Report
Stauffer Management Company Site
Skaneateles Falls, New York**

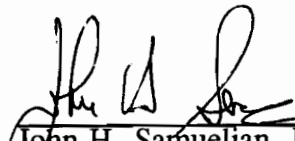
**Volume 2 of 2
(Appendix C through Appendix H)**

Prepared for

**Stauffer Management Company
Wilmington, Delaware 19897**

Prepared by

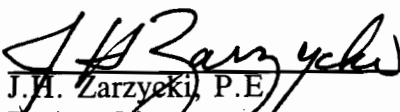
**EA Engineering, Science, and Technology
The Maple Building
3 Washington Center
Newburgh, New York 12550**



John H. Samuelian, Ph.D.
Project Technical Manager

8/23/94

Date



J.H. Zarzycki, P.E.
Project Director

8/23/94

D

August 1994

Appendix C

Seismic Refraction Survey Results (Gartner Lee, Inc. 1993)



**Gartner
Lee**

**Seismic Refraction Survey Results
Stauffer Management Company Facility
Skaneateles Falls, New York**

Prepared for:

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Professional Services in Environmental Management

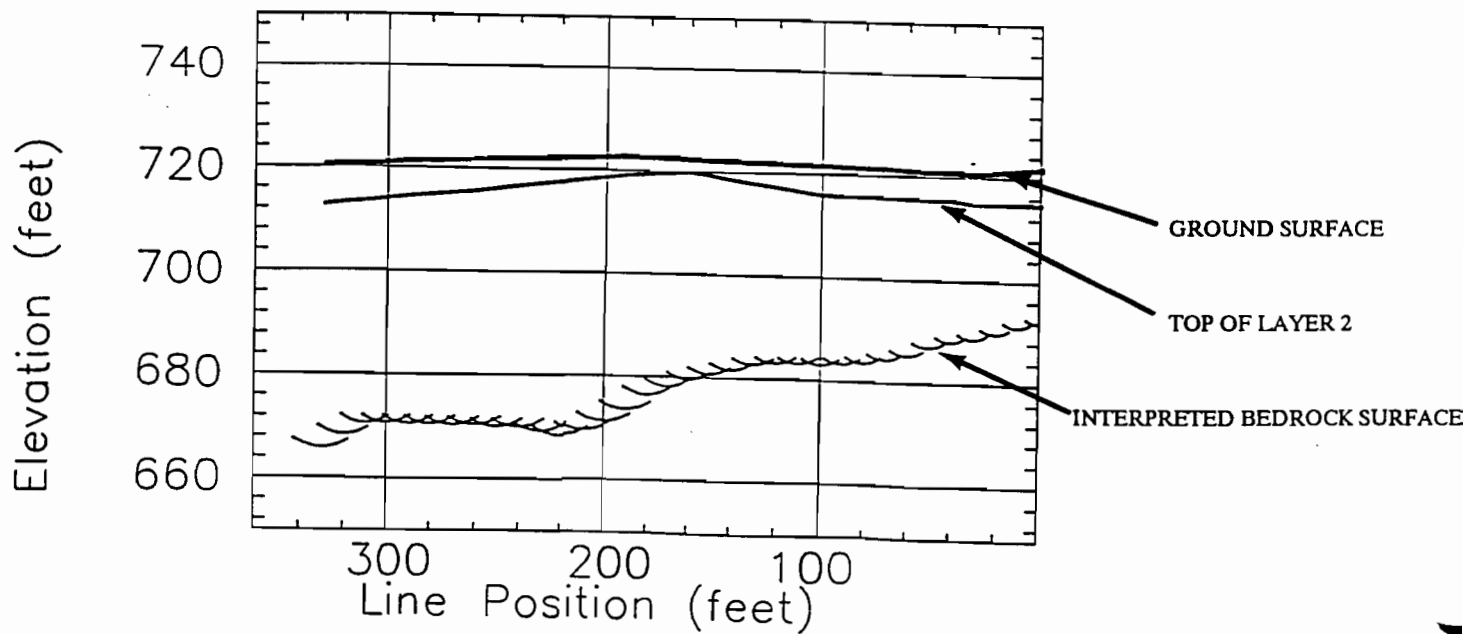


FIGURES

LEGEND

TIE L1 = TIE POINT WITH SEISMIC LINE 1

MW1, RP1 = BOREHOLE LOCATIONS





1.0 Introduction, Purpose and Scope

On January 12th through 22nd, 1993, a seismic refraction survey was performed at the Stauffer Management Facility Site in Skaneateles Falls, NY. The site is an inactive chemical producing facility that is currently being studied as part of a remedial investigation by EA Engineering, Science and Technology (EA).

The study area is shown in Figure 1. The facility site and surrounding regions were mostly open fields with gently rolling topography. Skaneateles Creek flows generally south to north through the area. Trees and brush were present, primarily in the area extending out from the shores of the creek. Jordan Road trends north-south and is west of the facility grounds. Directly behind the residential properties that line the west side of this road, is an open farm field.

Borehole logs supplied to Gartner Lee, Inc. by EA indicate that near surface soils are primarily a clayey silt and the overburden material is described generically as a glacial till. Bedrock beneath the site is a limestone. At the time the seismic survey was performed, the ground was covered with approximately 2 to 6 inches of snow. This light snow cover appeared to minimize the incidence and thickness of ground frost.

A industrial landfill is located east of the facility identifiable by the mounded cap and the monitoring wells located around the perimeter of the landfill. Borehole data indicate that bedrock topography dips to the south from a local bedrock high beneath the landfill. Bedrock is reported to outcrop south of the study area. It was hypothesized that a possible bedrock valley or glacial outwash channel is located south of the landfill which, if present, may be relevant to the local ground water flow regime.

The purpose of the geophysical survey was to map bedrock topography at the site and assess the presence/absence of the possible bedrock valley.

All geophysical methods utilize interpretative techniques which can be significantly impacted by varying site conditions. Seismic data relies upon borehole or testpit control to interpret bedrock topography and overburden stratigraphy. An absence of control data for seismic surveys can result in errors in calculating depths to refractors. Therefore, where possible, confirmation of any geophysical anomalies identified or interpreted should be sought through the use of aerial photography, test pit and borehole information.

The following report discusses the methodologies, results and the conclusions of the geophysical survey.



2.0 Methodology

2.1 Line Locations

A Gartner Lee, Inc. geophysicist visited the site on December, 1992 with a geologist from EA at which time the location of seismic lines was discussed. At that time, some of the seismic line locations were slightly altered in order to maximize the effectiveness of the survey. The seismic lines through the wooded area by the creek were subsequently cleared of brush by staff from EA. A total of four seismic lines were located off the site property following prior landowner property access permission. The approximate locations of the seismic lines are shown on Figure 1. At the completion of the seismic survey, the elevations along the seismic lines were surveyed by EA.

2.2 Seismic Refraction Survey

Seismic line locations were selected to provide information on bedrock topography at the site. A total of 16 seismic refraction lines were surveyed during the investigation. These data were collected using a geophone spacing of 10 ft. All data were collected using a single 14 Hz geophone per channel.

A 48 channel Bison 9000 Digital Instantaneous Floating Point (DIFP) seismograph was utilized to collect seismic refraction data at the Site. Seismic data are collected by generating a shock wave and recording the travel time and amplitude of the wave at nearby locations. The shock wave travels downward into the earth and reflects/refracts back to surface off geologic strata. The amplitude of the returning signal is measured as a function of time with ultra-sensitive motion detectors (geophones), and transmitted through a cable to a digital recording device; (a seismograph).

A vacuum assisted weight drop (VAWD) was used as the seismic source. The VAWD propels, under a vacuum, a heavy weight down a 10 foot barrel where it strikes a steel plate to create the seismic source vibration. For seismic lines located in areas where it was not possible to use the VAWD (wooded areas), a 10 pound sledge hammer and steel plate was used as the seismic source. For each shot, data were stacked from 1-10 times. "Stacking" of shots is used to improve the signal-to-noise ratio of the data. All shots were stacked until good "first breaks" were observed on the QA/QC printout of the seismograph. First breaks are the time of onset of the refracted wave arrival. The accurate measurement of these first break times is a critical function involved with refraction analysis.

The data were collected using 48 channels per seismic spread. Each spread was overlapped 4 geophones as the line progressed. For each spread, 12 to 16 shots were



made at varying shot to geophone offsets. The far offset (typically 100 to 150 feet) was chosen so that all first breaks measured for that shot were refractions of the bedrock interface. This was necessary to provide complete GRM coverage of the bedrock refractor. Data were collected and stored on the 48 channel engineering seismograph. Each evening, data were transferred to a lap top computer and backed up on floppy disks.

2.3 Data Interpretation

The first step in data interpretation involved selecting the "first break" arrival times from the seismic traces. These measurements represent the arrival times of the p-wave seismic energy refracted along layers exhibiting significant velocity contrasts. From these data, the number and velocities of the subsurface layers are determined.

The Generalized Reciprocal Method (GRM) of analysis was used to convert the data from measurements of time to measurements of layer thickness. The GRM allows for the interpretation of data from a number of undulating refractors and was used to interpret the arrival times from each layer. The technique accepts variation in both the surface topography and the velocities of the upper layers.

Seismic data provides an estimation of layer thickness. The process of converting refraction arrivals in units of time (milliseconds) to depth (feet) has an approximate accuracy of $\pm 15\%$. However, due to the effect of hidden layers and poor signal quality on some lines, a larger error in layer thickness and depths may be expected. The relative changes in bedrock topography interpreted along profile lines are believed to be representative of subsurface conditions. Seismic profile data should be used as relative estimates to evaluate changes in overburden stratigraphy and bedrock topography.

3.0 Results

Results are presented in the form of depth profiles denoting velocity contrasts in the subsurface (Figures 2 through 13). The lower most refracting interface, denoted by arcs on the figures, is interpreted to be bedrock. The bedrock surface is taken as the intersection of the loci of these arcs. Depending upon the velocity contrasts observed in the data for a particular line, two or three refracting layers are interpreted. In the three layer case, the middle layer likely represents the approximate top of the saturated zone. In some lines, where the water table is near the bedrock interface, hidden layer conditions may exist. Tie points, (points where seismic lines cross or where well data are available), are plotted on the figures in the appropriate line position. Not all seismic tie points match exactly and the difference in observed absolute depth



measurements may be used as a guide in assessing relative accuracy. All references to topographic highs and lows are referenced to elevation in feet above sea level (fasl).

Seismic Line 1 (Figure 2)

Seismic Line 1 trends north-south and lies to the east of the landfill area. This line is located under a power line right of way. In some places along this seismic line, 60 hz power line noise was observed in the data. This is likely due to leaky insulators on some power poles. The southern terminus of this line is Skaneateles Creek.

Bedrock topography is interpreted to slope to the south from a high of approximately 696 fasl at Line Position 300 ft to a low of approximately 664 fasl at Line Position 950 ft. There is an approximate 10 ft difference in the interpreted bedrock elevation with the tie for Seismic Line 8. A reverse, far offset shot was not obtained due to the presence of Skaneateles Creek. This shot would have provided bedrock data at the very end of the line that may have resolved the ambiguities observed at the tie point. However, as bedrock is interpreted to be topographically higher on Seismic Line 9 (Figure 8) located south of the creek, it is reasonable to assume that the maximum bedrock low occurs in the vicinity of Line Position 950 ft.

Seismic Lines 2 and 2B (Figure 3)

Seismic lines 2 and 2B trend north-south and are located west of the landfill area. Seismic Line 2 is located in the wooded area adjacent to the creek. It was not possible to use the VAWD as a source on this line and the hammer and steel plate were substituted. The southern most 12 geophones were planted in the soft earth of the flood plain of Skaneateles Creek. Data quality from these geophones and seismic shots at these locations were of poor quality and uninterpretable. For this reason, the bedrock surface is not interpreted south of Line position 120 ft.

Bedrock topography on these lines is interpreted to dip to the south from a high of approximately 693 fasl at Line Position 580 ft to a low of approximately 670 fasl at Line Position 120 ft.

An eight foot difference in bedrock elevation is observed at the intersection of the two lines. This is not interpreted as a sharp eight foot drop in bedrock topography but is rather related to the inaccuracies of the seismic technique and the poor quality of the data collected in the woods on Seismic Line 2.



Seismic Lines 3A, 3B and 3C (Figure 4)

Seismic Lines 3A, 3B and 3C trend generally north-south and are located immediately to the east of Jordan Road. This line is believed to be located on the old railroad bed of the now abandoned Skaneateles Short Line Railway. The fill material from this rail bed, combined with seismic noise from vehicle traffic on Jordan Road resulted in data of marginal quality.

Bedrock is interpreted to be relatively shallow to the north and deeper towards the south. The topographic bedrock high is interpreted to occur at the southern end of Line 3A. The topographic bedrock low is interpreted to be 660 fasl at Line Position 300 ft of Seismic Line 3C. It should be emphasized that the data quality of Seismic Line 3C was particularly poor due to fill material and vehicle induced seismic noise.

Seismic Line 4 (Figure 5)

Seismic Line 4 trends north-south and is located in a farm field behind the residential properties to the west of Jordan Road. There was significant ground frost at the time of data acquisition, as such each geophone was placed below grade with a shovel in order to improve data quality.

Bedrock topography is interpreted to slope to the north from a high of approximately 695 fasl at Line position 0 ft to a low of 660 fasl at Line Position 770 ft. The steep change in surface topography at Line position 720 ft adversely affected the quality of the interpretation at the north end of this line. However, good tie points were obtained with Seismic Lines 7A and 8A.

Seismic Line 5

Property access could not be obtained for this location and hence, data were not collected.

Seismic Line 6 (Figure 6)

Seismic Line 6 trends west-east and is located north of the landfill area. Bedrock is interpreted as shallow and gently dipping to the west from a high of approximately 700 fasl at Line Position 450 ft to a low at 684 fasl at approximately Line Position 50 ft.



Seismic Line 7 Figure 7)

Seismic Line 7 trends west-east and is located roughly parallel to the woods south of the landfill area. The western-most 17 geophones were located on the soft flood plain of Skaneateles Creek. Signal quality from these geophones was poor. The parking lot to the west of the creek however, provided the opportunity to acquire far offset reverse shot data using the radio link trigger. These offset shots helped resolve some of the ambiguities inherent in poor quality data.

Bedrock topography is interpreted to be gently rolling at an elevation of approximately 680 fasl. Bedrock topographic highs are interpreted to occur at Line Positions 0 ft and 200 ft.

Seismic Line 7A (Figure 8)

Seismic Line 7A trends west-east and is located west of Jordan Road. The eastern end of this line is located on residential property and the eastern end is located in a field by the intersection of Line 4.

Bedrock topography is interpreted to dip gently to the west from a high of approximately 680 fasl at Line Position 0 to a low of approximately 665 fasl at Line Position 430 ft.

Seismic Line 8 (Figure 9)

Seismic Line 8 trends west-east and is located roughly parallel to Skaneateles Creek. This line is located entirely in the wooded area. The last 14 geophones are located in the soft earth of the flood plain of Skaneateles Creek which resulted in poor signal quality and generally uninterpretable data from these geophones.

Bedrock topography is interpreted to be gently dipping to the west. The apparent abrupt western dip in the bedrock elevation at Line Position 350 may be real or may be related to the poor quality data for the geophones located in the flood plain.



Seismic Line 8A (Figure 10)

Seismic Line 8A trends west-east. The eastern end of this line is located on residential property and from about Line position 400 ft to 1250 ft crosses a farm field.

Bedrock topography is interpreted to dip westward from Line Position 0 to approximately Line Position 250 and then is gently undulating at an approximate elevation 680 fasl.

A bedrock low is observed at approximately Line Position 950 ft.

Seismic Line 9 and 9A (Figure 11)

Seismic Lines 9 and 9A trend west-east to the south of Skaneateles Creek. Line 9 is located on a trail through the woods and Line 9A is located in a field west of Jordan Road.

Bedrock topography on both lines is interpreted to dip to the west with a relatively steep dip in bedrock topography observed on Line 9A.

The bedrock elevations interpreted on these lines do not correlate with each other. We recommend that the surface elevations be resurveyed for Lines 9 and 9a.

Seismic Line 10 (Figure 12)

Seismic Line 10 trends north-south and is the eastern-most line surveyed. Data quality on the northern end of Line 10 was excellent and degrades to the south. This may be due to the possible presence of fill material at the southern end of Line 10.

Bedrock topography is interpreted to be relatively flat lying at 698 fasl over the first 200 ft of this line and then gently dips to about 686 fasl at Line Position 430 ft.

Seismic Line 11 (Figure 13)

Seismic Line 11 trends west-east and crosses a paved parking lot. The eastern portion of this line ends at Skaneateles Creek and the western end is terminated at the intersection of Seismic Line 3B.

A power drill was used to auger holes for planting the geophones in the gravel sub-base. Data quality on this line was poor, likely due to a combination of the effects of



geophone plants in the gravel, geophone plants in the soft flood plain of Skaneateles Creek, and possibly the existence of fill material beneath the line.

Bedrock is interpreted to be flat lying at approximately 684 fasl.

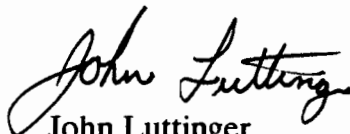
4.0 Conclusions

The seismic survey at the Stauffer Chemical Management Facility site in Skaneateles Falls, NY was successful at mapping bedrock topography. Where available, monitoring well data provided depth control for the seismic interpretations. Some Seismic Lines, most notably 2, 3 and 8 provided data of marginal quality.

An apparent dip of bedrock along Seismic Line 9A suggest that a depression in the bedrock may be located south of the study area. A bedrock depression of approximately 660 to 670 fasl was observed at the western terminus of Seismic Line 9A and Line Position 300 ft on Line 3C.

Respectfully submitted,

GARTNER LEE, INC.


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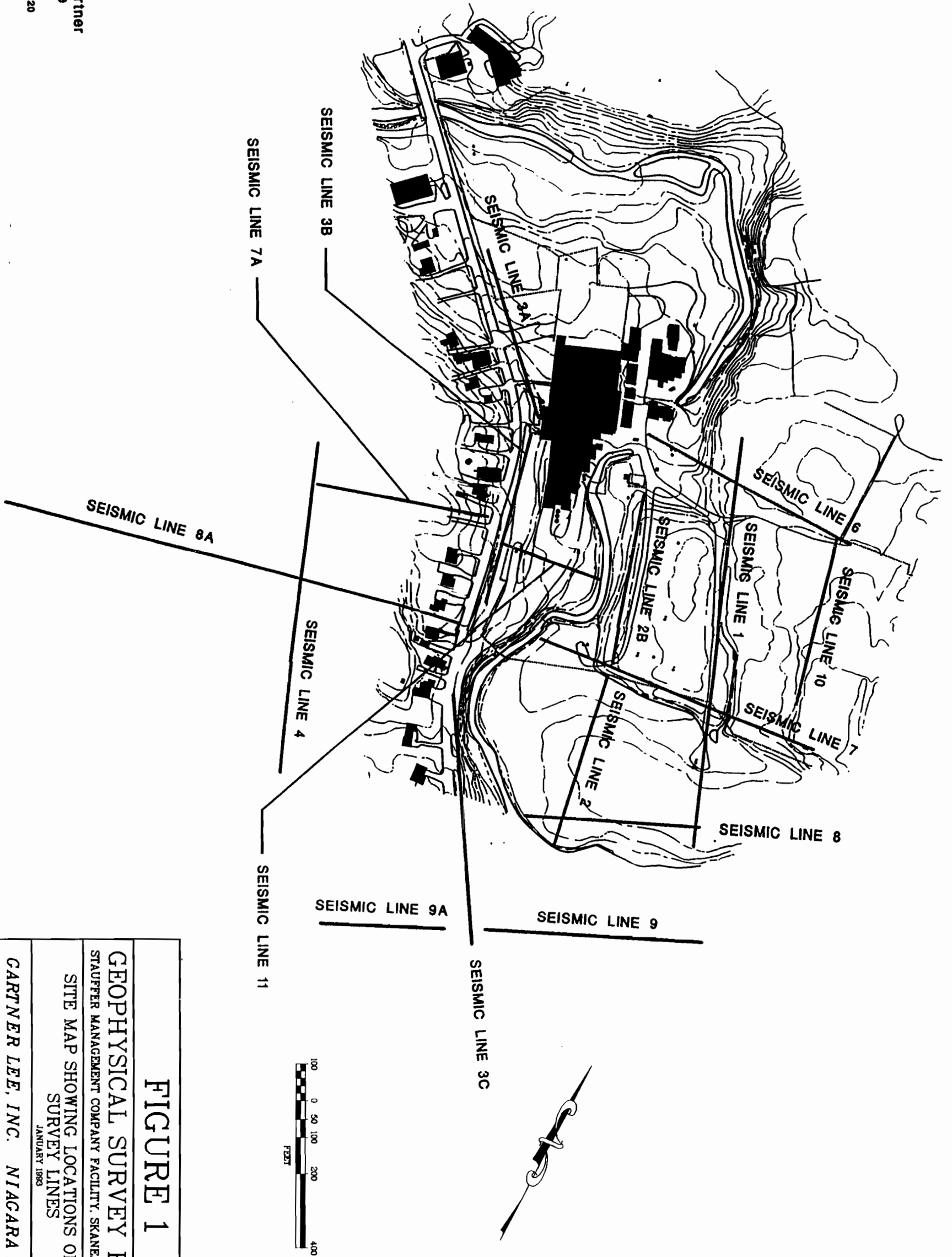


FIGURE 1

GEOPHYSICAL SURVEY RESULTS
STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY
SITE MAP SHOWING LOCATIONS OF SEISMIC
SURVEY LINES
JANUARY 1983
GARTNER LEE, INC. NIAGARA FALLS, NY

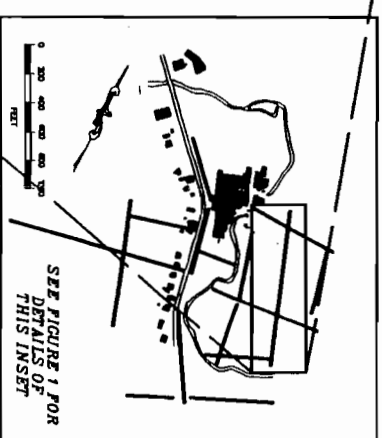


FIGURE 2

GEOPHYSICAL SURVEY RESULTS

STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

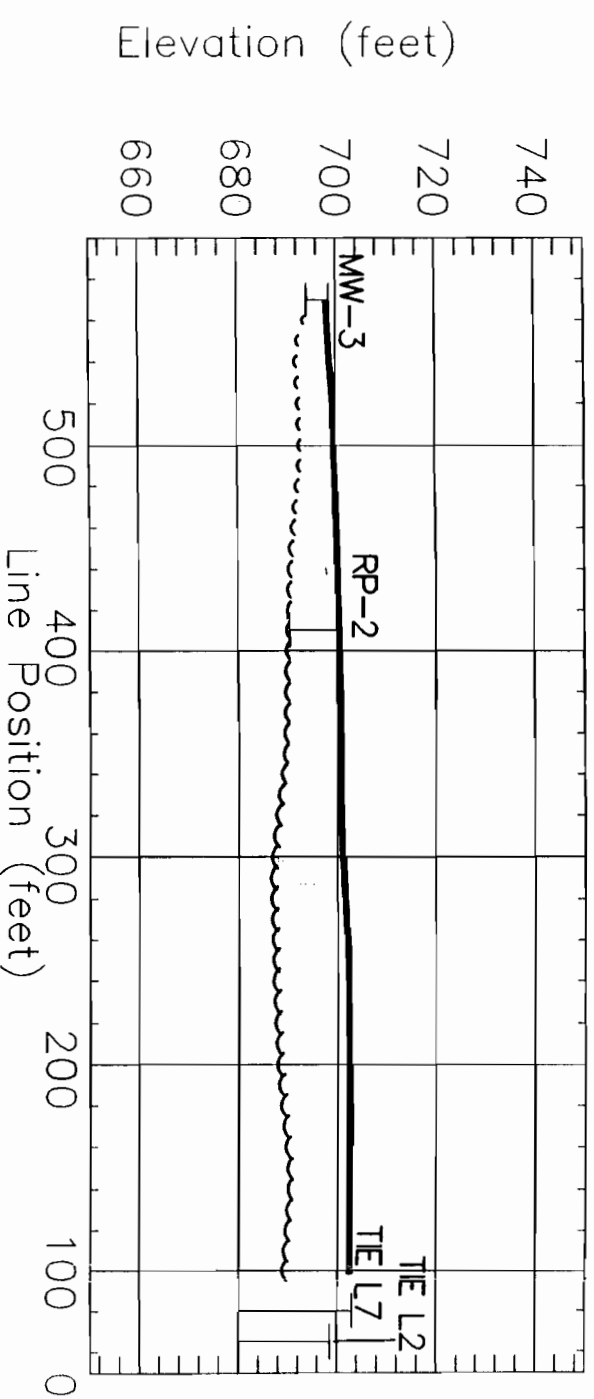
SEISMIC LINE 1

BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION
JANUARY 1983

CARTNER LEE, INC. NIAGARA FALLS, NY



NORTH 2B



2 SOUTH

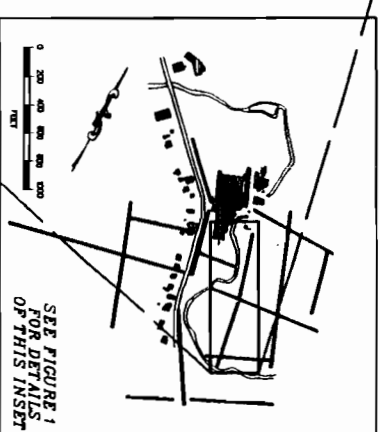
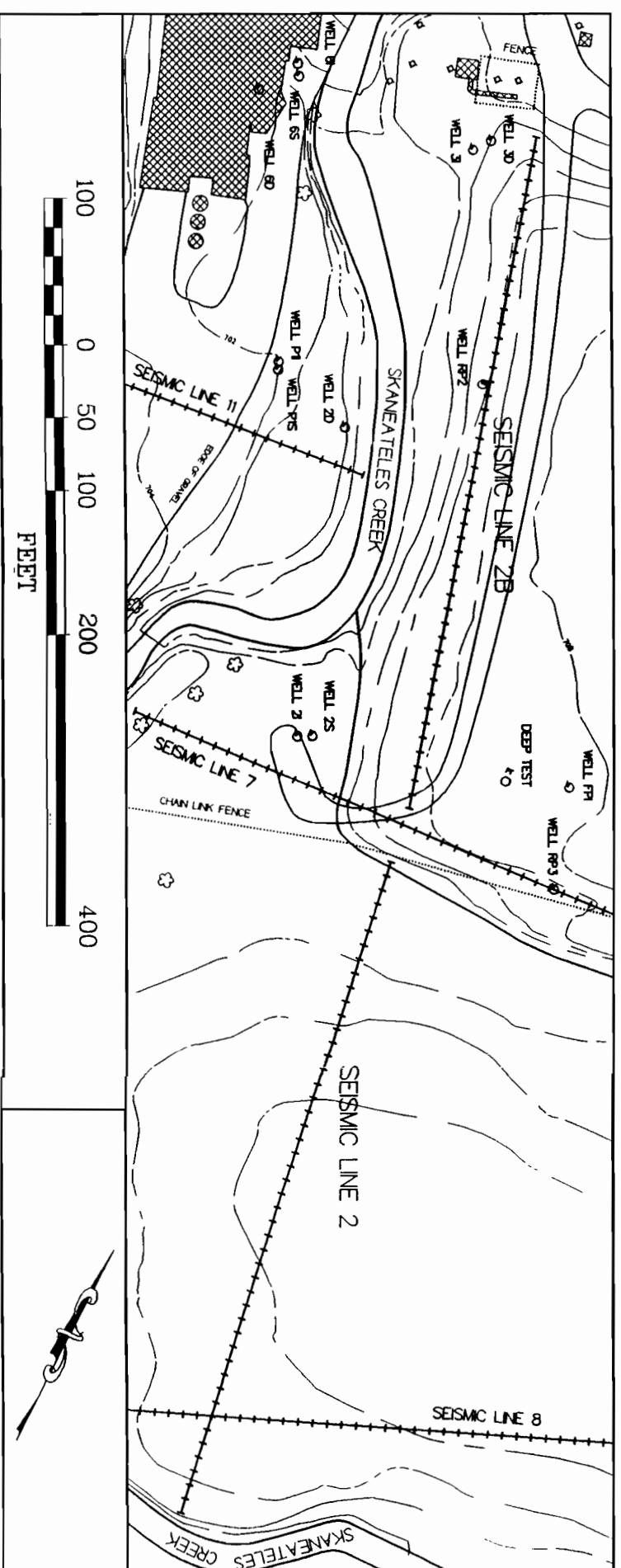
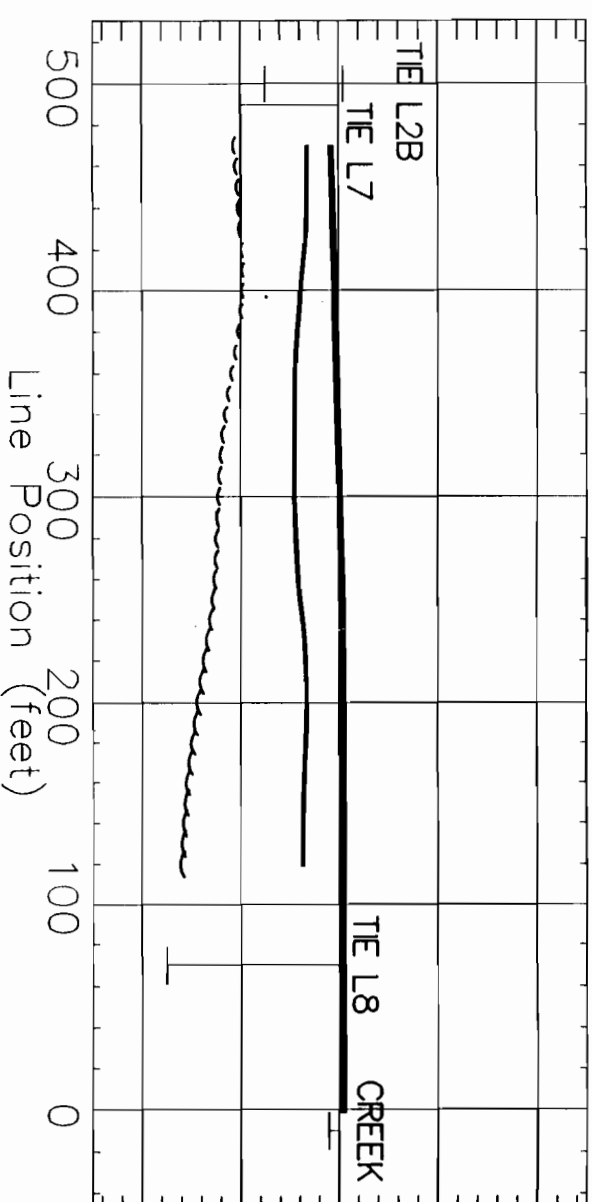


FIGURE 3

GEOPHYSICAL SURVEY RESULTS

STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

SEISMIC LINES 2 AND 2B

BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION

JANUARY 1983

GARTNER LEE, INC. NIAGARA FALLS, NY



NORTH 3A 3B 3C SOUTH

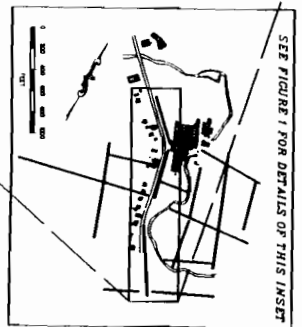
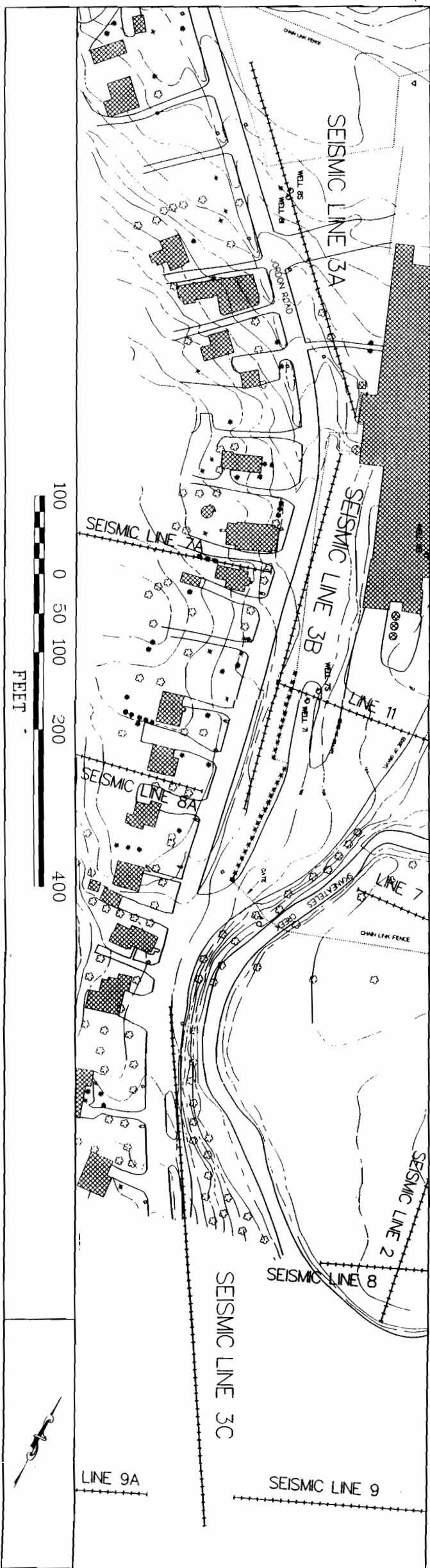
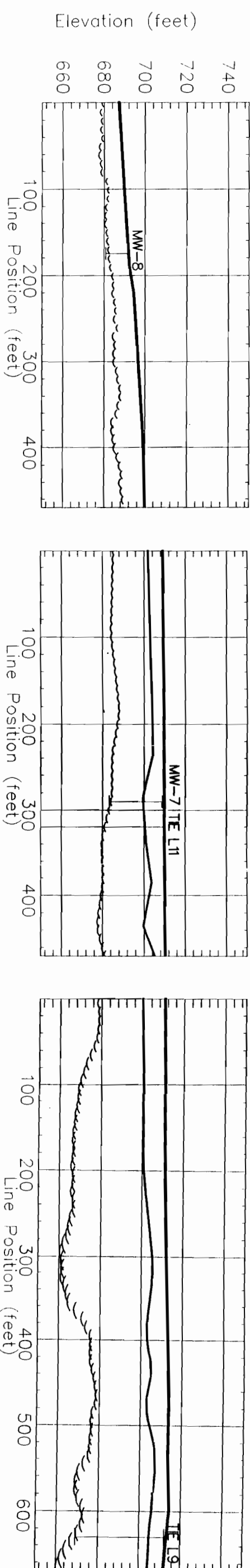


FIGURE 4

GEOPHYSICAL SURVEY RESULTS
STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY
SEISMIC LINES 3A, 3B, AND 3C
BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION
JANUARY 1980
GARTNER LEE, INC. NIAGARA FALLS, NY

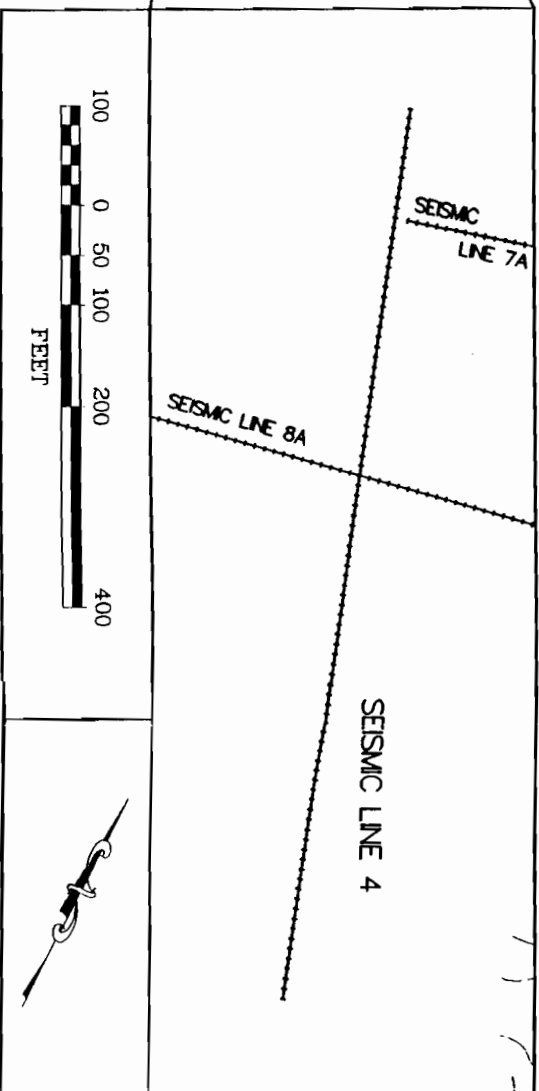
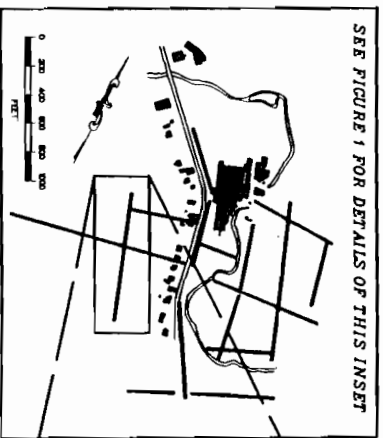
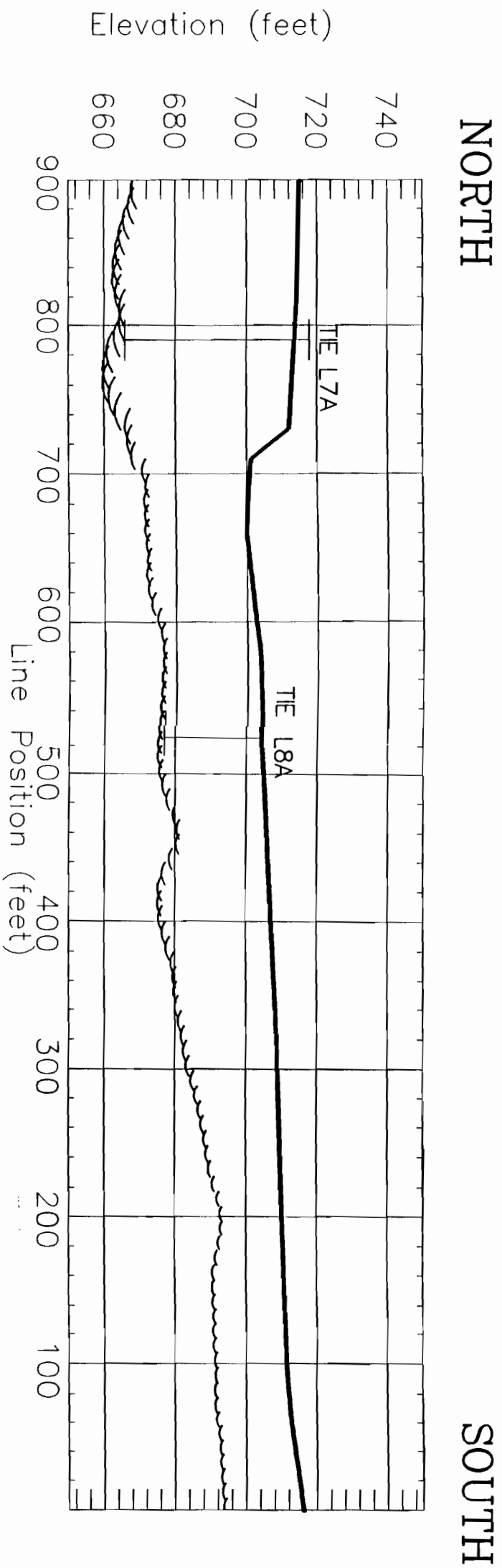


FIGURE 5

GEOPHYSICAL SURVEY RESULTS
STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

SEISMIC LINE 4
BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION
JANUARY 1983

GARTNER LEE, INC. NIAGARA FALLS, NY

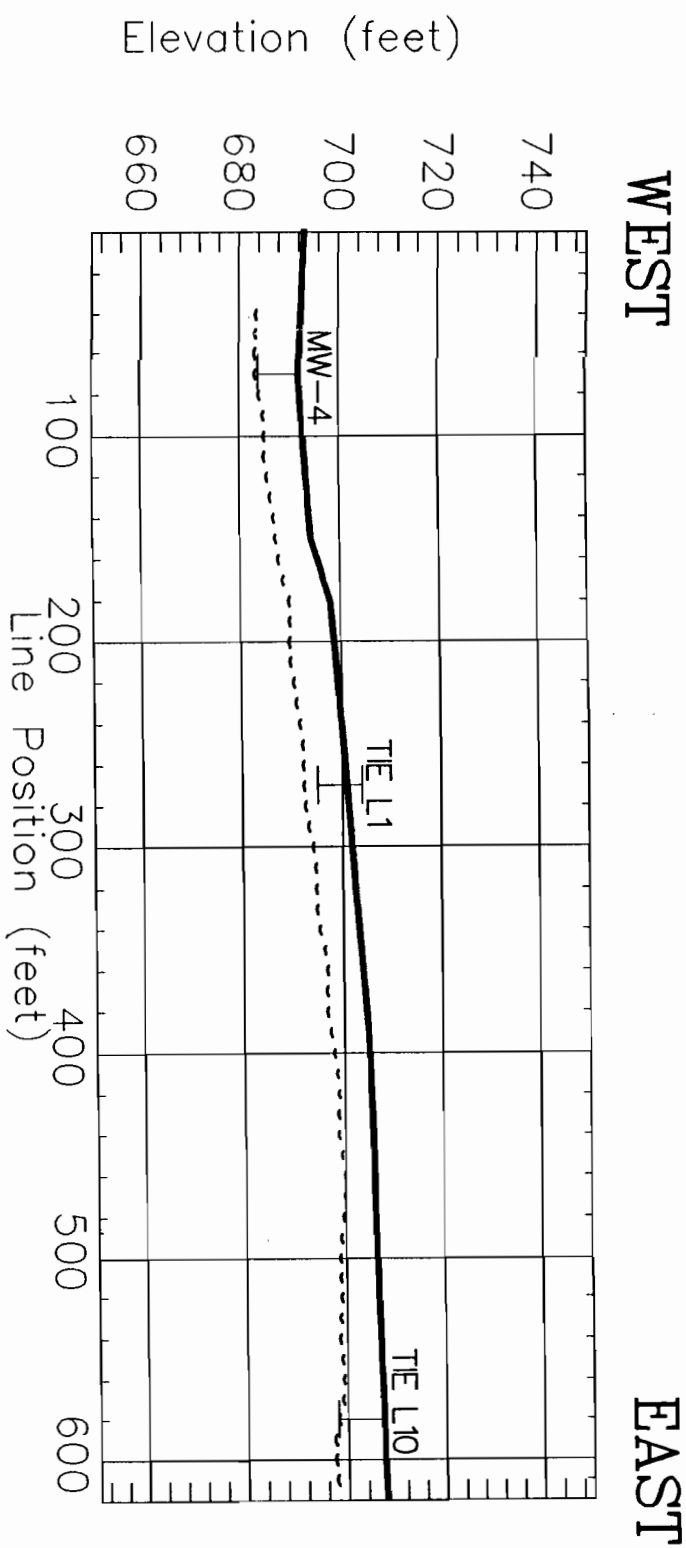
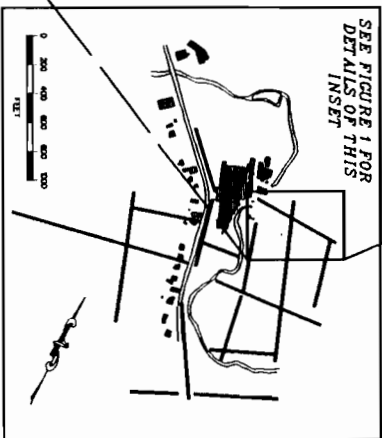
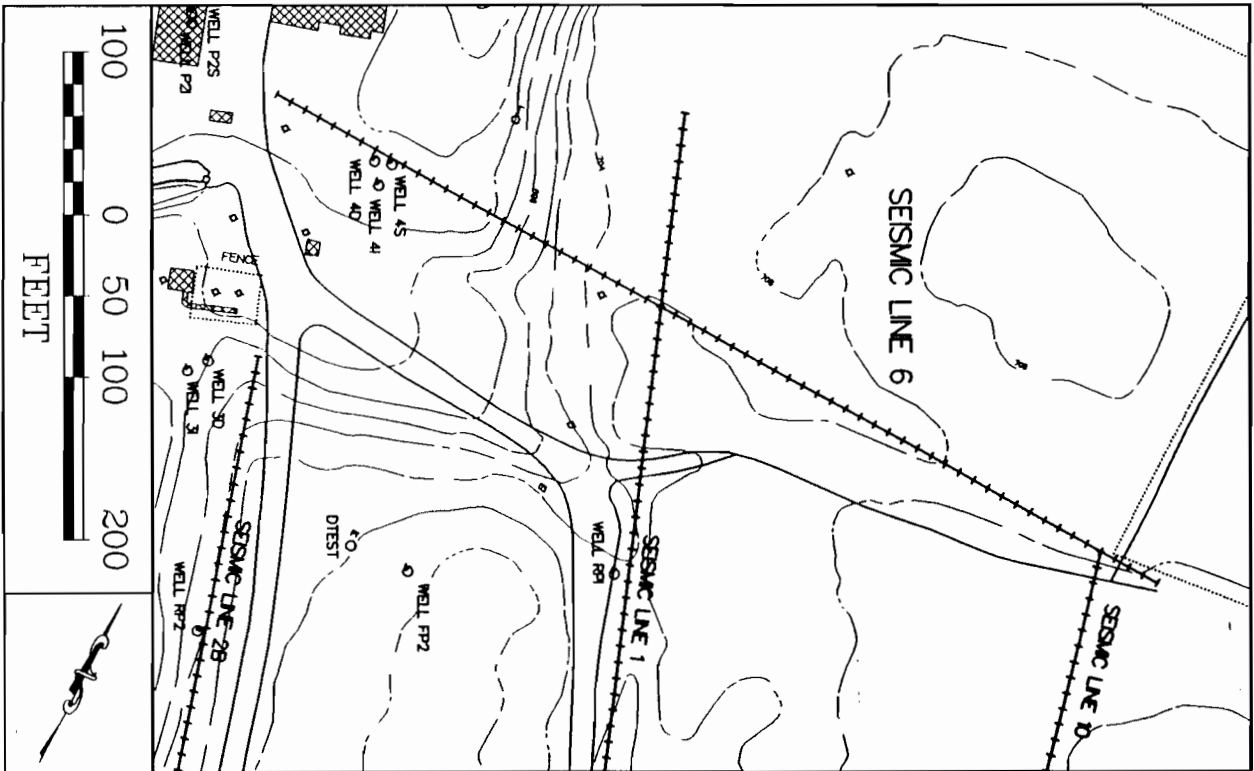


FIGURE 6

GEOPHYSICAL SURVEY RESULTS
STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

SEISMIC LINE 6
BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION
JANUARY 1983

GARTNER LEE, INC. NIAGARA FALLS, NY

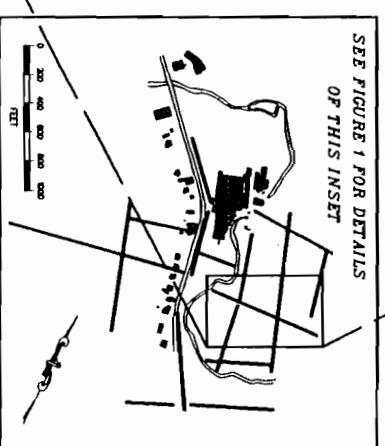
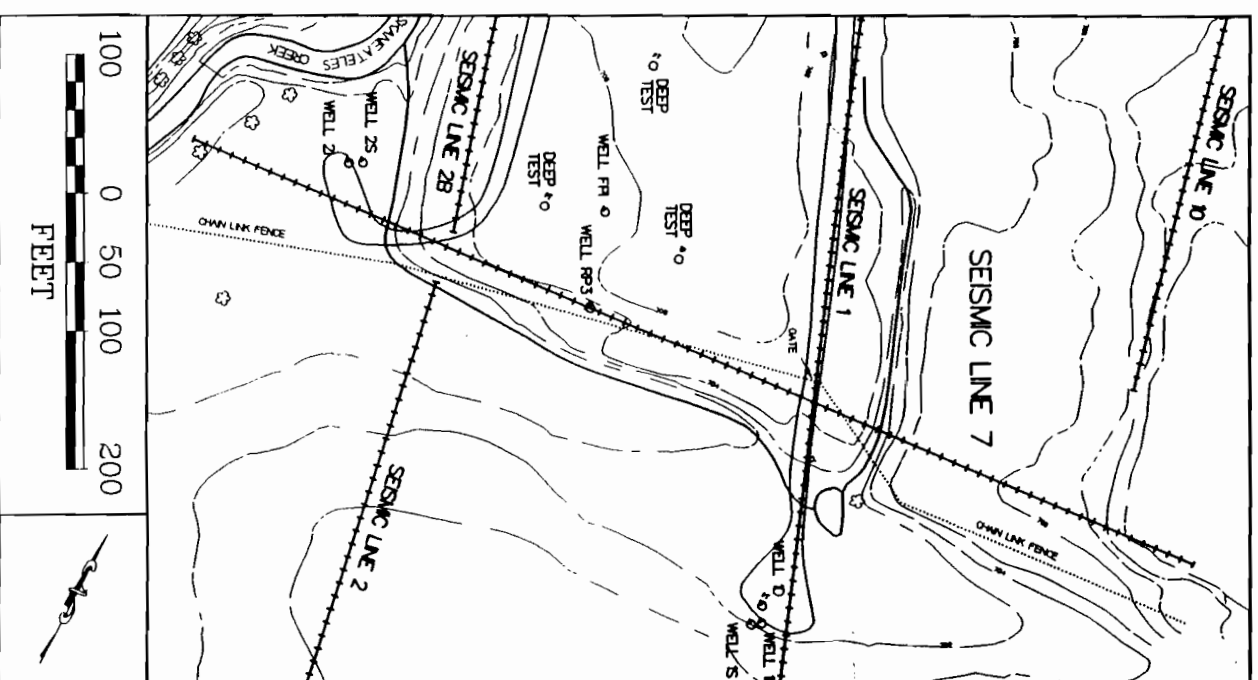
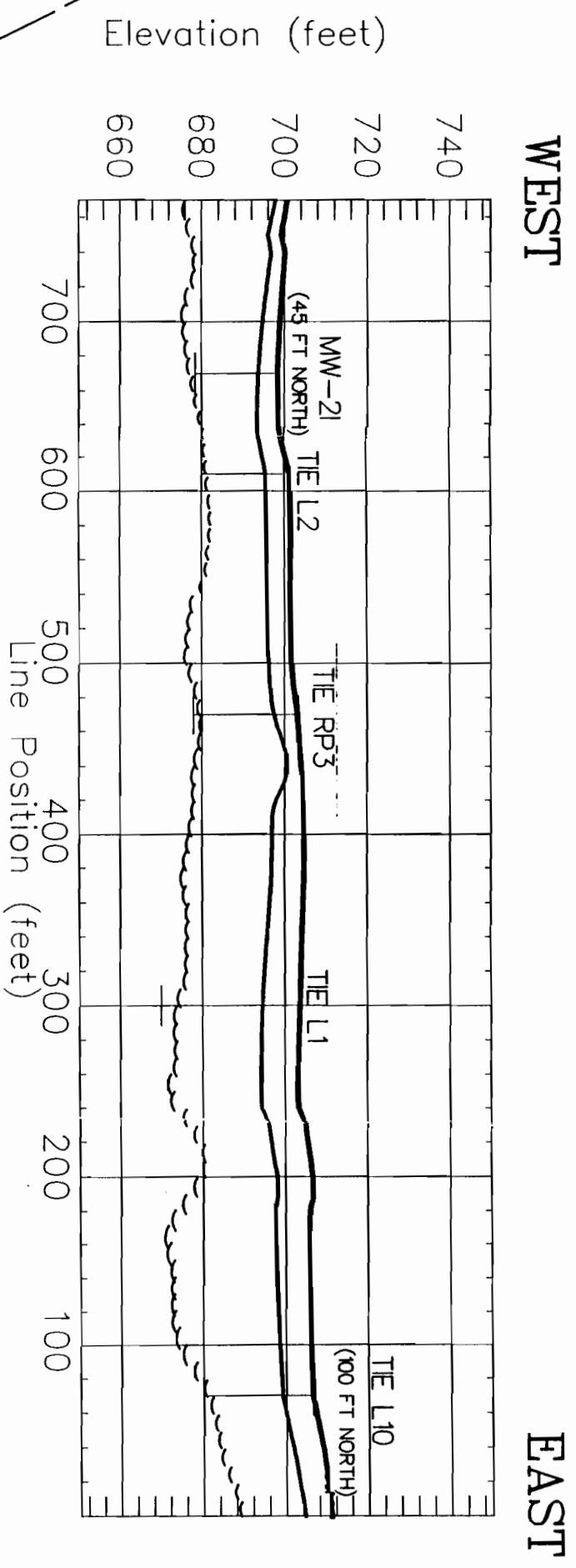


FIGURE 7

GEOPHYSICAL SURVEY RESULTS
STAUFFER MANAGEMENT COMPANY FACILITY, SKANATELES FALLS, NY

SEISMIC LINE 7

BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION
JANUARY 1983

CARTNER LEE, INC. NIAGARA FALLS, NY

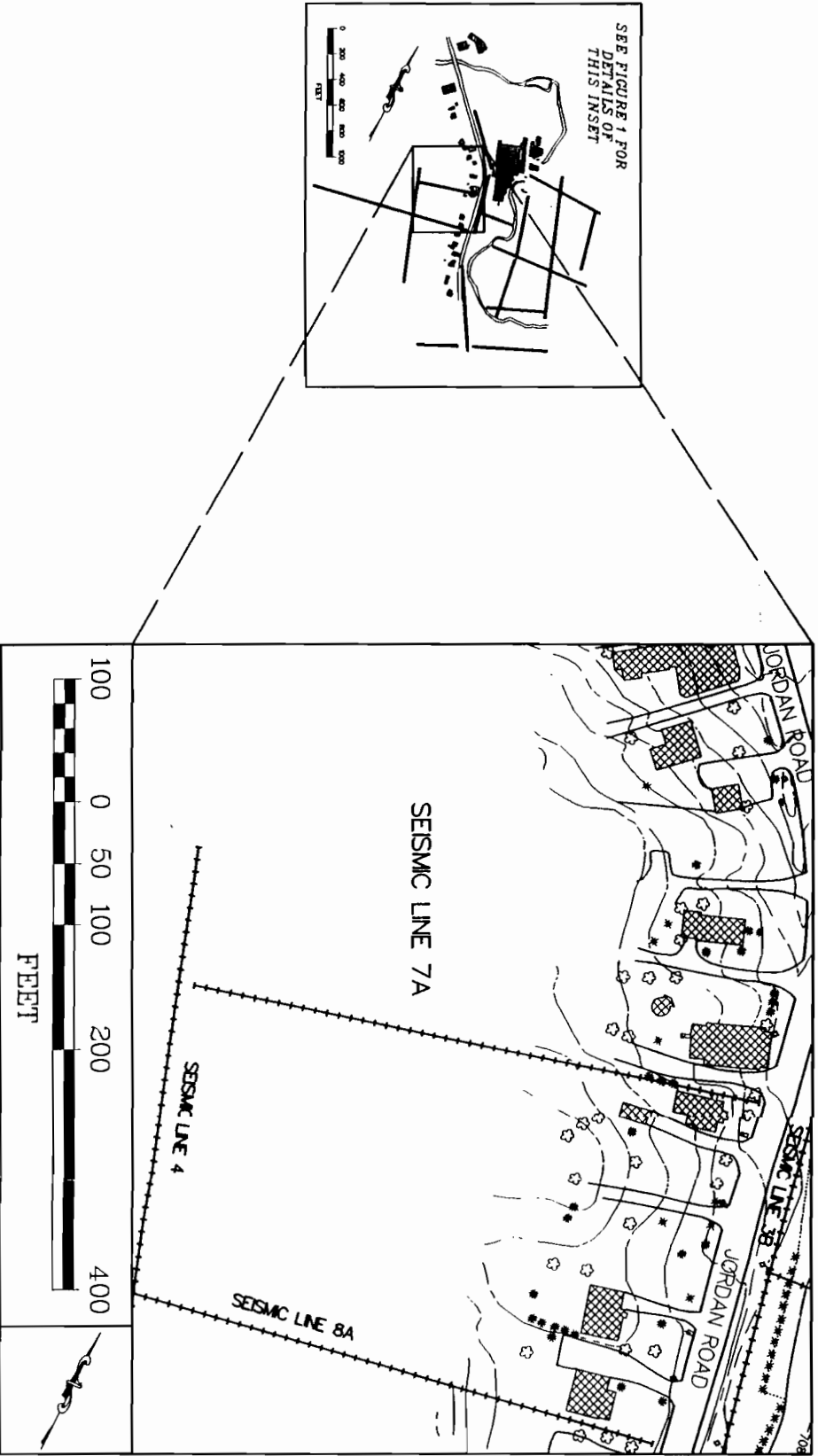
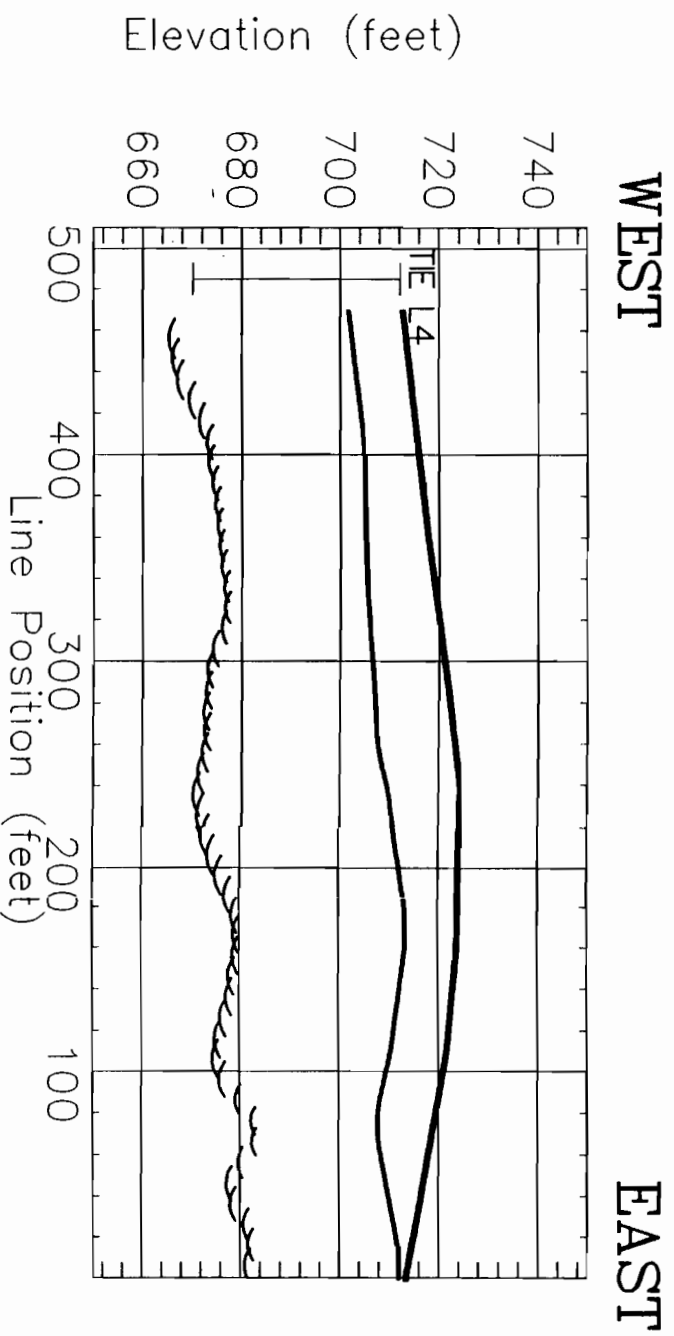


FIGURE 8

GEOPHYSICAL SURVEY RESULTS
STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

SEISMIC LINE 7A
BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION
JANUARY 1983

GARTNER LEE, INC. NIAGARA FALLS, NY

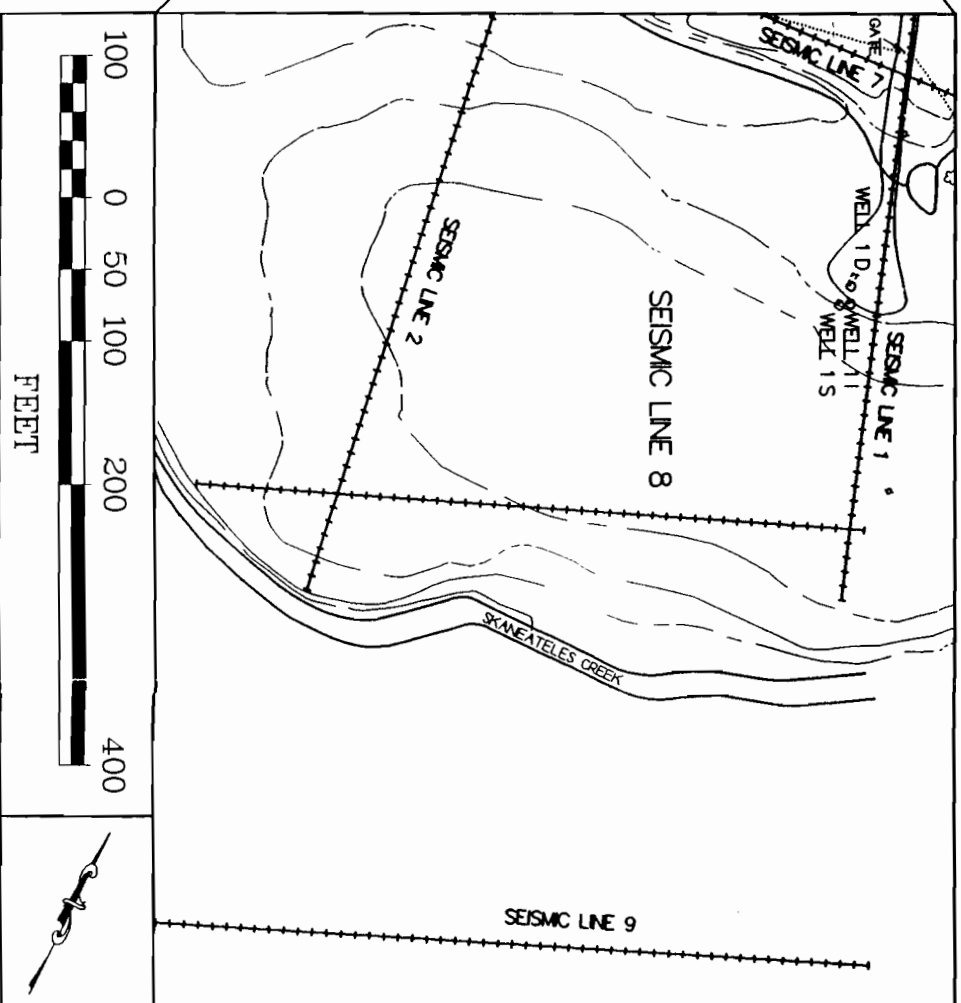
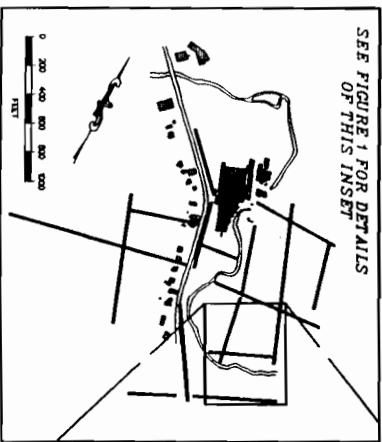
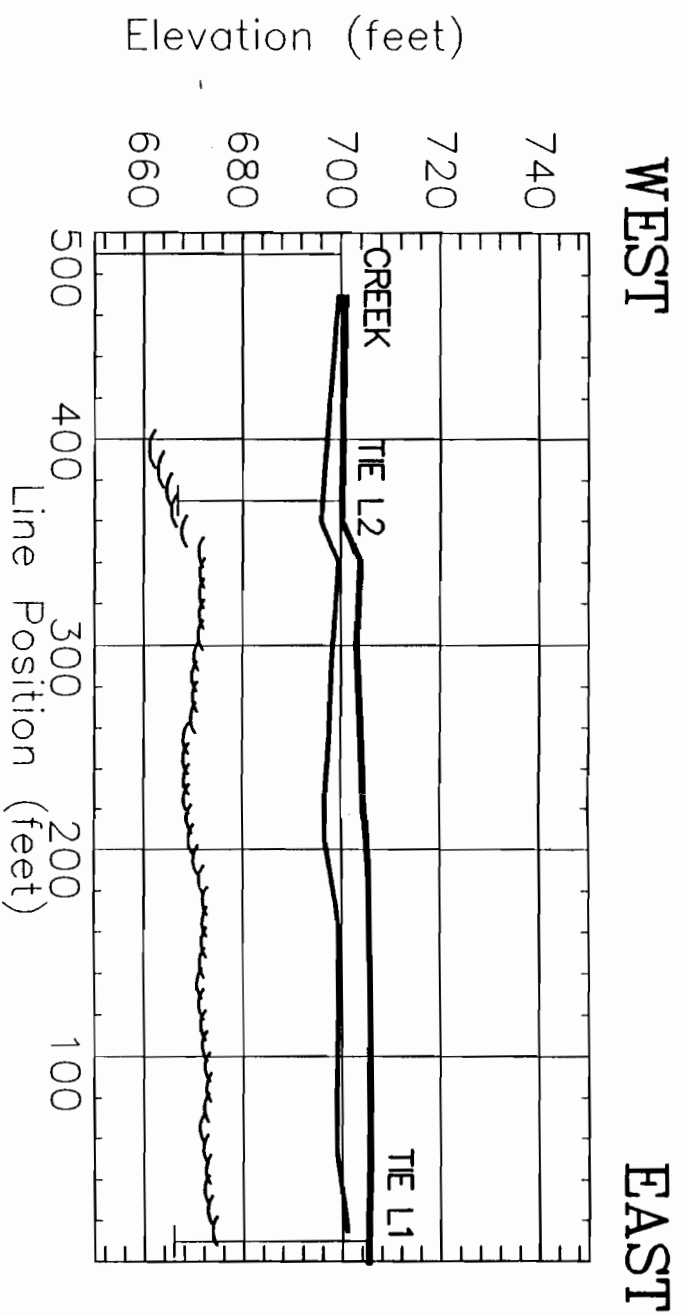


FIGURE 9

GEOPHYSICAL SURVEY RESULTS

STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

SEISMIC LINE 8

BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION
JANUARY 1983

GARTNER LEE, INC. NIAGARA FALLS, NY

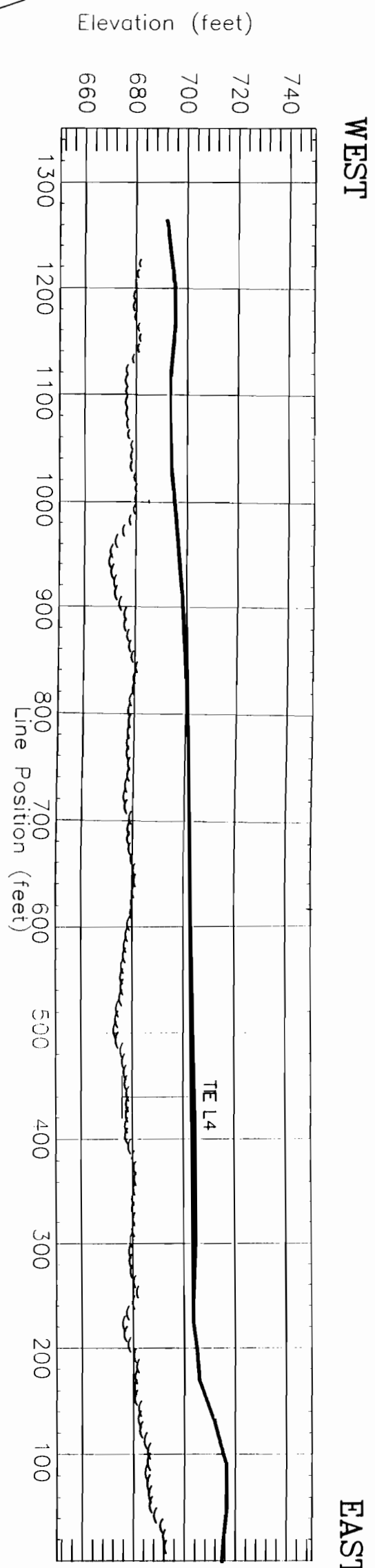
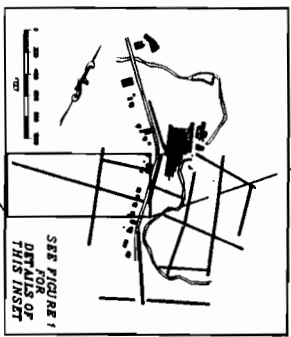
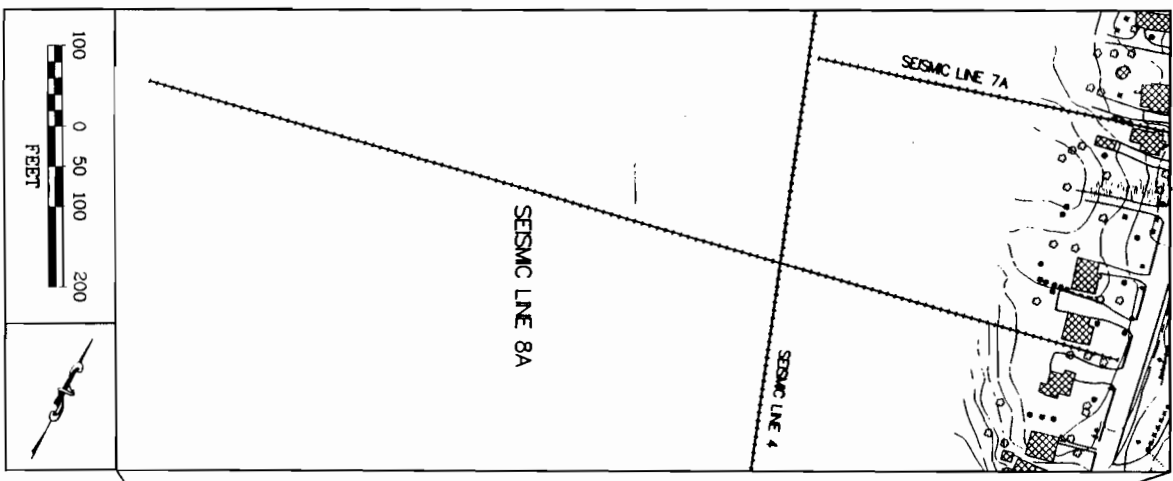


FIGURE 10

GEOPHYSICAL SURVEY RESULTS
STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY
SEISMIC LINE 8A
BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION
JANUARY 1993
GARTNER LEE, INC. NIAGARA FALLS, NY

11/19/94-03

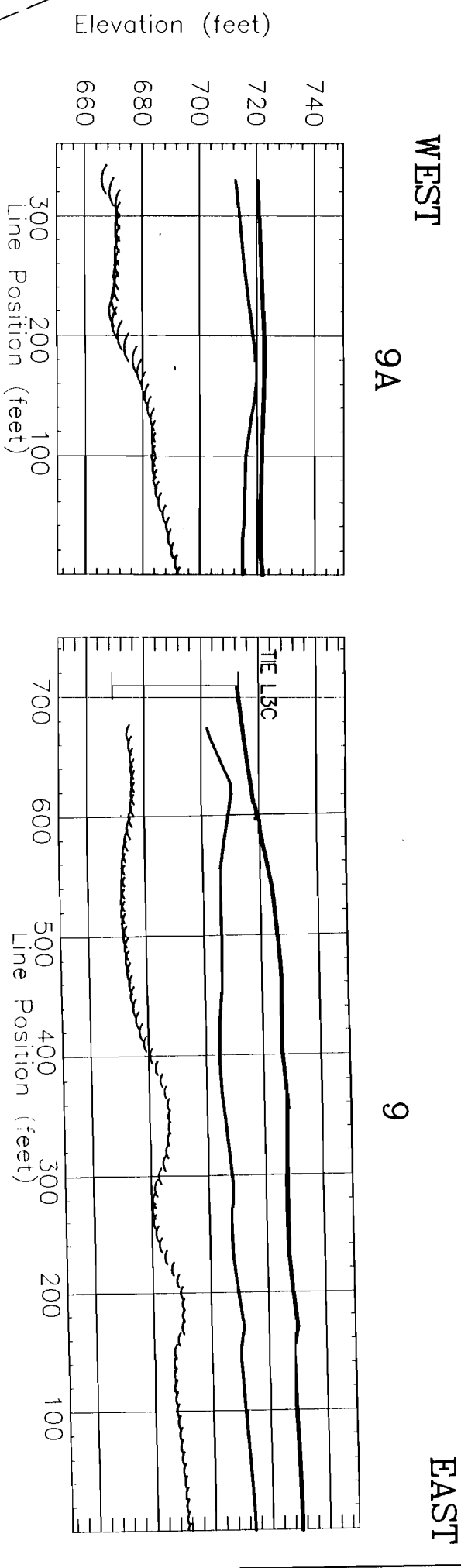
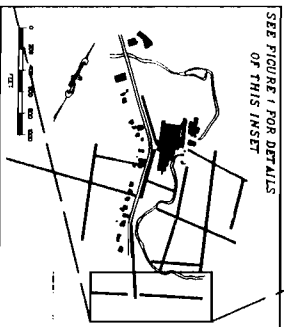
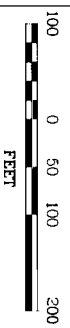
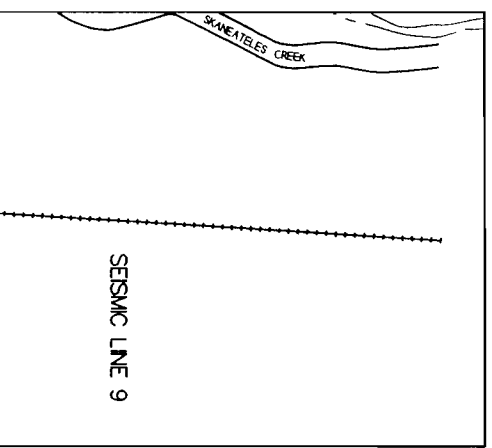


FIGURE 11

GEOPHYSICAL SURVEY RESULTS
STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

SEISMIC LINES 9 AND 9A
BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION

JANUARY 1980

GARTNER LEE, INC. NIAGARA FALLS, NY

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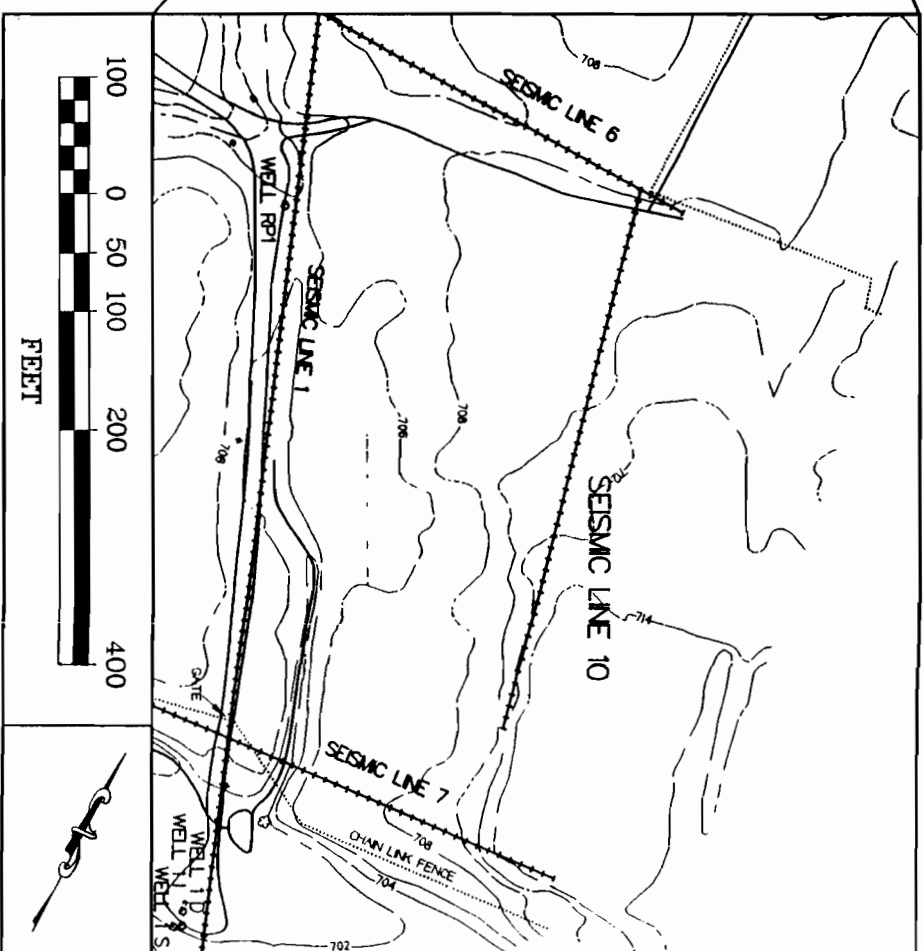
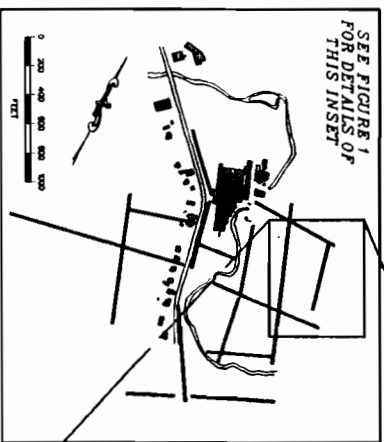
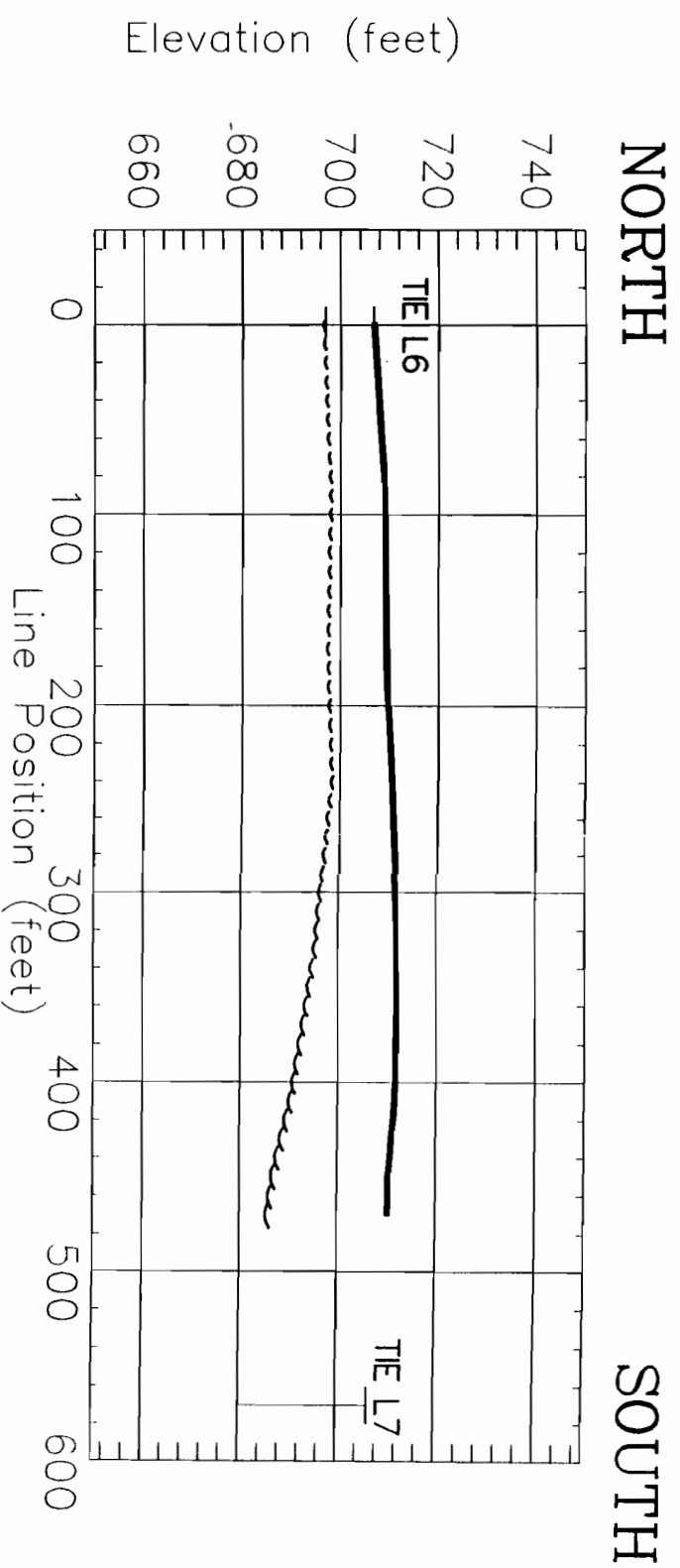


FIGURE 12

GEOPHYSICAL SURVEY RESULTS

STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

SEISMIC LINE 10

BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION

JANUARY 1983

GARTNER LEE, INC. NIAGARA FALLS, NY

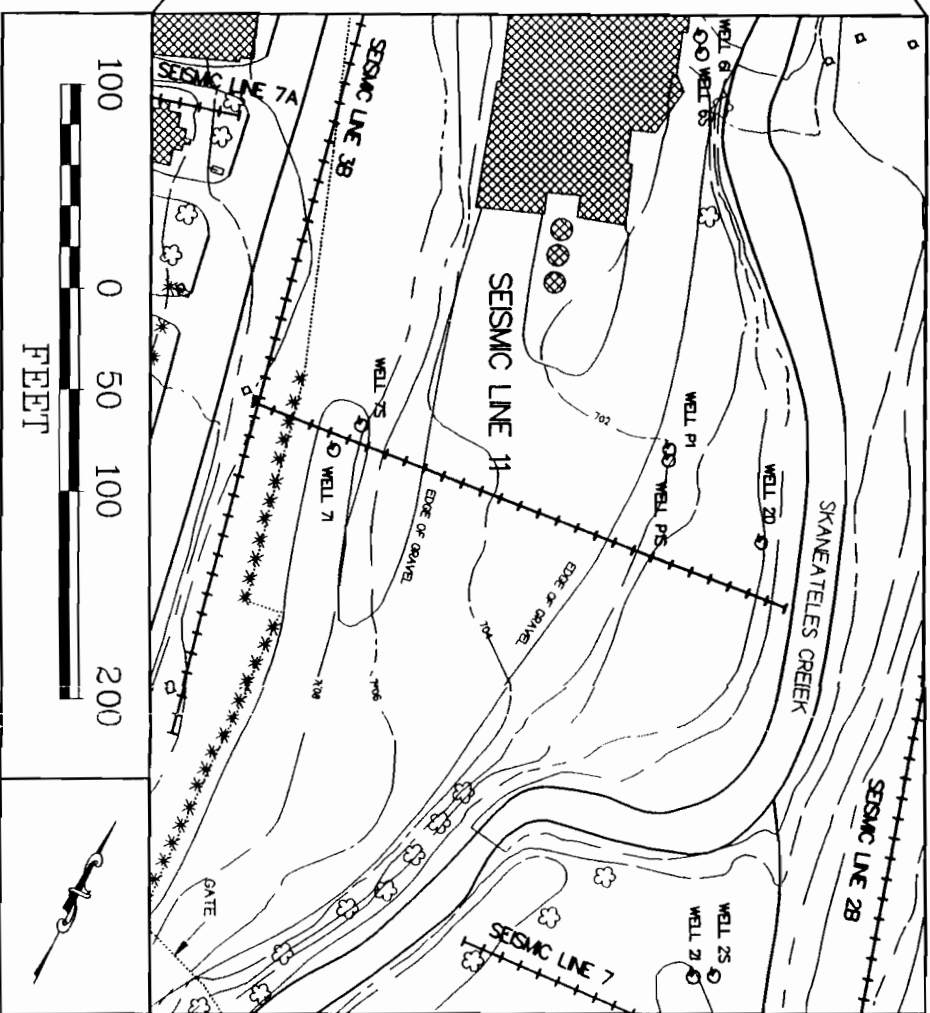
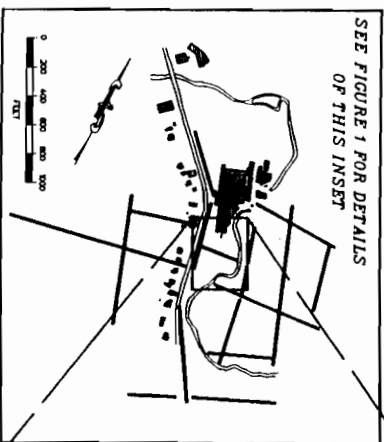
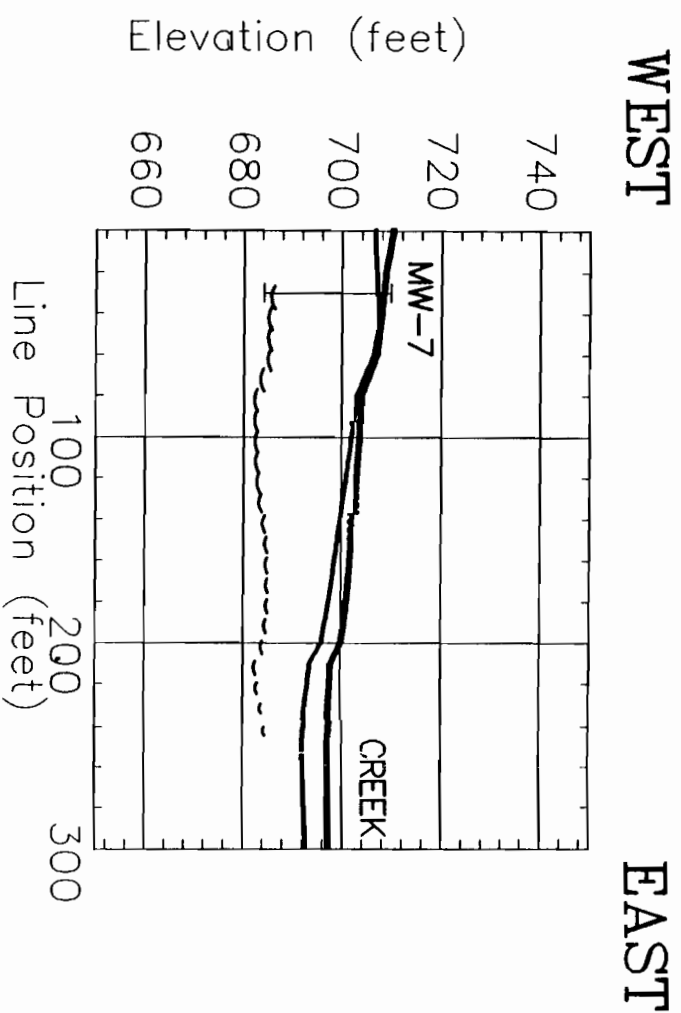


FIGURE 13

GEOPHYSICAL SURVEY RESULTS

STAUFFER MANAGEMENT COMPANY FACILITY, SKANEATELES FALLS, NY

SEISMIC LINE 11

BEDROCK DEPTH INTERPRETATION WITH MAP SHOWING LINE LOCATION

JANUARY 1993

GARTNER LEE, INC. NIAGARA FALLS, NY

Appendix D

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TABLE D-1 VOLATILE ORGANICS MEASURED IN SOIL VAPOR FROM FORMER ORGANICS PLANT AREA

p 1 of 2

Analyte	Units	VP-1 (ppm _v)	VP-2 (ppm _v)	VP-3 (ppm _v)	VP-4 (ppm _v)	VP-5 (ppm _v)	VP-6 (ppm _v)	VP-7 (ppm _v)	VP-8 (ppm _v)	VP-9 (ppm _v)	VP-10 (ppm _v)	VP-11 (ppm _v)
Toluene		(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)
Ethylbenzene		(<0.46U)	(<0.46U)	1.0	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)
m/p-Xylene		(<0.79U)	(<0.79U)	22.4	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)
o-Xylene		(<0.79U)	(<0.79U)		(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)	(<0.79U)
Methylene Chloride		0.2	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)	0.3	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)
cis-1,2-Dichloroethene		(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)
trans-1,2-Dichloroethene		0.1	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)
1,1,1-Trichloroethane		(<0.019U)	0.1	(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)
Trichloroethene		(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)
Tetrachloroethene		(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)
Analyte	Units	VP-16 (ppm _v)	VP-17 (ppm _v)	VP-18 (ppm _v)	VP-21 (ppm _v)	VP-23 (ppm _v)	VP-24 (ppm _v)	VP-25 (ppm _v)	VP-27 (ppm _v)	VP-28 (ppm _v)	VP-29 (ppm _v)	VP-30 (ppm _v)
Toluene		(<0.42U)	(<0.42U)	1.3	(<0.42U)	3.0	(<0.42U)	(<0.42U)	0.1	(<0.42U)	(<0.42U)	0.4
Ethylbenzene		(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)
m/p-Xylene		0.7	(<0.79U)	13.8	(<0.79U)	91.4	1.3	1.1	5.8	(<0.79U)	7.1	6
o-Xylene		0.6	(<0.79U)	19.8	(<0.79U)	417.2	1.2	9.3	4.1		4	53.5
Methylene Chloride		(<0.32U)	0.2	(<0.32U)	(<0.32U)	4.9	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)
cis-1,2-Dichloroethene		(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	0.9	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)
trans-1,2-Dichloroethene		(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	6.2	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)
1,1,1-Trichloroethane		(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)		(<0.019U)	(<0.019U)	0.1	(<0.019U)	(<0.019U)	(<0.019U)
Trichloroethene		(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)
Tetrachloroethene		(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)
Analyte	Units	VP-31 (ppm _v)	VP-32 (ppm _v)	VP-32D (ppm _v)	VP-33 (ppm _v)	VP-34 (ppm _v)	VP-35 (ppm _v)	VP-36 (ppm _v)	VP-37 (ppm _v)	VP-38 (ppm _v)	VP-39 (ppm _v)	VP-43 (ppm _v)
Toluene		0.2	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	(<0.42U)	0.3	0.1	(<0.42U)	0.7	1.5
Ethylbenzene		0.5	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	(<0.46U)	0.1	2.1	5.7
m/p-Xylene		5.5	1.5	1.5	0.1	(<0.79U)	(<0.79U)	(<0.79U)	0.5	0.1	1	0.9
o-Xylene		64.5	0.6	1	(<0.79U)	0.3	(<0.79U)	0.2	0.9	0.4	12.8	1.1
Methylene Chloride		(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)	(<0.32U)	0.8	(<0.32U)	1.2	3
cis-1,2-Dichloroethene		(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	(<0.37U)	1.1	8.3
trans-1,2-Dichloroethene		(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	(<0.81U)	1.7	1.6
1,1,1-Trichloroethane		(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)	0.1	(<0.019U)	(<0.019U)	(<0.019U)	(<0.019U)	0.2	1.1
Trichloroethene		(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)	(<0.022U)
Tetrachloroethene		(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)	(<0.009U)

NOTE:

U = Not detected. Detection limits shown as (<_U).

TABLE D-2 VOLATILE ORGANIC ANALYTES MEASURED IN LANDFILL PERIMETER SOIL BORINGS

p 1 of 3

Analytes	SB02	SB03	SB04	SB05	SB05DUP	SB06	SB07
Depth	3.5-5.5 ft	3.5-5.0 ft	4.5-6.0 ft	0-1.5 ft	0-1.5 ft	1-3 ft	0.5-1.5 ft
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
VOLATILES							
Methylene Chloride	(<6U)	(<6U)	(<6U)	(<5U)	(<6U)	(<6U)	(<8U)
Acetone	5 J	9 J	26	6 J	6 J	(<11U)	5 J
2-Butanone	(<12 U)	(<12 U)	(<12 U)	(<10 U)	6 J	(<11U)	(<16U)
Tetrachloroethene	2 J	(<6U)	(<6U)	(<5U)	(<6U)	(<6U)	(<8U)
Toluene	(<6U)	(<6U)	4 J	(<5U)	(<6U)	(<6U)	(<8U)
Ethylbenzene	(<6U)	(<6U)	(<6U)	(<5U)	2 J	(<6U)	(<8U)
Xylenes (Total)	(<6U)	(<6U)	66	11	6 J	2 J	(<8U)
TICs-Known							
Undecane	---	---	---	---	---	---	---
TICs-Unknown							
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Reported value is an estimate following data validation review.

--- = No detectable TICs.

Data validation results presented in data report 911652.

TABLE D-2 (Continued)

p 2 of 3

	SB08	SB09	SB10	SB11	SB12	SB13	SB14
	1-3 ft	2-4 ft	3.5-5.5 ft	5-7 ft	4-6 ft	1.3-3.5 ft	4-6 ft
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
VOLATILES							
Methylene Chloride	(<6U)	(<6U)	3 J	3 J	(<6U)	(<6U)	(<7U)
Acetone	58	(<13U)	21	6 J	26	(<12U)	39
2-Butanone	(<16 U)	(<13U)	7 J	(<11U)	12 J	6 J	25
Tetrachloroethene	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	(<7U)
Toluene	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	3 J
Ethylbenzene	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	(<7U)
Xylenes (Total)	7 J	(<6U)	(<6U)	1 J	(<6U)	(<6U)	670
TICs-Known							
Undecane	22 JN	---	---	---	---	---	---
TICs-Unknown							
	---	---	---	---	---	---	---
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1

table-1.wk1

TABLE D-2 (Continued)

p 3 of 3

	SB15 6-8 ft	FB01 -01A	FB02 -01A	FB03 -01A
Units	(ug/kg)	(ug/l)	(ug/l)	(ug/l)
VOLATILES				
Methylene Chloride	(<6U)	(<5U)	(<5U)	(<5U)
Acetone	(<12U)	(<10U)	4 J	(<10U)
2-Butanone	(<12U)	(<10U)	4 J	(<10U)
Tetrachloroethene	(<6U)	(<5U)	(<5U)	(<5U)
Toluene	(<6U)	(<5U)	(<5U)	(<5U)
Ethylbenzene	(<6U)	(<5U)	(<5U)	(<5U)
Xylenes (Total)	(<6U)	(<5U)	(<5U)	(<5U)
TICs-Known				
Undecane	---	---	---	---
TICs-Unknown				
Level (low or medium)	L	L	L	L
Dilution factor	1	1	1	1

TABLE D-3 EXTRACTABLE ORGANIC ANALYTES MEASURED IN LANDFILL PERIMETER SOIL BORINGS

p 1 of 3

Analytes	Depth Units	SB02 3.5-5.5 ft (ug/kg)	SB03 3.5-5.0 ft (ug/kg)	SB04 4.5-6.0 ft (ug/kg)	SB05 0-1.5 ft (ug/kg)	SB05DUP 0-1.5 ft (ug/kg)	SB06 1-3 ft (ug/kg)
SEMI-VOLATILES							
2-Methylphenol		(<400U)	(<400U)	(<390U)	20 J	40 J	(<370U)
4-Methylphenol		(<400U)	(<400U)	(<390U)	(<340U)	29 J	(<370U)
Naphthalene		(<400U)	(<400U)	(<390U)	67 J	180 J	41 J
2-Methylnaphthalene		(<400U)	(<400U)	(<390U)	55 J	140 J	31 J
Dimethyl Phthalate		(<400U)	(<400U)	(<390U)	(<340U)	(<370U)	19 J
Acenaphthylene		(<400U)	(<400U)	(<390U)	62 J	200 J	24 J
Acenaphthene		(<400U)	(<400U)	(<390U)	20 J	92 J	29 J
Dibenzofuran		(<400U)	(<400U)	(<390U)	33 J	120 J	29 J
Diethylphthalate		(<400U)	(<400U)	(<390U)	(<340U)	(<370U)	17 J
Fluorene		(<400U)	(<400U)	(<390U)	49 J	250 J	25 J
N-Nitrosodiphenylamine		(<400U)	(<400U)	(<390U)	(<340U)	(<370U)	23 J
Phenanthrene		(<400U)	(<400U)	(<390U)	460	1,800	45 J
Anthracene		(<400U)	(<400U)	(<390U)	87 J	390	15 J
Di-n-Butylphthalate		(<400U)	(<400U)	(<390U)	(<340U)	(<370U)	(<370U)
Fluoranthene		(<400U)	(<400U)	(<390U)	730	2,300	55 J
Pyrene		(<400U)	(<400U)	(<390U)	680	2,200	70 J
Benzo(a)Anthracene		(<400U)	(<400U)	(<390U)	460	1,500	(<370U)
bis(2-ethylhexyl)Phthalate		(<400U)	(<400U)	(<390U)	(<340U)	(<370U)	(<370U)
Chrysene		(<400U)	(<400U)	(<390U)	530	1,600	(<370U)
Benzo(b)Fluoranthene		(<400U)	(<400U)	(<390U)	600	2,000	40 J
Benzo(k)Fluoranthene		(<400U)	(<400U)	(<390U)	270 J	1,000	(<370U)
Benzo(a)Pyrene		(<400U)	(<400U)	(<390U)	360	1,300	(<370U)
o-Toluic Acid		(<2,000U)	(<2,000U)	(<2,000U)	60 J	49 J	(<2,000U)
m-Toluic Acid		(<2,000U)	(<2,000U)	(<2,000U)	(<1,800U)	(<1,900U)	(<2,000U)
p-Toluic Acid		(<2,000U)	(<2,000U)	(<2,000U)	(<1,800U)	(<1,900U)	(<2,000U)
TICs-Known							
2-Hexanone,5-methyl		---	---	---	---	---	---
Naphthalene,2-phenyl		---	---	---	---	360 JN	---
Phenanthrene,2,5-dimethyl		---	---	---	---	570 JN	---
Benzaldehyde,4-methyl		---	---	---	---	---	830 JN
Octane,2,4,6-trimethyl		---	---	---	---	---	---
Hexadecanoic acid,dioctyl		---	---	---	---	---	---
Ethanol,2,2'-[oxybis(2,1-ethyl		---	---	---	---	---	---
Phenol,4-(2,2,3,3-tetramethyl		---	---	---	---	---	---
Phenol,4-nonyl		---	---	---	---	---	---
Tetradecanoic acid		---	---	---	---	---	---
Phenol,nonyl-		---	---	---	---	---	---
Benzaldehyde,3-methyl-oxime		---	---	---	---	---	---
Octadecanoic acid		---	---	---	---	---	---
TICs-Unknown;n		430 J;1	860 J;2	350 J;1	3,570 J;11	11,840 J;17	14,220 J;22
PESTICIDES/PCBs							
4,4'-DDE		(<10U)	(<10U)	(<10U)	6 J	7 J	36 J
4,4'-DDD		(<10U)	(<10U)	(<10U)	(<8.3U)	(<8.9U)	6 J

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Reported concentration is an estimated value following data validation review.

B = Compound detected in corresponding method blank.

JN = Presumptive identification and an estimated concentration.

--- = No detectable TICs.

Unknown TICs reported as total concentrations and total number of unknowns.

Data validation results provided in data report 911652.

TABLE D-3 (Continued)

p 2 of 3

Analytes	Depth Units	SB07 0.5-1.5 ft (ug/kg)	SB08 1-3 ft (ug/kg)	SB09 2-4 ft (ug/kg)	SB10 3.5-5.5 ft (ug/kg)	SB11 5-7 ft (ug/kg)	SB12 4-6 ft (ug/kg)
SEMI-VOLATILES							
2-Methylphenol		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
4-Methylphenol		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Naphthalene	48 J		(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
2-Methylnaphthalene		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Dimethyl Phthalate		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Acenaphthylene		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Acenaphthene		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Dibenzofuran		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Diethylphthalate		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Fluorene		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
N-Nitrosodiphenylamine		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Phenanthrene	170 J		(<390U)	(<410U)	(<400U)	22 J	(<420U)
Anthracene	13 J		(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Di-n-Butylphthalate		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Fluoranthene	210 J		(<390U)	(<410U)	(<400U)	21 J	(<420U)
Pyrene	150 J		(<390U)	(<410U)	(<400U)	23 J	(<420U)
Benzo(a)Anthracene		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
bis(2-ethylhexyl)Phthalate		(<530U)	(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Chrysene	74 J		(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Benzo(b)Fluoranthene	83 J		(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Benzo(k)Fluoranthene	47 J		(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
Benzo(a)Pyrene	50 J		(<390U)	(<410U)	(<400U)	(<380U)	(<420U)
o-Toluic Acid		(<2,700U)	(<2,000U)	(<2,100U)	(<2,100U)	(<2,000U)	(<2,000U)
m-Toluic Acid		(<2,700U)	(<2,000U)	(<2,100U)	(<2,100U)	(<2,000U)	(<2,000U)
p-Toluic Acid		(<2,700U)	(<2,000U)	(<2,100U)	(<2,100U)	(<2,000U)	(<2,000U)
TICs-Known							
2-Hexanone,5-methyl		---	---	---	---	---	---
Naphthalene,2-phenyl		---	---	---	---	---	---
Phenanthrene,2,5-dimethyl		---	---	---	---	---	---
Benzaldehyde,4-methyl		---	---	---	---	---	---
Octane,2,4,6-trimethyl	430 JN		---	---	---	---	---
Hexadecanoic acid,dioctyl		---	---	---	---	---	---
Ethanol,2,2'-(oxybis(2,1-ethyl		---	---	---	---	---	---
Phenol,4-(2,2,3,3-tetramethyl		---	---	---	---	---	---
Phenol,4-nonyl		---	---	---	---	---	---
Tetradecanoic acid		---	---	---	---	---	---
Phenol,nonyl-		---	---	---	---	---	---
Benzaldehyde,3-methyl-oxime		---	---	---	---	---	---
Octadecanoic acid		---	---	---	---	---	---
TICs-Unknown;n		5,240 J;8	1,310 J;2	1,260 J;2	2,370 J;4	7,410 J;6	3,480 J;4
PESTICIDES/PCBs							
4,4'-DDE		(<13U)	(<9.4U)	(<10U)	(<9.8U)	(<9.2U)	(<10U)
4,4'-DDD		(<13U)	(<9.4U)	(<10U)	(<9.8U)	(<9.2U)	(<10U)

TABLE D-3 (Continued)

p 3 of 3

Analytes	Depth Units	SB13 1.5-3.5 ft (ug/kg)	SB14 4-6 ft (ug/kg)	SB15 6-8 ft (ug/kg)	FB01 (ug/l)	FB02 (ug/l)	FB03 (ug/l)
SEMI-VOLATILES							
2-Methylphenol		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
4-Methylphenol		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Naphthalene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
2-Methylnaphthalene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Dimethyl Phthalate		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Acenaphthylene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Acenaphthene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Dibenzofuran		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Diethylphthalate		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Fluorene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
N-Nitrosodiphenylamine		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Phenanthrene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Anthracene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Di-n-Butylphthalate		150 J	220 J	170 J	(<5U)	(<5U)	(<10U)
Fluoranthene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Pyrene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Benzo(a)Anthracene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
bis(2-ethylhexyl)Phthalate		110 J	(<440U)	(<410U)	2 BJ	0.6 BJ	(<10U)
Chrysene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Benzo(b)Fluoranthene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Benzo(k)Fluoranthene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
Benzo(a)Pyrene		(<400U)	(<440U)	(<410U)	(<5U)	(<5U)	(<10U)
o-Toluic Acid		(<2,000U)	170 J	(<2,100U)	(<5U)	(<5U)	(<10U)
m-Toluic Acid		46 J	120 J	(<2,100U)	(<5U)	(<5U)	(<10U)
p-Toluic Acid		(<2,000U)	48 J	(<2,100U)	(<5U)	(<5U)	(<10U)
TICs-Known							
2-Hexanone,5-methyl		---	---	---	38 BJN	22 BJN	37 BJN
Naphthalene,2-phenyl		---	---	---	---	---	---
Phenanthrene,2,5-dimethyl		---	---	---	---	---	---
Benzaldehyde,4-methyl		---	---	---	---	---	---
Octane,2,4,6-trimethyl		---	---	---	---	---	---
Hexadecanoic acid,dioctyl		460 JN	---	---	---	---	---
Ethanol,2,2'-(oxybis(2,1-ethyl		---	290 JN	---	---	---	---
Phenol,4-(2,2,3,3-tetramethyl		---	450 JN	---	---	---	---
Phenol,4-nonyl		---	600 JN	---	---	---	---
Tetradecanoic acid		---	1,500 JN	---	---	---	---
Phenol,nonyl-		---	470 JN	---	---	---	---
Benzaldehyde,3-methyl-oxime		---	200 JN	---	---	---	---
Octadecanoic acid		---	2,700 JN	---	---	---	---
TICs-Unknown;n		1,810 J;2	9,800 J;10	2,680 J;4	---	---	---
PESTICIDES/PCBs							
4,4'-DDE		(<9.6U)	(<11U)	(<9.9U)	(<0.10U)	(<0.10U)	(<0.10U)
4,4'-DDD		(<9.6U)	(<11U)	(<9.9U)	(<0.10U)	(<0.10U)	(<0.10U)

TABLE D-4 INORGANIC ANALYTES MEASURED IN LANDFILL PERIMETER SOIL BORINGS

p 1 of 3

Analytes	SB02	SB03	SB04	SB05	SB05DUP	SB06	SB07
Depths	3.5-5.5 ft	3.5-5.0 ft	4.5-6.0 ft	0-1.5 ft	0-1.5 ft	1-3 ft	0.5-1.5 ft
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aluminum	16,200	19,700	13,800	10,700	8,800	4,180	12,100
Antimony	(<3.8U) J	(<3.2U) J	6.1 J	(<3.1U) J	2.8 BJ	(<3.3U) J	6.6 J
Arsenic	5.1 J	5.0 J	7.8 J	3.1 J	3.6 J	4.2 J	4.8 J
Barium	103	124	92.1	78.7	58.5	35.2	50.0
Beryllium	0.64	0.72	0.84	0.52	0.45	0.31 B	0.46 B
Cadmium	4.5 J	4.6 J	6.5 J	4.5 J	3.2 J	1.6 J	4.9 J
Calcium	87,300	53,100	2,510	93,900	148,000	177,000	53,600 B
Chromium	17.3 J	18.9 J	21.8 J	16.7 J	14.0 J	13.1 J	14.6 J
Cobalt	9.6	12.3	14.4	57.7	20.4	11.4	9.6
Copper	25.1	26.3	46.2	26.0	20.5	33.6	41.0
Iron	25,700	27,900	36,600	25,000	20,300	13,200	30,100
Lead	11.0	8.0 R	15.3	15.5	20.7	11.1	11.4 R
Magnesium	30,600 B	21,100 B	5,240	6,680	12,200 B	20,600 B	29,100 B
Manganese	469	838	827	632	543	372	406
Mercury	(<0.11U)	(<0.11U)	(<0.11U)	(<0.10U)	(<0.09U)	(<0.32U)	0.26
Nickel	26.0	27.4	48.4	29.0	24.8	16.9	25.1
Potassium	2,570	2,550	1,080	1,240	1,250	1,060	1,070
Selenium	(<0.08U)J	(<0.10U)J	0.18 BJ	(<0.10U)J	(<0.09U)J	(<0.09U)J	(<0.11U)J
Silver	2.7 J	1.9 J	1.2 J	2.7 J	4.1 J	4.9 J	2.5 J
Sodium	302 B	756	204 B	1,720	1,410	869	301 B
Thallium	(<0.17U)	(<0.20U)	0.31 B	(<0.20U)	(<0.19U)	(<0.18U)	(<0.21U)
Vanadium	17.4	18.4	21.9	11.5	10.8	8.4	16.2
Zinc	45.6 R	46.2 R	54.2 R	107 R	83.7 R	54.0 R	52.3 R
Cyanide	1.0 J	0.64	(<0.49U)	(<0.46U)	(<0.39U)	(<0.38U)	(<0.70U)
TOC	2,280	2,100	3,870	12,100	8,840	4,340	13,300

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below CRDL.

J = Reported concentration is an estimated value following data validation review.

R = Data is unusable.

NA = Not analyzed.

Data validation results provided in data report 911652.

TABLE D-4 (Continued)

p 2 of 3

Analytes	SB08	SB09	SB10	SB11	SB12	SB13	SB14
Depth	1-3 ft	2-4 ft	3.5-5.5 ft	5-7 ft	4-6 ft	1.5-3.5 ft	4-6 ft
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aluminum	18,300	17,400	15,500	13,200	19,600	11,700	13,000
Antimony	(<3.3U) J	5.3 BJ	4.0 BJ	4.5 J	5.0 BJ	(<2.9U) J	(<4.4U) J
Arsenic	4.5 J	4.8 J	5.2 J	5.4 J	2.7 J	2.2 J	5.0 J
Barium	86.1	78.3	74.4	64.9	52.7	53.8	115
Beryllium	0.68	0.69	0.62	0.64	0.76	0.41 B	0.89
Cadmium	5.0 J	4.8 J	4.0 J	4.6 J	4.9 J	3.2 J	5.5 J
Calcium	74,700	52,500 B	55,200	12,100 B	34,400 B	5,610	4,090
Chromium	18.4 J	20.8 J	16.5 J	22.8 J	25.2 J	13.2 J	20.8 J
Cobalt	9.6	10.9	9.3	9.2	11.2	5.7	9.9
Copper	24.7	26.0	22.8	23.1	26.4	11.8	21.5
Iron	26,500	21,300	25,700	26,300	27,000	17,100	32,100
Lead	9.2	10.7	12.6	14.4	15.2	7.4 R	16.4
Magnesium	27,900 B	16,900 B	23,200	6,050	18,200 B	3,400	3,690
Manganese	560	681	552	511	741	289	1,850
Mercury	(<0.10U)	0.10	(<0.10U)	(<0.10U)	(<0.11U)	(<0.10U)	0.19
Nickel	24.5	27.6	24.7	27.5	27.1	14	32.8
Potassium	3,460	2,940	2,070	1,660	2,200	566	1,240
Selenium	(<0.09U)J	0.40 BJ	(<0.11U)J	(<0.10U)J	(<0.11U)J	(<0.09U)J	(<0.12U)J
Silver	2.4 J	2.1 J	2.5 J	0.95 J	1.6 J	0.75 J	1.4 J
Sodium	177 B	91.7 B	90.2 B	857	852	76.4 B	5,190
Thallium	(<0.18U)	(<0.23U)	(<0.22U)	(<0.20U)	(<0.21U)	(<0.19U)	0.24 B
Vanadium	19.8	19.9	17.1	15.3	22.4	17.7	24.3
Zinc	42.6 R	44.5 R	44.8 J	61.3 R	44.1 R	29.3 R	58.5 R
Cyanide	(<0.49U)	(<0.62U)	(<0.45U)	(<0.39U)	(<0.52U)	(<0.62U)	(<0.52U)
TOC	6,300	7,200	11,800	7,230	29,500	18,000	9,940

TABLE D-4 (Continued)

p 3 of 3

Analytes Depth Units	SB15 6-8 ft (mg/kg)	FB01 (ug/l)	FB02 (ug/l)	FB03 (ug/l)
Aluminum	15,600	25.8 B	24.0 B	71.5 B
Antimony	3.7 BJ	(<34U)	(<34U)	(<34U)
Arsenic	6.1 J	(<2U)	(<2U)	(<2U)
Barium	58.1	(<5U)	(<5U)	(<5U)
Beryllium	0.84	(<1U)	(<1U)	(<1U)
Cadmium	6.1 J	(<5U)	(<5U)	(<5U)
Calcium	8,490	146 B	151 B	158 B
Chromium	26.3 J	(<4U)	(<4U)	(<4U)
Cobalt	13.4	(<9U)	(<9U)	(<9U)
Copper	33.9	6.3 B	3 B	5.9 B
Iron	32,100	49.5 B	66.2 B	124
Lead	16.5	(<1U)	1.1 B	(<1U)
Magnesium	6,900	34.1 B	(<30U)	72.8 B
Manganese	625	4.1 B	1.5 B	2.9 B
Mercury	(<0.10U)	(<0.2U)	(<0.2U)	(<0.2U)
Nickel	35.9	(<9U)	(<9U)	(<9U)
Potassium	1,260	(<69U)	151 B	(<69U)
Selenium	(<0.10U)J	(<1U)	(<1U)	(<1U)
Silver	1.0 J	(<2U)J	(<2U)J	(<2U)J
Sodium	809	(<136U)	(<136U)	(<136U)
Thallium	(<0.20U)	(<2U)R	(<2U)R	9.8 BR
Vanadium	20.9	(<3U)	(<3U)	(<3U)
Zinc	70.7 R	64.2	13.7 B	8.7 B
Cyanide	(<0.57U)	(<10U)J	(<10U)J	(<10U)J
TOC	6,340	NA	NA	NA

TABLE D-5 VOLATILE ORGANIC ANALYTES MEASURED IN LANDFILL SOIL BORINGS

p 1 of 4

Analytes	SB16 -01A	SB16 -02A	SB17 -01A	SB18 -01A	SB18 -02A	SB18 -03A
Depth	3-4 ft	5.5-7 ft	4-6 ft	0-2 ft	5-7 ft	10-12 ft
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
Methylene Chloride	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	1,300 J
Acetone	26	25 J	(<13U)	(<12U)	(<12U)	(<1,500U)J
2-Butanone	12 J	(<12U)	(<13U)	(<12U)	(<12U)	(<1,500U)J
Benzene	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	1,700 J
Chloroform	(<6U)	(<6U)	1 J	0.7 J	0.8 J	[7,300U]J
Chlorobenzene	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	(<7,300U)J
1,2-Dichloroethene (total)	(<6U)	17	(<6U)	(<6U)	(<6U)	(<7,300U)J
Trichloroethene	(<6U)	2 J	(<6U)	(<6U)	(<6U)	(<7,300U)J
Tetrachloroethene	(<6U)	2 J	(<6U)	(<6U)	4 J	(<7,300U)J
Toluene	(<6U)	3 J	(<6U)	(<6U)	(<6U)	1,100 J
Ethylbenzene	(<6U)	(<6U)	(<6U)	(<6U)	(<6U)	(<7,300U)J
Xylenes (Total)	(<6U)	280	(<6U)	(<6U)	(<6U)	170,000J
TICs - Known	---	---	---	---	---	---
TICs - Unknown;n	---	3 J;1	---	---	---	---
Level (low or medium)	L	L	L	L	L	M
Dilution factor	1	1	1	1	1	1

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

[-U] = Reported result was false-positive following data validation review.

J = Reported concentration is an estimated value following data validation review.

--- = No detectable TICs.

Unknown TICs reported as total concentration and total number of unknowns.

Samples SB-27-01A and SB27-02A were samples of the white and black material present at the referenced depths.

Data validation results provided in data reports 911652 (SB16-01A only), 911664

(SB16-02A to SB21-01A), and 911691 (SB22-01A to SB27-01A).

table-7.wk1

TABLE D-5 (Continued)

p 2 of 4

Analytes	SB19 -01A Depth Units 5-7 ft (ug/kg)	SB20 -01A 3-5 ft (ug/kg)	SB21 -01A 12.5-14.5 ft (ug/kg)	SB22 -01A 10-12 ft (ug/kg)	SB23 -01A 10-12 ft (ug/kg)	SB23 -02A (ug/kg)
Methylene Chloride	(<220,000U)J	(<77,000U)J	[6U]	(<760U)	2 J	(<6U)
Acetone	(<450,000U)J	(<150,000U)J	43 J	(<1500U)J	14 J	17 J
2-Butanone	(<450,000U)J	(<150,000U)J	35	6,400 J	(<11U)	(<11U)
Benzene	19,000 J	6,300 J	1 J	(<760U)	(<6U)	(<6U)
Chloroform	[220,000U]J	[<77,000]J	0.8 J	(<1500U)	1 J	(<6U)
Chlorobenzene	(<220,000U)J	(<77,000U)J	(<6U)	(<760U)	(<6U)	(<6U)
1,2-Dichloroethene (total)	(<220,000U)J	(<77,000U)J	(<6U)	(<760U)	(<6U)	(<6U)
Trichloroethene	(<220,000U)J	(<77,000U)J	(<6U)	(<760U)	(<6U)	(<6U)
Tetrachloroethene	(<220,000U)J	(<77,000U)J	0.9 J	(<760U)	(<6U)	(<6U)
Toluene	1,000,000J	11,000 J	16	660 J	2J	(<6U)
Ethylbenzene	92,000 J	(<77,000U)J	(<6U)	(<760U)	(<6U)	(<6U)
Xylenes (Total)	25,000,000J	2,000,000J	700	35,000	44	10
TICs - Known	---	---	---	---	---	---
TICs - Unknown;n	---	---	---	---	---	---
Level (low or medium)	M	M	L	M	L	L
Dilution factor	1	1	1	1	1	1

TABLE D-5 (Continued)

p 3 of 4

Analytes	SB24 -01A	SB24 DUP -01A	SB25 -01A	SB26 -01A	SB27 -01A
Depth	7-9 ft	7-9 ft	8-10 ft	4-6 ft	5 ft
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
Methylene Chloride	(<17U)	370 J	450 J	(<220,000U)J	(<170,000U)J
Acetone	55 J	(<2,000U)	(<1,900U)	(<450,000U)J	(<340,000U)J
2-Butanone	[49 U]	7,000 J	7,100 J	(<450,000U)J	(<340,000U)J
Benzene	3 J	(<990U)	290 J	(<220,000U)J	(<170,000U)J
Chloroform	(<17U)	(<990U)	(<930U)	(<220,000U)J	(<170,000U)J
Chlorobenzene	14J	210 J	89J	[220,000U]J	[170,000U]J
1,2-Dichloroethene (total)	(<17U)	(<990U)	(<1,900U)	(<220,000U)J	(<170,000U)J
Trichloroethene	(<17U)	(<990U)	110J	(<220,000U)J	(<170,000U)J
Tetrachloroethene	(<17U)	(<990U)	(<930U)	(<220,000U)J	(<170,000U)J
Toluene	41	500 J	19,000	27,000 J	330,000 J
Ethylbenzene	4 J	(<990U)	790 J	(<220,000U)J	(<170,000U)J
Xylenes (Total)	2,000 J	45,000	94,000 J	4,700,000 J	21,000,000 J
TICs - Known	--	--	--	--	--
TICs - Unknown;n	--	--	--	--	--
Level (low or medium)	L	L	L	M	M
Dilution factor	1	1	1	1	1

TABLE D-5 (Continued)

p 4 of 4

Analytes	SB27 -02A 6 ft (ug/kg)	FB03 (ug/L)	FB04 (ug/L)	FB05 (ug/L)
Depth Units				
Methylene Chloride	3,600 J	(<5U)	2 J	(<5U)
Acetone	(<26,000U)	(<10U)	(<10U)	(<10U)
2-Butanone	(<26,000U)	(<10U)	(<10U)	(<10U) J
Benzene	(<13,000U)	(<5U)	(<5U)	(<5U)
Chloroform	(<13,000U)	(<5U)	(<5U)	(<5U)
Chlorobenzene	(<13,000U)	(<5U)	(<5U)	(<5U)
1,2-Dichloroethene (total)	(<13,000U)	(<5U)	(<5U)	(<5U)
Trichloroethene	(<13,000U)	(<5U)	(<5U)	(<5U)
Tetrachloroethene	2,700 J	(<5U)	(<5U)	(<5U)
Toluene	51,000	(<5U)	(<5U)	(<5U)
Ethylbenzene	(<13,000U)	(<5U)	(<5U)	(<5U)
Xylenes (Total)	1,200,000 J	(<5U)	(<5U)	(<5U)
TICs - Known	---	---	---	---
TICs - Unknown;n	---	---	---	---
Level (low or medium)	M	L	L	L
Dilution factor	1	1	1	1

TABLE D-6A EXTRACTABLE ORGANIC COMPOUNDS MEASURED IN LANDFILL SOIL BORINGS

p 1 of 4

Analytes	SB16 -01A Depth Units 3-4 ft (ug/kg)	SB16 -02A 5.5-7 ft (ug/kg)	SB17 -01A 4-6 ft (ug/kg)	SB18 -01A 0-2 ft (ug/kg)	SB18 -02A 5-7 ft (ug/kg)	SB1 -03A 10-12 ft (ug/kg)
SEMI-VOLATILES						
Phenol	(<380U)	(<390U)	(<420U)	(<380U)	(<390U)	(<380U)
Benzyl alcohol	(<380U)	(<390U)	(<420U)	(<380U)	(<390U)	51 J
2-methyl phenol	(<380U)	(<390U)	64 J	(<380U)	(<390U)	54 J
4-methyl phenol	(<380U)	200 J	(<420U)	(<380U)	(<390U)	(<380U)
Benzoic acid	(<1,900U)	(<390U)	110 J	(<1,900U)	(<2,000U)	(<1,900U)
2,4-dimethyl phenol	(<380U)	(<390U)	(<420U)	(<380U)	(<390U)	(<380U)
Naphthalene	(<380U)	160 J	400 J	(<380U)	180 J	250 J
4-Chloroaniline	(<380U)	(<390U)	(<420U)	(<380U)	(<390U)	(<380U)
2-methyl naphthalene	(<380U)	330 J	140 J	(<380U)	150 J	200 J
Acenaphthylene	(<380U)	(<390U)	(<420U)	(<380U)	67 J	130 J
Acenaphthene	(<380U)	(<390U)	48 J	(<380U)	(<390U)	79 J
Dibenzofuran	(<380U)	(<390U)	(<420U)	(<380U)	(<390U)	140 J
Fluorene	(<380U)	(<390U)	(<420U)	(<380U)	180 J	280 J
N-nitrosodiphenylamine	(<380U)	490	(<420U)	(<380U)	(<390U)	(<380U)
Phenanthrene	(<380U)	540	160 J	(<380U)	610	2600
Anthracene	(<380U)	63 J	(<420U)	(<380U)	110 J	250 J
Di-n-butyl phthalate	170 J	[390U]	[390U]	[410U]	[390U]	(<380U)
Dibenzo(a,h)anthracene	(<380U)	(<390U)	(<420U)	(<380U)	(<390U)	230 J
Fluoranthene	(<380U)	220 J	140 J	(<380U)	910	1500 J
Pyrene	(<380U)	650 J	170 J	(<380U)	1100	2300 J
Butylbenzylphthalate	(<380U)	(<390U)J	(<420U)J	(<380U)	(<390U)	(<380U)J
Benzo(a)Anthracene	(<380U)	170 J	97 J	(<380U)	770	990 J
Bis(2-ethyl hexyl)phthalate	58 J	280 J	190 J	480	210 J	140 J
Chrysene	(<380U)	250 J	97 J	(<380U)	850	1100
Benzo(b)Fluoranthene	(<380U)	140 J	55 J	(<380U)	910	79C
Benzo(k)Fluoranthene	(<380U)	*	80 J	(<380U)	550	810 J
Benzo(a)Pyrene	(<380U)	76 J	77 J	(<380U)	780	930 J
Indeno(1,2,3-cd)Pyrene	(<380U)	(<390U)J	(<420U)J	(<380U)	580	560 J
Benzo(g,h,i)Perylene	(<380U)	(<390U)J	(<420U)J	(<380U)	620	600 J
o-Toluic acid	(<2000U)	(<2000U)	4,000	(<2000U)	140 J	2,000
m-Toluic acid	(<2000U)	(<2000U)	3,000	(<2000U)	290 J	2,100
p-Toluic acid	(<2000U)	(<2000U)	240 J	(<2000U)	(<2000U)	190 J
Level (low or medium)	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1
PESTICIDES/PCBs						
4,4'-DDE	(<9.2 U)	(<9.4 U)	(<200 U)	(<9.3 U)	(<190 U)	(<9.3 U)
4,4'-DDD	(<9.2 U)	(<9.4 U)	(<200 U)	(<9.3 U)	(<190 U)	(<9.3 U)
4,4'-DDT	(<9.2 U)	(<9.4 U)	(<200 U)	(<9.3 U)	(<190 U)	(<9.3 U)
Aroclor 1248	(<46 U)	(<47 U)	(<1,000 U)	(<47 U)	(<940 U)	(<47 U)
Level (low or medium)	L	L	L	L	L	L
Dilution factor	1	1	20	1	20	1

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

[-U] = Reported result was false positive following data validation review.

J = Reported value is an estimated concentration following data validation review.

B = Compound detected in corresponding method blank.

D = Reported result from diluted analysis.

Unknown TICs reported as total concentration and total number of unknowns.

--- = No detectable TICs.

* = Benzo(k)fluoranthene coeluted with benzo(b)fluoranthene.

Data validation results provided in data reports 911652 (SB16-01A), 911664 (SB16-02A through SB21-01A), and 911691 (SB22-01A through SB27-01A).

TABLE D-6A (Continued)

p 2 of 4

Analytes	SB19 -01A 5-7 ft (ug/kg)	SB20 -01A 3-5 ft (ug/kg)	SB21 -01A 12.5-14.5 ft (ug/kg)	SB22 -01A 10-12 ft (ug/kg)	SB23 -01A 10-12 ft (ug/kg)
Depth Units					
SEMI-VOLATILES					
Phenol	(<1,200U) J	(<410U)R	(<400U)	300 J	(<380U)
Benzyl alcohol	(<1,200U) J	(<410U)R	(<400U)	160 J	(<380U)
2-methyl phenol	(<1,200U) J	(<410U)R	(<400U)	43 J	(<380U)
4-methyl phenol	(<1,200U) J	(<410U)R	110 J	110 J	(<380U)
Benzoic acid	3000J	(<2000U)R	(<400U)	(<2,000U)	(<1800U)
2,4-dimethyl phenol	12,000 J	(<410U)	(<400U)	(<410U)	(<380U)
Naphthalene	330J	10,000 D	(<400U)	(<410U)	(<380U)
4-chloroaniline	(<1,200U) J	(<410U)	(<400U)	(<410U)	(<380U)
2-methyl naphthalene	(<1,200U) J	2,400	(<400U)	57 J	(<380U)
Acenaphthylene	(<1,200U) J	(<410U)	(<400U)	(<410U)	(<380U)
Acenaphthene	(<1,200U) J	(<410U)	(<400U)	(<410U)	(<380U)
Dibenzofuran	(<1,200U) J	(<410U)	(<400U)	(<410U)	(<380U)
Fluorene	(<1,200U) J	3600	(<400U)	(<410U)	(<380U)
N-nitrosodiphenylamine	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Phenanthrene	(<1,200U) J	140 J	(<400U)	(<410U)	(<380U)
Anthracene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Di-n-butyl phthalate	(<1,200U) J	(<410U)J	[400U]	[<410U]	[920U]
Dibenzo(a,h)anthracene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Fluoranthene	(<1,200U) J	45 J	(<400U)	(<410U)	(<380U)
Pyrene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Butylbenzylphthalate	(<1,200U) J	830 J	(<400U)	(<410U)	(<380U)
Benzo(a)Anthracene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Bis(2-ethyl hexyl)phthalate	(<1,200U) J	270 J	57 J	420 B	[380U]
Chrysene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Benzo(b)Fluoranthene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Benzo(k)Fluoranthene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Benzo(a)Pyrene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Indeno(1,2,3-cd)Pyrene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
Benzo(g,h,i)Perylene	(<1,200U) J	(<410U)J	(<400U)	(<410U)	(<380U)
o-Toluic acid	81,000 J	(<2100U)R	(<400U)	(<410U)	62 J
m-Toluic acid	(<120,000U)	(<2100U)R	(<400U)	250 J	1,300
p-Toluic acid	1,600,000	(<2100U)R	(<400U)	98 J	750
Level (low or medium)	M	L	L	L	L
Dilution factor	1	1	1	1	1
PESTICIDES/PCBs					
4,4'-DDE	(<570 U)	(<10 U)	(<10 U)	(<10 U)	(<9.2 U)
4,4'-DDD	(<570 U)	16	(<10 U)	(<10 U)	(<9.2 U)
4,4'-DDT	(<570 U)	(<10 U)	(<10 U)	(<10 U)	(<9.2 U)
Aroclor 1248	(<2,900 U)	(<49 U)	(<49 U)	230	(<46 U)
Level (low or medium)	M	L	L	L	L
Dilution factor	1	1	1	1	1

TABLE D-6A (Continued)

p 3 of 4

Analyte	Depth Units	SB23 -02A 10-12 ft (ug/kg)	SB24 -01A 7-9 ft (ug/kg)	SB24 DUP -01A 7-9 ft (ug/kg)	SB25 -01A 8-10 ft (ug/kg)	SB26 -01A 4-6 ft (ug/kg)
SEMI-VOLATILES						
Phenol		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)
Benzyl alcohol		(<380U)	(<2,800U)	(<2,600U)	2,200 J	(<29,000U)
2-methyl phenol		67 J	(<2,800U)	(<2,600U)	250 J	15,000 J
4-methyl phenol		99 J	(<2,800U)	(<2,600U)	470 J	10,000 J
Benzoic acid		(<1,900U)	(<13,000U)	(<2,600U)	(<12,000)R	(<140,000U)
2,4-dimethyl phenol		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)R	(<29,000U)
Naphthalene		(<380U)	(<2,800U)	(<2,600U)	1,000 J	(<29,000U)
4-chloroaniline		(<380U)	19,000	25,000	(<2,500U)J	(<29,000U)
2-methyl naphthalene		(<380U)	290 J	250 J	800 J	(<29,000U)
Acenaphthylene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)
Acenaphthene		(<380U)	130 J	(<2,600U)	(<2,500U)J	(<29,000U)
Dibenzofuran		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)
Fluorene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)
N-nitrosodiphenylamine		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)
Phenanthrene		(<380U)	570 J	370 J	(<2,500U)J	(<29,000U)
Anthracene		(<380U)	150 J	95 J	(<2,500U)J	(<29,000U)
Di-n-butyl phthalate		[990U]	[2,800U]	[2,600U]	[2,500U]J	(<29,000U)
Dibenzo(a,h)anthracene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)
Fluoranthene		(<380U)	560 J	290 J	(<2,500U)J	(<29,000U)
Pyrene		(<380U)	460 J	230 J	(<2,500U)J	(<29,000U)J
Butylbenzylphthalate		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)J
Benzo(a)Anthracene		(<380U)	240 J	(<2,600U)	(<2,500U)J	(<29,000U)J
Bis(2-ethyl hexyl)phthalate		[380U]	[2,800U]	[2,600U]	(<2,500U)J	(<29,000U)J
Chrysene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)J
Benzo(b)Fluoranthene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)J
Benzo(k)Fluoranthene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)J
Benzo(a)Pyrene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)J
Indeno(1,2,3-cd)Pyrene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)J
Benzo(g,h,i)Perylene		(<380U)	(<2,800U)	(<2,600U)	(<2,500U)J	(<29,000U)J
o-Toluic acid		(<380U)	(<2,800U)	210 J	1,800 R	67,000
m-Toluic acid		350 J	670 J	2,100 J	2,400 R	120,000
p-Toluic acid		100 J	560 J	2,400 J	(<13,000U)R	5,800 J
Level (low or medium)		L	L	L	L	L
Dilution factor		1	1	1	1	100
4,4'-DDE		(<9.2 U)	19	22	22	(<2,800 U)J
4,4'-DDD		(<9.2 U)	(<13 U)	(<13 U)	12	(<2,800 U)J
4,4'-DDT		(<9.2 U)	6.1 J	(<13 U)	(<12 U)	(<2,800 U)J
Aroclor 1248		(<46 U)	(<66 U)	(<63 U)	(<60 U)	(<14,000 U)J
Level (low or medium)		L	L	L	L	L
Dilution factor		1	1	1	1	200

TABLE D-6A (Continued)

p 4 of 4

Analyte	Depth Units	SB27 -03A 4-6 ft (ug/kg)	SB27 -04A 4-4.5 ft (ug/kg)	FB03 (ug/L)	FB04 (ug/L)	FB05 (ug/L)
SEMI-VOLATILES						
Phenol		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Benzyl alcohol		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
2-methyl phenol		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
4-methyl phenol		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Benzoic acid		(<210,000U)	(<220,000U)J	(<50U)	(<50U)	(<50U)
2,4-dimethyl phenol		110,000	63,000 J	(<10U)	(<10U)	(<10U)
Naphthalene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
4-chloroaniline		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
2-methyl naphthalene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Acenaphthylene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Acenaphthene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Dibenzofuran		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Fluorene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
N-nitrosodiphenylamine		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Phenanthrene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Anthracene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Di-n-butyl phthalate		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Dibenzo(a,h)anthracene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Fluoranthene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Pyrene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Butylbenzylphthalate		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Benzo(a)Anthracene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Bis(2-ethyl hexyl)phthalate		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	2 JB
Chrysene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Benzo(b)Fluoranthene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Benzo(k)Fluoranthene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Benzo(a)Pyrene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Indeno(1,2,3-cd)Pyrene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
Benzo(g,h,i)Perylene		(<42,000U)	(<220,000U)J	(<10U)	(<10U)	(<10U)
o-Toluic acid		(<220,000U)	(<2,200,000U)J	(<50U)	(<50U)	(<10U)
m-Toluic acid		500,000	8,500,000 UJ	(<50U)	(<50U)	(<10U)
p-Toluic acid		(<220,000U)	(<2,200,000U)J	(<50U)	(<50U)	(<10U)
Level (low or medium)		L	L	L	L	L
Dilution factor		50	100	1	1	1
4,4'-DDE		(<1,000 U)J	(<1,000 U)	(<0.10 U)	(<0.10 U)	(<0.10 U)
4,4'-DDD		(<1,000 U)J	(<1,000 U)	(<0.10 U)	(<0.10 U)	(<0.10 U)
4,4'-DDT		(<1,000 U)J	(<1,000 U)	(<0.10 U)	(<0.10 U)	(<0.10 U)
Aroclor 1248		(<5,100 U)J	(<5,200 U)	(<0.5 U)	(<0.5 U)	(<0.5 U)
Level (low or medium)		L	L	L	L	L
Dilution factor		100	100	1	1	1

TABLE D-6B SEMI-VOLATILE TENTATIVELY IDENTIFIED COMPOUNDS MEASURED IN LANDFILL SOIL BORINGS

p 1 of 4

Analytes	SB16 -01A Depth 3-4 ft Units (ug/kg)	SB16 -02A 5.5 -7 ft (ug/kg)	SB17 -01A 4-6 ft (ug/kg)	SB18 -01A 0-2 ft (ug/kg)	SB18 -02A 5-7 ft (ug/kg)	SB18 -03A 10-12 ft (ug/kg)
SEMI-VOLATILES						
TICs-known						
Benzamine,N,N-diethyl-3-methyl	---	1,000 JN	---	---	930 JN	1,500 JN
Benzene,1,1'-(1,2-ethanediyl	---	12,000 JN	4,000 JN	---	1,100 JN	---
Hexadecanoic acid	---	13,000 JN	---	---	---	---
Octadecanoic acid	---	13,000 JN	---	---	---	---
1(3H)-Isobenzofuranone	---	---	860 JN	---	---	---
Benzene,1,1'-oxybis	---	---	740 JN	---	---	---
Benzene,1,2-dimethyl-4-(phenyl	---	---	790 JN	---	200 JN	---
Heptadecane	---	---	650 JN	---	---	---
9-Hexadecanoic acid	---	---	---	160 JN	---	---
Hexadecanoic acid	---	---	---	300 JN	---	---
Phosphoric acid,tris(2-ethyl	---	---	---	---	1,300 JN	---
Benzaldehyde,4-methyl	---	---	---	---	750 JN	---
Ethanol,2-(hexyloxy)	---	---	---	---	---	240 JN
Benzenemethanol,2-methyl	---	---	---	---	---	1,300 JN
Phenol,2,6-bis(1,1-dimethylene	---	---	---	---	---	400 JN
Dodecanamide,N,N-bis(2-hydro	---	---	---	---	---	330 JN
15-Tetracosenoic acid,methyl	---	---	---	---	---	15,000 JN
Octadecanoic acid	---	---	---	---	---	13,000 JN
Benzene,1,2,4,5-tetramethyl	---	---	---	---	---	---
1,2-Propanediol	---	---	---	---	---	---
Tetradecanoic acid	---	---	---	---	---	---
Pentadecanoic acid	---	---	---	---	---	---
Octadecanoic acid	---	---	---	---	---	---
Benzene,1,4-dichloro-isocyanato	---	---	---	---	---	---
3-Pentamine	---	---	---	---	---	---
Benzenemethanimine	---	---	---	---	---	---
2-Propen-1-one,2-(4-methyl	---	---	---	---	---	---
2-Propen-1-one,3-(4-methyl	---	---	---	---	---	---
1,4-Benzenedicarboxaldehyde	---	---	---	---	---	---
Benzenemethanol,4-methyl-(9c	---	---	---	---	---	---
Toluic acid methyl ester Isomer	---	---	---	---	---	---
BNA TICs-unknown(n)	1,290 J;3	26,390 J;16	14,290 J;14	450 J;2	7,090 J;14	36,970 ;13
Level (low or medium)	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1

NOTE:

J = Reported value is an estimate following data validation review.

JN = Presumptive identification and an estimated concentration.

R = Data is unusable.

Unknown TICs reported as total concentration and total number of unknowns.

Data validation results provided in data reports 911652 (SB16-01A), 911664 (SB16-02A through SB21-01A), and 911691 (SB22-01A through SB27-01A).

TABLE D-6B (Continued)

p 2 of 4

Analytes	SB19	SB20	SB21	SB22	SB23
	-01A	-01A	-01A	-01A	-01A
Depth	5-7 ft	3-5 ft	12.5-14.5 ft	10-12 ft	10-12 ft
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
SEMI-VOLATILES					
TICs-known					
Benzamine,N,N-diethyl-3-methyl	---	2,000 JN	---	770 JN	---
Benzene,1,1'-(1,2-ethanediyl	---	---	---	---	---
Hexadecanoic acid	---	---	---	---	---
Octadecanoic acid	---	---	---	---	---
1(3H)-Isobenzofuranone	---	---	---	---	---
Benzene,1,1'-oxybis	---	---	---	---	---
Benzene,1,2-dimethyl-4-(phenyl	---	2,500 JN	---	---	---
Heptadecane	---	---	---	---	---
9-Hexadecanoic acid	---	---	---	640 JN	---
Hexadecanoic acid	---	12,000 JN	---	4,900 JN	1500 R
Phosphoric acid,tris(2-ethyl	---	---	---	---	---
Benzaldehyde,4-methyl	---	---	---	---	---
Ethanol,2-(hexyloxy)	---	---	---	---	---
Benzenemethanol,2-methyl	---	---	650 JN	540 JN	---
Phenol,2,6-bis(1,1-dimethylene	---	---	---	---	---
Dodecanamide,N,N-bis(2-hydro	---	---	---	---	---
15-Tetracosenoic acid,methyl	---	---	---	---	---
Octadecanoic acid	---	---	---	---	---
Benzene,1,2,4,5-tetramethyl	---	4,900 JN	---	---	---
1,2-Propanediol	---	---	---	2,600 JN	---
Tetradecanoic acid	---	---	---	960 JN	---
Pentadecanoic acid	---	---	---	---	---
Octadecanoic acid	---	---	---	2,700 JN	---
Benzene,1,4-dichloro-isocyanato	---	---	---	---	---
3-Pentamine	---	---	---	---	---
Benzenemethanimine	---	---	---	---	---
2-Propen-1-one,2-(4-methyl	---	---	---	---	---
2-Propen-1-one,3-(4-methyl	4,600 JN	---	---	---	---
1,4-Benzenedicarboxaldehyde	---	---	---	---	---
Benzenemethanol,4-methyl-(9c	89,000 JN	---	---	---	---
Toluic acid methyl ester Iso	3,200 JN	---	---	---	---
TICs-unknown(n)					
	376,200 J;13	115,800 J;15	1,650 J;5	32,400 J;10	13,150 J;4
Level (low or medium)	L/M	L	L	L	L
Dilution factor	1	1	1	1	1

TABLE D-6B (Continued)

p 3 of 4

Analyte	Depth Units	SB23 -02A 10-12 ft (ug/kg)	SB24 -01A 7-9 ft (ug/kg)	SB24 DUP -01A 7-9 ft (ug/kg)	SB25 -01A 8-10 ft (ug/kg)	SB26 -01A 4-6 ft (ug/kg)
SEMI-VOLATILES						
TICs-known						
Benzamine,N,N-diethyl-3-methyl		---	---	---	---	---
Benzene,1,1'-(1,2-ethanediyl		---	---	---	---	---
Hexadecanoic acid		---	---	---	---	---
Octadecanoic acid		---	---	---	---	---
1(3H)-Isobenzofuranone		---	---	---	---	510,000 JN
Benzene,1,1'-oxybis		---	---	---	---	---
Benzene,1,2-dimethyl-4-(phenyl		---	---	---	---	---
Heptadecane		---	---	---	---	---
9-Hexadecanoic acid		1,300 R	---	10,000 R	---	---
Hexadecanoic acid		2,000 R	7,500 R	10,000 R	19,000 R	---
Phosphoric acid,tris(2-ethyl		---	---	---	---	---
Benzaldehyde,4-methyl		---	---	---	---	---
Ethanol,2-(hexyloxy)		---	---	---	---	---
Benzenemethanol,2-methyl		670 JN	---	4,700 JN	24,000 JN	88,000 JN
Phenol,2,6-bis(1,1-dimethylene		---	---	---	---	---
Dodecanamide,N,N-bis(2-hydro		---	---	---	---	---
15-Tetracosenoic acid,methyl		---	---	---	---	---
Octadecanoic acid		---	---	---	---	---
Benzene,1,2,4,5-tetramethyl		---	---	---	---	---
1,2-Propanediol		---	---	---	---	---
Tetradecanoic acid		---	17,000 JN	16,000 JN	3,100 JN	---
Pentadecanoic acid		---	2,300 JN	---	---	---
Octadecanoic acid		---	48,000 JN	---	9,000 JN	---
Benzene,1,4-dichloro-isocyanato		---	3,800 JN	5,500 JN	---	---
3-Pentamine		---	---	2,200 JN	---	---
Benzenemethanimine		---	---	---	---	46,000 JN
2-Propen-1-one,2-(4-methyl		---	---	---	---	---
2-Propen-1-one,3-(4-methyl		---	---	---	---	65,000 JN
1,4-Benzenedicarboxaldehyde		---	---	---	---	---
Benzenemethanol,4-methyl-(9c		---	---	---	---	---
Toluic acid methyl ester Iso		---	---	---	---	---
TICs-unknown(n)						
		2230 J;8	330,800 J;15	291,100 J;14	263,900 J;16	4,927,000 J;17
Level (low or medium)		L	L	L	L	L
Dilution factor		1	1	1	1	100

TABLE D-6B (Continued)

p 4 of 4

Analyte	Depth Units	SB27 -03A 4-6 ft (ug/kg)	SB27 -04A 4-4.5 ft (ug/kg)	FB03 (ug/l)	FB04 (ug/l)	FB05 (ug/l)
SEMI-VOLATILES						
TICs-known						
Benzamine,N,N-diethyl-3-methyl		---	---	---	---	---
Benzene,1,1'-(1,2-ethanediyl		---	---	---	---	---
Hexadecanoic acid		---	---	---	---	---
Octadecanoic acid		---	---	---	---	---
1(3H)-Isobenzofuranone		---	---	---	---	---
Benzene,1,1'-oxybis		---	---	---	---	---
Benzene,1,2-dimethyl-4-(phenyl		---	---	---	---	---
Heptadecane		---	---	---	---	---
9-Hexadecanoic acid		---	---	---	---	---
Hexadecanoic acid		---	---	---	---	---
Phosphoric acid,tris(2-ethyl		---	---	---	---	---
Benzaldehyde,4-methyl		---	---	---	---	---
Ethanol,2-(hexyloxy)		---	---	---	---	---
Benzenemethanol,2-methyl		---	---	---	---	---
Phenol,2,6-bis(1,1-dimethylene		---	---	---	---	---
Dodecanamide,N,N-bis(2-hydro		---	---	---	---	---
15-Tetracosenoic acid,methyl		---	---	---	---	---
Octadecanoic acid		---	---	---	---	---
Benzene,1,2,4,5-tetramethyl		---	---	---	---	---
1,2-Propanediol		---	---	---	---	---
Tetradecanoic acid		---	---	---	---	---
Pentadecanoic acid		---	---	---	---	---
Octadecanoic acid		---	---	---	---	---
Benzene,1,4-dichloro-isocyanato		---	---	---	---	---
3-Pentamine		---	---	---	---	---
Benzenemethanimine		---	---	---	---	---
2-Propen-1-one,2-(4-methyl		---	---	---	---	---
2-Propen-1-one,3-(4-methyl		---	---	---	---	---
1,4-Benzenedicarboxaldehyde		32,000 JN	---	---	---	65,000 JN
Benzenemethanol,4-methyl-(9c		---	---	---	---	---
Toluic acid methyl ester Iso		---	---	---	---	---
TICs-unknown(n)						
		5,181,000 J;15	13,000,000 J;7	---	---	25 J;3
Level (low or medium)		L	L	L	L	L
Dilution factor		50	100	1	1	1

TABLE D-7 INORGANIC ANALYTES MEASURED IN LANDFILL SOIL BORINGS

p 1 of 4

Analytes	SB16 -01A	SB16 -02A	SB17 -01A	SB18 -01A	SB18 -02A	SB18 -03A
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aluminum	13,900	5,690	9,710	6,330	4,140	6,620
Antimony	3.1 BJ	(<3.5U) J	6.9 J	3.7 J	3.0 J	2.7 BJ
Arsenic	5.7 J	10.0 J	8.8 J	8.6 J	10.4 J	5.2 J
Barium	64.3	78.4	60.5	105	45.8	58.1
Beryllium	0.57	0.60	0.46 B	0.69	0.49	0.36 B
Cadmium	4.1 J	3.3 J	8.4 J	3.5 J	2.5 J	3.7 J
Calcium	67,400	11,000	17,200	8,790	42,900	50,500
Chromium	18.0 J	20.3	23.4	16.9	18.6	27.4
Cobalt	8.2	31.5 J	53.5 J	10.1 J	16.4 J	12.5 J
Copper	20.8	36.9 J	38.5 J	23.8 J	22.8 J	32.5 J
Iron	26,200	9,300	24,700	10,100	7,340	11,100
Lead	15.1	44.4	40.1	12.1	17.7	58.1
Magnesium	35,300 B	5,450 B	5,780 J	7,390	5,430 B	7,560 B
Manganese	599	636 J	638 J	635 J	431 J	465 J
Mercury	(<0.09U)	0.15	0.30	0.11	0.21	0.15
Nickel	24.7	22.2 J	44.5 J	23.9 J	16.6 J	23.3
Potassium	2,460	2,330	1,420	1,850	2,390	1,780
Selenium	(<0.12U)J	(<0.08U)J	(<0.11U)J	(<0.11U)J	(<0.10U)J	(<0.09U)J
Silver	2.8 J	1.6 J	2.1 J	0.46 BJ	3.2 J	3.8 J
Sodium	3,280	3,970	451 B	156 B	875	3570
Thallium	(<0.21 U)	(<0.16 U)R	(<0.21 U)	(<0.23 U)R	(<0.19 U)R	(<0.19 U)R
Vanadium	16.2	18.0	11.6	17.8	12.0	10.3
Zinc	37.4 R	91.5 J	301 J	45.2 J	101 J	190 J
Cyanide	(<0.57 U)	(<0.53 U)J	(<0.51 U)J	(<0.50 U)J	(<0.44 U)J	(<0.52 U)J
TOC	11,000	7,020	8,350	15,000	7,450	10,900

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below CRQL.

J = Reported value is an estimate following data validation review.

R = Unusable.

TOC = Total Organic Carbon.

Data validation results provided in data reports 911652 (SB16-01A), 911664 (SB16-02A through (SB21-01A), and 911691 (SB22-01A through SB2701A).

table-9. wk 1

TABLE D-7 (Continued)

p 2 of 4

Analytes	SB19	SB20	SB21	SB22	SB23	SB23
	-01A	-01A	-01A	-01A	-01A	-02A
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aluminum	9,780 J	7,300	7,170	13,400	12,600	8,310
Antimony	(<9.1U)R	(<3.6)J	(<2.8U)J	(<3.1U)R	(<3.4U)J	(3.7U)J
Arsenic	5.2 J	2.0 J	4.4 J	3.6	9.1 J	6.3 J
Barium	92.5 J	46.5	62.9	53.0	76.4	59.1
Beryllium	0.52 J	0.32 B	0.58	0.63	0.54	0.37 B
Cadmium	9.5 J	1.8 J	3.3 J	4.6 J	3.8	3.1
Calcium	37,100 J	40,300	14,100	3,960	23,400 B	83,000
Chromium	33.0 J	21.2	18.7	52.5 J	15.2	13.6
Cobalt	1,260 J	122 J	9.7 J	14.7	8.0	5.9
Copper	44.7 J	38.4 J	25.3 J	35.2 J	20.2	19.1
Iron	57,000 J	5,020	10,400	29,400	24,300	20,100
Lead	20 J	106	13.2	35.9	11.0J	8.8 J
Magnesium	11,400 J	6,180 B	8,640	5,450	14,000 B	38,600 B
Manganese	582 J	299 J	674 J	551	628	400
Mercury	0.50 J	17.2	(<0.10U)	0.13	(<0.11U)	(<0.09U)
Nickel	32 J	15.4 J	22.1 J	28	20.5	18.1
Potassium	2,200 J	2,370	1,810	3,840	1,390	1,540
Selenium	(<3.2U)J	(<0.12U)J	(<0.11U)J	(<0.09U)J	0.13 BJ	(<0.10U)J
Silver	2.0 J	3.3 J	1.5 J	0.45 J	1.4 J	2.9 J
Sodium	15,300 J	5,860	7,010	41,000 B	388 B	6,310
Thallium	(<0.64U)J	0.32 B	(<0.22 U)	(<0.18U)J	(<0.21U)J	(<0.20U)J
Vanadium	13.9 J	7.8	17.4	13.0	16.1	12.0
Zinc	107 J	589 J	41.9 J	138 J	38.5	37.7
Cyanide	1.7 J	(<0.51 U)J	(<0.60 U)J	(<0.48U)	(<0.56U)	(<0.48U)
TOC		25,600	2,700		6,960	16,300

TABLE D-7 (Continued)

p 3 of 4

Analytes	SB24 -01A	SB24 DUP -01A	SB25 -01A	SB26 -01A	SB27 -03A
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aluminum	19,900	43,900	8,120	19,100 J	1,160 J
Antimony	8.7 J	10.3 J	3.9 BJ	13.5 J	(<8.4U)J
Arsenic	7.7 J	8.1 BJ	18.5 J	11.7 J	0.78 BJ
Barium	157	135	89.5	175 J	51.1 J
Beryllium	0.68	0.82	0.41 B	1.1 J	(<0.25U)J
Cadmium	5.2	4.6	5.2	8.9 J	20.5 J
Calcium	18,000 B	11,400	26,300 B	83,300 BJ	6,060 J
Chromium	153	164	41.7	11 J	13.7 J
Cobalt	44.2	39.3	108	710 J	1,020 J
Copper	458	294	234	82.5 J	26.0 J
Iron	25,400	21,600	25,800	59,300 J	124,000 J
Lead	141	11.5	124	160 J	2.4 J
Magnesium	5,010	10,500	6,790	14,900 J	1,520 J
Manganese	826	519	347	1,360 J	411 J
Mercury	0.43	0.33	0.36	0.82 J	0.24 J
Nickel	28.4	35.4	19.0	99.2 J	19.7 J
Potassium	10,100	11,600	3,140	8,560 J	342 BJ
Selenium	(<0.11U)J	0.13 BJ	(<0.11U)J	(<2.2U)J	(<0.5U)J
Silver	1.7 J	2.0 J	1.3 J	3.6 J	0.98 J
Sodium	24,000	67,900 B	51,600 B	6,010 J	1,160 BJ
Thallium	(<0.23U)J	(<0.21U)J	(<0.20U)J	(<0.45U)J	(<0.50U)J
Vanadium	13.4	18.7	10.8	25.0 J	(<0.74U)J
Zinc	438	363	1,170	725 J	73.2 J
Cyanide	(<0.65U)	(<0.63U)	3.6	(<1.6U)J	1.4 J
TOC	28,100	21,400	8,000	35,600	141,000

TABLE D-7 (Continued)

p 4 of 4

Analytes	SB27 -04A	FB03	FB04	FB05
Units	(mg/kg)	(ug/L)	(ug/L)	(ug/L)
Aluminum	552	71.5 B	(<12U)	25.0 B
Antimony	(<3.6U)J	(<34U)	(<34U)	(<34U)
Arsenic	1.0 BJ	(<2U)	(<2U)	(<2U)
Barium	6.6 B	(<5U)	(<5U)	15.0 B
Beryllium	(<0.11U)	(<1U)	(<1U)	(<1U)
Cadmium	1.6	(<5U)	(<5U)	(<5U)
Calcium	1,570	158 B	99.9 B	1,380 B
Chromium	4.2	(<4U)	(<4U)	(<4U)
Cobalt	4,230	(<9U)	(<9U)	(<9U)
Copper	6.4	5.9 B	(<2U)	9.7 B
Iron	8,530	124	15.4 B	125
Lead	1.9	(<1U)	(<2U)	(<2U)
Magnesium	725	72.8 B	(<30U)	303 B
Manganese	45.9	2.9 B	1.0 B	5.0 B
Mercury	(<0.12U)	(<0.2U)	(<0.2U)	(<0.2U)
Nickel	20.6	(<9U)	(<9U)	(<9U)
Potassium	146 B	(<69U)	(<69U)	1,330 R
Selenium	(<0.11U)J	(<1U)	(<1U)	(<1U)N
Silver	(<0.21U)J	(<2U)N	(<2U)N	6.5 J
Sodium	90.1 B	(<136U)	314 B	2,310 J
Thallium	(<0.23U)J	9.8 B	(<2U)	(<2U)
Vanadium	0.61 B	(<3U)	(<3U)	(<3U)
Zinc	26.4	8.7 B	11.5 B	65.7J
Cyanide	(<0.58U)	(<10U)N	(<10U)	(<10U)
TOC	8,780			

TABLE D-8 VOLATILE ORGANIC ANALYTES MEASURED IN SOIL BORING SAMPLES FROM FORMER ORGANICS PLANT AREA

p 1 of 2

Analytes	MWB-1	MW5-1	MW5-01	MW5-02	MW5-03	MW5-04	MW5-05	MW5-06	MW5-07	MW5-08	MW5-09
Depth	3-5 ft	4.5-6.5 ft	2-4 ft	0.5-2.5 ft	4-6 ft	4.5-6.5 ft	10-12 ft	0.5-2.5 ft	10-12 ft	4.5-6.5 ft	
Zone	VZ	SZ	VZ	VZ	SZ	SZ	SZ	VZ	SZ	SZ	SZ
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
TCL Analytes											
Acetone	<15,000UJ	37 J	<12UJ	<12UJ	<12UJ	22 J	18	<12UJ	<12UJ	13 J	26 J
1,1-Dichloroethane	<7,700UJ	<18 U	<12U	<12U	<12U	<18U	<14U	<12U	<12U	<14U	4 J
1,2-Dichloroethene (total)	<7,700UJ	<18 U	2 J	<12U	<12U	<18U	<14U	<12U	<12U	<14U	<15UJ
2-Butanone	<150,000UJ	21	<12U	<12U	<12U	15 J	<14U	<12U	<12U	<14U	<15U
Benzene	<7,700UJ	<18 U	<12U	<12U	<12U	<18U	<14U	<12U	<12U	<14U	<15U
Tetrachloroethene	<7,700UJ	<18 U	1 J	<12U	<12U	<18U	<14U	<12U	<12U	<14U	<15U
Toluene	<7,700UJ	37	<12U	<12U	<12U	<18U	<14U	<12U	<12U	<14U	<15U
Xylenes (total)	2,200,000 J	320,000 D	68	<12U	<12U	120,000 D	22	<12U	<12U	580	210
TICs											
Unknown (RT 10.69 min)		64 R	42 R	34 R	41 JN	54 R	49 R	46 R	45 BJ	7 J	22 R
Unknown (RT 12.54 min)		11 JN									
Unknown (RT 26.13 min)		29 JN									
Unknown (RT 26.42 min)											
Unknown (RT 27.42 min)											
Unknown C9H12 (RT 27.63 min)		29 JN									
Unknown (RT 28.39 min)											
Unknown (RT 28.71 min)											
Unknown (RT 28.95 min)											
Unknown (RT 29.75 min)											
Unknown C10H14 (RT 30.09)											
Unknown (RT 30.27 min)											
Unknown C10H14 (RT 30.64)											
Unknown C10H14 (RT 30.90)											
Unknown C10H14 (RT 31.06)											
Unknown (RT 31.22 min)											
Unknown (RT 31.31 min)											
Level (low or medium)	L/M*	L	L	L	L/M*	L/M*	L	L	L	L	L
Dilution Factor	1	1	1	1	1	1	1	1	1	1	1

NOTE:

U = Not detected. Sample quantitation limits are shown as (<U).

JN = Presumptive identification, estimated value (TICs).

B = Analyte not in corresponding method blank.

J = Reported value is an estimate following data validation review.

* = Xylene data from medium level analysis.

Zones: SZ = Saturated zone; VZ = Vadose zone.

1193203Table-1.a

TABLE D-8 (Continued)

p 2 of 2

Analytes	Depth Zone	MW5- SB-10 4-6 ft SZ	MW5- SB-11 6-8 ft SZ	MW5- SB-12 4-6 ft SZ	MW5- SB-13 2-4 ft SZ	MW5- SB-14 0-2 ft VZ#	MW5- SB-15 6-8 ft SZ	MW5- SB-16 8-10 ft SZ	MW5- FB-01 ---	MW5- TB-01 ---	MW5- TB-02 ---	MW5- FB-02 ---
Units		(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
TCL Analytes												
Acetone		<12UJ	<12UJ	<16UJ	<13UJ	40 J	140 BJ	20 BJ	<10U	<10U	<10U	<10U)R
1,1-Dichloroethane		<12U	<12U	<16U	<13U	<12U	<67U	<13U	1 J	<10U	<10U	<10U
1,2-Dichloroethane (total)		<12U	<12U	<16U	<13U	<12U	<67U	<13U	<10U	<10U	<10U	<10U
2-Butanone		<12UJ	<12UJ	<16UJ	<13UJ	<12UJ	59 J	13 J	<10UJ	<10UJ	<10UJ	<10UJ
Benzene		<12U	<12U	<16U	<13U	<12U	5 J	<13U	<10U	<10U	<10U	<10U
Tetrachloroethene		<12UJ	<12UJ	<16U	<13UJ	<12UJ	<67U	<13U	<10U	<10U	<10U	<10U
Toluene		<12U	1 J	<16U	<13U	<12U	<67U	2 J	<10U	<10UJ	<10U	<10U
Xylenes (total)		<12U	<12U	<16U	<13U	<12U	1,300	6 J	25 J	<10UJ	<10U	<10U
TICs												
Unknown (RT 10.69 min)									30BJ	29BJ	30BJ	
Unknown (RT 12.54 min)												
Unknown (RT 26.13 min)												
Unknown (RT 26.42 min)												
Unknown (RT 27.42 min)												
Unknown C9H12 (RT 27.63 min)												
Unknown (RT 28.39 min)												
Unknown (RT 28.71 min)												
Unknown (RT 28.95 min)												
Unknown (RT 29.75 min)												
Unknown C10H14 (RT 30.09)												
Unknown (RT 30.27 min)												
Unknown C10H14 (RT 30.64)												
Unknown C10H14 (RT 30.90)												
Unknown C10H14 (RT 31.06)												
Unknown (RT 31.22 min)												
Unknown (RT 31.31 min)												
Level (low or medium)												
Dilution Factor												
		L	L	L	L	L			L	L	L	L
		1	1	1	1	1			1	1	1	1

TABLE D-9A SEMI-VOLATILE ORGANIC ANALYTES MEASURED IN SOIL BORING SAMPLES FROM FORMER ORGANICS PLANT AREA

p 1 of 2

Analytes	Depth Zone	Units	MW5- MW5-01	MW5- SB-01	MW5- SB-02	MW5- SB-03	MW5- SB-04	MW5- SB-05	MW5- SB-06	MW5- SB-07	MW5- SB-08	MW5- SB-09
			3-5 ft	4.5-6.5 ft	2-4 ft	0.5-2.5 ft	4-6 ft	4.5-6.5 ft	10-12 ft	0.5-2.5 ft	10-12 ft	4.5-6.5 ft
			VZ	SZ	VZ	VZ	SZ	SZ	SZ	VZ	SZ	SZ
			(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
1,4 Dichlorobenzene			<600U	<600U	<380U	220 J	<390U	<12,000U	<450U	<410U	<480U	<15,000U
Phenol			270 J	<600U	<380U	<380U	<390U	<12,000U	<450U	<410U	<480U	<15,000U
2-Methylphenol			280 J	<600U	<380U	<380U	<390U	1,400 J	<450U	<410U	<480U	<15,000U
4-Methylphenol			<2,000U	66 J	<380U	<380U	<390U	2,400 J	<450U	<410U	<480U	<15,000U
2,4-Dimethylphenol			3,700 J	210 J	<380U	<380U	<390U	2,900 J	<450U	<410U	<480U	<15,000U
Naphthalene			<2,000U	160 J	<380U	21 J	1,200	590 J	<450U	160 J	<480U	2,100 J
2-Methylnaphthalene			<2,000U	68 J	<380U	30 J	120 J	<12,000U	<450U	270 J	<480U	1,400 J
Acenaphthylene			<2,000U	70 J	26 J	<380U	<390U	<12,000U	<450U	<410U	<480U	770 J
Acenaphthene			<2,000U	64 J	20 J	<380U	<390U	<12,000U	<450U	29 J	<480U	<15,000U
Dibenzofuran			<2,000U	49 J	<380U	<380U	<390U	<12,000U	<450U	75 J	<480U	<15,000U
Fluorene			<2,000U	430 J	23 J	<380U	<390U	4,100 J	<450U	29 J	<480U	<15,000U
Phenanthrene			230 J	750	290 J	100 J	32 J	<12,000U	<450U	340 J	<480U	1,300 J
Anthracene			<2,000U	140 J	83 J	27 J	<390U	<12,000U	<450U	43 J	<480U	<15,000U
Carbazole			<2,000U	130 J	37 J	20 J	<390U	<12,000U	<450U	31 J	<480U	<15,000U
Di-n-butylphthalate			<2,000U	45 J	90 J	<380U	<390U	<12,000U	<450U	28 J	<480U	<15,000U
Fluoranthene			<2,000U	1,000	430	150 J	29 J	600 J	<450U	200 J	<480U	7,800 J
Pyrene			<2,000U	910	390	190 J	26 J	<12,000U	<450U	180 J	<480U	7,800 J
Benzo(a)anthracene			<2,000U	450 J	250 J	99 J	<390U	<12,000U	<450U	<410U	<480U	6,700 J
bis(2-Ethylhexyl)phthalate			<2,000U	<600U	<380U	<380U	<390U	<12,000U	<450U	<410U	<480U	<15,000U
Chrysene			<2,000U	510 J	340 J	150 J	<390U	<12,000U	<450U	170 J	<480U	6,600 J
Di-n-octyl phthalate			<2,000U	<600U	<380U	<380U	<390U	<12,000U	<450U	37 J	<480U	<15,000U
Benzo(b)fluoranthene			<2,000U	410 J	410	160 J	<390U	<12,000U	<450U	110 J	<480U	5,600 J
Benzo(k)fluoranthene			<2,000U	400 J	390	120 J	<390U	<12,000U	<450U	100 J	<480U	6,100 J
Benzo(a)pyrene			<2,000U	460 J	480	220 J	<390U	<12,000U	<450U	110 J	<480U	7,900 J
Indeno(123-cd)pyrene			<2,000U	300 J	410	180 J	<390U	<12,000U	<450U	68 J	<480U	3,800 J
Dibenzo(a,h)anthracene			<2,000U	<600U	170 J	<380U	<390U	<12,000U	<450U	<410U	<480U	<15,000U
Benzo(ghi)perylene			<2,000U	330 J	520	270 J	<390U	<12,000U	<450U	<410U	<480U	3,800 J
o-Toluic Acid			19,000	1,300 J	<2,000U	<2,000U	<2,000U	<60,000U	<2,300U	<2,100U	<2,500U	<75,000U
m-Toluic Acid			11,000	810 J	<2,000U	<2,000U	<2,000U	46,000 J	<2,300U	<2,100U	<2,500U	<75,000U
p-Toluic Acid			14,000	<3100U	<2,000U	<2,000U	<2,000U	<60,000U	<2,300U	<2,100U	<2,500U	<75,000U

Level (low or medium)

Dilution Factor

Pest/PCB

Aroclor 1248

NOTE:

U = Not detected. Sample quantitation limits are shown as (<U).

B = Analyte present in corresponding method blank.

J = Reported value is an estimate following data validation review.

ND = None detected.

Zones: SZ = Saturated zone; VZ = Vadose zone.

Tabley-1.wk1

TABLE D-9A (Continued)

p 2 of 2

Analytes	Depth Zone	MW5- SB-10 4-6 ft SZ	MW5- SB-11 6-8 ft SZ	MW5- SB-12 4-6 ft SZ	MW5- SB-13 2-4 ft SZ	MW5- SB-14 0-2 ft VZ	MW5- SB-15 6-8 ft SZ	MW5- SB-16 8-10 ft SZ	MW5- FB-01 ---	MW5- FB-02 ---
	Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/L)	(ug/L)
1,4 Dichlorobenzene		(<390U)	(<390U)	(<520U)	(<430U)J	(<410U)J	(<440U)	(<430U)	(<10U)	(<10U)
Phenol		(<390U)	(<390U)	(<520U)	(<430U)	(<410U)	(<440U)	(<430U)	(<10U)	(<10U)
2-Methylphenol		(<390U)	(<390U)	(<520U)	(<430U)	(<410U)	(<440U)	(<430U)	(<10U)	(<10U)
4-Methylphenol		(<390U)	(<390U)	(<520U)	(<430U)	(<410U)	(<440U)	(<430U)	(<10U)	(<10U)
2,4-Dimethylphenol		(<390U)	(<390U)	(<520U)	(<430U)	(<410U)	46 J	(<430U)	(<10U)	(<10U)
Naphthalene		(<390U)	53 J	(<520U)	(<430U)J	(<410U)J	(<440U)	(<430U)	(<10U)	(<10U)
2-Methylnaphthalene		(<390U)	41 J	(<520U)	(<430U)J	(<410U)J	(<440U)	(<430U)	(<10U)	(<10U)
Acenaphthylene		(<390U)	35 J	(<520U)	(<430U)J	(<410U)J	(<440U)	(<430U)	(<10U)	(<10U)
Acenaphthene		(<390U)	30 J	(<520U)	(<430U)J	(<410U)J	28 J	(<430U)	(<10U)	(<10U)
Dibenzofuran		(<390U)	55 J	(<520U)	(<430U)J	(<410U)J	560	(<430U)	(<10U)	(<10U)
Fluorene		(<390U)	270 J	(<520U)	(<430U)J	(<410U)J	80 J	(<430U)	(<10U)	(<10U)
Phenanthrene		(<390U)	78 J	(<520U)	(<430U)J	(<410U)J	(<440U)	(<430U)	(<10U)	(<10U)
Anthracene		(<390U)	21 J	(<520U)	(<430U)J	(<410U)J	(<440U)	(<430U)	(<10U)	(<10U)
Carbazole		(<390U)	(<390U)	(<520U)	(<430U)J	(<410U)J	1,700	(<430U)	(<10U)	(<10U)
Di-n-butylphthalate		(<390U)	570	(<520U)	(<430U)J	(<410U)J	1,300	(<430U)	(<10U)	(<10U)
Fluoranthene		(<390U)	530	(<520U)	(<430U)J	(<410U)J	1,100	(<430U)	(<10U)	(<10U)
Pyrene		(<390U)	340 J	(<520U)	(<430U)J	(<410U)J	880	(<430U)	1 J	(<10U)
Benzo(a)anthracene		(<390U)	290 J	(<520U)	(<430U)J	(<410U)J	1,000	(<430U)	1 J	(<10U)
bis(2-Ethylhexyl)phthalate		(<390U)	420	(<520U)	(<430U)J	(<410U)J	530	(<430U)	1 J	(<10U)
Chrysene		(<390U)	220 J	(<520U)	(<430U)J	(<410U)J	700	(<430U)	(<10U)	(<10U)
Di-n-octyl phthalate		(<390U)	310 J	(<520U)	(<430U)J	(<410U)J	330 J	(<430U)	(<10U)	(<10U)
Benzo(k)fluoranthene		(<390U)	120 J	(<520U)	(<430U)J	(<410U)J	100	(<430U)	(<10U)	(<10U)
Benzo(a)pyrene		(<390U)	45 J	(<520U)	(<430U)J	(<410U)J	330 J	(<430U)	(<10U)	(<10U)
Indeno(1,23-cd)pyrene		(<390U)	110 J	(<520U)	(<430U)J	(<410U)J	(<2,300U)	(<2,200U)	(<50U)	(<50U)
Dibenzo(a,h)anthracene		(<390U)	380 J	100 J	(<2,200U)	(<2100U)	(<2,300U)	(<2,200U)	(<50U)	(<50U)
Benzo(ghi)perylene		(<390U)	100 J	(<2,700U)	(<2,200U)	(<2100U)	(<2,300U)	(<2,200U)	(<50U)	(<50U)
o-Toluic Acid		(<2,000U)	(<2,000U)							
m-Toluic Acid		(<2,000U)								
p-Toluic Acid		(<2,000U)								
Level (low or medium) Dilution Factor		L 1	L 1	L 1	L 1	L 1	L 1	L 1	L 1	L 1
Pest/PCB Aroclor 1248		ND	ND	ND	ND	ND	59	ND	ND	ND

TABLE D-9B SEMI-VOLATILE TENTATIVELY IDENTIFIED COMPOUNDS MEASURED IN SOIL BORING SAMPLES FROM FORMER ORGANICS PLANT AREA
p 1 of 3

Analytes	MWB-01 3-5ft (ug/kg)	MW5- SB-01 4.5-6.5 ft (ug/kg)	MW5- SB-02 2-4 ft (ug/kg)	MW5- SB-03 0.5-2.5 ft (ug/kg)	MW5- SB-04 4-6 ft (ug/kg)	MW5- SB-05 4.5-6.5 ft (ug/kg)	MW5- SB-06 10-12 ft (ug/kg)	MW5- SB-07 0.5-2.5 ft (ug/kg)	MW5- SB-08 10-12 ft (ug/kg)	MW5- SB-09 4.5-6.5 ft (ug/kg)
Unknown (RT 3.92 min)		970 JN					460 JN 230 JN			
Unknown (RT 5.36 min)									190 JN	6100 JN
Unknown Hydrocarbon (RT 5.37 min)										
Unknown (RT 6.65 min)										
Unknown (RT 7.25 min)										
Unknown (RT 7.16 min)					1,000 JN					
2-Cyclohexen-1-one (RT 8.12 min)										
Unknown C10H14 isomer, 8.71 min					690 JN					8400 JN
Unknown C10H14 isomer, 8.79 min					490 JN					5300 JN
Unknown C10H14 isomer, 9.02 min										5300 JN
Unknown C10H14 isomer, 9.20 min					1,400 JN					16000 JN
Unknown C10H14 isomer, 9.32 min					1,600 JN					21000 JN
Unknown (RT 9.71 min)			190 JN		490 JN					7600 JN
Unknown (RT 9.84 min)					880 JN					13000 JN
Unknown C10H14 isomer, 9.92 min					1200JN					9900 JN
Unknown C10H12 isomer, 10.27 min					670JN					
Bicyclo[2.2.1]heptan-2-one, 10.4 min			310 JN	3,300 JN						
Unknown (RT 10.41 min)										
Unknown C10H12 isomer, 10.47 min										
Unknown C10H14 isomer, 10.48min										
Unknown (RT 10.55 min)					1200 JN					
Ethanone, 1 phenyl (RT 10.60 min)										
Unknown (RT 10.67 min)										
Unknown C10H14 isomer, 10.79 min										
Unknown C11H16 isomer (RT 11.16 min)										
Unknown C11H16 isomer, 11.36 min										
Unknown Alkylbenzene (11.52 min)										
Unknown (RT 11.77 min)										
Unknown (RT 11.90 min)										
Unknown (RT 12.12 min)										
Unknown (RT 12.52 min)			170 JN					190 JN 210 JN		
1(3H)-Isobenzofuranone (9CI), 13.67 min										
Unknown HC (RT 13.95 min)										
Unknown C12H10O isomer, 14.31										
Unknown C12H12 isomer, 14.64 min										
Unknown Hydrocarbon (RT 14.81 min)										
Level (low or medium)	L	L	L	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	20	1	1	1	1

NOTE:

JN = Presu. Identification, estimated value (TICs). J = Reported value is a () ate following data validation review.

TABLE D-9B (Continued)

p 1 (EXT) of 3

Analytes	Sampling depth Units	MW5- SB-10 (ug/kg)	MW5- SB-11 (ug/kg)	MW5- SB-12 (ug/kg)	MW5- SB-13 (ug/kg)	MW5- SB-14 (ug/kg)	MW5- SB-15 (ug/kg)	MW5- SB-16 (ug/kg)
Unknown (RT 3.92 min)								
Unknown (RT 5.36 min)								
Unknown Hydrocarbon (RT 5.37 min)								
Unknown (RT 6.65 min)		320 JN	230 JN	270 JN	280 JN	330 JN		
Unknown (RT 7.25 min)		95 JN	150 JN					
Unknown (RT 7.16 min)								
2-Cyclohexen-1-one (RT 8.12 min)		100 JN	140 JN		100 JN	99 JN		
Unknown C10H14 isomer, 8.71 min						120 JN		
Unknown C10H14 isomer, 8.79 min								
Unknown C10H14 isomer, 9.02 min								
Unknown C10H14 isomer, 9.20 min								
Unknown C10H14 isomer, 9.32 min								
Unknown (RT 9.71 min)								
Unknown (RT 9.84 min)								
Unknown C10H14 isomer, 9.92 min								
Unknown C10H12 isomer, 10.27 min								
Bicyclo[2.2.1]heptan-2-one, 10.4 min								
Unknown (RT 10.41 min)								
Unknown C10H12 isomer, 10.47 min								
Unknown C10H14 isomer, 10.48 min								
Unknown (RT 10.55 min)								
Ethanone, 1 phenyl (RT 10.60 min)			160 JN	610 JN 400 JN				
Unknown (RT 10.67 min)								
Unknown C10H14 isomer, 10.79 min								
Unknown C11H16 isomer (RT 11.16 min)								
Unknown C11H16 isomer, 11.36 min								
Unknown Alkylbenzene (11.52 min)			60 JN					
Unknown (RT 11.77 min)								
Unknown (RT 11.90 min)				120 JN 860 JN				
Unknown (RT 12.12 min)								
Unknown (RT 12.52 min)								
1(3H)-isobenzofuranone (9CI), 13.67 min								
Unknown HC (RT 13.95 min)								
Unknown C12H10O isomer, 14.31								
Unknown C12H12 isomer, 14.64 min								
Unknown Hydrocarbon (RT 14.81 min)								
Level (low or medium)		L	L	L	L	L	L	L
Dilution factor		1	1	1	1	1	1	1

TABLE D-9B (Continued)

p 2 of 3

Analytes	MW5- MWB-01 Sampling depth Units	MW5- SB-01 4.5-6.5 ft (ug/kg)	MW5- SB-02 2-4 ft (ug/kg)	MW5- SB-03 0.5-2.5 ft (ug/kg)	MW5- SB-04 4-6 ft (ug/kg)	MW5- SB-05 4.5-6.5 ft (ug/kg)	MW5- SB-06 10-12 ft (ug/kg)	MW5- SB-07 0.5-2.5 ft (ug/kg)	MW5- SB-08 10-12 ft (ug/kg)	MW5- SB-09 4.5-6.5 ft (ug/kg)
Unknown Hydrocarbon (RT 15.32 min)										
Unknown C15H16 Isomer, 15.95	1,600 JN	880 JN				12000 JN		250 JN		
1(3H) Isobenzofuranone (15.96)										
Unknown (RT 16.58 min)		4,200 JN	160 JN				160 JN	450 JN		
Unknown C12H17NO Isomer, 16.68					570 JN					
Unknown C14H22O Isomer, 16.96 min										
Benzene, 1,1-oxybis (16.81)										
Unknown (RT 17.10 min)			310 JN							
Unknown C15H16 Isomer, 17.30 min						5300 J				
Stannane, chlorotris (2-methyl), 17.31 min										
Unknown (RT 17.85 min)		2,400 JN	970 JN	370 JN		4,100 J		490 JN		3000 JN
Unknown (RT 18.27 min)		610 JN		160 JN						5300 JN
Unknown (RT 18.37 min)		880 JN								
Unknown C16H18 Isomer, 18.58		1,100 JN			200 JN	29000 JN			120 JN	
Unknown (RT 18.67 min)										
Unknown (RT 18.79 min)						11000 JN				3000 JN
Unknown (RT 18.94 min)				97 JN		3500 JN		430 JN		
Unknown (RT 19.04 min)			77 JN							
Unknown (RT 19.77 min)		790 JN				16000 JN				
Unknown (20.25 min)						3500 JN				
Unknown (20.58 min)										
Unknown C15H12, 20.69 min			77 JN							
Unknown (RT 20.9 min)		2,100 JN			1,800 JN	270000 JN		230 JN	410 JN	
Unknown HC (RT 21.08 min)			140 JN	170 JN				270 JN		
Unknown (RT 21.20 min)		2,700 JN				110000 JN				
Unknown (RT 21.28 min)						15000 JN				
Unknown (RT 21.44 min)						4100 JN				
Unknown HC (RT 22.07 min)			190 JN	160 JN				390 JN		
Benzene, 1,1-(1,2-ethanedithiol) (22.19)										
Unknown (RT 22.62 min)		1,000 JN		190 JN		6400 JN				
Unknown (RT 23.83 min)		1,200 JN								
Unknown (RT 23.93 min)			1,900 JN	270 JN	470 JN			470 JN		
Unknown (RT 24.10 min)										
Unknown Hydrocarbon (RT 24.81 min)			1,200 JN	450 JN	550 JN					
Unknown Hydrocarbon (RT 25.68 min)		1,200 JN	1,800 JN	720 JN	570 JN			350 JN	170 JN	
Unknown (RT 25.85 min)								290 JN		
Level (low or medium)		L	L	L	L	L	L	L	L	L
Dilution factor		1	1	1	1	20	1	1	1	1

TABLE D-9B (Continued)

		p 2 (EXT) of 3							
Analytes	Sampling depth	MW5- SB-10 (ug/kg)	MW5- SB-11 (ug/kg)	MW5- SB-12 (ug/kg)	MW5- SB-13 (ug/kg)	MW5- SB-14 (ug/kg)	MW5- SB-15 (ug/kg)	MW5- SB-16 (ug/kg)	
Units									
Unknown Hydrocarbon (RT 15.32 min)									
Unknown C15H16 isomer,15.95									
1(3H) Isobenzofuranone(15.96)									
Unknown (RT 16.58 min)									
Unknown C12H17NO isomer,16.68									
Unknown C14H22O isomer,16.96 min									
Benzene,1,1-oxybis(16.81)									
Unknown (RT 17.10 min)									
Unknown C15H16 isomer,17.30 min									
Stannane, chlorotris(2-methyl), 17.31 min									
Unknown (RT 17.85 min)									
Unknown (RT 18.27 min)									
Unknown (RT 18.37 min)									
Unknown C16H18 isomer,18.58									
Unknown (RT 18.67 min)									
Unknown (RT 18.79 min)									
Unknown (RT 18.94 min)									
Unknown (RT 19.04 min)									
Unknown (RT 19.77 min)									
Unknown (20.25 min)				220 JN					
Unknown (20.58 min)				150 JN					
Unknown C15H12, 20.69 min									
Unknown (RT 20.9 min)				120 JN					
Unknown HC (RT 21.08 min)									
Unknown (RT 21.20 min)									
Unknown (RT 21.28 min)									
Unknown (RT 21.44 min)									
Unknown HC (RT 22.07 min)									
Benzene,1,1-(1,2-ethanedithyl)(22.19)									
Unknown (RT 22.62 min)			160 JN						
Unknown (RT 23.83 min)									
Unknown (RT 23.93 min)									
Unknown (RT 24.10 min)									
Unknown Hydrocarbon (RT 24.81 min)									
Unknown Hydrocarbon (RT 25.68 min)			210 JN						
Unknown (RT 25.85 min)			140 JN						
290 JN									
Level (low or medium)		L	L	L	L	L	L	L	
Dilution factor		1	1	1	1	1	1	1	

TABLE D-9B (Continued)

p 3 of 3

Analytes	MW5- MWB-01	MW5- SB-01	MW5- SB-02	MW5- SB-03	MW5- SB-04	MW5- SB-05	MW5- SB-06	MW5- SB-07	MW5- SB-08	MW5- SB-09
Sampling depth	3-5 ft	4.5-6.5 ft	2-4 ft	0.5-2.5 ft	4-6 ft	4.5-6.5 ft	10-12 ft	0.5-2.5 ft	10-12 ft	4.5-6.5 ft
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
Unknown (RT 25.95 min)										
Unknown Hydrocarbon (RT 26.48 min)		760 JN	1,500 JN	780 JN				290 JN		
Unknown Hydrocarbon (RT 27.25 min)		1,800 JN	1,200 JN	830 JN				310 JN		
Unknown Hydrocarbon (RT 28.00 min)		550 JN	890 JN	680 JN	200 JN		140 JN	230 JN		
Unknown (RT 28.13 min)							91 JN		360 JN	
Unknown (RT 28.23 min)										
Unknown (RT 28.37 min)		1,100 JN			470 JN	7000 JN	140 JN			
Unknown (RT 28.63 min)										
Unknown Hydrocarbon (RT 28.77 min)		2,100 JN	910 JN	930 JN	490 JN	3500 JN	270 JN	780 JN	170 JN	9000 JN
Unknown (RT 29.33 min)										
Unknown C20H12 (RT 29.72 min)			560 JN							
Unknown (RT 30.12 min)										
Unknown (RT 30.45 min)										
Unknown (RT 30.52 min)										
Unknown Hydrocarbon (RT 30.55 min)		2,500 JN	1,000 JN	680 JN			180 JN	660 JN	140 JN	10000 JN
Unknown (RT 30.80 min)										
Unknown Hydrocarbon (RT 30.98 min)										
Unknown Hydrocarbon (RT 31.18 min)										
Unknown (RT 31.25 min)										
Unknown (RT 31.36 min)						4100 JN				
Benzo [E] Pyrene (RT 31.48 min)										
Unknown (RT 31.53 min)										
Unknown (RT 31.77 min)										
Unknown (RT 32.37 min)			430 JN	460 JN						
Unknown Hydrocarbon (RT 32.91 min)			330 JN							
Unknown Hydrocarbon (RT 33.17 min)										
Unknown Hydrocarbon (RT 33.73 min)			140 JN							
Unknown Hydrocarbon (RT 34.55 min)										
Unknown (RT 34.78 min)										
Unknown (RT 34.87 min)										
Level (low or medium)	L	L	L	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	20	1	1	1	1

TABLE D-9B (Continued)

p 3 (EXT) of 3

Analytes	MW5- SB-10 4-6 ft (ug/kg)	MW5- SB-11 6-8 ft (ug/kg)	MW5- SB-12 4-6 ft (ug/kg)	MW5- SB-13 2-4 ft (ug/kg)	MW5- SB-14 0-2 ft (ug/kg)	MW5- SB-15 6-8 ft (ug/kg)	MW5- SB-16 8-10 ft (ug/kg)
Unknown (RT 25.95 min)		97 JN					
Unknown Hydrocarbon (RT 26.48 min)			160 JN				
Unknown Hydrocarbon (RT 27.25 min)							
Unknown Hydrocarbon (RT 28.00 min)							
Unknown (RT 28.13 min)							
Unknown (RT 28.23 min)		80 JN					
Unknown (RT 28.37 min)							
Unknown (RT 28.63 min)			580 JN				
Unknown Hydrocarbon (RT 28.77 min)							
Unknown (RT 29.33 min)		97 JN					
Unknown C20H12 (RT 29.72 min)							
Unknown (RT 30.12 min)			440 JN				
Unknown (RT 30.45 min)		140 JN	390 JN				
Unknown (RT 30.52 min)			830 JN				
Unknown Hydrocarbon (RT 30.55 min)							
Unknown (RT 30.80 min)			770 JN				
Unknown Hydrocarbon (RT 30.98 min)		240 JN					
Unknown Hydrocarbon (RT 31.18 min)		270 JN					
Unknown (RT 31.25 min)			690 JN				
Unknown (RT 31.36 min)							
Benzo [E] Pyrene (RT 31.48 min)		280 JN					
Unknown (RT 31.53 min)			440 JN				
Unknown (RT 31.77 min)			920 JN				
Unknown (RT 32.37 min)							
Unknown Hydrocarbon (RT 32.91 min)							
Unknown Hydrocarbon (RT 33.17 min)							
Unknown Hydrocarbon (RT 33.73 min)							
Unknown Hydrocarbon (RT 34.55 min)							
Unknown (RT 34.78 min)		85 JN					
Unknown (RT 34.87 min)		85 JN	630 JN				
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1

TABLE D-10 INORGANIC ANALYTES AND TOTAL ORGANIC CARBON MEASURED IN SOIL SAMPLES FROM FORMER ORGANICS PLANT AREA

p 1 of 2

Analytes	MW5 MWB-1	MW5 SB-01	MW5 SB-2B	MW5 SB-03	MW5 SB-04	MW5 SB-05	MW5 SB-06	MW5 SB-07	MW5 SB-08	MW5
Depth (ft)	3-5 ft	4.5-6.5	2-4	0.2-2.5	4-6	4.5-6.5	10-12	2.5-4.5	10-12	
Zone	VZ	SZ	VZ	VZ	SZ	SZ	SZ	VZ	SZ	
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aluminum	8,390 J	7,370	11,400	3,270	6,360	16,500	4,570	3,060	6,160	2,150
Antimony	1.9 J	11.8 J	11.0 J	30.2 J	(<6.7U)J	(<8.7U)J	(<6.7U)J	10.4 J	(<8.1U)J	18.2 J
Arsenic	8.2 J	24.7 J	11.6 J	11.6 J	2.9 J	8.3 J	5.0 J	7.2 J	11.5 J	8.7 J
Barium	138 J	1,130 J	155 J	645 J	26.0 J	269 J	78.4 J	108 J	120 J	270 J
Beryllium	0.54 J	0.46 B	0.61	0.31 B	0.33 B	0.95	0.39 B	0.44	0.43 B	0.26 B
Cadmium	3.6 J	5.9 J	9.0 J	39.6 J	1.1 J	5.8 J	1.9 J	6.3 J	3.8 J	3.3 J
Calcium	45,000 J	48,200	11,900	79,700	161,000	6,940	98,900	2,080	12,500	7,500
Chromium	26.4 J	162 J	18.5 J	42.7 J	9.7 J	77.3 J	20.8 J	12.8 J	11.2 J	74.5 J
Cobalt	10.7 J	30.3 J	11.0	16.8	5.7	22.5 J	17.9 J	6.3	14.0	4.2 B
Copper	318 J	547	1,000	22,300	15.2	165	40.2	3,140	29.9	238
Iron	24,700 J	20,300	36,400	134,000	12,500	32,300	11,400	33,600	24,100	13,000
Lead	63.2 J	1,580 J	1,290 J	2,870 J	5.6 S	302 J	206 J	445 J	35.4 J	339 J
Magnesium	8,560 J	9,920	5,830	5,300	18,800	6,890	8,610	1,240	3,950	2,280
Manganese	344 J	280	802	631	357	270	422	221	482	76.8
Mercury	0.67 R	25.2 J	6.2 J	7.3 J	(<0.11U)J	5.0 J	0.63 J	0.79 J	(<0.13U)J	2.0 J
Nickel	32.7 J	34.8	45.6	97.5 J	16.0 J	43.3 J	22.5 J	30.4 J	29.6 J	13.5 J
Potassium	926 J	965	1,210	336 B	1,350	3,080	1,060	374 B	985	252 B
Selenium	0.25 J	(<0.16U)J	(<0.11U)J	(<0.10U)J	(<0.07U)J	0.17 J	(<0.10U)J	(<0.11U)J	(<0.14U)J	0.33 BJ
Silver	(<0.37U)J	(<1.2U)	(<0.92U)	(<0.76U)	(<1.0U)	(<0.13U)	(<1.0U)	(<0.80U)	(<1.2U)	(<0.94U)
Sodium	913 J	1,210 J	411 B	144 B	135 B	1,570 J	311 B	136 B	258 B	336 B
Thallium	0.43 J	(<0.48U)	(<0.32U)	(<0.30U)	(<0.22U)	(<0.51U)	(<0.30U)	(<0.32U)	(<0.43U)	(<0.44U)
Vanadium	14.8 J	14.8 J	17.6 J	5.6	10.8 J	26.3 J	11.0 J	9.0	13.2 J	6.2
Zinc	421 J	1,160	2,470	15,600	22.5	310	126	1,320	85.2	786
Cyanide	(<0.11U)	0.24 J	0.15 J	0.39 J	(<0.11U)J	(<0.18U)J	(<0.14U)J	(<0.12U)J	(<0.15U)J	0.48 J
Organic Carbon	NR	NR	NR	20,200 J	8,050 J	NR	NR	NR	NR	26,600 J

NOTE:

U = Not detected. Sample quantitation limits are shown as (< U).

B = Reported value is below CRQL.

J = Reported value is an estimate following data validation review.

NR = Analysis not required.

Zones: SZ = Saturated zone; VZ = Vadose zone.

TABLE D-11A ORGANIC ANALYTES MEASURED IN CREEK SEEPS AND SEEP SEDIMENT - ROUND 1

p 1 of 1

Analytes	Units	CS01 -01A (ug/L)	CS02 -01A (ug/L)	CS03 -01A (ug/L)	CS04 -01A (ug/L)	SS03 -01A (ug/kg)	TB (ug/L)
VOLATILES							
Acetone		(<10U)	49	(<50U)	(<50U)	(<17U)	(<10U)
Methylene chloride		(<5U)	(<5U)	[9U]	[6U]	[9U]	(<5U)
1,2-Dichloroethene (total)		(<5U)	33	670	80	84	(<5U)
Trichloroethene		(<5U)	10	260	72	54	(<5U)
Tetrachloroethene		(<5U)	3 J	100	560	34	(<5U)
Toluene		(<5U)	8	53	20	13	(<5U)
Xylenes		(<5U)	150	570	570	200	(<5U)
TICs - Known		---	---	---	---	---	---
TICs - Unknown		---	---	---	---	---	---
Level (low or medium)		L	L	L	L	L	L
Dilution factor		1	1	5	5	1	1
SEMI-VOLATILES							
Phenol		(<10U)	(<10U)	81	47	(<570U)	NA
o-Methylphenol		(<10U)	11	16 J	10 J	(<570U)	NA
m+p-Methylphenol (coelutes)		(<10U)	4 J	11 J	8 J	(<570U)	NA
2,4-Dimethylphenol		(<10U)	(<10U)	(<10U)	(<10U)	190 J	NA
Bis(2-ethyl hexyl)phthalate		1 J	(<10U)	2 J	2 J	(<570U)	NA
Napthalene		(<10U)	(<10U)	(<10U)	2 J	(<570U)	NA
Phenanthrene		(<10U)	(<10U)	(<10U)	15	(<570U)	NA
Anthracene		(<10U)	(<10U)	1 J	3 J	(<570U)	NA
Fluorene		(<10U)	(<10U)	(<10U)J	2 J	(<570U)	NA
Fluoranthene		(<10U)	(<10U)	(<10U)	28	(<570U)	NA
Pyrene		(<10U)	(<10U)	(<10U)J	18	(<570U)	NA
Benzo(a)anthracene		(<10U)	(<10U)	(<10U)J	10 J	(<570U)	NA
Chrysene		(<10U)	(<10U)	(<10U)	11	(<570U)	NA
Benzo(b)fluoranthene		(<10U)	(<10U)	(<10U)	19	(<570U)	NA
Benzo(k)fluoranthene		(<10U)	(<10U)	(<10U)	19	(<570U)	NA
Benzo(a)pyrene		(<10U)	(<10U)	(<10U)	8 J	(<570U)	NA
o-Toluic acid		(<50U)	86,000 D	79,000 D	23,000 D	7,200	NA
m-Toluic acid		(<50U)	46,000 D	40,000 D	13,000 D	4,800	NA
p-Toluic acid		(<50U)	15,000 D	8,800 D	1,800 D	710	NA
TICs - known							
Benzamine,N,N-diethyl-3-methyl		---	310 JN	760 JN	83 JN	---	NA
Benzenemethanol, 2-methyl		---	810 JN	1,500 JN	---	---	NA
Phenol, 4-(tetramethylbutyl)		---	---	1,900 JN	250 JN	---	NA
1(3H)-Isobenzofuranone		---	---	---	420 JN	---	NA
TICs - unknown							
		---	604 J;15	9,414 J;15	2,357 J;13	47,000 J;1	NA
Level (low or medium)		L	L	L	L	L	L
Dilution factor		1	1/500 *	1/500 *	1/200 *	1/500 *	1
PESTICIDES/PCBs							
None detected		U	UJ	UJ	UJ	U	U

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Report value is an estimate.

[-U] = Reported value was false positive following data validation.

JN = Presumptive identification, estimated value.

--- = No detectable TICs.

NA = Not applicable.

D = Sample value from diluted analysis.

* = Dilution factor for toluic acid results.

Values shown for unknown TICs are the total concentration and total number of unknowns.

Data validation results provided in data report 920461.

Lab#001, rev.1

TABLE D-11B ORGANIC ANALYTES MEASURED IN CREEK SEEPS AND SEEP SEDIMENT - ROUND 2

p 1 of 1

Analytes	Units	CS01 -01B (ug/L)	CS02 -01B (ug/L)	CS03 -01B (ug/L)	CS04 -01B (ug/L)	SS03 -01B (ug/kg)	TB (ug/L)
VOLATILES							
Acetone	Dry		Dry	(<10U)	Dry	82 BJ	
1,2-Dichloroethene (total)				12 J		83	
Chloroform				4		[32U]	
2-Butanone				(<10U)		18 J	
Toluene				(<10U)		12 J	
Xylenes				(<10U)		320	
<i>TICs - Known</i>				---		---	
<i>TICs - Unknown</i>				---		---	
Level (low or medium)				L		L	
Dilution factor				5		2	
SEMI-VOLATILES							
2-Methylphenol	Dry		Dry	5 J	Dry	(<530U)	
<i>o</i> -Toluic acid				8 J		89 J	
<i>m</i> -Toluic acid				3 J		(<2,600U)	
<i>p</i> -Toluic acid				2 J		(<2,600U) J	
<i>TICs - known</i>							
Cyclohexen-1-one				7 JN		--	
<i>TICs - unknown</i>				74 J;19		780 J; 3	
Level (low or medium)				L		L	
Dilution factor				1		1	
PESTICIDES/PCBs							
None detected	Dry		Dry	U	Dry	U	

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Report value is an estimate following data validation review.

[-U] = Reported value was false positive following data validation.

JN = Presumptive identification, estimated value.

Values shown for unknown TICs are the total concentration and total number of unknowns.

Data validation results provided in data report.

TABLE D-12 INORGANIC ANALYTES MEASURED IN CREEK SEEPS AND SEEP SEDIMENT

p 1 of 1

Analyte Units	CS01 (ug/L)	CS02 (ug/L)	CS03 (ug/L)	CS04 (ug/L)	SS03 (mg/kg)
Aluminum	1,710	6,160	29,300	6,850	8,610
Antimony	114 J	99.3 J	269	150 J	(<3.4U)J
Arsenic	5.7 B	95.4	170	29.2	2.2
Barium	164 BJ	144 B	491	70.8 B	119 J
Beryllium	(<1U)	(<1U)	1.8 B	(<1U)	0.49 B
Cadmium	(<5U)	(<5U)J	8.7 J	(<5U)J	2.2 J
Calcium	72,200	27,600	51,500	63,400	11,600
Chromium	8.0 B	36.6	92.4	35.3	18.0
Cobalt	(<8U)	(<8U)	28.3 B	11.4 B	8.1 B
Copper	29.1 J	97.8 J	158 J	135 J	29.8 J
Iron	8,840	10,000	34,600	9,320	16,000
Lead	87.8	117	194	112	24.0
Magnesium	12,500	5,550	16,300	14,100	7,680
Manganese	785	271	778	369	185
Mercury	1.1 J	0.80 J	1.3 J	0.53 J	0.14
Nickel	(<8U)	81.8	238	58	18.8 J
Potassium	2,450 B	6,500	13,000	22,700	926
Selenium	(<2U)	(<20U)	(<40U)	(<20U)	0.25 BJ
Sodium	31,300	1,300,000	2,670,000	1,020,000	4,810
Thallium	(<1U)	(<1U)	1.3 B	1.0 B	0.23 B
Vanadium	(<4U)	75.3 J	172 J	45.1 BJ	13.1
Zinc	51.4 J	90.6 J	244 J	131 J	52.2 J
Cyanide	(<10U)	(<10U)	(<10U)	(<10U)	2.2 J

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRQL.

J = Reported concentration is an estimated value following data validation review.

Data validation results provided in data report 920461.

Labeled2.wt1

TABLE D-13A ORGANIC ANALYTES MEASURED IN OVERBURDEN GROUND WATER - ROUND 1

p 1 of 2

Analytes	GW01S -01A Units (ug/L)	GW02S -01A (ug/L)	GW04S -01A (ug/L)	GW06S -01A (ug/L)	GW07S -01A (ug/L)	GW08S -01A (ug/L)
VOLATILES						
Vinyl Chloride	(<10U)	(<10U)	(<10U)	(<10U)J	5 J	(<10U)
Acetone	(<10U)	19	(<10U)	(<10U)J	(<10U)	(<10U)
1,2-Dichloroethene (Total)	(<5U)	(<5U)	(<5U)	(<5U)J	18	(<5U)
Trichloroethene	(<5U)	(<5U)	(<5U)	(<5U)J	2 J	(<5U)
Tetrachloroethene	(<5U)	(<5U)	2 J	(<5U)J	(<5U)	(<5U)
Toluene	(<5U)	(<5U)	(<5U)	(<5U)J	2 J	(<5U)
Xylenes (Total)	(<5U)	4 J	4 J	(<5U)J	19	(<5U)
TICs - Known	---	---	---	---	---	---
TICs - Unknown	---	---	---	---	---	---
SEMI - VOLATILES						
2-Methylphenol	(<10U)	(<20U)J	(<10U)	(<10U)	15	(<10U)
4-Methylphenol	(<10U)	(<20U)J	(<10U)	(<10U)	11	(<10U)
Benzoic Acid	(<50U)	(<100U)J	(<50U)	(<50U)	4 J	(<50U)
Dimethylphthalate	(<10U)	21J	(<10U)	(<10U)	(<10U)	(<10U)
Phenanthrene	(<10U)	(<20U)J	(<10U)	2 J	(<10U)	(<10U)
Fluoranthene	(<10U)	(<20U)J	(<10U)	4 J	(<10U)	(<10U)
Pyrene	(<10U)	(<20U)J	(<10U)	3 J	(<10U)	(<10U)
Benzo(a)Anthracene	(<10U)	(<20U)J	(<10U)	2 J	(<10U)	(<10U)
bis(2-Ethylhexyl)phthalate	(<10U)	(<20U)J	(<10U)	3 J	2 J	(<10U)
Chrysene	(<10U)	(<20U)J	(<10U)	2 J	(<10U)	(<10U)
Benzo(b)Fluoranthene	(<10U)	(<20U)J	(<10U)	1 J	(<10U)	(<10U)
Benzo(k)Fluoranthene	(<10U)	(<20U)J	(<10U)J	1 J	(<10U)	(<10U)
Benzo(a)Pyrene	(<10U)	(<20U)J	(<10U)J	2 J	(<10U)	(<10U)
p-Toluic Acid	(<50U)	(<100U)J	(<50U)	(<50U)	(<2,500U)	(<50U)
m-Toluic Acid	(<50U)	(<100U)J	(<50U)	(<50U)	(<2,500U)	(<50U)
o-Toluic Acid	(<50U)	(<100U)J	(<50U)	(<50U)	11,000 D	(<50U)
TICs - Known	---	---	---	---	---	---
Benzamide, N,N-diethyl-3-methyl	---	---	10 J	---	---	16J
2,4-pentanediol,2 methyl	---	---	---	---	---	9J
Benzomethane,.Alpha.Alpha.	---	---	---	---	---	8J
1(3H)-Isobenzofuranone	---	---	---	---	---	110J
TICs - Unknown;n	---	---	1000 J;1	24 J;2	26 J;1	---

PESTICIDES

None Detected

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Reported concentration is an estimated value following data validation review.

NA = Not applicable.

D = Data reported from diluted analysis.

Values shown for unknown TICs are the total concentration and total number of unknowns.

TABLE D-13A (Continued)

p 2 of 2

Analytes	Units	GW FB-1 (ug/L)	GW FB-2 (ug/L)	TB-3 (ug/L)	TB-4 (ug/L)	TB-5 (ug/L)
VOLATILES						
Vinyl Chloride		(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Acetone		(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
1,2-Dichloroethene (Total)		(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Trichloroethene		(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Tetrachloroethene		(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Toluene		(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Xylenes (Total)		(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
<i>TICs - Known</i>		---	---	---	---	---
<i>TICs - Unknown</i>		---	---	---	---	---
SEMI - VOLATILES						
2-Methylphenol		(<10U)	(<10U)	NA	NA	NA
4-Methylphenol		(<10U)	(<10U)	NA	NA	NA
Benzoic Acid		(<10U)	(<10U)	NA	NA	NA
Dimethylphthalate		(<10U)	(<10U)	NA	NA	NA
Phenanthrene		(<10U)	(<10U)	NA	NA	NA
Fluoranthene		(<10U)	(<10U)	NA	NA	NA
Pyrene		(<10U)	(<10U)	NA	NA	NA
Benzo(a)Anthracene		(<10U)	(<10U)	NA	NA	NA
bis(2-Ethylhexyl)phthalate		(<10U)	(<10U)	NA	NA	NA
Chrysene		(<10U)	(<10U)	NA	NA	NA
Benzo(b)Fluoranthene		(<10U)	(<10U)	NA	NA	NA
Benzo(k)Fluoranthene		(<10U)	(<10U)	NA	NA	NA
Benzo(a)Pyrene		(<10U)	(<10U)	NA	NA	NA
p-Toluic Acid		(<50U)	(<50U)	NA	NA	NA
m-Toluic Acid		(<50U)	(<50U)	NA	NA	NA
m-Toluic Acid		(<50U)	(<50U)	NA	NA	NA
<i>TICs - Known</i>		---	---	NA	NA	NA
Benzamide, N,N-diethyl-3-methyl		---	---	NA	NA	NA
2,4-pentandiol,2 methyl		---	---	NA	NA	NA
Benzomethane, Alpha.Alpha.		---	---	NA	NA	NA
1(3H)-Isobenzofuranone		---	---	NA	NA	NA
<i>TICs - Unknown</i>		---	---	NA	NA	NA

PESTICIDES

None Detected

TABLE D-13B ORGANIC ANALYTES MEASURED IN OVERBURDEN GROUND WATER - ROUND 2

p 1 of 2

Analytes	GW01S -01B Units (ug/L)	GW02S -01B (ug/L)	GW04S -01B (ug/L)	GW05S -01B (ug/L)	GW06S -01B (ug/L)	GW07S -01B (ug/L)
VOLATILES						
Vinyl Chloride	Dry	(<10U)	(<10U)	(<1,000U)	(<10U)	5 J
1,1-Dichloroethane		(<10U)	(<10U)	(<1,000U)	(<10U)	(<10U)
1,2-Dichloroethene (Total)		(<10U)	(<10U)	(<1,000U)	(<10U)	85
Toluene		(<10U)	(<10U)	270 J	(<10U)	6 J
Xylenes (Total)		(<10U)	26	28,000	(<10U)	41
TICs - Known		---	---	---	---	---
TICs - Unknown		---	---	---	---	---
Level (Low or Medium)		L	L	L	L	L
Dilution Factor		1	1	100	1	1
SEMI - VOLATILES						
Phenol	Dry	(<10U)	(<10U)	12	(<10U) J	(<10U) J
1,3-Dichlorobenzene		(<10U)	1 J	(<10U)	(<10U)	(<10U) R
2-Methylphenol		1 J	(<10U)	13	(<10U)	9 J
4-Methylphenol		(<10U)	(<10U)	150 J	(<10U)	7 J
2,4-Dimethylphenol		(<10U)	14	(<10U)	(<10U)	(<10U)
Dimethylphthalate		(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Pentachlorophenol		(<25U) J	(<25U) J	2 J	(<25U) J	(<25U)
Naphthalene		(<10U)	(<10U)	11	2 J	(<10U) R
2-methylnaphthalene		(<10U)	(<10U)	(<10U)	0.8 J	(<10U) R
Acenaphthene		(<10U)	(<10U)	(<10U)	1 J	(<10U) R
Dibenzofuran		(<10U)	(<10U)	(<10U)	0.7 J	(<10U) R
Fluorene		(<10U)	(<10U)	(<10U)	2 J	(<10U) R
Phenanthrene		(<10U)	(<10U)	5 J	15	(<10U) R
Anthracene		(<10U)	(<10U)	0.8 J	5 J	(<10U) R
Carbazole		(<10U)	(<10U)	3 J	(<10U)	(<10U) R
Fluoranthene		(<10U)	(<10U)	2 J	27	(<10U) R
Pyrene		(<10U)	(<10U)	1 J	27	(<10U) R
Benzo(a)Anthracene		(<10U)	(<10U)	(<10U)	14	(<10U) R
Di-n-butyl phthalate		[10U] J	(<10U) J	(<10U)	[10U] J	[10U] J
bis(2-Ethylhexyl)phthalate		[10U] J	[10U]	(<10U)	[10U] J	[10U] J
Chrysene		(<10U) J	(<10U)	(<10U)	13	(<10U) R
Benzo(b)Fluoranthene		(<10U)	(<10U)	(<10U)	19	(<10U) R
Benzo(a)Pyrene		(<10U)	(<10U)	(<10U)	10	(<10U) R
o-Toluic Acid		1,500 DJ	17 J	6,300 DJ	(<50U) J	14,000 DJ
m-Toluic Acid		160 DJ	(<50U)	4,800 DJ	(<50U) J	6,500 DJ
p-Toluic Acid		(<50U)	(<50U)	270 J	(<50U) J	700 DJ
TICs - Known						
Benzenemethanol, 2-methyl ...		--	--	--	--	5 JN
TICs - Unknown;n		27 J;7	18 J;4	3,944 J;20	26 J;7	64 J;10
PESTICIDES						
None Detected	Dry	U	U	UJ	U	U

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Reported concentration is an estimated value following data validation review.

NA = Not applicable.

D = Data reported from diluted analysis.

*: Dilution used for xylene results labeled "D."

Values shown for unknown TICs are the total concentration and total number of unknowns.

TABLE D-13B (Continued)

p 2 of 2

Analytes	GW08S -01B Units (ug/L)	GW12S -01B (ug/L)	GW18S -01B (ug/L)
VOLATILES			
Vinyl Chloride	(<10U)	(<10U)	(<10U)
1,1-Dichloroethane	(<10U)	(<10U)	3 J
1,2-Dichloroethene (Total)	(<10U)	(<10U)	(<10U)
Toluene	(<10U)	(<10U)	(<10U)
Xylenes (Total)	(<10U) J	55	450 D
TICs - Known	---	---	
TICs - Unknown	---	---	
Level (Low or Medium)	L	L	L
Dilution Factor	1	1	1/10*
SEMI - VOLATILES			
Phenol	(<10U)	(<10U)	(<10U)
1,3-Dichlorobenzene	(<10U)	(<10U)	(<10U)
2-Methylphenol	(<10U)	(<10U)	(<10U)
4-Methylphenol	(<10U)	(<10U)	(<10U)
2,4-Dimethylphenol	(<10U)	(<10U)	4 J
Dimethylphthalate	(<10U)	(<10U)	(<10U)
Prentachlorophenol	(<25U)	(<25U)	(<25U)
Naphthalene	(<10U)	2 J	(<10U)
2-methylnaphthalene	(<10U)	(<10U)	(<10U)
Acenaphthene	(<10U)	(<10U)	(<10U)
Dibenzofuran	(<10U)	(<10U)	(<10U)
Fluorene	(<10U)	(<10U)	(<10U)
Phenanthrene	(<10U)	(<10U)	(<10U)
Anthracene	(<10U)	(<10U)	(<10U)
Carbazole	(<10U)	(<10U)	(<10U)
Fluoranthene	(<10U)	(<10U)	(<10U)
Pyrene	(<10U)	(<10U)	(<10U)
Benzo(a)Anthracene	(<10U)	(<10U)	(<10U)
Di-n-butyl phthalate	(<10U)	(<10U)	(<10U)
bis(2-Ethylhexyl)phthalate	1 J	(<10U)	4 J
Chrysene	(<10U)	(<10U)	(<10U)
Benzo(b)Fluoranthene	(<10U)	(<10U)	(<10U)
Benzo(a)Pyrene	(<10U)	(<10U)	(<10U)
o-Toluic Acid	(<50U)	100 J	2 J
m-Toluic Acid	(<50U)	40 J	(<50U)
p-Toluic Acid	(<50U)	(<50U)	(<50U)
TICs - Known			
Benzamide, N,N-diethyl-3-methyl	--	--	--
TICs - Unknown;n	16 J;2		209 J;19
PESTICIDES			
None Detected	UJ	U	UJ

TABLE D-14A INORGANIC ANALYTES MEASURED IN OVERBURDEN MONITORING WELLS - ROUND 1

p 1 of 1

Analyte	GW01S	GW02S	GW04S	GW06S	GW07S	GW08S	GWFB01	GWFB02
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Aluminum	19,300	7,720 J	885 J	1,690	6,040	933	(<11U)	(<87U)J
Antimony	(<20.0U)R	(<20.0U)R	(<20.0U)R	22.2 B	(<20.0U)	20.8 B	(<20U)	(<18U)NR
Arsenic	(<2.0U)J	21.8 J	2.9 BJ	8.9 R	44.0 R	7.3 R	(<2.0U)	39.2 J
Barium	385J	163 J	63.6 J	146 B	266	50.2 B	(<6U)	80.6 BJ
Beryllium	1.3 BR	(<1.0U) J	(<1.0U) J	(<1.0U)	0.58	(<1.0U)	(<1.0U)	(<1.0U)R
Calcium	504,000	78,400	43,400	20,600	155,000	121,000	369 B	93.2 B
Chromium	43.2 J	17.3 J	5.6 BJ	27.0	17.7	2,550	(<3U)	(<4U)J
Cobalt	27.3 B	11.7 B	(<11.0 U)	(<11.0 U)	12.6	20.7 B	(<11.0 U)	(<11.0 U)
Copper	80.2 J	44.7 J	15.0 BJ	458	47.7 J	52.4 J	11.0 BJ	9.6 BR
Iron	69,800 J	13,600 J	1,970 J	5,740	16,800	23,200	30.2 B	21.8 BJ
Lead	26.7	13.7 R	6.9 R	390	15.1	(<2.0U)J	(<2.0U)J	(<2.0U)R
Magnesium	119,000	17,200	10,200	4,360 B	35,100	20,800	108 B	(<78U)R
Manganese	1,460 J	334 J	578 J	159	430	437	3.0 B	(<5U)R
Nickel	50.7 J	53.7 J	20.3 BJ	20.9 B	46.9	923	(<5U)	(<8U)R
Potassium	4,890 B	4,390 B	4,270 B	71,100	5,350	2,910 B	(<203U)	(<203U)
Sodium	71,400 R	438,000 R	246,000 R	276,000 J	529,000 J	268,000 J	846 BJ	206 B
Vanadium	32.3 R	31.9 J	(<6.0U)J	12.4 B	30.6	5.7 B	(<4U)	(<6U)R
Zinc	163	92.7	26.1	643	68.4	217	(<16U)	(<16U)J
Cyanide	(<10U)	13	(<10U)	(<10U)J	(<10U)J	(<10U)J	18 J	(<10U)J

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRQL.

J = Reported concentration is an estimated value following data validation review.

R = Reported data is unusable following data validation review.

TABLE D-14B INORGANIC ANALYTES MEASURED IN OVERBURDEN MONITORING WELLS - ROUND 2

p 1 of 2

Analyte	Units	GW01S (ug/L)	GW02S (ug/L)	GW04S (ug/L)	GW05S (ug/L)	GW06S (ug/L)	GW07S (ug/L)	GW08S (ug/L)	GW12S (ug/L)
Aluminum	Dry		42,800	508	14,000	2,700	5,690	2,140	2,580
Antimony			(<2U)	(<2U)	34.9 B	23.9 B	(<2U)	(<3U)	(<17U)
Arsenic			20.5 J	7.3 BJ	45.2	9.1 B J	46.3 J	30.5	4.7 B
Barium			430	(<89U)	490	222	116 B	(<89U)	231
Beryllium			2.4 B	(<1U)	1.1 B	(<1U)	(<1U)	(<1U)	(<1U)
Cadmium			14.7 J	(<3U) J	(<3U)	(<3U)	(<3U)	3.1 B	(<3U)
Calcium			169,000	46,600	35,800	47,000	80,500	80,700	79,100
Chromium			78.8	(<7U)	172	24.2	20	6,870	10.9
Cobalt			57.2	(<13U)	28.8 B	(<13U)	(<13U)	22.7 B	(<13U)
Copper			172	9.2 B	1,320	778	22.8 B	220 J	14.1 B
Iron			94,200 R	1,040 R	31,100	7,350	12,500	19,000	11,600
Lead			117	3.7 J	1,370	988	8.0 J	6.7	50.3
Magnesium			47,400	11,200	11,100	14,700	19,600	21,000	37,800
Manganese			1,350	688	651	378 J	245 J	401	352
Mercury			0.4	(<0.2U)	5.0	2.8	(<0.2U)	(<0.2U)	(<0.2U)
Nickel			154	(<26U)	93.1	27.6 B	42.0	1,090	92.5
Potassium			10,300	4,840 B	20,200	85,800	4,530 B	3,610 B	11,800
Selenium			(<1U) J	(<1U) J	1.5 B	1.1 B J	(<5U)	1.2 B J	(<1U)
Sodium			504,000	197,000	577,000	277,000	655,000	714,000	433,000
Vanadium			107	4.1 B	75.6	19.8	52.6	23.2 B	8.2 B
Zinc			450	23.8 J	1,080	1,140 J	87.0 J	51.8 J	40.7
Cyanide			28.0 J	(<10U) J	(<10U)	(<10U)	13.0	(<10U)	(<10U)

NOTE:

U = Not detected. Sample quantitation limits are shown as (< U).

B = Reported value is below the CRQL.

J = Reported concentration is an estimated value following data validation review.

R = Reported data is unusable following data validation review.

TABLE D-14B (Continued)

p 2 of 2

Analyte	Units	GW14S (ug/L)	GW18S (ug/L)
Aluminum	Dry		32,600
Antimony			(<3U)
Arsenic			15.7
Barium			483
Beryllium			2.7 B
Cadmium			11.4
Calcium			243,000
Chromium			110
Cobalt			49.1 B
Copper			153 J
Iron			76,200
Lead			130
Magnesium			50,500
Manganese			7,460
Mercury			0.91
Nickel			184
Potassium			13,700
Selenium			(<1U) J
Sodium			50,100
Vanadium			76.5
Zinc			635
Cyanide			(<10U)

TABLE D-15 WATER QUALITY PARAMETERS MEASURED IN OVERBURDEN GROUND WATER
p 1 of 1

Analyte	Units	GW01S (mg/L)	GW02S (mg/L)	GW04S (mg/L)	GW06S (mg/L)	GW07S (mg/L)	GW08S (mg/L)
Chloride		4.8	26.0	9.8	54.9	98.7	344
Fluoride		(<0.2U)	1.4	1.4	0.59	2.2	(<0.2U)
Ammonia		(<0.1U)	1.8	0.5	0.6	8	(<0.1U)
Nitrate		0.3	(<0.2U)	(<0.2U)	(<0.2U)	(<0.2U)	3.9
Sulfate		(<125U)	(<500U)	22.8	(<1,000U)	(<500U)	(<50U)
Alkalinity		395	516	4,770	710	1,300	410
Hardness		1,750	267	150	69.4	531.6	387.8
Total suspended solids		651	309	57	269	742	218
Dissolved organic carbon		69.1	35.9	25.8	41.6	149	29.9

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

table-10.wk1

TABLE D-16A ORGANIC ANALYTES MEASURED IN UPPER BEDROCK GROUND WATER - ROUND 1

p 1 of 3

Analytes	GW01I -01A (ug/L)	GW02I -01A (ug/L)	GW03I -01A (ug/L)	GW03I DUP -01A (ug/L)	GW04I -01A (ug/L)	GW05I -01A (ug/L)	GW06I -01A (ug/L)
VOLATILES							
Chloroethane	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	31	(<5U)
Vinyl Chloride	(<10U)	(<10U)	(<200U)	(<200U)	(<50U)	3 J	(<10U)
Methylene Chloride	(<5U)	(<5U)	[100U]	[100U]	(<25U)	(<5U)	(<5U)
Acetone	(<10U)	130	(<200U)	(<200U)	(<50U)	(<10U)	(<10U)
1,1-Dichloroethene	(<5U)	(<5U)	(<100U)	(<100U)	(<25U)	10	(<5U)
1,2-Dichloroethene (Total)	13	8	160	140	160	9	(<5U)
Trichloroethene	1 J	2 J	190	180	32	(<5U)	(<5U)
Benzene	(<5U)	1 J	(<100U)	(<100U)	(<25U)	(<5U)	(<5U)
4-Methyl-2-Pentanone (MIBK)	(<10U)	(<10U)	(<200U)	(<200U)	71	(<10U)	(<10U)
Tetrachloroethene	3 J	(<5U)	2,300	2,300	110	(<5U)	(<5U)
Toluene	(<5U)	19	68	66	60	(<5U)	(<5U)
Xylenes (Total)	8	580	2,100	2,100	2,100	110	(<5U)
VOA TICs - Known	---	---	---	---	---	---	---
VOA TICs - Unknown;n	---	---	---	---	---	12J;1	---
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1	1	20	20	5	1	1
SEMI - VOLATILES							
Benzyl alcohol	(<50U)	26 J	14 J	26 J	(<50U)	(<50U)	(<50U)
Bis(2-chloroethoxy)methane	(<50U)	(<50U)	(<50U)J	150	(<50U)	(<50U)	(<50U)
Phenol	60	140	34 J	62	51	(<10U)	22
2-Methylphenol	3 J	(<50U)	(<50U)J	10 J	11 J	(<10U)	2 J
4-Methylphenol	4 J	29 J	(<50U)J	19 J	25 J	3 J	17
Nitrobenzene	3 J	(<50U)	11 J	18 J	(<10U)	(<10U)	(<10U)
2,4-Dimethylphenol	14	(<50U)	(<50U)J	320 J	14 J	(<10U)	10
Benzoic Acid	70	(<50U)	(<50U)J	11 J	330	(<10U)	5 J
Naphthalene	(<10U)	(<50U)	(<50U)J	(<40U)J	(<10U)	(<10U)	9 J
Pentachlorophenol	(<50U)	8 J	(<250U)J	(<200U)J	(<50U)	(<50U)	(<50U)
Phenanthrene	(<10U)	(<50U)	(<50U)J	(<40U)J	(<10U)	(<10U)	1 J
Benzo(a)anthracene	(<10U)	(<50U)J	(<10U)J	(<10U)J	(<10U)	(<10U)	(<10U)
bis(2-Ethylhexyl)phthalate	(<10U)	(<50U)J	(<50U)J	(<40U)	(<10U)	2 J	1 J
Di-n-octylphthalate	(<10U)	(<50U)J	(<50U)J	(<40U)	(<10U)	(<10U)	
2,4-Dinitrotoluene	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)
Dimethyl phthalate	(<50U)	(<50U)	(<50U)J	24 J	(<50U)	(<50U)	(<50U)
m-Toluic Acid	11,000 D	30,000 DJ	1,800 DJ	50,000 D	19,000 J	840 J	2,100 D
p-Toluic Acid	1,200 DJ	720 DJ		5,400 DJ	(<250U)	100	160 DJ
o-Toluic Acid	16,000 D	87,000 DJ	3,000 DJ	78,000 D	32,000 J	1,900 DJ	3,300 J
BNA TICs- Known							
Butanoic acid	26 J	240 J	--	140 J	--	--	--
Pentanoic acid	150 J	--	--	--	--	--	--
Benzenemethanol,4-methyl	20 J	--	--	--	--	--	--
Benzamide,N,N-diethyl-methyl	18 J	40 J	30 J	56 J	100 J	--	--
Propanoic acid,2-methyl	--	270 J	90 J	--	--	--	--
Hexanoic acid	--	110 J	65 J	140 J	--	--	--
Hexadecanoic acid	--	--	--	140 J	--	--	--
Hexanedioic acid	--	90 J	--	--	--	--	--
9-Octadecanoic acid	--	900 J	--	--	--	--	--
1-Hexanol,2-ethyl	--	--	20 J	--	--	--	--
Benzoic acid,2-methyl	--	--	40 J	--	--	--	--
Decanoic acid	--	--	25 J	--	--	--	--
9-Hexadecanoic acid	--	--	95 J	--	--	--	--
10-Octadecanoic acid,methyl	--	--	290 J	--	--	--	--
1(3H)-Isobenzofuranone	--	--	--	--	520 J	--	--
Benzomethanol.alpha.	--	--	--	48 J	--	--	--
Bicyclo[2.2.1]heptan-1-ol	--	--	--	32 J	--	--	--
Ethanol,2-phenoxy-	--	--	--	32 J	--	--	--
2,4-pentanediol,2-methyl	--	--	--	--	--	--	--
Hexanoic acid,2-methyl	--	--	--	--	--	--	--
2,5-Furandione,3,4-diethyl	--	--	--	--	--	--	--
Hexanoic acid,2-ethyl	--	--	--	--	--	--	--
Butanamide,N-(oxypropyl)	--	--	--	--	--	--	--
Phenol,4,4'-Butylidenebis[2-	--	--	--	--	--	--	--
BNA TICs - Unknown;n	136 J;4	3,035 J;11	6,408 J;7	4,256 J;11	2,600 J;8	582 J;15	188 J;2
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1/100	5/3,000 *	5/150 *	5/150 *	5	1/10 *	1/20 *
PESTICIDES							
None Detected							

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Reported concentration is an estimated value following data validation review.

[-U] = Value was false positive following data validation review.

NA = Not applicable.

D = Reported result from diluted analysis.

* = Dilution factors for toluic acid labeled "D."

Values shown for unknown TICs are the total concentration and total number of unknowns.

Data validation results provided in data reports 920398 (MW11-MW4I) and 920396 (MW5I-MW11I).

TABLE D-16A (Continued)

p 2 of 3

Analytes	GW07I -01A (ug/L)	GW08I -01A (ug/L)	GW09I -01A (ug/L)	GW010I -01A (ug/L)	GW011I -01A (ug/L)
Units					
VOLATILES					
Chloroethane	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Vinyl Chloride	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Methylene Chloride	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Acetone	23	(<10U)	(<10U)	(<10U)	(<10U)
1,1-Dichloroethene	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
1,2-Dichloroethene (Total)	93	(<5U)	(<5U)	(<5U)	(<5U)
Trichloroethene	37	(<5U)	(<5U)	(<5U)	(<5U)
Benzene	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
4-Methyl-2-Pentanone (MIBK)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Tetrachloroethene	26	(<5U)	(<5U)	(<5U)	(<5U)
Toluene	16	(<5U)	(<5U)	(<5U)	(<5U)
Xylenes (Total)	280	(<5U)	(<5U)	(<5U)	(<5U)
VOA TICs - Known	---	---	---	---	---
VOA TICs - Unknown;n	---	---	---	---	---
Level (low or medium)	L	L	L	L	L
Dilution factor	1	1	1	1	1
SEMI - VOLATILES					
Benzyl alcohol	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)
Bis(2-chloroethoxy)methane	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)
Phenol	9 J	(<10U)R	(<10U)	(<10U)	(<10U)
2-Methylphenol	18	(<10U)	(<10U)J	(<10U)	(<10U)
4-Methylphenol	28	(<10U)R	(<10U)J	(<10U)	(<10U)
Nitrobenzene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
2,4-Dimethylphenol	(<10U)	(<10U)R	(<10U)J	(<10U)	(<10U)
Benzoic Acid	190 E	(<50U)R	(<50U)J	(<50U)	(<50U)
Naphthalene	(<10U)	(<10U)	(<10U)J	(<10U)	(<10U)
Pentachlorophenol	(<50U)	(<50U)R	(<50U)J	(<50U)	(<50U)
Phenanthrene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Benzo(a)anthracene	(<10U)	5 J	(<10U)	(<10U)	(<10U)
bis(2-Ethylhexyl)phthalate	5 J	5 J	4 J	7 J	160
Di-n-octylphthalate	(<10U)	(<10U)	(<10U)	(<10U)	3 J
2,4-Dinitrotoluene	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)
Dimethyl phthalate	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)
m-Toluic Acid	960 DJ	(<50U)R	(<50U)	(<50U)	(<50U)
p-Toluic Acid	(<10,000U)	(<50U)R	(<50U)	(<50U)	(<50U)
o-Toluic Acid	24,000 D	(<50U)R	(<50U)	(<50U)	(<50U)
BNA TICs- Known					
Butanoic acid	100 J	---	---	---	---
Pentanoic acid	--	---	---	---	---
Benzenemethanol,4-methyl	--	---	---	---	---
Benzamide,N,N-diethyl-methyl	97 J	---	---	---	---
Propanoic acid,2-methyl	--	---	---	---	---
Hexanoic acid	--	---	---	---	---
Hexadecanoic acid	--	---	---	---	---
Hexanedioic acid	--	---	---	---	---
9-Octadecanoic acid	--	---	---	---	---
1-Hexanol,2-ethyl	--	---	---	---	---
Benzolc acid,2-methyl	--	---	---	---	---
Decanoic acid	--	---	---	---	---
9-Hexadecanoic acid	--	---	---	---	---
10-Octadecanoic acid,methyl	--	---	---	---	---
1(3H)-Isobenzofuranone	--	---	---	---	---
Benzomethanol.alpha.	26 J	---	---	---	---
Bicyclo[2.2.1]heptan-1-ol	--	---	---	---	---
Ethanol,2-phenoxy-	39 J	---	---	---	---
2,4-pentanedioic acid,2-methyl	44 J	---	---	---	---
Hexanoic acid,2-methyl	--	---	---	---	---
2,5-Furandione,3,4-dlethyl	--	---	---	---	---
Hexanoic acid,2-ethyl	--	---	---	---	---
Butanamide,N-(oxypropyl)	--	---	---	---	---
Phenol,4,4'-Butyldenebis(2-	--	---	---	---	11 J
BNA TICs - Unknown;n					
	626 J;13	26 J;1	9 J;1	23 J;2	178 J;10
Level (low or medium)	L	L	L	L	L
Dilution factor	1/200 *	1	1	1	1
PESTICIDES					
None Detected					

TABLE D-16A (Continued)

p 3 of 3

Analytes	GWFB01	GWFB02	GWTB-2	GWTB-3	GWTB-4	GWTB-5
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES						
Chloroethene	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Vinyl Chloride	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Methylene Chloride	(<5U)	(<5U)	(<5U)	2 J	(<5U)	(<5U)
Acetone	(<10U)	(<10U)	31	(<10U)	(<10U)	(<10U)
1,1-Dichloroethene	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
1,2-Dichloroethene (Total)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Trichloroethene	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Benzene	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
4-Methyl-2-Pentanone (MIBK)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Tetrachloroethene	(<5U)	2 J	(<5U)	(<5U)	(<5U)	(<5U)
Toluene	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Xylenes (Total)	(<5U)	5 J	(<5U)	(<5U)	(<5U)	(<5U)
VOA TICs - Known	---	---	---	---	---	---
VOA TICs - Unknown;n	---	---	---	---	---	---
Level (low or medium)	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1
SEMI - VOLATILES						
Benzyl alcohol	(<50U)	(<50U)	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	(<50U)	(<50U)	NA	NA	NA	NA
Phenol	(<10U)J	(<10U)	NA	NA	NA	NA
2-Methylphenol	(<10U)	(<10U)	NA	NA	NA	NA
4-Methylphenol	(<10U)J	(<10U)	NA	NA	NA	NA
Nitrobenzene	(<10U)	(<10U)	NA	NA	NA	NA
2,4-Dimethylphenol	(<10U)J	(<10U)	NA	NA	NA	NA
Benzoic Acid	(<50U)J	(<50U)	NA	NA	NA	NA
Naphthalene	(<10U)	(<10U)	NA	NA	NA	NA
Pentachlorophenol	(<50U)J	(<50U)	NA	NA	NA	NA
Phenanthrene	(<10U)	(<10U)	NA	NA	NA	NA
Benzo(a)anthracene	(<10U)	(<10U)	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	(<10U)	(<10U)	NA	NA	NA	NA
Di-n-octylphthalate	(<10U)	(<10U)	NA	NA	NA	NA
2,4-Dinitrotoluene	(<50U)	(<50U)	NA	NA	NA	NA
Dimethyl phthalate	(<50U)	(<50U)	NA	NA	NA	NA
m-Toluic Acid	(<50U)	(<50U)	NA	NA	NA	NA
p-Toluic Acid	(<50U)	(<50U)	NA	NA	NA	NA
o-Toluic Acid	(<50U)	(<50U)	NA	NA	NA	NA
BNA TICs- Known						
Butanoic acid	---	---	NA	NA	NA	NA
Pentanoic acid	---	---	NA	NA	NA	NA
Benzenemethanol,4-methyl	---	---	NA	NA	NA	NA
Benzamide,N,N-diethyl-methyl	---	---	NA	NA	NA	NA
Propanoic acid,2-methyl	---	---	NA	NA	NA	NA
Hexanoic acid	---	---	NA	NA	NA	NA
Hexadecanoic acid	---	---	NA	NA	NA	NA
Hexanedioic acid	---	---	NA	NA	NA	NA
9-Octadecanoic acid	---	---	NA	NA	NA	NA
1-Hexanol,2-ethyl	---	---	NA	NA	NA	NA
Benzoic acid,2-methyl	---	---	NA	NA	NA	NA
Decanoic acid	---	---	NA	NA	NA	NA
9-Hexadecanoic acid	---	---	NA	NA	NA	NA
10-Octadecanoic acid,methyl	---	---	NA	NA	NA	NA
1(3H)-Isobenzofuranone	---	---	NA	NA	NA	NA
Benzomethanol.alpha.	---	---	NA	NA	NA	NA
Bicyclo[2.2.1]heptan-1-ol	---	---	NA	NA	NA	NA
Ethanol,2-phenoxy-	---	---	NA	NA	NA	NA
2,4-pentanediol,2-methyl	---	---	NA	NA	NA	NA
Hexanoic acid,2-methyl	---	---	NA	NA	NA	NA
2,5-Furandione,3,4-diethyl	---	---	NA	NA	NA	NA
Hexanoic acid,2-ethyl	---	---	NA	NA	NA	NA
Butanamide,N-(oxypropyl)	---	---	NA	NA	NA	NA
Phenol,4,4'-Butyldienebis[2-	---	---	NA	NA	NA	NA
BNA TICs - Unknown;n	---	1000 J;1	NA	NA	NA	NA
Level (low or medium)	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1
PESTICIDES						
None Detected			NA	NA	NA	NA

TABLE D-16B ORGANIC ANALYTES MEASURED IN UPPER BEDROCK GROUND WATER - ROUND 2

p 1 of 4

Analytes	GW01I -01B	GW02I -01B	GW03I -01B	GW04I -01B	GW05I -01B	GW06I -01B	GW07I -01B
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES							
Chloroethane	14	(<20U)	(<50U)	(<100U)	49	(<10U)	(<100U)
Vinyl Chloride	(<10U)	(<20U)	(<50U)	(<100U)	21	(<10U)	(<100U)
Acetone	(<10U)	39	(<50U)	(<100U)	(<10U)	(<10U)	(<100U)
1,1-Dichloroethane	(<10U)	(<20U)	(<50U)	(<100U)	150	(<10U)	(<100U)
1,2-Dichloroethane (Total)	120	20	1,500	300	100	4 J	200
Trichloroethene	29	(<20U)	54	11 J	(<10U)	2 J	12 J
Benzene	(<10U)	(<20U)	(<50U)	(<100U)	(<10U)	(<10U)	(<100U)
Tetrachloroethene	100	(<20U)	190	34 J	(<10U)	(<10U)	(<100U)
Toluene	11	22	37 J	(<100U)	9 J	3 J	19 J
Ethyl benzene	(<10U)	(<20U)	(<50U)	(<100U)	1 J	(<10U)	(<100U)
Xylenes (Total)	290	670	1,400	1,900	430 D	50	300
VOA TICs - Known	---	---	---	---	---	---	---
VOA TICs - Unknown;n	7 J;1	---	---	---	12J;1	---	---
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1	2	5	10	1/10+	1	10
SEMI - VOLATILES							
Phenol	2,400 J	370	(<10U)	28	(<10U)	27	24
2-Methylphenol	30 J	26 J	(<10U)	(<10U)	(<10U)	4 J	14 J
4-Methylphenol	69 J	55 J	(<10U)	(<10U)	(<10U)	14	12 J
2,4-Dimethylphenol	(<100U)	(<100U)	(<10U)	(<10U)	(<10U)	(<10U)	(<20U)
Naphthalene	(<100U)	(<100U)	(<10U)	(<10U)	2 J	8 J	(<20U)
Di-n-butyl phthalate	(<100U)	(<100U)	(<10U)	(<10U)	(<10U)	(<10U)	(<20U)
bis(2-Ethylhexyl)phthalate	(<100U)	(<100U)	(<10U)	(<10U)	(<10U)	(<10U)	(<20U)
Fluorene	(<100U)	(<100U)	(<10U)	(<10U)	(<10U)	(<10U)	(<20U)
o-Toluic Acid	190,000 DJ	220,000 DJ	28,000 J	42,000 DJ	1,300 J	7,900 D	64,000 J
m-Toluic Acid	150,000 DJ	100,000 DJ	16,000 J	32,000 DJ	310 J	7,700 D	42,000 J
p-Toluic Acid	89,000 J+	240,000 J	9,200 J	12,000 J	69	920 DJ	16,000 J
BNA TICs- Known							
Bimethyl benzoic acid	--	--	--	--	--	--	--
Bicyclo[2.2]heptan-2-one	--	--	--	--	--	--	--
Benzene, 1,1'-oxybis	--	--	--	--	--	--	--
2-methylbenzenemethanol	--	--	--	--	--	150 JN	--
2-methylcyclopentanol	--	--	--	--	--	7 JN	--
Benzamide, N,N-diethyl-3-methyl ...	--	--	370 JN	--	--	--	--
BNA TICs - Unknown;n	1,590 J;20	17,598 J;20	2,213 J;19	1,113 J;20	657 J;20	356 J;18	469 J;20
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	10/5,000*	10/5,000 *	1	1/2,000 *	1	1/100 *	2/100 *
PESTICIDES/PCBs							
4,4'-DDE	(<0.1U)	(<0.1U)	0.23	0.61	(<0.1U)	(<0.1U)	(<0.1U)

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Reported concentration is an estimated value following data validation review.

[-U] = Value was false positive following data validation review.

NA = Not applicable.

D = Reported result from diluted analysis.

* = Dilution factors for toluic acid labeled "D."

+ = Dilution factors for xylenes labeled "D."

Values shown for unknown TICs are the total concentration and total number of unknowns.

Data validation results provided in data report 931235.

TABLE D-16B (Continued)

p 2 of 4

Analytes	GW08I -01B (ug/L)	GW08I DUP -01B (ug/L)	GW09I -01B (ug/L)	GW010I -01B (ug/L)	GW011I -01B (ug/L)
Units					
VOLATILES					
Chloroethane	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Vinyl Chloride	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Acetone	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
1,1-Dichloroethane	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
1,2-Dichloroethene (Total)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Trichloroethene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Benzene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Tetrachloroethene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Toluene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Ethyl benzene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Xylenes (Total)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
VOA TICs - Known	---	---	---	---	---
VOA TICs - Unknown;n	---	---	24 J;2	---	39 J;1
Level (low or medium)	L	L	L	L	L
Dilution factor	1	1	1	1	1
SEMI - VOLATILES					
Phenol	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
2-Methylphenol	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
4-Methylphenol	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
2,4-Dimethylphenol	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Naphthalene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Di-n-butyl phthalate	(<10U)	(<10U)	(<10U)	2 J	(<10U)
bis(2-Ethylhexyl)phthalate	(<10U)	(<10U)	(<10U)	4 J	49
Fluorene	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
o-Toluic Acid	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)
m-Toluic Acid	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)
p-Toluic Acid	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)
BNA TICs- Known					
Bimethyl benzoic acid	--	--	--	--	--
Bicyclo[2.2]heptan-2-one	--	--	--	--	--
Benzene, 1,1'-oxybis	--	--	--	--	--
2-methylbenzenemethanol	--	--	--	--	--
2-methylcyclopentanol	--	--	--	--	--
Benzamidine, N,N-diethyl-3-methy	--	--	--	--	--
BNA TICs - Unknown;n	26 J;1		9 J;1		178 J;10
Level (low or medium)	L		L	L	L
Dilution factor	1		1	1	1
PESTICIDES/PCBs					
4,4'-DDE	(<0.1U)	(<0.1U)	(<0.1U)	(<0.1U)	(<0.1U)

TABLE D-16B (Continued)

p 3 of 4

Analytes	Units	GW12I -01B (ug/L)	GW13I -01B (ug/L)	GW14I -01B (ug/L)	GW15I -01B (ug/L)	GW16I -01B (ug/L)	GW16I -01R (ug/L)
VOLATILES							
Chloroethane		32 J	(<10U)	(<10U)	Dry	(<10U)	NA
Vinyl Chloride		(<50U)	(<10U)	(<10U)		(<10U)	
Acetone		(<50U)	(<10U)	(<10U)		(<10U) J	
1,1-Dichloroethane		39 J	(<10U)	(<10U)		(<10U)	
1,2-Dichloroethane (Total)		26 J	(<10U)	(<10U)		23	
Trichloroethene		(<50U)	(<10U)	(<10U)		(<10U)	
Benzene		(<50U)	4 J	(<10U)		(<10U)	
Tetrachloroethene		(<50U)	(<10U)	(<10U)		(<10U)	
Toluene		(<50U)	(<10U)	(<10U)		2 J	
Ethyl benzene		(<50U)	(<10U)	(<10U)		(<10U)	
Xylenes (Total)		1,700	(<10U)	(<10U)		9 J	
VOA TICs - Known		---	---	---		---	
VOA TICs - Unknown;n		---	---	---		---	
Level (low or medium)		L	L	L		L	
Dilution factor		5	1	1		1	
SEMI - VOLATILES							
Phenol		2 J	(<10U)	(<10U)	Dry	(<10U) J	(<10U)
2-Methylphenol		1 J	(<10U)	(<10U)		0.9 J	2 J
4-Methylphenol		2 J	(<10U)	(<10U)		0.8 J	4 J
2,4-Dimethylphenol		(<10U)	(<10U)	(<10U)		0.6 J	(<10U)
Naphthalene		1J	(<10U)	(<10U)		(<10U)	(<10U)
Di-n-butyl phthalate		(<10U)	(<10U)	(<10U)		[10U] J	(<10U)
bis(2-Ethylhexyl)phthalate		3 J	3 J	(<10U)		[10U]	[10U]
Fluorene		2 J	(<10U)	(<10U)		(<10U)	(<10U)
o-Toluic Acid		76	(<50U)	32 J		4,500 DJ	3,100 D
m-Toluic Acid		29 J	(<50U)	11 J		1,200 DJ	560 D
p-Toluic Acid		470 DJ	(<50U)	12 J		190 DJ	(<50U)
BNA TICs- Known							
Bimethyl benzoic acid		--	--	--		2 JN	--
Bicyclo[2.2]heptan-2-one		--	--	--		12 JN	--
Benzene, 1,1'-oxybis		110 JN	--	--		--	--
2-methylbenzenemethanol		--	--	--		--	--
2-methylcyclopentanol		--	--	--		--	--
Benzamide, N,N-diethyl-3-methy		--	--	--		--	4 JN
BNA TICs - Unknown;n							
		2,218 J;19	93 J;15	--		56 J;11	21 J; 7
Level (low or medium)		L	L	L			
Dilution factor		1	1	1			
PESTICIDES							
4,4'-DDE		(<0.1U)	(<0.1U)	(<0.1U)	Dry	(<0.1U) J	--

NOTE:

Well MW-16I sampled twice during Round 2 program. Labeled "GW-16I-01R"

NA = Not analyzed.

TABLE D-16B (Continued)

p 4 of 4

Analytes	Units	GW171 -01B (ug/L)	GW181 -01B (ug/L)	FB-01B (8/27/93) (ug/L)	TB-01B (ug/L)	TB-02B (ug/L)	TB-02 (ug/L)	TB(9/3) (ug/l)
VOLATILES								
Chloroethane	Dry		(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Vinyl Chloride			(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Acetone			(<10U) R	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
1,1-Dichloroethane			3 J	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
1,2-Dichloroethane (Total)			(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Trichloroethene			(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Benzene			(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Tetrachloroethene			(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Toluene			(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Ethyl benzene			(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
Xylenes (Total)			490 D	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
VOA TICs - Known				---	---	---		
VOA TICs - Unknown;n			135 J;9	---	---	---		
Level (low or medium)			L	L	L	L		
Dilution factor			1/5*	1	1	1		
SEMI - VOLATILES								
Phenol	Dry		(<10U)	(<10U)				
2-Methylphenol			(<10U)	(<10U)				
4-Methylphenol			(<10U)	(<10U)				
2,4-Dimethylphenol			7 J	(<10U)				
Naphthalene			3 J	(<10U)				
Di-n-butyl phthalate			(<10U)	(<10U)				
bis(2-Ethylhexyl)phthalate			1 J	(<10U)				
Fluorene			(<10U)	(<10U)				
o-Toluic Acid			5 J	(<50U)				
m-Toluic Acid			(<50U)	(<50U)				
p-Toluic Acid			(<50U)	(<50U)				
BNA TICs- Known								
Bimethyl benzoic acid			--	--				
Bicyclo[2.2]heptan-2-one			--	--				
Benzene, 1,1'-oxybis			--	--				
2-methylbenzenemethanol			--	--				
2-methylcyclopentanol			--	--				
Benzamidine, N,N-diethyl-3-methyl ...			--	--				
BNA TICs - Unknown;n			209 J;20	--				
Level (low or medium)			L	L				
Dilution factor			1	1				
PESTICIDES								
4,4'-DDE	Dry		(<0.1U) J	(<0.1U)				

TABLE D-17A INORGANIC ANALYTES MEASURED IN UPPER BEDROCK GROUND WATER - ROUND 1

p 1 of 2

Analyte	SMC- GW011 (ug/L)	SMC- GW021 (ug/L)	SMC- GW031 (ug/L)	SMC- GW031 DUP (ug/L)	SMC- GW041 (ug/L)	SMC- GW051 (ug/L)	SMC- GW061 (ug/L)	SMC- GW071 (ug/L)	SMC- GW071 DUP (ug/L)	SMC- GW081 (ug/L)	SMC- GW091 (ug/L)
Aluminum	10,700 J	1,760 J	156 J	138 BJ	2,460 J	259	261	947	1,230	107 B	167 B
Arsenic	60.7 J	910 J	46.7 J	37.3 BJ	44.1 J	22.6 R	12.8 R	98.6 R	125 R	<2.0U	16.5
Barium	142 BJ	284 J	41.0 BJ	34.9 BJ	163 BJ	326	87.8 B	129 B	139 B	44.2 B	254
Beryllium	1.2 R	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J
Calcium	126,000 B	9,160	6,270	6,550	72,200	34,900	6,180	26,400	29,900	71,100	142,000
Chromium	33.1 J	53.2 J	41.3 J	38.1 J	44.6 J	17.1	34.2	22.8	26.0	<3.0U> J	<3.0U> J
Cobalt	42.4 B	19.0 B	17.3 B	13.8 B	35.6 B	<11.0U> J	<11.0U> J	<11.0U> J	11.1 B	<11.0U> J	12.9 B
Copper	63.3 R	42.1 J	63.4 J	69.8 J	87.2 J	27.7 J	84.0 J	62.1 J	69.7 J	15.2 BJ	10.6 B
Iron	17,600 J	3,750 J	1,900 J	3,980 J	5,700 J	24,100	1,670	13,500	20,200	6,590	10,700 J
Lead	20.5 BR	<20.0U> R	62.7 R	57.1 R	84.1 R	41.0 S	122	<2.0U> J	31.1	<2.0U> J	<2.0U> J
Magnesium	18,000	201 B	904 B	886 B	5,160	8,720	542 B	3,230 B	3,600 B	14,600	25,800
Manganese	491 J	23.1 J	122 J	134 J	690 J	175	45.9	113	149	58.4	637
Mercury	0.26 R	0.53 J	0.24 R	0.28 R	0.55 J	<0.20U> J	0.65	0.35 R	0.34 R	<0.20U> J	<0.20U> J
Nickel	222 J	254 J	65.4 J	82.1 J	122 J	38.5 B	20.7 B	71.2	76.2	6.0 B	8.6 B
Potassium	5,530	17,300	48,100	46,700	26,500	16,500	54,900	29,800	30,400	2,860 B	3,570 B
Selenium	<10U> R	<10U> R	<10U> R	<10U> R	<10U> R	<20U> J	<2U> J	<20U> J	<20U> J	2.0 BJ	<2U> J
Sodium	1,230,000 R	7,950,000 R	2,130,000 R	2,240,000 R	1,260,000 R	361,000	527,000	1,170,000	1,190,000	396,000	188,000
Thallium	<1.0U> J	1.1 BJ	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J	<1.0U> J
Vanadium	62.6 R	343 J	78.7 J	82.6 J	89.7 J	11.4 B	44.5 B	106	112	<4.0U> J	<4.0U> J
Zinc	49.3J	27.3	22.6	43.5	58.0	23.5	28.8	22.7	34.9	<16.0U> J	25.6
Cyanide	<10U> J	20	12	<10U> J	<10U> J	<10U> J	10 J	72 J	79 J	<10U> J	<10U> J

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRQL.

R = Data is unusable following data validation review.

J = Reported value is an estimate following data validation review.

Data validation results provided in data reports 920398 (MW11-MW41) and 920396 (MW51-MW111).

TABLE 15A.WK1

TABLE D-17A (Continued)

p 2 of 2

Parameter	SMC- GW010I (ug/L)	SMC- GW011I (ug/L)	SMC- GW_FB1 (ug/L)	SMC- GW_FB2 (ug/L)
Aluminum	212	233	<11U	<87U) J
Arsenic	<1.0U)	1.1 B	<2U) N	39.2 J
Barium	39.1 B	55.4 B	<6U)	80.6 J
Beryllium	<1.0U)	<1.0U)	<1U)	<1.0U) R
Calcium	96,200	87,100	369 B	93.2 B
Chromium	<3.0U)	6.5 B	<3U)	<4U) J
Cobalt	14.8 B	<11U)	<11U)	<11 U)
Copper	19.0 B	53.9	11 BJ	9.6 R
Iron	3,560 J	4,970 J	30.2 B	21.8 J
Lead	2.5 B	4.0 W	<2U)J	<2U) J
Magnesium	23,900	21,100	108 B	<78 U)
Manganese	34.3	48.2	3 B	<5U) R
Mercury	<0.20U) N	<0.20U)	<0.20U)	<0.20U) R
Nickel	<5.0U)	15.9 B	<5 U)	<8U) R
Potassium	802 B	1,190 B	<203U)	<203U)
Selenium	<2U)	<2U)	<2U) NJ	<1U) R
Sodium	7,670	19,500	846 B	206 B
Thallium	<4.0U)	<1.0U)	<1.0U)J	<1.0U)J
Vanadium	<4.0U)	<4.0U)	<4 U)	<6U) R
Zinc	<16.0U)	25.6	<16 U)	<16 U)J
Cyanide	<10U)J	<10U)J	<10U)J	<10U)J

TABLE D-17B INORGANIC ANALYTES MEASURED IN UPPER BEDROCK GROUND WATER - ROUND 2

p 1 of 2

Analyte	SMC- GW011 (ug/L)	SMC- GW021 (ug/L)	SMC- GW031 (ug/L)	SMC- GW041 (ug/L)	SMC- GW051 (ug/L)	SMC- GW061 (ug/L)	SMC- GW071 (ug/L)	SMC- GW081 (ug/L)	SMC- GW081 DUP (ug/L)	SMC- GW091 (ug/L)	SMC- GW0101 (ug/L)
Aluminum	801	751	36.2 B	2,650	241	1,660	726	46.1 B	44.1 B	558	1,620
Arsenic	472	631	30.8	(<u><3U</u>)	52.6	21.9	114	(<u><3U</u>)	18.5	9.4 B	(<u><3U</u>)
Barium	134	265	(<u><89U</u>)	189 B	280	127 B	107 B	(<u><89U</u>)	(<u><89U</u>)	220	(<u><89U</u>)
Beryllium	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)
Cadmium	(<u><3U</u>)	(<u><3U</u>)	(<u><3U</u>)	(<u><3U</u>)	(<u><3U</u>)	(<u><3U</u>)	(<u><3U</u>)	3.2 B	3.2 B	(<u><3U</u>)	(<u><3U</u>)
Calcium	18,500	6,140	7,210	55,600	23,100	15,100	20,700	87,800	88,900	127,000	32,100
Chromium	48.8	34.9	34.1	48.9	15.7	33.9	30.3	(<u><7U</u>)	(<u><7U</u>)	(<u><7U</u>)	11.9
Cobalt	40.0 B	16.7 B	(<u><13U</u>)	38.0 B	(<u><13U</u>)	(<u><13U</u>)	(<u><13U</u>)	(<u><13U</u>)	(<u><13U</u>)	33.8 B	23.0 B
Copper	33.6	42.5	43.2	94.5	12.3 B	89.7	38.6	(<u><3U</u>)	(<u><3U</u>)	(<u><3U</u>)	10.7 B
Iron	11,600	3,900	1,970	8,540	25,500	17,300	20,400	30,000	30,100	10,100	21,500
Lead	(<u><5U</u>)	(<u><5U</u>)	41.2	114	41.7	128	17.8	1.6 B	7.4	1.3 B	2.7 B
Magnesium	1,280 B	73.1	1,040 B	3,460 B	7,310	2,710 B	1,270 B	19,000	19,300	23,100	30,100
Manganese	150	30.2	175	978	136	135	128	177	188	651	103
Mercury	0.32	0.28	(<u><0.2U</u>)	0.39	(<u><0.2U</u>)	0.52	(<u><0.2U</u>)	(<u><0.2U</u>)	(<u><0.2U</u>)	(<u><0.2U</u>)	(<u><0.2U</u>)
Nickel	441	166	53.0	106	35.5	34.3	77.8	(<u><26U</u>)	(<u><26U</u>)	26.7 B	(<u><26U</u>)
Potassium	2,780	19,000	33,300	25,800	15,000	52,800	28,100	4,360	4,570	4,860 B	16,700
Selenium	(<u><10U</u>)	(<u><20U</u>)	(<u><5U</u>)	6.4	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	(<u><1U</u>)	1.7 B
Sodium	4,770,000	4,300,000	1,240,000	940,000	408,000	516,000	1,420,000	385,000	398,000	177,000	46,800
Thallium	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)	(<u><2U</u>)
Vanadium	170	206	75.1	79.5	17.2 B	52.8	136	(<u><4U</u>)	(<u><4U</u>)	(<u><4U</u>)	7.5 B
Zinc	47.9	155	35.0	83.2	36.8	53.3	72	57.1	21.2	26.6	31.6
Cyanide	(<u><10U</u>)	(<u><10U</u>)	(<u><10U</u>)	(<u><10U</u>)	(<u><10U</u>)	(<u><10U</u>)	36	(<u><10U</u>)	(<u><10U</u>)	(<u><10U</u>)	(<u><10U</u>)

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CROL.

R = Data is unusable following data validation review.

J = Reported value is an estimate following data validation review.

TABLE D-17B (Continued)

p 2 of 2

Parameter Units	SMC- GW0111 (ug/L)	SMC- GW0121 (ug/L)	SMC- GW0131 (ug/L)	SMC- GW0141 (ug/L)	SMC- GW0151 (ug/L)	SMC- GW0161 (ug/L)	SMC- GW0181 (ug/L)
Aluminum	1,560 (<3U)	125 B	1,100 (<3U)	366 (<3U)	Dry	32,500	410
Arsenic		16.5				41.6 J	3.9 B
Barium		165 B				653	190 B
Beryllium						2.5 B	
Cadmium						12.1 J	5.0
Calcium	114,000	53,600	80,600	33,300		666,000	86,300
Chromium	41.4	7.7 B	23.8			60.4	13.1
Cobalt	15.0 B	33.4 B				73.2	
Copper	31.0	8.1 B				167	10.1 B
Iron	8,670	13,000	44,500	30,500		97,500 R	35,300
Lead	3.5	15.0	5.0	2.7 B		31.7 J	12.2
Magnesium	24,600	22,000	19,300	17,300		82,400	20,100
Manganese	136	216	709	551		2,270	792
Mercury							
Nickel							
Potassium							
Selenium							
Sodium							
Thallium							
Vanadium							
Zinc							
Cyanide							

TABLE D-18 WATER QUALITY PARAMETERS MEASURED IN UPPER BEDROCK GROUND WATER

p 1 of 1

Analyte	Units	GW01I (mg/L)	GW02I (mg/L)	GW03I (mg/L)	GW03I DUP (mg/L)	GW04I (mg/L)	GW05I (mg/L)	GW06I (mg/L)	GW07I (mg/L)	GW07I DUP (mg/L)
Chloride		74.1	291.0	60.0	60.7	46.0	78.9	99.5	91.4	96.9
Fluoride		5.1	32.9	21.6	26.0	11.8	0.31	1.1	8.9	8.4
Ammonia		0.6	1.3	11.0	11.0	4	8.8	3.7	15	15
Nitrate		(<0.2U)	(<0.2U)	0.6	0.6	(<0.2U)	(<0.2U)	(<0.2U)	(<0.2U)	(<0.2U)
Sulfate		(<500U)	(<500U)	(<500U)	(<500U)	(<500U)	(<1,000U)	(<1,000U)	(<125U)	(<1000U)
Alkalinity		1,740	15,800	4,770	4,990	4,340	864	132	2,170	1,980
Hardness		704	23.7	19.4	20.0	202	123.1	69.4	79.2	89.5
Total suspended solids		362	27	19	25.0	184	57	40	63	59
Dissolved organic carbon		191	726	368	193	77.9	112	84.2	171	266

Analyte	Units	GW08I (mg/L)	GW09I (mg/L)	GW010I (mg/L)	GW011I (mg/L)	GW-FB1 (mg/L)	GW-FB2 (mg/L)	GW-FB3 (mg/L)
Chloride		340	317	12.9	28.5	(<1.0U)	(<1.0U)	(<1.0U)
Fluoride		0.28	0.29	(<0.2U)	(<0.2U)	(<0.2U)	(<0.2U)	(<0.2U)
Ammonia		(<0.1U)	0.6	(<0.1U)	(<0.1U)	(<1.0U)	(<0.1U)	(<1.0U)
Nitrate		1.8	(<0.2U)	1.6	4.4	(<0.2U)	(<0.2U)	(<0.2U)
Sulfate		42.5	(<25U)	18.9	20.9	(<5U)	(<5U)	(<5U)
Alkalinity		486	295	415	263	1	1.1	1
Hardness		237.7	460.8	338.6	304.4	1.4	0.23	1
Total suspended solids		67	33	49	62	(<4U)	(<4U)	(<4U)
Dissolved organic carbon		33.0	75.8	55.7	35.9	2.3	(<0.5U)	2.3

NOTE:

U = Not detected. Sample quantitation limits reported as (<_U).

table 11a.wkt

TABLE D-19A ORGANIC ANALYTES MEASURED IN DEEP BEDROCK GROUND WATER - ROUND 1

p 1 of 1

Analytes	Units	GW01D -01A (ug/l)	GW02D -01A (ug/l)	GW03D -01A (ug/l)	GW04D -01A (ug/l)	GW05D -01A (ug/l)	GW06D -01A (ug/l)	GW09D -01A (ug/l)	GW010D -01A (ug/l)	GW011D -01A (ug/l)	GWFB03 (ug/l)	GWTB-7 (ug/l)	GWTB-8 (ug/l)	GWTB-9 (ug/l)
VOLATILES														
Methylene chloride		(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	1 J (<10U)	(<5U)	2 J (<10U)	1 J (<10U)
Acetone	15	(<5U)	20	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Chloroform	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
1,1-Dichloroethane	2 J	(<5U)	2 J	(<5U)	2 J	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
1,2-Dichloroethane (total)	94	(<5U)	4 J	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Trichloroethene	3 J	(<5U)	2 J	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Benzene	2 J	(<10U)	9	(<10U)	1 J	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
4-Methyl-2-Pentanone (MIBK)	4 J	(<5U)	6	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Tetrachloroethene	23	(<5U)	6	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Toluene	3 J	(<5U)	2 J	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Ethyl benzene	520	(<5U)	150	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)	(<5U)
Xylenes (total)	---	---	---	---	---	---	---	---	---	---	---	---	---	---
VOA TICs-known														
VOA TICs-unknown														
Level (low or medium)	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SEMI - VOLATILES														
Phenol	22	(<10U)	(<10U)	(<10U)	(<20U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	NA	NA	NA
2-Methylphenol	7 J	(<10U)	(<10U)	(<10U)	(<20U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	NA	NA	NA
4-Methylphenol	9 J	(<10U)	(<10U)	(<10U)	(<20U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	NA	NA	NA
2,4-Dimethylphenol	(<10U)	(<10U)	(<10U)	(<10U)	(<20U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	NA	NA	NA
Benzoic Acid	28	(<50U)	76	(<50U)	(<100U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	NA	NA	NA
Pentachlorophenol	5 J	(<10U)	5 J	(<50U)	(<100U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	NA	NA	NA
bis(2-Ethylhexyl)phthalate	(<10U)	(<10U)	14	(<20U)	(<20U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	NA	NA	NA
o-Toluic Acid	20,000 D	(<50U)	5,400 D	(<50U)	610	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	NA	NA	NA
m-Toluic Acid	9,000 D	(<50U)	3,600 D	(<50U)	(<100U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	NA	NA	NA
p-Toluic Acid	1,100 DJ	(<50U)	400 D	(<50U)	(<100U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	(<50U)	NA	NA	NA
BNA TICs-known														
BNA TICs - Unknown;n														
Level (low or medium)	494 J,14	L	156 J,9	---	---	---	---	---	46 J,1	---	1000 J,1	NA	NA	NA
Dilution factor	1/100 *	1	1/25 *	1	1	1	1	1	1	1	1	L	L	L
PESTICIDES														
None Detected	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
Level (low or medium)	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

UJ = Not detected, estimated value.

Values shown for unknown TICs are the total concentration and total number of unknowns.

J = Reported concentration is an estimated value following data validation review.

Data validation results provided in data reports 920508 and 920502.

D = Reported result from diluted analysis.

NA = Not applicable.

--- = No detectable TICs.

* = Dilution factor for toluic acid results.

TABLE D-19B ORGANIC ANALYTES MEASURED IN DEEP BEDROCK GROUND WATER - ROUND 2

p 1 of 2

Analytes	GW01D -01B (ug/L)	GW02D -01B (ug/L)	GW03D -01B (ug/L)	GW04D -01B (ug/L)	GW05D -01B (ug/L)	GW06D -01B (ug/L)	GW07D -01B (ug/L)	GW09D -01B (ug/L)	GW10D -01B (ug/L)	GW11D -01B (ug/L)	GW13D -01B (ug/L)	GW14D -01B (ug/L)	GW15D -01B (ug/L)
Units													
VOLATILES													
Methylene chloride	Dry	Dry	Dry	Dry	Dry	Dry	<10U	<10U	Dry	Dry	<10U	Dry	<10U
Acetone							47 J	<10U			<10U		<10U
Chloroform							<10U	<10U			<10U		<10U
1,1-Dichloroethane							5 J	<10U			<10U		<10U
1,2-Dichloroethane (total)							4 J	<10U			<10U		<10U
Trichloroethane							4 J	<10U			<10U		<10U
Benzene							<10U	<10U			<10U		<10U
4-Methyl-2-Pentanone (MIBK)							<10U	<10U			<10U		<10U
Tetrachloroethane							11	<10U			<10U		<10U
Toluene							4 J	<10U			<10U		<10U
Ethyl benzene							<10U	<10U			<10U		<10U
Xylenes (total)							330	<10U			<10U		<10U
VOA TICs-known													
Methyl tertiary butyl ether	--	--	--	--	--	--	3 J	--	--	--	--	--	--
VOA TICs-unknown													
Level (low or medium)	L	L	L	L	L	L	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1	1	1	1	1	1	1
SEMI - VOLATILES													
Phenol	Dry	Dry	Dry	Dry	Dry	Dry	35 J	<10U	Dry	Dry	<10U	Dry	<10U
2-Methylphenol							10 J	<10U			<10U		<10U
4-Methylphenol							9 J	<10U			<10U		<10U
2,4-Dimethylphenol							<10U	<10U			<10U		<10U
Pentachlorophenol							60 J	<25U			<25U		<25U
Naphthalene							1 J	<10U			<10U		<10U
Di-n-butyl phthalate							[10U] J	[10U] J			[10U] J		[10U] J
bis(2-Ethylhexyl)phthalate							[22U] J	[10U]			53 B		[10U] J
o-Toluic Acid							17,000 DJ	<50U			<50U		<50U
m-Toluic Acid							17,000 DJ	<50U			<50U		<50U
p-Toluic Acid							1,300 DJ	<50U			<50U		<50U
BNA TICs-known													
4,4'-Butyldienebis(2							--	--			--		4 JN
BNA TICs - Unknown;n													
Level (low or medium)							L	L			13 J,2		31 J,3
Dilution factor							1	1			L		1
PESTICIDES													
4,4'-DDE							0.14 J	<0.10U			<0.10U		<0.10U
Level (low or medium)	L	L	L	L	L	L	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1	1	1	1	1	1	1

NOTE:

U = Not detected. Sample quantitation limits are shown as (<U).

UJ = Not detected, estimated value.

Values shown for unknown TICs are the total concentration and total number of unknowns.

J = Reported concentration is an estimated value following data validation review.

D = Reported result from diluted analysis.

NA = Not applicable.

-- = No detectable TICs.

* = Dilution factor for Toluic acid results.

R = Data is unusable.

Data: results provided in data reports 920508 and 920562.

TABLE D-19B (Continued)

Analytes Units	GW016D -01B (ug/L)	GW17D -01B (ug/L)
VOLATILES		
Methylene cl	(<10U)	(<10U)
Acetone	(<10U) J	(<10U) J
Chloroform	(<10U)	(<10U)
1,1-Dichloro	(<10U)	(<10U)
1,2-Dichloro	(<10U)	(<10U)
Trichloroeth	(<10U)	(<10U)
Benzene	(<10U)	(<10U)
4-Methyl-2-P	(<10U)	(<10U)
Tetrachloro	(<10U)	(<10U)
Toluene	(<10U)	(<10U)
Ethyl benzer	(<10U)	(<10U)
Xylenes (tol)	(<10U)	(<10U)
VOA <i>TICs-known</i>		
Methyl teria	--	--
VOA <i>TICs-U</i>	--	--
Level (low or	L	L
Dilution fact	1	1
SEMI - VOLATILES		
Phenol	(<10U) J	(<10U)
2-Methylphe	(<10U)	(<10U)
4-Methylphe	(<10U)	(<10U)
2,4-Dimethyl	(<10U)	(<10U)
Pentachloro	(<25U) J	(<10U) J
Naphthalene	(<10U)	(<10U)
Di-n-butyl ph	[10U] J	[10U] J
bis(2-Ethylhe	[10U] J	1 BU
m-Toluic Acid	(<50U) J	(<50U)
p-Toluic Acid	(<50U) J	(<50U)
o-Toluic Acid	(<50U) J	(<50U)
BNA <i>TICs-known</i>		
4,4'-Butylide	12 JN	3 JN
BNA <i>TICs - I</i>	193 J 15	18 J;1
Level (low or	L	L
Dilution fact	1	1
PESTICIDES		
4,4'-DDE	(<0.10U)	(<0.10U)
Level (low or	L	L
Dilution fact	1	1

TABLE D-20A INORGANIC ANALYTES MEASURED IN DEEP BEDROCK GROUND WATER - ROUND 1

p 1 of 1

Analyte Units	GW01D (ug/L)	GW02D (ug/L)	GW03D (ug/L)	GW04D (ug/L)	GW05D (ug/L)	GW06D (ug/L)	GW09D (ug/L)	GW010D (ug/L)	GW011D (ug/L)	GW-FB3 (ug/L)
Aluminum	114 B	281	126 B	145 B	123 R	<87.0U>	220	87.2 R	186 R	<87U>
Antimony	<52.0U>	<52.0U>	<52.0U>	<52.0U>	<52.0U>	<52.0U>	<52.0U>	55.6 B	<52.0U>	<52.0U>
Arsenic	90.5 B	73.3	<2.0U>	3.8 B	<1.0U>	<2.0U>	<2.0U>	<1.0U>	<1.0U>	<2U>
Barium	55.4 B	46.2 B	106 B	123 B	544 R	96.0 B	36.7 B	80.0 R	204 R	<8.0U>
Calcium	4,700 B	27,600	76,800	72,800	73,100	73,300	63,200	52,500	86,100	115 B
Chromium	18.6	<5.0U>	<5.0U>	<5.0U>	<4.0U>	<5.0U>	<4.0U>	<4.0U>	<4.0U>	<5U>
Cobalt	16.1 B	<11.0U>	<11.0U>	<11.0U>	<8.0U>	<11.0U>	<8.0U>	<8.0U>	<8.0U>	<11 U>
Copper	35.5 R	35.6 R	23.4 R	18.6 R	11.1 B	12.2 R	9.8 B	12.3 B	18.0 B	18.3 B
Iron	1,600	960	588	668	355	223	678	427	422	28.0 B
Lead	5.8 J	2.1 J	<2.0U>	4.7J	<2.0U>	<2.0U>	<1.0U>J	<2.0U>	<2.0U>	<2U>
Magnesium	517 BJ	10,300 J	24,600 J	22,800 J	20,200	23,900 J	14,300	11,400	20,300	167 B
Manganese	139 J	31.2 J	33.4 J	22.7 J	6.1 B	6.9 BJ	8.0 B	4.0 B	6.6 B	<5U>
Mercury	0.21 R	1.2	<2.0U>	<2.0U>	<2.0U>	<0.20U>	0.66 J	<0.20U>	<0.20U>	<0.20U>
Nickel	134	27.1 B	17.2 B	15.7 B	<8.0U>	14.8 B	<8.0U>	<8.0U>	8.9 B	<11U>
Potassium	2,700 R	2,740 R	2,570 R	3,200 R	1,250 R	2,790 R	2,360 B	2,270 R	2,430 R	587
Sodium	1,530,000	1,070,000	56,600	77,400	36,000 J	72,300	31,100	20,000 J	26,600 J	1,160 B
Thallium	1.2 B	1.3 B	<1.0U>	<1.0U>	<1.0U>J	<1.0U>	<1.0U>	<1.0U>J	<1.0U>J	<1.0U>
Vanadium	58.5	21.4 B	<6.0U>	<6.0U>	<6.0U>	<6.0U>	<6.0U>	<6.0U>	<6.0U>	<6U>
Zinc	<16.0U>	<16.0U>	31.8	<16.0U>	<16.0U>	<16.0U>	20.4	<16.0U>	<16.0U>	<16 U>

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRQL.

J = Reported value is an estimate after data review.

R = Data is unusable.

Data validation results provided in data reports 920508 and 920582.

TABLE D-20B INORGANIC ANALYTES MEASURED IN DEEP BEDROCK GROUND WATER - ROUND 2

p 1 of 2

Analyte Units	GW01D (ug/L)	GW02D (ug/L)	GW03D (ug/L)	GW04D (ug/L)	GW05D (ug/L)	GW06D (ug/L)	GW07D (ug/L)	GW09D (ug/L)	GW010D (ug/L)	GW011D (ug/L)
Aluminum	Dry	Dry	Dry	Dry	Dry	Dry	789	2,420	Dry	Dry
Antimony							3.9 BJ	(<2U)J		
Arsenic							149 J	(<2U)		
Barium							(<89U)	104 B		
Cadmium							(<3U)	3.9 B		
Calcium							16,100	67,000		
Chromium							32.5	(<7U)		
Cobalt							(<13U)	(<13U)		
Copper							35.8	(<3U)		
Iron							15,600	26,000		
Lead							11.0 B	5.8		
Magnesium							999 B	13,300		
Manganese							144 J	114 J		
Mercury							0.36	(<0.2U)		
Nickel							68.0	(<26U)		
Potassium							9,290	1,890 B		
Sodium							4,220,000	11,300		
Thallium							(<2U) J	(<2U)		
Vanadium							141	(<4U)		
Zinc							91.8 J	63.8 J		
Cyanide							12.0	27.0		

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRQL.

J = Reported value is an estimate after data review.

R = Data is unusable.

TABLE 20B (Continued)

p 2 of 2

Analyte Units	GW13D (ug/L)	GW14D (ug/L)	GW15D (ug/L)	GW16D (ug/L)	GW17D (ug/L)
Aluminum	836	Dry	1,870	993	1,130
Antimony	(<2U)		(<2U)	(<2U)	(<2U)
Arsenic	(<2U) J		2.0 BJ	(<2U) J	5.4 B J
Barium	106 B		(<89U)	188 B	110 B
Cadmium	(<3U)		(<3U)	9.1 J	(<3U) J
Calcium	90,200		69,300	122,000	69,600
Chromium	(<7U)		(<7U)	19.2	(<7U)
Cobalt	(<13U)		(<13U)	(<13U)	(<13U)
Copper	3.1 B		10.5 B	(<3U)	4.2 B
Iron	2,110		7,750	55,200 R	16,500 R
Lead	4.4		2.9 B	1.8 BJ	3.0 J
Magnesium	24,300		19,900	46,000	21,700
Manganese	53.3 BJ		158 J	589	204
Mercury	(<0.2U)		(<0.2U)	(<0.2U)	(<0.2U)
Nickel	(<26U)		(<26U)	(<26U)	(<26U)
Potassium	2,150 B		2,360 B	8,610	27,000
Sodium	27,400		10,800	68,500	37,500
Thallium	(<2U)		(<2U)	(<2U) J	(<2U) J
Vanadium	(<4U)		5.0 B	(<4U)	(<4U)
Zinc	52.1 J		49.3 J	99.3	39.8 J
Cyanide	(<10U)		(<10U)	(<10U) J	(<10U) J

table15b.wk1

TABLE D-21 WATER QUALITY PARAMETERS MEASURED IN DEEP BEDROCK GROUND WATER

p 1 of 1

Analyte	Units	GW01D (mg/L)	GW02D (mg/L)	GW03D (mg/L)	GW04D (mg/L)	GW05D (mg/L)	GW06D (mg/L)	GW09D (mg/L)	GW10D (mg/L)	GW011D (mg/L)
Chloride		92.5	60.2	27	28.2	41.6	33.2	47.5	28.6	37.2
Fluoride		10	2.2	0.33	0.58	(<0.2U)	0.27	(<0.2U)	0.22	(<0.2U)
Ammonia		3.8	1.1	(<0.1U)	(<0.1U)	(<0.1U)	(<0.1U)	0.2	(<0.1U)	0.2
Nitrate		(<0.2U)	2.1	2.9	2.6	1.1	3.4	1.3	1.2	2.4
Sulfate		(<50U)	62.9	40.8	59.9	26.8	34.8	21.1	19.7	21.4
Alkalinity		3160	2930	305	365	213	299	178	70.2	205
Hardness		13.9	111	293	276	265.7	282	217	178	298.6
Total suspended solids		22	114	48	89	21	11	99	7	30
Dissolved organic carbon		677	458	88.6	112	17.1	39.5	57.6	19.6	23

Analyte	Units	GW-FB1 (mg/L)	GW-FB2 (mg/L)	GW-FB3 (mg/L)
Chloride		(<1.0U)	(<1.0U)	(<1.0U)
Fluoride		(<0.2U)	(<0.2U)	(<0.2U)
Ammonia		(<1.0U)	(<0.1U)	(<1.0U)
Nitrate		(<0.2U)	(<0.2U)	(<0.2U)
Sulfate		(<5U)	(<5U)	(<5U)
Alkalinity		1	1.1	1
Hardness		1.4	0.23	1
Total suspended solids		(<4U)	(<4U)	(<4U)
Dissolved organic carbon		2.3	(<0.5U)	2.3

NOTE:

U = Not detected. Sample quantitation limits reported as (<_U).

TABLE D-22 ORGANIC ANALYTES MEASURED IN
INORGANIC SLUDGE BASIN WELLS

p 1 of 1

Analyte	Units	SPW-01 (ug/L)	SPW-02 (ug/L)	SPW-03 (ug/L)
Volatiles				
None detected		(<10U)	(<10U)	(<10U)
Semi-volatiles				
Bis(2-ethylhexyl)phthalate		0.7 J	1 J	0.8 J
<i>TICs - known</i>				
Phenol, 4,4'-buplidenebis[2 ...		--	8 JN	--
<i>TICs - unknown;n</i>				
		--	17 J; 3	7 J; 2
Pesticides/PCBs				
		U	U	U

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

J = Reported value is an estimate following data validation review.

TABLE D-23 INORGANIC ANALYTES MEASURED IN
INORGANIC SLUDGE BASIN WELLS

p 1 of 1

Analyte Units	SPW-01 (ug/L)	SPW-02 (ug/L)	SPW-03 (ug/L)
Aluminum	100 B	252	106 B
Arsenic	(<2.0U)	(<2.0U)	6.3 B J
Barium	91.0 B	(<89.0U)	(<89.0U)
Calcium	70,500	68,400	72,200
Copper	16.7 B	(<3.0U)	(<3.0U)
Iron	470	1,590	10,500
Lead	2.8 B	3.5	1.2 B
Magnesium	19,900	17,900	15,200
Manganese	206	17.4	202
Nickel	37.3 B	(<26.0U)	(<26.0U)
Potassium	1,440 B	1,380 B	1,640 B
Sodium	26,400	14,500	1,200 B
Zinc	54.6 J	44.9 J	18.5 B J

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRDL.

J = Reported value is an estimate following data validation review.

TABLE D-24A ORGANIC ANALYTES MEASURED IN STREAM SURFACE WATER - ROUND 1

p 1 of 1

Analytes	SW01 -01A	SW01 Dup	SW02 -01A	SW03 -01A	SW04 -02A	SWFB01 -01A	TB1
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES							
Acetone	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)	13
TICs - Known	---	---	---	---	---	---	---
TICs - unknown	---	---	---	---	---	---	---
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1
SEMI-VOLATILES							
Bis(2-ethyl hexyl)phthalate	(<10U)	(<10U)	210 DJ	(<10U)	(<10U)J	(<10U)	NA
TICs - Known	---	---	---	---	---	---	NA
TICs - unknown (total;n)	10 J;1	172 J;2	34 J;1	---	---	---	NA
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1	1	1/2 *	1	1	1	1
PESTICIDES/PCBs							
None detected	U	U	U	U	U	U	U
Level (low or medium)	L	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1	1

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Reported value is an estimate following data validation review

* = Bis(2-ethylhexyl)phthalate result from diluted analysis

--- = No detectable TICs.

NA = Not applicable.

D = Reported result from diluted analysis.

Values shown for unknown TICs are the total concentration and total number of unknowns.

Data validation results provided in data report 920386.

table D-24a.tbl

TABLE D-24B ORGANIC ANALYTES MEASURED IN STREAM SURFACE WATER - ROUND 2

p 1 of 1

Analytes	SW01 -01B	SW01 Dup	SW02 -01B	SW03 -01B	SW04 -01B
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES					
None Detected	(<10U)	(<10U)	(<10U)	(<10U)	(<10U)
<i>TICs - Known</i>	---	---	---	---	---
<i>TICs - unknown</i>	---	---	---	---	---
Level (low or medium)	L	L	L	L	L
Dilution factor	1	1	1	1	1
SEMI-VOLATILES					
Bis(2-ethyl hexyl)phthalate	(<10U)	(<10U)	(<10U)	0.7 BJ	(<10U)
<i>TICs - Known</i>					
Hexadecanoic acid, mono ...	---	---	2 JN	---	---
<i>TICs - unknown (total;n)</i>	---	5 J;2	119 J;3	---	---
Level (low or medium)	L	L	L	L	L
Dilution factor	1	1	1	1	1
PESTICIDES/PCBs					
None detected	U	U	U	U	U
Level (low or medium)	L	L	L	L	L
Dilution factor	1	1	1	1	1

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

J = Reported value is an estimate following data validation review.

* = Bis(2-ethylhexyl)phthalate result from diluted analysis

--- = No detectable TICs.

NA = Not applicable.

D = Reported result from diluted analysis.

Values shown for unknown TICs are the total concentration and total number of unknowns.

TABLE D-25A INORGANIC ANALYTES MEASURED IN SURFACE WATER SAMPLES - ROUND 1

p 1 of 1

Analytes	SW-1	SW-1 DUP	SW-2	SW-3	SW-4	SW-FB
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Aluminum	81.0 B	104 B	121 B	102 B	164 B	(<11U)
Antimony	81.5 J	87.6 J	83.2 J	76.8 J	90.8 J	(<52U)
Arsenic	(<1.0U)	(<1.0U)	1.2 B	(<1.0U)	(<1.0U)	(<1U)
Barium	81.1 BJ	66.1 BJ	80.9 BJ	102 BJ	75.2 BJ	36.8 B
Calcium	60,300	56,700	55,900	52,800	58,100	461 B
Copper	19.4 BR	32.4 R	16.4 BR	16.5 BR	21.7 BR	14.5 BR
Iron	91.2 B	94.6 BJ	187	113	278	(<6U)
Lead	(<2.0U)	(<2.0U)	(<2.0U)	(<2.0U)	3.4	(<2U)
Magnesium	12,900	12,100	12,100	11,400	12,400	(<78U)
Manganese	15.6	14.5 B	18.5	14.1 B	24.6	(<2U)
Potassium	1,660 B	1,390 B	1,540 B	1,530 B	1,440 B	(<389U)
Sodium	29,600	28,300	30,200	28,300	30,400	701 B
Zinc	(<3.0U)	5.6 BJ	7.8 BJ	9.9 BJ	6.8 BJ	(<3U)

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRDL.

R = Data is unusable following data validation review.

J = Result was positively identified but is an estimated value following data validation review.

Table D-25A

TABLE D-25B INORGANIC ANALYTES MEASURED IN SURFACE WATER SAMPLES - ROUND 2

p 1 of 1

Analytes Units	SW-1 (ug/L)	SW-1 DUP (ug/L)	SW-2 (ug/L)	SW-3 (ug/L)	SW-4 (ug/L)
Aluminum	90.8 B	87.9 B	91.0 B	87.5 B	72.1 B
Calcium	38,200	39,400	38,100	40,500	40,200
Copper	10.9 B	3.6 B	3.8 B	4.2 B	14.5 B
Iron	73.4 B	91.4 B	95.5 B	133	75.3 B
Lead	(<1U) J	(<1U) J	1.1 B J	1.0 B R	(<1U) R
Magnesium	7,930	8,180	7,920	8,410	8,360
Manganese	7.2 B	7.4 B	7.8 B	7.7 B	7.2 B
Potassium	1,430 B	1,480 B	1,470 B	1,570 B	1,510
Selenium	(<1U) J	(<1U) J	(<1U) J	1.2 B R	(<1U) R
Sodium	8,800	9,040	8,890	9,480	8,900

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRDL.

R = Data is unusable following data validation review.

J = Result was positively identified but is an estimated value following data validation review.

Table 17.xls

TABLE D-26 WATER QUALITY PARAMETERS MEASURED IN SURFACE WATER

p 1 of 1

Analyte	Units	SW-1 (mg/L)	SW-1 DUP (mg/L)	SW-2 (mg/L)	SW-3 (mg/L)	SW-4 (mg/L)	SW-FB (mg/L)
Chloride		53.6	55.6	57.0	53.9	53.8	(<1U)
Fluoride		(<0.2U)	(<0.2U)	(<0.2U)	(<0.2U)	(<0.2U)	(<0.2U)
Ammonia		(<0.1U)	(<0.1U)	(<0.1U)	(<0.1U)	(<0.1U)	(<0.1U)
Nitrate		1.1	1.1	1.1	1.2	1.2	(<0.2U)
Sulfate		19.2	14.1	20.3	20.9	19.8	(<5U)
Alkalinity		139	165	161	154	135	1.08
Hardness		203.7	191.4	189.4	178.8	196.1	1.2
Total suspended solids		(<4U)	(<4U)	(<4U)	(<4U)	(<4U)	(<4U)
Dissolved organic carbon		52.5	37.9	13.8	28.8	28.4	(<0.5U)

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

TABLE D-27A ORGANIC ANALYTES MEASURED IN STREAM SEDIMENTS - ROUND 1

p 1 of 1

Analytes	SD01 -01A	SD01 DUP	SD02 -01A	SD03 -01A	SD04 -01A	SDFB01 -01A
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/l)
VOLATILES						
Acetone	[14U]	(<13U)	[12U]	(<12U)	[75U]	16
Tetrachloroethene	(<7U)	(<6U)	(<6U)	16	(<8U)J	(<5U)
Xylenes (total)	(<7U)	(<6U)	(<6U)	2 J	(<8U)J	(<5U)
TICs - known	---	---	---	---	---	---
TICs - unknown;n	---	6 J;1	---	---	11 J;1	---
Level (low or medium)	L	L	L	L	L	L
Dilution factor	1	1	1	1	1	1
SEMI-VOLATILES						
Naphthalene	(<4,400U)	(<850U)	(<4,100U)	1,100	(<1,000U)	(<10U)
2-methyl naphthalene	(<4,400U)	(<850U)	(<4,100U)	700 J	(<1,000U)	(<10U)
Acenaphthene	(<4,400U)	(<850U)	(<4,100U)	1,900	(<1,000U)	(<10U)
Dibenzofuran	(<4,400U)	(<850U)	(<4,100U)	2,500	(<1,000U)	(<10U)
Fluorene	(<4,400U)	(<850U)	(<4,100U)	2,400	(<1,000U)	(<10U)
Phenanthrene	2,100 J	130 J	450 J	11,000	(<1,000U)	(<10U)
Anthracene	560 J	(<850U)	(<4,100U)	3,600	(<1,000U)	(<10U)
Fluoranthene	2,100 J	250 J	680 J	10,000	(<1,000U)	(<10U)
Pyrene	1,800 J	450 J	630 J	15,000 D	(<1,000U)	(<10U)
Benzo(a) anthracene	1,000 J	140 J	(<4,100U)	4,700	(<1,000U)	(<10U)
Chrysene	1,000 J	160 J	(<4,100U)	4,500	(<1,000U)	(<10U)
Benzo(b)fluoranthene	440 J	110 J	(<4,100U)	3,800	(<1,000U)	(<10U)
Benzo(k)fluoranthene	540 J	140 J	(<4,100U)	3,500	(<1,000U)	(<10U)
Benzo(a)pyrene	620 J	96 J	(<4,100U)	4,600	(<1,000U)	(<10U)
Indeno(1,2,3-cd)pyrene	(<4,400U)	(<850U)	(<4,100U)	3,000	(<1,000U)	(<10U)
Dibenzo(a,h)anthracene	(<4,400U)	(<850U)	(<4,100U)	1,600	(<1,000U)	(<10U)
Benzo(g,h,i)perylene	(<4,400U)	(<850U)	(<4,100U)	3,200	(<1,000U)	(<10U)
TICs - known	---	---	---	---	---	---
Dibenzofuran, 4-methyl	---	---	---	23,000 J	---	---
9,10-Phenanthrenedione	---	---	---	31,000 J	---	---
Dibenzothiophene	---	---	---	53,000 J	---	---
9H-Fluoren-9-imine	---	---	---	25,000 J	---	---
5H-Indeno[1,2-b]pyridine	---	---	---	140,000 J	---	---
9,10-Anthracenedione	---	---	---	45,000 J	---	---
TICs - unknown;n	---	---	580,000 J;1	798,000 J;11	334,000 J;2	---
Level (low or medium)	L	L	L	L	L	L
Dilution factor	5	5	1	1/2 *	1	1
PESTICIDES/PCBs						
None detected	U	U	U	U	U	U

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

[-U] = Value was false positive following data validation review.

J = Reported value is an estimate following data validation review.

--- = No detectable TICs.

* = Pyrene data from diluted result.

Values shown for unknown TICs are the total concentrations and total number of unknowns.

Data validation results provided in data report 920391.

table-19.wkt

TABLE D-27B ORGANIC ANALYTES MEASURED IN STREAM SEDIMENTS - ROUND 2

p 1 of 1

Analytes	SD01 -01B	SD01 DUP	SD02 -01B	SD03 -01B	SD04 -01B
Units	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
VOLATILES					
Vinyl chloride	(<13U)	(<13U)	(<17U)	12 J	(<16U)
Acetone	(<13U) J	(<13U) J	[49U] J	330 J	160 J
Carbon disulfide	(<13U)	(<13U)	(<17U)	9 J	(<16U)
1,2-Dichloroethene	(<13U)	(<13U)	(<17U)	1,100 D	(<16U)
Chloroform	[13U]	[13U]	[17U]	[24U]	[16U]
2-Butanone	(<13U)	(<13U)	(<17U)	62	35
Toluene	(<13U)	(<13U)	(<17U)	48	(<16U)
Ethylbenzene	(<13U)	(<13U)	(<17U)	7 J	(<16U)
Xylenes (total)	(<13U)	(<13U)	(<17U)	3,600 D	(<16U)
TICs - known	---	---	---	---	---
TICs - unknown;n	---	---	---	---	---
Level (low or medium)	L	L	L	L	L
Dilution factor	1	1	1	1/5*	1
SEMI-VOLATILES					
2-Methylphenol	(<430U)	(<430U)	(<560U)	200 J	(<520U)
Naphthalene	(<430U)	(<430U)	86 J	(<800U)	(<520U)
Acenaphthene	(<430U)	(<430U)	130 J	(<800U)	(<520U)
Dibenzofuran	(<430U)	(<430U)	89 J	(<800U)	(<520U)
Fluorene	(<430U)	(<430U)	140 J	(<800U)	(<520U)
Phenanthrene	54 J	54 J	1,300	170 J	(<520U)
Anthracene	(<430U)	(<430U)	230 J	(<800U)	(<520U)
Carbazole	(<430U)	(<430U)	160 J	(<800U)	(<520U)
Fluoranthene	140 J	170 J	1,800	390 J	(<520U)
Pyrene	110 J	140 J	1,400	350 J	(<520U)
Benzo(a) anthracene	100 J	120 J	980	250 J	(<520U)
Chrysene	68 J	97 J	750	250 J	(<520U)
Benzo(b)fluoranthene	89 J	120 J	1,100	550 J	(<520U)
Benzo(k)fluoranthene	59 J	73 J	490 J	(<800U)	(<520U)
Benzo(a)pyrene	79 J	98 J	780	290 J	(<520U)
Indeno(1,2,3-cd)pyrene	(<430U)	(<430U)	230 J	140 J	(<520U)
Benzo(g,h,i)perylene	(<430U)	(<430U)	230 J	130 J	(<520U)
o-Toluic acid	(<2,100U)	(<2,100U)	(<2,700U)	630 J	(<2,500U)
m-Toluic acid	(<2,100U)	(<2,100U) J	(<2,700U) J	240 J	(<2,500U) J
p-Toluic acid	(<2,100U) J	(<2,100U)	(<2,700U)	42 J	(<2,500U)
TICs - known	--	--	--	--	--
TICs - unknown;n	100 J;1	--	1,850J;7	2,690 J;9	--
Level (low or medium)	L	L	L	L	L
Dilution factor	1	1	1	1	1
PESTICIDES/PCBs					
Dieldrin	4.2 J	(<4.3U)	4.6 J	(<8.0U)	(<5.2U)
Methoxychlor	17 R	(<22U)	21 JN	(<41U)	(<27U)
Endrin ketone	8.0 R	(<4.3U)J	12 JN	5.2 R	(<5.2U)J
gamma-chlordane	2.6	(<2.2U)	2.8 R	(<4.1U)	(<2.7U)

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

[-U] = Value was false positive following data validation review.

--- = No detectable TICs.

J = Reported value is an estimate following data validation review.

R = Data is unusable.

JN = Presumptive presence, estimated concentration.

Values shown for unknown TICs are the total concentrations and total number of unknowns.

table-19.wk1

TABLE D-28A INORGANIC ANALYTES MEASURED IN STREAM SEDIMENTS

p 1 of 1

Analyte	SD01	SD01DUP	SD02	SD03	SD04	SD-FB
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ug/L)
Aluminum	3,270	3,730	3,510	4,480	6,690	(<11U)
Antimony	81.1 J	71.5 J	60.5 J	91.7 J	60.4 J	(<52U)
Arsenic	2.4	3.2	2.7	3.1	1.2 B	(<1U)
Barium	36.9 J	60.7 J	97.1 J	68.4 J	71.8 J	59.1 B
Beryllium	0.20 B	0.24 B	0.25 B	0.28 B	0.37 B	(<1U)
Cadmium	1.8 J	1.9 J	1.8 J	1.6 J	1.3 J	(<5U)
Calcium	88,400	40,500	27,700	82,500	3,950	1,170 B
Chromium	7.4 J	10.4 J	6.9 J	11.0 J	12.0 J	(<4U)
Cobalt	4.1 B	9.0	4.3 B	4.1 B	4.4 B	(<11U)
Copper	41.8 J	56.8 J	53.7 J	21.2 J	16.7 J	16.1 B
Iron	11,300	11,600	12,100	12,400	11,500	15.1 B
Lead	181	55.8	293	63.2	12.8	(<2U)
Magnesium	7,130	10,900	7,500	32,200	3,310	205 B
Manganese	233	239	195	227	98.1	26.2
Nickel	16.1 J	23.6 J	16.0 J	15.8 J	16.2 J	(<8U)
Potassium	368 B	387 B	408 B	510 B	604 B	(<389U)
Silver	3.4 J	2.2 J	2.3 J	3.2 J	(<1.3U)J	---
Sodium	136 B	90.0 B	109 B	334 B	110 B	3,960 B
Vanadium	6.1 B	5.0 B	6.7	8.3	9.5	(<4U)
Zinc	97.4 J	155 J	102 J	79.7 J	44.1 J	6.8B
Cyanide	0.13 J	0.13 J	0.12 J	0.11 J	0.12 J	---
Total organic carbon	16,400	4,300	11,000	9,600	16,000	---

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRDL.

R = Reported value was unusable following data validation review.

Data validation results provided in data report 920391.

TABLE D-28B INORGANIC ANALYTES MEASURED IN STREAM SEDIMENTS - ROUND 2

p 1 of 1

Analyte	SD01	SD01DUP	SD02	SD03	SD04
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aluminum	3,110	3,580	4,770	4,750 J	6,260
Arsenic	2.1	4.2	3.0	3.9 J	6.5
Barium	50.9	49.7	132	193 J	52.6
Beryllium	0.23 B	0.21 B	0.31 B	0.29 BJ	0.33 B
Cadmium	2.2 J	1.4	2.2	2.0 J	1.8 J
Calcium	54,000	58,900	24,100	51,900 J	20,300
Chromium	9.8 J	8.1	18.1	30.1 J	18.3 J
Cobalt	5.4	3.8 B	5.6 B	4.7 BJ	5.7
Copper	351. J	52.9	128	57.9 J	23.2 J
Iron	13,900	9,730	12,600	12,200 J	11,700
Lead	104 J	64.7	215	125 J	28.4 J
Magnesium	10,600	11,900	7,940	11,600 J	10,900
Manganese	414	500	148	433 J	205
Mercury	0.19	1.5	2.0	0.95 J	0.21
Nickel	15.8	14.3	20.6	48.7 J	16.2
Potassium	350	468 B	553	645 BJ	700
Selenium	(<0.12U) J	(<0.13U)	0.68 B	0.33 BJ	0.17 BJ
Silver	(<0.18U)	(<0.19U)	0.37 B	(<0.31U)J	(<0.21U)
Sodium	61.8 B	69.1 B	82.7 R	1,670 J	187 B
Vanadium	6.6	6.1	8.5	8.0 J	10.2
Zinc	229	104	177	146 J	44.5
Cyanide	(<24) R	(<24) R	(<32) R	(<0.47U) R	(<0.30U) R

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRDL.

J = Reported value is an estimate following data validation review.

R = Reported value was unusable following data validation review.

Data validation results provided in data report 931455.

TABLE D-29A ORGANIC ANALYTES MEASURED IN BASEMENT SEEP - ROUND 1

p 1 of 1

Analyte	Units	BS01 (ug/L)	BS01 DUP (ug/L)	BS-FB (ug/L)
VOLATILES				
Methylene chloride		(<5U)	(<5U)	1 J
Acetone		16	(<10U)	(<10U)
1,1-Dichloroethane		9	8	(<5U)
1,2-Dichloroethene (total)		2 J	2 J	(<5U)
1,1,1-Trichloroethane		3 J	3 J	(<5U)
Trichloroethene		2 J	2 J	(<5U)
Tetrachloroethene		4 J	5	(<5U)
Xylenes (total)		240	220	(<5U)
<i>TICs-known</i>		---	---	---
<i>TICs-unknown</i>		---	---	---
Level (low or medium)		L	L	L
Dilution factor		1	1	1
SEMI-VOLATILES				
2,4-Dimethyl phenol		9 J	15	(<10U)
Pentachlorophenol		2 J	5 J	(<50U)
<i>o</i> -Toluic acid		350 DJ	1,600 DJ	(<50U)
<i>m</i> -Toluic acid		23 J	4,100 DJ	(<50U)
<i>p</i> -Toluic acid		(<150U)	(<50U)	(<50U)
<i>TICs-known</i>				
Benzene, acetic acid		20 J	---	---
1(3H)-Isobenzofuran		48 J	82 J	---
Phenol, 4-nonyl		---	40 J	---
Phenol, nonyl-		---	28 J	---
<i>TIC-unknown;n</i>		434 J;9	1,084 J;16	---
Level (low or medium)		L	L	L
Dilution factor		1/3 *	1/25 *	1
PESTICIDES/PCB				
None Detected		U	U	U

NOTE:

J = Reported concentration is an estimated value following data validation review.

U = Not detected. Sample quantitation limits are shown as (<_U).

D = Reported result from diluted analysis.

* = Tolic acid results from diluted analysis.

Values shown for unknown TICs are the total concentration and total number of unknowns.

--- = No detectable TICs.

Data validation results provided in data report 920398.

table16a.wk1

TABLE D-29B ORGANIC ANALYTES MEASURED IN BASEMENT SEEP - ROUND 2

p 1 of 1

Analyte	Units	BS01 (ug/L)	BS01 DUP (ug/L)	FB2-01B (ug/L)
VOLATILES				
1,1-Dichloroethane		5 J	5 J	(<10U)
Trichloroethene		2 J	2 J	(<10U)
Tetrachloroethene		(<10U)	1 J	(<10U)
Toluene		10	11	(<10U)
Ethyl benzene		10 J	13	(<10U)
Xylenes (total)		1,700 D	2,500 D	(<10U)
<i>TICs-known</i>		---	---	---
<i>TICs-unknown</i>		---	---	---
Level (low or medium)		L	L	L
Dilution factor		1/10+	1/10+	1
SEMI-VOLATILES				
2,4-Dimethyl phenol		16	13	(<50U)
Pentachlorophenol		11 J	10 J	(<50U)
<i>o</i> -Toluic acid		260 DJ	180 DJ	(<50U)
<i>m</i> -Toluic acid		220 DJ	530 DJ	(<50U)
<i>p</i> -Toluic acid		(<50U)	(<50U)	(<50U)
<i>TICs-known</i>		---	---	---
None		---	---	---
<i>TIC-unknown;n</i>		488 J;20	493 J;20	---
Level (low or medium)		L	L	L
Dilution factor		1/20 *	1/50 *	1

PESTICIDES/PCB

None Detected

NOTE:

J = Reported concentration is an estimated value following data validation review.

U = Not detected. Sample quantitation limits are shown as (<_U).

D = Reported result from diluted analysis.

* = Toluic acid results from diluted analysis.

+ = Xylene results from diluted analysis.

Values shown for unknown TICs are the total concentration and total number of unknowns.

--- = No detectable TICs.

Data validation results provided in data report 931339.

table16a.wk1

TABLE D-30A INORGANIC ANALYTES MEASURED IN BASEMENT SEEP - ROUND 1
p 1 of 1

Analyte Units	SMC- BS01 (ug/l)	SMC- BS01 DUP (ug/l)	SMC- BS-FB (ug/l)
Aluminum	129 B	125 B	(<87 U)
Arsenic	39.8	40.7	(<2U)
Barium	56.0 B	67.0 B	30.1 B
Calcium	31,500	32,200	156 B
Chromium	18.1	16.7	(<4U)
Copper	111	102	(<6U)R
Iron	2,540	2,420	(<11U)
Lead	122	106	(<2U)
Magnesium	6,950	7,150	(<78U)
Manganese	103	101	(<5U)R
Mercury	0.34 R	1.3	(<0.2U)
Nickel	17.3 BR	(<8.0U)R	(<8U)R
Potassium	31,600	28,300	(<203U)
Sodium	1,130,000 R	1,070,000 R	480 R
Vanadium	37.9 BR	32.7 BR	(<6U)R
Zinc	60.3 J	51.6 J	(<16U)J

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRDL.

R = Unusable data.

Data validation results provided in data report 920398.

TABLE D-30B INORGANIC ANALYTES MEASURED IN BASEMENT SEEP - ROUND 2

p 1 of 1

Analyte Units	SMC- BS01 (ug/l)	SMC- BS01 DUP (ug/l)	SMC- FB-2 (ug/l)
Aluminum	129 B	142 B	(<16 U)
Arsenic	59.9	55.2	(<2U)
Calcium	24,000	23,200	78.7 B
Chromium	19.6	17.7	(<7U)
Copper	154	160	5.3 B
Iron	4,700	4,420	9.3 B
Lead	180	167	(<1U)
Magnesium	5,060	4,970	(<48U)
Manganese	177	170	(<1U)
Mercury	0.79	0.80	(<0.2U)
Potassium	57,800	57,600	(<96U)
Sodium	882,000	904,000	230 B
Vanadium	49.7	53.1	(<4U)
Zinc	62.9	61.0	(<9U)

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below the CRDL.

Data validation results provided in data report 931339.

table16b.wk1

TABLE D-31 WATER QUALITY PARAMETERS MEASURED IN BASEMENT SEEP
p 1 of 1

Parameter	Units	BS01 (mg/l)	BS01 DUP (mg/l)	BS-FB (mg/l)
Chloride		142	121	(<1U)
Fluoride		1.3	1.3	(<0.2U)
Ammonia		1.4	1.5	(<0.1U)
Nitrate		0.4	0.4	(<0.2U)
Sulfate		(<500U)	(<500U)	(<5U)
Alkalinity		1,650	1,770	1.1
Hardness		107	110	0.39
Total suspended solids		34	43	(<4U)
Dissolved organic carbon		40.3	114	0.53

NOTE:

U = Not detected. Sample quantitation limits reported as (<_U).

Data validation results provided in data report 920398.

table-12.wk1

TABLE D-32 ORGANIC ANALYTES MEASURED IN
STORMWATER COLLECTION PIT p 1 of 1

Analytes	Units	(ug/L)
VOLATILES		
Acetone		26 J
1,1-Dichloroethane		28
1,2-Dichloroethene (total)		9 J
1,1,1-Trichloroethane		1 J
Trichloroethene		2 J
Tetrachloroethene		5 J
Xylenes (total)		3 J
<i>TICs - known</i>		---
<i>TICs - unknown</i>		
Unknown (RT 18.5 min)		29 R
		1
Level (Low or medium)		L
Dilution Factor		1
Semi-volatiles		
2-Methylphenol		0.8 J
2,4-Dimethylphenol		2 J
Bis(2-ethylhexyl)phthalate		4 J
<i>TICs - known</i>		
Hexadecanoic acid		3 JN
<i>TICs - unknown;n</i>		59 J;9
Level (Low or medium)		L
Dilution factor		1
Pesticide/PCBs		
Endosulfan I		0.014 R
4,4'-DDE		0.010 R
Level (Low or medium)		L
Dilution factor		1

NOTE:

J = Reported value is below CRQL (except for TICs).

J = Reported value is an estimate (for TICs).

B = Analyte present in corresponding method blank.

JN = Presumptive identification, estimated concentration (for TICs).

R = Data is unusable.

TABLE D-33 INORGANIC ANALYTES MEASURED IN STORMWATER COLLECTION PIT

p 1 of 1

Analytes	
Units	(ug/L)
Aluminum	246
Barium	53.2 B
Cadmium	(<5U)J
Calcium	26,200
Copper	58.0
Iron	915
Lead	12.8 J
Magnesium	3,460 B
Manganese	43.4
Mercury	0.30
Nickel	21.8 B
Potassium	4,410 B
Silver	(<10U)J
Sodium	53,500
Zinc	93.7
Cyanide	(<10U)J

NOTE:

U = Not detected. Sample quantitation limits are shown as (<_U).

B = Reported value is below CRDL.

J = Reported result is an estimate following data validation review.

TABLE D-34 ORGANIC ANALYTES MEASURED IN PIEZOMETER WIPE SAMPLE

p 1 of 1

Analytes	WP-28D -01A (ng/wipe)	WPFB-01 -01A (ng/wipe)
Units		
SEMI-VOLATILES		
Di-n-butyl phthalate	[41,000U]	55,000 B
Bis(2-ethylhexyl)phthalate	(<330U)	1,600
Di-n-octyl phthalate	(<330U)	1,200
<i>TICs - known</i>		
3-penten-2-one, 4-methyl	---	30,000 JN
<i>TICs - unknown;n</i>		
	311,000 J;4	55,900 J;6
	520,000 R;5	97,000 JN;2
PCBs		
None detected	U	U

NOTE:

U = Not detected. Sample quantitation limits are shown as (<__U).

B = Analyte detected in corresponding method blank.

R = Data is unusable.

JN = Presumptive identification, estimated concentration.

--- = No detectable TIC.

Values shown for unknown TICs are the total concentration and total number of unknowns.

[-U] = Data was false positive following data validation review.

TABLE21.WK1

Appendix E

Data Validation Reports

APPENDIX E - LIST OF TABLES

<u>Number</u>	<u>Title</u>
E-1	Analytical quality assurance splits and calculated RPDs for organic analytes measured in landfill soil borings (Round 1).
E-2	Analytical quality assurance splits and calculated RPDs for inorganic analytes measured in landfill soil borings (Round 1).
E-3	Analytical quality assurance splits and calculated RPDs for organic analytes measured in north area soil borings (Round 2).
E-4	Analytical quality assurance splits and calculated RPDs for inorganic analytes measured in north area soil borings (Round 2).
E-5	Analytical quality assurance splits and calculated precision for organic analytes identified in Skaneateles Creek sediment.
E-6	Analytical quality assurance splits and calculated RPDs for organic analytes measured in creek seeps and seep sediment.
E-7	Analytical quality assurance splits and calculated precision for inorganic analytes measured in creek seeps and seep sediment.
E-8	Analytical quality assurance splits and calculated precision for organic analytes measured in groundwater (Round 1).
E-9	Analytical quality assurance splits and calculated precision for organic analytes measured in groundwater (Round 2).
E-10	Analytical quality assurance splits and calculated precision for inorganic analytes measured in groundwater (Round 1).
E-11	Analytical quality assurance splits and calculated precision for inorganic analytes measured in groundwater (Round 2).

APPENDIX E

DATA VALIDATION AND USABILITY SUMMARY

E.1 INTRODUCTION

This appendix contains the data validation reports for samples collected at the Stauffer Management Company (SMC) Skaneateles Falls, New York site. Samples were analyzed following the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) methods for Target Compound List (TCL) volatile organics, TCL semi-volatile organics, TCL pesticides/polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) metals plus cyanide. The 3 toluic acid isomers were analyzed as part of the semi-volatile fraction. Data were validated for compliance with the ASP and reviewed for data usability following the most current U.S. Environmental Protection Agency (EPA) Region 2 protocols.

Data usability qualifiers were applied based upon the EPA guidelines. The following qualifiers were used and are defined below:

- U = The material was analyzed for, but was not detected above, the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ = The material was analyzed for, but was not detected. The associated value is estimated and may be inaccurate or imprecise.
- J = The analyte was analyzed for and was positively identified, but the associated numerical value may not be consistent with the amount actually present in the environmental sample.
- R = Data is unusable.

Analytical results which were qualified with "UJ" or "J" are still usable, with the limitations defined above. Data which are qualified with an "R" are unusable and were not evaluated in this Remedial Investigation.

This summary contains an overview of the validation and usability results, and also provides a comparison to the split samples collected for analysis by the oversight contractor.

E.2 DATA VALIDATION SUMMARY

This summary is divided into subsections by matrix type and sampling round (when applicable) for clarity. The data validation reports contain detailed review of the analytical samples.

E.2.1 Landfill Perimeter Soil Borings

The validation results are provided in Data Report No. 911652. All organic data results were valid and acceptable except for non-compliant quality control (QC) noted for calibrations, internal standard areas, and blank contamination. Acetone and 2 polycyclic aromatic hydrocarbons (PAHs) (anthracene and benzo[k]fluoranthene) were qualified as estimates (no bias determined) due to initial and continuing calibration criteria exceedances. A potential high bias in the reported results for 8 analytes in SB-08 for 8 volatile organics was the result of low internal standard area. The 2-butanone and 2 phthalate compounds were considered false-positives since they were identified in corresponding method blanks.

All inorganic data results were valid and acceptable except for non-compliant QC noted for initial calibration verification, CRDL standard recoveries, and spike sample recoveries. Cyanide was qualified as an estimate (low bias) in SB-02 due to initial calibration verification outside of the lower limit. Zinc was rejected and cadmium was qualified as an estimate (high bias) in all soil samples due to CRDL standard recoveries outside of control limits. Antimony, arsenic, lead, and selenium were qualified as estimates (low bias) in all soil samples due to spike sample recoveries below the lower control limit.

All general chemistry (total organic carbon) results were valid and acceptable.

E.2.2 Landfill Interior Soil Borings

The validation results are provided in Data Report Nos. 911664 and 911691. All organic data results were valid and acceptable except for non-compliant QC noted for holding times, calibrations, acid surrogate recovery, internal standard areas, and blank contamination. The volatile analyses of 4 samples (SB-18-03, SB20-01, SB26-01, and SB27-01) and semi-volatile analyses of 2 samples (SB27-04 and SB25-01) were outside of the technical holding time. All volatile and semi-volatile results were qualified as estimates (low bias). Acetone was qualified as an estimate (no bias determined) in 4 samples due to continuing calibration criteria exceedance. Positive acid extractable analytes were qualified as estimates (low bias) and non-detect acid extractable analytes were rejected in 2 samples due to low acid surrogate recovery. A potential low bias in the reported results for 5 samples resulted from low internal standard areas. The 2-butanone and 2 phthalate compounds were considered false-positives since they were identified in corresponding method blanks.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, spike sample recoveries, and ICP serial dilution. Cadmium, copper, nickel, silver, and zinc were qualified as estimates (high bias) in 7 soil samples, and lead as an estimate (high bias) in 1 sample due to CRDL standard recoveries outside of control limits. Thallium was qualified as an estimate (low bias) in 5 samples due to CRDL standard recoveries outside of control limits. Arsenic was rejected in 3 samples due to poor spike recovery. Antimony, cobalt, selenium, silver, and cyanide were qualified as estimates (low bias) in 17 soil samples due to spike sample recoveries below the lower control limit. Manganese was qualified as an estimate (no bias determined) in 6 samples, and zinc in 1 sample, due to ICP serial dilution outside the control limit.

All general chemistry (total organic carbon) results were valid and acceptable.

E.2.3 Surface Water - Round 1

The validation results are provided in Data Report No. 920386. All organic data results were valid and acceptable except for non-compliant QC noted for holding times (for re-analyses only) and surrogate recoveries. The re-analyses of 2 samples were outside of the technical holding time. The affected results were qualified as estimates (low bias). All semi-volatile analytes were qualified as estimates (low bias) in 1 sample (SW-04) due to low surrogate recoveries.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries. Antimony, chromium, copper, nickel, and zinc were qualified as estimates (high bias) in all samples and mercury was rejected in all samples due to CRDL standard recoveries outside of control limits.

All general chemistry results were valid and acceptable.

E.2.4 Surface Water - Round 2

The validation results are provided in Data Report No. 931455. All organic data results were valid and acceptable except for non-compliant QC noted for initial and continuing calibration.

Initial and continuing calibration criteria exceedances resulted in acetone and methylene chloride being qualified as estimates in all 4 samples. Semi-volatile and pesticide/PCB calibration exceedances resulted in 9 semi-volatiles and 8 pesticide compounds also being qualified as estimates in the 4 samples.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, matrix spike recoveries, and duplicate sample analysis. Zinc was qualified as an estimate (high bias) for 2 samples (SW-01 and SW-02). Matrix spike recovery exceedances resulted in antimony and cadmium being estimates in 3 of the samples, and lead, selenium, arsenic, and thallium being rejected (low bias) in 2 of the samples (SW-03 and SW-04). Cyanide was qualified as an estimate in all 4 samples due to %D criteria exceedances of duplicate sample analysis.

E.2.5 Stream Sediment - Round 1

The validation results are provided in Data Report No. 920391. All organic data results were valid and acceptable except for non-compliant QC noted for holding times (pesticide/PCB fraction), internal standards, and blank contamination.

The pesticide/PCB analyses of all 4 samples were outside of the technical holding time. The affected results were qualified as estimates (low bias). All volatile analytes were qualified as estimates (high bias) in SD-04 due to low internal standard areas; some of the semi-volatile analytes in SD-04 were qualified as estimates (low bias) due to internal standard

areas outside of control limits. A phthalate compound was considered a false-positive in the samples since it was present in the corresponding method blank. Acetone was considered a false-positive in the samples since it was present in the corresponding field blank.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries and sample spike analysis. Antimony, chromium, copper, nickel, silver, and zinc were qualified as estimates (high bias) in all samples due to CRDL standard recoveries outside of control limits. Cyanide was qualified as an estimate (low bias) in all samples due to low spike recovery.

All general chemistry (total organic carbon) results were valid and acceptable.

E.2.6 Stream Sediment - Round 2

The validation results are provided in Data Report No. 931455. All organic data results were valid and acceptable except for non-compliant QC noted for initial and continuing calibrations, method blank contamination, compound identification, holding times (pesticide/PCB fraction), internal standards, and blank contamination.

Seven volatile compounds, 4 semi-volatile compounds, and 8 pesticide results were qualified as estimates (no bias defined) affecting 4 samples, 2 samples, and 4 samples, respectively, for non-compliant initial and continuing calibrations. Acetone in SD-01 was considered a false-positive due to method blank contamination. Chloroform was also a false-positive in all 4 samples due to method blank contamination. Nine pesticides were rejected in 3 samples due to dual column quantification outside of control limits.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, sample spike analysis, duplicate sample analysis, ICP serial dilutions, and percent solids. Silver was rejected in SD-02 for CRDL recoveries outside of control limits (bias high). Antimony, cadmium, lead, and selenium were qualified as estimates (low bias), affecting all 4 samples, due to low spike recovery. Due to similar low spike recoveries, cyanide was rejected in the 4 samples. Copper was qualified as an estimate in 3 of the samples for exceedance of %D criteria for duplicate sample analyses. Failure of serial dilution %D criteria resulted in the qualification of all 4 samples as estimates for chromium. Sample SD-03 had percent solids of less than 50 percent resulting in all analytes qualified as estimates.

E.2.7 Creek Seeps and Seep Sediment - Round 1

The validation results are provided in Data Report No. 920461. All organic data results were valid and acceptable except for non-compliant QC noted for surrogate recoveries and internal standard areas. The pesticide/PCB analytes were qualified as estimates (low bias) in 3 samples due to surrogate recoveries below the lower control limit. Several semi-volatile analytes were qualified as estimates in 1 sample (CS-03) due to internal standard areas outside of control limits.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, spike recoveries, duplicate analysis, and ICP serial dilution.

Antimony, barium, cadmium, and copper were qualified as estimates (high bias) in all creek seep samples, and cadmium, copper, nickel, and zinc were qualified as estimates in the seep sediment sample, due to CRDL standard recoveries outside of control limits. Antimony, cadmium, selenium, and silver were qualified as estimates (low bias) in the seep sediment sample due to spike recoveries below the lower control limits. Cyanide was qualified as an estimate (low bias) in the seep sediment due to low spike recovery. Mercury was qualified as an estimate in all seep samples due to duplicate sample analysis outside of the control limit. Barium was qualified as an estimate in the seep sediment, copper, and vanadium as estimates in 3 seep samples, and zinc as an estimate in all 4 seep samples due to ICP serial dilution outside of control limits.

E.2.7 Creek Seeps and Seep Sediment - Round 2

The validation results for the 1 creek seep sample and 1 creek sediment sample, analyzed in Round 2, are provided in Data Report No. 931455. All organic data results were valid and acceptable except for non-compliant QC noted for initial and continuing calibrations and method blank contamination.

Initial and continuing calibration non-conformances resulted in 2 volatile compounds and 2 semi-volatile compounds being qualified as estimates in creek seep Sample CS-03. Likewise, in SS-03, the seep sediment sample, 5 volatile compounds, and 1 semi-volatile compound (p-toluic acid) were qualified as estimates due to initial and continuing calibration criteria exceedances. Detectable chloroform was qualified as non-detectable in SS-03 due to method blank contamination.

Pesticide/PCB and inorganic metals analyses (including cyanide) were not performed on the 2 Round 2 samples.

Although the analytical results were valid or received usability qualifiers following data validation, the second round results were not used since they showed poor comparability with the Round 1 results.

E.2.8 Overburden Groundwater - Round 1

The validation results are provided in Data Report Nos. 920396 and 920398. All organic data results were valid and acceptable except for non-compliant QC noted exceedances of technical holding times, surrogate recoveries, and internal standard areas.

All semi-volatile analytes were qualified as estimates (low bias) in Sample MW-2S due to exceedance of technical holding times. All acid extractable analytes were qualified as estimates (low bias) in 1 sample (MW-6S) due to low acid surrogate recoveries. All pesticide/PCB analytes were qualified as estimates (low bias) in 3 samples due to low surrogate recoveries. Six semi-volatile analytes were qualified as estimates (high bias) in 1 sample (MW-4S) due to low internal standard area.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, spike recoveries, duplicate sample analysis, and ICP serial dilution.

Selenium was qualified as an estimate (high bias) in Sample MW-6S; selenium and copper were qualified as estimates (high bias) in Sample MW-7S; and copper, lead, and selenium were qualified as estimates (high bias) in MW-8S, due to CRDL standard recoveries above the upper control limit. Mercury was rejected in 2 samples (MW-2S and MW-4S) and beryllium, mercury, and vanadium were rejected in 1 sample (MW-1S) due to CRDL standard recoveries outside of the control limits. Arsenic was rejected in 2 samples due to high spike recoveries, and selenium and thallium were qualified as estimates (low bias) in 3 samples due to spike recoveries below the lower control limit. Cyanide was qualified as an estimate (low bias) in 3 samples due to low spike recovery. Copper and arsenic were qualified as estimates (low bias) in 4 samples. Sodium was qualified as an estimate (unknown bias) in 3 samples and rejected in 1 sample (MW-1S) due to ICP serial dilution outside of the control limits.

E.2.9 Overburden Groundwater - Round 2

The validation results are provided in Data Report Nos. 931455 and 931235. All organic data results were valid and acceptable except for non-compliant QC noted exceedances of initial and continuing calibration criteria, surrogate recoveries, internal standards recoveries, and method blank contamination.

Acetone was qualified as an estimate in 6 of the samples due to initial and continuing calibration criteria exceedances. In 2 of the samples (MW-18S and MW-8S), acetone was rejected for the same criteria. Eight other volatile organic analyte parameters were also qualified as estimates (bias undetermined) due to calibration non-conformances. These qualifications affected 6 of the samples.

Base neutral extractable analyses indicated initial and continuing calibration exceedances for the 31 compounds. All 31 compounds were estimates in 8 samples, and 11 of the 31 compounds were rejected in Sample MW-7S. Biases were not specified in the data validation report. Two surrogates exceeded criteria resulting in MW-7S data being rejected for all compounds with the exception of 1 compound. Internal standard non-compliances resulted in the estimation of 3 PAHs, 2 phthalates, and 3,3-dichlorobenzidine in MW-2S. Method blank contamination affected 3 samples when two common laboratory contaminants were qualified as non-detect in 3 of the samples due to laboratory contamination. Pesticide/PCB analysis results were affected by surrogate recoveries (bias undetermined) and all compounds were qualified as estimates for 2 of the samples. For 6 of the samples, all compounds were bias low for surrogate recoveries and were, therefore, qualified as estimates.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, spike recoveries, duplicate sample analysis, laboratory control sample analysis, ICP serial dilution, and furnace QC analysis.

Arsenic was rejected in 2 samples and estimates in 3 others due to low matrix spike recoveries. Similarly, 2 samples were qualified as estimates (low bias) for lead and thallium, and selenium was also qualified as estimates (bias low) in 4 samples. All qualifications were a result of low matrix spike recoveries. Poor duplication of analyses resulted in the qualification as estimate for cyanide and zinc in 2 samples. The laboratory control sample indicated a low bias affecting selenium in 2 of the samples, of which both were qualified as estimates. Copper (in 3 samples) and manganese (in 2 samples) were qualified as estimates due to exceedance of serial dilution percent difference. For the same exceedance, iron was rejected in 2 samples (MW-2S and MW-4S). Two samples were qualified as estimates for zinc due to bias high CRDL standard recoveries. Biases determined by analytical spikes were observed for furnace analyses (no bias specified) affecting the following parameters: thallium (4 samples), lead (1 sample), and selenium (1 sample). All parameters were qualified as estimates.

E.2.10 Upper Bedrock Groundwater - Round 1

The validation results are provided in Data Report Nos. 920396 and 920398. All organic data results were valid and acceptable except for non-compliant QC noted exceedance of surrogate recoveries.

All acid extractable analytes were qualified as estimates (low bias) in 1 sample (MW-9I) due to low acid surrogate recoveries, and all acid extractable analytes were rejected in 1 sample (MW-8I) due to poor surrogate recovery. All pesticide/PCB analytes were qualified as estimates (low bias) in 3 samples due to low surrogate recoveries.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, spike recoveries, duplicate sample analysis, and ICP serial dilution.

Selenium and copper were qualified as estimates (high bias) in 2 samples (MW-5I and MW-6I), and lead, selenium, and copper were qualified as estimates (high bias) in MW-8I, due to CRDL standard recoveries above the upper control limit. Mercury was rejected in 1 sample (MW-7I) due to CRDL standard recoveries outside of the control limits. Beryllium, copper, vanadium, and mercury were rejected, and zinc was qualified as an estimate in Sample MW-1I due to CRDL standard recoveries outside of control limits. Silver was qualified as an estimate (low bias) in 3 samples, arsenic was rejected in 3 samples due to high spike recoveries, and selenium and thallium were qualified as estimates (low bias) in 4 samples due to spike recoveries below the lower control limit. Cyanide was qualified as an estimate (low bias) in 2 samples due to low spike recovery. Iron was qualified as an estimate (low bias) in 3 samples due to ICP serial dilution precision outside of control limits. Sodium was rejected in 1 sample (MW-3I) due to ICP serial dilution outside of control limits.

E.2.11 Upper Bedrock Groundwater - Round 2

The validation results are provided in Data Report Nos. 931235 and 931455. All organic data results were valid and acceptable except for non-compliant QC in the initial and continuing calibrations, and surrogate recoveries.

For volatile organic analyte analysis, initial and continuing calibration exceedances resulted in 4 ketones and 2 halogenated compounds being qualified as estimates, affecting a maximum of 16 samples. Acetone was rejected in 2 samples for the same criteria. Semi-volatile analysis also indicated initial and continuing calibration exceedances. The toluic acid isomers (*m*-, *o*-, *p*-) and 2-4-Dinitrophenol were qualified as estimates for initial and continuing calibration exceedances, affecting 12 samples. Hexachlorocyclopentadiene and 4 nitrophenol were also qualified as estimates for calibration criteria exceedances in 3 of the samples (bias undefined). For samples MW-6S and MW-7S, parameters associated with 2-fluorobiphenyl and terphenyl-d14 surrogates were qualified as estimates due to poor recoveries (bias undefined). Pesticide/PCB analysis results were affected by surrogate recoveries (bias low for 2 samples and undefined for 14 samples). All the compounds were qualified as estimates in the 16 samples. In 1 sample, 2 BHC compounds were qualified as estimates due to initial and continuing calibration criteria exceedances (bias undetermined).

All inorganic data results were valid and acceptable except for non-compliant QC noted for serial dilution, furnace spike recoveries, matrix spike recoveries, ICP serial dilution, CRDL recoveries, and duplicate sample analysis.

Three samples were qualified as estimates for copper, and iron was rejected in 1 sample (MW-16I) due to serial dilution QC criteria exceedances. Both lead (MW-1I and MW-2I) and selenium (MW-1I) were rejected for furnace spike recoveries (bias low), affecting a total of 3 samples. Selenium was also qualified as an estimate for furnace spike recoveries affecting 6 samples. Matrix spike recovery exceedances (bias low) for lead, selenium, and thallium resulted in the qualification of these parameters as estimates, affecting 15 of the samples. Similarly, arsenic was qualified as an estimate in 12 samples and rejected in 4 samples. Both aluminum and manganese were qualified as estimates for ICP serial dilution criteria exceedances, affecting 10 samples. Iron was rejected in one of the samples (MW-16I) for ICP serial dilution. Zinc was qualified as an estimate due to CRDL recoveries, affecting only 1 sample. One sample was affected by the exceedance of duplicate sample analysis criteria resulting in the qualification of cyanide as an estimate. Low recoveries of selenium in the laboratory control sample (LCS) resulted in the qualification of 1 sample as an estimate for selenium.

E.2.12 Deep Bedrock Groundwater - Round 1

The validation results are provided in Data Report Nos. 920508 and 920562. All organic data results were valid and acceptable except for non-compliant QC noted exceedances of technical holding times and surrogate recoveries.

All pesticide/PCB analytes were qualified as estimates (low bias) in MW-5D due to exceedance of the technical holding times. All pesticide/PCB analytes were qualified as estimates (low bias) in 3 samples due to low surrogate recoveries.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, spike recoveries, duplicate sample analysis, and ICP serial dilution.

Mercury was rejected in MW-1D, silver and cadmium were qualified as estimates (low bias) in 6 samples, and lead was qualified as an estimate in 6 samples due to CRDL standard recoveries outside of control limits. Silver was qualified as an estimate (low bias) in 2 samples (MW-10D and MW-11D) due to CRDL standard recoveries outside of control limits. Silver was qualified as an estimate in 2 samples (MW-6D and MW-9D) and mercury was qualified as an estimate in 1 sample (MW-9D) due to spike recoveries below the lower control limit. Silver and thallium were qualified as estimates (low bias) in 3 samples due to spike recoveries below the lower control limit. Mercury was qualified as an estimate (bias undetermined) in 1 sample and barium in 3 samples due to duplicate sample analysis outside of control limits. Copper and potassium were rejected in 5 samples and magnesium and manganese were qualified as estimates in 5 samples. Aluminum, barium, and potassium were rejected in 2 samples and sodium was qualified as an estimate in 3 samples due to ICP serial dilution outside of control limits.

E.2.13 Deep Bedrock Groundwater - Round 2

The validation results are provided in Data Report No. 931455. All organic data results were valid and acceptable except for non-compliant QC noted for calibrations, surrogate recoveries, method blank contamination, and compound identification criteria.

Initial and continuing calibration QC exceedances were determined to affect all 6 samples. Of the volatile organic analyte analyses, only 2 parameters were qualified as estimates (acetone and chloromethane). Of the semi-volatiles, most of the TCL compounds were affected by calibration criteria exceedances. In most cases, the qualifications were estimations, however, there were 10 rejected parameters affecting sample MW-7D. MW-7D was also affected by surrogate recoveries. Bias was not presented in the data validation reports, however, all base/neutral compounds were rejected with the exception naphthalene and 2 phthalates in MW-7D. Common laboratory contaminants were in 5 of the samples. Pesticide/PCB analyses required qualifications for both calibration and surrogate recoveries. Two samples were affected (low bias) and all compounds were qualified as estimates with the exception of 4,4'-DDT (MW-9D) which was rejected due to dual column quantification outside of control limits. Pesticide calibration verification failures affected 4 of the samples causing 7 pesticides to be estimates.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, spike recoveries, duplicate sample analysis, ICP serial dilution, and furnace spike recoveries.

Zinc was qualified as an estimate (bias high) in 4 of the samples and silver was rejected in 1 of the samples due to CRDL recoveries (bias high). Spiked sample recoveries indicated matrix interferences (low bias) for cadmium, lead, selenium, arsenic, and thallium. All parameters were qualified as estimates, affecting 5 of the samples. Duplication of analysis indicated poor precision by the laboratory and, therefore, both cyanide and zinc were qualified as estimates.

Serial dilution outside of control limits resulted in the qualification of manganese as an estimate in 4 samples and rejection of iron in 1 sample. Thallium and antimony were qualified as estimates in MW-07D due to furnace spike recovery failure (bias undetermined).

E.2.14 North Area Soil Borings

Soil borings were collected from the area north of the Main Plant Building only during Phase II field program. The validation results are provided in Data Report Nos. MW5-SB01, 930779 and 931104. All organic data results were valid and acceptable except for non-compliant QC noted for holding times, initial and continuing calibrations, internal standard area, surrogates, MS/MSD analyses, %D for LCS recoveries, and method blank contamination.

Non-detectable volatile organic and pesticide/PCBs results in MW5-SBFB were qualified as estimates due to exceedance in the holding time criteria. Several volatile analytes in this sample was qualified as estimates due to initial or continuing calibration criteria exceedances. Acetone was rejected in 2 of the samples (MWFB1601 and MWTB15/1601) due to continuing calibration %D of greater than 90 percent.

Nine volatile organic analyte analytes in MW5-SB09 were qualified as estimates (high bias) due to an internal standard area below the lower control limit. Chloroform and xylene (total) were considered as false-positives, affecting 3 samples, due to method blank and field blank contamination. Semi-volatile analyses indicated that initial calibration criteria non-compliance resulted in 2 compounds being qualified as estimates in 6 of the samples. Two semi-volatile surrogates failed to meet criteria (bias not determined) in 2 of the samples (MW5-SB13 and MW5-SB14), resulting in the base/neutral compounds being qualified as estimates. Six MS/MSD recoveries and 9 RPDs in the base neutral analytes were outside criteria establishing that matrix interferences may be suspected, however, no data validation actions were taken according to EPA protocol. A common laboratory contaminant, bis(2-ethylhexyl)phthalate, was detected in the semi-volatile method blank resulting in 4 of the detectable samples being qualified as false-positives.

Initial and continuing calibration criteria exceedances in the pesticide/PCB analyses resulted in 7 pesticides being qualified as estimates in 7 samples. Pesticide/PCB compound identification criteria was exceeded resulting in 5 compounds being rejected affecting 3 samples. Five pesticides (non-detectables) were qualified as estimates affecting 5 of the associated samples, as a result of the %D between the two columns on the LCS sample.

All inorganic data results were valid and acceptable except for non-compliant QC noted for CRDL standard recoveries, spike recoveries, duplicate sample analysis, ICP serial dilution and furnace spike recoveries.

Iron, silver, and zinc were qualified (bias high) as estimates due to CRDL recoveries, affecting 3 of the samples. Nickel was qualified as an estimate (bias low) in 1 sample due to CRDL recoveries. Spiked sample recoveries (bias low) resulted in 7 samples being qualified as estimates for 5 of the metals. Cadmium and mercury had recoveries of greater than 200 percent, and were qualified as estimates (bias high). Cyanide spike recoveries indicated a matrix interference (low bias) and resulted in 5 samples (non-detectables) being qualified as estimates. ICP serial dilution non-conformances required that 5 parameters be qualified as estimates affecting 7 of the samples. Analytical spike recoveries for selenium and arsenic confirmed qualifications resulting from matrix spike results (low bias) in 7 of the samples.

E.3 EVALUATION OF SPLIT SAMPLE DATA

Split samples for chemical analysis of soil, sediment, groundwater, surface water, and seeps were collected by NYSDEC as part of the Project Quality Assurance Program. Although all efforts were made to ensure a homogenous source for the split samples, minor differences in the sample matrix effects can result in varying analytical results. Therefore, aqueous-based matrices are more reliable splits when compared to solid matrices. The latter are more properly defined as sample duplicates or sample co-locates.

The split samples were analyzed by an independent laboratory (IT-Pennsylvania [IT-Pa]) and validated by the NYSDEC oversight contractor for compliance with the ASP. The following is a matrix-specific discussion of the results of the split samples and comparison to the results reported by EA Laboratories.

The comparisons were based upon the calculated relative percent differences (RPDs) between the 2 reported concentrations, and review of absolute concentrations. An RPD of 50 percent or greater was used as an indicator of possible analytical discrepancies. Absolute values were not used since positive and negative RPD values represent the laboratory bias. Positive RPD values indicate a higher value reported by the EA laboratories, whereas a negative RPD represents a higher value reported by IT-Pa.

E.3.1 Landfill Perimeter Soil Borings

Two landfill perimeter soil samples (SB02 and SB09) were collected and split in the field for separate analyses as a measure of the quality of the analytical data. The RPDs of the split organic and inorganic analysis compared to EA Laboratories' data is presented in Tables E-1 and E-2.

E.3.1.1 Organics

In SB02, 2 TCL volatile compounds were detected. Both results were below the sample quantitation limit (SQL) and were detected by EA Laboratories but were not confirmed by the split laboratory (positive RPD). One of these compounds was acetone, which is a

common laboratory contaminant and can be considered a false-positive at the observed concentration. The other volatile organic (tetrachloroethene) was detected at trace (sub-SQL) concentrations. Inter-laboratory variation is expected when the observed concentrations are at or below the SQL and the sample matrix is a solid. No positive semi-volatile or pesticide/PCB results were reported by either laboratory for this sample, indicating good inter-laboratory duplication.

Sample SB09 showed no detectable volatile organic, semi-volatile organic, or pesticide/PCB results by both EA Laboratories and IT-Pa, indicating good inter-laboratory duplication.

E.3.1.2 Inorganics

The EA Laboratories and IT-Pa inorganic results for the 2 interior soil borings are compared in Table E-2.

Sample SB02 had 21 metal parameters detected, with 4 RPDs having absolute values greater than 50 percent. Three analytes (cadmium, silver, and cyanide) were identified at a greater concentration by EA Laboratories than IT-Pa and antimony was observed by IT-Pa and not EA Laboratories. Comparison of the zinc results yielded an RPD of -200 percent since the EA Laboratories result was rejected based upon EPA usability criteria. Most of the observed differences greater than 50 percent were for analytes which were present at low concentrations. The remaining analytes showed acceptable inter-laboratory variation.

SB09 had 23 detectable metal parameters. Of the 23 results, 7 had RPDs greater than 50 percent. Four analytes (cadmium, mercury, selenium, and silver) were reported at greater concentrations by EA Laboratories than IT-Pa (positive RPD), antimony was observed at greater concentrations by IT-Pa than EA Laboratories, and thallium was reported by IT-Pa and not EA Laboratories. Comparison of the zinc results yielded an RPD of -200 percent since the EA Laboratories result was rejected based upon EPA usability criteria.

Most of the observed differences greater than 50 percent were for analytes which were present at low concentrations. The remaining analytes showed acceptable inter-laboratory variation.

E.3.2 Landfill Interior Soil Borings

Three samples (SB18-03A, SB23-01A, and SB27-01A) from the landfill interior soil borings were collected and split in the field for separate analyses as a measure of the quality of the analytical data. The RPDs of the split organic and inorganic analysis compared to EA Laboratories' data are presented in Tables E-1 and E-2.

E.3.2.1 Organics

SB18-03A had 4 TCL volatile and 25 TCL semi-volatile compounds detected. All 4 volatile compounds identified had RPDs greater than 50 percent, with EA Laboratories reporting concentrations greater than those reported by IT-Pa. Three of these compounds were not detected by IT-Pa. Of the 25 semi-volatile results reported, 14 had RPDs greater than

50 percent, with 9 reported at greater concentrations by EA Laboratories than IT-Pa. Seven of these 9 compounds were not detected by IT-Pa. IT-Pa reported 4 compounds (2-methylphenol, bis(2-ethylhexyl)phthalate, pentachlorophenol, and *p*-toluic acid) at greater concentrations than reported by EA Laboratories. The remaining analytes showed acceptable inter-laboratory variation. There were no detectable semi-volatile or pesticide/PCB compounds identified by either laboratory.

SB23-01A had 5 TCL volatile and 3 TCL semi-volatile compounds detected. All 5 volatile compounds identified had RPDs greater than 50 percent, with EA Laboratories reporting greater concentrations than those reported by IT-Pa. Four of these volatile compounds were not detected by IT-Pa. However, this inter-laboratory variation can be dismissed due to trace (sub-SQL) concentrations reported by both laboratories. The only semi-volatile compounds detected were the toluic acid isomers. For all three isomers, EA Laboratories' results were not confirmed by IT-Pa, which reported no detectable results (i.e., RPD of +200 percent). There were no detectable semi-volatile or pesticide/PCB compounds identified by either laboratory.

SB27-01A showed 2 volatile compounds (toluene and xylenes). The RPD exceeded 50 percent only for the toluene result, which was identified by EA Laboratories but not IT-Pa. However, this inter-laboratory variation can be dismissed due to the high dilution factor required for this sample. The remaining analytes showed acceptable inter-laboratory variation. There was no detectable semi-volatile or pesticide/PCB compounds identified by either laboratory.

E.3.2.2 Inorganics

SB18-01A showed 21 metal parameters, with 19 having RPDs greater than 50 percent. Four of these were detected by EA Laboratories and not IT-Pa, although this inter-laboratory variation can be dismissed since all 4 analytes were present at trace concentrations. The remaining analytes were present at greater concentrations by IT-Pa. This variation may have been due to a non-homogenous soil matrix.

SB23-01A showed 22 metal parameters, with 6 having RPDs greater than 50 percent. Three of these (beryllium, cadmium, and selenium) were detected by EA Laboratories and not IT-Pa, and 2 (antimony and thallium) were detected by IT-Pa and not EA Laboratories. The remaining analytes showed acceptable inter-laboratory variation.

E.3.3 North Area Soil Borings

In Round 2, 3 samples (MW5-SB04, MW5-SB05, and MW5-SB16) were collected and split in the field for separate analyses as a measure of the quality of the analytical data. The RPDs of the split organic and inorganic analysis compared to EA Laboratories' data is presented in Tables E-3 and E-4.

E.3.3.1 Organics

MW5-SB04 had 1 TCL volatile, 11 semi-volatile, and 3 pesticide/PCB compounds detected. IT-Pa reported a greater concentration for the single volatile result (xylenes) than reported by EA Laboratories. In both cases, the observed concentration was greater than 50 mg/kg, requiring the use of the medium level analytical protocol by the laboratories. Some of the variation may be attributable to different dilution factors and aliquot volumes used by the 2 laboratories. Ten of the 11 semi-volatile results were reported at a greater concentration by IT-Pa compared to EA Laboratories. This inter-laboratory variation is not significant the semi-volatile organics since the observed concentrations were reported below the SQLs. There were no detectable pesticide/PCBs in the EA Laboratories sample but IT-Pa reported 3 pesticides (4,4'-DDT, 4,4'-DDE, and 4,4'-DDD). The source of this variation is not apparent from the data provided.

MW5-SB05 had 4 TCL volatile, 13 semi-volatile, and 13 pesticide/PCB compounds detected. Three of the 4 volatile compounds showed greater than 50 percent RPD. In all 3 cases the reported concentrations were less than the SQL which is the likely source of the inter-laboratory variation. Seven of the 13 semi-volatile results showed greater than 50 percent RPD, with the results reported by IT-Pa greater than those from EA Laboratories in 6 of the cases. IT-Pa detected 13 pesticide/PCB compounds which were not confirmed by EA Laboratories. The IT-Pa data was flagged with a "P" indicating that the analytical duplication (quantified as the percent difference between the dual analyses) was greater than 25 percent. Depending upon the actual value of the percent difference, some of the inter-laboratory variation may be attributed to the analyses.

MW5-SB16 had 4 TCL volatile, 1 semi-volatile, and 1 pesticide/PCB compounds detected. Five results had RPDs greater than 50 percent. Of the 5, 4 had RPDs of 200 indicating that compounds were detected by one laboratory but not by the other laboratory. Two of the compounds were detected by the EA Laboratories but were not detected by IT-Pa. All analyte concentrations were not above the SQL. The remaining 2 RPDs of 200 were negative indicating that IT-Pa's detectable results were not confirmed by EA Laboratories. All analyte concentrations were not above the SQL.

The remaining RPD above 50 percent was for 2-butanone (74 percent) with EA Laboratories results being greater than IT-Pa results. The discrepancy in the data may be dismissed due to low level concentrations. Both laboratories reported concentrations below the SQL.

E.3.3.2 Inorganics

In MW5-SB04, 19 metal parameters were detected, with 1 showing an RPD greater than 50 percent. This analyte (antimony) was detected by IT-Pa but not EA Laboratories. All of the remaining analytes showed acceptable inter-laboratory variation.

In MW5-SB05, 22 metal parameters were detected, with 6 showing an RPD greater than 50 percent. Two of these analytes (cadmium and zinc) were reported at a greater concentration by EA Laboratories, while the remaining analytes (lead, selenium, silver and

thallium) were reported at a greater concentration by IT-Pa. Most of these analytes were reported at low concentrations by both laboratories indicating that this inter-laboratory variation was not significant.

No analytical results were reported by IT-Pa for comparison to sample MW5-SB16 results.

E.3.3 Stream Sediments

In Round 1, 1 creek sediment sample (SD03-01A) was collected and split in the field for separate analyses as a measure of the quality of the analytical data. The RPDs of the split organic analysis compared to EA Laboratories' data is presented in Table E-5.

E.3.3.1 Organics

Sample SD03-01A had 3 TCL volatile and 19 semi-volatile compounds detected, with 22 results showing an RPD greater than 50 percent. All 3 volatile results showed RPD greater than 50 percent, with EA Laboratories showing greater concentration than IT-Pa for 2 of the results. All 19 semi-volatile results had RPDs greater than 50 percent, with EA Laboratories reporting 17 results at greater concentrations than those reported by IT-Pa. Most of these were PAHs, which are extremely sensitive to matrix characteristics due to their high K_d -values. IT-Pa reported toluic acid when none was detected by EA Laboratories. There were no reported pesticide/PCBs by either laboratory.

E.3.3.2 Inorganics

No split sample results for inorganics were provided.

E.3.4 Creek Seeps and Seep Sediment

In Round 1, 2 creek seeps (CS01-01A and CS03-01A) and the seep sediment sample (SS03-01A) were collected and split in the field for separate analyses as a measure of the quality of the analytical data. The RPDs for organic and inorganic data of the split analysis compared to EA Laboratories' data is presented in Tables E-6 and E-7.

E.3.4.1 Organics

In CS01-01A, 1 TCL volatile and 3 semi-volatile compounds were detected. The single volatile and 2 of the 3 semi-volatile results had RPDs greater than 50 percent. The volatile compound methylene chloride was reported by IT-Pa but not EA Laboratories. This compound is a common laboratory contaminant and may be a false positive result. The 2 semi-volatile compounds (butyl benzyl phthalate and pentachlorophenol) were reported by IT-Pa but not EA Laboratories. This does not indicate a significant inter-laboratory discrepancy since the 2 compounds were present at trace (sub-SQL) concentrations. There were no pesticide/PCBs reported by either laboratory.

CS03-01A had 7 TCL volatile compounds and 8 TCL semi-volatile compounds detected. Three of the 7 volatile results (acetone, methylene chloride and toluene) showed RPDs

greater than 50 percent, with IT-Pa reporting greater concentrations than EA Laboratories. The different acetone and methylene chloride results are not significant since these are common laboratory contaminants. Five semi-volatile compounds were reported by EA Laboratories but not by IT-Pa. All of the concentrations were low and may not be reflective of significant inter-laboratory variation since the IT-Pa data appears to have been heavily diluted to permit quantification of toluic acid. IT-Pa reported a greater concentration for all 3 toluic acid isomers than reported by EA Laboratories. This may have been due to different dilution factors.

In SS03-01A, 6 TCL volatile compounds and 9 TCL semi-volatile compounds were detected. Five of the 6 volatile compounds showed RPDs greater than 50 percent, with all but one of these reported at a greater concentration by IT-Pa than EA Laboratories. Six of the 9 semi-volatile compounds showed RPDs greater than 50 percent, with all but the *o*-toluic acid results reported at a greater concentration by IT-Pa than EA Laboratories. Most of these compounds were reported below the SQL indicating that the inter-laboratory variation was not significant.

Table E-7 compares the laboratory results from the creek seep and seep sediment samples.

E.3.4.2 Inorganics

In CS01-01A, 17 inorganics were detected, with 7 (antimony, cobalt, copper, lead, mercury, nickel, and zinc) showing RPDs greater than 50 percent. Six of the 7 analytes were detected at a greater concentration by IT-Pa than EA Laboratories. Antimony was reported by EA Laboratories but not IT-Pa, and cobalt and nickel were reported by IT-Pa but not EA Laboratories. The mercury RPD is minor since the reported concentrations by both laboratories are similar. Comparison of the remaining analyte concentrations to the RPDs shows that, with 5 exceptions (antimony, copper, lead, nickel, and zinc) there was acceptable inter-laboratory variation for this sample.

In CS03-01A, 22 inorganics were detected, with 12 (antimony, arsenic, cadmium, calcium, copper, lead, magnesium, manganese, mercury, potassium, thallium, and cyanide) showing RPDs greater than 50 percent. With 2 exceptions (arsenic and cyanide), EA Laboratories reported greater concentrations than IT-Pa.

In SS03-01A, 22 inorganics were detected, with 3 (cadmium, thallium, and cyanide) having RPDs greater than 50 percent. In all cases, EA Laboratories reported a positive result while these analytes were not detected by IT-Pa. This does not indicate a significant inter-laboratory variation since the concentrations were at or below the SQL. The remaining analytes showed acceptable inter-laboratory precision.

E.3.5 Shallow Groundwater

Two overburden groundwater samples (GW01S-01A and GW04S-01A) were collected in Round 1, and split in the field for separate analyses as a measure of the quality of the analytical data. A sample of overburden groundwater (GW05S-01B) and landfill leachate

(LFP-1) were collected and split in Round 2. The RPDs of the split Round 1 and Round 2 organic results are shown in Tables E-8 and E-9, and for the split Round 1 and 2 inorganic results in Tables E-10 and E-11.

E.3.5.1 Organics

The comparison of the Round 1 split organic samples for overburden groundwater is shown in Table E-8. There were no detectable volatile organic or pesticide/PCB compounds by either laboratory in Round 1 sample GW-01S. The single positive semi-volatile result [bis(2-ethylhexyl)phthalate] reported by IT-Pa was at concentrations typical of laboratory background and likely is a false-positive result. There were no detectable semi-volatile organic or pesticide/PCB compounds by either laboratory in Round 1 sample GW-04S. Two volatile organics were reported by EA Laboratories with one of these confirmed by IT-Pa. The single discrepancy is not significant since the compound (tetrachloroethene) was present at trace levels. The results show acceptable inter-laboratory variation for these Round 1 samples.

The comparison of the Round 2 split organic samples for overburden groundwater is shown in Table E-9. Round 2 sample GW05S-01B showed 2 TCL volatile and 14 TCL semi-volatile compounds detected, with 12 compounds having an RPD greater than 50 percent. In all but one case (2,4-dimethylphenol), EA Laboratories identified a compound which was not confirmed by IT-Pa. However, this inter-laboratory variation is not significant since most of the compounds were present at near SQL concentrations. There were no detectable pesticide/PCBs by either laboratory in this sample. The results show acceptable inter-laboratory variation for these Round 2 sample.

Round 2 sample LFP-1 had 2 TCL volatile, 6 TCL semi-volatile, and 4 pesticide/PCB compounds detected. Of those 12 results, 11 had RPDs greater than 50 percent. One of the volatile compounds was identified by EA Laboratories but not IT-Pa. This discrepancy might have been an artifact of the dilution required to obtain xylenes within the calibrated range. Four of the 6 semi-volatile compounds were reported at a greater concentration by IT-Pa, and 1 of the 6 was reported at a greater concentration by EA Laboratories. All 4 pesticide results were reported at a greater concentration by IT-Pa.

E.3.5.2 Inorganics

The comparison of the Round 1 split organic samples for overburden groundwater is shown in Table E-10. In GW01S-01A, 17 inorganics were detected, with 4 (arsenic, beryllium, sodium, and vanadium) showing RPDs greater than 50 percent. For arsenic, IT-Pa reported the presence of this analyte but it was not detected by EA Laboratories. This is not indicative of a significant discrepancy since arsenic was present at a sub-SQL concentration. The EA Laboratories results for the remaining 3 analytes were rejected based upon EPA usability criteria and were treated as non-detects for these comparisons. The remaining analytes showed acceptable inter-laboratory variation.

In Round 1 sample GW04S-01A, 16 inorganics were detected, with 6 (cobalt, copper, lead, nickel, sodium, and vanadium) showing RPDs greater than 50 percent. Two of these (copper

and nickel) were reported at a greater concentration by EA Laboratories than IT-Pa. Cobalt and vanadium were identified by IT-Pa but not EA Laboratories. This is not indicative of a significant discrepancy since these analytes were present at sub-SQL concentrations. The EA Laboratories results for the remaining 3 analytes were rejected based upon EPA usability criteria and were treated as non-detects for these comparisons. The remaining analytes showed acceptable inter-laboratory variation.

The comparison of the Round 2 split organic samples for the single overburden groundwater sample and leachate water sample are shown in Table E-11. In Round 2 sample GW05S-01B, 22 inorganics were detected, with 3 (selenium, silver, and thallium) showing RPDs greater than 50 percent. Selenium was reported at a greater concentration by EA Laboratories, and silver and thallium were reported at a greater concentration by IT-Pa. However, this discrepancy is not significant since all 3 analytes were reported at sub-SQL concentrations. The remaining analytes showed acceptable inter-laboratory variation.

In Round 2 sample LFP-1, 20 inorganics were identified, with 13 showing RPDs greater than 50 percent. Three analytes (cadmium, copper, and mercury) were reported at a greater concentration by EA Laboratories, and the remaining 10 were reported at a greater concentration by IT-Pa. Some of this inter-laboratory variation can be attributed to solids content. Aluminum is a useful indicator of solids content and IT-Pa reported a larger concentration for aluminum than EA Laboratories. Therefore, the apparent discrepancy may be due to matrix effects.

E.3.6 Upper Bedrock Groundwater

One upper bedrock groundwater sample (GW03I-01A) was collected in Round 1, and split in the field for separate analyses as a measure of the quality of the analytical data. A sample of upper bedrock groundwater (GW18I-01B) was collected and split in Round 2. The RPDs of the split Round 1 and Round 2 organic results are shown in Tables E-8 and E-9, and for the split Round 1 and 2 inorganic results in Tables E-10 and E-11.

E.3.6.1 Organics

In Round 1 sample GW03I-01A, 5 TCL volatile, 6 TCL semi-volatile, and 2 pesticide/PCB compounds were detected. All of the volatile results showed RPDs less than 50 percent, indicating acceptable inter-laboratory precision. Three of the 6 semi-volatile compounds were detected by EA Laboratories and not IT-Pa. However, this may be artifactual since the IT-Pa analyses appears to have been heavily diluted to permit quantification of toluic acid within the calibrated range. IT-Pa reported toluic acid isomer concentrations approximately 10 times that reported by EA Laboratories. The source of this discrepancy is not apparent from the information provided. The toluic acid concentrations reported by IT-Pa for this sample replaced those reported by EA Laboratories for the evaluation of the nature and extent of contamination and risk assessment.

In Round 2 sample GW18I-01B, 4 TCL volatile, 6 TCL semi-volatile, and 1 pesticide/PCB compounds were detected. Two of the 4 volatile compounds showed RPDs greater than 50 percent, with IT-Pa reporting the presence of these compounds which were not detected

by EA Laboratories. However, this discrepancy is not significant since the 2 analytes were present at trace levels. IT-Pa reported the presence of 3 toluic acid isomers when none were detected by EA Laboratories. The source of this variation is not apparent from the information provided. The toluic acid concentrations reported by IT-Pa for this sample replaced those reported by EA Laboratories for the evaluation of the nature and extent of contamination and risk assessment. IT-Pa reported 1 pesticide at trace levels which was not detected by EA Laboratories. This is not indicative of a significant discrepancy since this analyte was present at sub-SQL concentrations.

E.3.6.2 Inorganics

Table E-10 compares the inorganic results from the 2 laboratories. In Round 1 sample GW03I-01A, 18 inorganics were detected, with 5 (antimony, cobalt, copper, iron, and sodium) showing RPDs greater than 50 percent. Antimony was detected by IT-Pa but not EA Laboratories. This discrepancy is not significant since this analyte was present at a sub-SQL concentration. Cobalt was reported at a greater concentration by EA Laboratories; and iron, lead, and sodium were reported at greater concentrations by IT-Pa. The EA Laboratories results for lead and sodium were rejected based upon EPA usability criteria and were treated as non-detects for these comparisons. The remaining analytes showed acceptable inter-laboratory variation.

Table E-11 compares the inorganic results from the 2 laboratories for Round 2 sample GW18I-01B. In this sample, 16 inorganics were detected, with 3 (cadmium, cobalt, and nickel) showing RPDs greater than 50 percent. Cadmium was detected by EA Laboratories but not IT-Pa, and cobalt and nickel were detected by IT-Pa but not EA Laboratories. This is not indicative of a significant discrepancy since these analytes were present at sub-SQL concentrations. The remaining analytes showed acceptable inter-laboratory variation.

E.3.7 Deep Bedrock Groundwater

Two deep bedrock groundwater samples (GW02D-01A and GW-09D-01A) were collected in Round 1, and split in the field for separate analyses as a measure of the quality of the analytical data. Three samples of deep bedrock groundwater (GW-07D-01B, GW-15D-01B, and GW-16D-01B) and 1 sample from a sludge basin well (SPW-1) were collected and split in Round 2. The RPDs of the split Round 1 and Round 2 organic results are shown in Tables E-8 and E-9, and for the split Round 1 and 2 inorganic results in Tables E-10 and E-11.

E.3.7.1 Organics

Table E-8 compares the organic results from both laboratories for the Round 1 samples. In Round 1 sample GW02D, 11 TCL volatile compounds and 5 TCL semi-volatile were detected, with 10 showing RPDs greater than 50 percent. Four of the 6 volatile results which showed RPDs greater than 50 percent were calculated at a greater concentration by EA Laboratories. This discrepancy is not significant since these analytes were present at a sub-SQL concentration. Two of the 4 semi-volatile organics were reported at a greater concentration by EA Laboratories than IT-Pa. IT-Pa reported approximately 10 times greater

concentration for the *ortho*- and *para*-toluic acid isomers than reported by EA Laboratories. The source of this discrepancy is not apparent from the information provided. The toluic acid concentrations reported by IT-Pa for this sample replaced those reported by EA Laboratories for the evaluation of the nature and extent of contamination and risk assessment.

Round 1 sample GW09D-01A showed no detectable TCL volatile compounds for both laboratories. Two semi-volatile compounds were detected by IT-Pa below the SQL but were not detected by EA Laboratories. The results are indicative of acceptable inter-laboratory variation.

Table E-9 compares the organic results from both laboratories for the Round 2 samples. In Round 2 sample GW07D-01B, 8 TCL volatile, 9 TCL semi-volatile, and 4 pesticide/PCB compounds were detected, with 12 RPDs greater than 50 percent. One volatile compound was detected by IT-Pa and not EA Laboratories. This is not considered a significant discrepancy since the reported concentration was less than the SQL. Six of the 7 semi-volatile compounds were reported at a greater concentration by EA Laboratories than IT-Pa. Four of these were phenolic compounds which were present at sub-SQL concentrations and thus does not represent a significant discrepancy. EA Laboratories reported *m*-toluic acid when none was reported by IT-Pa. However, this discrepancy may have been due to the dilution required to obtain toluic acid within the calibrated range.

For Round 2 sample GW15D-01B, both laboratories reported no detectable analytes.

For Round 2 sample GW16D-01B, EA Laboratories reported no detectable analytes. IT-Pa detected 2 TCL volatiles and 1 TCL semi-volatile. This does not indicate a significant discrepancy since these compounds were present at sub-SQL concentrations.

Round 2 sample SPW-1 had 1 TCL volatile and 2 pesticide/PCB compounds detected, with all 3 showing RPDs greater than 50 percent. This does not indicate a significant discrepancy since these compounds were present at sub-SQL concentrations.

E.3.7.2 Inorganics

Table E-10 compares the laboratory inorganic results for the 2 Round 1 samples. Eighteen inorganics were detected in GW02D-01A, with 7 (chromium, copper, mercury, potassium, thallium, zinc, and cyanide) showing RPDs greater than 50 percent. Two of these analytes (mercury and thallium) were reported at a greater concentration by EA Laboratories than by IT-Pa, and 2 (zinc and cyanide) were detected by IT-Pa and not EA Laboratories. Copper and potassium were detected by IT-Pa but the EA Laboratories results were rejected based upon EPA usability criteria and were treated as non-detects for these comparisons. The remaining analytes showed acceptable inter-laboratory variation.

In Round 1 sample GW09D-01A, 11 inorganics were detected, with 3 (barium, copper, and mercury) showing RPDs greater than 50 percent. Copper and mercury were detected at a greater concentration by EA Laboratories, and barium was detected at a greater concentration

by IT-Pa. However, this discrepancy is not significant since the results were at or below the SQLs for all of these analytes. The remaining analytes showed acceptable inter-laboratory variation.

Table E-11 compares the laboratory inorganic results for the Round 2 samples. Round 2 sample GW07D-01B had 19 inorganics detected, with 10 showing RPDs greater than 50 percent. Seven analytes were reported at a greater concentration by EA Laboratories than IT-Pa, and 3 analytes reported at a greater concentration by IT-Pa. Some of this inter-laboratory variation can be attributed to solids content. Aluminum is a useful indicator of solids content and EA Laboratories reported a greater concentration for aluminum than IT-Pa. Therefore, the apparent discrepancy may be due to matrix effects.

In Round 2 sample GW015D-01B, 15 inorganics were detected with 4 (arsenic, barium, chromium, and nickel) showing RPDs greater than 50 percent. EA Laboratories reported a greater concentration for arsenic than reported by IT-Pa, and did not detect the remaining 3 analytes. However, this discrepancy is not significant since the reported concentrations were all below the SQL. The remaining analytes showed acceptable inter-laboratory variation.

In Round 2 sample GW16D-01B, 19 inorganics were detected, with 7 (antimony, arsenic, beryllium, cobalt, copper, nickel, and vanadium) showing RPDs greater than 50 percent. In all but 1 case (cadmium), these analytes were detected by IT-Pa but not EA Laboratories. However, this discrepancy is not significant since the reported concentrations were all below the SQL. The remaining analytes showed acceptable inter-laboratory variation.

In Round 2 sample SPW-1, 14 inorganics were detected, with 4 showing RPDs greater than 50 percent. Aluminum and iron were detected at a greater concentration by EA Laboratories than IT-Pa, with the remaining 2 analytes reported by IT-Pa and not EA Laboratories. However, this discrepancy is not significant since the reported concentrations were all below the SQL. The remaining analytes showed acceptable inter-laboratory variation.

TABLE E-1 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED RPDs FOR ORGANIC ANALYTES MEASURED IN LANDFILL SOIL BORINGS (ROUND 1)

Analytes	Dep Unit	LANDFILL PERIMETER SOIL BORINGS				LANDFILL INTERIOR SOIL BORINGS											
		SB02 3.5-3.5 ft (ug/kg)	SPLIT SB02 3.5-3.5 ft (ug/kg)	RPD	SB09 2-4 ft (ug/kg)	SPLIT SB09 2-4 ft (ug/kg)	RPD	SB18 -03A 10-12 ft (ug/kg)	SPLIT SB18 -03A 10-12 ft (ug/kg)	RPD	SB23 -01A 10-12 ft (ug/kg)	SPLIT SB23 -01A 10-12 ft (ug/kg)	RPD	SB27 -01A 5 ft (ug/kg)	SPLIT SB27 -01A 5 ft (ug/kg)	RPD	
VOLATILES																	
Methylene Chloride																	
Acetone		5 J		200				1,300 J			200	2 J	200				
2-Butanone												14 J	200				
Benzene								1,700 J			200	1 J	200				
Chloroform																	
Trichloroethane																	
Tetrachloroethene																	
Toluene		2 J		200				1,100 J			200	2 J	200				
Ethylbenzene																	
Xylenes (Total)								170,000 J	61,000	94	44 J	4 J	159	21,000,000 J	32,000,000	200	
SEMI-VOLATILES																	
Benzyl alcohol		None Detected	None Detected														
2-Methylphenol								51 J		200							
4-Methylphenol								54 J	120 J	-76							
2,4-Dimethylphenol																	
Naphthalene								250 J	280 J	-11							
2-Methylnaphthalene								200 J	190	5							
Dimethyl Phthalate																	
Acenaphthylene								130 J	130 J	0							
Acenaphthene								70 J	110 J	-44							
Dibenzofuran								140 J		200							
Diethylphthalate																	
Fluorene								280 J	260 J	7							
N-Nitrosodiphenylamine																	
Phenanthrene								2,600 J	1,300	67							
Anthracene								250 J	290 J	-15							
Dibenzo(a,h)anthracene								230 J		200							
Di-n-Butylphthalate																	
Fluoranthene																	
Pyrene								1,500	1,400	7							
Benzo(a)Anthracene								2,300 J		200							
bis(2-ethylhexyl)Phthalate								990 J	630 J	44							
Chrysene								140 J	480 J	-110							
Benzo(b)Fluoranthene								1,100 J	780 J	34							
Benzo(k)Fluoranthene								790 J	500 J	45							
Benzo(a)Pyrene								810 J	530 J	42							
Indeno(1,2,3-cd)Pyrene								930 J	420 J	76							
Benzo(g,h,i)Perylene								560 J		200							
Pentachlorophenol								600 J		200							
o-Toluic Acid									250 J	-200							
m-Toluic Acid								2,000 J		200		62 J				200	
p-Toluic Acid								2,100 J	2,300	-9		1300				200	
								190 J	9,300	-192		750				200	

TABLE E-2 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED RPDS FOR
INORGANIC ANALYTES MEASURED IN LANDFILL SOIL BORINGS (ROUND 1)

[illegible]

TABLE E-3 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED RPDs FOR ORGANIC ANALYTES
MEASURED IN NORTH AREA SOIL BORINGS (ROUND 2)

Analytes	Units	MW5-SB04 (ug/kg)	SPLIT MW5-SB04 (ug/kg)	RPD	MW5-SB05 (ug/kg)	SPLIT MW5-SB05 (ug/kg)	RPD	MW5-SB16 (ug/kg)	SPLIT MW5-SB16 (ug/kg)	RPD
VOLATILES										
Acetone					22 J			20 BJ	31	-43
2-Butanone					15 J			13 J	6 J	74
Toluene								2 J		200
Ethylbenzene								6 J		200
Xylenes (Total)		52,000 D	1,100,000	-182	120,000 D	350 J	-200			
SEMI-VOLATILES										
2-Methylphenol					1,400 J	1,100 J	24			
4-Methylphenol					2,400 J	1,600 J	40			
2,4-Dimethylphenol					2,900 J	3,200 J	-10			
Naphthalene		1,200		9	590 J	800 J	-30			
2-Methylnaphthalene		120 J	1,100	200						
Fluorene					4,100 J	660 J	200			
Phenanthrene		32 J	140 J	-126			-200			
Di-n-Butylphthalate									61 BJ	-200
Fluoranthene		29 J	120 J	-122	600 J	780 J	-26			
Pyrene		26 J	100 J	-117		620 J	-200			
Benzo(a)Anthracene			44 J	-200						
bis(2-ethylhexyl)Phthalate		52 BJ	110 J	-72		970 J	-200			
Chrysene			61 J	-200						
Benzo(b)Fluoranthene			57 J	-200						
Pentachlorophenol						550 J	-200			
o-Toluic Acid			560 J	-200		2,900 DJ	-200			
m-Toluic Acid			110 J	-200	46,000 J	160,000 D	-200			
PESTICIDES/PCBs										
44'-DDE		None	71 DP	-200		170 DP	-200			
44'-DDD		Detected	610 D	-200		440 DP	-200		2 J	-200
44'-DDT			370 D	-200						
Heptachlor epoxide						98 PD	-200			
Endosulfan I						3 P	-200			
Dieldrin						120 PD	-200			
Endosulfate sulfate						650 DP	-200			
alpha-Chlordane						81 Z	-200			
Endrin						320 D	-200			
Endosulfan II						240 DP	-200			
Methoxychlor						520 DP	-200			
Endrin ketone						230 DP	-200			
gamma-Chlordane						370 P	-200			
Aroclor 1254						2800 DP	-200			

TABLE E-5 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED
PRECISION FOR ORGANIC ANALYTES IDENTIFIED IN
SKANEATELES CREEK SEDIMENT

Analytes	Depth Units	SD03 -01A (ug/kg)	SPLIT SD03 -01A (ug/kg)	RPD
VOLATILES				
Acetone			28 J	-200
Tetrachloroethene		16	6	91
Xylenes (Total)		2 J		200
SEMI-VOLATILES				
Naphthalene		1,100		200
2-Methylnaphthalene		700 J		200
Acenaphthene		1,900		200
Dibenzofurn		2,500		200
Fluorene		2,400		200
Phenanthrene		11,000	170 J	194
Anthracene		3,600		200
Fluoranthene		10,000	420 J	184
Pyrene		15,000	390 J	190
Benzo(a)Anthracene		4,700	260 J	179
Chrysene		4,500	280 J	177
Benzo(b)Fluoranthene		3,800	500 J	153
Benzo(k)Fluoranthene		3,500	190 J	179
Benzo(a)Pyrene		4,600	390 J	169
Indeno(1,2,3-cd)Pyrene		3,000		200
Dibenzo(a,h)anthracene		1,600		200
Benzo(g,h,i)Perylene		3,200		200
Pentachlorophenol				
<i>o</i> -Toluic Acid			1,000 J	-200
<i>m</i> -Toluic Acid			750 J	-200
<i>p</i> -Toluic Acid				

TABLE E-6 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED RPDs FOR ORGANIC ANALYTES MEASURED IN CREEK SEEPS AND SEEP SEDIMENT

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Analytes	Depth Units	CS01 (ug/L)	SPLIT CS01 -01A (ug/L)	RPD	CS03 -01A (ug/L)	SPLIT CS01 -01A (ug/L)	RPD	SS03 -01A (ug/kg)	SPLIT SS03 -01A (ug/kg)	RPD
VOLATILES										
Methylene Chloride			28 J	-200	9	78 J	-159	3 J		200
Acetone						9	-200			
1,2-Dichloroethene					670	880	-27	84	240	-96
Trichloroethene					260	380	-38	54	110	-68
Tetrachloroethene					100	140	-33	34	55	-47
Toluene					53	95	-57	13	32	-84
Xylenes (Total)					570	790	-32	200	370	-60
SEMI-VOLATILES										
Phenol					81		200			
2-Methylphenol					16 J		200			
4-Methylphenol					11 J		200			
2,4-Dimethylphenol								190 J	110 J	53
Diethylphthalate									510 J	-200
Anthracene					1 J		200			
Dibenzo(a,h)anthracene										
Di-n-Butylphthalate									740	-200
Fluoranthene									70 J	-200
Pyrene									57 J	-200
bis(2-ethylhexyl)Phthalate	1 J	1 J	1 J	0	2 J		200		120 J	-200
Pentachlorophenol			2 J	-200						
Butylbenzyl phthalate			1 J	-200						
o-Toluic Acid					79,000	510,000	-146	7,200	1,800	120
m-Toluic Acid					40,000	250,000	-145	4,800	7,200	-40
p-Toluic Acid					8,800	71,000	-156	710	1,100 J	-43

TABLE E-7 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED PRECISION
FOR INORGANIC ANALYTES MEASURED IN CREEK SEEPS AND SEEP SEDIMENT

Analytes Depths Units	CS01 -01A (ug/L)	SPLIT CS01 -01A (ug/L)	RSD	CS03 -01A (ug/L)	SPLIT CS03 -01A (ug/L)	RSD	SS03 -01A (ug/kg)	SPLIT SS03 -01A (ug/kg)	RSD
Aluminum	1,710	2,140 J	-22	29,300	23,500 J	22	8,610	7,690	11
Antimony	114 J		200	269		200			
Arsenic	5.7 B	5.2 J	9	170	1,443 J	-158	2	4	-46
Barium	164 B	148 J	10	491	402 J	20	119 J	105	13
Beryllium				1.8 B	1.4 B	25	0.49 B	0.40 B	20
Cadmium				8.7 J		200	2		200
Calcium	72,200	86,200 J	-18	51,500	19,600 J	90	11,660	11,000	6
Chromium	8.0 B	6.4 B	22	92.4	61.0	41	18	15	19
Cobalt		6 B	-200	28.3 B	27.0 B	5	8 B	9 B	-6
Copper	29.1	95.8	-107	158 J	66	82	30 J	24	20
Iron	8,840	8,890 J	-1	34,600	32,100 J	7	16,000	13,900	14
Lead	87.6	250.0 J	-96	194	76 J	88	24	31	-25
Magnesium	12,500	18,600 J	-39	16,300	9,460 J	53	7,680	7,370	4
Manganese	785	629 J	22	778	450 J	53	185	168	10
Mercury	1.1 J	1.9	-53	1.3 J	0.5	87	0.14	0.20	-35
Nickel		40.0	-200	238	199	18	19 J	22	-14
Potassium	2,450 B	2,360 B	4	13,000	8,950	37	926	879 B	5
Selenium							0.25 J	0.33 B	-28
Silver									
Sodium	31,300	30,000 J	4	2,670,000	2,460,000 J	8	4,810	4,040	17
Thallium				1.3 B		200	0.23 B		200
Vanadium				172 J	142 J	19	13	19 B	-38
Zinc	51.4 J	178.0	-110	244 J	171	35	52 J	56 J	-7
Cyanide					25.5	-200	2.2 J		200

TABLE E-8 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED PRECISION FOR ORGANIC ANALYTES
MEASURED IN GROUNDWATER (ROUND 1)

Page 1 of 1

Analytes	Depth Units	OVERBURDEN WELLS				UPPER BEDROCK WELL				DEEP BEDROCK WELLS						
		GW01S 01A (ug/L)	SPLIT MW01S 01A (ug/L)	RPD	GW04S 01A (ug/L)	SPLIT GW04S 01A (ug/L)	RPD	GW03I 01A (ug/L)	SPLIT MW03I 01A (ug/L)	RPD	GW02D -01A (ug/L)	SPLIT MW02D -01A (ug/L)	RPD	GW09D -01A (ug/L)	SPLIT MW09D -01A (ug/L)	RPD
VOLATILES																
Methylene Chloride																
Acetone																
2-Butanone																
Benzene																
Chloroform																
Trichloroethane																
Tetrachloroethene																
Toluene							200	2,300	2,900							
Ethylbenzene								68	83 J							
Xylenes (Total)																
1,2-Dichloroethene							-22	2,100	1,800							
Trichloroethene								160	130							
								190	150							
SEMI-VOLATILES																
Phenol																
Benzyl alcohol								34 J								
Pentachlorophenol								14 J								
Nitrobenzene																
2-Methylnaphthalene								11 J								
Di-n-Butylphthalate																
bis(2-ethylhexyl)Phthalate																
o-Toluic Acid																
m-Toluic Acid																
p-Toluic Acid																
PESTICIDES/PCBs																
4,4'-DDE																
BHC																
		None Detected	None Detected	3 J	-200	None Detected		78,000	750,000	-162	5,460	47,000	-158		2 J	-200
								50,000	480,000	-162	3,600	3,700	-3		4 J	-200
								5,400 J	27,000 J	-133	400	3,900 J	-163			

TABLE E-9 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED PRECISION FOR ORGANIC ANALYTES MEASURED IN GROUNDWATER (ROUND 2)

Analytes Depth Units	OVERBURDEN WELL		LEACHATE WELL		UPPER BEDROCK	
	GW05S 01B (ug/L)	SPLIT GW05S 01B (ug/L)	LFP-1 (ug/L)	SPLIT LFP-1 (ug/L)	GW18I 01B (ug/L)	SPLIT GW18I 01B (ug/L)
VOLATILES						
Methylene Chloride						
Acetone						
2-Butanone						
Tetrachloroethene						
Toluene						
Xylenes (Total)	270 J 28,000	200 27,000 EX	140 J 7,900	4,000 X	490 D	1 J 600 EX
1,2-Dichloroethene						
Trichloroethene						
Chloroethane						
1,1-Dichloroethane						
Carbon Disulfide						
SEMI-VOLATILES						
Phenol	12	200		1,700 J		
2-Methylphenol	13	200				
4-Methylphenol	150 J	200				
2,4-Dimethylphenol		170 J		640 J	7 J 3 J	6 J 2 J
Naphthalene	11	200				
Phenanthrene	5 J	200				
Anthracene	0.8 J	200				
Di-n-butyl phthalate						
Fluoranthene	2 J	200				
Pyrene	1 J	200				
bis(2-ethylhexyl)Phthalate			0.7 J		1 J	
Carbazole	3 J	200				
Pentachlorophenol	2 J	200				
o-Toluic Acid	6,300 DJ	9,000	30,000 DJ	100,000		67
m-Toluic Acid	4,800 DJ	6,800	78,000 DJ	170,000		7 J
p-Toluic Acid	270 J	380 J	23,000 J	23,000 J		4 J
PESTICIDES/PCBs						
Dieldrin	None Detected	None Detected		0.052 P		0.0051 JP
Lindane				0.098 P		
Heptachlor epoxide				0.11		
4,4'-DDE				3.7 p		
Aroclor 1248						
Methoxychlor						

TABLE E-9 (Continued)

p 2 of 2

Analytes Depth Units	DEEP BEDROCK					SLUDGE BASIN WELLS		
	GW07D 01B (ug/L)	SPLIT GW07D 01B (ug/L)	RPD	GW15D 01B (ug/L)	SPLIT GW15D 01B (ug/L)	RPD	GW16D 01B (ug/L)	SPLIT GW16D 01B (ug/L)
VOLATILES								
Methylene Chloride	47 J	31	41	None Detected	None Detected		None Detected	3 J
Acetone		7 J	-200					
2-Butanone	11	11	0					
Tetrachloroethene	4 J	3 J	29					
Toluene	330	240 X	32					
Xylenes (Total)	4 J	5 JX	-22					1 JX
1,2-Dichloroethene	4 J	4 J	0					
Trichloroethene	5 J	4 J	22					
Chloroethane								
1,1-Dichloroethane								
Carbon Disulfide								
SEMI-VOLATILES								
Phenol	35 J		200	None Detected	None Detected		None Detected	
2-Methylphenol	10 J		200					
4-Methylphenol	9 J		200					
2,4-Dimethylphenol								
Naphthalene	1 J		200					
Phenanthrene								
Anthracene								
Di-n-butyl phthalate								
Fluoranthene								
Pyrene								
bis(2-ethylhexyl)Phthalate								
Carbazole	60 J		200					3 J
Pentachlorophenol		4 J	-200					
o-Toluic Acid	17,000 DJ	16,000 E	6					
m-Toluic Acid	1,300 DJ		200					
p-Toluic Acid	17,000 DJ	16,000 E	6					
PESTICIDES/PCBs								
Dieldrin		0.011 J	-200	None Detected	None Detected		None Detected	0.0071 J
Lindane		0.0072 JP	-200					
Heptachlor epoxide		0.021 J	-200					
4,4'-DDE		0.067 J	71					
Aroclor 1248	0.14 J							0.071 JP
Methoxychlor								

TABLE E-10 ANALYTICAL QUALITY ASSURANCE SPLITS AND CALCULATED PRECISION FOR
INORGANIC ANALYTES MEASURED IN GROUNDWATER (ROUND 1)

Analytes Depths Units	OVERBURDEN WELLS					UPPER BEDROCK WELLS					DEEP BEDROCK WELLS				
	GW01S -01A (ug/L)	SPLIT GW01S -01A (ug/L)	RPD	GW04S -01A (ug/L)	SPLIT GW04S -01A (ug/L)	RPD	GW03I -01A (ug/L)	SPLIT GW03I -01A (ug/L)	RPD	GW02D -01A (ug/L)	SPLIT GW02D -01A (ug/L)	RPD	GW09D -01A (ug/L)	SPLIT GW09D -01A (ug/L)	RPD
Aluminum	19,300	21,500	-11	885 J	654 J	30	156 J	173 J	-10	281	289	-3	220	160 B	32
Antimony								38 B	-200						
Arsenic		1.7 B	-200	3.0 J	3.1 B	-4	47 J	44	6	73.3	74.2	-1			
Barium	385 J	304	24	64 J	47 B	31	41 J	34 B	19	46.2 B	46.8 B	-1	37 B	76 B	-70
Beryllium	1 R	1 B	-200												
Cadmium															
Calcium	504,000	408,000	21	43,400	39,000	11	6,270	6,700	-7	27,600	28,800	-4	63,200	62,900	0
Chromium	43.2 J	45.7	-6	6 J	3 B	49	41 J	38	9		4.5 B	-200			
Cobalt	27 B	30 B	-8		3 B	-200	17 B	10 B	51						
Copper	80.2 J	63.8	23	15 J	8 B	63	63 J	62	2	36 R	13.1 B	-200	10 B	4 B	84
Iron	69,800 J	86,100	-21	1,970 J	1,530	25	1,900 J	4,300	-77	960	1,380	-36	678	1120	-49
Lead	26.7	18.7	35	7 R	4	-200	63 R	67	-200	2.1 J	2.4 B	-13			
Magnesium	119,000	124,000	-4	10,200	9,860	3	904 B	943 B	-4	10,300 J	10,100	2	14,300	14,000	2
Manganese	1,460 J	1,240	16	578 J	495	15	122 J	118	3	31 J	30	4	8 B	10 B	-18
Mercury										1.2	0.21	140	1 J		200
Nickel	50.7 J	66.7	-27	203 J	19 B	166	65 J	84	-24	27 B	26 B	4			
Potassium	4,890 B	7,480	-42	4,270 B	4,320 B	-1	48,100	51,700	-7	2,740 R	1,640 B	-200	2,360 B	2,460 B	-4
Selenium															
Silver															
Sodium	71,400 R	48,700	-200	246,000 R	202,000	-200	2,130,000 R	2,240,000	-200	1,070,000	1,030,000	4	31,100	30,600	2
Thallium										1 B		200			
Vanadium	32.3 R	41.0 B	-200		5 B	-200	79 J	88	-11	21 B	25 B	-14			
Zinc	163	130 J	23	26.1	20.3	25	23	34	-40		16 B	-200	20	13 B	41
Cyanide							12	9 B	29		14	-200			

TABLE E-11 (Continued)

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INORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: Stauffers Management Company, Skaneateles Falls, NY.
Sample Type: Aqueous(8)
Analysis Type: TAL Metals and Cyanide
Laboratory: EA Laboratories
Report No.: 931235

A. INTRODUCTION:

Eight aqueous samples were analyzed for TAL metals. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (1991)/USEPA Region 2 Standard Operating Procedure NO. HW-2 (Revision XI January 30, 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument calibration
- Initial calibration verification (ICV) and continuing calibration verification (CCV)
- CRDL standards for AA (CRA), and ICP (CRI)
- Initial calibration blank (ICB), continuing calibration blank (CCB), and preparation blank (PB)
- ICP interference check sample (ICS) analysis
- Spike sample analysis (S)
- Duplicate sample analysis (D)
- Laboratory control sample (LCS)
- ICP serial dilution analysis (L)
- Instrument detection limit (IDL) determination
- Interelement correction for ICP
- Linear Range analysis
- Furnace QC analysis

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: Stauffers Management Company, Skaneateles Falls, NY.
Analysis Type: TAL Metals.
Laboratory: EA Laboratories
Report No.: 931235

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW14I01B	T10183
GW1I01B	T10184
GW2I01B	T10185
GW7I01B	T10187
GW12S01B	T10214
GW5S01B	T10215
GWLFP101B	T10216
GWLFP201B	T10217

1. Sample Holding Time Before Analysis: All metal analyses were performed within ASP and USEPA prescribed holding times.
2. Instrument Calibration: All instruments were calibrated daily and dates and times clearly shown on the raw data. The proper sequence of the instrument blanks and standards were used. A three-point calibration for ICP and at least four-point calibration for furnace AA were used as required by the NYSDEC ASP.
3. Initial and Continuing Calibrations Verifications: The percent recovery for all analytes were within the prescribed window (90-110%). The ICV and the CCV standards were analyzed at the correct frequency in the injection sequence.
4. CRDL Standards for AA (CRA) and ICP (CRI): The CRDL standards were run at the frequency and appropriate concentration for each analyte. The percent recovery for silver (147.1 and 149.2%) were outside the control limit (80-120%). No action was required since the samples concentrations were non-detects.
5. Laboratory Blanks: All laboratory blanks were analyzed at the correct frequency during the injection sequence. The aqueous calibration and preparation blanks contained traces of copper, potassium, calcium, thallium, magnesium, iron, and silver. All the concentrations were below the CRDL. No action was required.

6. ICP Interference Check Sample (ICS) Analysis: The interference check sample percent recoveries were all within the acceptable window (80-120%).
7. Spiked Sample Analysis: The spike recoveries were outside acceptable range(75-125%) for arsenic(29.3),iron(210.4%),selenium(50.6%),lead(73.8%), and thallium(57.5%). The laboratory correctly qualified the results with an "N". Iron was not qualified since sample concentration >4x spike added.
- Action:
- Arsenic was rejected "R" in samples GW14I01B,GW1I01B,GW2I01B, GW7I01B, GW12S01B,GW5S01B,GWLFP101B, and GWLFP201B.
- Lead was qualified with a "J" in samples GW14I01B,GW12S01B, GWLFP201B,GW05S01B, and GW7I01B.
- Selenium was qualified with a "UJ" in samples GW14I01B,GW2I01B, GW7I01B,GW12S01B, and GWLFP101B.
- Selenium was qualified with a "J" in samples GW5S01B.
- Thallium was qualified with a "J" in samples GW14I01B,GW1I01B, GW2I01B,GW7I01B,GW12S01B,GW5S01B, GWLFP101B, and GWLFP201B.
8. Post-digestion Spike Analysis: The post-digestion spike analyses was not performed for any of the analytes tha exceeded the acceptable range. No action was required.
9. Duplicate Sample Analysis: The duplicate analyses were performed on aqueous samples. Cobalt,lead, and sodium were non-compliant due to duplicate analysis. The lab incorrectly qualified sodium with asterick(*). No action was required for cobalt,lead, and sodium since the diferrence between sample and duplicate was less than one times the CRDL for all the analytes.
10. Laboratory Control Sample Analysis: The laboratory control sample analysis was analyzed at the correct frequency. All percent recoveries were within acceptable range (80-120%).

11. ICP Serial Dilution Analysis: The ICP serial dilution were performed on both soil and aqueous samples. The percent difference for chromium(100%),nickel(100%), copper(46.4%), and vanadium(100%) were outside the control limit(10%). No action was required for chromium,nickel, and vanadium since the initial sample concentration was less than 10X IDL.

Action:

Copper was qualified with a "J" in samples GW1I01B,GW2I01B, GW7I01B,GW5S01B,GWLFP01B, and GWLFP201B for serial dilution.

12. Instrument Detection Limit Analysis: The IDLs were generated in 12/30/92 by the laboratory. All the IDLs were lower than the CRDLs.
13. Interelement Correction for ICP: Interelement correction factor applied to aqueous data.
14. Linear Range Analysis: The linear range for the ICP was supplied by the laboratory. A comparison of the Form 1 results to Form XII showed that the observed concentrations of the analytes were within the linear range. The linear range was not determined quaterly. No action was required.
15. Furnace QC Analysis: The analytical spike recovery for lead(10.7,0.0,and 9.0%) selenium(1.9%) were out of control limits (85-115%), while sample absorbencies were less than 50% of spike absorbencies. The laboratory correctly qualified the results with a "W". The thallium and arsenic results were previously qualified for spike recovery.

Action:

Selenium was rejected "R" in sample GW1I01B.

Lead was rejected "R" in samples GW1I01B,GW2I01B, and GWLFP101B.

16. Calculations: All checked calculations were within rounding errors.
17. Other Q.C.: None.

C. DATA LIMITATION OVERVIEW:

The inorganic analyses of water and soil samples from the SMC Skaneateles Falls, NY referenced as Report No. 931235, showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

Arsenic was rejected "R" in GW14I01B, GW1I01B, GW2I01B, GW7I01B, GW12S01B, GW5S01B, GWLFP101B, and GWLFP201B for spike recovery.

Lead was qualified with a "J" in GW14I01B, GW12S01B, GWLFP201B, GW5S01B, and GW7I01B for spike recovery.

Selenium was qualified with a "UJ" in samples GW14I01B, GW2I01B, GW7I01B, GW12S01B, and GWLFP101B for spike recovery.

Selenium was qualified with a "J" in samples GW5S01B for spike recovery.

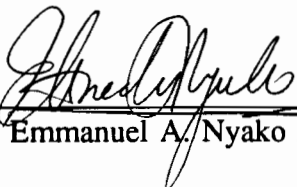
Thallium was qualified with a "J" in samples GW14I01B, GW1I01B, GW2I01B, GW7I01B, GW12S01B, GW5S01B, GWLFP101B, and GWLFP201B for spike recovery.

Copper was qualified with a "J" in samples GW1I01B, GW2I01B, GW7I01B, GW5S01B, GWLFP01B, and GWLFP201B for serial dilution.

Selenium was rejected "R" in sample GW1I01B for furnace analysis.

Lead was rejected "R" in samples GW1I01B, GW2I01B, and GWLFP101B for furnace analysis.

Prepared by: _____


Emmanuel A. Nyako M.S.

Date: 10 Nov. 1993

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INORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: Stauffers Management Company, Skaneateles Falls, NY.
Sample Type: Aqueous (12)
Analysis Type: TAL Metals and Cyanide
Laboratory: EA Laboratories
Report No.: 931235

A. INTRODUCTION:

Twelve aqueous samples were for TAL metals and cyanide. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (1991)/USEPA Region 2 Standard Operating Procedure NO. HW-2 (Revision XI January 30, 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument calibration
- Initial calibration verification (ICV) and continuing calibration verification (CCV)
- CRDL standards for AA (CRA), and ICP (CRI)
- Initial calibration blank (ICB), continuing calibration blank (CCB), and preparation blank (PB)
- ICP interference check sample (ICS) analysis
- Spike sample analysis (S)
- Duplicate sample analysis (D)
- Laboratory control sample (LCS)
- ICP serial dilution analysis (L)
- Instrument detection limit (IDL) determination
- Interelement correction for ICP
- Linear Range analysis
- Furnace QC analysis

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: Stauffers Management Company, Skaneateles Falls, NY.
Analysis Type: TAL Metals and Cyanide
Laboratory: EA Laboratories
Report No.: 931235

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW10I01B	ET9821
FB01B	ET9822
GW13I01B	ET9892
GW11I01B	ET9893
GW12I01B	T10112
GW8I01B	T10113
GWU01B	T10114
GW06I01B	T10115
GW3I01B	T10116
GW4I01B	T10117
GW9I01B	T10118
GW5I01B	T10119

1. Sample Holding Time Before Analysis: All metal analyses were performed within ASP and USEPA prescribed holding times.
2. Instrument Calibration: All instruments were calibrated daily and dates and times clearly shown on the raw data. The proper sequence of the instrument blanks and standards were used. A three-point calibration for ICP and at least four-point calibration for furnace AA were used as required by the NYSDEC ASP.
3. Initial and Continuing Calibrations Verifications: The percent recovery for all analytes were within the prescribed window (90-110%). The ICV and the CCV standards were analyzed at the correct frequency in the injection sequence.
4. CRDL Standards for AA (CRA) and ICP (CRI): The CRDL standards were run at the frequency and appropriate concentration for each analyte. The percent recoveries for the analytes were within the control limit (80-120%).

5. Laboratory Blanks: All laboratory blanks were analyzed at the correct frequency during the injection sequence. The aqueous and soil calibration and preparation blanks contained traces of aluminum, sodium, calcium, magnesium, lead, iron, and silver. All the concentrations were below the CRDL. No action was required.
6. ICP Interference Check Sample (ICS) Analysis: The interference check sample percent recoveries were all within the acceptable window (80-120%).
7. Spiked Sample Analysis: The spike recoveries were outside acceptable range (75-125%) for arsenic (68.8%) and thallium (69.2%). The laboratory correctly qualified arsenic and thallium results with an "N".

Action:

Arsenic was qualified with a "J" in samples GW1201B, GWU01B, GW6I01B, GW3I01B, GW9I01B, and GW5I01B for spike recovery.

Arsenic was qualified with a "UJ" in samples GW10I01B, FB01B, GW13I01B, GW1101B, GW8I01B, and GW4I01B for spike recovery.

Thallium was qualified with a "UJ" in samples GW10I01B, FB01B, GW13I01B, GW1101B, GW8I01B, GW4I01B, GW1201B, GWU01B, GW6I01B, GW3I01B, GW9I01B, and GW5I01B.

8. Post-digestion Spike Analysis: The post-digestion spike analyses were not performed on the analytes out of control limit. No action was required.
9. Duplicate Sample Analysis: The duplicate analyses were performed aqueous samples. All the analytes were within the control limit as per SOP.
10. Laboratory Control Sample Analysis: The laboratory control sample analysis was analyzed at the correct frequency. All percent recoveries were within acceptable range (80-120%).

11. ICP Serial Dilution Analysis: The ICP serial dilution were performed on aqueous samples. The percent difference for zinc(70.5%),aluminum(64,6%), manganese(10.4%) were outside the control limit(10%). No action was required for zinc since the initial sample concentration was less than 10X IDL.

Action:

Aluminum was qualified with a "J" in samples GW10I01B, GW13I01B,GW1101B,GW6I01B,GW4I01B,GW9I01B, and GW5I01B for serial dilution.

Manganese was qualified with a "J" in samples GW10I01B,GW13I01B,GW1101B,GW8I01B,GW4I01B,GW1201B, GWU01B,GW6I01B,GW3I01B,GW9I01B, and GW5I01B for serial dilution.

12. Instrument Detection Limit Analysis: The IDLs were generated in 1992 by the laboratory. All the IDLs were lower than the CRDLs.
13. Interelement Correction for ICP: Interelement correction factor applied to aqueous data had were acceptable. No action was required.
14. Linear Range Analysis: The linear range for the ICP was supplied by the laboratory. A comparison of the Form 1 results to Form XII showed that the observed concentrations of the analytes were within the linear range. The linear range was not determined quaterly. No action was required.
15. Furnace QC Analysis: The analytical spike recovery for arsenic,selenium, and thallium in most of the samples were out of control limits (85-115%), while sample absorbencies were less than 50% of spike absorbencies. The laboratory correctly qualified the results with a "W". The thallium and arsenic results in the samples were were previously qualified for spike recovery.

Action:

Selenium was qualified with a "UJ" in samples GW10I01B, GW13I01B,GW8I01B,GW1201B,GWU01B,GW6I01B for furnace analysis.

16. Calculations: All checked calculations were within rounding errors.
17. Other Q.C.: None.

C. DATA LIMITATION OVERVIEW:

The inorganic analyses of water and soil samples from the SMC Skaneateles Falls, NY referenced as Report No. 931235, showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

Arsenic was qualified with a "J" in samples GW1201B, GWU01B, GW6I01B, GW3I01B, GW9I01B, and GW5I01B for spike recovery.

Arsenic was qualified with a "UJ" in samples GW10I01B, FB01B, GW13I01B, GW1101B, GW8I01B, and GW4I01B for spike recovery.

Thallium was qualified with a "UJ" in samples GW10I01B, FB01B, GW13I01B, GW1101B, GW8I01B, GW4I01B, GW1201B, GWU01B, GW6I01B, GW3I01B, GW9I01B, and GW5I01B for spike recovery.

Aluminum was qualified with a "J" in samples GW10I01B, GW13I01B, GW1101B, GW6I01B, GW4I01B, GW9I01B, and GW5I01B for serial dilution.

Manganese was qualified with a "J" in samples GW10I01B, GW13I01B, GW1101B, GW8I01B, GW4I01B, GW1201B, GWU01B, GW6I01B, GW3I01B, GW9I01B, and GW5I01B for serial dilution.

Selenium was qualified with a "UJ" in samples GW10I01B, GW13I01B, GW8I01B, GW1201B, GWU01B, GW6I01B for furnace analysis.

Prepared by: _____


Emmanuel A. Nyako M.S.

Date: 10 Nov. 1993

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ORGANIC DATA VALIDATION AND LIMITATION REPORT

Project Site: Stauffers Management Company, Skaneateles Falls, NY
Sample Type: Aqueous
Analysis Type: Pesticides/PCB,s
Laboratory: EA Laboratorties
Report No.: 931235

A. INTRODUCTION

Twenty aqueous samples were analyzed for Pesticide/PCBs. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 standard Operating Procedure No. HW-6 (Revision #8, 1/92). The following information was used to validate the analytical results:

- Sample hold time before analysis
- Surrogate Recoveries
- MS/MSD analyses
- Method blank contamination
- Field blank contamination
- Calibration and GC performance
- Analysis sequence
- Cleanup efficiency verification
- Compound identification
- Chromatogram quality
- Calculations
- Other QC

The holding time summary table and summary of qualified data are attached.

B. CONTRACT AND TECHNICAL REVIEW

Project Site: Stauffers Management Company, Skaneateles Falls, NY
Sample Type: Aqueous
Analysis Type: Pesticides/PCB,s
Laboratory: EA Laboratories
Report No.: 931235

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW10I01B	9821
FB01B	9822
GW13I01B	9892
GW11I01B	9894
GW12I01B	10112
GW8I01B	10113
GWU01B	10114
GW06I01B	10115
GW3I01B	10116
GW4I01B	10117
GW9I01B	10118
GW5I01B	10119
GW14I01B	10183
GW1I01B	10184
GW2I01B	10185
GW7I01B	10187
GW12S01B	10214
GW5S01B	10215
GWCFP101B	10216
GWCFP102B	10217

Contract and Technical Review (CTR) Comments

1. Sample Hold Before Analysis: All Pesticide/PCB,s analyses were performed within the NYSDEC ASP and EPA technical holding times.
2. Surrogate Recovery: Surrogates measure the ability of the laboratory to extract the targeted analytes by evaluating the recovery of 2 indicator compounds (tetrachloro-m-xylene and decachlorobiphenyl), which are structurally similar to some of the targeted analytes, as indicators for all of the analytes. Most surrogate recoveries were outside ASP contractual and EPA technical QC limits.

Action:

The analytical results for all the compounds were qualified as estimates("J" positives, "UJ" non-detects) in samples GW10I01B,FB01B,GW13I01B, GW11I01B,GW12I01B,GW8I01B,GWU01B,GW06I01B,GW3I01B,GW4I01B, GW9I01B,GW5I01B,GW14I01B,GW1I01B,GW2I01B, GW7I01B,GW12S01B, and GW5S01B.

3. MS/MSD Analyses: The MS/MSD recoveries and RPDs were determined for five of the targeted analytes. All RPDs and spike recoveries complied with ASP contractual and EPA technical requirements.
4. LCS Analysis: Percent recovery for five of the targeted analytes was also determined for an LCS sample. All spike recoveries were compliant.
5. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. The single method blank contained no targeted analytes.
6. Rinsate Blank Contamination: The rinsate blank (RB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The rinsate blank was provided in this data contained no targeted analytes.
7. Initial Calibration: A three-point calibration for single component pesticides and one-point calibration for multicomponent pesticides/PCBs is required. The RSD of the calibration factors was reviewed. Delta BHC(20.1%) was outside the QC requirements(i.e.RSD<20%).

Action:

Delta-BHC was qualified with a "UJ" in sample GW13I01B for RSD>20%.

8. Analyte Resolution: To ensure proper analyte separation on the GC column, the resolution of closely eluting compound peaks is evaluated. Peak resolution was compliant for all compounds and both GC columns.

9. Performance Evaluation Mixtures: The PEM is used to verify that the initial calibration is stable throughout the GC analyses. The calculated relative percent difference %D (labeled as "RPD") for each alpha-BHC was outside the QC requirements.

Action:

Alpha-BHC was qualified with a "UJ" in sample GW13I01B for %D>25.

10. Pesticide Calibration Verification: The relative percent difference %D (labeled as "RPD") of calculated amount and the true amount of each of the single component pesticides in mid point concentration of the Individual Standard Mixtures used to demonstrate continuing calibration must be less or equal to 25%. Alpha-BHC(30%) was outside the QC limit. No action was taken since it was previously qualified.(see CTR # 9)
11. Analysis Sequence: Pesticide/PCB analyses are required to follow a specific initial and continuing calibration sequence. The analyses complied with the ASP and EPA required sequence.
12. Cleanup Efficiency Verification: All pesticide/PCB analyses must undergo florisil cleanup and may also undergo sulfur and GPC cleanup (the latter is required for soil samples). The samples did not undergo florisil cleanup.
13. Compound Identification and Ion Spectra Match: Verification of identification of an analyte is based upon the retention time of the analyte falling within the retention time windows on 2 columns. In addition, the percent difference between the concentrations of the compounds in the two columns should not exceed 25%. The following non-compliances were noted and appropriate qualifiers applied as per SOP.

Action:

4,4'DDE was qualified with a "JN" in sample GWCFP101B for %D between two columns greater than 25%.

14. Chromatogram Quality: The quality of the chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms exhibited some baseline rise (typically less than 30% of full scale).The quality of the data was not affected.
15. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors except for Form 7D, 7E, and 10A. The quality of the data was not affected.

16. Other QC: The laboratory should label MS/MSD on both Form 1 and PEST Form 2E.

C. DATA LIMITATION OVERVIEW

Summary of Qualified Data

The pesticide/PCB analyses of water samples, referenced as Report No: 931235 showed compliance with the QC requirements of the NYSDEC ASP pesticide/PCBs and required no technical qualifiers from the EPA validation procedure except the following:

The analytical results for all the compounds were qualified as estimates("J" positives, "UJ" non-detects) in samples GW10I01B,FB01B,GW13I01B,GW11I01B,GW12I01B, GW8I01B,GWU01B,GW06I01B,GW3I01B,GW4I01B,GW9I01B,GW5I01B,GW14I01B, GW1I01B,GW2I01B,GW7I01B,GW12S-01B, and GW5S-01B.

Delta-BHC was qualified with a "UJ" in sample GW13I01B for RSD>20%.

Alpha-BHC was qualified with a "UJ" in sample GW13I01B for %D>25.

4,4'DDE was qualified with a "JN" in sample GWCFP101B for %D between two columns greater than 25%.

No data qualifiers were applied to internal laboratory QC samples (e.g., MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by:



Date: 10 November 1993

Emmanuel A. Nyako. M.S.

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ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(9)
Analysis Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No. 931235

A. INTRODUCTION

Nine aqueous samples were analyzed for Volatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW12I01B	10112
GW08I01B	10113
GWU01B	10114
GW04I01B	10117
GW09I01B	10118
TRIP BLK 2	10120
GW06I01B	10115
GW03I01B	10116
GW05I01B	10119

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All VOA analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with BFB (VOA). All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of VOAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30% acetone (31.289)

%D>25% acetone (40.70), 2-hexanone (52.45), 2-butanone (32.45), and 4-methyl-2-pentanone (27.30).

Action(s):

Acetone was qualified with a "UJ" in samples GW06I01B, GW03I01B, GW05I01B for RSD>30%.

Acetone was qualified with a "UJ" in samples GW12I01B, GW08I01B, GWU01B, GW04I01B, GW09I01B, Trip Blk 2 for %D>25

2-butanone was qualified with a "UJ" in samples GW12I01B, GW08I01B, GWU01B, GW04I01B, GW09I01B, Trip Blk 2 for %D>25

4-methyl-2-pentanone was qualified with a "UJ" in samples GW12I01B, GW08I01B, GWU01B, GW04I01B, GW09I01B, Trip Blk 2 for %D>25

2-hexanone was qualified with a "UJ" in samples GW12I01B, GW08I01B, GWU01B, GW04I01B, GW09I01B, Trip Blk 2 for %D>25

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of three indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the VOA analyses were within acceptable limits.
5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon three internal standards (bromochloromethane, 1,4-difluorobenzene, and chlorobenzene). All internal standards areas were compliant.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. The MS/MSD recoveries in the VOA analyses were within acceptable limits.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the VOA analyses were within acceptable limits.
8. Analysis Sequence: VOA sample analyses are required to be run within 12 hours of GC/MS tune. The VOA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. One VOA method blank was analyzed. The method blank contained methylene chloride, but the associated sample was a trip blank, hence, no qualifications was required.

10. Field and Trip Blank Contamination: Field and Trip Blank Contamination :The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The trip blank (TB) measures the potential for false-positive results introduced during sample holding in the shipping containers. One trip blank and one field blank were analyzed. The blanks did not contain any target compounds.
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All VOA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality: The quality of the VOA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: Xylene exceeded calibration range in sample GW05I01B. The laboratory correctly qualified the values with a "E". The reviewer transferred xylene values from diluted sample to undiluted sample. The Form 1 of the original sample should be used.

C. DATA LIMITATION OVERVIEW:

The VOA analyses of three water samples from Report # 931235 showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region SOP, and all data are considered valid and acceptable except for the following:

In sample GW06I01B, acetone was qualified with a "UJ" for RSD>30%

In sample GW03I01B, acetone was qualified with a "UJ" for RSD>30%

In sample GW05I01B, acetone was qualified with a "UJ" for RSD>30%

In sample GW12I01B, 2-butanone, acetone, 2-hexanone, and 4-methyl-2-pentanone were qualified with a "UJ" for %D>25.

In sample GW08I01B, 2-butanone, acetone, 2-hexanone, and 4-methyl-2-pentanone were qualified with a "UJ" for %D>25.

In sample GWU01B, 2-butanone, acetone, 2-hexanone, and 4-methyl-2-pentanone were qualified with a "UJ" for %D>25.

In sample GWU0401B, 2-butanone, acetone, 2-hexanone, and 4-methyl-2-pentanone were qualified with a "UJ" for %D>25.

In sample GWU0901B, 2-butanone, acetone, 2-hexanone, and 4-methyl-2-pentanone were qualified with a "UJ" for %D>25.

In sample Trip Blk 2, 2-butanone, acetone, 2-hexanone, and 4-methyl-2-pentanone were qualified with a "UJ" for %D>25.

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSD, method blanks). No qualifiers were applied since these analyses are not provided to the data user.

Prepared by:  Date: 20 December 1993
Emmanuel A. Nyako

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ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(5)
Analysis Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No. 931235

A. INTRODUCTION

Five aqueous samples were analyzed for Volatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW14I01B	10183
GW01I01B	10184
GW02I01B	10185
GW07I01B	10187
TRIP BLK	10188

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All VOA analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with BFB (VOA). All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of VOAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30% acetone (31.289)

%D>25% 2-hexanone (23.34)

Action(s):

Acetone was qualified with a "UJ" in samples GW14I01B, GW01I01B, GW02I01B, GW07I01B, and TRIP BLK for RSD>30%.

Hexanone was qualified with a "UJ" in samples GW14I01B, GW01I01B, GW02I01B, GW07I01B, and TRIP BLK for RSD>30%.

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of three indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the VOA

analyses were within acceptable limits.

5. Internal Standards:GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon three internal standards (bromochloromethane, 1,4-difluorobenzene, and chlorobenzene). All internal standards areas were compliant.
6. Matrix Spike/Matrix Spike Duplicate:The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. The MS/MSD recoveries in the VOA analyses were within acceptable limits.
7. LCS Recoveries:The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the VOA analyses were within acceptable limits.
8. Analysis Sequence:VOA sample analyses are required to be run within 12 hours of GC/MS tune. The VOA analyses complied with the analysis sequences.
9. Method Blank Contamination:A method blank measures the potential for false-positive results introduced by internal laboratory contamination. One VOA method blank was analyzed. The method blank contained methylene chloride, but the associated sample was a trip blank, hence, no qualifications was required.
10. Field and Trip Blank Contamination:Field and Trip Blank Contamination :The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The trip blank (TB) measures the potential for false-positive results introduced during sample holding in the shipping containers. One trip blank and one field blank were analyzed. The blanks did not contain any target compounds.
11. Compound Identification and Spectra Match:Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All VOA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality:The quality of the VOA chromatograms are evaluated to determine whether there are any interfering

unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.

13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.

14. Other QC: None.

C. DATA LIMITATION OVERVIEW:

The VOA analyses of three water samples from Report # 931235 showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

In samples GW14I01B, GW01I01B, GW02I01B, GW07I01B, and TRIP BLK, acetone was qualified with a "UJ" for RSD>30%

In samples GW14I01B, GW01I01B, GW02I01B, GW07I01B, and TRIP BLK, 2-hexanone was qualified with a "UJ" for %D>25

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSD, method blanks). No qualifiers were applied since these analyses are not provided to the data user.

Prepared by: _____



Emmanuel A. Nyako

Date: 20 December 1993

ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(3)
Analysis Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No. 931235

A. INTRODUCTION

Three aqueous samples were analyzed for Volatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW10I01B	9821
FB01B	9822
TB01B	9823

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All VOA analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with BFB (VOA). All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of VOAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

%D>25% chloromethane (30.50), bromethane (36.46), acetone (52.13), 2-hexanone (36.39), 4-methyl-2-pentanone (35.98), and 2-butanone (51.15).

Action(s):

Chloromethane was qualified with a "UJ" in three water samples GW10I01B, TB01B, FB01B for %D>25.

Bromethane was qualified with a "UJ" in three water samples GW10I01B, TB01B, FB01B for %D>25.

2-butanone was qualified with a "UJ" in three water samples GW10I01B, TB01B, FB01B for %D>25.

Acetone was qualified with a "UJ" in three water samples GW10I01B, TB01B, FB01B for %D>25.

4-methyl-2-pentanone was qualified with a "UJ" in three water samples GW10I01B, TB01B, FB01B for %D>25.

2-hexanone was qualified with a "UJ" in three water samples GW10I1B, TB01B, CFB01B for %D>25.

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of three indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the VOA analyses were within acceptable limits.
5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon three internal standards (bromochloromethane, 1,4-difluorobenzene, and chlorobenzene). All internal standards areas were compliant.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. The MS/MSD recoveries in the VOA analyses were within acceptable limits.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the VOA analyses were within acceptable limits.
8. Analysis Sequence: VOA sample analyses are required to be run within 12 hours of GC/MS tune. The VOA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. One VOA method blank was analyzed. The method blank was not contaminated with any target analyte.
10. Field and Trip Blank Contamination: Field and Trip Blank Contamination : The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The trip blank (TB) measures the potential for false-positive results introduced during sample holding in the shipping containers. One trip blank and one field blank were analyzed. The blanks did not contain any target compounds.

11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All VOA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality: The quality of the VOA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: None

C. DATA LIMITATION OVERVIEW:

The VOA analyses of three water samples from Report # 931235 showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

In sample GW10I01B, chloromethane, bromethane, 2-butanone, acetone, 4-methyl-2-pentanone, 2-hexanone were qualified with a "UJ" for %D>25.

In sample TB01B, chloromethane, bromethane, 2-butanone, acetone, 4-methyl-2-pentanone, 2-hexanone were qualified with a "UJ" for %D>25.

In sample FB01B, chloromethane, bromethane, 2-butanone, acetone, 4-methyl-2-pentanone, 2-hexanone were qualified with a "UJ" for %D>25.

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSD, method blanks). No qualifiers were applied since these analyses are not provided to the data user.

Prepared by: _____


Emmanuel A. Nyako

Date: 20 December 1993

ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(3)
Analysis Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No. 931235

A. INTRODUCTION

Three aqueous samples were analyzed for Volatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW13I01B	9892
GW11I01B	9893
TB02B	9895

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All VOA analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with BFB (VOA). All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of VOAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

%D>25% chloromethane (91.81), acetone (35.89), 2-hexanone (26.60), (35.98), and 2-butanone (37.86).

Action(s):

Chloromethane was qualified with a "UJ" in three water samples GW13I01B, GW11I01B, TB02B for %D>25.

Acetone was qualified with a "UJ" in three water samples GW13I01B, GW11I01B, TB02B for %D>25.

2-butanone was qualified with a "UJ" in three water samples GW13I01B, GW11I01B, TB02B for %D>25.

2-hexanone was qualified with a "UJ" in three water samples GW13I01B, GW11I01B, TB02B for %D>25.

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of three indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the VOA analyses were within acceptable limits.
5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon three internal standards (bromochloromethane, 1,4-difluorobenzene, and chlorobenzene). All internal standards areas were compliant.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. The MS/MSD recoveries in the VOA analyses were within acceptable limits.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the VOA analyses were within acceptable limits.
8. Analysis Sequence: VOA sample analyses are required to be run within 12 hours of GC/MS tune. The VOA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. One VOA method blank was analyzed. The method blank contained methylene chloride, but the associated sample was a trip blank, hence, no qualifications was required.
10. Field and Trip Blank Contamination: Field and Trip Blank Contamination : The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The trip blank (TB) measures the potential for false-positive results introduced during sample holding in the shipping containers. One trip blank and one field blank were analyzed. The blanks did not contain any target compounds.

11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All VOA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality: The quality of the VOA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: None

C. DATA LIMITATION OVERVIEW:

The VOA analyses of three water samples from Report # 931235 showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

In sample GW13I01B, chloromethane, 2-butanone, acetone, 2-hexanone were qualified with a "UJ" for %D>25.

In sample GW11I01B, chloromethane, 2-butanone, acetone, 2-hexanone were qualified with a "UJ" for %D>25.

In sample TB02B, chloromethane, 2-butanone, acetone, 2-hexanone were qualified with a "UJ" for %D>25.

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSD, method blanks). No qualifiers were applied since these analyses are not provided to the data user.

Prepared by:  Date: 20 December 1993
Emmanuel A. Nyako

ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(5)
Analysis Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No. 931235

A. INTRODUCTION

Five aqueous samples were analyzed for Volatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW12SI01B	10214
GW05S01B	10215
CFP101B	10216
CFP201B	10217
TRIP BLK5A&B	10218

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All VOA analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with BFB (VOA). All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of VOAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30% acetone (31.289)

Action(s):

Acetone was qualified with a "UJ" in samples GW12SI01B, GW05S01B, CFP101B, CFP201B, TRIP BLK5A&B for RSD>30%.
4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of three indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the VOA analyses were within acceptable limits.

5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon three internal standards (bromochloromethane, 1,4-difluorobenzene, and chlorobenzene). All internal standards areas were compliant.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. The MS/MSD recoveries in the VOA analyses were within acceptable limits.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the VOA analyses were within acceptable limits.
8. Analysis Sequence: VOA sample analyses are required to be run within 12 hours of GC/MS tune. The VOA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. One VOA method blank was analyzed. The method blank contained methylene chloride, but the associated sample was a trip blank, hence, no qualifications was required.
10. Field and Trip Blank Contamination: Field and Trip Blank Contamination: The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The trip blank (TB) measures the potential for false-positive results introduced during sample holding in the shipping containers. One trip blank and one field blank were analyzed. The blanks did not contain any target compounds.
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All VOA ion spectra for the targeted analytes correctly matched the standard spectra.

12. Chromatogram Quality: The quality of the VOA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: Xylene exceeded calibration range in sample CFP201B. The laboratory correctly qualified the values with a "E". The reviewer transferred xylene values from diluted sample to undiluted sample. The Form 1 of the original sample should be used.

C. DATA LIMITATION OVERVIEW:

The VOA analyses of three water samples from Report # 931235 showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

In sample GW12SI01B, acetone was qualified with a "UJ" for RSD>30%

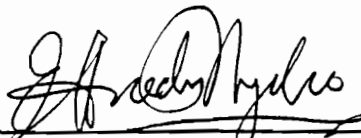
In sample GW05S01B, acetone was qualified with a "UJ" for RSD>30%

In sample CFP201B, acetone was qualified with a "UJ" for RSD>30%.

In sample CFP201B, acetone was qualified with a "UJ" for RSD>30%.

In sample TRIP BLK5A&B, acetone was qualified with a "UJ" for RSD>30%.

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSD, method blanks). No qualifiers were applied since these analyses are not provided to the data user.

Prepared by:  Date: 20 December 1993
Emmanuel A. Nyako

ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(8)
Analysis Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235

A. INTRODUCTION

Eight water samples were analyzed for semivolatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW12I01B	10112
GW8I01B	10113
GWU01B	10114
GW06I01B	10115
GW3I01B	10116
GW4I01B	10117
GW9I01B	10118
GW5I01B	10119

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All semivolatile analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with DFTPP. All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of BNAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30% 2-4-dinitrophenol (32.260)

%D>25% m-toluic acid (42.647), o-toluic
acid(32.738), and p-toluic acid(25.010).

Action(s):

2-4-dinitrophenol (32.260) was qualified with a "UJ" in samples GW12I01B, GW08I01B, GWU01B, GW06I01B, GW03I01B, GW04I01B, GW05I01B, GW09I01B, GW03I01BDL, and GW04I01BDL for to RSD>30%.

m-toluic acid was qualified with a "J" in samples GW06I01B, GW09I01B, GW05I01B, GW03I01BDL, and "UJ" GW04I01BDL for %D>25.

o-toluic acid was qualified with a "J" in samples GW06I01B, GW09I01B, GW05I01B, GW03I01BDL, and "UJ" GW04I01BDL for %D>25.

p-toluic acid was qualified with a "J" in samples GW03I01BDL and GW04I01BDL for %D>25.

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of eight indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for 2-fluorobiphenyl and terphenyl-d14 were outside the acceptable limits.

Action:

The compounds associated with the two surrogates in sample GW0601B were qualified as estimates("J"positives,"UJ"non-detects).

5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon six internal standards. All internal standards areas were outside the control limit for acenaphthene-d10, perylene-d12, phenanthrene-d10, and chrysene-d12 in sample GW0401B and perylene-d12, and phenanthrene-d10 in sample GW0301B. No action was taken since the internal standards recoveries were within acceptable limits in the diluted samples.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. Eight MS/MSD recoveries and five RPDs in the BNA analyses were outside the acceptable limits. No action was required as per SOP.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the BNA analyses were within acceptable limits. No action was taken as per SOP.
8. Analysis Sequence: BNA sample analyses are required to be run within 12 hours of GC/MS tune. The BNA analyses complied with the analysis sequences.

9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. A total of two BNA method blanks were analyzed. Two blanks contained no target compounds.
10. Field Blank Contamination: The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. One field blank was analyzed. The field blanks contained no target compounds.
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All BNA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality: The quality of the BNA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: The following compounds, o-m, and p-toluic acid exceeded the calibration range. The results of the diluted compounds were transferred to the Form 1 of the original sample; use GW06I01B, GW12I01B, and GW09I01B. The diluted samples GW03I01BDL and GW04I01BDL should be used since the internal standard areas were better than the original samples.

C. DATA LIMITATION OVERVIEW: The BNA analyses of eight water samples from Report No:931235 showed compliance with the QC requirements of the NYSDE ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except the following:

In sample GW12I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%.

In sample GW08I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%.

In sample GWU01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%.

In sample GW06I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. The compounds associated with the two surrogates 2-fluorobiphenyl and terphenyl-d14 were qualified as estimates("J"positives,"UJ"non-detects).

In sample GW03I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25.

In sample GW04I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%.

In sample GW05I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25.

In sample GW09I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25.

In sample GW03I01BDL, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25. P-toluic acid was qualified with a "J" for %D>25.

In samples GW04I01BDL, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25. P-toluic acid was qualified with a "J" for %D>25.

No data qualifiers were applied to internal laboratory QC samples (e.g.MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by: Emmanuel A. Nyako Date: 10 January 1993



ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(4)
Analysis Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235

A. INTRODUCTION

Four water samples were analyzed for semivolatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW14I01B	10183
GW01I01B	10184
GW02I01B	10185
GW07I01B	10187

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All semivolatile analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with DFTPP. All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of BNAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30% 2-4-dinitrophenol (32.260)

%D>25% m-toluic acid (42.647), o-toluic
acid(32.738), and p-toluic acid(27.425).

Action(s):

2-4-dinitrophenol (32.260) was qualified with a "UJ" in samples GW14I01B, GW01I01B, GW02I01B, and GW07I01B for RSD>30%.

m-toluic acid was qualified with a "J" in samples, GW14I01B, GW01I01B, GW02I01B, and GW07I01B for %D>25.

p-toluic acid was qualified with a "J" in samples, GW14I01B, and GW07I01B and "UJ" in samples GW01I01B, GW02I01B for %D>25.

o-toluic acid was qualified with a "J" in samples GW14I01B, GW01I01B, GW02I01B, and GW07I01B for %D>25.

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of eight indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for 2-fluorobiphenyl and terphenyl-d14 were outside the acceptable limits.

Action:

The compounds associated with the two surrogates in sample GW07I01B were qualified as estimates ("J" positives, "UJ" non-detects).

5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon six internal standards. The internal standards areas within the control limit for all samples.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. Eight MS/MSD recoveries and seven RPDs in the BNA analyses were outside the acceptable limits. No action was required as per SOP.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the BNA analyses were within acceptable limits. No action was taken as per SOP.
8. Analysis Sequence: BNA sample analyses are required to be run within 12 hours of GC/MS tune. The BNA analyses complied with the analysis sequences.

9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. One BNA method blank was analyzed. The blank contained no target compounds.
10. Field Blank Contamination: The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. One field blank was analyzed. The field blanks contained no target compounds.
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All BNA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality: The quality of the BNA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: The following compounds, o-m-p- toluic acid and phenol exceeded the calibration range. The results of the diluted compounds were transferred to the Form 1 of the original sample; use GW01I01B, GW02I01B, and GW07I01B.

C. DATA LIMITATION OVERVIEW: The BNA analyses of four water samples from Report No:931235 showed compliance with the QC requirements of the NYSDE ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except the following:

In sample GW14I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25. P-toluic acid was qualified with a "J" for %D>25.

In sample GW01I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25. P-toluic acid was qualified with a "UJ" for %D>25.

In sample GW02I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25. P-toluic acid was qualified with a "UJ" for %D>25.

In sample GW07I01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for to RSD>30%. M-toluic acid and o-toluic acid were qualified with a "J" for %D>25. P-toluic acid was qualified with a "J" for %D>25. The compounds associated with the two surrogates 2-fluorobiphenyl and terphenyl-d14 were qualified as estimates("J"positives,"UJ"non-detects).

No data qualifiers were applied to internal laboratory QC samples (e.g.MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by:  Date: 20 Deceber 1993
Emmanuel A. Nyako

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ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(4)
Analysis Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235

A. INTRODUCTION

Four water samples were analyzed for semivolatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW12S01B	10214
GW05S01B	10215
CFP101B	10216
CFP201B	10217

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All semivolatile analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with DFTPP. All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of BNAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30%	2,4-dinitrophenol (32.260)
%D>25%	m-toluic acid (42.647), o-toluic acid (32.738, 47.908), p-toluic acid (25.010), and 2,4-dinitrophenol (32.312).

Action(s):

2,4-dinitrophenol (32.260) was qualified with a "UJ" in samples GW12S01B, GW05S01B, CFP101B, and CFP201B for RSD>30%

2,4-dinitrophenol (32.260) was qualified with a "J" in sample GW12S01BDL for %D>25%

2,4-dinitrophenol (32.260) was qualified with a "UJ" in samples CFP101B and CFP201B for %D>25%

m-toluic acid was qualified with a "J" in samples GW12S01B and GW05S01B for %D>25.

o-toluic acid was qualified with a "UJ" in samples GW12S01B and GW05S01B for %D>25.

o-toluic acid was qualified with a "J" in sample GW12S01BDL for %D>25.

p-toluic acid was qualified with a "J" in samples GW12S01B and GW05S01B for %D>25.

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of eight indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recovery was outside the control limit for GW05S01B. No action was required as per SOP.
5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon six internal standards. All internal standards areas were outside the control limit for perylene-d12 and phenanthrene-d10 in sample CFP101B and CFP201B. No action was required since the internal standards recoveries were within acceptable limits in the diluted samples.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. Eight MS/MSD recoveries and five RPDs in the BNA analyses were outside the acceptable limits. No action was required as per SOP.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the BNA analyses were within acceptable limits. No action was taken as per SOP.
8. Analysis Sequence: BNA sample analyses are required to be run within 12 hours of GC/MS tune. The BNA analyses complied with the analysis sequences.

9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. A total of two BNA method blanks were analyzed. Two blanks contained no target compounds.
10. Field Blank Contamination: The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. One field blank was analyzed. The field blanks contained no target compounds.
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All BNA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality: The quality of the BNA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: The following compounds, o-m, and p-toluic acid and 4-methyphenol exceeded the calibration range. the results of the diluted compounds were transferred to the Form 1 of the original sample; use GW12S01B, and GW05S01B. The diluted samples CFP101BDL and CFP201BDL should be used since the internal standard areas were better than the original samples.

C. DATA LIMITATION OVERVIEW: The BNA analyses of four water samples from Report No:931235 showed compliance with the QC requirements of the NYSDE ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except the following:

In sample GW12S01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for RSD>30%. O-toluic acid was qualified with a "UJ" for %D>25. P-toluic acid was qualified with a "J" in sample GW12S01B for %D>25. M-toluic acid was qualified with a "J" in sample GW12S01B for %D>25.

In sample GW05S01B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for RSD>30% O-toluic acid was qualified with a "UJ" for %D>25. P-toluic acid was qualified with a "J" in sample GW05S01B for %D>25. M-toluic acid was qualified with a "J" in sample GW05S01B for %D>25.

In sample CFP101B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for RSD>30%

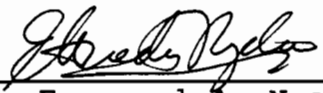
In sample CFP201B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for RSD>30%

In sample GW12S01BDL, 2-4-dinitrophenol (32.260) was qualified with a "J" for %D>25%. O-toluic acid was qualified with a "J" in sample for %D>25.

In sample CFP101B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for %D>25%

In sample CFP201B, 2-4-dinitrophenol (32.260) was qualified with a "UJ" for %D>25%

No data qualifiers were applied to internal laboratory QC samples (e.g.MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by:  Date: 20 December 1993
Emmanuel A. Nyako

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ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC Skaneateles Falls, NY
Sample Type: Water(4)
Analysis Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235

A. INTRODUCTION

Four water samples were analyzed for semivolatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC Skaneateles Falls, NY
Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931235

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW10I01B	9821
FB01B	9822
GW13I01B	9892
GW11I01B	9894

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All semivolatile analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with DFTPP. All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of BNAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30% 2-4-dinitrophenol (32.260)

%D>25% hexachlorocyclopentadiene(33.745), 4-nitrophenol(30.20).

Action(s):

2-4-dinitrophenol was qualified with a "UJ" in samples GW10I01B, FB01B, GW13I01B, and GW11I01B for RSD>30%

4-nitrophenol was qualified with a "UJ" in samples GW10I01B, FB01B, GW13I01B, and GW11I01B for %D>25%

Hexachlorocyclopentadiene, was qualified with a "UJ" in samples GW10I01B, FB01B, GW13I01B, and GW11I01B for %D>25%

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of eight indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries were within the control limit for all samples.
5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon six internal standards. All internal standards areas were within the control limits.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. Eight MS/MSD recoveries the BNA analyses were outside the acceptable limits. No action was required as per SOP.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the BNA analyses were within acceptable limits. No action was taken as per SOP.
8. Analysis Sequence: BNA sample analyses are required to be run within 12 hours of GC/MS tune. The BNA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. One BNA method blanks was analyzed. The blank contained no target compounds.
10. Field Blank Contamination: The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. One field blank was analyzed. The field blanks contained no target compounds.
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All BNA ion spectra for the targeted analytes correctly matched the standard spectra.

12. Chromatogram Quality: The quality of the BNA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: None.

C. **DATA LIMITATION OVERVIEW**: The BNA analyses of four water samples from Report No:931235 showed compliance with the QC requirements of the NYSDE ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except the following:

In sample GW10I01B, 2-4-dinitrophenol was qualified with a "UJ" for RSD>30%. 4-nitrophenol and hexachlorocyclopentadiene were qualified with a "UJ" for %D>25%.

In sample FB01B, 2-4-dinitrophenol was qualified with a "UJ" for RSD>30%. 4-nitrophenol and hexachlorocyclopentadiene were qualified with a "UJ" for %D>25%

In sample GW13I01B, 2-4-dinitrophenol was qualified with a "UJ" for RSD>30%. 4-nitrophenol and hexachlorocyclopentadiene were qualified with a "UJ" for %D>25%

In sample GW11I01B, 2-4-dinitrophenol was qualified with a "UJ" for RSD>30%. 4-nitrophenol and hexachlorocyclopentadiene were qualified with a "UJ" for %D>25%

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by: Emmanuel A. Nyako Date: 20 December 1993

ORGANIC DATA VALIDATION AND LIMITATION REPORT

Project Site: Stauffers Management Company, Skaneateles Falls, NY
Sample Type: Aqueous(24) and Soil(5)
Analysis Type: Pesticides
Laboratory: EA Laboratories
Report No.: 931455

A. INTRODUCTION

Twenty-four aqueous and five soil samples were analyzed for Pesticide/PCBs. The analytical results were validated following EPA Region 2 Standard Operating Procedure No. HW-6 (Revision #8, 1/92). In addition, a compliance check with the NYSDEC ASP was performed. The following information was used to validate the analytical results:

- Sample hold time before analysis
- Surrogate Recoveries
- MS/MSD analyses
- Method blank contamination
- Field blank contamination
- Calibration and GC performance
- Analysis sequence
- Cleanup efficiency verification
- Compound identification
- Chromatogram quality
- Calculations
- Other QC

The holding time summary table and summary of qualified data are attached.

B. CONTRACT AND TECHNICAL REVIEW

Project Site: ICI Skaneateles Falls, NY
Sample Type: Aqueous and Soil
Analysis Type: CLP Pesticides
Laboratory: EA Laboratories
SDG No.: N/A

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW09D01B	11585
GW07S501B	11856
GW07D01B	11587
GW13D01B	11589
GW06S01B	11590
GW15D01B	11592
GW16I01B	11691
GW16D01B	11692
GW17D01B	11693
GW04S01B	11733
GWFB01B	11734
GW02S01B	11735
SW0101B	11737
SWDU01B	11738
SW0201B	11739
SW0301B	11744
SW0401B	11748
TB03B	11467
SPW0301B	11468
SPW0201B	11469
SPW0101B	11470
GW18S01B	11471
GW18I01B	11472
GW08S01B	11473
SD0101B	11740
SDDU01B	11741
SD0201B	11742
SD0301B	11745
SD0401B	11749

Contract and Technical Review (CTR) Comments

1. Sample Hold Before Analysis: All Pesticide/PCB analyses were performed within the NYSDEC ASP and EPA technical holding times.
2. Surrogate Recovery: Surrogates measure the ability of the laboratory to extract the targeted analytes by evaluating the recovery of 2 indicator compounds (tetrachloro-m-xylene and decachlorobiphenyl), which are structurally similar to some of the targeted analytes, as indicators for all of the analytes. The two surrogate recoveries(%R) were outside ASP contractual and EPA technical QC limits in the associated samples are listed below.

<u>Sample#</u>	<u>TCX</u>	<u>DCB</u>
GW02S01B	50/52	30/33
GW04S01B	53/52	45/51
GW06S01B	50/56	44/49
GW07D01B	44/45	34/37
GW07S01B	58/60	39/41
GW09D01B	43/44	35/37
GW16I01B	33/35	14/14
GW08S01B	34/35	37/33
GW18I01B	51/41	54/52
GW18S01B	52/44	40/40

Action:

The surrogate recoveries were between 10 and 60%. The "UJ" qualifier was applied to all non-detect compounds in the above samples except a positive 4,4' DDT in sample GW09D01B which was rejected for %D between two columns.

3. MS/MSD Analyses: The MS/MSD recoveries and RPDs were determined for six of the targeted analytes. All RPDs complied with ASP contractual and EPA technical requirements. Eight spike recoveries were outside the required QC criteria. No action was required as per SOP.
4. LCS Analysis: Percent recovery for six of the targeted analytes was also determined for an LCS sample. Four out of the six spike recoveries were non-compliant. No action was required as per SOP.
5. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. The method blanks contained no targeted analytes.

6. Rinsate Blank Contamination: The rinsate blank (RB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The rinsate blank was provided with the samples contained no targeted analytes.
7. Initial Calibration: A three-point calibration for single component pesticides and one-point calibration for multicomponent pesticides/PCBs is required. The relative standard deviations (RSDs) of the calibration factors must be less than 20%. Endrin ketone(26.7%) exceeded the QC requirements.

Action:

The "UJ" qualifier was applied to endrin ketone in samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B,SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SDDU01B,and SD0401B.

8. Analyte Resolution: To ensure proper analyte separation on the GC column, the resolution of closely eluting compound peaks is evaluated. Peak resolution was compliant for all compounds and both GC columns.
9. Performance Evaluation Mixtures: The PEM is used to verify that the initial calibration is stable throughout the GC analyses. The calculated relative percent difference %D (labeled as "RPD") for each PEM analyte complied with QC requirements.
10. Pesticide Calibration Verification: The relative percent difference %D (labeled as "RPD") of calculated amount and the true amount of each of the single component pesticides in mid point concentration of the Individual Standard Mixtures used to demonstrate continuing calibration must be less or equal to 25%. Alpha-BHC(27.5%),gamma-BHC(30.5%),heptachlor(40.5%), endosulfan I(43.0%),heptachlor epoxide(37.5%),endosulfan II(37.0%), endrin ketone(39.0%), and endrin aldehyde(54.5%) exceeded the QC limit.

Action:

The "UJ" qualifier was applied to non-detect alpha-BHC in samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B,SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B,SD0201B,SD0301B,and SD0401B.

The "UJ" qualifier was applied to non-detect gamma-BHC in samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B,SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B,SD0201B,SD0301B,and SD0401B.

The "UJ" qualifier was applied to non-detect heptachlor in samples

GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B,SW0101B, SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B,SD0201B, SD0301B,and SD0401B.

The "UJ" qualifier was applied to non-detect endosulfan I in samples GW13D01B,GW15D01B,GW16D01B, GW17D01B,GWFB01B,SW0101B, SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B,SD0201B, SD0301B,and SD0401B .

The "UJ" qualifier was applied to non-detect heptachlor epoxide in samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SDDU01B,and SD0401B.

The "UJ" qualifier was applied to non-detect endosulfan II in samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B,SW0101B,SWD U01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B,SD0201B, SD0301B,and SD0401B.

The "UJ" qualifier was applied to non-detect endrin aldehyde in samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B, SD0201B,SD0301B,and SD0401B.

Endrin ketone was already qualified for RSD.

10. Analysis Sequence: Pesticide/PCB analyses are required to follow a specific initial and continuing calibration sequence. The analyses complied with the ASP and EPA required sequence.
11. Cleanup Efficiency Verification: All pesticide/PCB analyses must undergo florisil cleanup and may also undergo sulfur and GPC cleanup (the latter is required for soil samples). The samples were treated for sulfur and underwent florisil cleanup.
12. Compound Identification : Verification of identification of an analyte is based upon the retention time of the analyte falling within the retention time windows on two columns. In addition, the percent difference between the concentrations of the compounds in the two columns should not exceed 25%. The following non-compliances were noted and appropriate qualifiers applied as per SOP.

Action:

4,4' DDT was rejected "R" in samples GW09D01B,SD0201B, and SD0301B.

Heptachlor epoxide was rejected "R" in samples SD0101B,SD0201B and SD0301B .

Methoxychlor was rejected "R" in sample SD0101B and "JN" in SD0201B.

Endrin ketone was rejected "R" in samples SD0101B,SD0301B, and "JN" in SD0201B.

Gamma-chlordane was rejected "R" in samples SD0101B and SD0201B.

Beta-BHC was rejected "R" in sample SD0201B.

Aldrin was rejected "R" in sample SD0201B.

4,4'DDE was rejected "R" in sample SD0201B and "JN" in sample SD0301B.

Endosulfan Sulfate was rejected "R" in sample SD0201B and "JN" in sample SD0301B.

13. Chromatogram Quality: The quality of the chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. Most of the chromatograms exhibited some baseline rise (typically less than 30% of full scale) and some negative peaks. These anomalies had no effect on the data quality.
14. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors except for Form 7D, 7E, and 10A. It is the reviewer opinion that the laboratory should check their software and recalculate the values.
15. Other QC: The laboratory should complete filling the Form 1, for example Lab. Sample ID and Case No. The following changes were made on Form 1 to reflect correct client sample number on the traffic report.

<u>Old sample#</u>	<u>Correct sample#</u>
SMC-GW07501B	SMC-GW07S01B
SMC-GW13001B	SMC-GW13D01B
SMC-GW06501B	SMC-GW06S01B
SMC-GW15001B	SMC-GW15D01B
SMC-GW16I01B	SMC-GW16I01B
SMC-GW16001B	SMC-GW16D01B
SMC-GW04501B	SMC-GW04S01B
SMC-GW02501B	SMC-GW02S01B

C. DATA LIMITATION OVERVIEW

Summary of Qualified Data

The pesticide/PCB analyses of soil and water samples, referenced as Case#00012 showed compliance with the QC requirements of the NYSDEC ASP pesticide/PCBs and required no technical qualifiers from the EPA validation procedure except the following:

In the samples GW02S01B,GW04S01B,GW06S01B,GW07D01B, GW07S01B,GW09D01B,GW16I01B,GW08S01B,GW18I01B,GW18S01B, the "UJ" qualifier was applied to all non-detect compounds for surrogate recoveries except for 4,4' DDT in sample GW09D01B which was rejected "R" for %D between two columns

In samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SDDU01B,and SD0401B, the "UJ" qualifier was applied to endrin ketone for RSD.20%.

In samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B, SD0201B,SD0301B,and SD0401B, the "UJ" qualifier was applied to non-detect alpha-BHC for RPD>25%.

In samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B, SD0201B,SD0301B, and SD0401B, the "UJ" qualifier was applied to non-detect gamma-BHC for RPD>25%.

In samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B, SD0201B,SD0301B,and SD0401B, the "UJ" qualifier was applied to non-detect heptachlor for RPD>25%.

In samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B, SDDU01B,SD0201B,SD0301B,and SD0401B, the "UJ" qualifier was applied to non-detect endosulfan I for RPD>25%.

In samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SDDU01B, and SD0401B, the "UJ" qualifier was applied to non-detect heptachlor epoxide for RPD>25%.

In samples,GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B,

SD0201B,SD0301B,and SD0401B. the "UJ" qualifier was applied to non-detect endosulfan II for RPD>25%.

In samples GW13D01B,GW15D01B,GW16D01B,GW17D01B,GWFB01B, SW0101B,SWDU01B,SW0201B,SW0301B,SW0401B,SD0101B,SDDU01B, SD0201B,SD0301B,and SD0401B the "UJ" qualifier was applied to non-detect endrin aldehyde for RPD>25%.

In samples GW09D01B,SD0201B, and SD0301B, 4,4' DDT was rejected "R" for %D between two columns exceeding QC criteria.

In samples SD0101B,SDDU01B and SD0301B, heptachlor epoxide was rejected "R" for %D between two columns exceeding QC criteria.

Methoxychlor was rejected "R" in sample SD0101B and "JN" in SD0201B for %D between two columns exceeding QC criteria.

Endrin ketone was rejected "R" in samples SD0101B,SD0301B, and "JN" in SD0201B for %D between two columns exceeding QC criteria.

In samples SD0101B and SD0201B, gamma-chlordane was rejected "R" for %D between two columns exceeding QC criteria.

In sample SD0201B beta-BHC was rejected "R" for %D between two columns exceeding QC criteria.

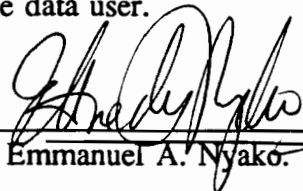
In sample SD0201B aldrin was rejected "R" for %D between two columns exceeding QC criteria.

4,4'DDE was rejected "R" in sample SD0201B and "JN" in sample SD0301B for %D between two columns exceeding QC criteria.

Endosulfan Sulfate was rejected "R" in sample SD0201B and "JN" in sample SD0301B for %D between two columns exceeding QC criteria.

Endrin ketone was already qualified for RSD

No data qualifiers were applied to internal laboratory QC samples (e.g., MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by:  Date: 10 November 1993
Emmanuel A. Nyakó.

ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: Stauffer Managemnt Company,Skaneateles Falls,N.Y.
Sample Type: Aqueous(29) and Soil(6)
Analysis Type: CLP volatiles Organics
Laboratory: EA Laboratories Inc.
Report No: 931455

A. INTRODUCTION

Twenty-nine (25 water, 4 field blanks) and six soils, analyzed for Volatile Organics.The analytical results were validated following the procedures outlined in the EPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: Stauffer Managemnt Company,Skaneateles Falls,N.Y.
Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931455
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW09D01B	11585
GW07S01B	11856
GW07D01B	11587
GWTB01B	11588
GW13D01B	11589
GW06S01B	11590
GW15D01B	11592
GWTB01B	11599
GW16I01B	11691
GW16D01B	11692
GW17D01B	11693
GWTB01B	11694
GW04S01B	11733
GWFB01B	11734
GW02S01B	11735
SW0101B	11737
SWDU01B	11738
SW0201B	11739
SW0301B	11744
SW0401B	11748
TB03B	11467
SPW0301B	11468
SPW0201B	11469
SPW0101B	11470
GW18S01B	11471
GW18I01B	11472
GW08S01B	11473
GWTB01B	11474
SD0101B	11740
SDDU01B	11741
SD0201B	11742
SD0301B	11745
CS0301B	11746

SS0301B 11747
SD0401B 11749

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All VOA analyses were performed within NYSDEC ASP contractual and EPA technical holding times except field blank(9688) and trip blank(9689).

Action(s):

- a. Aromatic analytes in field blank(9688) and trip blank(9689) were estimated "J" due to holding time.

2. Instrument Tune: The GC/MS was tuned with BFB (VOA). All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.

3. Initial and Continuing Calibrations: In the initial calibration of VOAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30% acetone(35.410)

%D>25% acetone (128.31, 62.25), 2-butanone(69.23), 2-hexanone(56.67, 69.08), o-xylene(25.98), chloromethane(27.01, 40.58), methylene chloride(59.76), 1,1-dichloromethane(58.43), 1,2-dichloropropane(34.95), bromoform(29.20), 4-methyl-2-pentanone(65.90)

Action(s):

Acetone was "UJ" in samples GWFB0101B, GWTB01B(11736), GW04S01B, GW02S01B, SW0101B, SWDU01B, SW0201B, SW0301B, SW0401B, CS0301B for RSD>30

Acetone was "UJ" in samples in GWTB01B(11694), GW16I01B, GW16D01B, GW17D01B for RSD>30

Acetone was "UJ" in samples in GWTB01B(11588), GWTB01B(11591), GW09D01, GW07S01B, GW13D01B, GW06S01B, GW15D01B, GW07D01B, for %RSD>30

Acetone was "J" in sample GW07D01B for %RSD>30

Acetone was rejected "R" in samples GWTB01B(11474), TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %D>90.

2-Butone was "UJ" in samples trip blank 11474 TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %D>25.

2-Hexanone was "UJ" in samples trip blank 11474 TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %D>25.

O-xylene was "UJ" in samples trip blank 11474 TB03B, SPW0301B, SPW0201B, SPW0101B, GW08S01B, for %D>25.

O-xylene was "J" in samples GW18S01B, and GW18I01B for %D>25.

Methylene Chloride was "UJ" in samples GWFB0101B, GWTB01B(11736), GW04S01B, GW02S01B, SW0101B, SWDU01B, SW0201B, SW0301B, SW0401B, CS0301B for %D>25

Chloromethane was "UJ" in samples GWTB01B(11588), GW07D01B, GWTB01B(11591), GW09D01, GW07S01B, GW13D01B, GW06S01B, GW15D01B, GW07D01B, for %D>25.

Chloromethane was "UJ" in samples GWTB01B(11694), GW16I01B, GW16D01B, GW17D01B, SD0101B, SDDU01B, SD0201B, SD0301B, SD0401B for %D>25.

Acetone was "UJ" in sample SD0101B, and SDDU01B for %D>25.

Acetone was "J" in sample SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

1,1-dichloromethane was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

1,2-dichloropropane was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

Bromoform was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

4-Methyl-2-pentanone was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

2-Hexanone was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of three indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the VOA analyses were within acceptable limits.
5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon three internal standards (bromochloromethane, 1,4-difluorobenzene, and chlorobenzene). All internal standards areas were compliant.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. The MS/MSD recoveries in the VOA analyses were within acceptable limits.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the VOA analyses were within acceptable limits.
8. Analysis Sequence: VOA sample analyses are required to be run within 12 hours of GC/MS tune. The VOA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. A total of 3 VOA method blanks were analyzed. The three blanks were contaminated with acetone and chloroform.

Action:

Acetone was qualified with a "U" in samples SD0101B for blank contamination.

Chloroform was qualified with a "U" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, SD0401B for blank contamination.

10. Field and Trip Blank Contamination: Field and Trip Blank Contamination :The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The trip blank (TB) measures the potential for false-positive results introduced during sample holding in the shipping containers. A total of 4 trip blanks were analyzed. The trip blanks were not contaminated.
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All VOA ion spectra for the targeted analytes correctly matched the standard spectra.

12. Chromatogram Quality: The quality of the VOA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: Xylene and 1,2-dichloroethene exceeded calibration range in samples SD0301B. The laboratory correctly qualified the values with a "E". The reviewer transferred xylene values from diluted samples to undiluted samples. The Form 1 of the original samples should be used.

C. DATA LIMITATION OVERVIEW:

The VOA analyses of twenty-four and six soils samples from the Lab report # 931455 showed compliance with the QC requirements of EPA Region 2 SOP with the following EPA usability actions:

Acetone was "UJ" in samples GWFB0101B, GWTB01B(11736), GW04S01B, GW02S01B, SW0101B, SWDU01B, SW0201B, SW0301B, SW0401B, CS0301B for RSD>30

Acetone was "UJ" in samples in GWTB01B(11694), GW16I01B, GW16D01B, GW17D01B for RSD>30

Acetone was "UJ" in samples in GWTB01B(11588), GWTB01B(11591), GW09D01, GW07S01B, GW13D01B, GW06S01B, GW15D01B, GW07D01B, for %RSD>30

Acetone was "J" in sample GW07D01B for %RSD>30

Acetone was rejected "R" in samples GWTB01B(11474), TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %D>90.

2-Butone was "UJ" in samples trip blank 11474 TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %D>25.

2-Hexanone was "UJ" in samples trip blank 11474 TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %D>25.

O-xylene was "UJ" in samples trip blank 11474 TB03B, SPW0301B, SPW0201B, SPW0101B, GW08S01B, for %D>25.

O-xylene was "J" in samples GW18S01B, and GW18I01B for %D>25.

Methylene Chloride was "UJ" in samples GWFB0101B, GWTB01B(11736), GW04S01B, GW02S01B, SW0101B, SWDU01B, SW0201B, SW0301B, SW0401B, CS0301B for %D>25

Chloromethane was "UJ" in samples GWTB01B(11588), GW07D01B, GWTB01B(11591), GW09D01, GW07S01B, GW13D01B, GW06S01B, GW15D01B, GW07D01B, for %D>25.

Chloromethane was "UJ" in samples GWTB01B(11694), GW16I01B, GW16D01B, GW17D01B, SD0101B, SDDU01B, SD0201B, SD0301B, SD0401B for %D>25.

Acetone was "UJ" in sample SD0101B, and SDDU01B for %D>25.

Acetone was "J" in sample SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

1,1-dichloromethane was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

1,2-dichloropropane was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

Bromoform was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

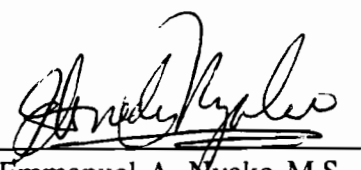
4-Methyl-2-pentanone was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

2-Hexanone was "UJ" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, and SD0401B for %D>25.

Acetone was qualified with a "U" in samples SD0101B for blank contamination.

Chloroform was qualified with a "U" in samples SD0101B, SDDU01B, SD0201B, SD0301B, SS0301B, SD0401B for blank contamination.

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSD, method blanks). No qualifiers were applied since these analyses are not provided to the data user.

Prepared by:  Date: 11 November 1993
Emmanuel A. Myako M.S.

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ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC
Sample Type: Water(24), Soil(6)
Analysis Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931455

A. INTRODUCTION

Twenty four aqueous and six soil samples analyzed by CLP semivolatile Organics were validated following the procedures outlined in the EPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC
Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931455
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW09D01B	11585
GW07S01B	11856
GW07D01B	11587
GW13D01B	11589
GW06S01B	11590
GW15D01B	11592
GW16I01B	11691
GW16D01B	11692
GW17D01B	11693
GW04S01B	11733
GWFB01B	11734
GW02S01B	11735
SW0101B	11737
SWDU01B	11738
SW0201B	11739
SW0301B	11744
SW0401B	11748
TB03B	11467
SPW0301B	11468
SPW0201B	11469
SPW0101B	11470
GW18S01B	11471
GW18I01B	11472
GW08S01B	11473
SD0101B	11740
SDDU01B	11741
SD0201B	11742
SD0301B	11745
CS0301B	11746
SS0301B	11747
SD0401B	11749

Contract and Technical Review (CTR) Comments

1. Sample Hold Time Before Analysis: All semivolatile analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. Instrument Tune: The GC/MS was tuned with DFTPP. All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. Initial and Continuing Calibrations: In the initial calibration of BNAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30%	4-Chlorophenyl-phenylether	31.379
	3,3'-Dichlorobenzidine	36.529
	bis (2-Ethylhexyl) phthalate	36.529
	P-toluic Acid	30.362
	Di-n-butylphthalate	34.478
	Di-n-octylphthalate	34.545
%D>25%	Di-n-octylphthalate	27.87, 26.71, 65.70, 28.85
	Hexachlorocyclopentadiene	28.37
	bis(2-Ethylhexyl)phthalate	25.40
	bis(2-chloroethylether)	25.90, 31.06
	N-nitroso-di-n-propylamine	26.03
	2-nitroaniline	27.479
	2,2'-oxybis(1-chloropropane)	26.34, 74.79
	phenol	29.61
	N-nitroso-di-n-propylamine	44.78
	Isophere	27.12
	Hexachlorocyclobutadiene	30.07
	O-toluic acid	32.46
	M-toluic acid	26.06
	Hexachlorocyclopentadiene	42.78
	2-Nitroaniline	67.07, 32.09
	3-Nitroaniline	26.11
	2,4-Dinitroaniline	49.06
	4-Nitroaniline	46.95, 49.42
	Hexachlorobenzene	32.15
	Pentachlorophenol	78.69
	Di-n-Butylphthalate	28.46

Butylbenzylphthalate	70.80
2,4-Dinitrophenol	40.60
4-Nitrophenol	28.67
Pentachlorophenol	63.12
Indeno(1,2,3-cd)pyrene	36.53
Dibenz(a,h)anthracene	38.19
Benzo(g,h,i)perylene	38.77

Action(s):

4-Chlorophenyl-pheryethene was "UJ" in samples TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B for RSD>30%

3,3' Dichlorobenzidine was "UJ" in sample TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B

bis(2-Ethylhexyl)phthalate was "UJ" in samples TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B

P-toullic acid was "UJ" in samples GWSD0101B, GWSDU01B, SS0301B, SD0401B, SW0201B, SWDU01B, GWFB01B, SW0401B

P-toullic acid was "J" in samples CS0301B

Di-n-butylphthalate was "J" in samples GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW15D01B, GW16I01B, GW16D01B, GW17D01B, GW02S01B

Di-n-butylphthalate was "UJ" in samples GW04S01B, SW0101B, SW0301B

Di-n-octylphthalate was "UJ" in GW09D01B, GW13D01B, GW06S01B, GW15D01B, GW16I01B, GW16D01B, GW17D01B, GW04S01B, SW0101B, SW0301B, for RSD>30%.

4-chlorophenyl-phenylether and 3,3'-dichlorobenzidine were "UJ" in samples TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B.

bis(2-Ethylhexyl)phthalate was "J" in samples TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B.

Di-n-octylphthalate was "UJ" in samples TB03B, SPW0301B, SPW0201B for %D>25.

Hexachlorocyclopentadiene was "UJ" in samples GW18S01B, GW18I01B, GW08S01B

2-Nitroaniline was "UJ" in samples SD0201B, SW0201B, FB01B, SW0401B

N-Nitroso-di-n-propylamine was "UJ" in samples SD0201B, SW0201B, FB01B, SW0401B

bis(2-Chloroethy)ether was "UJ" in samples SD0201B, SW0201, FB01B, SW0401B, CS301B

2,2'-oxybis(1-chloropropane) was "UJ" in samples CS301B, GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

2,2'-oxybis(1-chloropropane) was "R" in samples GW07S01B, GW07D01B

Phenol was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Phenol was "J" in samples GS07D01B

N-Nitroso-di-n-propylamine was "UJ" in samples GW09D01B, GW13D01B, GW16I01B, GW16D01B

N-Nitroso-di-n-propylamine was "R" in samples GW07S01B, GW07D01B

N-Nitroso-di-n-propylamine was "J" in samples GW06S01B

Isophorone was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Isophorone was "R" in samples GW07S01B, GW07D01B

Hexachloroethane was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Hexachloroethane was "R" in samples GW07S01B, GW07D01B

O-Toulic Acid was "UJ" in samples GW09D01B, GW13D01B, GW06S01B

O-Toulic Acid was "J" in samples GW07S01B, GW07D01B, GW16I01B, GW16D01B

M-Toulic Acid was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B

M-Toulic Acid was "J" in samples GW07D01B, GW16I01B, GW16D01B

P-Toullic Acid was "UJ" in samples GW09D01B, GW13D01B, GW06S01B

P-Toullic Acid was "J" in samples GW07S01B, GW07D01B, GW16I01B, GW16D01B, GW07S01B

Hexachlorocyclopentadiene was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Hexachlorocyclopentadiene was "R" in samples GW07S01B, GW07D01B

2-Nitroanaline was "UJ" in samples GW09D01B, GW07S01B, GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

2-Nitroanaline was "R" in samples GW07D01B

3-Nitroanaline was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

3-Nitroanaline was "R" in samples GW07S01B

2,4-Dinitrophenol was "UJ" in samples GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B, GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

4-Nitrophenol was "UJ" in samples GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B, GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

4-Nitroanaline was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16S01B, GW16D01B, GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

4-Nitroanaline was "R" in samples GW07S01B, GW07D01B

4-6-Dinitro-2-Methylphenol was "UJ" in samples GW09D01B, Gw07S01B, GW07D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Hexachlorobenzene was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Hexachlorobenzene was "R" in samples GW07D01B

Pentachlorophenol was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B, GW17D01B, GW15D01B, GW04S01B,

GW02S01B, SW0101B, SW0301B

Pentachlorophenol was "J" in samples GW07D01B

Di-n-butylphthalate was "R" in samples GW07S01B, GW07D01B

Butylphthalate was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Butylphthalate was "R" in samples GW07S01B, GW07D01B

Di-n-octylphthalate was "R" in samples GW07S01B

Indeno(1,2,3-CD) Pyrene was "UJ" in samples GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

Dibenzo(A,H) Anthracene was "UJ" in samples GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

Benzo(G,H,I)Perylene was "UJ" in samples GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B.

Di-n-octylphthalate was "UJ" in samples TB03, SPW0301B, SPW0201B.

Hexachlorocyclopentadiene and Di-n-octylphthalate were "UJ" in samples SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %D>25.

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of eight indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the BNA analyses were outside the acceptable limits for 2-Fluorobiphenyl, and Terphenyl-d14.

Action(s):

All base/neutral in sample GW07S01B were rejected "R", except Di-n-butylphthalate and bis(2-Ethylhexyl)phthalate

All base/neutral in sample GW07D01B were rejected "R", except Naphthalene, bis(2-Ethylhexyl)phthalate, and Di-n-phthalate.

5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon six internal standards. All internal standards areas were compliant, except chrysene and perylene.

Action(s):

Pyrene, Benzo(a)anthracene, and Chrysene were "J" in sample GWSD0101B

Butylbenzylphthalate, 3,3'-Dichlorobenzidine, and bis(2-Ethylhexyl)phthalate were "UJ" in sample GWSD0101B

Di-n-octylphthalate, Indeno(1,2,3-CD)-pyrene, Dibenzo(A,H)-anthracene, and Benzo(G,H,I)-perylene were "UJ" in sample GWSD0101B

Benzo(b)fluoranthene, Benzo(k)fluoranthene, and Benzo(a)pyrene were "J" in sample GWSD0101B

Pyrene, Butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, and Chrysene were "UJ" in sample GW02S01B

Bis(2-Ethylhexyl)phthalate was "J" in sample GW02S01B

6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. Six MS/MSD recoveries in the BNA analyses were outside the acceptable limits. No action was required as per SOP.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the BNA analyses were within acceptable limits except 4-Nitorphenol(87% and 84%). No action was taken as per SOP.
8. Analysis Sequence: BNA sample analyses are required to be run within 12 hours of GC/MS tune. The BNA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. A total of 3 BNA method blanks were analyzed. Two blanks contained bis(2-ethylhexyl)phthalate, and di-n-butylphthalate.

Action(s):

Bis(2-ethylhexyl)phthalate was qualified with "U" in nine samples: GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B, GW15D01B, GW02S01B; since the sample concentration was less than 10X the observed concentration in the blank.

Di-n-Butylphthalate was qualified with "U" in eight samples: GW09D01B, GW07S01B, GW07D01B, GW06S01B, GW16I01B, GW16D01B, GW15D01B, GW02S01B; since the sample concentration was less than 10X the observed concentration in the blank

10. Field Blank Contamination:The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. One field blank was analyzed. There was no contamination in the field blank.
11. Compound Identification and Spectra Match:Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All BNA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality:The quality of the BNA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations:The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC:Moisture > 50%, positive values were estimated "J" and non-detects "UJ" in sample SD0301B

C. DATA LIMITATION OVERVIEW:

The BNA analyses of twenty-four aqueous and six soils samples from SMC referenced as Report# 931455 showed compliance with QC requirements of NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except the following:

4-Chlorophenyl-pheryethene was "UJ" in samples TB03B, SPW0301B,SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B

3,3' Dichlorobenzidine was "UJ" in sample TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B

bis(2-Ethylhexyl)phthalate was "UJ" in samples TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B

P-toulic acid was "UJ" in samples GWSD0101B, GWSDU01B, SS0301B, SD0401B, SW0201B, SWDU01B, GWFB01B, SW0401B

P-toulic acid was "J" in samples CS0301B

Di-n-butylphthalate was "J" in samples GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW15D01B, GW16I01B, GW16D01B, GW17D01B, GW02S01B

Di-n-butylphthalate was "UJ" in samples GW04S01B, SW0101B, SW0301B

Di-n-octylphthalate was "UJ" in GW09D01B, GW13D01B, GW06S01B, GW15D01B, GW16I01B, GW16D01B, GW17D01B, GW04S01B, SW0101B, SW0301B.

4-chlorophenyl-phenylether and 3,3'-dichlorobenzidine were "UJ" in samples TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B.

bis(2-Ethylhexyl)phthalate was "J" in samples TB03B, SPW0301B, SPW0201B, SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %RSD>30.

Di-n-octylphthalate was "UJ" in samples TB03B, SPW0301B, SPW0201B

Hexachlorocyclopentadiene was "UJ" in samples GW18S01B, GW18I01B, GW08S01B

2-Nitroaniline was "UJ" in samples SD0201B, SW0201B, FB01B, SW0401B

N-Nitroso-di-n-propylamine was "UJ" in samples SD0201B, SW0201B, FB01B, SW0401B

bis(2-Chloroethy)ether was "UJ" in samples SD0201B, SW0201, FB01B, SW0401B, CS301B

2,2'-oxybis(1-chloropropane) was "UJ" in samples CS301B, GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

2,2'-oxybis(1-chloropropane) was "R" in samples GW07S01B, GW07D01B

Phenol was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B,

GW16I01B, GW16D01B

Phenol was "J" in samples GS07D01B

N-Nitroso-di-n-propylamine was "UJ" in samples GW09D01B, GW13D01B, GW16I01B, GW16D01B

N-Nitroso-di-n-propylamine was "R" in samples GW07S01B, GW07D01B

N-Nitroso-di-n-propylamine was "J" in samples GW06S01B

Isophorone was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Isophorone was "R" in samples GW07S01B, GW07D01B

Hexachloroethane was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Hexachloroethane was "R" in samples GW07S01B, GW07D01B

O-Toulic Acid was "UJ" in samples GW09D01B, GW13D01B, GW06S01B

O-Toulic Acid was "J" in samples GW07S01B, GW07D01B, GW16I01B, GW16D01B

M-Toulic Acid was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B

M-Toulic Acid was "J" in samples GW07D01B, GW16I01B, GW16D01B

P-Toulic Acid was "UJ" in samples GW09D01B, GW13D01B, GW06S01B

P-Toulic Acid was "J" in samples GW07S01B, GW07D01B, GW16I01B, GW16D01B, GW07S01B

Hexachlorocyclopentadiene was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Hexachlorocyclopentadiene was "R" in samples GW07S01B, GW07D01B

2-Nitroaniline was "UJ" in samples GW09D01B, GW07S01B, GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

2-Nitroaniline was "R" in samples GW07D01B

3-Nitroaniline was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

3-Nitroaniline was "R" in samples GW07S01B

2,4-Dinitrophenol was "UJ" in samples GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B, GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

4-Nitrophenol was "UJ" in samples GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B, GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

4-Nitroaniline was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16S01B, GW16D01B, GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

4-Nitroaniline was "R" in samples GW07S01B, GW07D01B

4-6-Dinitro-2-Methylphenol was "UJ" in samples GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Hexachlorobenzene was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Hexachlorobenzene was "R" in samples GW07D01B

Pentachlorophenol was "UJ" in samples GW09D01B, GW07S01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B, GW17D01B, GW15D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

Pentachlorophenol was "J" in samples GW07D01B

Di-n-butylphthalate was "R" in samples GW07S01B, GW07D01B

Butylphthalate was "UJ" in samples GW09D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B

Butylphthalate was "R" in samples GW07S01B, GW07D01B

Di-n-octylphthalate was "R" in samples GW07S01B

Indeno(1,2,3-CD) Pyrene was "UJ" in samples GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

Dibenzo(A,H) Anthracene was "UJ" in samples GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B

Benzo(G,H,I)Perylene was "UJ" in samples GW17D01B, GW04S01B, GW02S01B, SW0101B, SW0301B.

Di-n-octylphthalate was "UJ" in samples TB03, SPW0301B, SPW0201B.

Hexachlorocyclopentadiene and Di-n-octylphthalate were "UJ" in samples SPW0101B, GW18S01B, GW18I01B, GW08S01B, for %D>25.

All base/neutral in sample GW07S01B were rejected "R", except Di-n-butylphthalate and bis(2-Ethylhexyl)phthalate

All base/neutral in sample GW07D01B were rejected "R", except Naphthalene, bis(2-Ethylhexyl)phthalate, and Di-n-phthalate for surrogates recoveries.

Pyrene, Benzoanthracene, and Chrysene were "J" in sample GWSD0101B

Butylbenzylphthalate, 3,3'-Dichlorobenzidine, and bis(2-Ethylhexyl)phthalate were "UJ" in sample GWSD0101B

Di-n-octylphthalate, Indeno(1,2,3-CD)-pyrene, Dibenzo(A,H)-anthracene, and Benzo(G,H,I)-perylene were "UJ" in sample GWSD0101B

Benzo(b)fluoranthene, Benzo(k)fluoranthene, and Benzo(a)pyrene were "J" in sample GWSD0101B

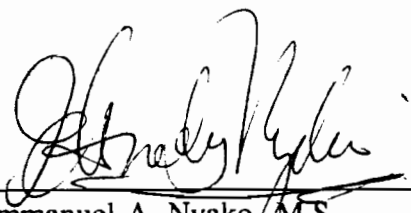
Pyrene, Butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, and Chrysene were "UJ" in sample GW02S01B

Bis(2-Ethylhexyl)phthalate was "J" in sample GW02S01B for internal standards.

Bis(2-ethylhexyl)phthalate was qualified with "U" in nine samples: GW09D01B, GW07S01B, GW07D01B, GW13D01B, GW06S01B, GW16I01B, GW16D01B, GW15D01B, GW02S01B; since the sample concentration was less than 10X the observed concentration in the blank.

Di-n-Butylphthalate was qualified with "U" in eight samples: GW09D01B, GW07S01B, GW07D01B, GW06S01B, GW16I01B, GW16D01B, GW15D01B, GW02S01B; since the sample concentration was less than 10X the observed concentration in the blank

No data qualifiers were applied to internal laboratory QC samples (e.g.MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by:  Date: 11 November 1993
Emmanuel A. Nyako M.S.

INORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: Stauffers Management Company, Skaneateles Falls, N.Y.
Sample Type: Aqueous and soil
Analysis Type: TAL Metals and Cyanide
Laboratory: EA Laboratories
Report No.: 931455

A. INTRODUCTION:

Twenty-four aqueous and five soil samples were analyzed for TAL metals and cyanide. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (1991)/USEPA Region 2 Standard Operating Procedure NO. HW-2 (Revision XI January 30, 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument calibration
- Initial calibration verification (ICV) and continuing calibration verification (CCV)
- CRDL standards for AA (CRA), and ICP (CRI)
- Initial calibration blank (ICB), continuing calibration blank (CCB), and preparation blank (PB)
- ICP interference check sample (ICS) analysis
- Spike sample analysis (S)
- Duplicate sample analysis (D)
- Laboratory control sample (LCS)
- ICP serial dilution analysis (L)
- Instrument detection limit (IDL) determination
- Interelement correction for ICP
- Linear Range analysis
- Furnace QC analysis

The holding time tables for mercury are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: Stauffers Management Company, Skaneateles Falls, N.Y.
Analysis Type: TAL Metals and Cyanide
Laboratory: EA Laboratories
Report No.: 931455

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GW09D01B	11585
GW07S01B	11856
GW07D01B	11587
GW13001B	11589
GW06S01B	11590
GW15D01B	11592
GW16I01B	11691
GW16D01B	11692
GW17D01B	11693
GW04S01B	11733
GWFB01B	11734
GW02S01B	11735
SW0101B	11737
SWDU01B	11738
SW0201B	11739
SW0301B	11744
SW0401B	11748
TB03B	11467
SPW0301B	11468
SPW0201B	11469
SPW0101B	11470
GW18S01B	11471
GW18I01B	11472
GW08S01B	11473
SD0101B	11740
SDDU01B	11741
SD0201B	11742
SD0301B	11745
SD0401B	11749

1. Sample Holding Time Before Analysis: All metal analyses were performed within ASP and USEPA prescribed holding times.
2. Instrument Calibration: All instruments were calibrated daily and dates and times clearly shown on the raw data. The proper sequence of the instrument blanks and standards were used. A three-point calibration for ICP and at least four-point calibration for furnace AA were used as required by the NYSDEC ASP.
3. Initial and Continuing Calibrations Verifications: The percent recovery for all analytes were within the prescribed window (90-110%). The ICV and the CCV standards were analyzed at the correct frequency in the injection sequence.
4. CRDL Standards for AA (CRA) and ICP (CRI): The CRDL standards were run at the frequency and appropriate concentration for each analyte. The percent recovery for silver(161.3%) and zinc(131.1%,127.4%,139%,136.7%) were outside the control limit(80-120%).

Action:

Silver was rejected "R" in sample SD0201B, and GW13D01B.

Zinc was qualified with a "J" in samples SPW0301B,SPW0201B, SPW0101B,GW18I01B,GW08S01B, GW09D01B,GW13D01B, GW15D01B,GW17D01B, and GW04S01B.

Zinc was qualified with a "UJ" in samples GWFB01B,SW0101B,SWDU01B, and SW0201B.

5. Laboratory Blanks: All laboratory blanks were analyzed at the correct frequency during the injection sequence. The aqueous and soil calibration and preparation blanks were below the CRDL except selenium(45.6 ug/l) which was above the CRDL in the calibration blank. No action was taken since selenium was qualified for poor spike recovery.
6. ICP Interference Check Sample (ICS) Analysis: The interference check sample percent recoveries were all within the acceptable window (80-120%).
7. Spiked Sample Analysis: The spike recoveries were outside acceptable range(75-125%) for antimony(47.0%,53.1%),arsenic(74.3%,58%,0.0%), cadmium(72.8%, 69.4%),lead(53.1%,73.9%,5.2%),selenium(56.3%,35.7%, 12.4%),thallium(73.1%0.0%), and cyanide(20%). The laboratory correctly qualified results with an "N".

Action:

Antimony was qualified with a "UJ" in samples SD0101B, SD0201B,SD0301B,SD0401B,SDDU01B,SW0301B, and SW0401B.

Cadmium was qualified with a "J" in samples SD0101B,SD0201B, SD0301B,SD0401B,SDDU01B,GW16I01B,GW16D01B,and GW02S01B.

Cadmium was qualified with a "UJ" in samples GW17D01B,GW04S01B,GWFB01B, SW0101B,SWDU01B, and SW0201B.

Lead was qualified with a "J" in samples SD0101B,SD0201B, SD0301B,SD0401B,SDDU01B,GW16I01B, GW16D01B,GW17D01B, GW04S01B,GW02S01B, and SW0201B. Lead was qualified with a "UJ" in samples GWFB01B,SW0101B, and SWDU01B. Lead was rejected "R" in samples SW0301B and SW0401B.

Selenium was qualified with a "UJ" in samples SD0101B, SDDU01B,GW16D01B,GW17D01B,GW04S01B,GWFB01B, GW02S01B,SW0101B,SWDU01B, and SW0201B. Selenium was qualified with a "J" in samples SD0201B, SD0301B,SD0401B, and GW16I01B. Selenium was rejected "R" in samples SW0301B and SW0401B.

Arsenic was qualified with a "UJ" in samples GW09D01B,GW13D01B,GW16D01B,GWFB01B,SW0101B,SWDU01B, and SW0201B. Arsenic was qualified with a "J" in samples GW07S01B,GW07D01B,GW06S01B,GW15D01B,GW16I01B, GW17D01B,GW04S01B,and GW02S01B. Arsenic was rejected "R" in samples SW0301B and SW0401B.

Thallium was qualified with a "UJ" in samples GW16I01B,GW16D01B,GW17D01B,GW04S01B,GWFB01B, GW02S01B,SW0101B,SWDU01B, and SW0201B. Thallium was rejected "R" in samples SW0301B and SW0401B.

Cyanide was "R" rejected in samples SD0101B,SDDU01B, SD0201B,SD0301B, and SD0401B.

8. Post-digestion Spike Analysis: The post-digestion spike analyses performed for antimony, cadmium, and lead were within the acceptable range. No action was required.
9. Duplicate Sample Analysis: The duplicate analyses were performed on both aqueous and soil samples. Calcium, cadmium, copper, manganese, magnesium, zinc, and cyanide were non-compliant due to duplicate analysis. The lab correctly qualified the affected analytes with asterisk(*). No action was required for calcium, cadmium, magnesium, and manganese as per SOP. Cadmium was already qualified for matrix spike, hence no further qualification was required.

Action:

Copper was qualified with a "J" in samples SD0101B, SD0201B, SD0301B, and SDDU01B for duplicate analysis.

Cyanide was qualified with a "J" in samples GW16I01B and GW02S01B. Cyanide was qualified with a "UJ" in samples GW16D01B, GW17D01B, GW04S01B, GWFB01B, SW0101B, SWDU01B, SW0201B, SW0301B, and SW0401B.

Zinc was qualified with a "J" in samples GW07S01B, GW07D01B, and GW06S01B.

10. Laboratory Control Sample Analysis: The laboratory control sample analysis was analyzed at the correct frequency. All percent recoveries were within acceptable range (80-120%) except selenium which had a recovery of 78.6%.

Action:

Selenium was qualified with a "J" in samples TB03B, SPW0201B, GW08S01B. Selenium was qualified with a "UJ" in samples SPW0301B, SPW0101B, GW18S01B, and GW18I01B.

11. ICP Serial Dilution Analysis: The ICP serial dilution were performed on both soil and aqueous samples. The percent difference for barium(18.3%), beryllium(100%), cadmium(100%), chromium(13.8%), cobalt(100%), copper(37.5%, 55%), lead(23.8%), nickel(16.1%), sodium(11.5%), manganese(10.5%), and iron(166.8%) were greater than 10%. No action was required for barium, beryllium, cadmium, cobalt, lead, and nickel since the initial sample concentration was less than 10X IDL.

Action:

Sodium was qualified with a "J" in samples SD0301B for serial dilution.

Chromium was qualified with a "J" in samples SD0101B,SD0201B, SD0301B,SD0401B,and SDDU01B.

Copper was qualified with a "J" in samples GW18S01B and GW08S01B.

Manganese was qualified with a "J" in samples GW09D01B,GW7S01B, GW07D01B,GW13D01B,GW06S01B, and GW15D01B.

Iron was rejected "R" in samples GW16I01B,GW16D01B, GW17D01B,GW04S01B, and GW02S01B.

12. Instrument Detection Limit Analysis: The IDLs were generated in 12/30/92 by the laboratory. All the IDLs were lower than the CRDLs.
13. Interelement Correction for ICP: Interelement correction factor applied to soil and aqueous data had neither dates nor values on Form 11A-ICP. No action was required.
14. Linear Range Analysis: The linear range for the ICP was supplied by the laboratory. A comparison of the Form 1 results to Form XII showed that the observed concentrations of the analytes were within the linear range. The linear range was determined quarterly. No action was required.
15. Furnace QC Analysis: The analytical spike recovery for selenium,arsenic, antimony,lead, and thallium in most of the samples were out of control limits (85-115%), while sample absorbencies were less than 50% of spike absorbencies. The laboratory correctly qualified the results with a "W".

Action:

Thallium was qualified with a "UJ" in samples GW18S01B,GW18I01B,GW08S01B,GW07S01B,GW07D01B, and GW06S01B.

Arsenic was qualified with a "J" in sample SPW0301B.

Lead was qualified with a "J" in sample GW07S01B.

Selenium was qualified with a "J" in sample GW06S01B.

Antimony was qualified with a "J" in sample GW07D01B.

16. Calculations: All checked calculations were within rounding errors.
17. Other Q.C.: The percent solids for sample SD0301B was less than 50%. Positive values for analytes(Al,As,Ba,Be,Ca,Co,Fe,Mg,Mn,Hg,Ni,K,Na, V, and Zn) not previously qualified were estimated "J" ; nondetects (Ag, and Tl) were qualified with "UJ" as per SOP.
- The following changes were made on Form 1 to reflect correct client sample number on the chain of custody form.

<u>Old sample#</u>	<u>Correct sample#</u>
SMC-GW07501B	SMC-GW07S01B
SMC-GW13001B	SMC-GW13D01B
SMC-GW06501B	SMC-GW06S01B
SMC-GW15001B	SMC-GW15D01B
SMC-GWI6I01B	SMC-GW16I01B
SMC-GWI6001B	SMC-GW16D01B
SMC-GW04501B	SMC-GW04S01B
SMC-GW02501B	SMC-GW02S01B
SMC-FB03B	SMC-TB03B

C. DATA LIMITATION OVERVIEW:

The inorganic analyses of water and soil samples from the SMC referenced as Lab.Report #931455, showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

In sample GW07D01B,Arsenic was "J" for spike recovery. Zinc was "J" for duplicate analysis. Manganese was "J" for serial dilution. Thallium was "UJ" for furnace analysis. Antimony was "J" for furnace analysis.

In sample GW09D01B,zinc was estimated "J" for CRDL standards.Arsenic was rejected "UJ" for spike recovery. Manganese was "J" for serial dilution.

In sample GW13D01B, silver was rejected "R" for CRDL standards. Zinc was estimated "J" for CRDL standards. Arsenic was "UJ" for spike recovery. Manganese was "J" for serial dilution.

In sample GW16D01B, cadmium was estimated "J" for spike recovery. Lead was "J" for spike recovery. Selenium was "UJ" for spike recovery. Arsenic was "UJ" for spike recovery. Thallium was "UJ" for spike recovery. Cyanide was "UJ" for duplicate analysis. Iron was rejected for serial dilution.

In sample GW17D01B, zinc was estimated "J" for CRDL standards. Cadmium was "UJ" for spike recovery. Lead was "J" for spike recovery. Selenium was "UJ" for spike recovery. Thallium was "UJ" for spike recovery. Arsenic was "J" for spike recovery. Cyanide was "UJ" for duplicate analysis. Iron was rejected "R" for serial dilution.

In sample GW02S01B, cadmium was estimated "J" for spike recovery. Lead was "J" for spike recovery. Selenium was "UJ" for spike recovery. Arsenic was "J" for spike recovery. Thallium was "UJ" for spike recovery. Cyanide was "J" for duplicate analysis. Iron was rejected for serial dilution.

In sample GW04S01B, zinc was estimated "J" for CRDL standards. Cadmium was "UJ" for spike recovery. Lead was "J" for spike recovery. Selenium was "UJ" for spike recovery. Arsenic was "J" for spike recovery. Thallium was "UJ" for spike recovery. Cyanide was "UJ" for duplicate analysis. Iron was rejected "R" for serial dilution.

In sample GW06S01B, arsenic was "J" for spike recovery. Zinc was "J" for duplicate analysis. Manganese was "J" for serial dilution. Thallium was "UJ" for furnace analysis. Selenium was "J" for furnace analysis.

In sample GW07S01B, arsenic was rejected "J" for spike recovery. Zinc was "J" for duplicate analysis. Manganese was "J" for serial dilution. Thallium was "UJ" for furnace analysis. Lead was "J" for furnace analysis.

In sample GW08S01B, zinc was estimated "J" for CRDL standards. Selenium was "J" for LCS recovery. Copper was "J" for serial dilution. Thallium was "UJ" for furnace analysis.

In sample GW18S01B, was estimated "J" for duplicate analyses. Selenium was estimated "UJ" for laboratory control sample analysis. Copper was "J" for serial dilution. Thallium was "UJ" for furnace analysis.

In sample GW15D01B, zinc was estimated "J" for CRDL standards. Arsenic was "J" for spike recovery. Manganese was "J" for serial dilution.

In sample SW0101B, zinc was "UJ" for CRDL standards. Cadmium was "UJ" for spike recovery. Lead was "UJ" for spike recovery. Selenium was "UJ" for spike recovery. Arsenic was rejected "UJ" for spike recovery. Thallium was "UJ" for spike recovery. Cyanide was "UJ" for duplicate analysis.

In sample SWDU01B, zinc was "UJ" for CRDL standards. Cadmium was "UJ" for spike recovery. Lead was "UJ" for spike recovery. Selenium was "UJ" for spike recovery. Arsenic was rejected "UJ" for spike recovery. Thallium was "UJ" for spike recovery. Cyanide was "UJ" for duplicate analysis.

In sample SW0201B, zinc was "UJ" for CRDL standards. Cadmium was "UJ" for spike recovery. Lead was "J" for spike recovery. Selenium was "UJ" for spike recovery. Arsenic was rejected "UJ" for spike recovery. Thallium was "UJ" for spike recovery. Cyanide was "UJ" for duplicate analysis.

In sample SW0301B, antimony was "UJ" for spike recovery. Lead was rejected "R" for spike recovery. Selenium was rejected "R" for spike recovery. Arsenic was rejected "R" for spike recovery. Thallium was rejected "R" for spike recovery. Cyanide was "UJ" for duplicate analysis. Silver and thallium were "UJ" for %solids less than 50%. The remaining analytes (Al, As, Ba, Be, Ca, Co, Fe, Mg, Mn, Hg, Ni, K, Na, V, and Tl) were qualified with "J" for %solids less than 50%.

In sample SW0401B, antimony was "UJ" for spike recovery. Lead was rejected "R" for spike recovery. Selenium was rejected "R" for spike recovery. Arsenic was rejected "R" for spike recovery. Thallium was rejected "R" for spike recovery. Cyanide was "UJ" for duplicate analysis.

In sample TB03B, selenium was "J" for LCS recovery.

In sample GWFB01B, zinc was "UJ" for CRDL standards. Cadmium was "UJ" for spike recovery. Lead was "UJ" for spike recovery. Selenium was "UJ" for spike recovery. Arsenic was rejected "UJ" for spike recovery. Thallium was "UJ" for spike recovery. Cyanide was "UJ" for duplicate analysis.

In sample SPW0301B, zinc was estimated "J" for CRDL standards. Selenium was "UJ" for LCS recovery. Arsenic was "J" for furnace analysis.

In sample SPW0201B, zinc was estimated "J" for CRDL standards. Cyanide was "J" for duplicate analyses. Selenium was "J" for LCS recovery.

In sample SPW0101B, zinc was estimated "J" for CRDL standards. cyanide was qualified with "UJ" for duplicate analysis.

In sample GW16I01B, cadmium was estimated "J" for spike recovery. Selenium was "J" for spike recovery. Arsenic was "J" for spike recovery. Thallium was "UJ" for spike recovery. Cyanide was "J" for duplicate analysis. Iron was rejected for serial dilution.

In sample GW18I01B, zinc was estimated "J" for CRDL standards. Selenium was estimated "UJ" for laboratory control sample analysis. Thallium was "UJ" for furnace analysis.

In sample SD0101B, antimony was "UJ" for spike recovery. Cadmium was estimated "J" for spike recovery. Selenium was "UJ" for spike recovery. Cyanide was rejected for spike recovery. Copper was "J" for duplicate analysis. Chromium was "J" for ICP serial dilution.

In sample SDDU01B, antimony was "UJ" for spike recovery. Cadmium was estimated "J" for spike recovery. Lead was "J" for spike recovery. Selenium was "UJ" for spike recovery. Cyanide was rejected for spike recovery. chromium was estimated "J" for serial dilution. Copper was "J" for duplicate analysis.

In sample SD0201B, silver was rejected "R" for CRDL standards. Antimony was "UJ" for spike recovery. Cadmium was estimated "J" for spike recovery. Lead was "J" for spike recovery. Selenium was "J" for spike recovery. Cyanide was rejected for spike recovery. Copper was "J" for duplicate analysis. Chromium was "J" for ICP serial dilution.

In sample SD0301B, antimony was "UJ" for spike recovery. Cadmium was estimated "J" for spike recovery. Lead was "J" for spike recovery. Selenium was "J" for spike recovery. Cyanide was rejected for spike recovery. Copper was "J" for duplicate analysis. Sodium was "J" for ICP serial dilution. Chromium was "J" for ICP serial dilution. Manganese was qualified with a "J" for serial dilution .

In sample SD0401B, antimony was "UJ" for spike recovery. Cadmium was estimated "J" for spike recovery. Lead was "J" for spike recovery. Selenium was "J" for spike recovery. Cyanide was rejected for spike recovery. Chromium was "J" for ICP serial dilution. iron was rejected "R" for serial dilution.

Prepared by: Emmanuel A. Nyako (M.S.)
Emmanuel A. Nyako ,M.S.

Date: 7 Nov. 1993

SUMMARY OF VALIDATED INORGANIC DATA

Site: SMC
LAB REPORT# 931455
EA Laboratory Inc.

p 1 of 2

Sample	Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn
GW09D01B			UJ											J
GW07S01B			J									J		J
GW07D01B		J	J											J
GW13D01B			UJ											J
GW06S01B			J											J
GW15D01B			J											J
GW16I01B			J			J					R	J		
GW16D01B			UJ			J					R	J		
GW17D01B			J			UJ					R	J		
GW04S01B			J			UJ					R	J		
GWFB01B			UJ			UJ						UJ		
GW02S01B			J			UJ					R	J		
SW01I01B			UJ			UJ						UJ		
SWDU01B			UJ			UJ						UJ		
SW02I01B			UJ			UJ						J		
SW03I01B		UJ	R									R		
SW04I01B		UJ	R									R		
TB03B														
SPW03I01B			J											
SPW02I01B														
SPW01I01B														
GW18S01B														
GW18I01B														
GW08S01B														
SD01I01B		UJ				J		J		J		J		
SDDU01B		UJ				J		J		J		J		
SD02I01B		UJ				J		J		J		J		
SD03I01B	J	UJ	J	J	J	J	J	J	J	J	J	J	J	J
SD04I01B		UJ				J		J		J		J		

U- The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
 J- The analyte was positively identified, but the associated numerical value may not be an accurate representation of the amount actually present in the environmental sample. The data should be considered for decision making and usable for many purposes.
 R- The data are unusable (may or may not be present). Resampling and reanalysis is necessary for verification.
 NJ- Presumptive evidence of the presence of the material at an estimated quantity.
 UJ- The material was analyzed for but was not detected. The sample quantitation limit is an estimated quantity.

931455/TABINR10.WQ1

Sample	Hg	Ni	K	Se	Ag	Na	Tl	V	Zn	CN	TOC
GW09D01B									J		N/A
GW07S01B							UJ		J		N/A
GW07D01B							UJ		J		N/A
GW13D01B					R		UJ		J		N/A
GW06S01B				J			UJ		J		N/A
GW15D01B									J		N/A
GW16I01B				J			UJ			J	N/A
GW16D01B				UJ			UJ			UJ	N/A
GW17D01B				UJ			UJ		J	UJ	N/A
GW04S01B				UJ			UJ		J	UJ	N/A
GWFB01B				UJ			UJ		UJ	UJ	N/A
GW02S01B				UJ			UJ		UJ	J	N/A
SW0101B				UJ			UJ		UJ	UJ	N/A
SWDU01B				UJ			UJ		UJ	UJ	N/A
SW0201B				UJ			UJ			UJ	N/A
SW0301B				R			R			UJ	N/A
SW0401B				R			R			UJ	N/A
TB03B				J							N/A
SPW0301B				UJ					J		N/A
SPW0201B				J					J		N/A
SPW0101B				UJ					J		N/A
GW18S01B				UJ			UJ				N/A
GW18I01B				UJ			UJ		J		N/A
GW08S01B				J			UJ		J		N/A
SD0101B				UJ						R	N/A
SDDU01B				UJ						R	N/A
SD0201B				J	R					R	N/A
SD0301B	J	J	J	J	UJ	J	UJ	J	J	R	N/A
SD0401B				J						R	N/A

INORGANICS : TABLE OF HOLDING TIMES

p 1 of 1

Site:SMC.
LAB REPORT# 931455
EA Laboratory Inc.

EA Sample ID	Lab ID	Matrix	Fraction	Sampled	Received	Holding Date Prepared	NYSDEC Date Analyzed	Holding Time S->P;P->A	Exceedance? Criteria	Exceedance?
1 GW09D01B	11585	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-27-93	21:1	28	No
2 GW07S01B	11586	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-27-93	21:1	28	No
3 GW07D01B	11587	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-27-93	21:1	28	No
4 GW13D01B	11589	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-27-93	21:1	28	No
5 GW06S01B	11590	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-27-93	21:1	28	No
6 GW15D01B	11592	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-27-93	21:1	28	No
7 GW16I01B	11691	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-28-93	19:2	28	No
8 GW16D01B	11692	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-28-93	19:2	28	No
9 GW17D01B	11693	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-28-93	19:2	28	No
10 GW04S01B	11733	aqueous	Hg	10-07-93	10-07-93	10-26-93	10-28-93	19:2	28	No
11 GWFB01B	11734	aqueous	Hg	10-07-93	10-09-93	10-26-93	10-28-93	19:2	28	No
12 GW02S01B	11735	aqueous	Hg	10-08-93	10-09-93	10-26-93	10-28-93	18:2	28	No
13 SW0101B	11737	aqueous	Hg	10-08-93	10-09-93	10-26-93	10-28-93	18:2	28	No
14 SWDU01B	11738	aqueous	Hg	10-08-93	10-09-93	10-26-93	10-28-93	18:2	28	No
15 SW0201B	11739	aqueous	Hg	10-08-93	10-09-93	10-26-93	10-28-93	18:2	28	No
16 SW0301B	11744	aqueous	Hg	10-08-93	10-09-93	N/A	N/A	N/A	N/A	N/A
17 SW0401B	11748	aqueous	Hg	10-08-93	10-09-93	N/A	N/A	N/A	N/A	N/A
18 TB03B	11467	aqueous	Hg	9-30-93	10-02-93	10-18-93	10-20-93	19:2	28	No
19 SPW0301B	11468	aqueous	Hg	9-30-93	10-02-93	10-18-93	10-20-93	19:2	28	No
20 SPW0201B	11469	aqueous	Hg	9-30-93	10-02-93	10-18-93	10-20-93	19:2	28	No
21 SPW0101B	11470	aqueous	Hg	9-30-93	10-02-93	10-18-93	10-20-93	19:2	28	No
22 GW18S01B	11471	aqueous	Hg	10-01-93	10-02-93	10-18-93	10-20-93	19:2	28	No
23 GW18I01B	11472	aqueous	Hg	10-01-93	10-02-93	10-18-93	10-20-93	19:2	28	No
24 GW08S01B	11473	aqueous	Hg	10-01-93	10-02-93	10-18-93	10-20-93	19:2	28	No
25 SDO101B	11740	soil	Hg	10-08-93	10-09-93	10-29-93	11-01-93	21:2	28	No
26 SDDU01B	11741	soil	Hg	10-08-93	10-09-93	10-29-93	11-01-93	21:2	28	No
27 SDO201B	11742	soil	Hg	10-08-93	10-09-93	10-29-93	11-01-93	21:2	28	No
28 SDO301B	11745	soil	Hg	10-08-93	10-09-93	10-29-93	11-01-93	21:2	28	No
29 SDO401B	11749	soil	Hg	10-08-93	10-09-93	10-29-93	11-01-93	21:2	28	No

All ICP metal and cyanide analyses were performed within holding times
Samples were analyzed following SOW 390

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Signature_____

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ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: SMC
Sample Type: Water(5)
Analysis Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931339

A. INTRODUCTION

Five aqueous samples were analyzed for semivolatile Organics. The analytical results were validated to confirm compliance with the (NYSDEC) Analytical Services Protocol(19191)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: SMC
Type: Semivolatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931339
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GWBS01B	10446
GWAQU01B	10448
GWBR01B	10449
GWSF01B	10450
GWFB201B	10451

Contract and Technical Review (CTR) Comments

1. **Sample Hold Time Before Analysis:** All semivolatile analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. **Instrument Tune:** The GC/MS was tuned with DFTPP. All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. **Initial and Continuing Calibrations:** In the initial calibration of BNAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30%	hexachlorocyclopentadiene	32.562
	m-toluic acid	32.525

Action(s):

Hexachlorocyclopentadiene was qualified with a "UJ" in samples GWBS01B, GWAQU01B, GWBR01B, GWSF01B, and GWFB201B for RSD>30%

M-toluic acid was qualified with a "UJ" in samples GWSF01B, and GWFB201B for RSD>30%

M-toluic acid was qualified with a "J" in samples GWBS01B, GWAQU01B, and GWBR01B for RSD>30%

4. Surrogate Recovery: Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of eight indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the BNA analyses were outside the acceptable limits for 2-fluorobiphenyl (in sample GWSF01B), 2-fluorobiphenyl and 1,2-dichlorobenzene-d14 (in sample GWR01B), and terphenyl-d14 (in samples GWBS01B, GWAQU01B, and GWR01B). No action was required as per SOP.
5. Internal Standards: GC/MS analytes concentrations are calculated based on the analytes detector response normalized to a standard(s) injected with the sample. Quantification was based upon six internal standards. All internal standards areas were compliant.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. Three MS/MSD recoveries in the BNA analyses were outside the acceptable limits. No action was required as per SOP.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the BNA analyses were within acceptable limits.
8. Analysis Sequence: BNA sample analyses are required to be run within 12 hours of GC/MS tune. The BNA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. One BNA method blank was analyzed. One method blank was not contaminated with any target compound.
10. Field Blank Contamination: The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. One field blank was analyzed. There was no contamination in the field blank.
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All BNA ion spectra for the targeted analytes correctly matched the standard spectra.
12. Chromatogram Quality: The quality of the BNA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.

14. Other QC: M-toluic acid exceeded calibration range in sample GWBS01B. The laboratory correctly qualified the result with a "E". The reviewer transferred the m-toluic result from diluted sample to undiluted sample. The Form 1 of the undiluted sample should be used. Similarly, o-toluic acid in sample GWAQU01B and 4-methylphenol in sample GWSF01B exceeded calibration range. The Form 1 of the undiluted sample should be used.

C. DATA LIMITATION OVERVIEW:

The BNA analyses of five aqueous samples from SMC referenced as Report# 931339 showed compliance with QC requirements of NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except the following:

In sample GWBS01B, hexachlorocyclopentadiene was qualified with a "UJ" for RSD>30%. M-toluic acid was qualified with a "J" for RSD>30%.

In sample GWAQU01B, hexachlorocyclopentadiene was qualified with a "UJ" for RSD>30%. M-toluic acid was qualified with a "J" for RSD>30%.

In sample GWBR01B, hexachlorocyclopentadiene was qualified with a "UJ" for RSD>30%. M-toluic acid was qualified with a "J" for RSD>30%.

In sample GWSF01B, hexachlorocyclopentadiene was qualified with a "UJ" for RSD>30%. M-toluic acid was qualified with a "UJ" for RSD>30%.

In sample GWFB201B, hexachlorocyclopentadiene was qualified with a "UJ" for RSD>30%. M-toluic acid was qualified with a "UJ" for RSD>30%.

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by: Emmanuel A. Nyako Date: 20 December 1993
Emmanuel A. Nyako M.S.

SUMMARY OF ORGANIC QUALIFIERS

Site: SMC Skaneateles Falls, NY
Report No: 831339
EA Laboratory Inc.

p 1 of 3

Sample	PHL	BooE	2CP	13DCB	14DCB	ByA	12DCB	2MP	BoiPe	4MP	NnpA	HcE	NB	ISO	2NP	24DmP	BzA
GWBS01B																	
GAQU01B																	
GWBR01B																	
GWSF01B																	
GWFB201B																	

- U- The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
- J- The analyte was positively identified, but the associated numerical value may not be an accurate representation of the amount actually present in the environmental sample. The data should be considered for decision making and usable for many purposes.
- R- The data are unusable (may or may not be present). Resampling and reanalysis is necessary for verification.
- NJ- Presumptive evidence of the presence of the material at an estimated quantity.
- UJ- The material was analyzed for but was not detected. The sample quantitation limit is an estimated quantity.

831339/TABBNA11.WQ1

Summary of Semi-volatile Organic Qualifiers (Cont)

p 2 of 3

Sample	BceM	24DcP	124TCB	NAP	4CA	HCBu	4CmP	2MeN	HCcpD	248TcP	245ToP	2CN	2NA	DMP
GWBS01B									UJ					
GAQU01B									UJ					
GWBR01B									UJ					
GWSF01B									UJ					
GWFB201B									UJ					

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Site: SMC
 Report #831339
 EA Laboratory Inc.

EA Sample ID	Lab ID	Matrix	Fraction	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed	Holding Times S > E; R > E; E > A	NYSDEC Criteria R > E; E > A	USEPA Criteria S > E; E > A	Exceedance?	
											NYSDEC	USEPA
1	GWBS01BB	aqueous	BNA	08-14-83	08-15-83	08-16-83	08-24-83	2;1;8	5;40	7;40	No	No
2	GWAQU01B	aqueous	BNA	08-14-83	08-15-83	08-16-83	08-24-83	2;1;8	5;40	7;40	No	No
3	GWBR01B	aqueous	BNA	08-14-83	08-15-83	08-16-83	08-24-83	2;1;8	5;40	7;40	No	No
4	GWSF01B	aqueous	BNA	08-14-83	08-15-83	08-16-83	08-24-83	2;1;8	5;40	7;40	No	No
5	GWFB201B	aqueous	BNA	08-14-83	08-15-83	08-16-83	08-24-83	2;1;8	5;40	7;40	No	No

Samples were analyzed following SOW 3/90

831339\HTBNA11.wq1

Signature: *EN*

ORGANIC DATA VALIDATION AND LIMITATION REPORT

Project Site: Stauffers Management Company, Skaneateles Falls, NY
Sample Type: Aqueous(5)
Analysis Type: Pesticides/PCBs
Laboratory: EA Laboratories
Report No.: 931339

A. INTRODUCTION

Five aqueous samples were analyzed for Pesticide/PCBs. The analytical results were validated following EPA Region 2 Standard Operating Procedure No. HW-6 (Revision #8, 1/92). In addition, a compliance check with the NYSDEC ASP was performed. The following information was used to validate the analytical results:

- Sample hold time before analysis
- Surrogate Recoveries
- MS/MSD analyses
- Method blank contamination
- Field blank contamination
- Calibration and GC performance
- Analysis sequence
- Cleanup efficiency verification
- Compound identification
- Chromatogram quality
- Calculations
- Other QC

The holding time summary table and summary of qualified data are attached.

B. CONTRACT AND TECHNICAL REVIEW

Project Site: Stauffers Management Company, Skaneateles Falls, NY
Sample Type: Aqueous
Analysis Type: Pesticide/PCBs
Laboratory: EA Laboratories
SDG No.: N/A

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GWBS01B	10446
GWAQU01B	10448
GWBR01B	10449
GWSF01B	10450
GWFB201B	10451

Contract and Technical Review (CTR) Comments

1. Sample Hold Before Analysis: All Pesticide/PCB analyses were performed within the NYSDEC ASP and EPA technical holding times.
2. Surrogate Recovery: Surrogates measure the ability of the laboratory to extract the targeted analytes by evaluating the recovery of 2 indicator compounds (tetrachloro-m-xylene and decachlorobiphenyl), which are structurally similar to some of the targeted analytes, as indicators for all of the analytes. The two surrogate recoveries(%R) were outside ASP contractual and EPA technical QC limits. The associated samples are listed below.

<u>Sample#</u>	<u>TCX</u>	<u>DCB</u>
GWAQU01B	46	0/0
GWBR01B	52/50	23/22
GWBS01B		0/0
GWFB201B		20/20
GWSF01B	0/0	0/0

Action:

The surrogate recoveries were between 10 and 60%. The "UJ" qualifier was applied to all non-detect compounds in sample GWBR01B. The surrogates were completely diluted out in samples GWBS01B, GWAQU01B, and GWSF01B. No action was required as per SOP.

3. MS/MSD Analyses: The MS/MSD recoveries and RPDs were determined for six of the targeted analytes. All RPDs complied with ASP contractual and EPA technical requirements. Six spike recoveries were outside the required QC criteria. No action was required as per SOP.

4. LCS Analysis: Percent recovery for six of the targeted analytes was also determined for an LCS sample. The six spike recoveries were compliant.
5. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. The method blanks contained no targeted analytes.
6. Rinsate Blank Contamination: The rinsate blank (RB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The rinsate blank provided with the samples contained no target analytes.
7. Initial Calibration: A three-point calibration for single component pesticides and one-point calibration for multicomponent pesticides/PCBs is required. The relative standard deviations (RSDs) of the calibration factors must be less than 20%. The RSDs were compliant with the QC requirements.
8. Analyte Resolution: To ensure proper analyte separation on the GC column, the resolution of closely eluting compound peaks is evaluated. Peak resolution was compliant for all compounds and both GC columns.
9. Performance Evaluation Mixtures: The PEM is used to verify that the initial calibration is stable throughout the GC analyses. The calculated relative percent difference %D (labeled as "RPD") for each PEM analyte complied with QC requirements.
10. Pesticide Calibration Verification: The relative percent difference %D (labeled as "RPD") of calculated amount and the true amount of each of the single component pesticides in mid point concentration of the Individual Standard Mixtures used to demonstrate continuing calibration must be less or equal to 25%. All the compounds complied with the QC requirement..
10. Analysis Sequence: Pesticide/PCB analyses are required to follow a specific initial and continuing calibration sequence. The analyses complied with the ASP and EPA required sequence.
11. Cleanup Efficiency Verification: All pesticide/PCB analyses must undergo florisil cleanup and may also undergo sulfur and GPC cleanup (the latter is required for soil samples). The samples did not undergo GPC cleanup. No action was required.
12. Compound Identification : Verification of identification of an analyte is based upon the retention time of the analyte falling within the retention time windows on two columns. In addition, the percent difference between the concentrations of the compounds in the two columns should not exceed 25%. No compound was detected.
13. Other QC: None.

C. DATA LIMITATION OVERVIEW :

The pesticides/pcbs analyses of five water samples from the Report #931339 showed compliance with the requirement of the NYSDEC ASP/USEPA Region 2 SOP, and all the data are considered valid and acceptable except the following:

In sample GWR01B, all compounds were qualified with a "UJ" for the surrogate recoveries were between 10 and 60%.

No data qualifiers were applied to internal laboratory QC samples (e.g., MS/MSDs, method blanks). No qualifiers were applied since these analyses are normally not provided to the data user.

Prepared by: _____


Emmanuel A. Nyako.

Date: 20 December 1993

Sample	aBHC	bBHC	dBHC	gBHC	HpCL	ALD	HpEp	EndS1	DiELD	DDE	END	EndSII	DDD	EndSS
GWBS01B														
GWAQO01b														
GWBR01B	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
GWSF01B														
GWFB201B														

- U- The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
- J- The analyte was positively identified, but the associated numerical value may not be an accurate representation of the amount actually present in the environmental sample. The data should be considered for decision making and usable for many purposes.
- R- The data are unusable (may or may not be present). Resampling and reanalysis is necessary for verification.
- NJ- Presumptive evidence of the presence of the material at an estimated quantity.
- UJ- The material was analyzed for but was not detected. The sample quantitation limit is an estimated quantity.

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ORGANICS : TABLE OF HOLDING TIMES

Site: SMC
Report #931339
EA Laboratory Inc.

p 1 of 1

EA Sample ID	Lab ID	Matrix	Fraction	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed	Holding Times S->E; R->E; E->A	NYSDEC Criteria R->E; E->A	USEPA Criteria S->E; E->A	Exceedance?	
											NYSDEC	USEPA
1	GWBS01BB	aqueous	Pest/pcbs	09-14-93	09-15-93	09-16-93	10-19-93	2;1;33	5;40	7;40	No	No
2	GWAAQU01B	aqueous	Pest/pcbs	09-14-93	09-15-93	09-16-93	10-19-93	2;1;33	5;40	7;40	No	No
3	GWBR01B	aqueous	Pest/pcbs	09-14-93	09-15-93	09-16-93	10-19-93	2;1;33	5;40	7;40	No	No
4	GWSE01B	aqueous	Pest/pcbs	09-14-93	09-15-93	09-16-93	10-19-93	2;1;32	5;40	7;40	No	No
5	GWFB201B	aqueous	Pest/pcbs	09-14-93	09-15-93	09-16-93	10-19-93	2;1;33	5;40	7;40	No	No

Samples were analyzed following SOW 3/90

931339\HTBNA11.wq1

Signature: 

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INORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: Stauffers Management Company, Skaneateles Falls, NY.
Sample Type: Aqueous (5)
Analysis Type: TAL Metals and Cyanide
Laboratory: EA Laboratories
Report No.: 931339

A. INTRODUCTION:

Five aqueous samples were analyzed for TAL metals and cyanide. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (1991)/USEAP A Region 2 Standard Operating Procedure NO. HW-2 (Revision XI January 30, 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument calibration
- Initial calibration verification (ICV) and continuing calibration verification (CCV)
- CRDL standards for AA (CRA), and ICP (CRI)
- Initial calibration blank (ICB), continuing calibration blank (CCB), and preparation blank (PB)
- ICP interference check sample (ICS) analysis
- Spike sample analysis (S)
- Duplicate sample analysis (D)
- Laboratory control sample (LCS)
- ICP serial dilution analysis (L)
- Instrument detection limit (IDL) determination
- Interelement correction for ICP
- Linear Range analysis
- Furnace QC analysis

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: Stauffers Management Company, Skaneateles Falls, NY.
Analysis Type: TAL Metals and Cyanide
Laboratory: EA Laboratories
Report No.: 931339

Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GWBS01B	10446
GWAQU01B	10448
GWBR01B	10449
GWSF01B	10450
GWFB201B	10451

1. Sample Holding Time Before Analysis: All metal analyses were performed within ASP and USEPA prescribed holding times.
2. Instrument Calibration: All instruments were calibrated daily and dates and times clearly shown on the raw data. The proper sequence of the instrument blanks and standards were used. A three-point calibration for ICP and at least four-point calibration for furnace AA were used as required by the NYSDEC ASP.
3. Initial and Continuing Calibrations Verifications: The percent recovery for all analytes were within the prescribed window (90-110%). The ICV and the CCV standards were analyzed at the correct frequency in the injection sequence.
4. CRDL Standards for AA (CRA) and ICP (CRI): The CRDL standards were run at the frequency and appropriate concentration for each analyte. The percent recoveries for silver(151.8,149.9) was outside the control limit(80-120%). No action was required for silver since it was not detected in associated sample.
5. Laboratory Blanks: All laboratory blanks were analyzed at the correct frequency during the injection sequence. The aqueous calibration and preparation blanks contained traces of calcium, magnesium, lead, iron, and sodium. All the concentrations were below the CRDL, hence no action was required.
6. ICP Interference Check Sample (ICS) Analysis: The interference check sample percent recoveries were all within the acceptable window (80-120%).

7. Spiked Sample Analysis: The spike recoveries were outside acceptable range(75-125%) for selenium(20.3%) and thallium(72.5%). The laboratory correctly qualified selenium and thallium results with an "N".

Action:

Selenium was rejected in all the five samples for spike recovery less than 30%.

Thallium was qualified with a "UJ" in all samples for spike recovery between 30 and 75%.

8. Post-digestion Spike Analysis: The post-digestion spike analyses were not performed on the analytes out of control limit. No action was required.
9. Duplicate Sample Analysis: The duplicate analyses were performed aqueous samples. All the analytes were within the control limit as per SOP.
10. Laboratory Control Sample Analysis: The laboratory control sample analysis was analyzed at the correct frequency. All percent recoveries were within acceptable range (80-120%).
11. ICP Serial Dilution Analysis: The ICP serial dilution was performed on aqueous samples. The percent difference for sodium(64.2%) was outside the control limit(10%).

Action:

Sodium was qualified with a "J" in samples GW1BS01B, GWAQU01B, GWBR01B, and GWSFB01B for serial dilution.

12. Instrument Detection Limit Analysis: The IDLs were generated in 1992 by the laboratory. All the IDLs were lower than the CRDLs.
13. Interelement Correction for ICP: Interelement correction factor applied to aqueous data were acceptable. No action was required.
14. Linear Range Analysis: The linear range for the ICP was supplied by the laboratory. A comparison of the Form 1 results to Form XII showed that the observed concentrations of the analytes were within the linear range. The linear range was not determined quarterly. No action was required.
15. Furnace QC Analysis: The analytical spike recovery for selenium and thallium in most of the samples were out of control limits (85-115%), while sample absorbencies were less than 50% of spike absorbencies. The laboratory correctly qualified the results with a "W". The thallium and selenium results in the samples were previously qualified for spike recovery.

16. Calculations: All checked calculations were within rounding errors.

17. Other Q.C.: None.

C. DATA LIMITATION OVERVIEW:

The inorganic analyses of water samples from the SMC Skaneateles Falls, NY referenced as Report No. 931339, showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

In sample GWBS01B, selenium was rejected "R" for spike recovery less than 30%. Thallium was qualified with a "UJ" for spike recovery between 30 and 75%. Sodium was qualified with a "J" for serial dilution.

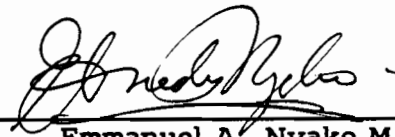
In sample GWAQU01B, selenium was rejected "R" for spike recovery less than 30%. Thallium was qualified with a "UJ" for spike recovery between 30 and 75%. Sodium was qualified with a "J" for serial dilution.

In sample GWBR01B, selenium was rejected "R" for spike recovery less than 30%. Thallium was qualified with a "UJ" for spike recovery between 30 and 75%. Sodium was qualified with a "J" for serial dilution.

In sample GWSF01B, selenium was rejected "R" for spike recovery less than 30%. Thallium was qualified with a "UJ" for spike recovery between 30 and 75%. Sodium was qualified with a "J" for serial dilution.

In sample GWFB201B, selenium was rejected "R" for spike recovery less than 30%. Thallium was qualified with a "UJ" for spike recovery between 30 and 75%.

Prepared by: _____


Emmanuel A. Nyako M.S.

Date: 20 Dec. 1993

SUMMARY OF VALIDATED INORGANIC DATA

Site: SMC
LAB REPORT # 931339
EA Laboratory Inc.

p 1 of 2

Sample	Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn
GWBS01B														
GWAQU01B														
GWBR01B														
GWSF01B														
GWFB201B														

- U- The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
- J- The analyte was positively identified, but the associated numerical value may not be an accurate representation of the amount actually present in the environmental sample. The data should be considered for decision making and usable for many purposes.
- R- The data are unusable (may or may not be present). Resampling and reanalysis is necessary for verification.
- NJ- Presumptive evidence of the presence of the material at an estimated quantity.
- UJ- The material was analyzed for but was not detected. The sample quantitation limit is an estimated quantity.

931339/TABINR11.WQ1

Sample	Hg	Ni	K	Se	Ag	Na	Tl	V	Zn	CN	TOC
GWBS01B				R		J	UJ				N/A
GWAQU01B				R		J	UJ				N/A
GWBR01B				R		J	UJ				N/A
GWSF01B				R		J	UJ				N/A
GWFB201B				R			UJ				N/A

EA Sample ID	Lab ID	Matrix	Fraction	Sampled	Received	Holding Date Prepared	NYSDEC Date Analyzed	Holding Time S->P, P->A	Exceedance? Criteria	Exceedance?
1	GWBS01BB	aqueous	Hg	9-14-93	9-15-93	9-27-93	9-27-93	13,0	28	No
2	GWACU01B	aqueous	Hg	9-14-93	9-15-93	9-27-93	9-27-93	13,0	28	No
3	GWBR01BB	aqueous	Hg	9-14-93	9-15-93	9-27-93	9-27-93	13,0	28	No
4	GWSF01B	aqueous	Hg	9-14-93	9-15-93	9-27-93	9-27-93	13,0	28	No
5	GWFB201B	aqueous	Hg	9-14-93	9-15-93	9-27-93	9-27-93	13,0	28	No

All ICP metal and cyanide analyses were performed within holding times
Samples were analyzed following SOW 3/90

931339\HTINOR11.wq1

Signature *EW*

ORGANIC DATA LIMITATION AND VALIDATION REPORT

Project Site: Stauffer Managemnt Company, Skaneateles Falls, N.Y.
Sample Type: Aqueous(6)
Analysis Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No: 931339

A. INTRODUCTION

Six water samples were analyzed for Volatile Organics. The analytical results were validated to confirm compliance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol(1991)/USEPA Region 2 Standard Operating Procedure No. HW-6 (Revision No. 8 January 1992). The following information was used to validate the analytical results:

- Sample holding time before analysis
- Instrument tune
- Initial and continuing calibration
- Surrogate recoveries
- Internal standard areas
- MS/MSD analyses
- Laboratory control samples
- Analysis Sequence
- Method blank contamination
- Compound identification and Ion spectra match
- Chromatogram quality
- Calculations
- Other QC

The holding time tables are attached to this report.

B. CONTRACT AND TECHNICAL REVIEW

Site: Stauffer Managemnt Company, Skaneateles Falls, N.Y.
Type: Volatiles Organics
Laboratory: EA Laboratories Inc.
Report No.: 931339
Sample Identification:

<u>Field ID</u>	<u>Lab ID</u>
GWBS01B	10446
GWAQU01B	10448
GWBR01B	10449
GWSF01B	10450
GWFB201B	10451
TRIP BLK 06	10452

Contract and Technical Review (CTR) Comments

1. **Sample Hold Time Before Analysis:** All VOA analyses were performed within NYSDEC ASP contractual and EPA technical holding times.
2. **Instrument Tune:** The GC/MS was tuned with BFB (VOA). All QC criteria were compliant and all samples were analyzed within 12 hours of the tune.
3. **Initial and Continuing Calibrations:** In the initial calibration of VOAs, the relative response factors (RRFs) and relative standard deviations (RSDs) of each analyte in the multi-concentration calibration is assessed. In the continuing calibration, the RRF and percent difference of the RRFs (%D) of each analyte is assessed. The following non-compliance were noted in one or more calibrations.

RSD>30% acetone(31.289)

Action(s):

Acetone was qualified with a "UJ" in samples GWBS01B, GWAQU01B, GWBR01B, GWFB201B, and TRIP BLK 06 for RSD>30%

Acetone was qualified with a "J" in sample GWSF01B for RSD>30
4. **Surrogate Recovery:** Surrogates measures the ability of the laboratory to extract the targeted analytes by evaluating the recovery of three indicator compounds which are structurally similar to some targeted analytes as indicators for all the analytes. The surrogate recoveries for the VOA analyses were within acceptable limits.

5. Internal Standards: GC/MS analyte concentrations are calculated based on the analyte detector response normalized to a standard(s) injected with the sample. Quantification was based upon three internal standards (bromochloromethane, 1,4-difluorobenzene, and chlorobenzene). All internal standards areas were compliant.
6. Matrix Spike/Matrix Spike Duplicate: The MS/MSD recovery measures the potential for matrix interferences in the recovery of selected spiking compounds. The MS/MSD recoveries in the VOA analyses were within acceptable limits.
7. LCS Recoveries: The LCS (or matrix spike blank) measures the ability to recover selected analytes in water sample and is used to confirm that the laboratory can comply with the sample extraction analysis requirements. The LCS recoveries in the VOA analyses were within acceptable limits.
8. Analysis Sequence: VOA sample analyses are required to be run within 12 hours of GC/MS tune. The VOA analyses complied with the analysis sequences.
9. Method Blank Contamination: A method blank measures the potential for false-positive results introduced by internal laboratory contamination. A total of two VOA method blanks were analyzed. The two blanks were not contaminated with target compounds.
10. Field and Trip Blank Contamination: Field and Trip Blank Contamination : The field blank (FB) measures the potential for false-positive results introduced by improper field decontamination procedures of sampling equipment. The trip blank (TB) measures the potential for false-positive results introduced during sample holding in the shipping containers. The trip blank (10452) was not contaminated with target compounds..
11. Compound Identification and Spectra Match: Verification of identification of an analyte is based upon the match between the relative ratios of the molecular fragments to the corresponding standard fragments in the GC/MS analysis of VOA compounds. All VOA ion spectra for the targeted analytes correctly matched the standard spectra.

12. Chromatogram Quality: The quality of the VOA chromatograms are evaluated to determine whether there are any interfering unknowns present which prevent the identification of the targeted analytes. All chromatograms were of acceptable quality.
13. Calculations: The reported analyte concentrations and any internal QC calculations are verified for their accuracy. All checked calculations were correct within rounding errors.
14. Other QC: Xylene exceeded calibration range in samples GWBS01B and GWAQU01B. The laboratory correctly qualified the values with a "E". The reviewer transferred xylene values from diluted samples to undiluted samples. The Form 1 of the original samples should be used.

C. DATA LIMITATION OVERVIEW:

The VOA analyses of six water samples from the Report # 931339 showed compliance with the QC requirements of the NYSDEC ASP/USEPA Region 2 SOP, and all data are considered valid and acceptable except for the following:

In sample GWBS01B, acetone was qualified with a "UJ" for RSD > 30%

In sample GWAQU01B, acetone was qualified with a "UJ" for RSD > 30%

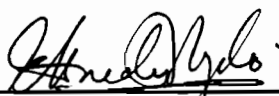
In sample GWFB201B, acetone was qualified with a "UJ" for RSD > 30%

In sample GWBR01B, acetone was qualified with a "UJ" for RSD > 30%

In TRIP BLK 06(10452), acetone was qualified with a "UJ" for RSD > 30%

In sample GWSF01B, acetone was qualified with a "J" for RSD > 30

No data qualifiers were applied to internal laboratory QC samples (e.g. MS/MSD, method blanks). No qualifiers were applied since these analyses are not provided to the data user.

Prepared by:  Date: 20 December 1993
Emmanuel A. Nyako M.S.

Summary of Volatile Organic Qualifiers
REPORT No:931339

p 1 of 2

sample	C1Me	BrMe	VCl	ClEt	MeCl	Ace	CS2	11DCE	11DC	12DCE	CHCL3	12DC	MEK	111TCA	CCl4	VAcet	BDCM	TCE
GWBS01B						UJ												
GWAQU01B						UJ												
GWBR01BB						UJ												
GWSF01B						UJ												
GWFB201B						J												
TRP.BLK.06						UJ												

- U- The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
- J- The analyte was positively identified, but the associated numerical value may not be an accurate representation of the amount actually present in the environmental sample.
The data should be considered for decision making and usable for many purposes.
- R- The data are unusable (may or may not be present). Resampling and reanalysis is necessary for verification.
- NJ- Presumptive evidence of the presence of the material at an estimated quantity.
- UJ- The material was analyzed for but was not detected. The sample quantitation limit is an estimated quantity.

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[illegible]

Report #931339
EA Laboratory Inc.

EA Sample ID	Lab ID	Matrix	Fraction	Date Sampled	Date Lab Received	Date Analyzed	Holding Times S->A; R->A Analyzed	NYSDEC Criteria R->A	USEPA Criteria S->A	Exceedance? 10,14 NYSDEC,USEPA
1	GWBS01B	aqueous	VOAs	09-14-83	09-15-83	09-17-83	3,2	2	3	No;No
2	GWAQU01B	aqueous	VOAs	09-14-83	09-15-83	09-17-83	3,2	2	3	No;No
3	GWBR01B	aqueous	VOAs	09-14-83	09-15-83	09-17-83	3,2	2	3	No;No
4	GWSF01B	aqueous	VOAs	09-14-83	09-15-83	09-17-83	3,2	2	3	No;No
5	GWFB201B	aqueous	VOAs	09-14-83	09-15-83	09-17-83	3,2	2	3	No;No
6	TRP.BLK.06	aqueous	VOAs	09-14-83	09-15-83	09-17-83	3,2	2	3	No;No

Samples were analyzed following SOW 3/80

831339\HTVOA11.wq1

Signature

EW

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #	SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS	OTHER
920508	SMC-GW09D-01A	WATER	OK	OK	OK	OK	OK	OK
	SMC-GW06D-01A	WATER	OK	OK	OK	OK	OK	OK
	SMC-GW03D-01A	WATER	OK	OK	OK	OK	OK	OK
	SMC-GW04D-01A	WATER	OK	OK	OK	OK	OK	OK
	SMC-GW01D-01A	WATER	OK	OK	OK	OK	OK	OK
	SMC-GW02D-01A	WATER	OK	OK	OK	OK	OK	OK
	SMC-GWFB03-01A	WATER	OK	OK	OK	OK	OK	OK
	Trip Blank	WATER	OK					
	Trip Blank	WATER	OK					

Bath Toxicology Group, Inc.

DATA REPORT 920508

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #	SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS	OTHER
920398	SMC-GW02I-01A	WATER	OK	OK	OK	OK	OK	OK
	SMC-GW02S-01A	WATER	OK	OK	OK	OK	OK	OK
	SMC-GW03I-01A	WATER	OK	OK	OK	OK	OK	OK
	Trip Blank	WATER	OK					

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #	SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS
920461	SMC-CS01-01A	WATER	OK	OK	OK	OK	OK
	SMC-CS02-01A	WATER	OK	OK	OK	OK	OK
	SMC-CS03-01A	WATER	OK	OK	OK	OK	OK
	SMC-CS04-01A	WATER	OK	OK	OK	OK	OK
	SMC-SS03-01A	SOIL	OK	OK	OK	NO	OK
	TRIP BLANK	WATER	OK	NA	NA	NA	NA

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #	SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS	TOC	OTHER
911652	SMC-SB02-01A	SOIL	OK	OK	OK	NO	OK	OK	NA
	SMC-SB03-01A	SOIL	OK	OK	OK	NO	OK	OK	NA
	SMC-SB04-01A	SOIL	OK	OK	OK	NO	OK	OK	NA
	SMC-SB05-01A	SOIL	OK	OK	OK	NO	OK	OK	NA
	SMC-SBU-01A	SOIL	OK	OK	OK	NO	OK	OK	NA
	SMC-SB06-01A	SOIL	OK	OK	OK	NO	OK	OK	NA
	SMC-SB07-01A	SOIL	OK	OK	OK	NO	OK	OK	NA
	SMC-SB08-01A	SOIL	OK	OK	OK	NO	OK	OK	NA
	SMC-SB09-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB10-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB11-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB12-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB13-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB14-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB15-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB16-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-FB-01A	WATER	OK	NO	OK	OK	OK	OK	NA
	SMC-FB-02A	WATER	OK	NO	OK	OK	OK	OK	NA
	SMC-FB-03A	WATER	OK	OK	OK	OK	OK	OK	NA

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #	SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS	TOC	OTHER
911691	SMC-SBU-02A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB23-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB23-02A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB24-01A	SOIL	NO	OK	OK	OK	OK	OK	NA
	SMC-SB25-01A	SOIL	NO	NO	OK	OK	OK	OK	NA
	SMC-SB26-01A	SOIL	NO	OK	OK	OK	OK	OK	NA
	SMC-SB27-01A	SOIL	NO	NA	NA	NA	NA	NA	NA
	SMC-SB27-02A	SOIL	NO	NA	NA	NA	NA	NA	NA
	SMC-SB27-03A	SOIL	NA	OK	OK	OK	OK	OK	OK
	SMC-SB27-04A	SOIL	NA	NO	OK	OK	OK	OK	OK

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #	SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS	TOC	OTHER
911664	SMC-FB-04A	water	OK	OK	NO	OK	OK	OK	NA
	SMC-SB16-02A	SOIL	OK	NO	OK	OK	OK	OK	NA
	SMC-SB17-01A	SOIL	OK	NO	OK	OK	OK	OK	NA
	SMC-SB18-01A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB18-02A	SOIL	OK	OK	OK	OK	OK	OK	NA
	SMC-SB18-03A	SOIL	NO	NO	OK	OK	OK	OK	NA
	SMC-SB20-01A	SOIL	NO	NO	OK	OK	OK	OK	NA
	SMC-SB21-01A	SOIL	OK	OK	OK	OK	OK	OK	NA

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #		SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS	TOC
911697		SMC-FB-05A	water	OK		OK		OK	NA
		SMC-SB22-01A	SOIL	OK		OK		OK	OK
		SMC-SB19-01A	SOIL	OK		OK		OK	OK

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #	SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS	OTHER
920398	SMC-GW02I-01A	WATER	OK	NO	NO	OK	NO	NO
	SMC-GW02S-01A	WATER	OK	NO	NO	OK	NO	NO
	SMC-GW03I-01A	WATER	OK	NO	NO	OK	NO	NO
	SMC-GW04S-01A	WATER	OK	OK	NO	OK	NO	NO
	SMC-GW04I-01A	WATER	OK	OK	NO	OK	NO	NO
	SMC-GWU-02A	WATER	OK	OK	NO	OK	NO	NO
	SMC-GWFB02-01A	WATER	OK	OK	NO	OK	NO	NO
	SMC-GW01S-01A	WATER	OK	OK	NO	OK	NO	NO
	SMC-GW01I-01A	WATER	OK	OK	NO	OK	NO	NO
	SMC-BS01-01A	WATER	OK	OK	NO	NO	OK	NO
	SMC-BSU-01A	WATER	OK	OK	NO	NO	OK	NO
	SMC-BSFB01-01A	WATER	OK	OK	NO	NO	OK	NO
	Trip Blank	WATER	OK					
	Trip Blank	WATER	OK					

STAUFFER MANAGEMENT COMPANY RI/FS

GROUP #	SAMPLE #	MATRIX	VOA	BNA	PEST/PCB	CN	METALS	OTHER
920396	SMC-GW11I-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GW10I-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GW09I-01A	WATER	OK	NO	OK	NO	OK	OK
	SMC-GW08I-01A	WATER	OK	NO	OK	NO	OK	OK
	SMC-GW08S-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GW07I-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GW07S-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GW06I-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GW06S-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GW05I-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GWU-01A	WATER	OK	OK	OK	NO	OK	OK
	SMC-GWFB01-01A	WATER	OK	OK	OK	NO	OK	OK
	Trip Blank	WATER	OK					
	Trip Blank	WATER	OK					

Bath Toxicology Group, Inc.

DATA REPORT 920396

COMPLIANCY SUMMARY TABLE - ROUND 2 ANALYTICAL DATA
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

p 1 of 3

Report #	Date received	Sample #	Matrix	VOA	BNA	Pest/PCBs	Metals/CN	EPA Region 2 Qualifications
931104	8-5-93	MW5SB15	soil	OK	OK	NO	OK	yes
	8-5-93	MW5SB16	soil	OK	OK	OK	OK	yes
	8-5-93	FB16	aqueous	OK	OK	OK	OK	yes
	8-5-93	TB15/16	aqueous	OK	NA	NA	NA	yes
930779	6-4-93	MW5SBFB	aqueous	OK	OK	NO	OK	yes
	6-4-93	MW5SB12	soil	OK	OK	OK	OK	yes
	6-4-93	MW5SB10	soil	OK	OK	OK	OK	yes
	6-4-93	MW5SB11	soil	OK	OK	OK	OK	yes
	6-4-93	MW5SB13	soil	OK	NO	OK	OK	yes
	6-4-93	MW5SB14	soil	OK	NO	OK	OK	yes
931455	10-07-93	GW09D01B	aqueous	OK	OK	OK	OK	yes
	10-07-93	GW07S01B	aqueous	OK	OK	OK	OK	yes
	10-07-93	GWTB01B	aqueous	OK	NA	NA	NA	yes
	10-07-93	GW07D01B	aqueous	OK	OK	OK	OK	yes
	10-07-93	GWTB01B	aqueous	OK	NA	NA	NA	yes
	10-07-93	GW13D01B	aqueous	OK	OK	OK	OK	yes
	10-07-93	GW06S01B	aqueous	OK	OK	OK	OK	yes
	10-07-93	GW15D01B	aqueous	OK	OK	OK	OK	yes
	10-07-93	GWTB01B	aqueous	OK	NA	NA	NA	yes
	10-08-93	GW16I01B	aqueous	OK	OK	OK	OK	yes
	10-08-93	GW16D01B	aqueous	OK	OK	OK	OK	yes
	10-08-93	GW17D01B	aqueous	OK	OK	OK	OK	yes
	10-08-93	GWTB01B	aqueous	OK	NA	NA	NA	yes
	10-09-93	GW04S01B	aqueous	OK	OK	OK	OK	yes
	10-09-93	GW0FB01B	aqueous	OK	OK	OK	OK	yes
	10-09-93	GW02S01B	aqueous	OK	OK	OK	OK	yes
	10-09-93	SW0101B	aqueous	OK	OK	OK	OK	yes
	10-09-93	SWDU01B	aqueous	OK	OK	OK	OK	yes
	10-09-93	SW0201B	aqueous	OK	OK	OK	OK	yes
	10-09-93	SW0301B	aqueous	OK	OK	OK	OK	yes
	10-09-93	SW0401B	aqueous	OK	OK	OK	OK	yes
	10-02-93	TB03B	aqueous	OK	OK	OK	OK	yes
	10-02-93	SPW301B	aqueous	OK	OK	OK	OK	yes
	10-02-93	SPW201B	aqueous	OK	OK	OK	OK	yes
	10-02-93	SPW101B	aqueous	OK	OK	OK	OK	yes
	10-02-93	GW18S01B	aqueous	OK	OK	OK	OK	yes
	10-02-93	GW18I01B	aqueous	OK	OK	OK	OK	yes
	10-02-93	GW08S01B	aqueous	OK	OK	OK	OK	yes
	10-02-93	GWTB01B	aqueous	OK	NA	NA	NA	yes
	10-09-93	SD0101B	soil	OK	OK	OK	OK	yes
	10-09-93	SDDU01B	soil	OK	OK	OK	OK	yes
	10-09-93	S0D201B	soil	OK	OK	OK	OK	yes
	10-09-93	S0D301B	soil	OK	OK	OK	OK	yes
	10-09-93	S0D401B	soil	OK	OK	OK	OK	yes

COMPLIANCY SUMMARY TABLE - ROUND 2 ANALYTICAL DATA (Continued)

p 2 of :

<u>Report #</u>	<u>Date received</u>	<u>Sample #</u>	<u>Matrix</u>	<u>VOA</u>	<u>BNA</u>	<u>Pest/PCBs</u>	<u>Metals/CN</u>	<u>EPA Regi Qualificat</u>
931339	09-15-93	GWBS01B	aqueous	OK	OK	OK	OK	yes
	09-15-93	GWAQU01B	aqueous	OK	OK	OK	OK	yes
	09-15-93	GWBR01B	aqueous	OK	OK	OK	OK	yes
	09-15-93	GWSF01B	aqueous	OK	OK	OK	OK	yes
	09-15-93	GWFB201B	aqueous	OK	OK	OK	OK	yes
	09-15-93	TRP.BLK.06	aqueous	OK	NA	NA	NA	yes
921822	11-21-92	MW5-SB06	soil	OK	OK	OK	OK	yes
	11-21-92	MW5-SB01	soil	OK	OK	OK	OK	yes
	11-21-92	MW5-SB2B	soil	OK	OK	OK	OK	yes
	11-21-92	MW5-SB03	soil	OK	OK	OK	OK	yes
	11-21-92	FB (11/20/92)	aqueous	OK	OK	OK	OK	yes
	11-23-92	TB (11/20/92)	aqueous	OK	NA	NA	NA	yes
	11-23-92	MW5-SB07	soil	OK	OK	OK	OK	yes
	11-23-92	MW5-SB04	soil	OK	OK	OK	OK	yes
	11-23-92	MW5-SB09	soil	OK	OK	OK	OK	yes
	11-23-92	MW5-SB08	soil	OK	OK	OK	OK	yes
	11-23-92	MW5-SB05	soil	OK	OK	OK	OK	yes
	11-23-92	TB (11/22/92)	aqueous	OK	NA	NA	NA	yes
	11-24-92	OPEN PIT	aqueous	OK	OK	OK	OK	yes
931104	8-05-93	MW5SB15	aqueous	OK	OK	OK	OK	yes
	8-05-93	MW5SB16	soil	OK	OK	OK	OK	yes
	8-05-93	FB16	soil	OK	OK	OK	OK	yes
	8-05-93	TB15/16	soil	OK	NA	NA	NA	yes
911697	10-26-91	SMC-FB-05A	aqueous	OK	NA	NA	NA	yes
	10-26-91	SMC-SB22-01A	soil	OK	OK	OK	OK	yes
	10-29-91	SMC-SB19-01A	soil	OK	OK	OK	OK	yes
931235	08-27-93	GW10I01B	aqueous	OK	OK	OK	OK	yes
	08-27-93	CFB01B1B	aqueous	OK	OK	OK	OK	yes
	08-27-93	TB01B	aqueous	OK	NA	NA	NA	yes
	08-30-93	GW13I01B	aqueous	OK	NA	NA	NA	yes
	08-30-93	GW11I01B	aqueous	OK	OK	OK	OK	yes
	08-30-93	TB02B	aqueous	OK	NA	NA	NA	yes
	09-02-93	GW12I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GW08I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GWU01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GW06I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GW03I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GW04I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GW09I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GW05I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	TRIP BLK	aqueous	OK	NA	NA	NA	yes
	09-02-93	GW01I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GW02I01B	aqueous	OK	OK	OK	OK	yes
	09-02-93	GW07I01B	aqueous	OK	OK	OK	OK	yes

COMPLIANCY SUMMARY TABLE - ROUND 2 ANALYTICAL DATA (Continued)

p 3 of 3

<u>Report #</u>	<u>Date received</u>	<u>Sample #</u>	<u>Matrix</u>	<u>VOA</u>	<u>BNA</u>	<u>Pest/PCBs</u>	<u>Metals/CN</u>	<u>EPA Region 2 Qualifications</u>
931235 (Cont)	09-04-93	GW12S01B	aqueous	OK	OK	OK	OK	yes
	09-04-93	GW05S01B	aqueous	OK	OK	OK	OK	yes
	09-04-93	TRIP BLK	aqueous	OK	NA	NA	NA	yes
	09-04-93	GWCFP101B	aqueous	OK	OK	OK	OK	yes
	09-04-93	GWCFP201B	aqueous	OK	OK	OK	OK	yes
	09-04-93	TRIP BLK5A&B	aqueous	OK	OK	OK	OK	yes
	09-04-93	GW14I01B	aqueous	OK	OK	OK	OK	yes

1

APPENDIX F



Appendix F

Soil Vapor Contaminant Assessment Report (EA 1992)

Draft

**Stauffer Management Company
Remedial Investigation/Feasibility Study
Skaneateles Falls, New York
Monitoring Well 5 Area Investigation
Soil Vapor Contaminant Assessment®**

Prepared for

ICI Americas Inc.
Wilmington, Delaware

Prepared by

EA Engineering, P.C.
Newburgh, New York 12550

And Its Affiliate of EA Engineering, Science, and Technology

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1	Summary of volatile organic concentrations from SVCA.
2	Kriging parameters used for concentration contours.

1. INTRODUCTION

EA Engineering, P.C., and its affiliate EA Engineering, Science, and Technology, was retained by ICI Americas Inc. to perform a Remedial Investigation/Feasibility Study (RI/FS) at the Stauffer Management Company (SMC) site located in Skaneateles Falls, New York. The site area under investigation includes the onsite landfill and immediate vicinity of the former chemical plant. As part of the initial phase of the field investigation, a bedrock well cluster (MW-5I and MW-5D) was installed east of the main plant facility in the general area of the former organic processing plant.

During the installation of these bedrock wells, vapor readings above background levels were recorded from the drill cuttings with an HNu. A sheen was also observed on the drill cuttings and drilling fluid during installation of the monitoring well boring for MW-5I. A soil boring was added near MW-5I, and EA obtained a soil sample which confirmed the presence of xylenes. This area of the site, which is approximately 400 ft north of the onsite landfill, is referred to as "Area MW-5."

The data generated during the initial phase of the RI/FS gave a preliminary indication of the presence of organic compounds associated with the former manufacturing process in Area MW-5. However, the data was not adequate to assess the potential source(s), extent, and concentration of chemical constituents present nor to characterize localized groundwater flow in Area MW-5.

In support of the ongoing RI/FS at the SMC site, and to close existing data gaps in Area MW-5, an additional environmental sampling program was developed for this portion of the site. The Area MW-5 sampling program consists of a soil vapor contaminant assessment (SVCA®), installation of soil borings, and installation of monitoring wells. This report documents the results of the completed SVCA performed in Area MW-5 by EA and provides recommendations for soil boring and monitoring well locations.

1.1 SITE LOCATION AND HISTORY

The SMC site is located in central New York State in Skaneateles Falls, Onondaga County. The site, situated along Jordan Road, is approximately 3 mi north of Skaneateles Lake and 15 mi west of the City of Syracuse (Figure 1). The SMC facility encompasses an area of approximately 140 acres, of which 10 acres were used for production operations throughout the life of the site. Skaneateles Creek flows to the north through the western portion of the site.

The site was formerly used to manufacture potassium and sodium silicates, detergents, and organic intermediates for other industries. The principal organic compound manufactured at the site was toluic acid, which used xylene as a raw material. Currently, there are no manufacturing activities conducted at the site. The early site operation was owned by Draycott Mills, which manufactured felt roofing materials. Cowles Chemical Company

initiated the manufacturing of potassium and sodium silicates and industrial detergents in the mid-1940s. Organic compounds were manufactured at the facility from the late 1950s to 1981. Stauffer Chemical Company purchased the facility from Cowles Chemical Company in the late 1960s and continued operations until 1984.

1.2 SITE DESCRIPTION

Area MW-5 includes a portion of the apparent operations area for the former plant and is located northeast of the main plant building (Figure 2). As part of this investigation, the SVCA was expanded to include sampling in the vicinity of the septic leachfield which is located north of the main plant building and northwest of Area MW-5. The area under investigation is relatively flat and consists of concrete pads which are remnants of plant ancillary buildings, paved areas, and open grassy areas. Area MW-5 is bounded by Skaneateles Creek to the east and a wooded, low lying swampy area to the north.

The unconsolidated soils in Area MW-5 are approximately 15-ft thick and overlay limestone bedrock. Groundwater is present in the unconsolidated soils, with the water table approximately 4-5 ft below ground surface. Preliminary assessment of the rock cores from MW-5D exhibits a shallow fracture zone in the upper bedrock directly below the overburden. This fracture zone overlays a more competent rock zone; fractures are also present at depths below the competent rock layer. Figure 2 shows the locations of monitoring wells, soil borings, and surface features in the vicinity of Area MW-5.

2. SCOPE OF WORK

An SVCA in Area MW-5 was performed as a screening method to identify candidate areas for soil sampling and monitoring well installation. A grid of sampling points was developed with a total of 63 points that were placed at 50- and 100-ft spacings (Figure 3). Soil vapor samples were not analyzed from 10 sampling point locations because groundwater was aspirated into the soil vapor probes.

3. METHODOLOGY

3.1 SAMPLING

Sample probes were driven to a depth of 3 ft at all sampling locations. The probes were firmly seated at each location to prevent entrance of overlying air, and were purged using a vacuum pump attached to the sampling probe. Following purging, a 500-1,000 μL soil vapor sample was withdrawn and injected into a field gas chromatograph (Varian) equipped with a flame ionization detector (FID) and an electron captive detector (ECD). The FID was used to quantify the concentrations of the non-chlorinated aromatic compounds and the ECD was used for quantifying the chlorinated compounds.

Soil vapor concentrations were calculated using the external standard method. The instrument was calibrated at the start of the day and after every fifth sample run. The following equation was used to calculate the soil vapor concentrations:

$$C_i = CF_i * A_i * V_s / V_{std}$$

where

- C_i = Vapor concentration of compound of concern (ppm_v)
- CF_i = Calibration factor for compound of concern
- A_i = Observed area of targeted analyte
- V_s = Injection volume of vapor sample (μl)
- V_{std} = Injection volume of vapor standard (μl).

CF_i is calculated by dividing the concentration of the target analyte in the calibration standard (ppm_v) by its observed peak area on the gas chromatogram.

The following analytes were targeted for the SVCA:

- Benzene
- Toluene
- Xylene
- Trichloroethene
- Tetrachloroethene.

In addition, EA included ethylbenzene, methylene chloride, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and trichloroethane in the "standard" mixture to provide qualitative determination of the presence/absence of these compounds.

3.2 GEOSTATISTICAL ANALYSIS

The results of the SVCA consist of a two-dimensional grid of compound concentrations at the sampling points. A separate map of the concentrations can be plotted for each compound. Since the vapors are drawn from the unconsolidated sedimentary environment which may vary in porosity and physical characteristics, the resulting concentrations exhibit variability and are not easily contoured manually.

Kriging was selected as a mathematical method to contour the vapor concentration results. "Kriging is the process of estimating the value of a spatially distributed variable from adjacent values while considering the interdependence expressed in the variogram" (Davis 1973, Page 385). Variogram construction and kriging parameters are defined here by summarizing a description by Isaaks and Srivastava (1989, Pages 301 and 313).

The variogram plot or graph is the primary interpretive tool used in selection of kriging parameters for contouring spatial data arranged on a grid. The vertical axis is half the average quadratic deviation (also known as the semi-variance of the difference) of the variable measured at successive points along the data grid. The horizontal axis is the "lag" or distance between successive points used for each of several calculations of the semi-variance. The variogram or semi-variogram normally consists of a sloped line that rises to the right and reaches a plateau at a fairly high lag value. The rising slope of the semi-variance represents the zone of influence within which successive values of the variable or concentration of chemical constituents are highly correlated. The range is the maximum lag where the influence becomes negligible and the concentrations at successive points are uncorrelated (i.e., become independent). The "sill" is the value of the semi-variance plateau and is related to the magnitude of the arithmetic range of concentrations of chemical constituents.

The variogram can be calculated for separate directions such as east-west or north-south along a grid, or at angles such as northeast-southwest. If the shape of the variogram is the same in all directions, the variable is considered isotropic. If the variogram has a different range in different directions, the variable is anisotropic. In the case of chemical constituents under the influence of groundwater flow, an anisotropic distribution related to flow direction would be observed.

The direction of a directional variogram is specified by degrees of azimuth such as measured clockwise in a circle with north at 0, east at 90, south at 180, and west at 270. Directional tolerance is an angular measurement also in degrees. The smaller the angular tolerance, the more distinctive the anisotropy is shown on the variograms. However, the smaller the angle, the fewer the number of pairs of data points available to compute the semi-variance and greater erraticism of the resulting variogram. The smallest tolerance that displays the anisotropy is usually selected by trial and error.

The "nugget effect" is a term that is defined by a positive y-intercept on the variogram at zero lag. The "nugget effect" indicates a condition of a complete lack of spatial correlation indicating that the data value at a particular location bears no similarity even to very nearby data values. If the nugget parameter is zero, the effect is not present.

In using the kriging method of contouring for isotropic variables, the semi-variogram parameters are selected that optimize the display of anisotropy, then the parameters are used to estimate contour values throughout the map area. In this study, the kriging routine in "GEO-EAS" Version 1.2.1 (England and Sparks 1988; Yates and Yates 1990) was used.

4. DATA EVALUATION

Table 1 summarizes the mean, range, and frequency of detection for the volatile aromatic and chlorinated compounds. The concentration data are presented in detail in Appendix Table A-1 (volatile non-chlorinated aromatic compounds) and Table A-2 (chlorinated compounds).

Four volatile aromatic compounds were targeted for analysis. Of those, benzene was not detected in any of the soil vapor samples. Xylenes were present in greatest relative abundance (43 percent), with the maximum observed concentrations for o-xylene and m/p-xylene at 417.2 and 91.4 ppm_v, respectively. The maximum observed trichloroethene and tetrachloroethene concentrations (1.0 and 1.8 ppm_v, respectively) were lower relative to the aromatic compounds. Tetrachloroethene was detected at a greater frequency (53 percent) than m/p-xylenes (43 percent); trichloroethene was detected at a greater frequency (21 percent) compared to toluene (17 percent).

Figures 4 through 8 show the quartile distributions for the volatile aromatic compounds and chlorinated compounds. These are presented as the four quartiles of the cumulative concentration distributions of each of these analytes.

Table 2 summarizes the direction and tolerance parameters used to calculate the variogram, and the nugget, sill, and range used in kriging the observed data for each analyte. The search directions and tolerances selected yielded the best fit to the variogram spherical model. Figure 9 shows the variogram for m/p-xylenes.

Figures 10 through 14 show the contours of grid values estimated by kriging for the volatile aromatic compounds and chlorinated compounds. The contours are interpolated from grid values estimated by kriging based on the raw data (Tables A-1 and A-2; contour map Figures A-1 through A-5) and the selected variogram parameters (Table 2).

The distribution of the compounds that were detected indicate the presence of three areas of elevated SVCA readings (Figure 15). Area 1, located northwest of the main plant building, exhibited the maximum contoured values for toluene (Figure 10), m/p xylene (Figure 11), and o-xylenes (Figure 12) of 1.2 ppm_v, 30 ppm_v, and 140 ppm_v, respectively. The contours for each of these analytes coincide with an oval distribution with north-south elongation that encompasses the former process building. The contoured maximum for all three analytes is located in the area directly north of the former process building and northwest of MW-5I.

The second area of elevated SVCA readings (Area 2) is located between the north end of the main plant building and the aboveground storage tank south of the septic system leachfields. This area exhibited maximum contoured values for toluene (Figure 10), trichloroethene

(Figure 11), and tetrachloroethene (Figure 12) of 0.9 ppm_v, 0.5 ppm_v, and 0.5 ppm_v, respectively. The contours for all three analytes show an oval distribution with north-south elongation and were present at levels significantly lower than the xylene concentrations detected in the area of the former process building.

A third smaller area (Area 3) is located northwest of the main plant building between the septic system leachfields and Jordan Road. This area exhibited lower concentrations of m/p xylenes (Figure 11), o-xylene (Figure 12), trichloroethene (Figure 13), and tetrachloroethene (Figure 14). The m/p xylene and o-xylene levels were lower in this area of the site compared to levels detected in Area 1 northeast of the main plant building, and apparently unrelated to that area. The trichloroethene contours encompass a small area which had a maximum contour value of 0.3 ppm_v. The tetrachloroethene contours encompassed a more diffuse distribution with a contour maximum of 0.6 ppm_v. The tetrachloroethene contours appear to overlap with Area 2 north of the main plant building.

The single non-targeted aromatic compound ethylbenzene was identified in association with toluene in Area 2.

The four non-targeted chlorinated organic compounds (trichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and methylene chloride) were identified in association with trichloroethene and tetrachloroethene in Area 2. All of these analytes, with the exception of trichloroethane, are degradation products of trichloroethene and tetrachloroethene. Trichloroethane may be present as a trace component of the trichloroethene identified at the site.

Based upon the analysis of the SVCA results, the following conclusions can be made:

- Xylenes were found in an area of close proximity to MW-5I. This is in the vicinity of the former organic processing building. Additionally, lower concentrations of xylenes were found in a smaller area, apparently unrelated, northwest of the main plant building.
- Toluene was found in association with xylenes in the vicinity of MW-5I and was also identified in the area of an aboveground storage tank just south of the sanitary leachfield. Toluene concentrations were 1-2 orders of magnitude lower than that of the xylenes.
- Trichloroethene and tetrachloroethene were identified in areas north and northwest of the main plant building. Trichloroethene and tetrachloroethene were present at levels comparable to toluene and significantly lower than xylenes. They do not appear to be related to the former organics processing area.

5. RECOMMENDED SOIL BORING AND MONITORING WELL LOCATIONS

5.1 SOIL BORINGS

The soil boring program consists of the installation of three soil borings within the areas showing elevated SVCA readings and five confirmatory soil borings in areas identified as "clean" by the SVCA. The original program was modified in response to the SVCA results. The resulting data will be used to delineate the extent of contamination in this area, as well as to confirm "clean" soil along the perimeter of the area.

As part of the initial field investigation, EA obtained a soil sample in the proximity of MW-5 which confirmed the presence of xylenes. Toluene was not identified in this sample due to the high dilution factor required for the analysis.

As part of the Area MW-5 investigation, one soil boring is proposed for Area 1 near the former process building, approximately 120 ft north of the former process building and 75 ft west of MW-5D. This location approximates the 10 ppm_v m/p-xylene contour line, 40 ppm_v o-xylene contour line, and 0.4 ppm_v contour line for toluene.

A second soil boring is proposed for Area 2. The proposed soil boring is located at the approximate mid-point between the north end of the main plant area and the aboveground storage tank south of the septic system leachfields. This boring will be used to verify the toluene, trichloroethene, and tetrachloroethene contour maxima in this area.

A third soil boring is proposed for Area 3 northwest of the main plant building. The proposed soil boring is located approximately 150 ft northwest of the main plant building's northeast corner and 100 ft northeast of Well Cluster MW-8. This soil boring will verify the m/p xylene, o-xylene, trichloroethene, and tetrachloroethene contour maxima for this area of the site.

Five soil borings will be installed outside of the three areas showing elevated soil vapor contours at the following locations:

- Immediately west of the septic system leachfield
- 50 ft north of the northwest corner of the main plant building
- 220 ft north of the former process building and 125 ft northwest of MW-5D
- 125 ft south of MW-5I
- 50 ft east of the septic system leachfield.

These locations were selected based upon overlying the volatile aromatic and chlorinated compound contour drawings and identifying areas showing contours at or near 0.0 ppm for the two compound classes. Proposed soil boring locations for the Area MW-5 investigation are provided in Figure 16.

5.2 MONITORING WELLS

Installation of two overburden wells, two shallow bedrock wells, and one deep bedrock well is planned as part of the Area MW-5 investigation.

Preliminary assessment of groundwater flow from data obtained during the initial phase of the SMC RI/FS field investigation suggests that both the overburden and shallow bedrock groundwater flows towards the north in the northern portion of the site which includes Area MW-5. Deep bedrock groundwater, which is separate from the shallow groundwater, also appears to flow in a predominantly northern direction. However, it should be noted that there is a limited amount of groundwater elevation data in the immediate vicinity of Area MW-5.

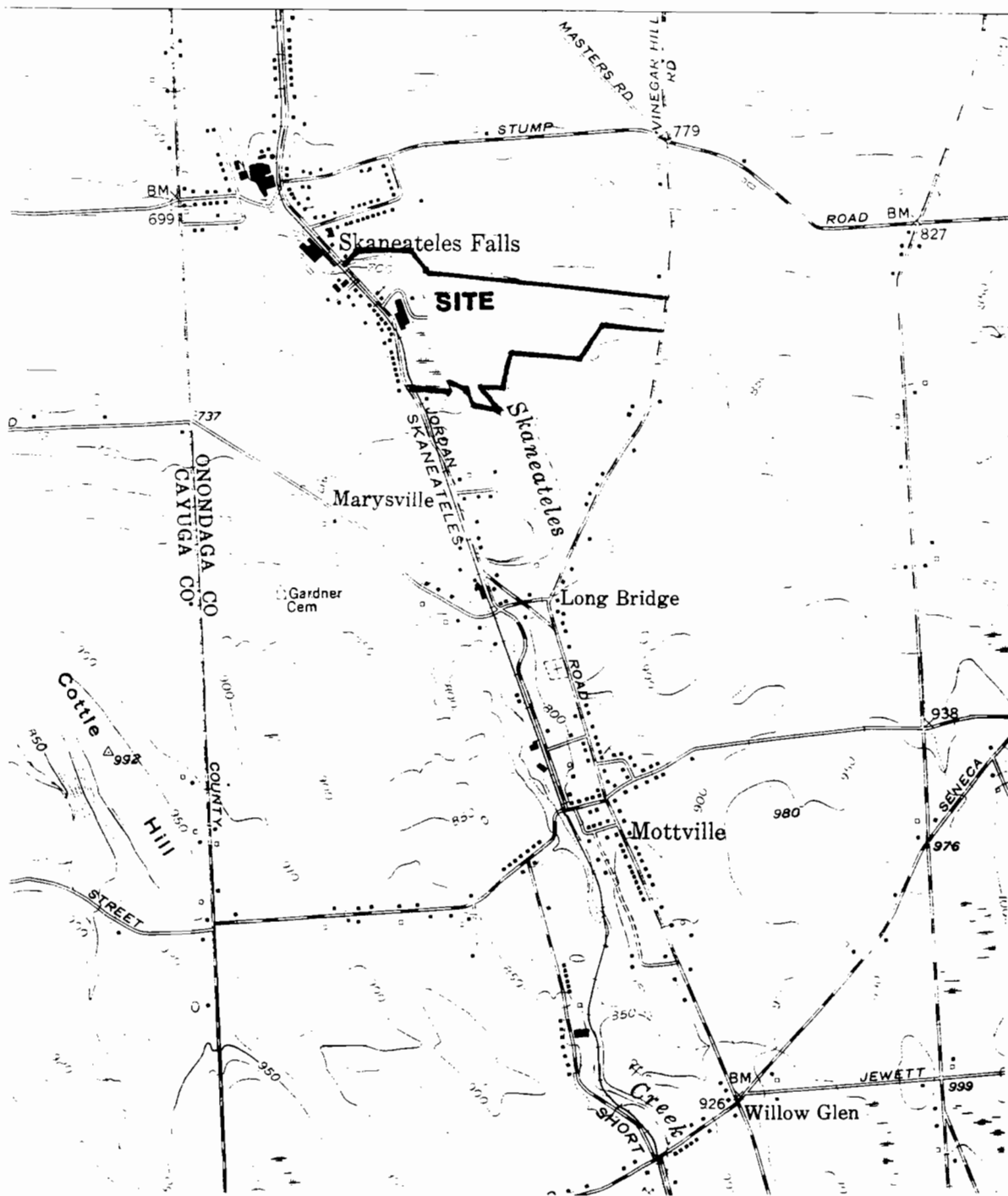
A new overburden monitoring well (MW-5S) will be installed proximate to the existing Well Cluster MW-5I, which is within Area 1. The purpose of this well is to evaluate potential chemical constituents with overburden groundwater originating from this portion of the site. During the initial phase of the investigation, the bedrock well cluster was installed to monitor the shallow and deep bedrock water quality downgradient of the onsite landfill, and no overburden monitoring well was originally judged as being necessary for this location.

Well Cluster MW-12S/MW-12I, consisting of an overburden and shallow bedrock monitoring well, will be installed hydrogeologically downgradient (north) and outside the area of elevated SVCA readings obtained in Area 1. This well cluster will be used to monitor the overburden and shallow bedrock groundwater to evaluate whether any compounds present have migrated from the former process building area.

Well Cluster MW-13I/MW-13D, consisting of a shallow and deep bedrock monitoring well, will be installed east of Skaneateles Creek and northeast (possibly downgradient) of the elevated SVCA readings obtained in Area 1. Due to the limited number of bedrock groundwater data points east of Area 1, the understanding of the shallow and deep groundwater flow patterns in Area MW-5 is not complete. Well cluster MW-13I/MW-13D will provide additional hydrogeological information and provide groundwater sampling points to evaluate whether any compounds present in Area MW-5 have migrated in a northeast direction. Existing monitoring Well Clusters MW-9, MW-10, and MW-11 provide groundwater sampling points for the remaining two areas of elevated SVCA readings.

Proposed monitoring well locations for the Area MW-5 investigation are provided in Figure 16. This monitoring well network will provide groundwater sampling points to determine more completely the chemical constituents present in the groundwater within Area MW-5 and whether any chemical compounds within groundwater originating from Area MW-5 have migrated away from the area. In addition, these monitoring wells will provide data points to further evaluate site-specific hydrogeology and flow patterns for the overburden, shallow bedrock, and deep bedrock groundwater.

The monitoring wells planned for Area MW-5 will also be used in conjunction with the existing onsite monitoring wells to provide groundwater data so that the principal objectives for the SMC RI/FS can be met.

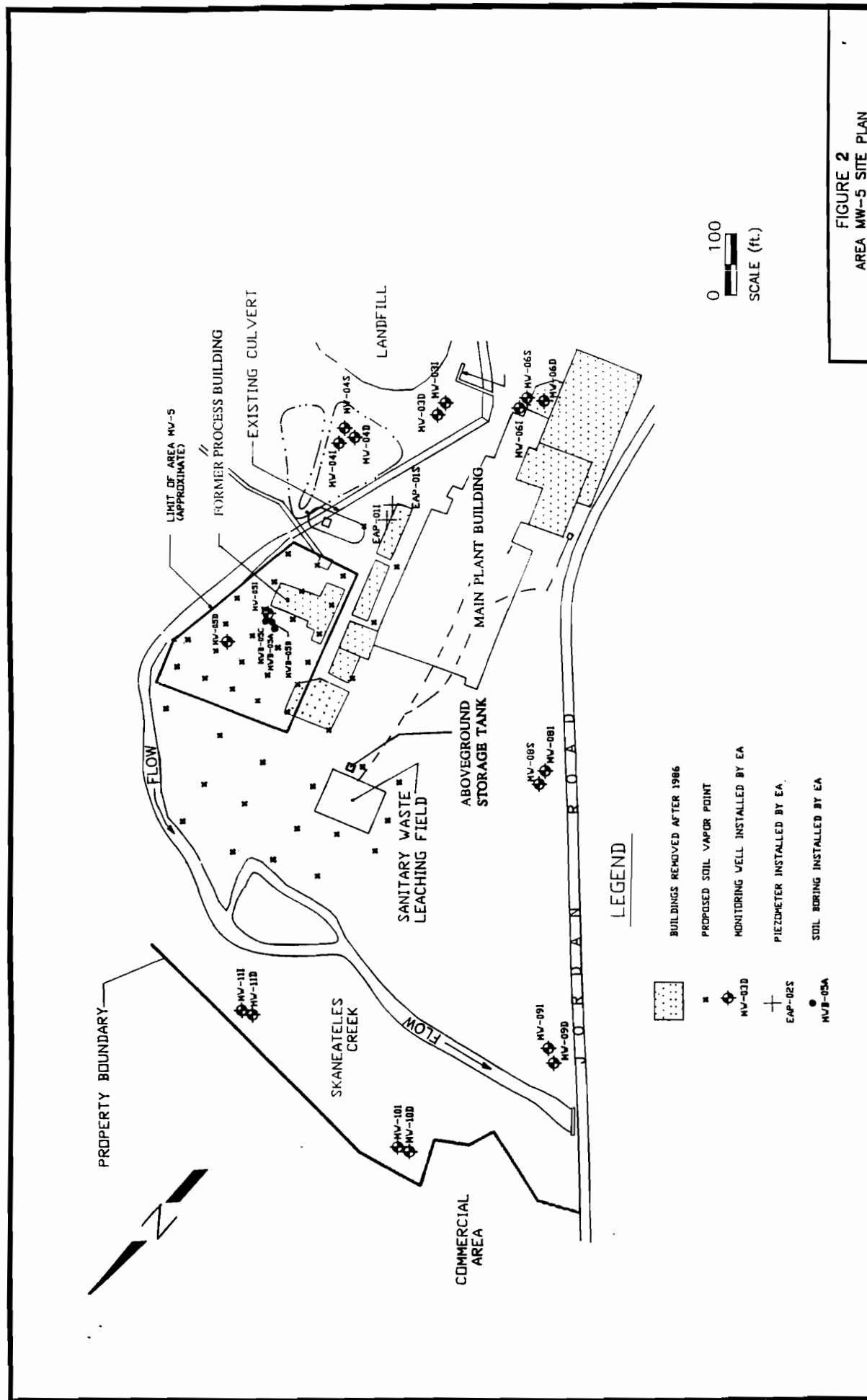


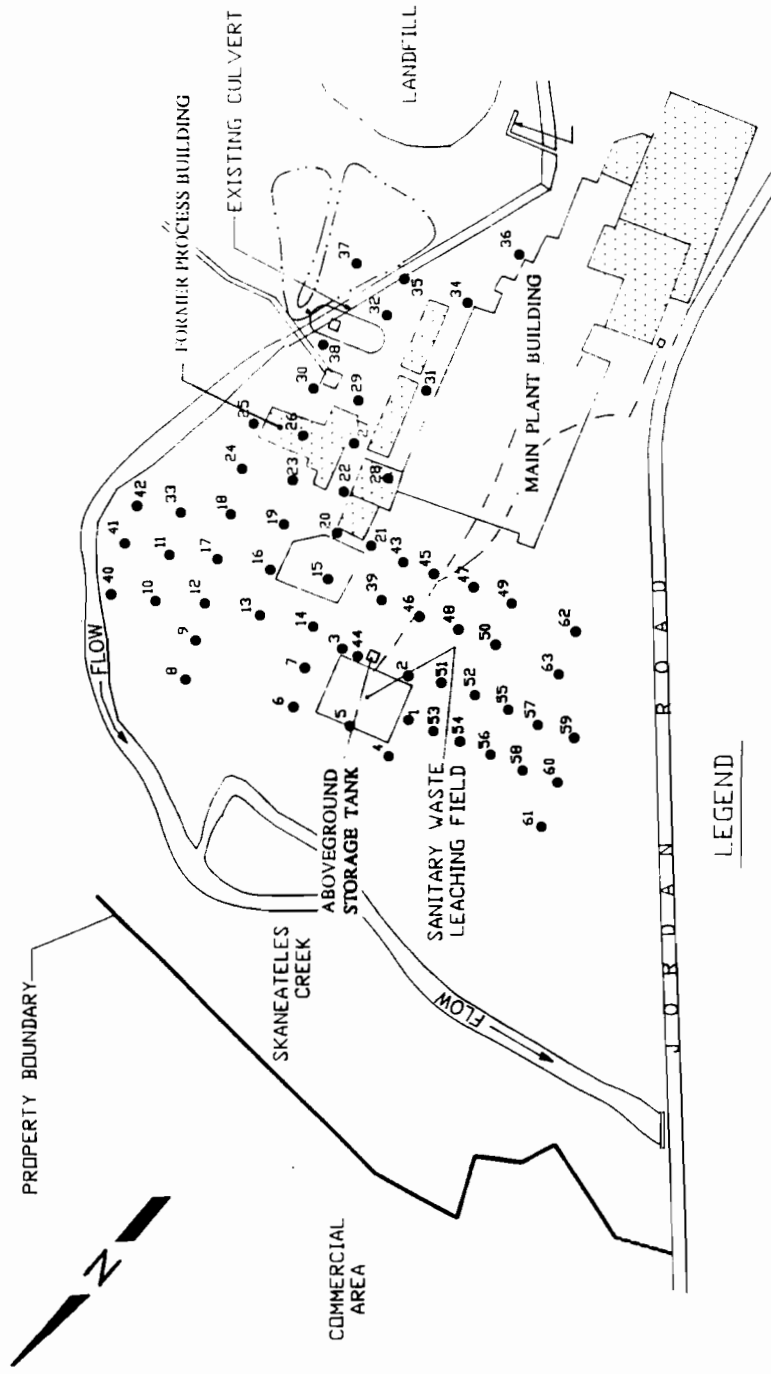
SCALE 0 1000 2000 (feet)



USGS Quads (7.5-min series):
SKANEATELES (Photoinspected 1976)
JORDAN (Photorevised 1976)

Figure 1. Site location map, Stauffer Management Company Facility, Skaneateles Falls, New York.





LEGEND

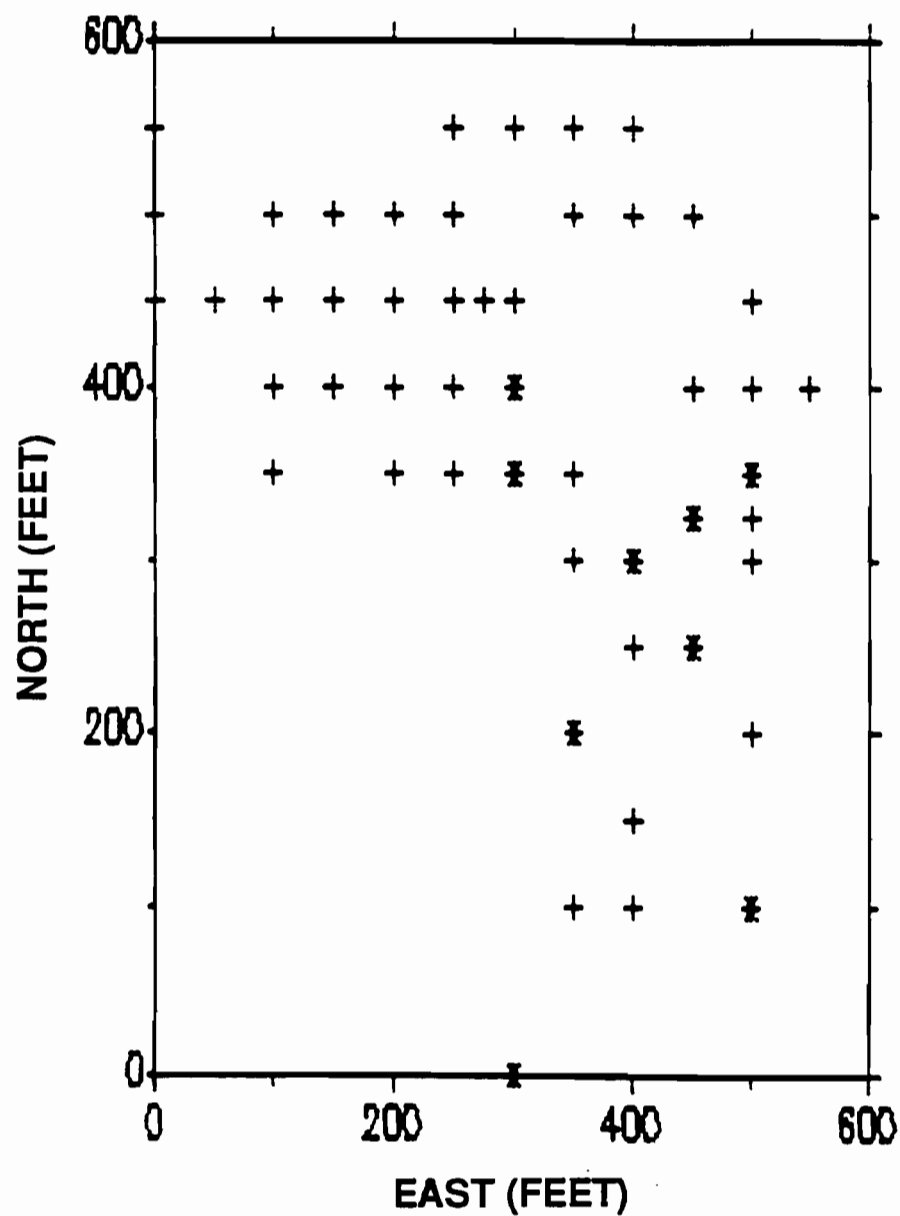
-  BUILDINGS REMOVED AFTER 1986
-  SOIL VAPOR POINT

FIGURE 3
SVCA LOCATIONS

STAUPFER MANAGEMENT COMPANY FACILITY
SKANEATELES FALLS, NEW YORK

DESIGN BY	TP	PROJECT NO.	42
DRAWN BY	CS	DATE	9/17/92
CHECKED BY	TP	PROJECT NO.	11520J

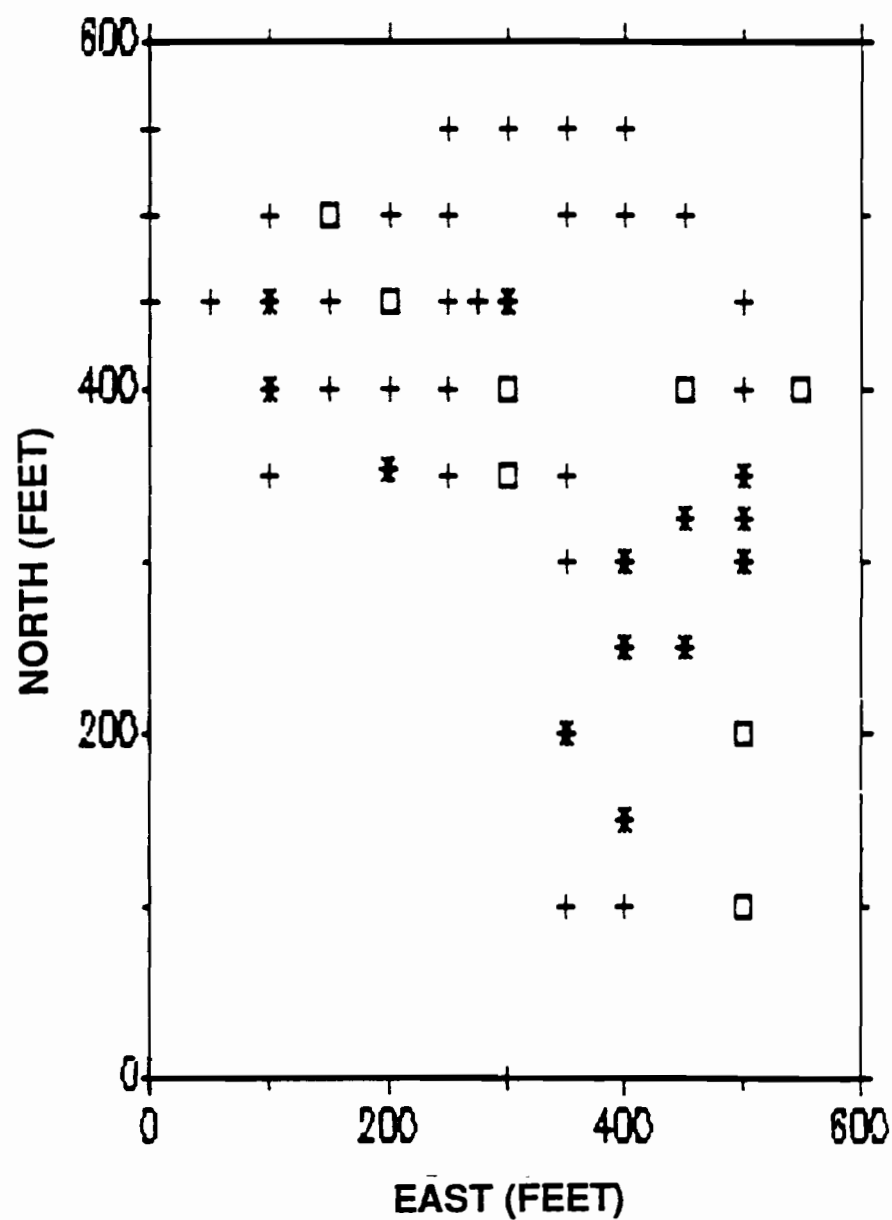
EA ENGINEERING P.C.
AN AFFILIATE OF
EA ENGINEERING SCIENCE
AND TECHNOLOGY



Legend

1st Quartile: $.000 \leq + \leq .000$
 2nd Quartile: $.000 < X \leq .000$
 3rd Quartile: $.000 < \square \leq .000$
 4th Quartile: $.000 < \boxplus \leq 3.000$
 Units are ppm,

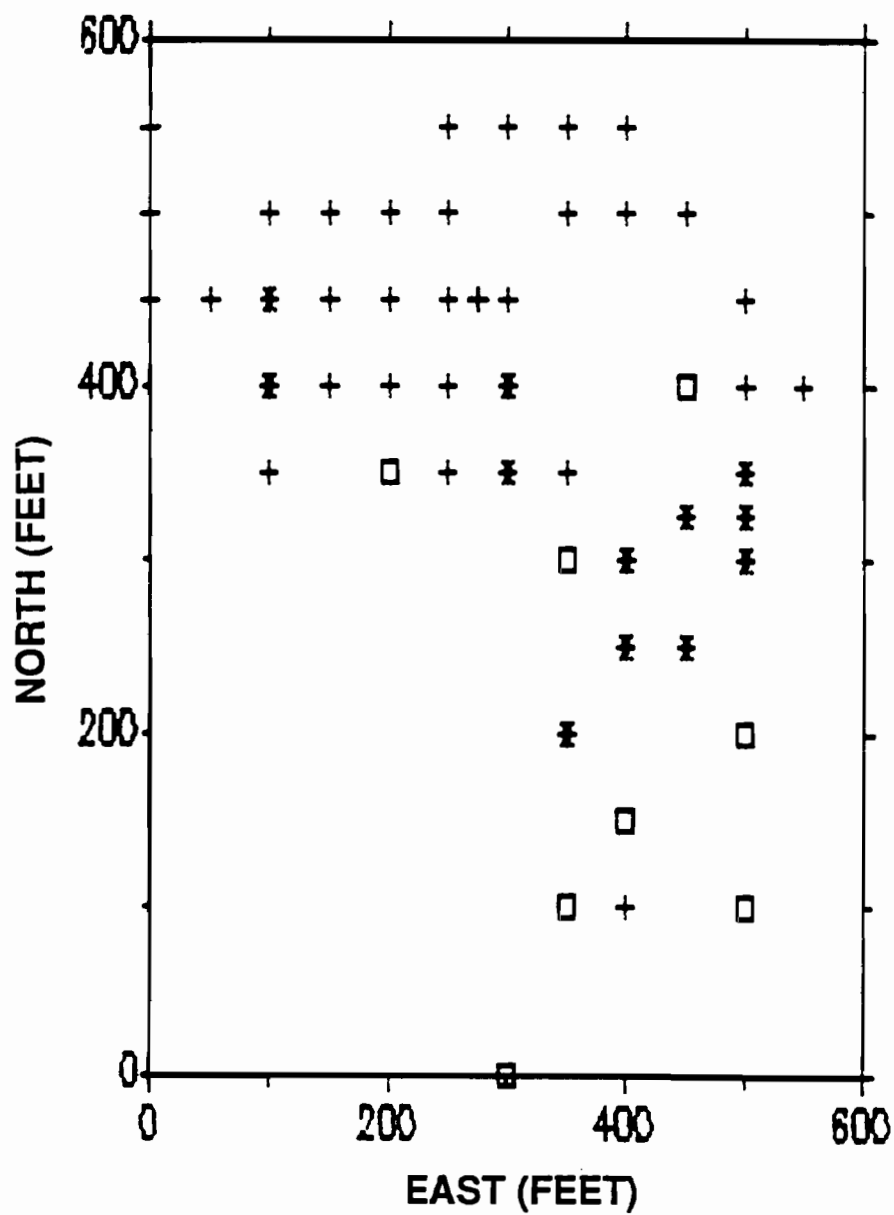
Figure 4. Plot of toluene concentrations.



Legend

1st Quartile: $.000 \leq + \leq .000$
 2nd Quartile: $.000 < X \leq .000$
 3rd Quartile: $.000 < \square \leq .000$
 4th Quartile: $1.000 < \boxplus \leq 91.400$
 Units are ppm,

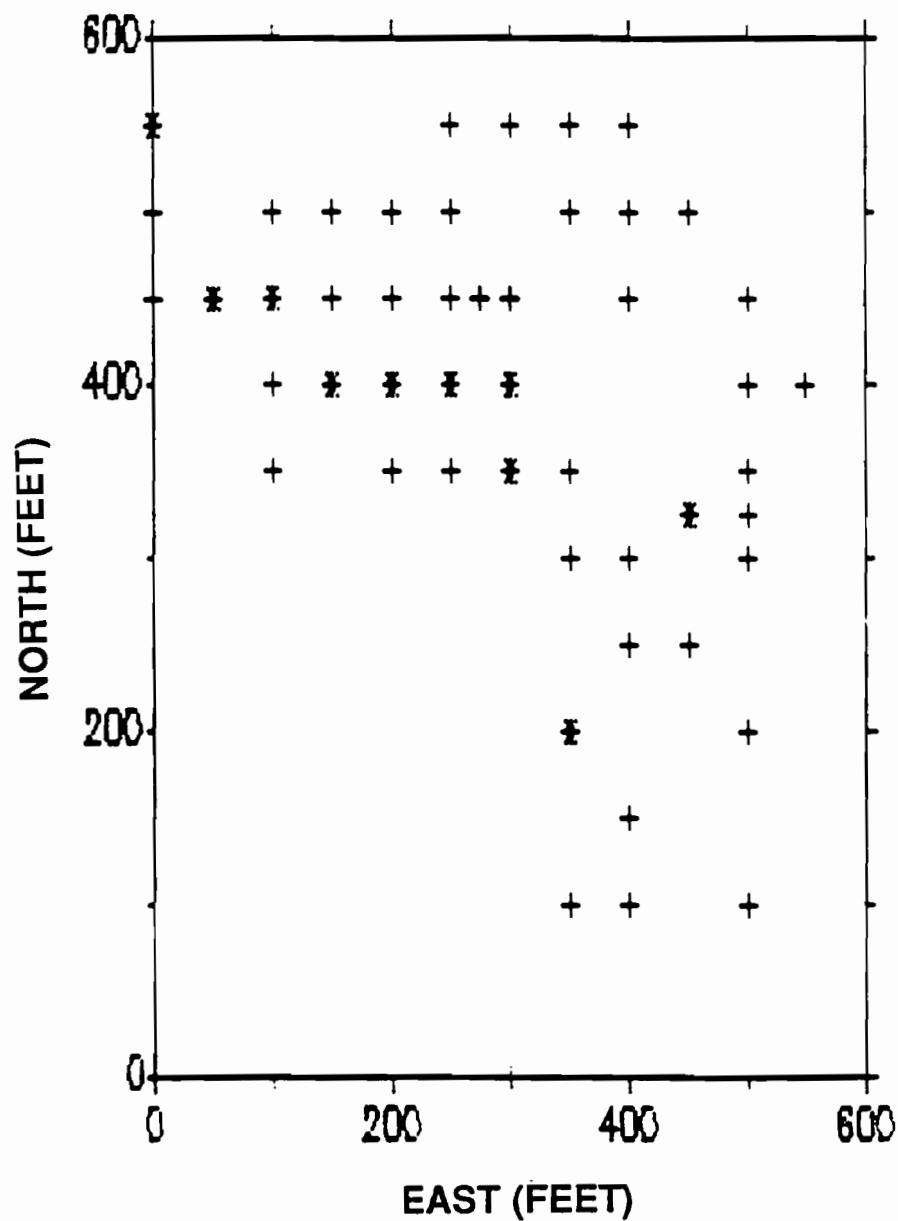
Figure 5. Plot of m/p-xylene concentrations.



Legend

1st Quartile: $.000 \leq + \leq .000$
 2nd Quartile: $.000 < X \leq .000$
 3rd Quartile: $.000 < \square \leq 1.000$
 4th Quartile: $1.000 < \text{---} \leq 417.200$
 Units are ppm,

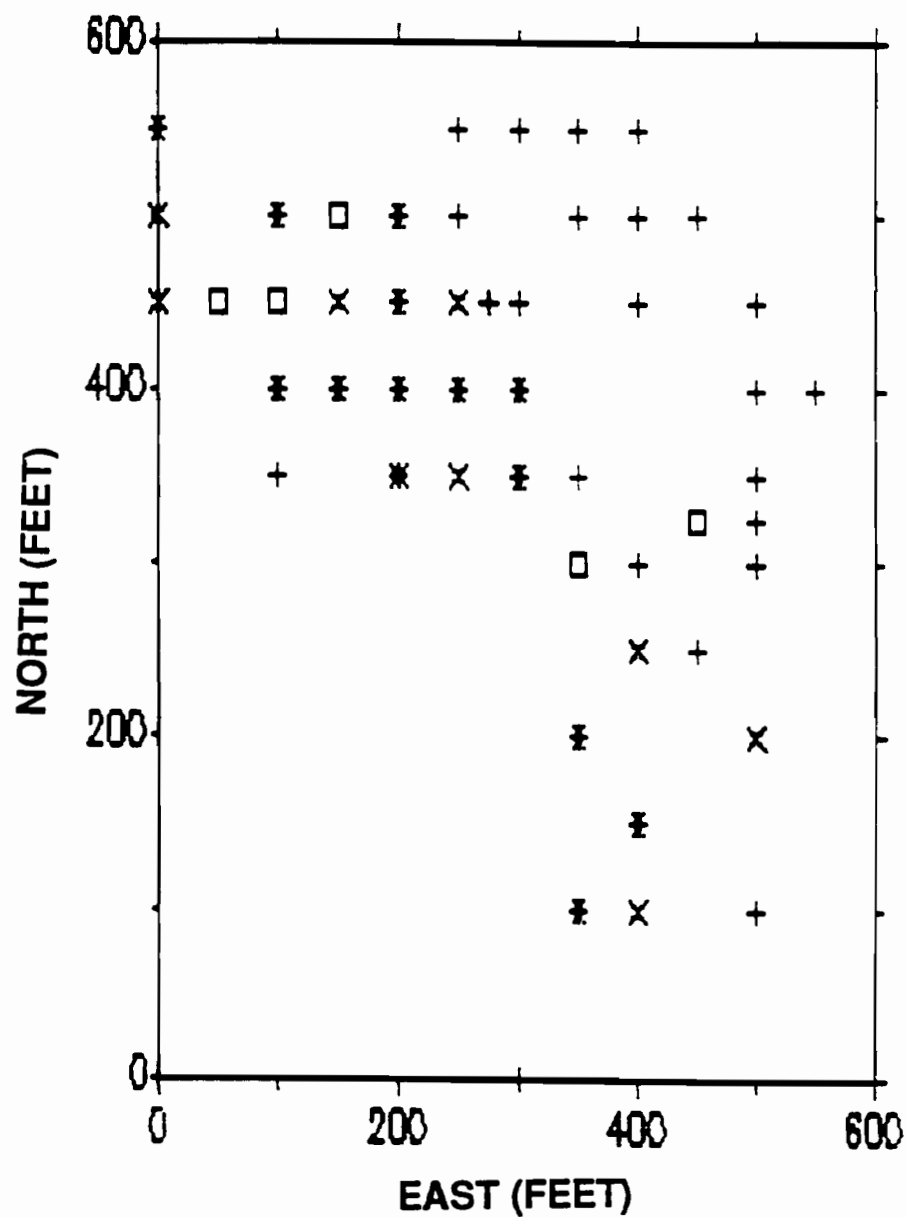
Figure 6. Plot of o-xylene concentrations.



Legend

1st Quartile: $.000 \leq + \leq .000$
 2nd Quartile: $.000 < X \leq .000$
 3rd Quartile: $.000 < \square \leq .000$
 4th Quartile: $.000 < \boxplus \leq 1.000$
 Units are ppm,

Figure 7. Plot of trichloroethene concentrations.



Legend

1st Quartile: $.000 \leq + \leq .000$
 2nd Quartile: $.000 < X \leq .100$
 3rd Quartile: $.100 < \square \leq .200$
 4th Quartile: $.200 < \boxplus \leq 1.800$
 Units are ppm_v

Figure 8. Plot of tetrachloroethene concentrations.

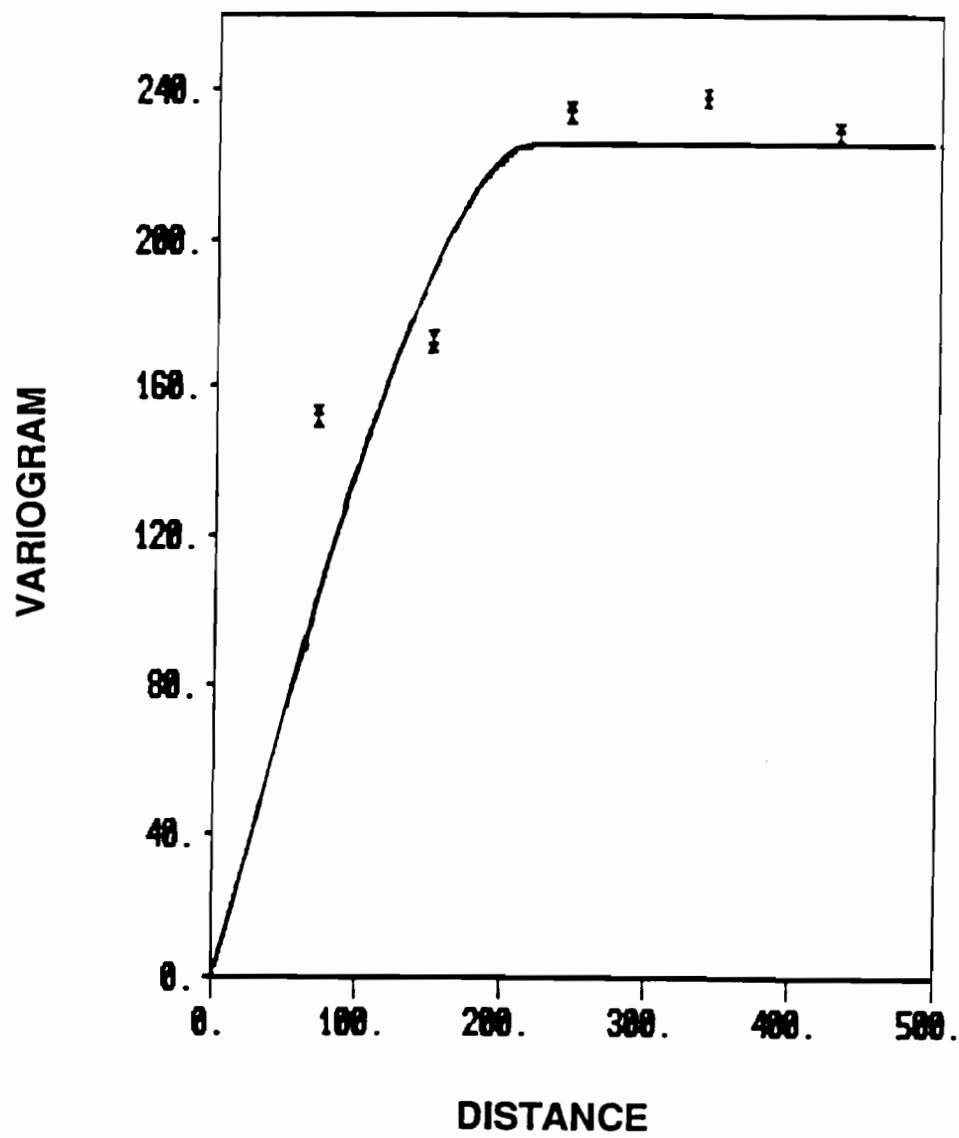
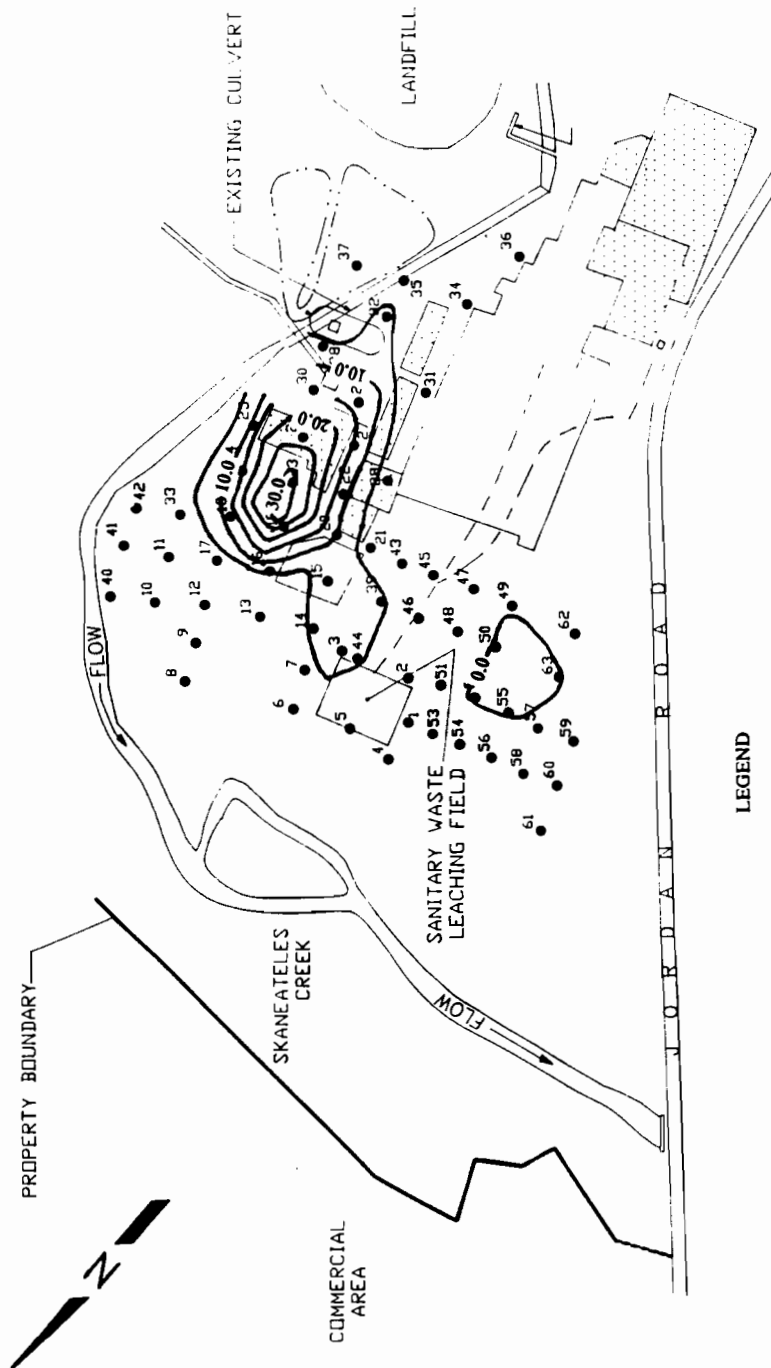


Figure 9. Variogram for m/p-xylene.



LEGEND

Buildings removed after 1986

Soil vapor point

Units are ppm,

FIGURE 11
Contours for m/p-xylene.

STAUFFER MANAGEMENT COMPANY FACILITY

SKANEATELES FALLS, NEW YORK

EA ENGINEERING P.C.
AN AFFILIATE OF
EA ENGINEERING SCIENCE
AND TECHNOLOGY

DESIGN BY TWP

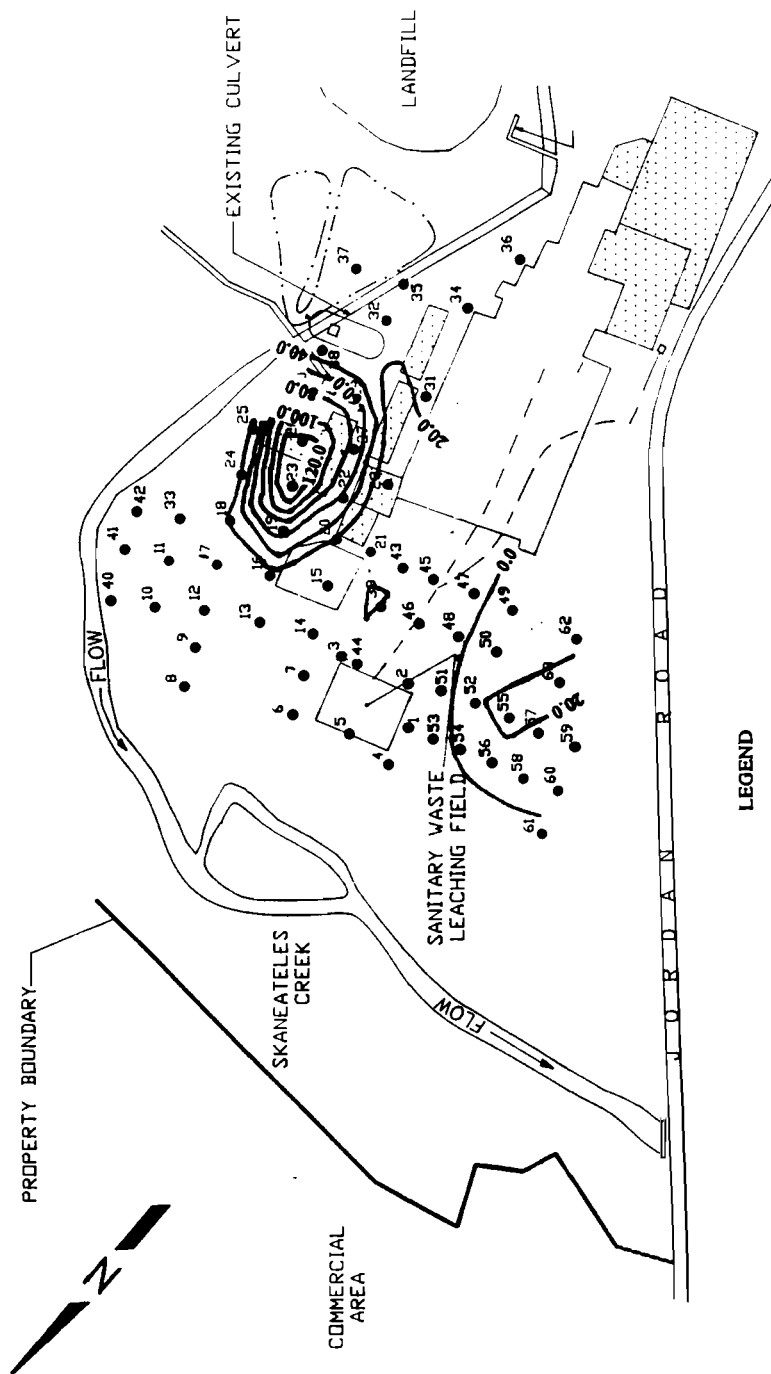
DRAWN BY GSI

CHECKED BY TWP

PROJECT NO. 42

DATE 9/17/92

PROJECT NO. 1152.01



LEGEND

Buildings removed after 1986

Soil vapor point

Units are ppm.

0 100
SCALE (ft.)

FIGURE 12
Contours for o-xylene.
STATEMENT OF WORK, SECTION 10

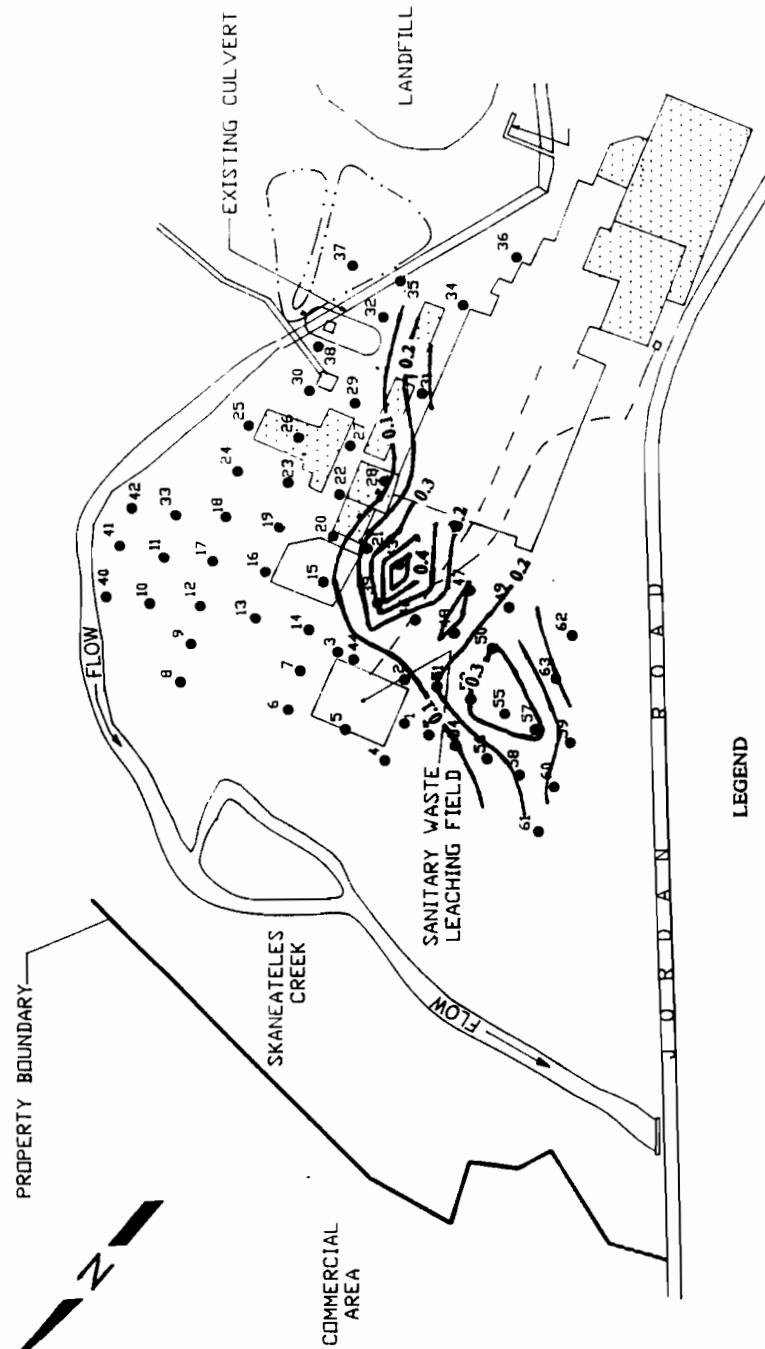


FIGURE 13
Contours for trichloroethene.
STAUFFER MANAGEMENT COMPANY FACILITY
SKANEATELES FALLS, NEW YORK

DESIGN BY	TRP	PROJECT NO.	32
DRAWN BY	CEB	DATE	9/17/92
CHECKED BY	TRP	PROJECT NO.	11932/01

EA ENGINEERING P.C.
AN AFFILIATE OF
EA ENGINEERING SCIENCE
AND TECHNOLOGY



FIGURE 14
Contours for tetrachloroethene.



FIGURE 15
Approximate areas of elevated
SVCA readings.

DESIGN BY	TRIP	 EVA ENGINEERING P.C. AN AFFILIATE of CA ENGINEERING SCIENCE AND TECHNOLOGY	PROJECT NO.	412
DRAWN BY	GEI		DATE	9/17/82
CHECKED BY	TRIP		PROJECT NO.	1103201

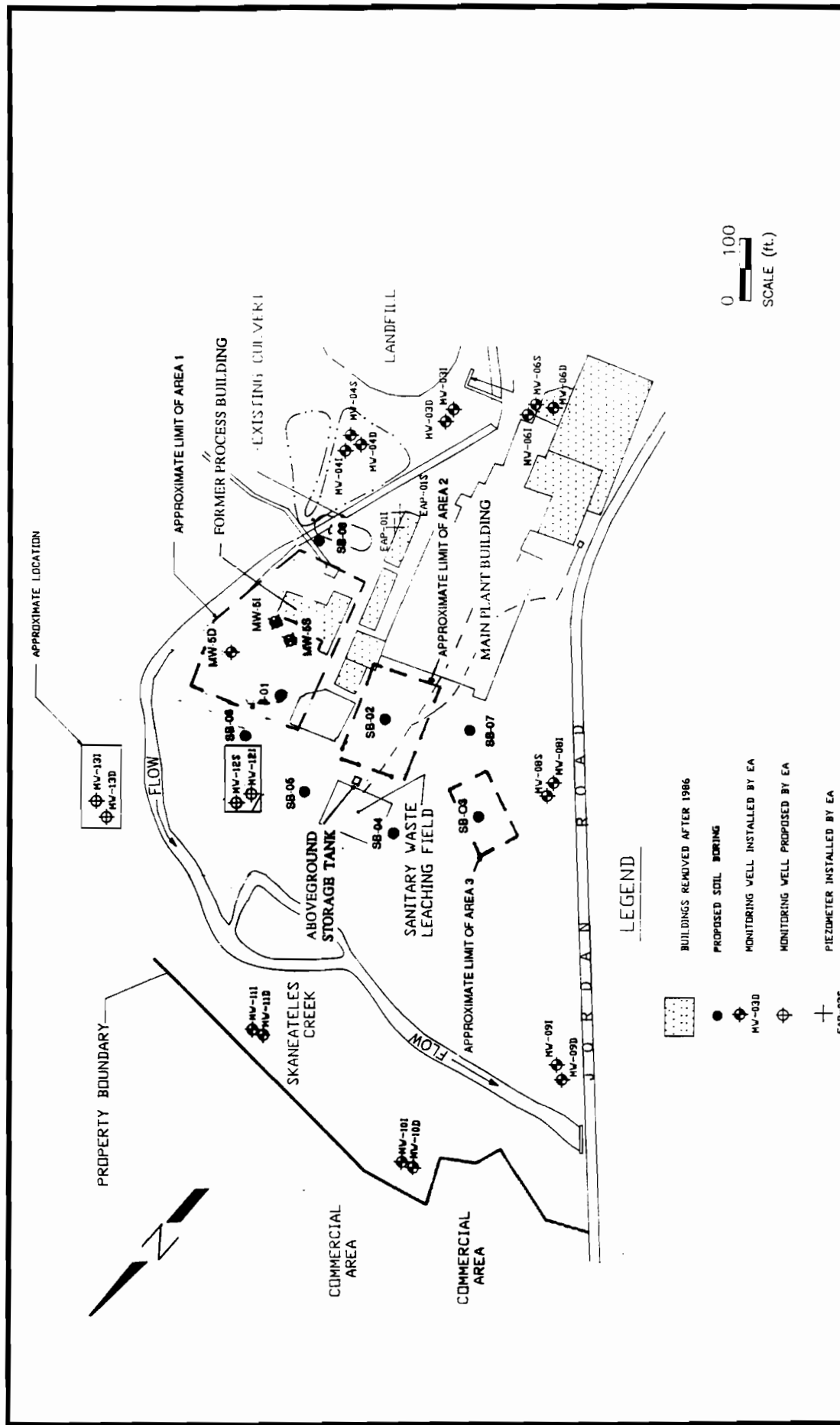


**TABLE 1 SUMMARY OF VOLATILE ORGANIC CONCENTRATIONS
FROM SVCA**

Analyte	Mean*	Range*	Frequency of Detection
Benzene	0.0	NA	0/53
Toluene	0.1	ND-3.0	9/53
m/p-xylenes	3.2	ND-91.4	25/53
o-xylene	13.4	ND-417.2	22/53
Trichloroethene	0.1	ND-1.0	11/53
Tetrachloroethene	0.3	ND-1.8	28/53
Ethylbenzene			7/53
Methylene chloride			11/53
c-1,2-dichloroethene			10/53
t-1,2-dichloroethene			5/53
Trichloroethane			17/53
* Concentration units are ppm _v .			
NOTE: NA = Not applicable. ND = Not detected.			

TABLE 2 KRIGING PARAMETERS USED FOR CONCENTRATION CONTOURS

Analyte	Direction	Tolerance	Nugget	Sill	Range
Benzene	---	---	---	---	---
Toluene	175	22	0	0.35	225
m/p xylenes	175	25	0	225	225
o-xylene	175	20	0	5,000	200
Trichloroethene	0	45	0	0.055	50
Tetrachloroethene	145	40	0	0.15	50
NOTE: All analytes were fit to a spherical model. Dashes (---) indicate modeling not performed since analyte was not detected.					

REFERENCES

- Davis, J.C. 1973. Statistics and Data Analysis in Geology, John Wiley and Sons, Inc.
- Englund, E. and A. Sparks. 1988. GEO-EAS (Geostatistical Environmental Assessment Software) Users Guide. EPA/600/4-88/033a.
- Isaaks, E.H. and R.M. Srivastava. 1989. Applied Geostatistics, Oxford University Press.
- Yates, S.R. and M.V. Yates. 1990. Geostatistics for Waste Management EPA/600/8-90/004.

Appendix A

Soil Vapor Concentrations and Contour Maps

APPENDIX A
LIST OF FIGURES

<u>Number</u>	<u>Title</u>
A-1	Contours for toluene.
A-2	Contours for m/p-xylene.
A-3	Contours for o-xylene.
A-4	Contours for trichloroethene (units are ppm _v).
A-5	Contours for tetrachloroethene (units are ppm _v).

LIST OF TABLES

<u>Number</u>	<u>Title</u>
A-1	Calculation of soil vapor concentrations of non-chlorinated aromatic compounds.
A-2	Calculation of soil vapor concentrations of chlorinated compounds.

FIGURE A-1

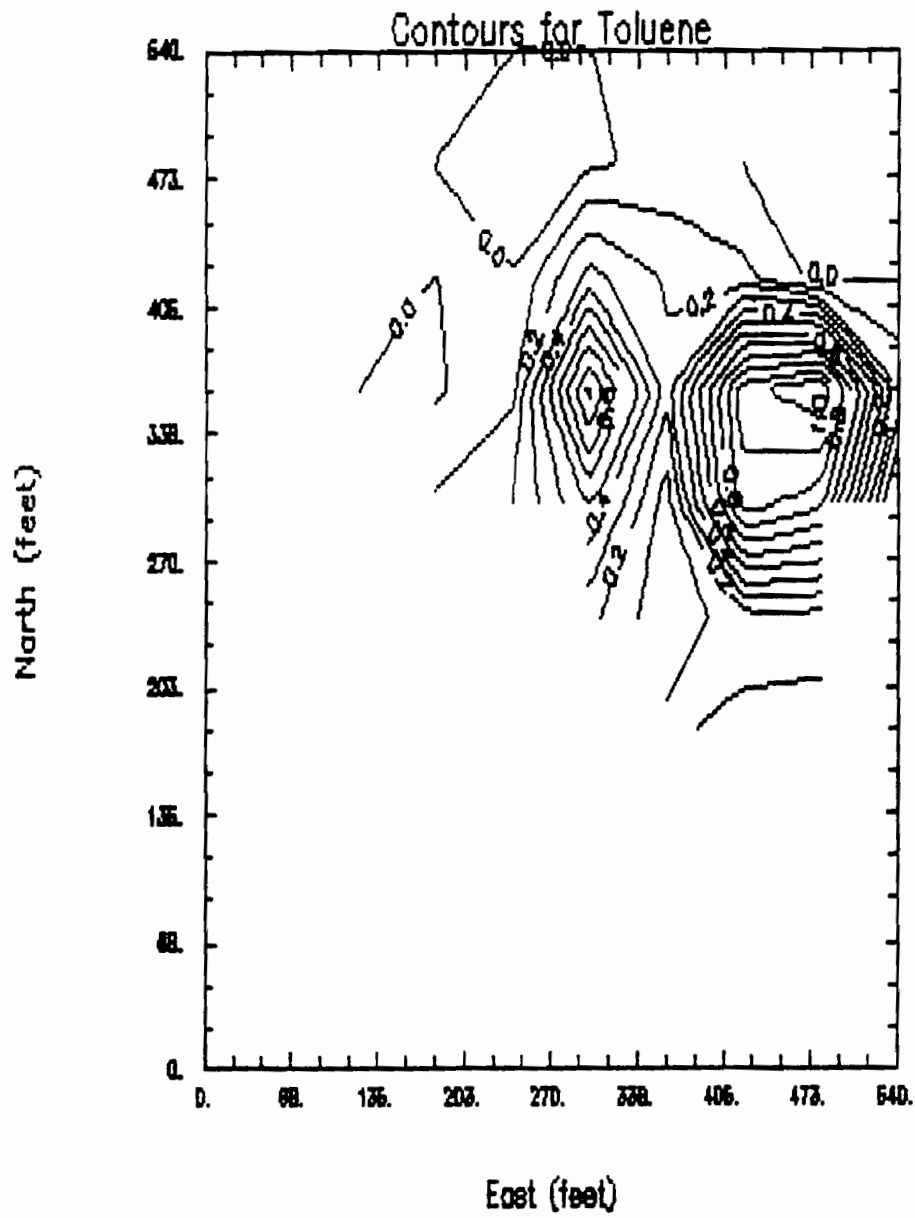


FIGURE A-2

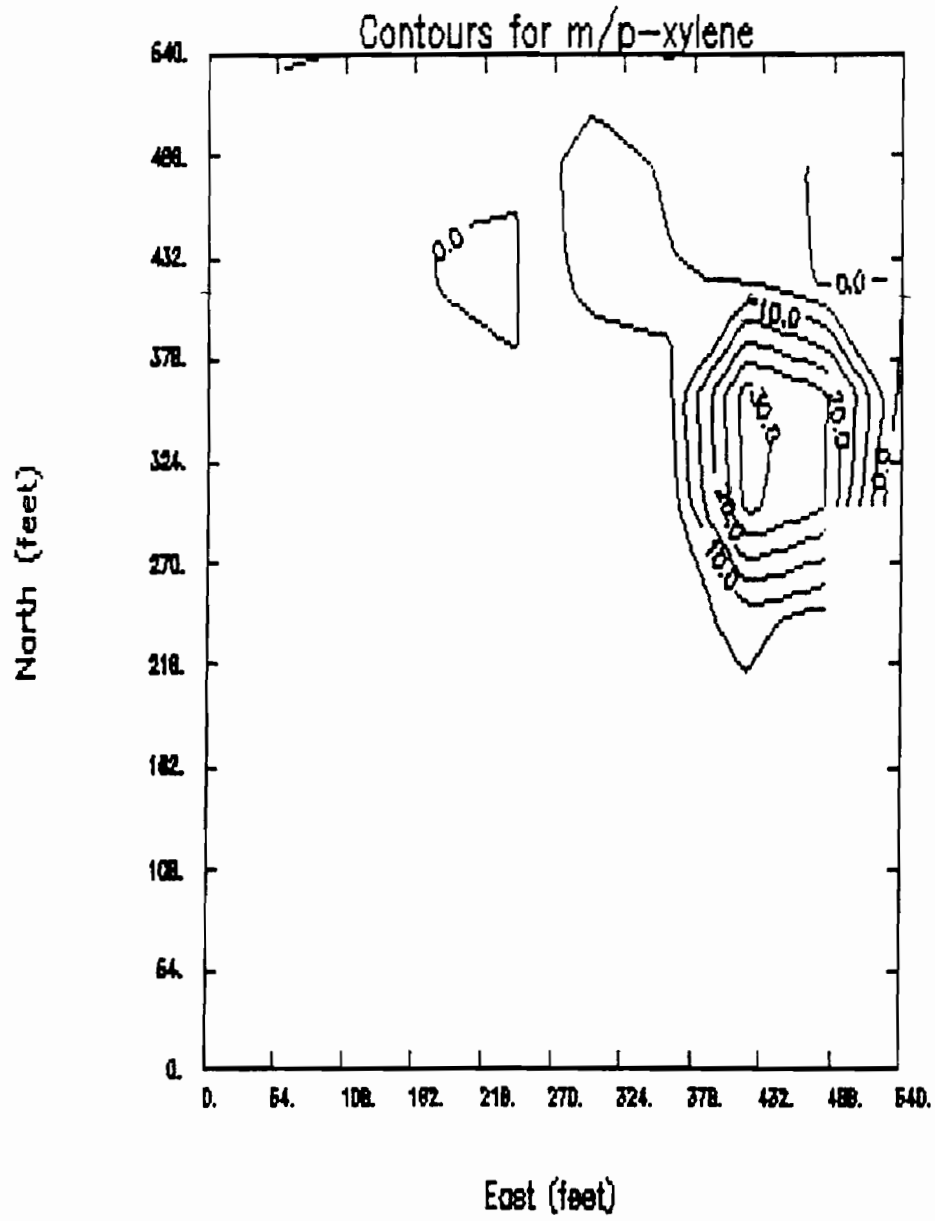


FIGURE A-3

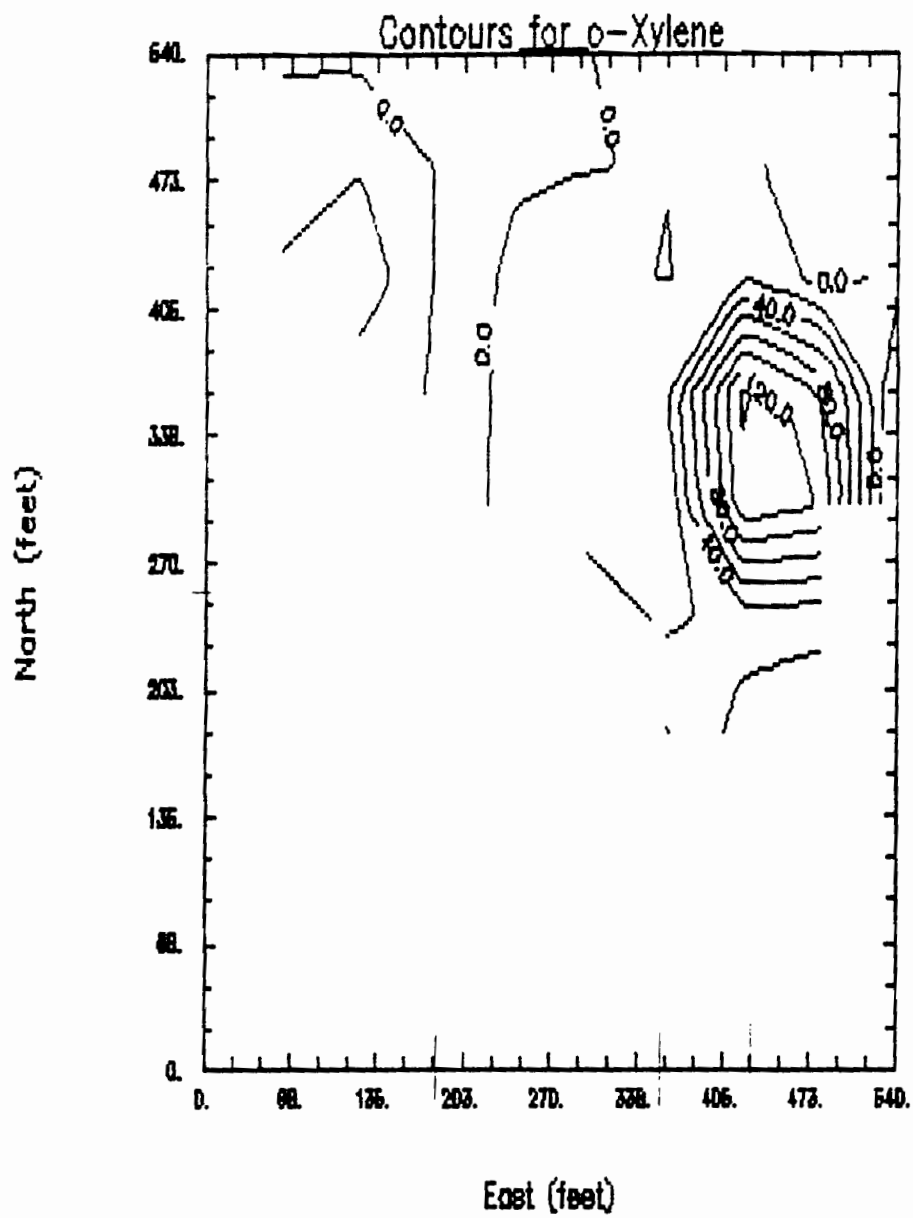


FIGURE A-4

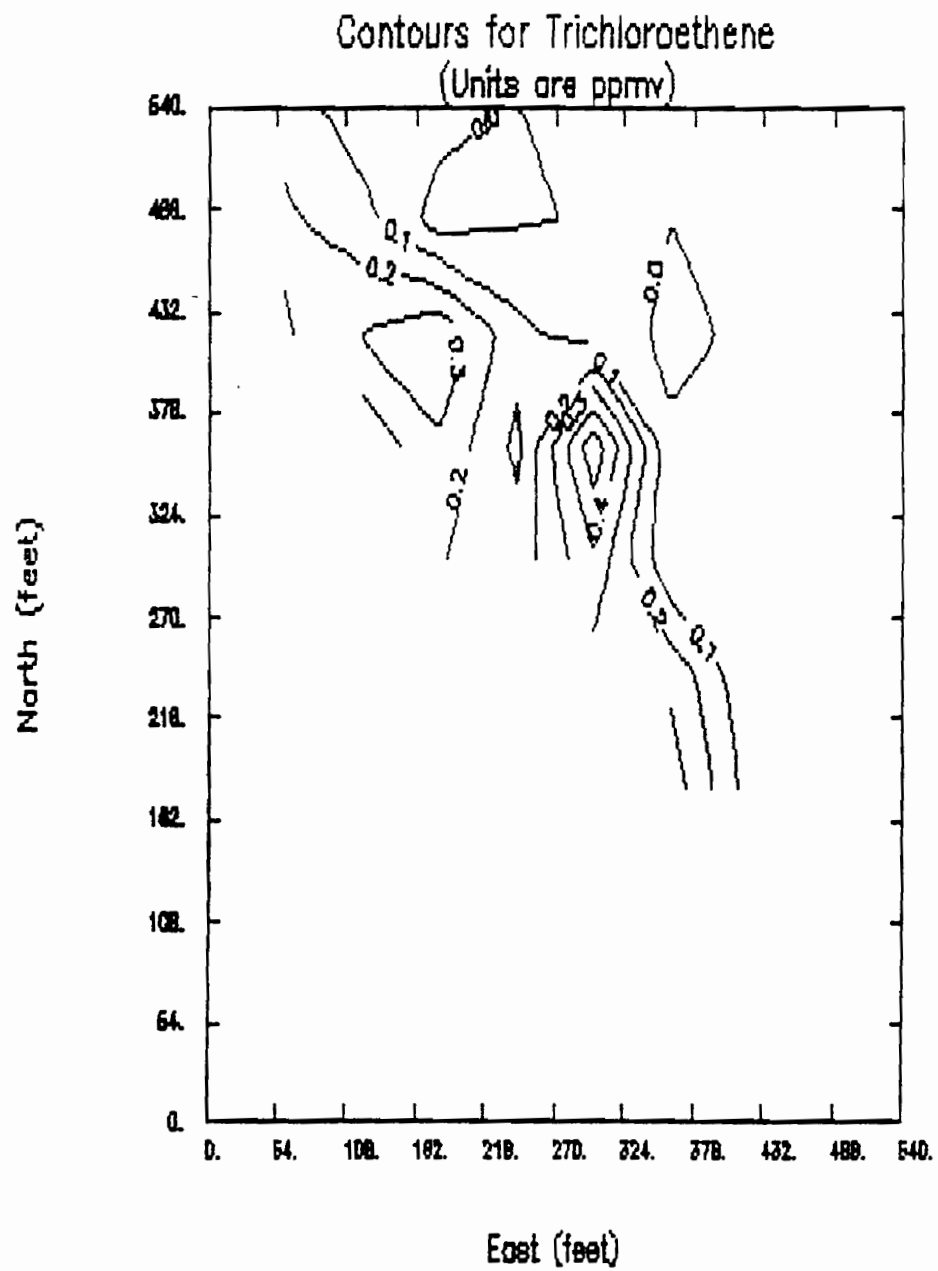


FIGURE A-5

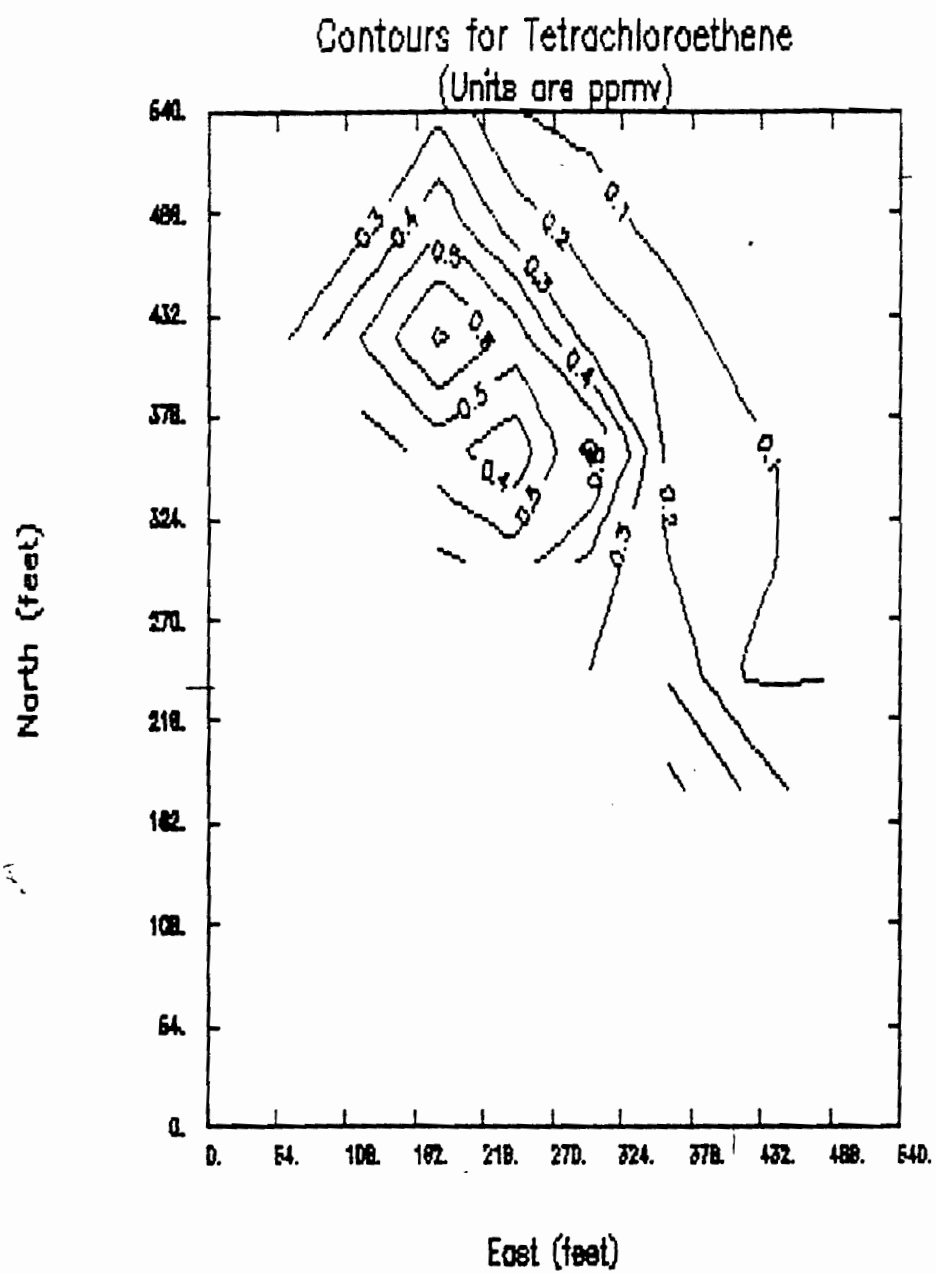


TABLE A-1 CALCULATION OF SOIL VAPOR CONCENTRATIONS OF
NON-CHLORINATED AROMATIC COMPOUNDS

Sample	Vol inj (ul)	North	East	Benzene			Toluene			m/p-xylene			o-xylene		
				RF	Area (Usec)	Conc (ppmv)	RF	Area (Usec)	Conc (ppmv)	RF	Area (Usec)	Conc (ppmv)	RF	Area (Usec)	Conc (ppmv)
VP-1	1000	500	250	0.073	0	0.0	0.052	0	0.0	0.06	0	0.0	0.057	0	0.0
VP-2	1000	450	250	0.073	0	0.0	0.052	0	0.0	0.06	0	0.0	0.057	0	0.0
VP-3	1000	450	300	0.073	0	0.0	0.052	0	0.0	0.06	373772	22.4	0.057	0	0.0
VP-4	1000	550	250	0.073	0	0.0	0.052	0	0.0	0.06	0	0.0	0.057	0	0.0
VP-5	1000	550	300	0.079	0	0.0	0.061	0	0.0	0.071	0	0.0	0.07	0	0.0
VP-6	1000	550	350	0.079	0	0.0	0.061	0	0.0	0.071	0	0.0	0.07	0	0.0
VP-7	1000	500	350	0.079	0	0.0	0.061	0	0.0	0.071	0	0.0	0.07	0	0.0
VP-8	1000	550	400	0.079	0	0.0	0.061	0	0.0	0.071	0	0.0	0.07	0	0.0
VP-9	1000	500	400	0.071	0	0.0	0.052	0	0.0	0.053	0	0.0	0.051	0	0.0
VP-10	1000	500	450	0.079	0	0.0	0.061	0	0.0	0.071	0	0.0	0.07	0	0.0
VP-11	1000	450	500	0.071	0	0.0	0.052	0	0.0	0.053	0	0.0	0.051	0	0.0
VP-16	1000	400	450	0.071	0	0.0	0.052	0	0.0	0.053	13599	0.7	0.051	11508	0.6
VP-17	1000	400	500	0.071	0	0.0	0.052	0	0.0	0.053	0	0.0	0.051	0	0.0
VP-18	1000	350	500	0.071	0	0.0	0.052	25284	1.3	0.053	257893	13.8	0.051	391807	19.8
VP-21	1000	350	350	0.048	0	0.0	0.055	0	0.0	0.054	0	0.0	0.049	0	0.0
VP-24	1000	325	500	0.048	0	0.0	0.055	0	0.0	0.054	23661	1.3	0.049	24055	1.2
VP-23	1000	325	450	0.048	0	0.0	0.055	54210	3.0	0.054	2e+06	91.4	0.049	8592220	417.2
VP-25	1000	300	500	0.048	0	0.0	0.055	0	0.0	0.054	19836	1.1	0.049	192335	9.3
VP-27	1000	300	400	0.095	0	0.0	0.073	1834	0.1	0.081	71162	5.8	0.078	51888	4.1
VP-28	1000	300	350	0.095	0	0.0	0.073	0	0.0	0.081	0	0.0	0.078	13212	1.0
VP-29	1000	250	400	0.095	0	0.0	0.073	0	0.0	0.081	87065	7.1	0.078	50796	4.0
VP-31	1000	200	350	0.095	0	0.0	0.073	2333	0.2	0.081	67942	5.5	0.078	824741	64.5
VP-30	1000	250	450	0.095	0	0.0	0.073	4965	0.4	0.081	73289	6.0	0.078	683312	53.5
VP-32	1000	150	400	0.095	0	0.0	0.073	0	0.0	0.081	18878	1.5	0.078	7508	0.6
VP-32D	1000	150	400	0.095	0	0.0	0.073	0	0.0	0.081	18044	1.5	0.078	13338	1.0
VP-33	1000	400	550	0.102	0	0.0	0.076	0	0.0	0.083	1516	0.1	0.081	0	0.0

TABLE A-1 (Continued)

Sample	Vol inj (ul)	North	East	Benzene			Toluene			m/p-xylene			o-xylene		
				RF	Area (Usec)	Conc (ppmv)	RF	Area (Usec)	Conc (ppmv)	RF	Area (Usec)	Conc (ppmv)	RF	Area (Usec)	Conc (ppmv)
VP-35	1000	100	400	0.102	0	0.0	0.076	0	0.0	0.083	0	0.0	0.081	0	0.0
VP-36	1000	0	300	0.097	0	0.0	0.067	4139	0.3	0.068	0	0.0	0.063	2779	0.2
VP-37	1000	100	500	0.097	0	0.0	0.067	1382	0.1	0.068	6709	0.5	0.063	14983	0.9
VP-38	1000	200	500	0.097	0	0.0	0.067	0	0.0	0.068	2145	0.1	0.063	6072	0.4
VP-39	1000	400	300	0.105	0	0.0	0.071	10108	0.7	0.065	15109	1.0	0.059	215944	12.8
VP-43	500	350	300	0.105	0	0.0	0.071	10290	1.5	0.065	7091	0.9	0.059	9088	1.1
VP-44	1000	450	275	0.105	0	0.0	0.071	0	0.0	0.065	0	0.0	0.059	0	0.0
VP-45	1000	350	250	0.105	0	0.0	0.071	0	0.0	0.065	0	0.0	0.059	0	0.0
VP-46	1000	400	250	0.105	0	0.0	0.071	0	0.0	0.065	0	0.0	0.059	0	0.0
VP-47	1000	350	200	0.107	0	0.0	0.074	0	0.0	0.068	8055	0.5	0.063	7208	0.5
VP-48	1000	400	200	0.107	0	0.0	0.074	0	0.0	0.068	0	0.0	0.063	0	0.0
VP-48D	1000	400	200	0.107	0	0.0	0.074	0	0.0	0.068	0	0.0	0.063	0	0.0
VP-49	1000	350	200	0.107	0	0.0	0.074	0	0.0	0.068	30530	2.1	0.063	15340	1.0
VP-50	1000	400	150	0.107	0	0.0	0.074	0	0.0	0.068	0	0.0	0.063	0	0.0
VP-51	1000	450	200	0.107	0	0.0	0.074	0	0.0	0.068	2051	0.1	0.063	0	0.0
VP-52	1000	450	150	0.107	0	0.0	0.074	0	0.0	0.068	0	0.0	0.063	0	0.0
VP-53	1000	500	200	0.06	0	0.0	0.077	0	0.0	0.126	0	0.0	0.15	0	0.0
VP-54	1000	500	150	0.06	0	0.0	0.077	0	0.0	0.126	7444	0.9	0.15	0	0.0
VP-56	1000	500	100	0.06	0	0.0	0.077	0	0.0	0.126	0	0.0	0.15	0	0.0
VP-55	1000	450	100	0.06	0	0.0	0.077	0	0.0	0.126	36357	4.6	0.15	491110	73.5
VP-57	1000	450	50	0.06	0	0.0	0.077	0	0.0	0.126	0	0.0	0.15	0	0.0
VP-59	1000	450	0	0.081	0	0.0	0.104	0	0.0	0.146	0	0.0	0.165	0	0.0
VP-60	1000	500	0	0.081	0	0.0	0.104	0	0.0	0.146	0	0.0	0.165	0	0.0
VP-61	1000	550	0	0.081	0	0.0	0.104	0	0.0	0.146	0	0.0	0.165	0	0.0
VP-62	1000	350	100	0.081	0	0.0	0.104	0	0.0	0.146	0	0.0	0.165	0	0.0
VP-63	1000	400	100	0.081	0	0.0	0.104	0	0.0	0.146	17877	2.6	0.165	242079	40.0

TABLE A-2 CALCULATION OF SOIL VAPOR CONCENTRATIONS
OF CHLORINATED COMPOUNDS

				TCE			PCE		
Sample	Vol inj (ul)	North	East	RF	Area (Usec)	Conc (ppmv)	RF	Area (Usec)	Conc (ppmv)
VP-1	1000	500	250	0.001	0	0.0	0.0004	0	0.0
VP-2	1000	450	250	0.001	12321	0.0	0.0004	274343	0.1
VP-3	1000	450	300	0.001	13613	0.0	0.0004	7297	0.0
VP-4	1000	550	250	0.001	0	0.0	0.0004	0	0.0
VP-5	1000	550	300	7e-04	0	0.0	0.0002	15929	0.0
VP-6	1000	550	350	7e-04	0	0.0	0.0002	138866	0.0
VP-7	1000	500	350	7e-04	0	0.0	0.0002	0	0.0
VP-8	1000	550	400	7e-04	0	0.0	0.0002	154297	0.0
VP-9	1000	500	400	7e-04	0	0.0	0.0002	0	0.0
VP-10	1000	500	450	7e-04	0	0.0	0.0002	14245	0.0
VP-11	1000	450	500	7e-04	0	0.0	0.0002	0	0.0
VP-16	1000	450	400	7e-04	0	0.0	0.0002	0	0.0
VP-17	1000	400	500	7e-04	0	0.0	0.0002	2952	0.0
VP-18	1000	350	500	7e-04	3633	0.0	0.0002	5377	0.0
VP-21	1000	350	350	6e-04	0	0.0	0.0002	0	0.0
VP-24	1000	325	500	6e-04	0	0.0	0.0002	6607	0.0
VP-23	1000	325	450	6e-04	265526	0.2	0.0002	760173	0.2
VP-25	1000	300	500	6e-04	0	0.0	0.0002	16357	0.0
VP-27	1000	300	400	5e-04	63890	0.0	0.0002	121618	0.0
VP-28	1000	300	350	5e-04	14515	0.0	0.0002	807264	0.2
VP-29	1000	250	400	5e-04	17322	0.0	0.0002	373836	0.1
VP-31	1000	200	350	5e-04	1e+06	0.6	0.0002	3e+06	0.6
VP-30	1000	250	450	5e-04	0	0.0	0.0002	0	0.0
VP-32	1000	150	400	5e-04	3047	0.0	0.0002	40154	0.0
VP-32D	1000	150	400	5e-04	10775	0.0	0.0002	1e+06	0.3
VP-33	1000	400	550	6e-04	0	0.0	0.0002	19349	0.0
VP-34	1000	100	350	6e-04	66645	0.0	0.0002	8e+06	1.8
VP-35	1000	100	400	6e-04	43531	0.0	0.0002	484773	0.1
VP-36	1000	0	300	5e-04	0	0.0	0.0002	98631	0.0
VP-37	1000	100	500	5e-04	5853	0.0	0.0002	73648	0.0
VP-38	1000	200	500	5e-04	7321	0.0	0.0002	303510	0.1
VP-39	1000	400	300	6e-04	98940	0.1	0.0002	1e+06	0.3
VP-43	500	350	300	6e-04	846463	1.0	0.0002	3e+06	1.2
VP-44	1000	450	275	6e-04	13185	0.0	0.0002	73719	0.0
VP-45	1000	350	250	6e-04	31915	0.0	0.0002	454254	0.1

TABLE A-2 (Continued)

				TCE			PCE		
Sample	Vol inj (ul)	North	East	RF	Area (Usec)	Conc (ppmv)	RF	Area (Usec)	Conc (ppmv)
VP-46	500	400	250	6e-04	76699	0.1	0.0002	2e+06	0.8
VP-47	250	350	200	5e-04	10659	0.0	0.0002	87872	0.1
VP-48	500	400	200	5e-04	482869	0.5	0.0002	3e+06	1.0
VP-48D	250	400	200	5e-04	348343	0.7	0.0002	2e+06	1.6
VP-49	300	350	200	5e-04	4957	0.0	0.0002	71127	0.0
VP-50	500	400	150	5e-04	636806	0.6	0.0002	3e+06	1.2
VP-51	500	450	200	5e-04	12894	0.0	0.0002	721463	0.3
VP-52	250	450	150	5e-04	0	0.0	0.0002	74819	0.1
VP-53	500	500	200	0.004	0	0.0	0.0014	360235	1.0
VP-54	500	500	150	0.004	0	0.0	0.0014	76483	0.2
VP-56	500	500	100	0.004	0	0.0	0.0014	109223	0.3
VP-55	500	450	100	0.004	71024	0.6	0.0014	77358	0.2
VP-57	500	450	50	0.004	41598	0.3	0.0014	67089	0.2
VP-59	500	450	0	0.003	0	0.0	0.0011	47875	0.1
VP-60	500	500	0	0.003	6904	0.0	0.0011	61503	0.1
VP-61	500	550	0	0.003	80316	0.5	0.0011	309153	0.7
VP-62	500	350	100	0.003	0	0.0	0.0011	3663	0.0
VP-63	500	400	100	0.003	0	0.0	0.0011	219636	0.5

Appendix G

Fate and Transport Calculations

APPENDIX G - LIST OF TABLES

<u>Number</u>	<u>Title</u>
G-1	Calculated emission rates of volatile compounds measured in soil vapor, Stauffer Management Company Remedial Investigation, Skaneateles Falls, New York.
G-2	Volatilization from shallow saturated soils, Stauffer Management Company Remedial Investigation, Skaneateles Falls, New York.
G-3	Calculated ambient air concentrations at receptor point, Stauffer Management Company Remedial Investigation, Skaneateles Falls, New York.

TABLE G-1 CALCULATED EMISSION RATES OF VOLATILE COMPOUNDS MEASURED IN SOIL VAPOR
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

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1. Mean concentrations

Compound	Mean SV Conc (ppm _v)	Mean SV Conc (g/cm ³)	MW (g/mol)	SV Conc (mol/cm ³)	Diff coeff (cm ² /sec)	Surface area (cm ²)	Soil porosity	Mole fraction (M)	Soil cover (cm)	Emission rate (g/sec)	Emission rate (g/m ² -sec)	% Total
Toluene	0.32	1.21E-09	92.14	1.31E-11	0.08301	8.09E+07	0.3	1.52E-02	91.44	2.71E-07	3.35E-11	0.05%
Ethyl benzene	0.45	1.95E-09	106.17	1.84E-11	0.07070	8.09E+07	0.3	2.13E-02	91.44	5.25E-07	6.50E-11	0.09%
m/p-Xylenes	3.46	1.50E-08	106.17	1.42E-10	0.07597	8.09E+07	0.3	1.64E-01	91.44	3.34E-05	4.13E-09	5.98%
o-Xylene	13.58	5.90E-08	106.17	5.55E-10	0.07597	8.09E+07	0.3	6.44E-01	91.44	5.14E-04	6.36E-08	92.07%
Methylene chloride	0.39	1.35E-09	84.93	1.60E-11	0.09600	8.09E+07	0.3	1.85E-02	91.44	4.29E-07	5.30E-11	0.08%
t-1,2-dichloroethene	0.66	2.60E-09	96.94	2.69E-11	0.08386	8.09E+07	0.3	3.11E-02	91.44	1.21E-06	1.50E-10	0.22%
c-1,2-dichloroethene	1.69	6.69E-09	96.94	6.90E-11	0.08386	8.09E+07	0.3	8.00E-02	91.44	8.00E-06	9.89E-10	1.43%
Trichloroethane	0.18	1.00E-09	133.40	7.53E-12	0.08447	8.09E+07	0.3	8.72E-03	91.44	1.32E-07	1.63E-11	0.02%
Trichloroethene	0.11	5.91E-10	131.39	4.50E-12	0.08606	8.09E+07	0.3	5.21E-03	91.44	4.73E-08	5.85E-12	0.01%
Tetrachloroethene	0.26	1.74E-09	165.83	1.05E-11	0.07852	8.09E+07	0.3	1.22E-02	91.44	2.97E-07	3.68E-11	0.05%
			(SUM)	8.63E-10								

2. 95% Upper Confidence Limit Concentrations

Compound	UCL SV Conc (ppm _v)	UCL SV Conc (g/cm ³)	MW (g/mol)	SV Conc (mol/cm ³)	Diff coeff (cm ² /sec)	Surface area (cm ²)	Soil porosity	Mole fraction (M)	Soil cover (cm)	Emission rate (g/sec)	Emission rate (g/m ² -sec)	% Total
Toluene	0.54	2.03E-09	92.14	2.21E-11	0.08301	8.09E+07	0.3	2.56E-02	91.44	7.71E-07	9.54E-11	0.01%
Ethyl benzene	0.91	3.95E-09	106.17	3.72E-11	0.07070	8.09E+07	0.3	4.31E-02	91.44	2.15E-06	2.66E-10	0.04%
m/p-Xylenes	9.92	4.31E-08	106.17	4.06E-10	0.07597	8.09E+07	0.3	4.70E-01	91.44	2.74E-04	3.39E-08	4.99%
o-Xylene	43.04	1.87E-07	106.17	1.76E-09	0.07597	8.09E+07	0.3	2.04E+00	91.44	5.17E-03	6.39E-07	94.01%
Methylene chloride	0.79	2.74E-09	84.93	3.23E-11	0.09600	8.09E+07	0.3	3.74E-02	91.44	1.76E-06	2.18E-10	0.03%
t-1,2-dichloroethene	1.15	4.55E-09	96.94	4.69E-11	0.08386	8.09E+07	0.3	5.44E-02	91.44	3.70E-06	4.57E-10	0.07%
c-1,2-dichloroethene	3.99	1.58E-08	96.94	1.63E-10	0.08386	8.09E+07	0.3	1.89E-01	91.44	4.47E-05	5.52E-09	0.81%
Trichloroethane	0.39	2.12E-09	133.40	1.59E-11	0.08447	8.09E+07	0.3	1.84E-02	91.44	5.89E-07	7.29E-11	0.01%
Trichloroethene	0.22	1.18E-09	131.39	9.00E-12	0.08606	8.09E+07	0.3	1.04E-02	91.44	1.89E-07	2.34E-11	0.00%
Tetrachloroethene	0.47	3.20E-09	165.83	1.93E-11	0.07852	8.09E+07	0.3	2.24E-02	91.44	1.00E-06	1.24E-10	0.02%
			(SUM)	2.51E-09								

Notes:

Diffusion coefficients from USEPA (1988)
Surface area was assumed to be 2 acres
Soil cover assumed to be 3 feet (91.44 cm)

TABLE G-2. VOLATILIZATION FROM SHALLOW SATURATED SOILS
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

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Landfill Soil Borings - Mean Concentrations

Analyte	MW	Mean Conc (ug/kg)	Mean Conc (g/cm ³)	HLC (atm/m ³ -mole)	R	Temp (°K)	Depth (L:cm)	Cg	(Do) Vapor Diff Coefficient (cm ² /sec)	(Ds) Soil Vapor Diffusion Coefficient (cm ² /sec)	FLUX RATE (g/m ² -sec)
Methylene chloride	85	1.30E+03	2.60E-06	3.19E-03	8.19E-05	293	244	3.456E-07	0.09600	8.549E-04	1.21E-08
Acetone	58	5.50E+01	1.10E-07	2.06E-05	8.19E-05	293	244	9.443E-11	0.10930	9.733E-04	3.77E-12
2-Butanone	72	7.10E+03	1.42E-05	2.74E-05	8.19E-05	293	244	1.621E-08	0.09485	8.446E-04	5.62E-10
Benzene	78	2.82E+03	5.64E-06	5.59E-03	8.19E-05	293	244	1.313E-06	0.09234	8.223E-04	4.43E-08
Chloroform	119	1.00E+00	2.00E-09	2.87E-03	8.19E-05	293	244	2.392E-10	0.09404	8.374E-04	8.21E-12
Chlorobenzene	113	2.10E+02	4.20E-07	3.72E-03	8.19E-05	293	244	6.511E-08	0.07627	6.792E-04	1.81E-09
1,2-Dichloroethene	97	1.70E+01	3.40E-08	4.08E-03	8.19E-05	293	244	5.781E-09	0.08386	7.468E-04	1.77E-10
Trichloroethene	131	1.53E+04	3.05E-05	1.17E-02	8.19E-05	293	244	1.488E-05	0.08606	7.664E-04	4.68E-07
Tetrachloroethene	166	4.00E+00	8.00E-09	2.68E-02	8.19E-05	293	244	8.951E-09	0.07852	6.992E-04	2.57E-10
Toluene	92	1.01E+05	2.03E-04	5.92E-03	8.19E-05	293	244	4.997E-05	0.08301	7.392E-04	1.51E-06
Ethylbenzene	106	1.73E+04	3.46E-05	8.04E-03	8.19E-05	293	244	1.160E-05	0.07070	6.296E-04	3.00E-07
Xylenes	113	2.72E+06	5.44E-03	7.04E-03	8.19E-05	293	244	1.596E-03	0.07597	6.765E-04	4.43E-05

Landfill Soil Borings - UCL Concentrations

Analyte	MW	UCL Conc (ug/kg)	UCL Conc (g/cm ³)	HLC (atm/m ³ -mole)	R	Temp (°K)	Depth (L:cm)	Cg	(Do) Vapor Diff Coefficient (cm ² /sec)	(Ds) Soil Vapor Diffusion Coefficient (cm ² /sec)	FLUX RATE (g/m ² -sec)
Methylene chloride	85	1.30E+03	2.60E-06	3.19E-03	8.19E-05	293	244	3.456E-07	0.09600	8.549E-04	1.21E-08
Acetone	58	5.50E+01	1.10E-07	2.06E-05	8.19E-05	293	244	9.443E-11	0.10930	9.733E-04	3.77E-12
2-Butanone	72	7.10E+03	1.42E-05	2.74E-05	8.19E-05	293	244	1.621E-08	0.09485	8.446E-04	5.62E-10
Benzene	78	6.21E+03	1.24E-05	5.59E-03	8.19E-05	293	244	2.895E-06	0.09234	8.223E-04	9.76E-08
Chloroform	119	1.00E+00	2.00E-09	2.87E-03	8.19E-05	293	244	2.392E-10	0.09404	8.374E-04	8.21E-12
Chlorobenzene	113	2.10E+02	4.20E-07	3.72E-03	8.19E-05	293	244	6.511E-08	0.07627	6.792E-04	1.81E-09
1,2-Dichloroethene	97	1.70E+01	3.40E-08	4.08E-03	8.19E-05	293	244	5.781E-09	0.08386	7.468E-04	1.77E-10
Trichloroethene	131	3.53E+04	7.05E-05	1.17E-02	8.19E-05	293	244	3.439E-05	0.08606	7.664E-04	1.08E-06
Tetrachloroethene	166	4.00E+00	8.00E-09	2.68E-02	8.19E-05	293	244	8.951E-09	0.07852	6.992E-04	2.57E-10
Toluene	92	2.80E+05	5.60E-04	5.92E-03	8.19E-05	293	244	1.381E-04	0.08301	7.392E-04	4.19E-06
Ethylbenzene	106	3.74E+04	7.49E-05	8.04E-03	8.19E-05	293	244	2.510E-05	0.07070	6.296E-04	6.48E-07
Xylenes	113	7.16E+06	1.43E-02	7.04E-03	8.19E-05	293	244	4.202E-03	0.07597	6.765E-04	1.17E-04

Notes:

¹ Vapor diffusion coefficients from USEPA (1988)

² Average depth of 8 feet (244 cm) for landfill borings, and 5.3 ft (162 cm) for North Area Soils.

TABLE G-2. (Continued)

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North Area Soil Borings - Mean Concentrations

Analyte	MW	Mean Conc (ug/kg)	Mean Conc (g/cm ³)	HLC (atm/m ³ -mole)	R	Temp (°K)	Depth (L:cm)	Cg	(Do) Vapor Diff Coefficient (cm ² /sec)	(Ds) Soil Vapor Diffusion Coefficient (cm ² /sec)	FLUX RATE (g/m ² -sec)
Acetone	58	1.40E+02	2.80E-07	2.06E-05	8.19E-05	293	162	2.404E-10	0.10930	9.733E-04	1.45E-11
1,1-Dichloroethane	99	4.00E+00	8.00E-09	5.87E-03	8.19E-05	293	162	1.957E-09	0.09643	8.587E-04	1.04E-10
1,2-Dichloroethane	97	2.00E+00	4.00E-09	4.08E-03	8.19E-05	293	162	6.801E-10	0.08386	7.468E-04	3.14E-11
2-Butanone	72	5.90E+01	1.18E-07	4.66E-05	8.19E-05	293	162	2.291E-10	0.09485	8.446E-04	1.20E-11
Benzene	78	5.00E+00	1.00E-08	5.55E-03	8.19E-05	293	162	2.313E-09	0.09234	8.223E-04	1.18E-10
Tetrachloroethane	166	5.00E+00	1.00E-08	2.68E-02	8.19E-05	293	162	1.119E-08	0.07852	6.992E-04	4.84E-10
Toluene	92	3.70E+01	7.40E-08	5.92E-03	8.19E-05	293	162	1.826E-08	0.08301	7.392E-04	8.35E-10
Xylenes	113	1.58E+05	3.17E-04	7.04E-03	8.19E-05	293	162	9.299E-05	0.07597	6.765E-04	3.89E-06

North Area Soil Borings - UCL Concentrations

Analyte	MW	UCL Conc (ug/kg)	UCL Conc (g/cm ³)	HLC (atm/m ³ -mole)	R	Temp (°K)	Depth (L:cm)	Cg	(Do) Vapor Diff Coefficient (cm ² /sec)	(Ds) Soil Vapor Diffusion Coefficient (cm ² /sec)	FLUX RATE (g/m ² -sec)
Acetone	58	1.40E+02	2.80E-07	2.06E-05	8.19E-05	293	162	2.404E-10	0.10930	9.733E-04	1.45E-11
1,1-Dichloroethane	99	4.00E+00	8.00E-09	5.87E-03	8.19E-05	293	162	1.957E-09	0.09643	8.587E-04	1.04E-10
1,2-Dichloroethane	97	2.00E+00	4.00E-09	4.08E-03	8.19E-05	293	162	6.801E-10	0.08386	7.468E-04	3.14E-11
2-Butanone	72	5.90E+01	1.18E-07	4.66E-05	8.19E-05	293	162	2.291E-10	0.09485	8.446E-04	1.20E-11
Benzene	78	5.00E+00	1.00E-08	5.55E-03	8.19E-05	293	162	2.313E-09	0.09234	8.223E-04	1.18E-10
Tetrachloroethane	166	5.00E+00	1.00E-08	2.68E-02	8.19E-05	293	162	1.119E-08	0.07852	6.992E-04	4.84E-10
Toluene	92	3.70E+01	7.40E-08	5.92E-03	8.19E-05	293	162	1.826E-08	0.08301	7.392E-04	8.35E-10
Xylenes	113	4.41E+05	8.81E-04	7.04E-03	8.19E-05	293	162	2.585E-04	0.07597	6.765E-04	1.08E-05

TABLE G-3. CALCULATED AMBIENT AIR CONCENTRATIONS AT RECEPTOR POINT
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

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Mean emission rates - Soil Vapor Source

Compound	Emission rate (g/sec)	Mixing Ht (m)	Cross wind width (m)	Wind Velocity (m/sec)	Ambient Air Conc (g/m ³)	Ambient Air Conc (ug/m ³)
Toluene	2.71E-07	88	152	4.4	9.21E-12	9.209E-06
Ethyl benzene	5.25E-07	88	152	4.4	1.78E-11	1.784E-05
m/p-Xylenes	3.34E-05	88	152	4.4	1.14E-09	1.135E-03
o-Xylenes	5.14E-04	88	152	4.4	1.75E-08	1.747E-02
Methylene chloride	4.29E-07	88	152	4.4	1.46E-11	1.458E-05
trans-Dichloroethene	1.21E-06	88	152	4.4	4.11E-11	4.112E-05
cis-Dichloroethene	8.00E-06	88	152	4.4	2.72E-10	2.719E-04
1,1,1-Trichloroethane	1.32E-07	88	152	4.4	4.49E-12	4.486E-06
Trichloroethene	4.33E-08	88	152	4.4	1.47E-12	1.471E-06
Tetrachloroethene	2.97E-07	88	152	4.4	1.01E-11	1.009E-05

UCL emission rates - Soil Vapor Source

Compound	Emission rate (g/sec)	Mixing Ht (m)	Cross wind width (m)	Wind Velocity (m/sec)	Ambient Air Conc (g/m ³)	Ambient Air Conc (ug/m ³)
Toluene	7.71E-07	88	152	4.4	2.62E-11	2.620E-05
Ethyl benzene	2.15E-06	88	152	4.4	7.31E-11	7.306E-05
m/p-Xylenes	2.74E-04	88	152	4.4	9.31E-09	9.311E-03
o-Xylenes	5.17E-03	88	152	4.4	1.76E-07	1.757E-01
Methylene chloride	1.76E-06	88	152	4.4	5.98E-11	5.981E-05
trans-Dichloroethene	3.76E-06	88	152	4.4	1.28E-10	1.278E-04
cis-Dichloroethene	4.47E-05	88	152	4.4	1.52E-09	1.519E-03
1,1,1-Trichloroethane	5.89E-07	88	152	4.4	2.00E-11	2.002E-05
Trichloroethene	1.89E-07	88	152	4.4	6.42E-12	6.423E-06
Tetrachloroethene	1.00E-06	88	152	4.4	3.40E-11	3.398E-05

Mean emission rates - Landfill Soil Borings

Compound	Emission rate (g/sec)	Mixing Ht (m)	Cross wind width (m)	Wind Velocity (m/sec)	Ambient Air Conc (g/m ³)	Ambient Air Conc (ug/m ³)
Methylene chloride	1.21E-08	88	152	4.4	4.11E-13	4.112E-07
Acetone	3.77E-12	88	152	4.4	1.28E-16	1.281E-10
2-Butanone	5.62E-10	88	152	4.4	1.91E-14	1.910E-08
Benzene	4.43E-08	88	152	4.4	1.51E-12	1.505E-06
Chloroform	8.21E-12	88	152	4.4	2.79E-16	2.790E-10
Chlorobenzene	1.81E-09	88	152	4.4	6.15E-14	6.151E-08
1,2-Dichloroethene	1.77E-10	88	152	4.4	6.01E-15	6.015E-09
Trichloroethene	4.68E-07	88	152	4.4	1.59E-11	1.590E-05
Tetrachloroethene	2.57E-10	88	152	4.4	8.73E-15	8.733E-09
Toluene	1.51E-06	88	152	4.4	5.13E-11	5.131E-05
Ethylbenzene	3.00E-07	88	152	4.4	1.02E-11	1.019E-05
Xylenes	4.43E-05	88	152	4.4	1.51E-09	1.505E-03

TABLE G-3. (Continued)

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UCL emission rates - Landfill Soil Borings

<u>Compound</u>	<u>Emission rate (g/sec)</u>	<u>Mixing Ht (m)</u>	<u>Cross wind width (m)</u>	<u>Wind Velocity (m/sec)</u>	<u>Ambient Air Conc (g/m³)</u>	<u>Ambient Air Conc (ug/m³)</u>
Methylene chloride	1.21E-08	88	152	4.4	4.11E-13	4.112E-07
Acetone	3.77E-12	88	152	4.4	1.28E-16	1.281E-10
2-Butanone	5.62E-10	88	152	4.4	1.91E-14	1.910E-08
Benzene	9.76E-08	88	152	4.4	3.32E-12	3.317E-06
Chloroform	8.21E-12	88	152	4.4	2.79E-16	2.790E-10
Chlorobenzene	1.81E-09	88	152	4.4	6.15E-14	6.151E-08
1,2-Dichloroethene	1.77E-10	88	152	4.4	6.01E-15	6.015E-09
Trichloroethene	1.08E-06	88	152	4.4	3.67E-11	3.670E-05
Tetrachloroethene	2.57E-10	88	152	4.4	8.73E-15	8.733E-09
Toluene	4.19E-06	88	152	4.4	1.42E-10	1.424E-04
Ethylbenzene	6.48E-07	88	152	4.4	2.20E-11	2.202E-05
Xylenes	1.74E-04	88	152	4.4	5.91E-09	5.913E-03

Mean emission rates - North Area Soils

<u>Compound</u>	<u>Emission rate (g/sec)</u>	<u>Mixing Ht (m)</u>	<u>Cross wind width (m)</u>	<u>Wind Velocity (m/sec)</u>	<u>Ambient Air Conc (g/m³)</u>	<u>Ambient Air Conc (ug/m³)</u>
Acetone	1.45E-11	88	152	4.4	4.93E-16	4.927E-10
1,1-Dichloroethane	1.04E-10	88	152	4.4	3.53E-15	3.534E-09
1,2-Dichloroethene	3.14E-11	88	152	4.4	1.07E-15	1.067E-09
2-Butanone	1.20E-11	88	152	4.4	4.08E-16	4.078E-10
Benzene	1.18E-10	88	152	4.4	4.01E-15	4.010E-09
Tetrachloroethene	4.84E-10	88	152	4.4	1.64E-14	1.645E-08
Toluene	8.35E-10	88	152	4.4	2.84E-14	2.838E-08
Xylenes	3.89E-06	88	152	4.4	1.32E-10	1.322E-04

UCL emission rates - North Area Soils

<u>Compound</u>	<u>Emission rate (g/sec)</u>	<u>Mixing Ht (m)</u>	<u>Cross wind width (m)</u>	<u>Wind Velocity (m/sec)</u>	<u>Ambient Air Conc (g/m³)</u>	<u>Ambient Air Conc (ug/m³)</u>
Acetone	1.45E-11	88	152	4.4	4.93E-16	4.927E-10
1,1-Dichloroethane	1.04E-10	88	152	4.4	3.53E-15	3.534E-09
1,2-Dichloroethene	3.14E-11	88	152	4.4	1.07E-15	1.067E-09
2-Butanone	1.20E-11	88	152	4.4	4.08E-16	4.078E-10
Benzene	1.18E-10	88	152	4.4	4.01E-15	4.010E-09
Tetrachloroethene	4.84E-10	88	152	4.4	1.64E-14	1.645E-08
Toluene	8.35E-10	88	152	4.4	2.84E-14	2.838E-08
Xylenes	1.08E-05	88	152	4.4	3.67E-10	3.670E-04



Appendix H

Risk Assessment Calculations

APPENDIX H - LIST OF TABLES

<u>Number</u>	<u>Title</u>
H-1	Selection matrix for organic chemicals of concern, Stauffer Management Company Remedial Investigation, Skaneateles Falls, New York.
H-2	Selection matrix for inorganic chemicals of concern, Stauffer Management Company Remedial Investigation, Skaneateles Falls, New York.
H-3	Risk factor calculations for selection of organic contaminants of concern, Stauffer Management Company Remedial Investigation, Skaneateles Falls, New York.
H-4	Risk factor calculations for selection of inorganic contaminants of concern, Stauffer Management Company Remedial Investigation, Skaneateles Falls, New York.
H-5	Inhalation of volatile compounds in ambient air (PS-1) soil vapor source, present and future-use scenario - residential exposure.
H-6	Dermal contact with stream sediments (PS-2) present- and future-use scenarios, Round 1 results.
H-7	Dermal contact with stream sediments (PS-2) present- and future-use scenarios, Round 2 results.
H-8	Dermal contact with creek seeps - hunter/fisherman exposure, present-use scenario - Round 1 data.
H-9	Incidental ingestion of contaminated stream sediments (PS-4) present- and future-use scenarios - Round 1 data.
H-10	Incidental ingestion of contaminated stream sediments (PS-4) present- and future-use scenario - Round 2 data.
H-11	Calculated ambient air concentrations at receptor point future-use - non-remedial construction scenario, Stauffer Management Company Remedial Investigation, Skaneateles Falls, New York.
H-12	Inhalation of volatile compounds in ambient air (FS-1) non-remedial site construction activity - landfill perimeter soils, future-use scenario - residential exposure.
H-13	Inhalation of volatile compounds in ambient air (FS-1) non-remedial site construction activity - North Area soils future-use scenario - residential exposure

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<u>Number</u>	<u>Title</u>
H-14	Inhalation of volatile compounds in ambient air (FS-1) non-remedial site construction activity - landfill perimeter soils, future-use scenario - industrial exposure (onsite).
H-15	Inhalation of volatile compounds in ambient air (FS-1) non-remedial site construction activity - North Area soils, future-use scenario - industrial exposure (onsite).
H-16	Dermal contact with exposed soils from non-remedial excavation (FS-2) future-use scenario - industrial receptor North Area soils.
H-17	Dermal contact with exposed soils from non-remedial excavation (FS-2) future-use scenario - industrial receptor landfill perimeter soils.
H-18	Future-use scenario - inhalation of suspended soils from an excavation area (FS-3) North Area soils residential receptor (offsite).
H-19	Future-use scenario - inhalation of suspended soils from an excavation area landfill perimeter soils, residential receptor (offsite).
H-20	Basement model - inhalation of volatile organic compounds entering basement from soil vapor (FS-4) future-use scenario - residential building.
H-21	Residential use of ground water - ingestion pathway (FS-5) future-use scenario - offsite upper bedrock well use.
H-22	Residential use of ground water - ingestion pathway, future-use scenario - offsite deep bedrock well use.
H-23	Residential use of ground water - ingestion pathway (FS-5) future-use scenario - offsite mixed bedrock well use.
H-24	Dermal contact with ground water while swimming - residential exposure (FS-6) future-use scenario - offsite upper bedrock wells.
H-25	Dermal contact with ground water while swimming - residential exposure (FS-6) future-use scenario - offsite deep bedrock wells.
H-26	Dermal contact with ground water while swimming - residential exposure future use-scenario - offsite mixed bedrock wells.
H-27	Inhalation of volatile organics while showering (FS-7) future-use scenario residential - offsite wells, upper bedrock wells.

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<u>Number</u>	<u>Title</u>
H-28	Inhalation of volatile organics while showering (FS-7) future-use scenario residential - offsite bedrock wells.
H-29	Inhalation of volatile organics while showering (FS-7) future-use scenario residential - offsite wells, mixed bedrock wells.
H-30	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) calculation of food chemical concentrations.
H-31	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) offsite ground-water use - upper bedrock.
H-32	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) - FS-8, offsite ground-water use - deep bedrock.
H-33	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) - FS-8, offsite ground-water use - mixed bedrock.
H-34	Residential use of ground water - drinking water ingestion pathway (FS-6) future-use scenario - onsite upper bedrock well use, Round 1 data.
H-35	Residential use of ground water - drinking water ingestion pathway (FS-8) future-use scenario - onsite upper bedrock well use, Round 2 data.
H-36	Residential use of ground water - drinking water ingestion pathway (FS-8) future-use scenario - onsite deep bedrock well use, Round 1 data.
H-37	Residential use of ground water - drinking water ingestion pathway (FS-6) future-use scenario - onsite deep bedrock well use, Round 2 data.
H-38	Residential use of ground water - drinking water ingestion pathway (FS-6) future-use scenario - onsite mixed bedrock well use, Round 1 data.
H-39	Residential use of ground water - drinking water ingestion pathway (FS-6) future-use scenario - onsite mixed bedrock well use, Round 2 data.
H-40	Residential use of ground water - ingestion pathway (FS-6) future-use scenario-onsite deep bedrock well use (Data from Well Nos. SPW-01, SPW-02, and SPW-03).
H-41	Dermal contact with ground water while swimming - residential exposure, future-use scenario - onsite upper bedrock wells - Round 1.

APPENDIX H - LIST OF TABLES (Continued)

<u>Number</u>	<u>Title</u>
H-42	Dermal contact with ground water while swimming - residential exposure, future-use scenario - onsite upper bedrock wells - Round 2.
H-43	Dermal contact with ground water while swimming - residential exposure, future-use scenario - onsite deep bedrock wells - Round 1.
H-44	Dermal contact with ground water while swimming - residential exposure, future-use scenario - onsite deep bedrock wells - Round 2.
H-45	Dermal contact with ground water while swimming - residential exposure, future-use scenario - onsite mixed bedrock wells - Round 1.
H-46	Dermal contact with ground water while swimming - residential exposure, future-use scenario - onsite mixed bedrock wells - Round 2.
H-47	Inhalation of volatile organics while showering, future-use scenario residential - onsite upper bedrock wells, Round 1 data.
H-48	Inhalation of volatile organics while showering, future-use scenario residential - onsite upper bedrock wells, Round 2 data.
H-49	Inhalation of volatile organics while showering, future-use scenario residential - onsite deep bedrock wells, Round 1 data.
H-50	Inhalation of volatile organics while showering, future-use scenario residential - onsite deep bedrock wells, Round 2 data.
H-51	Inhalation of volatile organics while showering, future-use scenario residential - onsite mixed bedrock wells, Round 1 data.
H-52	Inhalation of volatile organics while showering, future-use scenario residential - onsite mixed bedrock wells, Round 2 data.
H-53	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) - FS-8, onsite ground-water use - upper bedrock - Round 1.
H-54	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) - FS-8, onsite ground-water use - upper bedrock - Round 2.
H-55	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) onsite ground-water use - deep bedrock - Round 1.
H-56	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) onsite ground-water use - deep bedrock - Round 2.

APPENDIX H - LIST OF TABLES (Continued)

<u>Number</u>	<u>Title</u>
H-57	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) onsite ground-water use - mixed bedrock - Round 1.
H-58	Food chain transfer of contaminants - uptake from vegetables (residential gardeners) onsite ground-water use - mixed bedrock - Round 2.
H-59	Industrial use of ground water - drinking water ingestion pathway (FS-9) future-use scenario - onsite upper bedrock well use - Round 1 data.
H-60	Industrial use of ground water - drinking water ingestion pathway (FS-9) future-use scenario - onsite upper bedrock well use - Round 2 data.
H-61	Industrial use of ground water - drinking water ingestion pathway (FS-9) future-use scenario - onsite deep bedrock well use - Round 1 data.
H-62	Industrial use of ground water - drinking water ingestion pathway (FS-9) future-use scenario - onsite deep bedrock well use - Round 2 data.
H-63	Industrial use of ground water - drinking water ingestion pathway (FS-9) future-use scenario - onsite mixed bedrock well use - Round 1 data.
H-64	Industrial use of ground water - drinking water ingestion pathway (FS-9) future-use scenario - onsite mixed bedrock well use - Round 2 data.
H-65	Industrial use of ground water - incidental ingestion pathway (FS-10) future-use scenario - onsite upper bedrock well use - Round 1 data.
H-66	Industrial use of ground water - incidental ingestion pathway (FS-10) future-use scenario - onsite upper bedrock well use - Round 2 data.
H-67	Industrial use of ground water - incidental ingestion pathway (FS-10) future-use scenario - onsite deep bedrock well use - Round 1 data.
H-68	Industrial use of ground water - incidental ingestion pathway (FS-10) future-use scenario - onsite deep bedrock well use - Round 2 data.
H-69	Industrial use of ground water - incidental ingestion pathway (FS-10) future-use scenario - onsite mixed bedrock well use - Round 1 data.
H-70	Industrial use of ground water - incidental ingestion pathway (FS-10) future-use scenario - onsite mixed bedrock well use - Round 2 data.
H-71	Dermal contact with ground water - industrial use - future-use scenario, onsite upper bedrock wells - Round 1 data.

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<u>Number</u>	<u>Title</u>
H-72	Dermal contact with ground water - industrial use - future-use scenario, onsite upper bedrock wells - Round 2 data.
H-73	Dermal contact with ground water - industrial use - future-use scenario, onsite deep bedrock wells - Round 1 data.
H-74	Dermal contact with ground water - industrial use - future-use scenario, onsite deep bedrock wells - Round 2 data.
H-75	Dermal contact with ground water - industrial use - future-use scenario, onsite mixed bedrock wells - Round 1 data.
H-76	Dermal contact with ground water - industrial use - future-use scenario, onsite mixed bedrock wells - Round 2 data.
H-77	Inhalation of volatile organics while washing vehicles - future-use industrial scenario - onsite upper bedrock wells - Round 1 data.
H-78	Inhalation of volatile organics while washing vehicles - future-use industrial scenario - onsite upper bedrock wells - Round 2 data.
H-79	Inhalation of volatile organics while washing vehicles - future-use industrial scenario - onsite deep bedrock wells - Round 1 data.
H-80	Inhalation of volatile organics while washing vehicles - future-use industrial scenario - onsite deep bedrock wells - Round 2 data.
H-81	Inhalation of volatile organics while washing vehicles - future-use industrial scenario - onsite mixed bedrock wells - Round 1 data.
H-82	Inhalation of volatile organics while washing vehicles - future-use industrial scenario - onsite mixed bedrock wells - Round 2 data.
H-83	Basement model - inhalation of volatile organic compounds entering basement from soil vapor - future-use scenario - industrial building.
H-84	Calculated sediment criteria for organics present in Skaneateles Creek sediments.

TABLE H-1. SELECTION MATRIX FOR ORGANIC CHEMICALS OF CONCERN
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

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MATRIX: North Area Soils

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone			
Benzene		X	X
1,1-Dichloroethane			
1,2-Dichloroethene			
Tetrachloroethene		X	X
Toluene			
Xylenes	X		X
Phenol			
2-methylphenol	X		X
4-methylphenol	X		X
2,4-Dimethylphenol	X		X
Carbazole			X
Napthalene	X		X
Fluorene	X		X
Di-n-butyl phthalate			
Fluoranthene	X		X
Pyrene	X		X
Total c-PAHs		X	X
<i>o</i> -Toluic acid			X
<i>m</i> -Toluic acid			X
<i>p</i> -Toluic acid			
4,4'-DDD		X	X
Aroclor 1248		X	X

MATRIX: Landfill Perimeter Soils

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone			
Tetrachloroethene		X	X
Toluene			
Ethyl benzene			
Xylenes			
2-methylphenol	X		X
4-methylphenol	X		
Napthalene	X		X
Fluorene	X		X
Di-n-butyl phthalate	X		X
Fluoranthene	X		X
Pyrene	X		X
Total c-PAHs		X	X
<i>o</i> -Toluic acid			X
<i>m</i> -Toluic acid			X
4,4'-DDD		X	X
4,4'-DDE		X	X

TABLE H-1. (Continued)

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MATRIX: Creek Seeps - Round 1 Data

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone			
1,2-Dichloroethene	X		X
Trichloroethene		X	X
Tetrachloroethene	X		X
Toluene			
Xylenes			
Phenol			
2-methylphenol			
4-methylphenol			
Naphthalene			
Anthracene			
Fluorene			
Fluoranthene			
Pyrene			
<i>o</i> -Toluic acid	X		X
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid	X		X
Total c-PAHs		X	X

MATRIX: Stream Sediments - Round 1 Data

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Tetrachloroethene		X	X
Xylenes			
Naphthalene	X		X
Fluorene	X		X
Anthracene	X		X
Fluoranthene			
Pyrene	X		X
Total c-PAHs		X	X

MATRIX: Stream Sediments - Round 2 Data

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Vinyl chloride		X	X
Acetone	X		X
Carbon disulfide			
1,2-Dichloroethene	X		X
Toluene			
Ethylbenzene			
Xylenes			
2-methylphenol	X		X
Naphthalene	X		X
Fluorene	X		X
Fluoranthene	X		X
Pyrene	X		X
Carbazole		X	X
Total c-PAHs		X	X
<i>o</i> -Toluic acid			X
<i>m</i> -Toluic acid			X
<i>p</i> -Toluic acid			X
Dieldrin	X	X	X

TABLE H-1. (Continued)

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MATRIX: Deep Bedrock Groundwater (Off-Site Case) - Round 2 Data (Only)

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone	X		X
1,1-Dichloroethane	X		X
1,2-Dichloroethene	X		X
Trichloroethene		X	X
Tetrachloroethene	X	X	X
Toluene			
Xylenes	X		X
Phenol			
2-methylphenol	X		X
Pentachlorophenol	X		X
Naphthalene			
<i>o</i> -Toluic acid	X		X
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid	X		X
4,4'-DDE		X	X

MATRIX: Upper Bedrock Groundwater (Off-Site Case) - Round 2 Data (Only)

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
1,2-Dichloroethene	X		X
Trichloroethene		X	X
Toluene			
Xylenes	X		X
Phenol			
2-methylphenol			
4-methylphenol			
<i>o</i> -Toluic acid	X		
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid	X		X

MATRIX: Mixed Bedrock Groundwater (Off-Site Case) - Round 2 Data (Only)

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone			
1,1-Dichloroethane			
1,2-Dichloroethene	X		X
Trichloroethene		X	X
Tetrachloroethene	X	X	X
Toluene			
Xylenes			
Phenol			
2-methylphenol			
4-methylphenol			
Naphthalene			
<i>o</i> -Toluic acid	X		X
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid	X		X

MATRIX: Upper Bedrock Groundwater (On-Site Case) - Round 1 Data

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Vinyl chloride		X	X
Benzene		X	X
Acetone			
1,2-Dichloroethene	X		X
Trichloroethene		X	X
Tetrachloroethene	X		X
Toluene			
Xylenes			
Benzyl alcohol			
Phenol			
2-methylphenol			
4-methylphenol			
Benzoic acid			
Naphthalene			
<i>o</i> -Toluic acid	X		X
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid			X

MATRIX: Upper Bedrock Groundwater (On-Site Case) - Round 2 Data

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone			
1,2-Dichloroethene	X		X
Benzene		X	X
Vinyl chloride		X	X
Trichloroethene		X	X
Tetrachloroethene	X		X
Toluene			
Xylenes			
Phenol			
2-methylphenol			
4-methylphenol			
Naphthalene			
<i>o</i> -Toluic acid	X		X
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid	X		X
4,4'-DDE		X	X

MATRIX: Deep Bedrock Groundwater (On-Site Case) - Round 1 Data

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone	X		X
Benzene		X	X
1,2-Dichloroethene	X		X
Trichloroethene		X	X
Tetrachloroethene	X	X	X
Toluene			
Ethyl benzene			
Xylenes	X		X
Phenol			
2-methylphenol	X		X
4-methylphenol	X		X
Benzoic acid			
<i>o</i> -Toluic acid	X		X
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid	X		X

MATRIX: Deep Bedrock Groundwater (On-Site Case) - Round 2 Data

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone	X		X
1,2-Dichloroethene	X		X
Trichloroethene		X	X
Tetrachloroethene	X	X	X
Toluene			
Xylenes	X		X
Phenol			
2-methylphenol	X		X
Pentachlorophenol	X		X
Naphthalene			
<i>o</i> -Toluic acid	X		X
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid	X		X
4,4-DDE		X	X

MATRIX: Creek Seeps (Dermal contact) - Round 1 Data

Compound	Risk Factor >1%	Carcinogen	Chemical of Concern
Acetone			
1,2-Dichloroethene	X		X
Trichloroethene		X	X
Tetrachloroethene	X	X	X
Toluene			
Xylenes			
Phenol			
2-methylphenol			
4-methylphenol			
Naphthalene			
<i>o</i> -Toluic acid	X		X
<i>m</i> -Toluic acid	X		X
<i>p</i> -Toluic acid	X		X
Total c-PAHs		X	X

**TABLE H-2. SELECTION MATRIX FOR INORGANIC
CHEMICALS OF CONCERN
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK**

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MATRIX: North Area Soils

Analyte	Above Background	Risk Factor > 1%	Chemical of Concern
Arsenic	X	X	X
Barium	X	X	X
Beryllium			
Cadmium	X	X	X
Chromium	X		
Mercury	X	X	X
Nickel	X	X	X
Thallium		X	
Vanadium		X	
Zinc	X	X	X

MATRIX: Landfill Perimeter Soils

Analyte	Above Background	Risk Factor > 1%	Chemical of Concern
Arsenic		X	
Barium		X	
Beryllium			
Cadmium		X	
Chromium			
Mercury	X	X	X
Nickel	X	X	X
Thallium		X	
Vanadium			
Zinc			

MATRIX: Creek Seeps - Round 1 Data

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Barium	X	X
Beryllium	X	
Cadmium	X	X
Chromium	X	
Mercury	X	
Nickel	X	
Thallium	X	X
Vanadium	X	X
Zinc	X	

MATRIX: Stream Sediments - Round 1 Data

Analyte	Above Background	Risk Factor > 1%	Chemical of Concern
Arsenic	X	X	X
Barium		X	
Beryllium			
Cadmium	X	X	X
Chromium			
Nickel		X	
Vanadium		X	
Zinc		X	

MATRIX: Stream Sediments - Round 2 Data

Analyte	Above Background	Risk Factor > 1%	Chemical of Concern
Arsenic	X	X	X
Barium		X	
Beryllium			
Cadmium	X	X	X
Chromium			
Nickel		X	
Vanadium		X	
Zinc		X	

MATRIX: Surface Water - Round 1 Data

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Barium	X	X
Zinc	X	

MATRIX: Surface Water - Round 2 Data

No compounds detected with reference doses.

MATRIX: Inorganic Sludge Basin Wells

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Barium	X	X
Nickel	X	X
Zinc	X	

MATRIX: Deep Bedrock Groundwater (Off-site case) - Round 2 Data,

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Barium	X	
Cadmium	X	X
Chromium	X	
Mercury	X	
Nickel	X	
Zinc	X	
Cyanide	X	

MATRIX: Upper Bedrock Groundwater (Off-site case) - Round 2 Data,

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Barium	X	X
Beryllium	X	
Cadmium	X	X
Chromium	X	
Nickel	X	
Vanadium	X	X
Zinc	X	
Cyanide	X	

TABLE H-2 (Continued)

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MATRIX: Mixed Bedrock Groundwater (Off-site case) - Round 2 Data

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Barium	X	X
Beryllium	X	
Cadmium	X	X
Chromium	X	
Nickel	X	
Vanadium	X	X
Zinc	X	
Cyanide	X	

MATRIX: Upper Bedrock Groundwater (On-site case) - Round 1 Data

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Barium	X	
Chromium	X	
Mercury	X	
Nickel	X	
Vanadium	X	X
Zinc	X	
Cyanide	X	

MATRIX: Upper Bedrock Groundwater (On-site case) - Round 2 Data

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Barium	X	
Beryllium	X	
Cadmium	X	X
Chromium	X	
Mercury	X	
Nickel	X	
Vanadium	X	X
Zinc	X	
Cyanide	X	

MATRIX: Deep Bedrock Groundwater (On-site case) - Round 1 Data

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Antimony	X	X
Barium	X	X
Chromium	X	
Mercury	X	X
Nickel	X	
Thallium	X	X
Vanadium	X	X
Zinc	X	

MATRIX: Deep Bedrock Groundwater (On-site case) - Round 2 Data

Analyte	Freq > 10%	Chemical of Concern
Arsenic	X	X
Antimony	X	X
Barium	X	
Cadmium	X	X
Chromium	X	
Mercury	X	
Nickel	X	
Vanadium	X	
Zinc	X	
Cyanide	X	

TABLE H-3. RISK FACTOR CALCULATIONS FOR SELECTION OF
ORGANIC CONTAMINANTS OF CONCERN
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

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MATRIX: North Area Soils

Compound	UCL (mg/kg)	RfD	Risk Factor	% Total RF
Acetone	1.40E-01	1.00E-01	1.40E+00	0.28%
1,1-Dichloroethane	4.00E-03	1.00E-02	4.00E-01	0.08%
1,2-Dichloroethene	2.00E-03	2.00E-02	1.00E-01	0.02%
Tetrachloroethene	5.00E-03	1.00E-02	5.00E-01	0.10%
Toluene	3.70E-02	2.00E-01	1.85E-01	0.04%
Xylenes	4.41E+02	2.00E+00	2.20E+02	43.49%
Phenol	2.70E-01	6.00E-01	4.50E-01	0.09%
2-methylphenol	1.40E+00	5.00E-02	2.80E+01	5.53%
4-methylphenol	1.77E+00	5.00E-02	3.53E+01	6.98%
2,4-Dimethylphenol	2.05E+00	2.00E-02	1.02E+02	20.20%
Napthalene	7.01E-01	4.00E-02	1.75E+01	3.46%
Fluorene	4.30E-01	4.00E-02	1.08E+01	2.12%
Di-n-butyl phthalate	9.00E-02	1.00E-01	9.00E-01	0.18%
Fluoranthene	1.86E+00	4.00E-02	4.65E+01	9.17%
Pyrene	9.10E-01	3.00E-02	3.03E+01	5.99%
<i>o</i> -Toluic acid	1.21E+01	3.00E+00	4.02E+00	0.79%
<i>m</i> -Toluic acid	1.10E+01	3.00E+00	3.67E+00	0.72%
<i>p</i> -Toluic acid	1.17E+01	3.00E+00	3.89E+00	0.77%
Total			5.06E+02	

MATRIX: Landfill Perimeter Soils

Compound	UCL (mg/kg)	RfD	Risk Factor	% Total RF
Acetone	2.39E-02	1.00E-01	2.39E-01	0.51%
Tetrachloroethene	2.00E-03	1.00E-02	2.00E-01	0.43%
Toluene	3.30E-03	2.00E-01	1.65E-02	0.04%
Ethyl benzene	2.00E-03	1.00E-01	2.00E-02	0.04%
Xylenes	1.44E-01	2.00E+00	7.22E-02	0.16%
2-methylphenol	4.00E-02	5.00E-02	8.00E-01	1.72%
4-methylphenol	2.90E-02	5.00E-02	5.80E-01	1.25%
Napthalene	1.80E-01	4.00E-02	4.50E+00	9.67%
Fluorene	2.22E-02	4.00E-02	5.55E-01	1.19%
Di-n-butyl phthalate	2.10E-01	1.00E-01	2.10E+00	4.51%
Fluoranthene	6.56E-01	4.00E-02	1.64E+01	35.23%
Pyrene	6.29E-01	3.00E-02	2.10E+01	45.05%
<i>o</i> -Toluic acid	1.70E-01	3.00E+00	5.67E-02	0.12%
<i>m</i> -Toluic acid	1.20E-01	3.00E+00	4.00E-02	0.09%
Total			4.65E+01	

MATRIX: Creek Seeps - Round 1 Data

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
Acetone	4.03E-02	1.00E-01	4.03E-01	0.38%
1,2-Dichloroethene	4.49E-01	2.00E-02	2.24E+01	21.31%
Tetrachloroethene	3.78E-01	1.00E-02	3.78E+01	35.92%
Toluene	3.89E-02	2.00E-01	1.94E-01	0.18%
Xylenes	5.55E-01	2.00E+00	2.77E-01	0.26%
Phenol	4.70E-02	6.00E-01	7.83E-02	0.07%
2-methylphenol	1.41E-02	5.00E-02	2.82E-01	0.27%
4-methylphenol	2.00E-03	5.00E-02	4.00E-02	0.04%
Bis(2-ethylhexyl)phthalate	2.00E-03	2.00E-02	1.00E-01	0.09%
Napthalene	2.00E-03	4.00E-02	5.00E-02	0.05%
Anthracene	3.00E-03	3.00E-01	1.00E-02	0.01%
Fluorene	2.00E-03	4.00E-02	5.00E-02	0.05%
Fluoranthene	1.99E-02	4.00E-02	4.97E-01	0.47%
Pyrene	1.34E-02	3.00E-02	4.47E-01	0.42%
<i>o</i> -Toluic acid	1.18E+01	3.00E+00	3.94E+00	3.74%
<i>m</i> -Toluic acid	4.15E+01	3.00E+00	1.38E+01	13.14%
<i>p</i> -Toluic acid	7.46E+01	3.00E+00	2.49E+01	23.60%
Total			1.05E+02	

MATRIX: Stream Sediments - Round 1 Data

Compound	UCL (mg/kg)	RfD	Risk Factor	% Total RF
Tetrachloroethene	9.80E-03	1.00E-02	9.80E-01	0.27%
Xylenes	2.00E-03	2.00E+00	1.00E-03	0.00%
Naphthalene	1.10E+00	4.00E-02	2.75E+01	7.61%
Fluorene	2.19E+00	4.00E-02	5.47E+01	15.14%
Anthracene	2.39E+00	3.00E-01	7.97E+00	2.21%
Fluoranthene	1.99E-02	4.00E-02	4.97E-01	0.14%
Pyrene	8.09E+00	3.00E-02	2.70E+02	74.63%
Total			3.61E+02	

TABLE H-3. (Continued)

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MATRIX: Stream Sediments - Round 2 Data

Compound	UCL (mg/kg)	RfD	Risk Factor	% Total RF
Acetone	1.94E-01	1.00E-01	1.94E+00	1.84%
Carbon disulfide	8.50E-03	1.00E-01	8.50E-02	0.08%
1,2-Dichloroethene	5.65E-01	2.00E-02	2.82E+01	26.82%
Toluene	2.81E-02	2.00E-01	1.40E-01	0.13%
Ethylbenzene	7.00E-03	1.00E-01	7.00E-02	0.07%
Xylenes	1.84E+00	2.00E+00	9.20E-01	0.87%
2-methylphenol	2.00E-01	5.00E-02	4.00E+00	3.80%
Naphthalene	8.60E-02	4.00E-02	2.15E+00	2.04%
Fluorene	1.40E-01	4.00E-02	3.50E+00	3.32%
Fluoranthene	1.04E+00	4.00E-02	2.60E+01	24.71%
Pyrene	8.26E-01	3.00E-02	2.75E+01	26.14%
<i>o</i> -Toluic acid	6.30E-01	3.00E+00	2.10E-01	0.20%
<i>m</i> -Toluic acid	2.40E-01	3.00E+00	8.00E-02	0.08%
<i>p</i> -Toluic acid	4.20E-02	3.00E+00	1.40E-02	0.01%
Total			9.49E+01	

MATRIX: Deep Bedrock Groundwater (Off-Site Case) - Round 2 Data (Only)

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
Acetone	1.90E-02	1.00E-01	1.90E-01	1.22%
1,1-Dichloroethane	5.00E-03	1.00E-02	5.00E-01	3.21%
1,2-Dichloroethene	4.00E-03	2.00E-02	2.00E-01	1.28%
Tetrachloroethene	1.07E-02	1.00E-02	1.07E+00	6.87%
Toluene	4.00E-03	2.00E-01	2.00E-02	0.13%
Xylenes	3.15E-01	2.00E+00	1.58E-01	1.01%
Phenol	3.36E-02	6.00E-01	5.60E-02	0.36%
2-methylphenol	9.80E-03	5.00E-02	1.96E-01	1.26%
Pentachlorophenol	5.78E-02	3.00E-02	1.93E+00	12.37%
Naphthalene	1.00E-03	4.00E-02	2.50E-02	0.16%
<i>o</i> -Toluic acid	1.62E+01	3.00E+00	5.41E+00	34.73%
<i>m</i> -Toluic acid	1.62E+01	3.00E+00	5.41E+00	34.73%
<i>p</i> -Toluic acid	1.24E+00	3.00E+00	4.14E-01	2.66%
Total			1.56E+01	

TABLE H-3. (Continued)

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MATRIX: Upper Bedrock Groundwater (Off-Site Case) - Round 2 Data (Only)

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
1,2-Dichloroethene	1.12E-01	2.00E-02	5.58E+00	20.31%
Toluene	1.20E-02	2.00E-01	6.00E-02	0.39%
Xylenes	3.95E-01	2.00E+00	1.98E-01	1.27%
Phenol	1.45E-02	6.00E-01	2.42E-02	0.16%
2-methylphenol	7.50E-03	5.00E-02	1.50E-01	0.96%
4-methylphenol	6.40E-03	5.00E-02	1.28E-01	0.82%
<i>o</i> -Toluic acid	3.43E+01	3.00E+00	1.14E+01	73.31%
<i>m</i> -Toluic acid	2.16E+01	3.00E+00	7.20E+00	46.24%
<i>p</i> -Toluic acid	8.10E+00	3.00E+00	2.70E+00	17.33%
Total			2.74E+01	

MATRIX: Mixed Bedrock Groundwater (Off-Site Case) - Round 2 Data (Only)

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
Acetone	4.70E-02	1.00E-01	4.70E-01	0.88%
1,1-Dichloroethane	5.00E-03	1.00E-02	5.00E-01	0.94%
1,2-Dichloroethene	1.98E-01	2.00E-02	9.92E+00	18.58%
Tetrachloroethene	1.10E-02	1.00E-02	1.10E+00	2.06%
Toluene	1.20E-02	2.00E-01	6.00E-02	0.11%
Xylenes	4.61E-01	2.00E+00	2.30E-01	0.43%
Phenol	2.45E-02	6.00E-01	4.08E-02	0.08%
2-methylphenol	1.02E-02	5.00E-02	2.04E-01	0.38%
4-methylphenol	9.00E-03	5.00E-02	1.80E-01	0.34%
Naphthalene	1.00E-03	4.00E-02	2.50E-02	0.05%
<i>o</i> -Toluic acid	6.40E+01	3.00E+00	2.13E+01	39.95%
<i>m</i> -Toluic acid	4.20E+01	3.00E+00	1.40E+01	26.22%
<i>p</i> -Toluic acid	1.60E+01	3.00E+00	5.33E+00	9.99%
Total			5.34E+01	

MATRIX: Upper Bedrock Groundwater (On-Site Case) - Round 1 Data

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
Acetone	5.79E-02	1.00E-01	5.79E-01	0.52%
1,2-Dichloroethene	8.96E-02	2.00E-02	4.48E+00	4.05%
Tetrachloroethene	8.35E-01	1.00E-02	8.35E+01	75.47%
Toluene	3.44E-02	2.00E-01	1.72E-01	0.16%
Xylenes	1.06E+00	2.00E+00	5.31E-01	0.48%
Benzyl alcohol	2.60E-02	3.00E-01	8.67E-02	0.08%
Phenol	5.63E-02	6.00E-01	9.38E-02	0.08%
2-methylphenol	1.51E-02	5.00E-02	3.02E-01	0.27%
4-methylphenol	2.25E-02	5.00E-02	4.50E-01	0.41%
Benzoic acid	1.16E-01	4.00E+00	2.90E-02	0.03%
Naphthalene	9.00E-03	4.00E-02	2.25E-01	0.20%
<i>o</i> -Toluic acid	3.94E+01	3.00E+00	1.31E+01	11.88%
<i>m</i> -Toluic acid	1.89E+01	3.00E+00	6.31E+00	5.70%
<i>p</i> -Toluic acid	2.25E+00	3.00E+00	7.49E-01	0.68%
Total			1.11E+02	

MATRIX: Upper Bedrock Groundwater (On-Site Case) - Round 2 Data

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
Acetone	2.43E-02	1.00E-01	2.43E-01	0.22%
1,2-Dichloroethene	3.42E-01	2.00E-02	1.71E+01	15.47%
Tetrachloroethene	5.53E-02	1.00E-02	5.53E+00	5.00%
Toluene	2.41E-02	2.00E-01	1.20E-01	0.11%
Xylenes	7.70E-01	2.00E+00	3.85E-01	0.35%
Phenol	5.00E-01	6.00E-01	8.34E-01	0.75%
2-methylphenol	1.25E-02	5.00E-02	2.50E-01	0.23%
4-methylphenol	2.33E-02	5.00E-02	4.66E-01	0.42%
Naphthalene	1.90E-02	4.00E-02	4.75E-01	0.43%
<i>o</i> -Toluic acid	7.15E+01	3.00E+00	2.38E+01	21.54%
<i>m</i> -Toluic acid	4.48E+01	3.00E+00	1.49E+01	13.49%
<i>p</i> -Toluic acid	5.60E+01	3.00E+00	1.87E+01	16.86%
Total			8.29E+01	

MATRIX: Deep Bedrock Groundwater (On-Site Case) - Round 1 Data

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
Acetone	1.10E-02	1.00E-01	1.10E-01	1.83%
1,2-Dichloroethene	3.02E-02	2.00E-02	1.51E+00	25.18%
Tetrachloroethene	5.10E-03	1.00E-02	5.10E-01	8.50%
Toluene	9.10E-03	2.00E-01	4.55E-02	0.76%
Ethyl benzene	2.60E-03	1.00E-01	2.60E-02	0.43%
Xylenes	1.76E-01	2.00E+00	8.82E-02	1.47%
Phenol	1.02E-02	6.00E-01	1.70E-02	0.28%
2-methylphenol	5.60E-03	5.00E-02	1.12E-01	1.87%
4-methylphenol	6.20E-03	5.00E-02	1.24E-01	2.07%
Benzoic acid	4.05E-02	4.00E+00	1.01E-02	0.17%
<i>o</i> -Toluic acid	6.74E+00	3.00E+00	2.25E+00	37.46%
<i>m</i> -Toluic acid	3.20E+00	3.00E+00	1.07E+00	17.76%
<i>p</i> -Toluic acid	3.98E-01	3.00E+00	1.33E-01	2.21%
Total			6.00E+00	

MATRIX: Deep Bedrock Groundwater (On-Site Case) - Round 2 Data

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
Acetone	2.30E-02	1.00E-01	2.30E-01	3.01%
1,2-Dichloroethene	4.00E-03	2.00E-02	2.00E-01	2.62%
Tetrachloroethene	7.60E-03	1.00E-02	7.60E-01	9.95%
Toluene	4.00E-03	2.00E-01	2.00E-02	0.26%
Xylenes	1.44E-01	2.00E+00	7.22E-02	0.95%
Phenol	1.79E-02	6.00E-01	2.98E-02	0.39%
2-methylphenol	7.10E-03	5.00E-02	1.42E-01	1.86%
Pentachlorophenol	3.29E-02	3.00E-02	1.10E+00	14.36%
Naphthalene	1.00E-03	4.00E-02	2.50E-02	0.33%
<i>o</i> -Toluic acid	7.31E+00	3.00E+00	2.44E+00	31.89%
<i>m</i> -Toluic acid	7.31E+00	3.00E+00	2.44E+00	31.89%
<i>p</i> -Toluic acid	5.72E-01	3.00E+00	1.91E-01	2.50%
Total			7.64E+00	

MATRIX: Creek Seeps (Dermal contact) - Round 1 Data

Compound	UCL (mg/L)	RfD	Risk Factor	% Total RF
Acetone	4.03E-02	1.00E-01	4.03E-01	0.39%
1,2-Dichloroethene	4.49E-01	2.00E-02	2.24E+01	21.49%
Tetrachloroethene	3.78E-01	1.00E-02	3.78E+01	36.24%
Toluene	3.89E-02	2.00E-01	1.94E-01	0.19%
Xylenes	5.55E-01	2.00E+00	2.77E-01	0.27%
Phenol	6.38E-02	6.00E-01	1.06E-01	0.10%
2-methylphenol	1.41E-02	5.00E-02	2.82E-01	0.27%
4-methylphenol	9.50E-03	5.00E-02	1.90E-01	0.18%
Naphthalene	2.00E-03	4.00E-02	5.00E-02	0.05%
<i>o</i> -Toluic acid	7.46E+01	3.00E+00	2.49E+01	23.81%
<i>m</i> -Toluic acid	4.15E+01	3.00E+00	1.38E+01	13.25%
<i>p</i> -Toluic acid	1.18E+01	3.00E+00	3.94E+00	3.77%
Total			1.04E+02	

TABLE H-4. RISK FACTOR CALCULATIONS FOR SELECTION OF
INORGANIC CONTAMINANTS OF CONCERN
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

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MATRIX: North Area Soils

Analyte	UCL (mg/kg)	RfD	Risk Factor	% Total RF
Arsenic	1.49E+01	3.00E-04	4.97E+04	41.05%
Barium	5.01E+02	7.00E-02	7.16E+03	5.92%
Beryllium	5.90E-01	5.00E-03	1.18E+02	0.10%
Cadmium	1.12E+01	5.00E-04	2.24E+04	18.52%
Chromium	6.51E+01	1.00E+00	6.51E+01	0.05%
Mercury	6.80E+00	3.00E-04	2.27E+04	18.74%
Nickel	6.10E+01	5.00E-02	1.22E+03	1.01%
Thallium	2.20E-01	8.00E-05	2.75E+03	2.27%
Vanadium	1.87E+01	7.00E-03	2.67E+03	2.21%
Zinc	3.68E+03	3.00E-01	1.23E+04	10.14%
Total			1.21E+05	

MATRIX: Landfill Perimeter Soils

Analyte	UCL (mg/kg)	RfD	Risk Factor	% Total RF
Arsenic	5.40E+00	3.00E-04	1.80E+04	55.40%
Barium	8.86E+01	7.00E-02	1.27E+03	3.90%
Beryllium	7.20E-01	5.00E-03	1.44E+02	0.44%
Cadmium	5.00E+00	5.00E-04	1.00E+04	30.78%
Chromium	2.09E+01	1.00E+00	2.09E+01	0.06%
Mercury	1.20E-01	3.00E-04	4.00E+02	1.23%
Nickel	3.17E+01	5.00E-02	6.34E+02	1.95%
Thallium	1.60E-01	8.00E-05	2.00E+03	6.16%
Vanadium	1.99E-01	7.00E-03	2.84E+01	0.09%
Zinc	R			
Total			3.25E+04	

MATRIX: Creek Seeps - Round 1 Data

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	1.34E-01	3.00E-04	4.46E+02	88.25%
Barium	3.66E-01	7.00E-02	5.23E+00	1.03%
Beryllium	1.30E-03	5.00E-03	2.60E-01	0.05%
Cadmium	6.50E-03	5.00E-04	1.30E+01	2.57%
Chromium	7.13E-02	1.00E+00	7.13E-02	0.01%
Mercury	1.20E-03	3.00E-04	4.00E+00	0.79%
Nickel	1.85E-01	5.00E-02	3.70E+00	0.73%
Thallium	1.10E-03	8.00E-05	1.38E+01	2.72%
Vanadium	1.31E-01	7.00E-03	1.87E+01	3.70%
Zinc	1.95E-01	3.00E-01	6.51E-01	0.13%
Total			5.05E+02	

MATRIX: Stream Sediments - Round 1 Data

Analyte	UCL (mg/kg)	RfD	Risk Factor	% Total RF
Arsenic	3.10E+00	3.00E-04	1.03E+04	60.12%
Barium	8.20E+01	7.00E-02	1.17E+03	6.82%
Beryllium	3.10E-01	5.00E-03	6.20E+01	0.36%
Cadmium	1.80E+00	5.00E-04	3.60E+03	20.95%
Chromium	1.11E+01	1.00E+00	1.11E+01	0.06%
Nickel	1.99E+01	5.00E-02	3.98E+02	2.32%
Vanadium	8.40E+00	7.00E-03	1.20E+03	6.98%
Zinc	1.24E+02	3.00E-01	4.12E+02	2.40%
Total			1.72E+04	

MATRIX: Stream Sediments - Round 2 Data

Analyte	UCL (mg/kg)	RfD	Risk Factor	% Total RF
Arsenic	5.10E+00	3.00E-04	1.70E+04	65.20%
Barium	1.41E+02	7.00E-02	2.01E+03	7.70%
Beryllium	3.10E-01	5.00E-03	6.20E+01	0.24%
Cadmium	2.20E+00	5.00E-04	4.40E+03	16.88%
Chromium	2.29E+01	1.00E+00	2.29E+01	0.09%
Nickel	3.32E+01	5.00E-02	6.64E+02	2.55%
Vanadium	9.00E+00	7.00E-03	1.29E+03	4.93%
Zinc	1.89E+02	3.00E-01	6.30E+02	2.42%
Total			2.61E+04	

MATRIX: Surface Water - Round 1 Data

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	1.00E-03	3.00E-04	3.33E+00	71.72%
Barium	9.00E-02	7.00E-02	1.29E+00	27.67%
Zinc	8.50E-03	3.00E-01	2.83E-02	0.61%
Total			4.65E+00	

MATRIX: Surface Water - Round 1 Data

No compounds detected with reference doses.

MATRIX: Inorganic Sludge Basin Wells

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	6.00E-03	3.00E-04	2.00E+01	90.12%
Barium	8.89E-02	7.00E-02	1.27E+00	5.72%
Nickel	3.62E-02	5.00E-02	7.24E-01	3.26%
Zinc	5.94E-02	3.00E-01	1.98E-01	0.89%
Total			2.22E+01	

MATRIX: Deep Bedrock Groundwater (Off-site case) - Round 2 Data, only

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	1.42E-01	3.00E-04	4.74E+02	95.33%
Barium	1.91E-01	7.00E-02	2.73E+00	0.55%
Cadmium	8.80E-03	5.00E-04	1.76E+01	3.54%
Chromium	3.25E-02	1.00E+00	3.25E-02	0.01%
Mercury	3.50E-04	3.00E-04	1.17E+00	0.23%
Nickel	6.55E-02	5.00E-02	1.31E+00	0.26%
Zinc	9.93E-02	3.00E-01	3.31E-01	0.07%
Cyanide	1.17E-02	3.00E-01	3.90E-02	0.01%
Total			4.98E+02	

MATRIX: Upper Bedrock Groundwater (Off-site case) - Round 2 Data, only

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	7.78E-02	3.00E-04	2.59E+02	86.92%
Barium	3.80E-01	7.00E-02	5.43E+00	1.82%
Beryllium	1.50E-03	5.00E-03	3.00E-01	0.10%
Cadmium	6.80E-03	5.00E-04	1.36E+01	4.56%
Chromium	4.54E-02	1.00E+00	4.54E-02	0.02%
Nickel	1.22E-01	5.00E-02	2.45E+00	0.82%
Vanadium	1.06E-01	7.00E-03	1.52E+01	5.09%
Zinc	1.87E-01	3.00E-01	6.25E-01	0.21%
Cyanide	2.80E-02	2.00E-02	1.40E+00	0.47%
Total			2.98E+02	

MATRIX: Mixed Bedrock Groundwater (Off-site case) - Round 2 Data, only

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	1.08E-01	3.00E-04	3.61E+02	89.58%
Barium	3.85E-01	7.00E-02	5.50E+00	1.36%
Beryllium	1.50E-03	5.00E-03	3.00E-01	0.07%
Cadmium	8.70E-03	5.00E-04	1.74E+01	4.32%
Chromium	4.37E-02	1.00E+00	4.37E-02	0.01%
Nickel	1.12E-01	5.00E-02	2.23E+00	0.55%
Vanadium	1.02E-01	7.00E-03	1.46E+01	3.63%
Zinc	1.94E-01	3.00E-01	6.47E-01	0.16%
Cyanide	2.46E-02	2.00E-02	1.23E+00	0.31%
Total			4.03E+02	

MATRIX: Upper Bedrock Groundwater (On-site case) - Round 1 Data

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	1.49E-01	3.00E-04	4.97E+02	95.01%
Barium	1.88E-01	7.00E-02	2.68E+00	0.51%
Chromium	3.45E-02	1.00E+00	3.45E-02	0.01%
Mercury	4.00E-04	3.00E-04	1.33E+00	0.25%
Nickel	1.20E-01	5.00E-02	2.40E+00	0.46%
Vanadium	1.26E-01	7.00E-03	1.79E+01	3.43%
Zinc	3.70E-02	3.00E-01	1.23E-01	0.02%
Cyanide	3.21E-02	2.00E-02	1.60E+00	0.31%
Total			5.23E+02	

MATRIX: Upper Bedrock Groundwater (On-site case) - Round 2 Data

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	1.85E-01	3.00E-04	6.18E+02	96.16%
Barium	1.70E-01	7.00E-02	2.42E+00	0.38%
Beryllium	9.00E-04	5.00E-03	1.80E-01	0.03%
Cadmium	2.60E-03	5.00E-04	5.20E+00	0.81%
Chromium	3.13E-02	1.00E+00	3.13E-02	0.00%
Mercury	2.40E-04	3.00E-04	8.00E-01	0.12%
Nickel	1.54E-01	5.00E-02	3.08E+00	0.48%
Vanadium	8.37E-02	7.00E-03	1.20E+01	1.86%
Zinc	1.14E-01	3.00E-01	3.78E-01	0.06%
Cyanide	1.22E-02	2.00E-02	6.10E-01	0.09%
Total			6.43E+02	

MATRIX: Deep Bedrock Groundwater (On-site case) - Round 1 Data

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	3.98E-02	3.00E-04	1.33E+02	54.69%
Antimony	3.60E-02	4.00E-04	9.00E+01	37.10%
Barium	1.82E-01	7.00E-02	2.61E+00	1.07%
Chromium	7.20E-03	1.00E+00	7.20E-03	0.00%
Mercury	9.30E-04	3.00E-04	3.10E+00	1.28%
Nickel	4.94E-02	5.00E-02	9.88E-01	0.41%
Thallium	8.00E-04	8.00E-05	1.00E+01	4.12%
Vanadium	2.20E-02	7.00E-03	3.14E+00	1.30%
Zinc	1.69E-02	3.00E-01	5.63E-02	0.02%
Total			2.43E+02	

MATRIX: Deep Bedrock Groundwater (On-site case) - Round 2 Data

Analyte	UCL (mg/L)	RfD	Risk Factor	% Total RF
Arsenic	6.46E-02	3.00E-04	2.15E+02	91.29%
Antimony	2.20E-03	4.00E-04	5.50E+00	2.33%
Barium	1.34E-01	7.00E-02	1.91E+00	0.81%
Cadmium	5.10E-03	5.00E-04	1.02E+01	4.32%
Chromium	1.54E-02	1.00E+00	1.54E-02	0.01%
Mercury	2.10E-04	3.00E-04	7.00E-01	0.30%
Nickel	3.66E-02	5.00E-02	7.32E-01	0.31%
Vanadium	3.10E-03	7.00E-03	4.43E-01	0.19%
Zinc	8.16E-02	3.00E-01	2.72E-01	0.12%
Cyanide	1.55E-02	2.00E-02	7.75E-01	0.33%
Total			2.36E+02	

TABLE H-5 (cont)

p 2 of 3

NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE : Adults

Compound	Air Conc (mg/m ³) x Inhalation rate (m ³ /hr) x Hrs expd week x $\frac{1}{\text{Body weight (kg)}}$ x $\frac{\text{Yrs expd}}{\text{Yrs LT}}$ x $\frac{\text{Weeks expd}}{\text{Year}}$ = Averaged Daily Dose (mg/kg-day)									
	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	$\frac{\text{Weeks expd}}{\text{Year}}$	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Toluene	9.21E-09	0.83	7	70	0.129	19.0	1.87E-09	1.10E-01	1.70E-08	0.68%
Ethylbenzene	1.78E-08	0.83	7	70	0.129	19.0	3.63E-09	2.90E-01	1.25E-08	0.50%
Xylenes	1.86E-05	0.83	7	70	0.129	19.0	3.78E-06	2.00E+00	1.89E-06	75.98%
Dichloroethene	5.56E-08	0.83	7	70	0.129	19.0	1.13E-08	2.00E-02	5.66E-07	22.71%
1,1,1-trichloroethane	4.49E-09	0.83	7	70	0.129	19.0	9.13E-10	3.00E-01	3.04E-09	0.12%

HAZARD INDEX 2.49E-06

NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE : Child

Compound	Air Conc (mg/m ³) x Inhalation rate (m ³ /hr) x Hrs expd week x $\frac{1}{\text{Body weight (kg)}}$ x $\frac{\text{Yrs expd}}{\text{Yrs LT}}$ x $\frac{\text{Weeks expd}}{\text{Year}}$ = Averaged Daily Dose (mg/kg-day)									
	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	$\frac{\text{Weeks expd}}{\text{Year}}$	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Toluene	9.21E-09	0.9	21	35	0.129	19.0	1.22E-08	1.10E-01	1.11E-07	0.68%
Ethylbenzene	1.78E-08	0.9	21	35	0.129	19.0	2.36E-08	2.90E-01	8.14E-08	0.50%
Xylenes	1.86E-05	0.9	21	35	0.129	19.0	2.46E-05	2.00E+00	1.23E-05	75.98%
Dichloroethene	5.56E-08	0.9	21	35	0.129	19.0	7.36E-08	2.00E-02	3.68E-06	22.71%
1,1,1-trichloroethane	4.49E-09	0.9	21	35	0.129	19.0	5.94E-09	3.00E-01	1.98E-08	0.12%

HAZARD INDEX 1.62E-05

TABLE H-5 (cont)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Adults

Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	ADD	RfD	ADD/RfD	% TOTAL HAZARD
	Air Conc	x Inhalation rate	x Hrs expd week	x Body weight	x Yrs expd Yrs LT	x Weeks expd Year	= Averaged Daily Dose (mg/kg-day)			
	mg/m ³	x 1.25 m ³ /hr	x 7 hrs/wk	x 70	x 30	x 19 weeks Year	= ADD			
Toluene	2.62E-08	1.25	7	70	0.429	19.0	2.67E-08	1.10E-01	2.43E-07	0.14%
Ethylbenzene	7.31E-08	1.25	7	70	0.429	19.0	7.44E-08	2.90E-01	2.57E-07	0.14%
Xylenes	1.85E-04	1.25	7	70	0.429	19.0	1.89E-04	2.00E+00	9.43E-05	52.99%
Dichloroethene	1.63E-06	1.25	7	70	0.429	19.0	1.66E-06	2.00E-02	8.30E-05	46.69%
1,1,1-trichloroethane	2.00E-08	1.25	7	70	0.429	19.0	2.04E-08	3.00E-01	6.80E-08	0.04%

HAZARD INDEX 1.78E-04

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Child

Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	ADD	RfD	ADD/RfD	% TOTAL HAZARD
	Air Conc	x Inhalation rate	x Hrs expd week	x Body weight	x Yrs expd Yrs LT	x Weeks expd Year	= Averaged Daily Dose (mg/kg-day)			
	mg/m ³	x 1.25 m ³ /hr	x 21 hrs/wk	x 35	x 9	x 19 weeks Year	= ADD			
Toluene	2.62E-08	1.25	21	35	0.129	19.0	4.82E-08	1.10E-01	4.38E-07	0.14%
Ethylbenzene	7.31E-08	1.25	21	35	0.129	19.0	1.34E-07	2.90E-01	4.63E-07	0.14%
Xylenes	1.85E-04	1.25	21	35	0.129	19.0	3.40E-04	2.00E+00	1.70E-04	52.99%
Dichloroethene	1.63E-06	1.25	21	35	0.129	19.0	3.00E-06	2.00E-02	1.50E-04	46.69%
1,1,1-trichloroethane	2.00E-08	1.25	21	35	0.129	19.0	3.68E-08	3.00E-01	1.23E-07	0.04%

HAZARD INDEX 3.21E-04

TABLE H-6. DERMAL CONTACT WITH STREAM SEDIMENTS (PS-2)
PRESENT AND FUTURE USE SCENARIOS
ROUND 1 RESULTS

CARCINOGENS - AVERAGE SEDIMENT CONTACT EXPOSURE : Adults												p 1 of 3	
Compound	Sed Conc (mg/kg)	Skin Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Body Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	SF	RISK (SF*ADD)	% TOTAL RISK		
Tetrachloroethene	5.90E-03	2.90E+03	6.00E-03	0.5	70	0.041	0.129	3.89E-12	5.10E-02	1.98E-13	0.00%		
Total c-PAHs	7.14E+00	2.90E+03	6.00E-03	0.5	70	0.041	0.129	4.70E-09	7.30E+00	3.43E-08	100.00%		
TOTAL RISK										3.43E-08			
CARCINOGENS - MAXIMUM SEDIMENT CONTACT EXPOSURE : Adults													
Compound	Soil Conc (mg/kg)	Skin Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Body Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	SF	RISK (SF*ADD)	% TOTAL RISK		
Tetrachloroethene	9.80E-03	3.50E+03	1.20E-02	1.0	70	0.082	0.429	2.07E-10	5.10E-02	1.06E-11	0.00%		
Total c-PAHs	1.56E+01	3.50E+03	1.20E-02	1.0	70	0.082	0.429	3.31E-07	7.30E+00	2.41E-06	100.00%		
TOTAL RISK										2.41E-06			

TABLE H-6 (cont)

p 2 of 3

NONCARCINOGENS - AVERAGE SEDIMENT CONTACT EXPOSURE : Adults

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Tetrachloroethene	5.90E-03	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	3.87E-12	1.00E-02	3.87E-10	0.67%
Xylenes	5.90E-03	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	3.87E-12	2.00E+00	1.94E-12	0.00%
Fluoranthene	2.71E+00	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	1.78E-09	4.00E-02	4.44E-08	76.45%
Pyrene	3.60E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	2.36E-10	3.00E-02	7.88E-09	13.56%
Fluorene	3.30E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	2.17E-10	4.00E-02	5.42E-09	9.32%

HAZARD INDEX

5.81E-08

NONCARCINOGENS - MAXIMUM SEDIMENT CONTACT EXPOSURE : Adults

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Tetrachloroethene	2.80E+00	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.129	1.78E-08	1.00E-02	1.78E-06	92.58%
Xylenes	5.10E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.129	3.23E-09	2.00E+00	1.62E-09	0.08%
Fluoranthene	3.60E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.129	2.28E-09	4.00E-02	5.71E-08	2.98%
Pyrene	3.30E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.129	2.09E-09	3.00E-02	6.97E-08	3.64%
Fluorene	8.80E-02	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.129	5.58E-10	4.00E-02	1.39E-08	0.73%

HAZARD INDEX

1.92E-06

TABLE H-6 (cont)

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NONCARCINOGENS - AVERAGE SEDIMENT CONTACT EXPOSURE : Child

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
								1 kg 1e6 mg	-ADD		
	mg/kg	x 3,300 cm ²	x 6e-3	x 0.5 mg/cm ²	x 1	x 15 days 365 days	x 9 70	x 1 kg 1E6 mg	-ADD		
Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Tetrachloroethene	5.90E-03	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	4.38E-12	1.00E-02	4.38E-10	0.75%
Xylenes	5.90E-03	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	4.38E-12	2.00E+00	2.19E-12	0.00%
Fluoranthene	2.71E+00	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	2.01E-09	4.00E-02	5.02E-08	86.46%
Pyrene	3.60E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	2.67E-10	3.00E-02	8.91E-09	15.34%
Fluorene	3.30E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	2.45E-10	4.00E-02	6.13E-09	10.54%

HAZARD INDEX 6.57E-08

NONCARCINOGENS - MAXIMUM SEDIMENT CONTACT EXPOSURE : Child

								1 kg 1e6 mg	-ADD		
	mg/kg	x 3,920 cm ²	x 1.2e-2	x 1.0 mg/cm ²	x 1	x 60 days 365 days	x 9 70	x 1 kg 1E6 mg	-ADD		
Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Tetrachloroethene	2.80E+00	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	7.95E-08	1.00E-01	7.95E-07	41.47%
Xylenes	5.10E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	1.45E-08	4.00E-02	3.62E-07	18.89%
Fluoranthene	3.60E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	1.02E-08	3.00E-02	3.41E-07	17.77%
Pyrene	3.30E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	9.37E-09	4.00E-02	2.34E-07	12.22%
Fluorene	8.80E-02	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	2.50E-09	2.00E-02	1.25E-07	6.52%

HAZARD INDEX 1.86E-06

TABLE H-7. DERMAL CONTACT WITH STREAM SEDIMENTS (PS-2)
PRESENT AND FUTURE USE SCENARIOS
ROUND 2 RESULTS

CARCINOGENS - AVERAGE SEDIMENT CONTACT EXPOSURE : Adults															p 1 of 3	
Sed Conc	x	Skin Surf area	x	Bioavail factor	x	Skin Deposition	x	1 Body wt	x	Days expd Days/yr	x	Yrs Expd Yrs LT	x	1 kg 1e6 mg	=ADD	
mg/kg	x	2,900 cm ²	x	6e-3	x	0.5 mg/cm ²	x	1 70	x	15 days 365 days	x	9 70	x	1 kg 1E6 mg	=ADD	
Compound	Sed Conc (mg/kg)	Skin Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Body Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	SF	RISK (SF*ADD)	% TOTAL RISK					
Vinyl chloride	8.30E-03	2.90E+03	6.00E-03	0.5	70	0.041	0.129	5.47E-12	1.90E+00	1.04E-11	0.15%					
Carbazole	1.60E-01	2.90E+03	6.00E-03	0.5	70	0.041	0.129	1.05E-10	2.00E-02	2.11E-12	0.03%					
Total c-PAHs	1.47E+00	2.90E+03	6.00E-03	0.5	70	0.041	0.129	9.67E-10	7.30E+00	7.06E-09	99.82%					
										TOTAL RISK 7.07E-09						
CARCINOGENS - MAXIMUM SEDIMENT CONTACT EXPOSURE : Adults																
Soil Conc	x	Skin Surf area	x	Bioavail factor	x	Skin Deposition	x	1 Body wt	x	Days expd Days/yr	x	Yrs Expd Yrs LT	x	1 kg 1e6 mg	=ADD	
mg/kg	x	3,500 cm ²	x	1.2E-2	x	1.0 mg/cm ²	x	1 70	x	30 days 365 days	x	30 70	x	1 kg 1E6 mg	=ADD	
Compound	Soil Conc (mg/kg)	Skin Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Body Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	SF	RISK (SF*ADD)	% TOTAL RISK					
Vinyl chloride	9.90E-03	3.50E+03	1.20E-02	1.0	70	0.082	0.429	2.09E-10	1.90E+00	3.98E-10	0.09%					
Carbazole	1.60E-01	3.50E+03	1.20E-02	1.0	70	0.082	0.429	3.38E-09	2.00E-02	6.76E-11	0.02%					
Total c-PAHs	2.72E+00	3.50E+03	1.20E-02	1.0	70	0.082	0.429	5.76E-08	7.30E+00	4.21E-07	99.89%					
										TOTAL RISK 4.21E-07						

TABLE H-7 (cont)

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NONCARCINOGENS - AVERAGE SEDIMENT CONTACT EXPOSURE : Adults

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	1.00E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	6.59E-11	1.00E-01	6.59E-10	1.96%
1,2-Dichloroethene	2.26E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	1.48E-10	2.00E-02	7.42E-09	22.10%
2-Merthylphenol	2.00E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	1.31E-10	5.00E-02	2.63E-09	7.82%
Naphthalene	8.60E-02	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	5.65E-11	4.00E-02	1.41E-09	4.21%
Fluorene	1.40E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	9.19E-11	4.00E-02	2.30E-09	6.85%
Fluoranthene	5.52E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	3.62E-10	4.00E-02	9.06E-09	26.99%
Pyrene	4.52E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	2.97E-10	3.00E-02	9.89E-09	29.47%
o-Toluic acid	6.30E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	4.14E-10	3.00E+00	1.38E-10	0.41%
m-Toluic acid	2.40E-01	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	1.58E-10	3.00E+00	5.25E-11	0.16%
p-Toluic acid	4.20E-02	2.90E+03	6.00E-03	5.00E-01	70	0.041	0.129	2.76E-11	3.00E+00	9.19E-12	0.03%

HAZARD INDEX

3.36E-08

NONCARCINOGENS - MAXIMUM SEDIMENT CONTACT EXPOSURE : Adults

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	CD/RfD	% TOTAL HAZARD
Acetone	1.94E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	4.10E-09	1.00E-01	4.10E-08	2.07%
1,2-Dichloroethene	5.65E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	1.19E-08	2.00E-02	5.97E-07	30.15%
2-Merthylphenol	2.00E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	4.23E-09	5.00E-02	8.45E-08	4.27%
Naphthalene	8.60E-02	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	1.82E-09	4.00E-02	4.54E-08	2.29%
Fluorene	1.40E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	2.96E-09	4.00E-02	7.40E-08	3.74%
Fluoranthene	1.04E+00	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	2.20E-08	4.00E-02	5.50E-07	27.77%
Pyrene	8.26E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	1.75E-08	3.00E-02	5.82E-07	29.38%
o-Toluic acid	6.30E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	1.33E-08	3.00E+00	4.44E-09	0.22%
m-Toluic acid	2.40E-01	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	5.07E-09	3.00E+00	1.69E-09	0.09%
p-Toluic acid	4.20E-02	3.50E+03	1.20E-02	1.00E+00	70	0.082	0.429	8.88E-10	3.00E+00	2.96E-10	0.01%

HAZARD INDEX

1.98E-06

TABLE H-7 (cont)

p 3 of 3

NONCARCINOGENS - AVERAGE SEDIMENT CONTACT EXPOSURE : Child

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	1.00E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	7.46E-11	1.00E-01	7.46E-10	2.22%
1,2-Dichloroethene	2.26E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	1.68E-10	2.00E-02	8.39E-09	25.00%
2-Merthylphenol	2.00E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	1.49E-10	5.00E-02	2.97E-09	8.85%
Naphthalene	8.60E-02	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	6.39E-11	4.00E-02	1.60E-09	4.76%
Fluorene	1.40E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	1.04E-10	4.00E-02	2.60E-09	7.74%
Fluoranthene	5.52E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	4.10E-10	4.00E-02	1.02E-08	30.53%
Pyrene	4.52E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	3.36E-10	3.00E-02	1.12E-08	33.33%
o-Toluic acid	6.30E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	4.68E-10	3.00E+00	1.56E-10	0.46%
m-Toluic acid	2.40E-01	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	1.78E-10	3.00E+00	5.94E-11	0.18%
p-Toluic acid	4.20E-02	3.28E+03	6.00E-03	5.00E-01	70	0.041	0.129	3.12E-11	3.00E+00	1.04E-11	0.03%

HAZARD INDEX

3.80E-08

NONCARCINOGENS - MAXIMUM SEDIMENT CONTACT EXPOSURE : Child

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	1.94E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	5.52E-09	1.00E-01	5.52E-08	2.79%
1,2-Dichloroethene	5.65E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	1.60E-08	2.00E-02	8.02E-07	40.52%
2-Merthylphenol	2.00E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	5.68E-09	5.00E-02	1.14E-07	5.74%
Naphthalene	8.60E-02	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	2.44E-09	4.00E-02	6.11E-08	3.08%
Fluorene	1.40E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	3.98E-09	4.00E-02	9.94E-08	5.02%
Fluoranthene	1.04E+00	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	2.96E-08	4.00E-02	7.39E-07	37.33%
Pyrene	8.26E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	2.35E-08	3.00E-02	7.82E-07	39.49%
o-Toluic acid	6.30E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	1.79E-08	3.00E+00	5.97E-09	0.30%
m-Toluic acid	2.40E-01	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	6.82E-09	3.00E+00	2.27E-09	0.11%
p-Toluic acid	4.20E-02	3.92E+03	1.20E-02	1.00E+00	35	0.164	0.129	1.19E-09	3.00E+00	3.98E-10	0.02%

HAZARD INDEX

2.66E-06

**TABLE H-8. DERMAL CONTACT WITH CREEK SEEPS - Hunter/Fisherman Exposure
PRESENT-USE SCENARIO - Round 1 data**

CARCINOGENIC COMPOUNDS IN CREEK SEEPS - AVERAGE DERMAL CONTACT: Adults													
	Seep Conc	Dermal Permability	Hrs exp day	Days exp year	x	Yrs exp Yrs lifetime	Skin Surface area	x	1 Body wt	1 liter 1000 cm ³	= CDI		
	mg/L	x cm/hr	x 2 hrs day	x 15 days year	x	x 9 yrs 70 yrs	x 2,900 cm ²	x	x 1/70 kg	x 1/1000	= CDI		
Compound	Water Conc (mg/L)	Dermal Permability (cm/hr)	Hrs exp day	Days exp year		Yrs exp Yrs lifetime	Skin Surface Area (cm ²)		Body wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene Tetrachloroethene Total c-PAHs	1.16E-01	8.00E-04	2	15		0.129	2,900		70	1.48E-05	1.10E-02	1.63E-07	0.81%
	1.76E-01	8.00E-04	2	15		0.129	2,900		70	2.26E-05	5.10E-02	1.15E-06	5.68%
	2.03E-02	8.00E-04	2	15		0.129	2,900		70	2.60E-06	7.30E+00	1.89E-05	93.52%
											TOTAL RISK	2.03E-05	

CARCINOGENIC COMPOUNDS IN CREEK SEEPS - AVERAGE DERMAL CONTACT: Adults												
Compound	Seep Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area x	1 Body wt	1 liter 1000 cm ³	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene Tetrachloroethene Total c-PAHs	3.80E-01	8.00E-04	8	30	0.429	3,500	70	1.56E-03	1.10E-02	1.72E-05	0.81%	
	5.60E-01	8.00E-04	8	30	0.429	3,500	70	2.30E-03	5.10E-02	1.18E-04	5.55%	
	6.60E-02	8.00E-04	8	30	0.429	3,500	70	2.72E-04	7.30E+00	1.98E-03	93.64%	
TOTAL RISK											2.12E-03	

TABLE H-8. (Continued)

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NONCARCINOGENIC COMPOUNDS IN CREEK SEEPS - AVERAGE DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	2.49E-01	8.00E-04	2	15	0.129	2,600	70	2.85E-05	2.00E-02	1.43E-03	11.05%
Tetrachloroethene	1.76E-01	8.00E-04	2	15	0.129	2,600	70	2.02E-05	1.00E-02	2.02E-03	15.66%
o-Toluic acid	1.51E+02	8.00E-04	2	15	0.129	2,600	70	1.73E-02	3.00E+00	5.76E-03	44.62%
m-Toluic acid	7.52E+01	8.00E-04	2	15	0.129	2,600	70	8.62E-03	3.00E+00	2.87E-03	22.25%
p-Toluic acid	2.17E+01	8.00E-04	2	15	0.129	2,600	70	2.49E-03	3.00E+00	8.28E-04	6.42%

HAZ INDEX 1.29E-02

NONCARCINOGENIC COMPOUNDS IN CREEK SEEPS - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	8.80E-01	8.00E-04	8	30	0.429	3,500	70	3.62E-03	2.00E-02	1.81E-01	11.93%
Tetrachloroethene	5.60E-01	8.00E-04	8	30	0.429	3,500	70	2.30E-03	1.00E-02	2.30E-01	15.19%
o-Toluic acid	4.85E+02	8.00E-04	8	30	0.429	3,500	70	2.00E+00	3.00E+00	6.65E-01	43.86%
m-Toluic acid	2.50E+02	8.00E-04	8	30	0.429	3,500	70	1.03E+00	3.00E+00	3.43E-01	22.60%
p-Toluic acid	7.10E+01	8.00E-04	8	30	0.429	3,500	70	2.92E-01	3.00E+00	9.74E-02	6.42%

HAZ INDEX 1.52E+00

TABLE H-9. INCIDENTAL INGESTION OF CONTAMINATED STREAM SEDIMENTS (PS-4)
PRESENT- AND FUTURE-USE SCENARIO - ROUND 1 DATA

CARCINOGENS - AVERAGE SEDIMENT INGESTION EXPOSURE

Group	Compound	Conc (mg/kg)	Soil Conc mg/kg	x	Intake rate (mg/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs lifetime	=	Average Daily Dose (mg/kg-day)	RISK (CDI*SF)	% TOTAL RISK
				x	100 mg day	x	0.15	x	1 70 kg	x	15 days year	x	9 yrs 70 yrs	=	ADD		
Adults	Total c-PAHs	7.14E+00	100				0.15		70		15		0.129		2.96E-06	7.30E+00	2.16E-05
	Tetrachloroethene	5.90E-03	100				0.15		70		15		0.129		2.45E-09	5.10E-02	1.25E-10
																TOTAL RISK	
																2.16E-05	

CARCINOGENS - PLAUSIBLE MAXIMUM SEDIMENT EXPOSURE: Adults

Group	Compound	Conc (mg/kg)	Soil Conc mg/kg	x	Intake rate (mg/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs lifetime	=	Average Daily Dose (mg/kg-day)	RISK (CDI*SF)	% TOTAL RISK
				x	480 mg/day	x	0.15	x	1 70 kg	x	30 days year	x	30 yrs 70 yrs	=	ADD		
Adults	Total c-PAHs	1.56E+01	480				0.15		70		30		0.429		2.07E-04	7.30E+00	1.51E-03
	Tetrachloroethene	9.80E-03	480				0.15		70		30		0.429		1.30E-07	5.10E-02	6.61E-09
																TOTAL RISK	
																1.51E-03	

TABLE H-9 (Continued)

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NONCARCINOGENS - AVERAGE SEDIMENT INGESTION EXPOSURE; Adult

Group	Compound	Conc (mg/kg)	Soil Conc	x	Intake rate (mg/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs lifetime}}$	= Average Daily Dose (mg/kg-day)	% TOTAL RISK	
		mg/kg	x	$100 \frac{\text{mg}}{\text{day}}$	x	0.15	x	$\frac{1}{70 \text{ kg}}$	x	$\frac{15 \text{ days}}{\text{year}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	= ADD			
Adults	Tetrachloroethene	5.90E-03		100		0.15		70		15		0.129	2.45E-09	1.00E-02	2.45E-07	0.08%
	Naphthalene	1.10E+00		100		0.15		70		15		0.129	4.56E-07	4.00E-02	1.14E-05	3.53%
	Fluorene	1.51E+00		100		0.15		70		15		0.129	6.28E-07	4.00E-02	1.57E-05	4.86%
	Anthracene	1.43E+00		100		0.15		70		15		0.129	5.92E-07	3.00E-01	1.97E-06	0.61%
	Pyrene	3.68E+00		100		0.15		70		15		0.129	1.52E-06	3.00E-02	5.08E-05	15.71%
	Arsenic	2.50E+00		100		0.0075		70		15		0.129	5.18E-08	3.00E-04	1.73E-04	53.42%
	Cadmium	1.70E+00		100		0.0075		70		15		0.129	3.52E-08	5.00E-04	7.05E-05	21.80%

TOTAL HAZARD INDEX 3.23E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM SEDIMENT INGESTION EXPOSURE; Adult

		Soil Conc	x	Intake rate (mg/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs lifetime}}$	= Average Daily Dose (mg/kg-day)		% TOTAL RISK	
Group	Compound	Conc (mg/kg)		(mg/day)		Fraction absorbed		Body wt (kg)		$\frac{\text{Days expd}}{\text{Year}}$		$\frac{\text{Yrs expd}}{\text{Yrs lifetime}}$	ADD	RfD		ADD/RfD
Adults	Tetrachloroethene	9.80E-03		480		0.15		70		30		0.429	1.30E-07	1.00E-02	1.30E-05	0.09%
	Naphthalene	1.10E+00		480		0.15		70		30		0.429	1.45E-05	4.00E-02	3.64E-04	2.60%
	Fluorene	2.19E+00		480		0.15		70		30		0.429	2.89E-05	4.00E-02	7.23E-04	5.17%
	Anthracene	2.39E+00		480		0.15		70		30		0.429	3.16E-05	3.00E-01	1.05E-04	0.75%
	Pyrene	8.09E+00		480		0.15		70		30		0.429	1.07E-04	3.00E-02	3.56E-03	25.49%
	Arsenic	3.10E+00		480		0.0075		70		30		0.429	2.05E-06	3.00E-04	6.83E-03	48.86%
	Cadmium	1.80E+00		480		0.0075		70		30		0.429	1.19E-06	5.00E-04	2.38E-03	17.02%

TOTAL HAZARD INDEX 1.40E-02

TABLE H-9 (Continued)

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NONCARCINOGENS - AVERAGE SEDIMENT INGESTION EXPOSURE; Child

= Average Daily Dose (mg/kg-day)											
Soil Conc	x	Intake rate (mg/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs lifetime}}$	
mg/kg	x	$\frac{200 \text{ mg}}{\text{day}}$	x	0.15	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{30 \text{ days}}{\text{year}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	
= ADD											
Group	Compound	Conc (mg/kg)	(mg/day)	Fraction absorbed	Body wt (kg)	$\frac{\text{Days expd}}{\text{Year}}$	$\frac{\text{Yrs expd}}{\text{Yrs lifetime}}$	ADD	RfD	ADD/RfD	% TOTAL RISK
Child	Tetrachloroethene	5.90E-03	200	0.15	35	30	0.129	1.96E-08	1.00E-02	1.96E-06	0.08%
	Naphthalene	1.10E+00	200	0.15	35	30	0.129	3.65E-06	4.00E-02	9.12E-05	3.53%
	Fluorene	1.51E+00	200	0.15	35	30	0.129	5.03E-06	4.00E-02	1.26E-04	4.86%
	Anthracene	1.43E+00	200	0.15	35	30	0.129	4.73E-06	3.00E-01	1.58E-05	0.61%
	Pyrene	3.68E+00	200	0.15	35	30	0.129	1.22E-05	3.00E-02	4.06E-04	15.71%
	Arsenic	2.50E+00	200	0.0075	35	30	0.129	4.15E-07	3.00E-04	1.38E-03	53.42%
	Cadmium	1.70E+00	200	0.0075	35	30	0.129	2.82E-07	5.00E-04	5.64E-04	21.80%

TOTAL HAZARD INDEX 2.59E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM SEDIMENT INGESTION EXPOSURE; Child

		Soil Conc	x	Intake rate (mg/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs lifetime}}$	= Average Daily Dose (mg/kg-day)		% TOTAL RISK	
Group	Compound	Conc (mg/kg)		(mg/day)		Fraction absorbed		Body wt (kg)		$\frac{\text{Days expd}}{\text{Year}}$		$\frac{\text{Yrs expd}}{\text{Yrs lifetime}}$	ADD	ADD/RfD		
Adults	Tetrachloroethene	9.80E-03		800		0.15		35		60		0.129	2.59E-07	1.00E-02	2.59E-05	0.19%
	Naphthalene	1.10E+00		800		0.15		35		60		0.129	2.91E-05	4.00E-02	7.27E-04	5.20%
	Fluorene	2.19E+00		800		0.15		35		60		0.129	5.79E-05	4.00E-02	1.45E-03	10.35%
	Anthracene	2.39E+00		800		0.15		35		60		0.129	6.32E-05	3.00E-01	2.11E-04	1.51%
	Pyrene	8.09E+00		800		0.15		35		60		0.129	2.14E-04	3.00E-02	7.13E-03	50.98%
	Arsenic	3.10E+00		800		0.0075		35		60		0.129	4.10E-06	3.00E-04	1.37E-02	97.73%
	Cadmium	1.80E+00		800		0.0075		35		60		0.129	2.38E-06	5.00E-04	4.76E-03	34.05%

TOTAL HAZARD INDEX 2.80E-02

TABLE H-10. INCIDENTAL INGESTION OF CONTAMINATED STREAM SEDIMENTS (PS-4)
PRESENT- AND FUTURE-USE SCENARIO - ROUND 2 DATA

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CARCINOGENS - AVERAGE SEDIMENT INGESTION EXPOSURE

Group	Compound	Soil Conc (mg/kg)	Intake rate (mg/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs lifetime	Average Daily Dose (mg/kg-day)	ADD	SF	RISK (CDI*SF)	% TOTAL RISK
		mg/kg	x 100 mg day	x 0.15	x 1 70 kg	x 15 days year	x 9 yrs 70 yrs	= ADD				
Adults	Vinyl chloride	8.30E-03	100	0.15	70	15	0.129	3.44E-09	3.44E-09	1.90E+00	6.54E-09	0.15%
	Carbazole	1.60E-01	100	0.15	70	15	0.129	6.63E-08	6.63E-08	2.00E-02	1.33E-09	0.03%
	Total c-PAHs	1.47E+00	100	0.15	70	15	0.129	6.08E-07	6.08E-07	7.30E+00	4.44E-06	99.82%
										TOTAL RISK 4.45E-06		

CARCINOGENS - PLAUSIBLE MAXIMUM SEDIMENT EXPOSURE: Adults

Group	Compound	Soil Conc (mg/kg)	Intake rate (mg/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs lifetime	Average Daily Dose (mg/kg-day)	ADD	SF	RISK (CDI*SF)	% TOTAL RISK
		mg/kg	x 480 mg/day	x 0.15	x 1 70 kg	x 30 days year	x 30 yrs 70 yrs	= ADD				
Adults	Vinyl chloride	9.90E-03	480	0.15	70	30	0.429	1.31E-07	1.31E-07	1.90E+00	2.49E-07	0.09%
	Carbazole	1.60E-01	480	0.15	70	30	0.429	2.12E-06	2.12E-06	2.00E-02	4.23E-08	0.02%
	Total c-PAHs	2.72E+00	480	0.15	70	30	0.429	3.60E-05	3.60E-05	7.30E+00	2.63E-04	99.89%
										TOTAL RISK 2.63E-04		

TABLE H-10 (Continued)

- Average Daily Dose (mg/kg-day)

TOTAL HAZARD INDEX	3.69E-04

= Average Daily Dose (mg/kg-day)

TOTAL HAZARD INDEX 1.54E-02

TABLE H-10 (Continued)

NONCARCINOGENS - AVERAGE SEDIMENT INGESTION EXPOSURE; Child

Group	Compound	Conc (mg/kg)	Soil Conc	x	Intake rate (mg/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs lifetime	=	Average Daily Dose (mg/kg-day)	% TOTAL RISK
			mg/kg	x	200 mg day	x	0.15	x	1 35 kg	x	30 days year	x	9 yrs 70 yrs	=	ADD	
Child	Compound	Conc (mg/kg)	Soil Conc	x	Intake rate (mg/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs lifetime	=	ADD	% TOTAL RISK
	Acetone	1.00E-01	200	x	200	x	0.15	x	35	x	30	x	0.129	=	3.33E-07	0.11%
	1,2-Dichloroethene	2.26E-01	200	x	200	x	0.15	x	35	x	30	x	0.129	=	7.50E-07	1.27%
	2-Methylphenol	2.54E-01	200	x	200	x	0.15	x	35	x	30	x	0.129	=	8.43E-07	0.57%
	Naphthalene	8.60E-03	200	x	200	x	0.15	x	35	x	30	x	0.129	=	2.85E-08	0.02%
	Flourene	1.40E-01	200	x	200	x	0.15	x	35	x	30	x	0.129	=	4.64E-07	0.39%
	Flouoranthene	5.52E-01	200	x	200	x	0.15	x	35	x	30	x	0.129	=	1.83E-06	1.55%
	Pyrene	4.52E-01	200	x	200	x	0.15	x	35	x	30	x	0.129	=	1.50E-06	1.69%
	o-Toluiic acid	6.30E-01	200	x	200	x	0.15	x	35	x	30	x	0.129	=	2.09E-06	0.02%
	m-Toluiic acid	2.40E-01	200	x	200	x	0.15	x	35	x	30	x	0.129	=	7.96E-07	0.01%
	p-Toluiic acid	4.20E-02	200	x	200	x	0.0075	x	35	x	30	x	0.129	=	1.39E-07	0.00%
	Arsenic	3.90E+00	200	x	200	x	0.0075	x	35	x	30	x	0.129	=	6.47E-07	73.01%
	Cadmium	1.90E+00	200	x	200	x	0.0075	x	35	x	30	x	0.129	=	3.15E-07	21.34%

TOTAL HAZARD INDEX 2.95E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM SEDIMENT INGESTION EXPOSURE; Child

Group	Compound	Conc (mg/kg)	Soil Conc	x	Intake rate (mg/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs lifetime	=	Average Daily Dose (mg/kg-day)	% TOTAL RISK
			mg/kg	x	800 mg day	x	0.15	x	1 35 kg	x	60 days year	x	9 yrs 70 yrs	=	ADD	
Adults	Compound	Conc (mg/kg)	Soil Conc	x	Intake rate (mg/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs lifetime	=	ADD	% TOTAL RISK
	Acetone	1.94E-01	800	x	800	x	0.15	x	35	x	60	x	0.129	=	5.14E-06	0.33%
	1,2-Dichloroethene	5.65E-01	800	x	800	x	0.15	x	35	x	60	x	0.129	=	1.49E-05	4.86%
	2-Methylphenol	2.00E-01	800	x	800	x	0.15	x	35	x	60	x	0.129	=	5.29E-06	0.69%
	Naphthalene	8.60E-02	800	x	800	x	0.15	x	35	x	60	x	0.129	=	2.27E-06	0.37%
	Flourene	1.40E-01	800	x	800	x	0.15	x	35	x	60	x	0.129	=	3.70E-06	0.60%
	Flouoranthene	1.04E+00	800	x	800	x	0.15	x	35	x	60	x	0.129	=	2.75E-05	4.47%
	Pyrene	8.26E-01	800	x	800	x	0.15	x	35	x	60	x	0.129	=	2.18E-05	4.73%
	o-Toluiic acid	6.30E-01	800	x	800	x	0.15	x	35	x	60	x	0.129	=	1.67E-05	0.04%
	m-Toluiic acid	2.40E-01	800	x	800	x	0.15	x	35	x	60	x	0.129	=	6.35E-06	0.01%
	p-Toluiic acid	4.20E-02	800	x	800	x	0.0075	x	35	x	60	x	0.129	=	1.11E-06	0.00%
	Arsenic	5.10E+00	800	x	800	x	0.0075	x	35	x	60	x	0.129	=	6.74E-06	146.09%
	Cadmium	2.20E+00	800	x	800	x	0.0075	x	35	x	60	x	0.129	=	2.91E-06	37.81%

TOTAL HAZARD INDEX 3.08E-02

**TABLE H-11. CALCULATED AMBIENT AIR CONCENTRATIONS AT RECEPTOR POINT
FUTURE-USE - NONREMEDIAL CONSTRUCTION SCENARIO
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK**

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OFF-SITE RECEPTOR (Resident)

Mean emission rates - Landfill Perimeter Soil Borings

<u>Compound</u>	<u>Emission Rate (g/m²-sec)</u>	<u>Emission Rate (g/sec)</u>	<u>Mixing Ht (m)</u>	<u>Cross wind width (m)</u>	<u>Wind Velocity (m/sec)</u>	<u>Ambient Air Conc (g/m³)</u>	<u>Ambient Air Conc (ug/m³)</u>
Methylene chloride	6.82E-09	1.90E-07	88	152	4.4	6.46E-12	6.46E-06
Acetone	2.57E-10	7.17E-09	88	152	4.4	2.44E-13	2.44E-07
2-Butanone	1.52E-10	4.25E-09	88	152	4.4	1.44E-13	1.44E-07
Tetrachloroethene	3.13E-08	8.72E-07	88	152	4.4	2.96E-11	2.96E-05
Toluene	1.13E-08	3.15E-07	88	152	4.4	1.07E-11	1.07E-05
Ethylbenzene	8.44E-09	2.35E-07	88	152	4.4	7.99E-12	7.99E-06
Xylenes	2.08E-07	5.81E-06	88	152	4.4	1.97E-10	1.97E-04

UCL emission rates - Landfill Perimeter Soil Borings

<u>Compound</u>	<u>Emission Rate (g/m²-sec)</u>	<u>Emission Rate (g/sec)</u>	<u>Mixing Ht (m)</u>	<u>Cross wind width (m)</u>	<u>Wind Velocity (m/sec)</u>	<u>Ambient Air Conc (g/m³)</u>	<u>Ambient Air Conc (ug/m³)</u>
Methylene chloride	6.82E-09	1.90E-07	88	152	4.4	6.46E-12	6.46E-06
Acetone	3.99E-10	1.11E-08	88	152	4.4	3.78E-13	3.78E-07
2-Butanone	2.04E-10	5.70E-09	88	152	4.4	1.94E-13	1.94E-07
Tetrachloroethene	3.13E-08	8.72E-07	88	152	4.4	2.96E-11	2.96E-05
Toluene	1.20E-08	3.36E-07	88	152	4.4	1.14E-11	1.14E-05
Ethylbenzene	8.44E-09	2.35E-07	88	152	4.4	7.99E-12	7.99E-06
Xylenes	5.74E-07	1.60E-05	88	152	4.4	5.43E-10	5.43E-04

Mean emission rates - North Area Soils

<u>Compound</u>	<u>Emission Rate (g/m²-sec)</u>	<u>Emission Rate (g/sec)</u>	<u>Mixing Ht (m)</u>	<u>Cross wind width (m)</u>	<u>Wind Velocity (m/sec)</u>	<u>Ambient Air Conc (g/m³)</u>	<u>Ambient Air Conc (ug/m³)</u>
Acetone	2.34E-09	6.52E-08	88	152	4.4	2.22E-12	2.22E-06
1,1-Dichloroethane	1.68E-08	4.69E-07	88	152	4.4	1.59E-11	1.59E-05
1,2-Dichloroethene	5.08E-09	1.42E-07	88	152	4.4	4.81E-12	4.81E-06
2-Butanone	1.94E-09	5.39E-08	88	152	4.4	1.83E-12	1.83E-06
Benzene	1.90E-08	5.30E-07	88	152	4.4	1.80E-11	1.80E-05
Tetrachloroethene	7.82E-08	2.18E-06	88	152	4.4	7.41E-11	7.41E-05
Toluene	1.35E-07	3.76E-06	88	152	4.4	1.28E-10	1.28E-04
Xylenes	6.29E-04	1.75E-02	88	152	4.4	5.96E-07	5.96E-01

UCL emission rates - North Area Soils

<u>Compound</u>	<u>Emission Rate (g/m²-sec)</u>	<u>Emission Rate (g/sec)</u>	<u>Mixing Ht (m)</u>	<u>Cross wind width (m)</u>	<u>Wind Velocity (m/sec)</u>	<u>Ambient Air Conc (g/m³)</u>	<u>Ambient Air Conc (ug/m³)</u>
Acetone	2.34E-09	6.52E-08	88	152	4.4	2.22E-12	2.22E-06
1,1-Dichloroethane	1.68E-08	4.69E-07	88	152	4.4	1.59E-11	1.59E-05
1,2-Dichloroethene	5.08E-09	1.42E-07	88	152	4.4	4.81E-12	4.81E-06
2-Butanone	1.94E-09	5.39E-08	88	152	4.4	1.83E-12	1.83E-06
Benzene	1.90E-08	5.30E-07	88	152	4.4	1.80E-11	1.80E-05
Tetrachloroethene	7.82E-08	2.18E-06	88	152	4.4	7.41E-11	7.41E-05
Toluene	1.35E-07	3.76E-06	88	152	4.4	1.28E-10	1.28E-04
Xylenes	1.75E-03	4.87E-02	88	152	4.4	1.66E-06	1.66E+00

Notes:

Trench area assumed to be 2 ft by 150 ft (300 ft² or 28 m²)

TABLE H-11. (Continued)

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ON-SITE RECEPTOR (Worker)**Mean emission rates - Landfill Perimeter Soil Borings**

Compound	Emission Rate (g/m ² -sec)	Emission Rate (g/sec)	Mixing Ht (m)	Cross wind width (m)	Wind Velocity (m/sec)	Ambient Air Conc (g/m ³)	Ambient Air Conc (ug/m ³)
Methylene chloride	6.82E-09	1.90E-07	22.5	152	4.4	2.53E-11	2.53E-05
Acetone	2.57E-10	7.17E-09	22.5	152	4.4	9.53E-13	9.53E-07
2-Butanone	1.52E-10	4.25E-09	22.5	152	4.4	5.65E-13	5.65E-07
Tetrachloroethene	3.13E-08	8.72E-07	22.5	152	4.4	1.16E-10	1.16E-04
Toluene	1.13E-08	3.15E-07	22.5	152	4.4	4.19E-11	4.19E-05
Ethylbenzene	8.44E-09	2.35E-07	22.5	152	4.4	3.13E-11	3.13E-05
Xylenes	2.08E-07	5.81E-06	22.5	152	4.4	7.72E-10	7.72E-04

UCL emission rates - Landfill Perimeter Soil Borings

Compound	Emission Rate (g/m ² -sec)	Emission Rate (g/sec)	Mixing Ht (m)	Cross wind width (m)	Wind Velocity (m/sec)	Ambient Air Conc (g/m ³)	Ambient Air Conc (ug/m ³)
Methylene chloride	6.82E-09	1.90E-07	22.5	152	4.4	2.53E-11	2.53E-05
Acetone	3.99E-10	1.11E-08	22.5	152	4.4	1.48E-12	1.48E-06
2-Butanone	2.04E-10	5.70E-09	22.5	152	4.4	7.58E-13	7.58E-07
Tetrachloroethene	3.13E-08	8.72E-07	22.5	152	4.4	1.16E-10	1.16E-04
Toluene	1.20E-08	3.36E-07	22.5	152	4.4	4.46E-11	4.46E-05
Ethylbenzene	8.44E-09	2.35E-07	22.5	152	4.4	3.13E-11	3.13E-05
Xylenes	5.74E-07	1.60E-05	22.5	152	4.4	2.12E-09	2.12E-03

Mean emission rates - North Area Soils

Compound	Emission Rate (g/m ² -sec)	Emission Rate (g/sec)	Mixing Ht (m)	Cross wind width (m)	Wind Velocity (m/sec)	Ambient Air Conc (g/m ³)	Ambient Air Conc (ug/m ³)
Acetone	2.34E-09	6.52E-08	22.5	152	4.4	8.67E-12	8.67E-06
1,1-Dichloroethane	1.68E-08	4.69E-07	22.5	152	4.4	6.23E-11	6.23E-05
1,2-Dichloroethene	5.08E-09	1.42E-07	22.5	152	4.4	1.88E-11	1.88E-05
2-Butanone	1.94E-09	5.39E-08	22.5	152	4.4	7.17E-12	7.17E-06
Benzene	1.90E-08	5.30E-07	22.5	152	4.4	7.05E-11	7.05E-05
Tetrachloroethene	7.82E-08	2.18E-06	22.5	152	4.4	2.90E-10	2.90E-04
Toluene	1.35E-07	3.76E-06	22.5	152	4.4	5.00E-10	5.00E-04
Xylenes	6.29E-04	1.75E-02	22.5	152	4.4	2.33E-06	2.33E+00

UCL emission rates - North Area Soils

Compound	Emission Rate (g/m ² -sec)	Emission Rate (g/sec)	Mixing Ht (m)	Cross wind width (m)	Wind Velocity (m/sec)	Ambient Air Conc (g/m ³)	Ambient Air Conc (ug/m ³)
Acetone	2.34E-09	6.52E-08	22.5	152	4.4	8.67E-12	8.67E-06
1,1-Dichloroethane	1.68E-08	4.69E-07	22.5	152	4.4	6.23E-11	6.23E-05
1,2-Dichloroethene	5.08E-09	1.42E-07	22.5	152	4.4	1.88E-11	1.88E-05
2-Butanone	1.94E-09	5.39E-08	22.5	152	4.4	7.17E-12	7.17E-06
Benzene	1.90E-08	5.30E-07	22.5	152	4.4	7.05E-11	7.05E-05
Tetrachloroethene	7.82E-08	2.18E-06	22.5	152	4.4	2.90E-10	2.90E-04
Toluene	1.35E-07	3.76E-06	22.5	152	4.4	5.00E-10	5.00E-04
Xylenes	1.75E-03	4.87E-02	22.5	152	4.4	6.48E-06	6.48E+00

TABLE H-12. INHALATION OF VOLATILE COMPOUNDS IN AMBIENT AIR (FS-1)
NONREMEDIAL SITE CONSTRUCTION ACTIVITY - LANDFILL PERIMETER SOILS
FUTURE USE SCENARIO - RESIDENTIAL EXPOSURE

CARCINOGENS - AVERAGE INHALATION EXPOSURE : Adults

$$\begin{array}{ccccccccccc} \text{Air} & \times & \text{Inhalation} & \times & \text{Hrs exp} & \times & \frac{1}{\text{Body weight}} & \times & \frac{\text{Yrs expd}}{\text{Yrs LT}} & \times & \frac{\text{Weeks expd}}{\text{Year}} & = & \text{ADD} \\ \text{Conc} & & \text{rate} & & \text{week} & & & & & & & & \\ \text{mg/m}^3 & \times & 0.83 \text{ m}^3/\text{hr} & \times & 50 \text{ hrs/wk} & \times & \frac{1}{70} & \times & \frac{1}{70} & \times & \frac{1 \text{ week}}{\text{Year}} & = & \text{ADD} \end{array}$$

Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	hrs/wk exposed	Body weight (kg)	<u>Yrs expd</u> Yrs LT	<u>Weeks expd</u> Year	ADD	SF	RISK (ADD*SF)	% TOTAL RISK
Tetrachloroethene	2.96E-08	0.83	50	70	0.014	1.92E-02	4.83E-12	1.80E-03	8.69E-15	100.00%

TOTAL RISK	8.69E-15

CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Adults

$$\begin{array}{ccccccccccc} \text{Air} & \times & \text{Inhalation} & \times & \frac{\text{Hrs expd}}{\text{week}} & \times & \frac{1}{\text{Body weight}} & \times & \frac{\text{Yrs expd}}{\text{Yrs LT}} & \times & \frac{\text{Wks expd}}{\text{Year}} \\ \text{Conc} & & \text{rate} & & & & & & & & \\ \text{mg/m}^3 & \times & 1.35 \text{ m}^3/\text{hr} & \times & 50 \text{ hrs/wk} & \times & \frac{1}{70} & \times & \frac{1}{70} & \times & \frac{1 \text{ week}}{\text{Year}} \end{array} = \text{ADD}$$

Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Wks expd Year	ADD	SF	RISK (ADD*SF)	% TOTAL RISK
Benzene	2.96E-08	1.25	50	70	1	1.92E-02	5.09E-10	1.80E-03	9.16E-13	100.00%

TOTAL RISK	9.16E-13

TABLE H-12 (Continued)

p 3 of 3

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Adults

$\text{Air Conc} \times \text{Inhalation rate} \times \frac{\text{Hrs expd}}{\text{week}} \times \frac{1}{\text{Body weight}} \times \frac{\text{Yrs expd}}{\text{Yrs LT}} \times \frac{\text{Weeks expd}}{\text{Year}} = \text{ADD}$										
$\text{mg/m}^3 \times \frac{1.25 \text{ m}^3}{\text{hour}} \times \frac{50 \text{ hrs}}{\text{week}} \times \frac{1}{70} \times \frac{1}{70} \times \frac{1 \text{ week}}{\text{Year}} = \text{ADD}$										
Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	ADD	RfD	CDI/RfD	% TOTAL HAZARD
Tetrachloroethene	2.96E-08	1.25	50	70	0.014	1.92E-02	7.27E-12	1.00E-02	7.27E-10	88.10%
Toluene	1.11E-08	1.25	50	70	0.014	1.92E-02	2.73E-12	1.10E-01	2.48E-11	3.01%
Ethylbenzene	7.99E-09	1.25	50	70	0.014	1.92E-02	1.96E-12	2.90E-01	6.76E-12	0.82%
Xylene	5.43E-07	1.25	50	70	0.014	1.92E-02	1.33E-10	2.00E+00	6.66E-11	8.07%

HAZARD INDEX

8.25E-10

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Child

$\text{Air Conc} \times \text{Inhalation rate} \times \frac{\text{Hrs expd}}{\text{week}} \times \frac{1}{\text{Body weight}} \times \frac{\text{Yrs expd}}{\text{Yrs LT}} \times \frac{\text{Weeks expd}}{\text{Year}} = \text{Chronic Daily Intake (mg/kg-day)}$										
$\text{mg/m}^3 \times \frac{1.25 \text{ m}^3}{\text{hour}} \times \frac{50 \text{ hrs}}{\text{week}} \times \frac{1}{35} \times \frac{1}{70} \times \frac{1 \text{ week}}{\text{Year}} = \text{CDI}$										
$\text{Air Conc (mg/m}^3\text{)} \times \text{Inhalation Rate (m}^3\text{/hr)} \times \frac{\text{Hrs expd}}{\text{week}} \times \frac{1}{\text{Body weight (kg)}} \times \frac{\text{Yrs expd}}{\text{Yrs LT}} \times \frac{\text{Weeks expd}}{\text{Year}} = \text{CDI}$										
Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Tetrachloroethene	2.96E-08	1.25	50	35	0.014	1.92E-02	1.45E-11	1.00E-02	1.45E-09	88.10%
Toluene	1.11E-08	1.25	50	35	0.014	1.92E-02	5.47E-12	1.10E-01	4.97E-11	3.01%
Ethylbenzene	7.99E-09	1.25	50	35	0.014	1.92E-02	3.92E-12	2.90E-01	1.35E-11	0.82%
Xylene	5.43E-07	1.25	50	35	0.014	1.92E-02	2.67E-10	2.00E+00	1.33E-10	8.07%

HAZARD INDEX

1.65E-09

TABLE H-13. INHALATION OF VOLATILE COMPOUNDS IN AMBIENT AIR (FS-1)
NONREMEDIATED SITE CONSTRUCTION ACTIVITY - NORTH AREA SOILS
FUTURE USE SCENARIO - RESIDENTIAL EXPOSURE

CARCINOGENS - AVERAGE INHALATION EXPOSURE : Adults

= Chronic Daily Intake (mg/kg-day)											
Air Conc	x	Inhalation rate	x	Hrs exp week	x	Body weight	x	Yrs expd Yrs LT	x	Weeks expd Year	
mg/m ³	x	0.8 m ³ /hr	x	50 hrs week	x	1 70	x	1 70	x	1 week Year	= CDI
Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	hrs/wk exposed	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	CDI	SF	RISK (CDI*SF)	% TOTAL RISK	
Tetrachloroethene Benzene	7.41E-08	0.8	50	70	0.014	1.92E-02	1.16E-11	1.80E-03	2.09E-14	20.34%	
	1.80E-08	0.8	50	70	0.014	1.92E-02	2.83E-12	2.90E-02	8.20E-14	79.66%	
TOTAL RISK									1.03E-13		

CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Adults

= Chronic Daily Intake (mg/kg-day)												
Air Conc	x	Inhalation rate	x	Hrs expd week	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	x	$\frac{\text{Wks expd}}{\text{Year}}$		
mg/m ³	x	1.25 m ³ /hr	x.	50 hrs week	x	$\frac{1}{70}$	x	$\frac{1}{70}$	x	$\frac{1 \text{ week}}{\text{Year}}$	= CDI	
Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	$\frac{\text{Wks expd}}{\text{Year}}$	CDI	SF	RISK (CDI*SF)	% TOTAL RISK			
Tetrachloroethene	7.41E-08	1.25	50	70	1	1.92E-02	1.27E-09	1.80E-03	2.29E-12	20.34%		
Benzene	1.80E-08	1.25	50	70	1	1.92E-02	3.09E-10	2.90E-02	8.97E-12	79.66%		
TOTAL RISK									1.13E-11			

TABLE H-13 (Continued)

p 2 of 3

NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE : Adults

Compound	Air Conc (mg/m ³)	Inhalation rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	Chronic Daily Intake (mg/kg-day)	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,1-Dichloroethane	1.59E-08	0.8	50	70	0.014	1.92E-02	2.90E-03	2.50E-12	2.90E-03	8.62E-10	1.76%
1,2-Dichloroethane	4.80E-09	0.8	50	70	0.014	1.92E-02	2.00E-02	7.54E-13	2.00E-02	3.77E-11	0.08%
Tetrachloroethane	7.41E-08	0.8	50	70	0.014	1.92E-02	1.00E-02	1.16E-11	1.00E-02	1.16E-09	2.37%
Toluene	1.28E-07	0.8	50	70	0.014	1.92E-02	1.10E-01	2.01E-11	1.10E-01	1.82E-10	0.37%
Xylene	5.96E-04	0.8	50	70	0.014	1.92E-02	2.00E+00	9.35E-08	2.00E+00	4.68E-08	95.42%

HAZARD INDEX

4.90E-08

NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE : Child

Compound	Air Conc (mg/m ³)	Inhalation rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	Chronic Daily Intake (mg/kg-day)	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,1-Dichloroethane	1.59E-08	0.9	50	35	0.014	1.92E-02	2.90E-03	5.62E-12	2.90E-03	1.94E-09	1.76%
1,2-Dichloroethane	4.80E-09	0.9	50	35	0.014	1.92E-02	2.00E-02	1.70E-12	2.00E-02	8.48E-11	0.08%
Tetrachloroethane	7.41E-08	0.9	50	35	0.014	1.92E-02	1.00E-02	2.62E-11	1.00E-02	2.62E-09	2.37%
Toluene	1.28E-07	0.9	50	35	0.014	1.92E-02	1.10E-01	4.51E-11	1.10E-01	4.10E-10	0.37%
Xylene	5.96E-04	0.9	50	35	0.014	1.92E-02	2.00E+00	2.10E-07	2.00E+00	1.05E-07	95.42%

HAZARD INDEX

1.10E-07

TABLE H-13 (Continued)

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Adults

$\text{Air Conc} \times \text{Inhalation rate} \times \frac{\text{Hrs expd}}{\text{week}} \times \frac{1}{\text{Body weight}} \times \frac{\text{Yrs expd}}{\text{Yrs LT}} \times \frac{\text{Weeks expd}}{\text{Year}} = \text{ADD}$									
Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd/week	Body weight (kg)	Yrs expd/Yrs LT	Weeks expd/Year	ADD	RfD	% TOTAL HAZARD
1,1-Dichloroethane	1.59E-08	1.25	50	70	0.014	1.92E-02	3.91E-12	2.90E-03	1.35E-09
1,2-Dichloroethane	4.81E-09	1.25	50	70	0.014	1.92E-02	1.18E-12	2.00E-02	5.90E-11
Tetrachloroethene	7.41E-08	1.25	50	70	0.014	1.92E-02	1.82E-11	1.00E-02	1.82E-09
Toluene	1.28E-07	1.25	50	70	0.014	1.92E-02	3.13E-11	1.10E-01	2.85E-10
Xylene	1.66E-03	1.25	50	70	0.014	1.92E-02	4.06E-07	2.00E+00	2.03E-07
								HAZARD INDEX	
								2.07E-07	

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Child

$\text{Air Conc} \times \text{Inhalation rate} \times \frac{\text{Hrs expd}}{\text{week}} \times \frac{1}{\text{Body weight}} \times \frac{\text{Yrs expd}}{\text{Yrs LT}} \times \frac{\text{Weeks expd}}{\text{Year}} = \text{ADD}$									
Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd/week	Body weight (kg)	Yrs expd/Yrs LT	Weeks expd/Year	ADD	RfD	% TOTAL HAZARD
1,1-Dichloroethane	1.59E-08	1.25	50	35	0.014	1.92E-02	7.81E-12	2.90E-03	2.69E-09
1,2-Dichloroethane	4.81E-09	1.25	50	35	0.014	1.92E-02	2.36E-12	2.00E-02	1.18E-10
Tetrachloroethene	7.41E-08	1.25	50	35	0.014	1.92E-02	3.64E-11	1.00E-02	3.64E-09
Toluene	1.28E-07	1.25	50	35	0.014	1.92E-02	6.27E-11	1.10E-01	5.70E-10
Xylene	1.66E-03	1.25	50	35	0.014	1.92E-02	8.13E-07	2.00E+00	4.06E-07
								HAZARD INDEX	
								4.13E-07	

TABLE H-14. INHALATION OF VOLATILE COMPOUNDS IN AMBIENT AIR (FS-1)
NONREMEDIATED SITE CONSTRUCTION ACTIVITY - LANDFILL PERIMETER SOILS
FUTURE USE SCENARIO - INDUSTRIAL EXPOSURE (ON-SITE)

CARCINOGENS - AVERAGE INHALATION EXPOSURE : Adults

$$\begin{array}{ccccccc} \text{Air Conc} & \times & \text{Inhalation rate} & \times & \frac{\text{Hrs exp}}{\text{week}} & \times & \frac{1}{\text{Body weight}} & \times & \frac{\text{Yrs exp}}{\text{Yrs LT}} & \times & \frac{\text{Weeks expd}}{\text{Year}} & = & \text{Chronic Daily Intake (mg/kg-day)} \\ \text{mg/m}^3 & \times & \text{0.83 m}^3/\text{hour} & \times & \frac{50 \text{ hrs}}{\text{week}} & \times & \frac{1}{70} & \times & \frac{1}{70} & \times & \frac{1 \text{ week}}{\text{Year}} & = & \text{CDI} \end{array}$$

Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	hrs/wk exposed	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Tetrachloroethene	1.16E-07	0.83	50	70	0.014	1.92E-02	1.89E-11	1.80E-03	3.40E-14	100.00%

TOTAL RISK	3.40E-14

CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Adults

	Air Conc	x	Inhalation rate	x	$\frac{\text{Hrs expd}}{\text{week}}$	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	x	$\frac{\text{Wks expd}}{\text{Year}}$	= Chronic Daily Intake (mg/kg-day)
	mg/m ³	x	$\frac{1.25 \text{ m}^3}{\text{hour}}$	x	$\frac{50 \text{ hrs}}{\text{week}}$	x	$\frac{1}{70}$	x	$\frac{1}{70}$	x	$\frac{1 \text{ week}}{\text{Year}}$	= CDI

Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	<u>Yrs expd</u> Yrs LT	<u>Wks expd</u> Year	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Tetrachloroethene	1.16E-07	1.25	50	70	1	1.92E-02	1.99E-09	1.80E-03	3.58E-12	100.000%

TOTAL RISK	3.58E-12

TABLE H-14 (cont)

NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE : Adults

Air Conc										Chronic Daily Intake (mg/kg-day)										% TOTAL HAZARD
Compound	Air Conc (mg/m³)	Inhalation Rate (m³/hr)	x	Inhalation rate	x	Hrs expd week	x	1 Body weight	x	Yrs expd Yrs LT	x	Weeks expd Year	= CDI	RID	CDI/RID					
	mg/m³	x	0.8 m³/hr	x	50 hrs week	x	1 70	x	1 70	x	1 week Year	= CDI								
	Air Conc (mg/m³)	Inhalation Rate (m³/hr)				Hrs expd week		Body weight (kg)		Yrs expd Yrs LT		Weeks expd Year								
Tetrachloroethene	1.16E-07	0.8				50		70		0.014		1.92E-02	1.82E-11	1.00E-02	1.82E-09					
Toluene	4.19E-08	0.8				50		70		0.014		1.92E-02	6.58E-12	1.10E-01	5.98E-11					
Ethylbenzene	3.13E-08	0.8				50		70		0.014		1.92E-02	4.91E-12	2.90E-01	1.69E-11					
Xylene	7.72E-07	0.8				50		70		0.014		1.92E-02	1.21E-10	2.00E+00	6.06E-11					

HAZARD INDEX

1.96E-09

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Adults

Compound	Air Conc					Inhalation					Chronic Daily Intake (mg/kg-day)					% TOTAL HAZARD				
	Air Conc (mg/m ³)	x	Inhalation rate (m ³ /hr)	x	Hrs expd week	x	1	Body weight (kg)	x	Yrs expd Yrs LT	x	Weeks expd Year	=	CDI	RfD		CDI/RfD			
Tetrachloroethene	1.16E-07	x	1.25	x	50 hrs/wk	x	1	70	x	1	x	1 week Year	=	CDI			2.84E-11	1.00E-02	2.84E-09	88.20%
Toluene	4.19E-08	x	1.25	x	50 hrs/wk	x	1	70	x	1	x	1 week Year	=	CDI			1.03E-11	1.10E-01	9.34E-11	2.90%
Ethylbenzene	3.13E-08	x	1.25	x	50 hrs/wk	x	1	70	x	1	x	1 week Year	=	CDI			7.67E-12	2.90E-01	2.64E-11	0.82%
Xylene	2.12E-06	x	1.25	x	50 hrs/wk	x	1	70	x	1	x	1 week Year	=	CDI			5.21E-10	2.00E+00	2.61E-10	8.09%

HAZARD INDEX

3.22E-09

TABLE H-15. INHALATION OF VOLATILE COMPOUNDS IN AMBIENT AIR (FS-1)
NONREMEDIATION SITE CONSTRUCTION ACTIVITY - NORTH AREA SOILS
FUTURE USE SCENARIO - INDUSTRIAL EXPOSURE (ON-SITE)

$$\begin{array}{ccccccc} \text{Air} & \times & \text{Inhalation} & \times & \frac{\text{Hrs exp}}{\text{week}} & \times & \frac{1}{\text{Body weight}} & \times & \frac{\text{Yrs expd}}{\text{Yrs LT}} & \times & \frac{\text{Weeks expd}}{\text{Year}} & = & \text{Chronic Daily Intake (mg/kg-day)} \\ \text{Conc} & & \text{rate} & & & & & & & & & & \\ \text{mg/m}^3 & \times & 0.83 \text{ m}^3/\text{hr} & \times & \frac{50 \text{ hours}}{\text{week}} & \times & \frac{1}{70} & \times & \frac{1}{70} & \times & \frac{1 \text{ week}}{\text{Year}} & = & \text{CDI} \end{array}$$

Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	hrs/wk exposed	Body weight (kg)	<u>Yrs expd</u> Yrs LT	<u>Weeks expd</u> Year	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Tetrachloroethene	2.90E-07	0.83	50	70	0.014	1.92E-02	4.72E-11	1.80E-03	8.50E-14	20.34%
Benzene	7.05E-08	0.83	50	70	0.014	1.92E-02	1.15E-11	2.90E-02	3.33E-13	79.66%

TOTAL RISK	4.18E-13

CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE: Adults

Air Conc	x	Inhalation rate	x	$\frac{\text{Hrs expd}}{\text{week}}$	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	x	$\frac{\text{Wks expd}}{\text{Year}}$	=	Chronic Daily Intake (mg/kg-day)
mg/m ³	x	$\frac{1.25 \text{ m}^3}{\text{hour}}$	x	50 hrs/wk	x	$\frac{1}{70}$	x	$\frac{1}{70}$	x	$\frac{1 \text{ week}}{\text{Year}}$	=	CDI

Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Wks expd Year	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Tetrachloroethene	2.90E-07	1.25	50	70	1	1.92E-02	4.98E-09	1.80E-03	8.96E-12	20.34%
Benzene	7.05E-08	1.25	50	70	1	1.92E-02	1.21E-09	2.90E-02	3.51E-11	79.66%

TOTAL RISK	4.40E-11

TABLE H-15 (Continued)

NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE : Adults

Compound	Air Conc						Chronic Daily Intake (mg/kg-day)				% TOTAL HAZARD
	Air Conc	Inhalation rate	Hrs expd week	Body weight	Yrs expd Yrs LT	Weeks expd Year	CDI	RfD	CDI/RfD		
1,1-Dichloroethane	6.23E-08	0.83	50	70	0.014	1.92E-02	1.01E-11	2.90E-03	3.50E-09	1.76%	
1,2-Dichloroethane	1.88E-08	0.83	50	70	0.014	1.92E-02	3.06E-12	2.00E-02	1.53E-10	0.08%	
Tetrachloroethane	2.90E-07	0.83	50	70	0.014	1.92E-02	4.72E-11	1.00E-02	4.72E-09	2.37%	
Toluene	5.00E-07	0.83	50	70	0.014	1.92E-02	8.14E-11	1.10E-01	7.40E-10	0.37%	
Xylene	2.33E-03	0.83	50	70	0.014	1.92E-02	3.79E-07	2.00E+00	1.90E-07	95.42%	

HAZARD INDEX

1.99E-07

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE : Adults

Chronic Daily Intake (mg/kg-day)										
Compound	Air Conc (mg/m ³)	Inhalation Rate (m ³ /hr)	Hrs expd week	Body weight (kg)	Yrs expd Yrs LT	Weeks expd Year	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,1-Dichloroethane	6.23E-08	1.25	50	70	0.014	1.92E-02	1.53E-11	2.90E-03	5.27E-09	0.65%
1,2-Dichloroethane	1.88E-08	1.25	50	70	0.014	1.92E-02	4.61E-12	2.00E-02	2.31E-10	0.03%
Tetrachloroethane	2.90E-07	1.25	50	70	0.014	1.92E-02	7.11E-11	1.00E-02	7.11E-09	0.88%
Toluene	5.00E-07	1.25	50	70	0.014	1.92E-02	1.23E-10	1.10E-01	1.11E-09	0.14%
Xylene	6.48E-03	1.25	50	70	0.014	1.92E-02	1.59E-06	2.00E+00	7.95E-07	98.30%

HAZARD INDEX

8.08E-07

**TABLE H-16. DERMAL CONTACT WITH EXPOSED SOILS FROM NONREMEDIATED EXCAVATION (FS-2)
FUTURE USE SCENARIO - Industrial Receptor
NORTH AREA SOILS**

p 1 of 2

CARCINOGENS - AVERAGE SOIL CONTACT EXPOSURE : Adults

Sed Conc	x	Skin Surf area	x	Bioavail factor	x	Skin Deposition	x	1 Body wt	x	Days expd Days/yr	x	Yrs Expd Yrs LT	x	1 kg 1e6 mg	=	ADD
mg/kg	x	2,900 cm ²	x	6e-3	x	0.5 mg/cm ²	x	1 70	x	5 days 365 days	x	1 70	x	1 kg 1E6 mg	=	ADD
Compound	Sed Conc (mg/kg)	Skin Surface Area (cm ²)	Bio- availability Factor	Skin Deposition (mg/cm ²)	Body Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	SF	RISK (SF*ADD)	% TOTAL RISK					
Benzene	5.00E-03	2,900	6.00E-03	0.5	70	0.014	0.014	1.22E-13	2.90E-02	3.53E-15	0.00%					
Tetrachloroethene	5.00E-03	2,900	6.00E-03	0.5	70	0.014	0.014	1.22E-13	5.10E-02	6.20E-15	0.00%					
Carbazole	1.30E-01	2,900	6.00E-03	0.5	70	0.014	0.014	3.16E-12	5.10E-02	1.61E-13	0.02%					
Total c-PAHs	3.75E+00	2,900	6.00E-03	0.5	70	0.014	0.014	9.11E-11	7.30E+00	6.65E-10	99.19%					
4,4'-DDD	2.10E-03	2,900	6.00E-03	0.5	70	0.014	0.014	5.11E-14	2.40E-01	1.23E-14	0.00%					
Aroclor 1248	2.80E-02	2,900	6.00E-03	0.5	70	0.014	0.014	6.81E-13	7.70E+00	5.24E-12	0.78%					
TOTAL RISK											6.70E-10					

CARCINOGENS - PLAUSIBLE MAXIMUM SOIL CONTACT EXPOSURE : Adults

Compound	Soil Conc (mg/kg)	Soil x Conc	Skin Surf area	x Bioavail factor	x Skin Deposition	x 1 Body wt	x Days expd Days/yr	x Yrs Expd Yrs LT	x 1 kg 1e6 mg	= ADD	% TOTAL RISK
	mg/kg	x	3,500 cm ²	x 1.2E-2	x 1.0 mg/cm ²	x 1 70	x 5 days 365 days	x 1 70	x 1 kg 1E6 mg	= ADD	
Compound	Soil Conc (mg/kg)	Skin Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Body Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	SF	RISK (SF*ADD)	% TOTAL RISK
Benzene	5.00E-03	3,500	1.20E-02	1.0	70	0.014	0.014	5.87E-13	2.90E-02	1.70E-14	0.00%
Tetrachloroethene	5.00E-03	3,500	1.20E-02	1.0	70	0.014	0.014	5.87E-13	5.10E-02	2.99E-14	0.00%
Carbazole	1.30E-01	3,500	1.20E-02	1.0	70	0.014	0.014	1.53E-11	5.10E-02	7.78E-13	0.01%
Total c-PAHs	8.91E+00	3,500	1.20E-02	1.0	70	0.014	0.014	1.05E-09	7.30E+00	7.64E-09	99.42%
4,4'-DDD	3.00E+03	3,500	1.20E-02	1.0	70	0.014	0.014	3.52E-13	2.40E-01	8.45E-14	0.00%
Aroclor 1248	4.80E-02	3,500	1.20E-02	1.0	70	0.014	0.014	5.64E-12	7.70E+00	4.34E-11	0.56%
										TOTAL RISK	7.68E-09

NONCARCINOGENS - AVERAGE SOIL CONTACT EXPOSURE : Adults

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Tetrachloroethene	5.00E-03	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	1.22E-13	1.00E-02	1.22E-11	0.20%
Xylenes	1.58E+02	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	3.85E-09	2.00E+00	1.93E-09	31.91%
2-Methylphenol	7.19E-01	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	1.75E-11	5.00E-02	3.50E-10	5.79%
4-Methylphenol	8.07E-01	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	1.96E-11	5.00E-02	3.93E-10	6.50%
2,4-Dimethylphenol	1.00E+00	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	2.44E-11	2.00E-02	1.22E-09	20.22%
Naphthalene	4.25E-01	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	1.03E-11	4.00E-02	2.58E-10	4.28%
Fluorene	4.30E-01	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	1.05E-11	4.00E-02	2.61E-10	4.33%
Fluoranthene	8.73E-01	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	2.12E-11	4.00E-02	5.31E-10	8.79%
Pyrene	1.16E+00	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	2.82E-11	3.00E-02	9.39E-10	15.55%
o-Toluidic acid	5.94E+00	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	1.45E-10	3.00E+00	4.82E-11	0.80%
m-Toluidic acid	6.37E+00	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	1.55E-10	3.00E+00	5.16E-11	0.86%
p-Toluidic acid	5.72E+00	2.90E+03	6.00E-03	5.00E-01	70	0.014	0.014	1.39E-10	3.00E+00	4.64E-11	0.77%

HAZARD INDEX

6.04E-09

NONCARCINOGENS - PLAUSIBLE MAXIMUM SOIL CONTACT EXPOSURE : Adults

Compound	Soil Conc (mg/kg)	Soil Surface Area (cm ²)	Bio-availability Factor	Skin Deposition (mg/cm ²)	Weight (kg)	Days expd Days/yr	Yrs Expd Yrs LT	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Tetrachloroethene	5.00E-03	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	5.87E-13	1.00E-02	5.87E-11	0.08%
Xylenes	4.41E+02	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	5.17E-08	2.00E+00	2.59E-08	37.39%
2-Methylphenol	1.40E+00	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	1.64E-10	5.00E-02	3.29E-09	4.75%
4-Methylphenol	1.77E+00	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	2.07E-10	5.00E-02	4.15E-09	6.00%
2,4-Dimethylphenol	2.05E+00	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	2.40E-10	2.00E-02	1.20E-08	17.36%
Naphthalene	7.01E-01	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	8.23E-11	4.00E-02	2.06E-09	2.97%
Fluorene	1.93E+00	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	2.26E-10	4.00E-02	5.65E-09	8.17%
Fluoranthene	1.86E+00	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	2.18E-10	4.00E-02	5.45E-09	7.88%
Pyrene	2.35E+00	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	2.75E-10	3.00E-02	9.18E-09	13.27%
o-Toluidic acid	1.21E+01	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	1.42E-09	3.00E+00	4.72E-10	0.68%
m-Toluidic acid	1.37E+01	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	1.61E-09	3.00E+00	5.35E-10	0.77%
p-Toluidic acid	1.17E+01	3.50E+03	1.20E-02	1.00E+00	70	0.014	0.014	1.37E-09	3.00E+00	4.56E-10	0.66%

HAZARD INDEX

6.92E-08

**TABLE H-17. DERMAL CONTACT WITH EXPOSED SOILS FROM NONREMEDIATED EXCAVATION (FS-2)
FUTURE USE SCENARIO - Industrial Receptor
LANDFILL PERIMETER SOILS**

p 1 of 2

CARCINOGENS - AVERAGE SOIL CONTACT EXPOSURE : Adults

Compound	Sed Conc (mg/kg)	x	Skin Surf area (cm ²)	x	Bioavail factor	x	Skin Deposition (mg/cm ²)	x	Body wt (kg)	x	Days expd Days/yr	x	Yrs Expd Yrs Lt	x	ADD	=	ADD	% TOTAL RISK
Tetrachloroethene	2.00E-03		2,900		6.00E-03		0.5		70		0.014		0.014		4.86E-14		5.10E-02	2.48E-15
Total c-PAHs	1.51E+00		2,900		6.00E-03		0.5		70		0.014		0.014		3.67E-11		7.30E+00	2.68E-10
4,4'-DDD	5.00E-03		2,900		6.00E-03		0.5		70		0.014		0.014		1.22E-13		2.40E-01	2.92E-14
4,4'-DDE	7.30E-03		2,900		6.00E-03		0.5		70		0.014		0.014		1.78E-13		2.40E-01	4.26E-14
																TOTAL RISK		2.68E-10

CARCINOGENS - PLAUSIBLE MAXIMUM SOIL CONTACT EXPOSURE : Adults

Compound	Soil Conc (mg/kg)	Soil Conc	x	Skin Surf area	Bioavail factor	x	Skin Deposition	x	Body wt	x	Days expd	x	Yrs Expd	x	ADD	SF	RISK (SF*ADD)	% TOTAL RISK
									1		Days/yr		Yrs Lt		1 kg			
									70		365 days		70		1E6 mg			

TABLE H-18. FUTURE-USE SCENARIO - INHALATION OF SUSPENDED SOILS FROM AN EXCAVATION AREA (FS-3)
NORTH AREA SOILS
RESIDENTIAL RECEPTOR (OFF-SITE)

This model calculates the risk associated with sediment suspended due to wind erosion, based upon Cowherd et al (1985) model.

Step 1 - Particle emission rate

Roughness height (Zo; cm):	1
Threshold friction velocity (U*; m/sec):	0.5
Threshold velocity at 7 m (Ut; m/sec):	8
Fraction of surface with vegetation (V):	0
Mean annual wind speed ([U]; m/sec):	4.4
Unitless velocity ratio (X):	1.61
Correction factor [F(x)]:	0.9

Respirable particulate emissions (E_{10} ; g/m²-hr): 0.005

Sources for variables:

- Zo: Roughness height obtained from Cowherd document, Figure 3-6.
- U*: Based upon surface particle size mode, from Cowherd document Figure 3-4.
- Ut: Calculated from Cowherd Figure 4-1
- V: Ranges from 0 (0%) to 1 (100%), based upon field observation
- [U]: Mean annual wind speed, from local sources or Cowherd document Table 4-1.
- X: Calculated from Ut and U*
- F(x): Based upon value of X, using Cowherd document, Figure 4-3.

Site data: Particle size mode (coarse to fine sand) was 0.5 mm based upon boring logs.
Ratio of windspeed at 7 m to friction velocity was 50.
Mean annual wind speed from Syracuse, NY area (Cowherd et al, 1985)

Ref: Cowherd, C., G.E. Muleski, P.J. Englehart and D.A. Gillette. 1985. Rapid assessment of exposure to particulate emissions from surface contamination sites. EPA-600/8-85/002

Step 2 - Contaminant Emission Rates

AVERAGE CONCENTRATIONS					UCL CONCENTRATIONS					
Compound	Conc (ug/kg)	Emiss Rate (g/m ² -hr)	Site area (m ²)	Emission Rate (ug/hr)	Short-range Air conc (ug/m ³)	Conc (ug/kg)	Emiss Rate (g/m ² -hr)	Site area (m ²)	Emission Rate (ug/hr)	Short-range Air conc (ug/m ³)
Benzene	5	0.005	334	9.00E-03	1.00E-09	5	0.005	334	9.00E-03	1.00E-09
Tetrachloroethene	5	0.005	334	9.00E-03	1.00E-09	5	0.005	334	9.00E-03	1.00E-09
Xylenes	158,484	0.005	334	2.85E+02	3.17E-05	440,573	0.005	334	7.93E+02	8.81E-05
2-Methylphenol	719	0.005	334	1.29E+00	1.44E-07	1,400	0.005	334	2.52E+00	2.80E-07
4-Methylphenol	807	0.005	334	1.45E+00	1.61E-07	1,767	0.005	334	3.18E+00	3.53E-07
2,4-Dimethylphenol	1,004	0.005	334	1.81E+00	2.01E-07	2,046	0.005	334	3.68E+00	4.09E-07
Carbazole	130	0.005	334	2.34E-01	2.60E-08	130	0.005	334	2.34E-01	2.60E-08
Naphthalene	425	0.005	334	7.65E-01	8.50E-08	701	0.005	334	1.26E+00	1.40E-07
Fluorene	889	0.005	334	1.60E+00	1.78E-07	1,926	0.005	334	3.47E+00	3.85E-07
Fluoranthene	873	0.005	334	1.57E+00	1.75E-07	1,858	0.005	334	3.35E+00	3.72E-07
Pyrene	1,158	0.005	334	2.08E+00	2.32E-07	2,345	0.005	334	4.22E+00	4.69E-07
Total c-PAHs	3,745	0.005	334	6.74E+00	7.49E-07	8,913	0.005	334	1.60E+01	1.78E-06
o-Toluic acid	5,943	0.005	334	1.07E+01	1.19E-06	12,061	0.005	334	2.17E+01	2.41E-06
m-Toluic acid	6,368	0.005	334	1.15E+01	1.27E-06	13,672	0.005	334	2.46E+01	2.74E-06
p-Toluic acid	5,721	0.005	334	1.03E+01	1.14E-06	11,662	0.005	334	2.10E+01	2.33E-06
4,4'-DDD	2.1	0.005	334	3.78E-03	4.20E-10	3	0.005	334	5.40E-03	6.00E-10
Aroclor 1248	28	0.005	334	5.04E-02	5.60E-09	48	0.005	334	8.64E-02	9.60E-09

Short range air concentration: Assumed 0.1 km from source center, using a conversion factor of 400 usec/m³ (Figure 4-12 from Cowherd et al., 1985).

TABLE H-18 (Continued)

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CARCINOGENS - AVERAGE SOIL INHALATION EXPOSURE : Adults

$\text{Air Conc} \times \text{Inhalation Rate} \times \text{Fraction Absorbed} \times \frac{\text{Hrs}}{\text{week}} \times \frac{\text{Wks exp}}{\text{Yr}} \times \frac{\text{Yrs exp}}{\text{Lifetime}} \times \frac{1}{\text{Body weight}} = \text{ADD}$												
$\frac{\text{mg}}{\text{m}^3} \times \frac{0.8 \text{ m}^3}{\text{hour}} \times 1.0 \times \frac{50 \text{ hours}}{\text{week}} \times \frac{1 \text{ week}}{\text{year}} \times \frac{1 \text{ year}}{70 \text{ years}} \times \frac{1}{70 \text{ kg}} = \text{ADD}$												
Compound	Air conc (ug/m3)	Air conc (mg/m³)	Exp/week (hrs/wk)	Inhalation Rate (m³/hr)	Fraction absorbed	Body weight (kg)	Yrs expd Yrs lifetime	Wks expd Wks/year	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Benzene	1.00E-09	1.00E-12	50	0.8	1.000	70	0.014	0.019	1.57E-16	2.90E-02	4.55E-18	0.00%
Tetrachloroethene	3.17E-05	3.17E-08	50	0.8	1.000	70	0.014	0.019	4.98E-12	1.80E-03	8.96E-15	1.22%
Carbazole	2.60E-08	2.60E-11	50	0.8	1.000	70	0.014	0.019	4.08E-15	2.00E-02	8.17E-17	0.01%
Total c-PAHs	7.49E-07	7.49E-10	50	0.8	1.000	70	0.014	0.019	1.18E-13	6.10E+00	7.17E-13	97.84%
4,4'-DDD	4.20E-10	4.20E-13	50	0.8	1.000	70	0.014	0.019	6.60E-17	2.40E-01	1.58E-17	0.00%
Aroclor 1248	5.60E-09	5.60E-12	50	0.8	1.000	70	0.014	0.019	8.79E-16	7.70E+00	6.77E-15	0.92%
TOTAL RISK												7.33E-13

CARCINOGENS - PLAUSIBLE MAXIMUM SOIL INHALATION EXPOSURE : Adults

$\text{Air Conc} \times \text{Inhalation Rate} \times \text{Fraction Absorbed} \times \frac{\text{Hrs}}{\text{week}} \times \frac{\text{Wks exp}}{\text{Yr}} \times \frac{\text{Yrs exp}}{\text{Lifetime}} \times \frac{1}{\text{Body weight}} = \text{ADD}$												
$\text{mg m}^3 \times \frac{1.25 \text{ m}^3}{\text{hour}} \times 1.0 \times \frac{50 \text{ hours}}{\text{week}} \times \frac{1 \text{ week}}{\text{year}} \times \frac{1 \text{ year}}{70 \text{ years}} \times \frac{1}{70 \text{ kg}} = \text{ADD}$												
Compound	Air conc (ug/m³)	Air conc (mg/m³)	Exp/week (hrs/wk)	Inhalation Rate (m³/hr)	Fraction absorbed	Body weight (kg)	Yrs expd Yrs lifetime	Wks expd year	ADD	SF	RISK (ADD*SF)	% TOTAL RISK
Benzene	1.00E-09	1.00E-12	50	1.25	1.000	70	0.014	0.019	2.45E-16	2.90E-02	7.12E-18	0.00%
Tetrachloroethene	1.00E-09	1.00E-12	50	1.25	1.000	70	0.014	0.019	2.45E-16	1.80E-03	4.42E-19	0.00%
Carbazole	2.60E-08	2.60E-11	50	1.25	1.000	70	0.014	0.019	6.38E-15	2.00E-02	1.28E-16	0.00%
Total c-PAHs	1.78E-06	1.78E-09	50	1.25	1.000	70	0.014	0.019	4.37E-13	6.10E+00	2.67E-12	99.32%
4,4'-DDD	6.00E-10	6.00E-13	50	1.25	1.000	70	0.014	0.019	1.47E-16	2.40E-01	3.53E-17	0.00%
Aroclor 1248	9.60E-09	9.60E-12	50	1.25	1.000	70	0.014	0.019	2.36E-15	7.70E+00	1.81E-14	0.68%
TOTAL RISK											2.69E-12	

TABLE H-18 (Continued)

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NON-CARCINOGENS - AVERAGE SOIL INHALATION EXPOSURE : Child

Compound	Air conc (ug/m ³)	Air conc (mg/m ³)	Exp/week (hrs/wk)	Inhalation Rate (m ³ /hr)	Fraction absorbed	Body weight (kg)	Yrs expd Yrs lifetime	Wks expd Wks/year	ADD	RfD	RISK (ADD/RfD)	% TOTAL RISK
Tetrachloroethene	1.00E-09	1.00E-12	50	0.9	1.000	35	0.014	0.019	3.53E-16	1.00E-02	3.53E-18	0.00%
Xylenes	3.17E-05	3.17E-08	50	0.9	1.000	35	0.014	0.019	1.12E-11	2.00E+00	2.24E-11	85.38%
2-Methylphenol	1.44E-07	1.44E-10	50	0.9	1.000	35	0.014	0.019	5.08E-14	5.00E-02	2.54E-15	0.01%
4-Methylphenol	8.50E-08	8.50E-11	50	0.9	1.000	35	0.014	0.019	3.00E-14	5.00E-02	1.50E-15	0.01%
2,4-Dimethylphenol	2.01E-07	2.01E-10	50	0.9	1.000	35	0.014	0.019	7.09E-14	2.00E-02	1.42E-15	0.01%
Naphthalene	8.50E-08	8.50E-11	50	0.9	1.000	35	0.014	0.019	3.00E-14	4.00E-02	1.20E-15	0.00%
Fluorene	1.78E-07	1.78E-10	50	0.9	1.000	35	0.014	0.019	6.28E-14	4.00E-02	2.51E-15	0.01%
Pyrene	2.32E-07	2.32E-10	50	0.9	1.000	35	0.014	0.019	8.18E-14	3.00E-02	2.45E-15	0.01%
o-Toluic acid	1.19E-06	1.19E-09	50	0.9	1.000	35	0.014	0.019	4.20E-13	3.00E+00	1.26E-12	4.80%
m-Toluic acid	1.27E-06	1.27E-09	50	0.9	1.000	35	0.014	0.019	4.50E-13	3.00E+00	1.35E-12	5.15%
p-Toluic acid	1.14E-06	1.14E-09	50	0.9	1.000	35	0.014	0.019	4.04E-13	3.00E+00	1.21E-12	4.62%
TOTAL HAZARD INDEX											2.62E-11	

NON-CARCINOGENS - PLAUSIBLE MAXIMUM SOIL INHALATION EXPOSURE : Child

Compound	Air conc (ug/m³)	Air conc (mg/m³)	Exp/week (hrs/wk)	Inhalation Rate (m³/hr)	Fraction absorbed	Body weight (kg)	Yrs expd Yrs lifetime	Wks expd Wks/year	ADD	RfD	RISK (ADD/RfD)	% TOTAL RISK
	$\text{mg} \times \text{Inhalation Rate} \times \frac{\text{Fraction Absorbed}}{\text{Yr}}$	$\frac{\text{mg}}{\text{m}^3} \times \frac{1.25 \text{ m}^3}{\text{hour}} \times 1.0 \times \frac{1 \text{ week}}{\text{year}}$	$\times \frac{\text{Wks exp}}{\text{Yr}}$	$\times \frac{\text{Years exp}}{\text{Lifetime}}$	$\times \frac{1}{\text{Body weight}}$	$\times \frac{1}{35 \text{ kg}}$	$\times \frac{1}{70 \text{ years}}$	$\times \frac{1}{35 \text{ kg}}$	ADD	RfD	RISK (ADD/RfD)	% TOTAL RISK
Tetrachloroethene	1.00E-09	1.00E-12	50	1.25	1.000	35	0.014	0.019	4.91E-16	1.00E-02	4.91E-18	0.00%
Xylenes	8.81E-05	8.81E-08	50	1.25	1.000	35	0.014	0.019	4.32E-11	2.00E+00	8.65E-11	88.67%
2-Methylphenol	2.80E-07	2.80E-10	50	1.25	1.000	35	0.014	0.019	1.37E-13	5.00E-02	6.87E-15	0.01%
4-Methylphenol	3.53E-07	3.53E-10	50	1.25	1.000	35	0.014	0.019	1.73E-13	5.00E-02	8.67E-15	0.01%
2,4-Dimethylphenol	4.09E-07	4.09E-10	50	1.25	1.000	35	0.014	0.019	2.01E-13	2.00E-02	4.02E-15	0.00%
Naphthalene	1.40E-07	1.40E-10	50	1.25	1.000	35	0.014	0.019	6.88E-14	4.00E-02	2.75E-15	0.00%
Fluorene	3.85E-07	3.85E-10	50	1.25	1.000	35	0.014	0.019	1.89E-13	4.00E-02	7.56E-15	0.01%
Pyrene	4.69E-07	4.69E-10	50	1.25	1.000	35	0.014	0.019	2.30E-13	3.00E-02	6.90E-15	0.01%
o-Toluic acid	2.41E-06	2.41E-09	50	1.25	1.000	35	0.014	0.019	1.18E-12	3.00E+00	3.55E-12	3.64%
m-Toluic acid	2.74E-06	2.74E-09	50	1.25	1.000	35	0.014	0.019	1.34E-12	3.00E+00	4.03E-12	4.13%
p-Toluic acid	2.33E-06	2.33E-09	50	1.25	1.000	35	0.014	0.019	1.14E-12	3.00E+00	3.43E-12	3.52%

TABLE H-19. FUTURE-USE SCENARIO - INHALATION OF SUSPENDED SOILS FROM AN EXCAVATION AREA
 LANDFILL PERIMETER SOILS
 RESIDENTIAL RECEPTOR (OFF-SITE)

This model calculates the risk associated with sediment suspended due to wind erosion, based upon Cowherd et al (1985) model.

Step 1 - Particle emission rate

Roughness height (Zo; cm):	1
Threshold friction velocity (U*; m/sec):	0.5
Threshold velocity at 7 m (Ut; m/sec):	8
Fraction of surface with vegetation (V):	0
Mean annual wind speed ([U]; m/sec):	4.4
Unitless velocity ratio (X):	1.61
Correction factor [F(x)]:	0.9

Respirable particulate emissions (E_{10i}; g/m²-hr): 0.005

Sources for variables:

- Zo: Roughness height obtained from Cowherd document, Figure 3-6.
- U*: Based upon surface particle size mode, from Cowherd document Figure 3-4.
- Ut: Calculated from Cowherd Figure 4-1
- V: Ranges from 0 (0%) to 1 (100%), based upon field observation
- [U]: Mean annual wind speed, from local sources or Cowherd document Table 4-1.
- X: Calculated from Ut and U*
- F(x): Based upon value of X, using Cowherd document, Figure 4-3.

Site data: Particle size mode (coarse to fine sand) was 0.5 mm based upon boring logs.
 Ratio of windspeed at 7 m to friction velocity was 50.
 Mean annual wind speed from Syracuse, NY area (Cowherd et al, 1985)

Ref: Cowherd, C., G.E. Muleski, P.J. Englehart and D.A. Gillette. 1985. Rapid assessment of exposure to particulate emissions from surface contamination sites. EPA-600/8-85/002

TABLE H-19 (Continued)

Step 2 - Contaminant Emission Rates

AVERAGE CONCENTRATIONS

UCL CONCENTRATIONS

Compound	Conc (ug/kg)	Emission Rate (g/m ² -hr)	Site area (m ²)	Emission Rate (ug/hr)	Short-range Air conc (ug/m ³)	Conc (ug/kg)	Emission Ra (g/m ² -hr)	Site area (m ²)	Emission Rate (ug/hr)	Short-range Air conc (ug/m ³)
Tetrachloroethene	2	0.005	334	3.60E-03	4.00E-10	5	0.005	334	9.00E-03	1.00E-09
Xylenes	53	0.005	334	9.45E-02	1.05E-08	145	0.005	334	2.60E-01	2.89E-08
2-Methylphenol	40	0.005	334	7.20E-02	8.00E-09	40	0.005	334	7.20E-02	8.00E-09
Naphthalene	170	0.005	334	3.06E-01	3.40E-08	200	0.005	334	3.60E-01	4.00E-08
Fluorene	187	0.005	334	3.37E-01	3.75E-08	222	0.005	334	4.00E-01	4.44E-08
Pyrene	344	0.005	334	6.19E-01	6.88E-08	629	0.005	334	1.13E+00	1.26E-07
Chrysene	74	0.005	334	1.33E-01	1.48E-08	74	0.005	334	1.33E-01	1.48E-08
Total c-PAHs	245	0.005	334	4.41E-01	4.90E-08	254	0.005	334	4.57E-01	5.08E-08
o-Toluic acid	170	0.005	334	3.06E-01	3.40E-08	170	0.005	334	3.06E-01	3.40E-08
m-Toluic acid	120	0.005	334	2.16E-01	2.40E-08	120	0.005	334	2.16E-01	2.40E-08
4,4'-DDD	5.0	0.005	334	9.00E-03	1.00E-09	5.4	0.005	334	9.72E-03	1.08E-09
4,4'-DDE	7.3	0.005	334	1.31E-02	1.46E-09	11.6	0.005	334	2.09E-02	2.32E-09

Short range air concentration: Assumed 0.1 km from source center, using a conversion factor of 400 usec/m³ (Figure 4-12 from Cowherd et al., 1985).

CARCINOGENS - PLAUSIBLE MAXIMUM SOIL INHALATION EXPOSURE: Adults

$$\frac{\text{Air Conc}}{\text{mg m}^{-3}} \times \frac{\text{Inhalation Rate}}{\text{m}^3 \text{ hour}} \times \frac{\text{Fraction Absorbed}}{1.0} \times \frac{\text{Hrs week}}{50 \text{ hours week}} \times \frac{\text{Wks exp Yr}}{1 \text{ week year}} \times \frac{\text{Years exp Lifetime}}{1 \text{ year 70 years}} \times \frac{1}{\text{Body weight 70 kg}} = \text{ADD}$$

Compound	Air conc (ug/m ³)	Air conc (mg/m ³)	Exp/week (hrs/wk)	Inhalation Rate (m ³ /hr)	Fraction absorbed	Body weight (kg)	Yrs expd Yrs lifetime	Wks expd Wks/year	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Tetrachloroethene	4.00E-10	4.00E-13	50	0.8	1.000	70	0.014	0.019	6.28E-17	1.80E-03	1.13E-19	0.00%
Total c-PAHs	4.90E-08	4.90E-11	50	0.8	1.000	70	0.014	0.019	7.69E-15	6.10E+00	4.69E-14	100.00%
TOTAL RISK											4.69E-14	

Air Conc	x	Inhalation Rate	x	Fraction Absorbed	x	Hrs week	x	$\frac{\text{Wks exp}}{\text{Yr}}$	x	$\frac{\text{Yrs exp}}{\text{Lifetime}}$	x	$\frac{1}{\text{Body weight}}$	= ADD
mg m ³	x	1.25 m ³ hour	x	1.0	x	50 hours week	x	1 week year	x	1 year 70 years	x	1 70 kg	= ADD

Compound	Air conc ($\mu\text{g}/\text{m}^3$)	Air conc (mg/m^3)	Exp/week (hrs/wk)	Inhalation Rate (m^3/hr)	Fraction absorbed	Body weight (kg)	$\frac{\text{Yrs expd}}{\text{Yrs lifetime}}$	$\frac{\text{Wks expd}}{\text{year}}$	CDI	SF	RISK ($\text{CDI}\cdot\text{SF}$)	% TOTAL RISK
Tetrachloroethene	1.00E-09	1.00E-12	50	1.25	1.000	70	0.014	0.019	2.45E-16	1.80E-03	4.42E-19	0.00%
Total c-PAHs	5.08E-08	5.08E-11	50	1.25	1.000	70	0.014	0.019	1.25E-14	6.10E+00	7.60E-14	100.00%
TOTAL RISK											7.60E-14	

TOTAL HAZARD INDEX	3.26E-14

TOTAL HAZARD INDEX	5.64E-14

TABLE H-20. BASEMENT MODEL - INHALATION OF VOLATILE ORGANIC COMPOUNDS ENTERING BASEMENT FROM SOIL VAPOR (FS-4)
FUTURE-USE SCENARIO - Residential building

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STEP 1 - Calculate average emission rate of vapors into basement

Analyte	SV Conc (ug/m ³)	SV Conc (g/cm ³)	MW (g/mol)	SV Conc (mol/cm ³)	Diff coeff ¹ (cm ² /sec)	Contact Surface area (cm ²)	Soil porosity	Mole fraction (M)	Soil cover (cm)	Emission rate (g/sec)
1,1,1-Trichloroethane	1.00E+03	1.001E-09	133	7.526E-12	0.08447	1.20E+08	0.35	1.002E-02	15.2	1.646E-06
Trichloroethene	5.89E+02	5.894E-10	131	4.499E-12	0.08606	1.20E+08	0.35	5.991E-03	15.2	5.904E-07
Toluene	1.20E+03	1.204E-09	92	1.309E-11	0.08301	1.20E+08	0.35	1.743E-02	15.2	3.384E-06
Tetrachloroethene	1.74E+03	1.745E-09	166	1.051E-11	0.07852	1.20E+08	0.35	1.400E-02	15.2	3.726E-06
Ethyl benzene	1.95E+03	1.951E-09	106	1.840E-11	0.07070	1.20E+08	0.35	2.451E-02	15.2	6.568E-06
Xylenes	7.39E+04	7.387E-08	106	6.969E-10	0.07597	1.20E+08	0.35	9.281E-01	15.2	1.012E-02
			(SUM)	7.510E-10						

STEP 2 - Calculate average basement air concentration

Analyte	Soil Emission rate (g/sec)	Bldg Entry Rate (g/sec)	Ventilation rate (hr ⁻¹)	Bldg volume (m ³)	Bldg air conc (mg/m ³)
1,1,1-Trichloroethane	1.65E-06	1.65E-07	1	283	1.61E-09
Trichloroethene	5.90E-07	5.90E-08	1	283	5.79E-10
Toluene	3.38E-06	3.38E-07	1	283	3.32E-09
Tetrachloroethene	3.73E-06	3.73E-07	1	283	3.65E-09
Ethyl benzene	6.57E-06	6.57E-07	1	283	6.44E-09
Xylenes	1.01E-02	1.01E-03	1	283	9.93E-06

Building characteristics:

Soil total porosity: 0.35
Clean fill depth² (feet): 0.5
Building length (ft): 50
Building width (ft): 25
Soil contact depth (ft): 4
Length contact area (ft²): 200
Width contact area (ft²): 100
Total contact area (ft²): 1,850
Soil contact depth (ft): 4
Basement depth (ft): 8
Total basement volume (ft³): 10,000

Notes:

¹ Diffusion coefficients from USEPA (1988)

² Clean fill depth is the thickness of drainage layer fill separating foundation from existing (contaminated) soils.

TABLE H-20 (Continued)

p 2 of 3

STEP 1 - Calculate UCL emission rate of vapors into basement

Analyte	SV Conc (ug/m ³)	SV Conc (g/cm ³)	MW (g/mol)	SV Conc (mol/cm ³)	Diff coeff (cm ² /sec)	Surface area (cm ²)	Soil porosity	Mole fraction (M)	Soil cover (cm)	Emission rate (g/sec)
1,1,1-Trichloroethane	2.12E+03	2.116E-09	133	1.591E-11	0.08447	1.20E+08	0.35	2.119E-02	15.2	7.357E-06
Trichloroethene	1.18E+03	1.179E-09	131	8.998E-12	0.08606	1.20E+08	0.35	1.198E-02	15.2	2.361E-06
Toluene	2.03E+03	2.032E-09	92	2.209E-11	0.08301	1.20E+08	0.35	2.941E-02	15.2	9.637E-06
Tetrachloroethene	3.20E+03	3.205E-09	166	1.930E-11	0.07852	1.20E+08	0.35	2.571E-02	15.2	1.257E-05
Ethyl benzene	3.95E+03	3.945E-09	106	3.722E-11	0.07070	1.20E+08	0.35	4.956E-02	15.2	2.686E-05
Xylenes	2.30E+05	2.296E-07	106	2.166E-09	0.07597	1.20E+08	0.35	2.884E+00	15.2	9.775E-02
			(SUM)	2.270E-09						

STEP 2 - Calculate UCL basement air concentration

Analyte	Soil Emission rate (g/sec)	Bldg Entry Rate (g/sec)	Ventilation rate (hr ⁻¹)	Bldg volume (m ³)	Bldg air conc (mg/m ³)
1,1,1-Trichloroethane	7.36E-06	7.36E-07	1	283	7.22E-09
Trichloroethene	2.36E-06	2.36E-07	1	283	2.32E-09
Toluene	9.64E-06	9.64E-07	1	283	9.45E-09
Tetrachloroethene	1.26E-05	1.26E-06	1	283	1.23E-08
Ethyl benzene	2.69E-05	2.69E-06	1	283	2.63E-08
Xylenes	9.77E-02	9.77E-03	1	283	9.59E-05

STEP 3 - Risk Calculations

CARCINOGENS - AVERAGE INHALATION EXPOSURE: Adults

Compound	Air conc (mg/m ³)	Inhalation rate (m ³ /hr)	Body weight (kg)	Yrs exp Yrs ft	Wks exp year	ADD	SF	Risk (ADD*SF)	% total risk
Trichloroethene	5.79E-10	0.83	70	0.129	50	1.21E-13	1.70E-02	2.06E-15	59.94%
Tetrachloroethene	3.65E-09	0.83	70	0.129	50	7.63E-13	1.80E-03	1.37E-15	40.06%
						Total Risk		3.43E-15	

CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE

Compound	Air conc (mg/m ³)	Inhalation rate (m ³ /hr)	Body weight (kg)	Yrs exp Yrs ft	Wks exp year	CDI	SF	Risk (CDI*SF)	% total risk
Trichloroethene	2.32E-09	1.25	70	0.286	50	1.62E-12	1.70E-02	2.76E-14	63.96%
Tetrachloroethene	1.23E-08	1.25	70	0.286	50	8.62E-12	1.80E-03	1.55E-14	36.04%
						Total Risk		4.31E-14	

TABLE H-20 (cont)

NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE: Adults

[illegible]

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE

[illegible]

NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE; Child

Analyte	Air conc (mg/m ³)	Inhalation rate (m ³ /hr)	Body weight (kg)	Yrs exp Yrs ft	Wks exp year	CDI	RfD	CD/RfD	% Total Hazard
1,1,1-Trichloroethane	1.61E-09	0.9	35	0.129	50	7.31E-13	3.00E-01	2.44E-12	0.10%
Toluene	3.32E-09	0.9	35	0.129	50	1.50E-12	1.10E-01	1.37E-11	0.56%
Tetrachlorobutene	3.65E-09	0.9	35	0.129	50	1.66E-12	1.00E-02	1.66E-10	6.79%
Ethyl benzene	6.44E-09	0.9	35	0.129	50	2.92E-12	2.90E-01	1.01E-11	0.41%
Xylenes	9.93E-06	0.9	35	0.129	50	4.50E-09	2.00E+00	2.25E-09	92.14%
								HAZARD INDEX	2.44E-09

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE: Child

[illegible]

TABLE H-21. RESIDENTIAL USE OF GROUNDWATER - INGESTION PATHWAY (FS-5)
FUTURE-USE SCENARIO - Off-Site Upper Bedrock Well Use

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

										= Chronic Daily Intake (mg/kg-day)		
Water Conc	x	Intake	x	Fraction absorbed	x	1 Body weight	x	Yrs exposed Years lifetime				
mg/L	x	1.4 L/day	x	1.0	x	1 70 kg	x	9 yrs 70 yrs	= CDI			
Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI	SF	RISK (CDI*SF)	% TOTAL RISK			
Trichloroethene	8.50E-03	1.4	1.0	70	0.129	2.19E-05	1.10E-02	2.41E-07	100.00%			
TOTAL RISK									2.41E-07			

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

[illegible]

Note: Database from wells MW-71 and MW-161 (Round 2 only).

TABLE H-21 (Continued)

p 3 of 3

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water x Intake x Fraction x				Yrs exposed =				CDI (mg/kg-day)			% TOTAL HAZARD
	Conc	(L/day)	absorbed	Body weight	Body Wt (kg)	Years lifetime	Years lifetime		CDI	RfD	CDI/RfD	
1,2-Dichloroethene	2.00E-01	2	1.0	70	70	4.29E-01	4.29E-01		5.71E-03	2.00E-02	2.86E-01	12.41%
Xylenes	4.80E-01	2	1.0	70	70	4.29E-01	4.29E-01		1.37E-02	2.00E-02	6.86E-03	0.30%
o-Toluic acid	8.40E+01	2	1.0	70	70	4.29E-01	4.29E-01		2.40E+00	3.00E+00	8.00E-01	34.75%
m-Toluic acid	4.20E+01	2	1.0	70	70	4.29E-01	4.29E-01		1.20E+00	3.00E+00	4.00E-01	17.38%
p-Toluic acid	1.80E+01	2	1.0	70	70	4.29E-01	4.29E-01		5.14E-01	3.00E+00	1.71E-01	7.45%
Arsenic	1.14E-01	2	0.05	70	70	4.29E-01	4.29E-01		1.63E-04	3.00E-04	5.43E-01	23.58%
Barium	8.38E-01	2	0.06	70	70	4.29E-01	4.29E-01		1.44E-03	7.00E-02	2.05E-02	0.89%
Cadmium	1.21E-02	2	0.05	70	70	4.29E-01	4.29E-01		1.73E-05	5.00E-02	3.46E-02	1.50%
Lead	3.17E-02	2	0.05	70	70	4.29E-01	4.29E-01		4.53E-05	3.00E-02	1.51E-03	0.07%
Vanadium	1.88E-01	2	0.05	70	70	4.29E-01	4.29E-01		2.69E-04	7.00E-03	3.84E-02	1.67%

HAZARD INDEX 2.30E+00

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Child (0-17 years)

Compound	Water x Intake x Fraction x				Yrs exposed =				CDI (mg/kg-day)			% TOTAL HAZARD
	Conc	(L/day)	absorbed	Body weight	Body Wt (kg)	Years lifetime	Years lifetime		CDI	RfD	CDI/RfD	
1,2-Dichloroethene	2.00E-01	2	1.0	35	35	1.29E-01	1.29E-01		1.47E-03	2.00E-02	7.37E-02	12.39%
Xylenes	4.80E-01	2	1.0	35	35	1.29E-01	1.29E-01		3.54E-03	2.00E+00	1.77E-03	0.30%
o-Toluic acid	8.40E+01	2	1.0	35	35	1.29E-01	1.29E-01		6.19E-01	3.00E+00	2.06E-01	34.70%
m-Toluic acid	4.20E+01	2	1.0	35	35	1.29E-01	1.29E-01		3.10E-01	3.00E+00	1.03E-01	17.35%
p-Toluic acid	1.80E+01	2	1.0	35	35	1.29E-01	1.29E-01		1.33E-01	3.00E+00	4.42E-02	7.44%
Arsenic	1.14E-01	2	0.05	35	35	1.29E-01	1.29E-01		4.20E-05	3.00E-04	1.40E-01	23.54%
Barium	8.38E-01	2	0.05	35	35	1.29E-01	1.29E-01		3.09E-04	7.00E-02	4.41E-03	0.74%
Cadmium	1.21E-02	2	0.06	35	35	1.29E-01	1.29E-01		5.35E-06	5.00E-04	1.07E-02	1.80%
Lead	3.17E-02	2	0.06	35	35	1.29E-01	1.29E-01		1.40E-05	3.00E-02	4.67E-04	0.08%
Vanadium	1.88E-01	2	0.05	35	35	1.29E-01	1.29E-01		6.93E-05	7.00E-03	9.90E-03	1.66%

HAZARD INDEX 5.95E-01

TABLE H-22. RESIDENTIAL USE OF GROUNDWATER - INGESTION PATHWAY
FUTURE-USE SCENARIO - Off-Site Deep Bedrock Well Use

p 1 of 3

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

		= Chronic Daily Intake (mg/kg-day)								
Group	Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Adults	Trichloroethene	4.00E-03	1.4	1.0	70	0.129	1.03E-05	1.10E-02	1.14E-07	10.97%
	Tetrachloroethene	7.00E-03	1.4	1.0	70	0.129	1.81E-05	5.10E-02	9.21E-07	89.03%
TOTAL RISK									1.03E-06	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Group	Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Yrs Exposed Yrs Lifetime	Chronic Daily Intake (mg/kg-day)		% TOTAL RISK	
							CDI	RISK (CDI*SF)		
Adults	Trichloroethene Tetrachloroethene	4.00E-03	2	1.0	70	0.429	4.90E-05	1.10E-02	5.39E-07	10.97%
		7.00E-03	2	1.0	70	0.429	8.58E-05	5.10E-02	4.38E-06	89.03%
							TOTAL RISK		4.92E-06	

Note: Database from wells MW-7D, MW-16D and MW-17D (Round 2 only)

TABLE H-22 (Continued)

p 2 of 3

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Group	Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Adults	Acetone	1.90E-02	1.4	1.0	70	0.129	3.80E-04	1.00E-01	3.80E-03	1.25%
	1,1-Dichloroethane	5.00E-03	1.4	1.0	70	0.129	1.00E-04	1.00E-02	1.00E-02	3.28%
	1,2-Dichloroethane	4.00E-03	1.4	1.0	70	0.129	8.00E-05	2.00E-02	4.00E-03	1.31%
	Tetrachloroethene	1.13E-01	1.4	1.0	70	0.129	2.27E-03	2.00E+00	1.13E-03	2.63%
	Xylenes	6.70E-03	1.4	1.0	70	0.129	1.34E-04	5.00E-02	2.68E-03	0.37%
	2-Methylphenol	2.83E-02	1.4	1.0	70	0.129	5.66E-04	3.00E-02	1.89E-02	0.88%
	Pentachlorophenol	5.68E+00	1.4	1.0	70	0.129	1.14E-01	3.00E+00	3.79E-02	6.19%
	m-Toluic acid	5.68E+00	1.4	1.0	70	0.129	1.14E-01	3.00E+00	3.79E-02	12.43%
	p-Toluic acid	4.50E-01	1.4	1.0	70	0.129	9.00E-03	3.00E+00	3.00E-03	12.43%
	Arsenic	5.03E-02	1.4	0.05	70	0.129	5.03E-05	3.00E-04	1.68E-01	0.98%
	Cadmium	4.00E-03	1.4	0.06	70	0.129	4.80E-06	5.00E-04	9.60E-03	55.03%
	Lead	5.30E-03	1.4	0.05	70	0.129	5.30E-06	3.00E-02	1.77E-04	3.15%
										0.06%

HAZARD INDEX 3.05E-01

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child (0-17 years)

Group	Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Child	Acetone	1.90E-02	1.15	1.0	35	0.129	8.03E-05	1.00E-01	8.03E-04	1.25%
	1,1-Dichloroethane	5.00E-03	1.15	1.0	35	0.129	2.11E-05	1.00E-02	2.11E-03	3.28%
	1,2-Dichloroethane	4.00E-03	1.15	1.0	35	0.129	1.69E-05	2.00E-02	8.45E-04	1.31%
	Tetrachloroethene	1.13E-01	1.15	1.0	35	0.129	1.69E-05	1.00E-02	1.69E-03	2.63%
	Xylenes	6.70E-03	1.15	1.0	35	0.129	4.79E-04	2.00E+00	2.39E-04	0.37%
	2-Methylphenol	2.83E-02	1.15	1.0	35	0.129	2.83E-05	5.00E-02	5.66E-04	0.88%
	Pentachlorophenol	5.68E+00	1.15	1.0	35	0.129	1.20E-04	3.00E-02	3.99E-03	6.19%
	m-Toluic acid	5.68E+00	1.15	1.0	35	0.129	2.40E-02	3.00E+00	8.00E-03	12.43%
	p-Toluic acid	4.50E-01	1.15	1.0	35	0.129	1.90E-03	3.00E+00	6.34E-04	12.43%
	Arsenic	5.03E-02	1.15	0.05	35	0.129	1.06E-05	3.00E-04	3.54E-02	0.98%
	Cadmium	4.00E-03	1.15	0.06	35	0.129	1.01E-06	5.00E-04	2.03E-03	55.03%
	Lead	5.30E-03	1.15	0.05	35	0.129	1.12E-06	3.00E-02	3.73E-05	3.15%
										0.06%

HAZARD INDEX 6.44E-02

TABLE H-22 (Continued)

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NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Group	Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
		mg/L	x 2 L/day	x 1.0	x $\frac{1}{70}$ kg	x $\frac{30}{70}$	= CDI (mg/kg-day)			
Adults	Acetone	4.51E-02	2	1.0	70	0.429	1.29E-03	1.00E-01	1.29E-02	1.13%
	1,1-Dichloroethane	5.00E-03	2	1.0	70	0.429	1.43E-04	1.00E-02	1.43E-02	1.25%
	1,2-Dichloroethene	4.00E-03	2	1.0	70	0.429	1.14E-04	2.00E-02	5.71E-03	0.50%
	Tetrachloroethene	4.00E-03	2	1.0	70	0.429	1.14E-04	1.00E-02	1.14E-02	1.00%
	Xylenes	3.15E-01	2	1.0	70	0.429	9.01E-03	2.00E+00	4.50E-03	0.40%
	2-Methylphenol	9.80E-03	2	1.0	70	0.429	2.80E-04	5.00E-02	5.60E-03	0.49%
	Pentachlorophenol	5.78E-02	2	1.0	70	0.429	1.65E-03	3.00E-02	5.50E-02	4.83%
	o-Toluic acid	1.62E+01	2	1.0	70	0.429	4.64E-01	3.00E+00	1.55E-01	13.57%
	m-Toluic acid	1.24E+00	2	1.0	70	0.429	4.64E-01	3.00E+00	1.55E-01	13.57%
	p-Toluic acid	1.42E-01	2	0.05	70	0.429	3.55E-02	3.00E+00	1.18E-02	1.04%
	Arsenic	8.80E-03	2	0.06	70	0.429	2.03E-04	3.00E-04	6.78E-01	59.51%
	Cadmium	1.06E-02	2	0.05	70	0.429	1.51E-05	5.00E-04	3.02E-02	2.65%
	Lead						1.51E-05	3.00E-02	5.05E-04	0.04%

HAZARD INDEX 1.14E+00

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child (0-17 years)

Group	Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
		mg/L	x 2 L/day	x 1.0	x $\frac{1}{35}$ kg	x $\frac{9}{70}$	= CDI (mg/kg-day)			
Child	Acetone	4.51E-02	2	1.0	35	0.129	3.31E-04	1.00E-01	3.31E-03	1.13%
	1,1-Dichloroethane	5.00E-03	2	1.0	35	0.129	3.67E-05	1.00E-02	3.67E-03	1.25%
	1,2-Dichloroethene	4.00E-03	2	1.0	35	0.129	2.94E-05	2.00E-02	1.47E-03	0.50%
	Tetrachloroethene	4.00E-03	2	1.0	35	0.129	2.94E-05	1.00E-02	2.94E-03	1.00%
	Xylenes	3.15E-01	2	1.0	35	0.129	2.32E-03	2.00E+00	1.16E-03	0.40%
	2-Methylphenol	9.80E-03	2	1.0	35	0.129	7.20E-05	5.00E-02	1.44E-03	0.49%
	Pentachlorophenol	5.78E-02	2	1.0	35	0.129	4.25E-04	3.00E-02	1.42E-02	4.83%
	o-Toluic acid	1.62E+01	2	1.0	35	0.129	1.19E-01	3.00E+00	3.97E-02	13.57%
	m-Toluic acid	1.62E+01	2	1.0	35	0.129	1.19E-01	3.00E+00	3.97E-02	13.57%
	p-Toluic acid	1.24E+00	2	1.0	35	0.129	9.12E-03	3.00E+00	3.04E-03	1.04%
	Arsenic	1.42E-01	2	0.05	35	0.129	5.23E-05	3.00E-04	1.74E-01	59.51%
	Cadmium	8.80E-03	2	0.06	35	0.129	3.88E-06	5.00E-04	7.76E-03	2.65%
	Lead	1.06E-02	2	0.05	35	0.129	3.89E-06	3.00E-02	1.30E-04	0.04%

HAZARD INDEX 2.93E-01

TABLE H-23. RESIDENTIAL USE OF GROUNDWATER - INGESTION PATHWAY (FS-5)
FUTURE-USE SCENARIO - Off-Site Mixed Bedrock Well Use

p 1 of 3

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Water Conc		Intake		Fraction absorbed		Body weight		Yrs exposed		Chronic Daily Intake (mg/kg-day)		% TOTAL RISK
	mg/L	x	1.4 L/day	x	1.0	x	1	x	70 kg	70 yrs	CDI	RISK (CDI*SF)	
Trichloroethene	8.50E-03		1.4		1.0					0.129	2.19E-05	1.10E-02	14.29%
Tetrachloroethene	1.10E-02		1.4		1.0					0.129	2.84E-05	5.10E-02	85.71%
TOTAL RISK												1.69E-06	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Water Conc	x	Intake (L/day)	x	Fraction absorbed	x	1	Body weight	x	Yrs Exposed Yrs Lifetime	=	Chronic Daily Intake (mg/kg-day)	RISK		% TOTAL RISK
													CDI	SF	
Trichloroethene	1.19E-02		2		1.0				70	0.429		1.46E-04	1.10E-02	1.60E-06	18.92%
Tetrachloroethene	1.10E-02		2		1.0				70	0.429		1.35E-04	5.10E-02	6.88E-06	81.08%
TOTAL RISK														8.48E-06	

Note: Database from wells MW-7I, MW-16I, MW-7D, MW-16D and MW-17D (Round 2 only).

TABLE H-23 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water x Intake x Fraction x $\frac{1}{\text{Body weight}}$ x Yrs exposed =						CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
	Conc	(L/day)	absorbed	Body Wt (kg)	Years lifetime					
	mg/L	x 1.4 L/day	x 1.0	x $\frac{1}{70 \text{ kg}}$	x $\frac{9}{70}$	=	CDI (mg/kg-day)			
1,2-Dichloroethene	1.12E-01	1.4	1.0	70	1.29E-01		2.23E-03	2.00E-02	1.11E-01	18.85%
Tetrachloroethene	1.10E-02	1.4	1.0	70	1.29E-01		2.20E-04	1.00E-02	2.20E-02	3.72%
o-Toluic acid	1.80E+01	1.4	1.0	70	1.29E-01		3.60E-01	3.00E+00	1.20E-01	20.29%
m-Toluic acid	1.23E+01	1.4	1.0	70	1.29E-01		2.46E-01	3.00E+00	8.19E-02	13.84%
p-Toluic acid	3.54E+00	1.4	1.0	70	1.29E-01		7.08E-02	3.00E+00	2.36E-02	3.99%
Arsenic	6.24E-02	1.4	0.05	70	1.29E-01		6.24E-05	3.00E-04	2.08E-01	35.16%
Barium	2.07E-01	1.4	0.05	70	1.29E-01		2.07E-04	7.00E-02	2.96E-03	0.50%
Cadmium	5.10E-03	1.4	0.06	70	1.29E-01		6.12E-06	5.00E-04	1.22E-02	2.07%
Lead	1.30E-02	1.4	0.05	70	1.29E-01		1.30E-05	3.00E-02	4.33E-04	0.07%
Vanadium	6.22E-02	1.4	0.05	70	1.29E-01		6.22E-05	7.00E-03	8.89E-03	1.50%

HAZARD INDEX 5.92E-01

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child (0-17 years)

Compound	Water x Intake x Fraction x $\frac{1}{\text{Body weight}}$ x Yrs exposed =						CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
	Conc	(L/day)	absorbed	Body Wt (kg)	Years lifetime					
	mg/L	x 1.15 L/day	x 1.0	x $\frac{1}{35 \text{ kg}}$	x $\frac{9}{70}$	=	CDI (mg/kg-day)			
1,2-Dichloroethene	1.12E-01	1.15	1.0	35	1.29E-01		4.73E-04	2.00E-02	2.36E-02	18.73%
Tetrachloroethene	1.10E-02	1.15	1.0	35	1.29E-01		4.66E-05	1.00E-02	4.66E-03	3.69%
o-Toluic acid	1.80E+01	1.15	1.0	35	1.29E-01		7.63E-02	3.00E+00	2.54E-02	20.16%
m-Toluic acid	1.23E+01	1.15	1.0	35	1.29E-01		5.21E-02	3.00E+00	1.74E-02	13.75%
p-Toluic acid	3.54E+00	1.15	1.0	35	1.29E-01		1.50E-02	3.00E+00	5.00E-03	3.96%
Arsenic	6.24E-02	1.15	0.05	35	1.29E-01		1.32E-05	3.00E-04	4.41E-02	34.93%
Barium	2.07E-01	1.15	0.05	35	1.29E-01		4.39E-05	7.00E-02	6.27E-04	0.50%
Cadmium	5.10E-03	1.15	0.06	35	1.29E-01		1.30E-06	5.00E-04	2.59E-03	2.06%
Lead	1.30E-01	1.15	0.05	35	1.29E-01		2.76E-05	3.00E-02	9.18E-04	0.73%
Vanadium	6.22E-02	1.15	0.05	35	1.29E-01		1.32E-05	7.00E-03	1.88E-03	1.49%

HAZARD INDEX 1.26E-01

TABLE H-23 (Continued)

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NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	1.98E-01	2	1.0	70	4.29E-01	5.67E-03	2.00E-02	2.83E-01	13.81%
Tetrachloroethene	1.10E-02	2	1.0	70	4.29E-01	3.14E-04	1.00E-02	3.14E-02	1.53%
o-Toluidic acid	6.40E+01	2	1.0	70	4.29E-01	1.83E+00	3.00E+00	6.10E-01	29.70%
m-Toluidic acid	4.20E+01	2	1.0	70	4.29E-01	1.20E+00	3.00E+00	4.00E-01	19.49%
p-Toluidic acid	1.60E+01	2	1.0	70	4.29E-01	4.57E-01	3.00E+00	1.52E-01	7.43%
Arsenic	1.08E-01	2	0.05	70	4.29E-01	1.55E-04	3.00E-04	5.16E-01	25.13%
Barium	3.85E-01	2	0.05	70	4.29E-01	5.50E-04	7.00E-02	7.86E-03	0.38%
Cadmium	8.70E-03	2	0.06	70	4.29E-01	1.49E-05	5.00E-04	2.98E-02	1.45%
Lead	2.20E-02	2	0.05	70	4.29E-01	3.14E-05	3.00E-02	1.05E-03	0.05%
Vanadium	1.02E-01	2	0.05	70	4.29E-01	1.46E-04	7.00E-03	2.09E-02	1.02%

HAZARD INDEX 2.05E+00

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child (0-17 years)

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	1.98E-01	2	1.0	35	1.29E-01	1.46E-03	2.00E-02	7.31E-02	13.41%
Tetrachloroethene	1.10E-02	2	1.0	35	1.29E-01	8.11E-05	1.00E-02	8.11E-03	1.49%
o-Toluidic acid	6.40E+01	2	1.0	35	1.29E-01	4.72E-01	3.00E+00	1.57E-01	28.83%
m-Toluidic acid	4.20E+01	2	1.0	35	1.29E-01	3.10E-01	3.00E+00	1.03E-01	18.92%
p-Toluidic acid	1.60E+01	2	1.0	35	1.29E-01	1.18E-01	3.00E+00	3.93E-02	7.21%
Arsenic	1.08E-01	2	0.05	35	1.29E-01	3.99E-05	3.00E-04	1.33E-01	24.40%
Barium	3.85E-01	2	0.05	35	1.29E-01	1.42E-04	7.00E-02	2.03E-03	0.37%
Cadmium	8.70E-03	2	0.06	35	1.29E-01	3.85E-06	5.00E-04	7.70E-03	1.41%
Lead	2.20E-02	2	0.05	35	1.29E-01	8.11E-06	5.00E-04	1.62E-02	2.97%
Vanadium	1.02E-01	2	0.05	35	1.29E-01	3.77E-05	7.00E-03	5.39E-03	0.99%

HAZARD INDEX 5.45E-01

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x Yrs lifetime	Skin Surface area	1 Body wt	1 liter 1000 cm ³	= CDI	%	TOTAL RISK							
	mg/L	x	cm/hr	x	2.6 hrs day	x	26 days year	x	9 yrs 70 yrs	x	18,500 cm ²	x	1/70 kg	x	1/1000	= CDI		
Trichloroethene	8.50E-03	8.00E-04	2.6	26	0.129	18,150	70	1.53E-05	1.10E-02	1.69E-07	100.00%							
											TOTAL RISK	1.69E-07						

[illegible]

TABLE H-24 (Continued)

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	1.12E-01	8.00E-04	2.6	26	0.129	18,150	70	2.02E-04	1.00E-01	2.02E-03	4.67%
Xylenes	3.95E-01	8.00E-04	2.6	26	0.129	18,150	70	7.12E-04	2.00E+00	3.56E-04	0.82%
o-Toluic acid	3.43E+01	8.00E-04	2.6	26	0.129	18,150	70	6.18E-02	3.00E+00	2.06E-02	47.64%
m-Toluic acid	2.16E+01	8.00E-04	2.6	26	0.129	18,150	70	3.89E-02	3.00E+00	1.30E-02	30.00%
p-Toluic acid	8.10E+00	8.00E-04	2.6	26	0.129	18,150	70	1.46E-02	2.00E+00	7.30E-03	16.87%

HAZ INDEX 4.33E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	2.00E-01	8.00E-04	2.6	45	0.129	9,400	35	6.46E-04	1.00E-01	6.46E-03	8.48%
Xylenes	4.80E-01	8.00E-04	2.6	45	0.129	9,400	35	1.55E-03	2.00E+00	7.76E-04	1.02%
o-Toluic acid	3.43E+01	8.00E-04	2.6	45	0.129	9,400	35	1.11E-01	3.00E+00	3.70E-02	48.50%
m-Toluic acid	2.16E+01	8.00E-04	2.6	45	0.129	9,400	35	6.98E-02	3.00E+00	2.33E-02	30.54%
p-Toluic acid	8.10E+00	8.00E-04	2.6	45	0.129	9,400	35	2.62E-02	3.00E+00	8.73E-03	11.45%

HAZ INDEX 7.62E-02

TABLE H-24 (Continued)

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Perm (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x 1000 cm ³	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	2.00E-01	8.00E-04	2.6	26	0.429	18,150	70	1.20E-03	1.00E-01	1.20E-02	3.98%
Xylenes	4.80E-01	8.00E-04	2.6	26	0.429	18,150	70	2.88E-03	2.00E+00	1.44E-03	0.48%
o-Toluic acid	8.40E+01	8.00E-04	2.6	26	0.429	18,150	70	5.05E-01	3.00E+00	1.68E-01	55.73%
m-Toluic acid	4.20E+01	8.00E-04	2.6	26	0.429	18,150	70	2.52E-01	3.00E+00	8.41E-02	27.87%
p-Toluic acid	1.80E+01	8.00E-04	2.6	26	0.429	18,150	70	1.08E-01	3.00E+00	3.61E-02	11.94%

HAZ INDEX 3.02E-01

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Perm (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x 1000 cm ³	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	2.00E-01	8.00E-04	2.6	45	0.129	9,400	35	6.46E-04	1.00E-01	6.46E-03	2.14%
Xylenes	4.80E-01	8.00E-04	2.6	45	0.129	9,400	35	1.55E-03	2.00E+00	7.76E-04	0.26%
o-Toluic acid	8.40E+01	8.00E-04	2.6	45	0.129	9,400	35	2.71E-01	3.00E+00	9.05E-02	29.97%
m-Toluic acid	4.20E+01	8.00E-04	2.6	45	0.129	9,400	35	1.36E-01	3.00E+00	4.52E-02	14.99%
p-Toluic acid	1.80E+01	8.00E-04	2.6	45	0.129	9,400	35	5.82E-02	3.00E+00	1.94E-02	6.42%

HAZ INDEX 1.62E-01

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc mg/L	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x	Skin Surface area x	1 Body wt	1 liter 1000 cm ³	CDI	RISK	% TOTAL RISK
Trichloroethene Tetrachloroethene	4.00E-03	8.00E-04	2.6	26	0.129	18,150	70	7.21E-06	1.10E-02	7.93E-08	10.97%
	7.00E-03	8.00E-04	2.6	26	0.129	18,150	70	1.26E-05	5.10E-02	6.44E-07	89.03%
TOTAL RISK										7.23E-07	

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

[illegible]

TABLE H-25. Continued

p 3 of 3

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
Acetone	4.51E-02	8.00E-04	2.6	26	0.429	18,150	70	2.71E-04	1.00E-01	2.71E-03	22.45%
1,2-Dichloroethene	4.00E-03	8.00E-04	2.6	26	0.429	18,150	70	2.40E-05	2.00E-02	1.20E-03	9.96%
1,1-Dichloroethane	5.00E-03	8.00E-04	2.6	26	0.429	18,150	70	3.00E-05	1.00E-02	3.00E-03	24.89%
Tetrachloroethene	7.00E-03	8.00E-04	2.6	26	0.429	18,150	70	4.21E-05	1.00E-02	4.21E-03	34.85%
Xylenes	3.15E-01	8.00E-04	2.6	26	0.429	18,150	70	1.89E-03	2.00E+00	9.46E-04	7.84%

HAZ INDEX 1.21E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
Acetone	4.51E-02	8.00E-04	2.6	45	0.129	9,400	35	1.46E-04	2.00E-02	7.29E-03	60.38%
1,2-Dichloroethene	4.00E-03	8.00E-04	2.6	45	0.129	9,400	35	1.29E-05	1.00E-02	1.29E-03	10.71%
1,1-Dichloroethane	5.00E-03	8.00E-04	2.6	45	0.129	9,400	35	1.62E-05	3.00E+00	5.39E-06	0.04%
Tetrachloroethene	7.00E-03	8.00E-04	2.6	45	0.129	9,400	35	2.26E-05	3.00E+00	7.54E-06	0.06%
Xylenes	3.15E-01	8.00E-04	2.6	45	0.129	9,400	35	1.02E-03	3.00E+00	3.39E-04	2.81%

HAZ INDEX 8.93E-03

**TABLE H-26. DERMAL CONTACT WITH GROUNDWATER WHILE SWIMMING - Residential Exposure
FUTURE-USE SCENARIO - Off-Site Mixed Bedrock Wells**

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

[illegible]

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x	Skin Surface area x	1 Body wt	1 liter 1000 cm ³	CDI	%	TOTAL RISK
Trichloroethene	1.19E-02	8.00E-04	2.6	26	0.429	18,150	70	7.15E-05	1.10E-02	7.87E-07	18.92%
	1.10E-02	8.00E-04	2.6	26	0.429	18,150	70	6.61E-05	5.10E-02	3.37E-06	81.08%
TOTAL RISK										4.16E-06	

TABLE H-26 (Continued)

p 2 of 3

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	1.12E-01	8.00E-04	2.6	26	0.129	18,150	70	2.02E-04	2.00E-02	1.01E-02	31.15%
Tetrachloroethene	1.10E-02	8.00E-04	2.6	26	0.129	18,150	70	1.98E-05	1.00E-02	1.98E-03	6.12%
o-Toluic acid	1.80E+01	8.00E-04	2.6	26	0.129	18,150	70	3.25E-02	3.00E+00	1.08E-02	33.37%
m-Toluic acid	1.23E+01	8.00E-04	2.6	26	0.129	18,150	70	2.22E-02	3.00E+00	7.39E-03	22.80%
p-Toluic acid	3.54E+00	8.00E-04	2.6	26	0.129	18,150	70	6.38E-03	3.00E+00	2.13E-03	6.56%

HAZ INDEX 3.24E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal Permability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	1.12E-01	8.00E-04	2.6	45	0.129	9,400	35	3.62E-04	2.00E-02	1.81E-02	31.15%
Tetrachloroethene	1.10E-02	8.00E-04	2.6	45	0.129	9,400	35	3.56E-05	1.00E-02	3.56E-03	6.12%
o-Toluic acid	1.80E+01	8.00E-04	2.6	45	0.129	9,400	35	5.82E-02	3.00E+00	1.94E-02	33.37%
m-Toluic acid	1.23E+01	8.00E-04	2.6	45	0.129	9,400	35	3.98E-02	3.00E+00	1.33E-02	22.80%
p-Toluic acid	3.54E+00	8.00E-04	2.6	45	0.129	9,400	35	1.14E-02	3.00E+00	3.81E-03	6.56%

HAZ INDEX 5.81E-02

TABLE H-26 (Continued)

p 3 of 3

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area x	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	1.98E-01	8.00E-04	2.6	26	0.429	18,150	70	1.19E-03	2.00E-02	5.95E-02	19.16%
Tetrachloroethene	1.10E-02	8.00E-04	2.6	26	0.429	18,150	70	6.61E-05	1.00E-02	6.61E-03	2.13%
o-Toluic acid	6.40E+01	8.00E-04	2.6	26	0.429	18,150	70	3.85E-01	3.00E+00	1.28E-01	41.29%
m-Toluic acid	4.20E+01	8.00E-04	2.6	26	0.429	18,150	70	2.52E-01	3.00E+00	8.41E-02	27.10%
p-Toluic acid	1.60E+01	8.00E-04	2.6	26	0.429	18,150	70	9.62E-02	3.00E+00	3.21E-02	10.32%

HAZ INDEX 3.10E-01

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area x	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	1.98E-01	8.00E-04	2.6	45	0.129	9,400	35	6.40E-04	2.00E-02	3.20E-02	10.31%
Tetrachloroethene	1.10E-02	8.00E-04	2.6	45	0.129	9,400	35	3.56E-05	1.00E-02	3.56E-03	1.15%
o-Toluic acid	6.40E+01	8.00E-04	2.6	45	0.129	9,400	35	2.07E-01	3.00E+00	6.90E-02	22.21%
m-Toluic acid	4.20E+01	8.00E-04	2.6	45	0.129	9,400	35	1.36E-01	3.00E+00	4.52E-02	14.57%
p-Toluic acid	1.60E+01	8.00E-04	2.6	45	0.129	9,400	35	5.17E-02	3.00E+00	1.72E-02	5.55%

HAZ INDEX 1.67E-01

TABLE H-27. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING (FS-7)
FUTURE-USE SCENARIO RESIDENTIAL - OFF-SITE WELLS
Upper Bedrock Wells

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CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	8.5	1	2	3.392

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen' (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Trichloroethene	3.392	10	6	5.653	0.5	15	20	0.927

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	8.5	0.83	5.653	70	0.5	15	20	0.129		2.56E-04	1.70E-02	4.35E-06	100.0%

TOTAL RISK 4.35E-06

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276		12	1	2 4.788

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	4.788	10	6	7.980	0.5	15	20	1.309

• VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	12.0	0.83	7.980	70	0.5	15	20	0.429	1.20E-03	1.70E-02	2.05E-05	100.0%
											TOTAL RISK	2.05E-05

TABLE H-27 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	112	1	2	49.177
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	395	1	2	167.719

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	49.177	10	6	81.961	0.5	15	20	13.448
Xylenes	167.719	10	6	279.532	0.5	15	20	45.865

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	112.0	0.83	81.961	70	0.5	15	20	0.129	0.129	3.71E-03	2.00E-02	1.85E-01	96.7%
Xylenes	395.0	0.83	279.532	70	0.5	15	20	0.129	0.129	1.26E-02	2.00E+00	6.32E-03	3.3%

TOTAL HAZARD INDEX 1.92E-01

TABLE H-27 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	200	1	2	87.815
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	480	1	2	203.811

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	87.815	10	6	146.359	0.5	15	20	24.014
Xylenes	203.811	10	6	339.685	0.5	15	20	55.735

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	200.0	0.83	146.359	70	0.5	15	20	0.429	0.429	2.21E-02	2.00E-02	1.10E+00	97.7%
Xylenes	480.0	0.83	339.685	70	0.5	15	20	0.429	0.429	5.12E-02	2.00E+00	2.56E-02	2.3%

TOTAL HAZARD INDEX 1.13E+00

TABLE H-27 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	112.0	1	2	49.177
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	395	1	2	167.719

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	49.177	10	6	81.961	0.5	15	20	13.448
Xylenes	167.719	10	6	279.532	0.5	15	20	45.865

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	112.0	0.9	81.961	35	0.5	15	20	0.129	0.129	8.04E-03	2.00E-02	4.02E-01	96.70%
Xylenes	395.0	0.9	279.532	35	0.5	15	20	0.129	0.129	2.74E-02	2.00E+00	1.37E-02	3.30%

TOTAL HAZARD INDEX 4.16E-01

TABLE H-27 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	200	1	2	87.815
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	480	1	2	203.811

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	87.815	10	6	146.359	0.5	15	20	24.014
Xylenes	203.811	10	6	339.685	0.5	15	20	55.735

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	200.0	0.9	146.359	35	0.5	15	20	0.129	0.129	1.44E-02	2.00E-02	7.18E-01	97.73%
Xylenes	480.0	0.9	339.685	35	0.5	15	20	0.129	0.129	3.33E-02	2.00E+00	1.67E-02	2.27%

TOTAL HAZARD INDEX 7.35E-01

TABLE H-28. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING (FS-7)
FUTURE-USE SCENARIO RESIDENTIAL - OFF-SITE DEEP BEDROCK WELLS

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	4	1	2	1.596
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	7	1	2	2.575

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Trichloroethene	1.596	10	6	2.660	0.5	15	20	0.436
Tetrachloroethene	2.575	10	6	4.292	0.5	15	20	0.704

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	4.0	0.83	2.660	70	0.5	15	20	0.129	1.20E-04	1.70E-02	2.05E-06	85.4%
Tetrachloroethene	7.0	0.83	4.292	70	0.5	15	20	0.129	1.94E-04	1.80E-03	3.49E-07	14.6%

TOTAL RIS 2.40E-06

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	4	1	2	1.596
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	7	1	2	2.575

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³)*
Trichloroethene	1.596	10	6	2.660	0.5	15	20	0.436
Tetrachloroethene	2.575	10	6	4.292	0.5	15	20	0.704

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	4.0	0.83	2.660	70	0.5	15	20	0.429	4.01E-04	1.70E-02	6.82E-06	85.4%
Tetrachloroethene	7.0	0.83	4.292	70	0.5	15	20	0.429	6.47E-04	1.80E-03	1.16E-06	14.6%
TOTAL RISK											7.98E-06	

TABLE H-28 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	19	1	2	2.049
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4	1	2	1.756
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	5	1	2	2.253
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	7	1	2	2.575
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	113	1	2	47.980

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen' (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.049	10	6	3.414	0.5	15	20	0.560
1,2-Dichloroethene	1.756	10	6	2.927	0.5	15	20	0.480
1,1-Dichloroethene	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	2.575	10	6	4.292	0.5	15	20	0.704
Xylenes	47.980	10	6	79.967	0.5	15	20	13.121

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	CDI (mg/kg-day)	RfD	CD/RfD	% TOTAL HAZARD
Acetone	19.0	0.83	3.414	70	0.5	15	20	0.129	1.54E-04	1.00E-01	1.54E-03	3.3%
1,2-Dichloroethene	4.0	0.83	2.927	70	0.5	15	20	0.129	1.32E-04	2.00E-02	6.62E-03	14.3%
1,1-Dichloroethene	5.0	0.83	3.755	70	0.5	15	20	0.129	1.70E-04	1.00E-02	1.70E-02	36.6%
Tetrachloroethene	7.0	0.83	4.292	70	0.5	15	20	0.129	1.94E-04	1.00E-02	1.94E-02	41.9%
Xylenes	113.0	0.83	79.967	70	0.5	15	20	0.129	3.62E-03	2.00E+00	1.81E-03	3.9%

TOTAL HAZARD INDEX 4.64E-02

TABLE H-28 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	45.1	1	2	4.863
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4	1	2	1.756
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	5	1	2	2.253
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	7	1	2	2.575
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	315	1	2	133.751

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen' (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	4.863	10	6	8.104	0.5	15	20	1.330
1,2-Dichloroethene	1.756	10	6	2.927	0.5	15	20	0.480
1,1-Dichloroethene	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	2.575	10	6	4.292	0.5	15	20	0.704
Xylenes	133.751	10	6	222.918	0.5	15	20	36.576

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CD/RfD	% TOTAL HAZARD
Acetone	45.1	0.83	8.104	70	0.5	15	20	0.429	0.429	1.22E-03	1.00E-01	1.22E-02	7.1%
1,2-Dichloroethene	4.0	0.83	2.927	70	0.5	15	20	0.429	0.429	4.41E-04	2.00E-02	2.21E-02	12.8%
1,1-Dichloroethene	5.0	0.83	3.755	70	0.5	15	20	0.429	0.429	5.66E-04	1.00E-02	5.66E-02	32.8%
Tetrachloroethene	7.0	0.83	4.292	70	0.5	15	20	0.429	0.429	6.47E-04	1.00E-02	6.47E-02	37.5%
Xylenes	315.0	0.83	222.918	70	0.5	15	20	0.429	0.429	3.36E-02	2.00E+00	1.68E-02	9.7%

TOTAL HAZARD INDEX 1.72E-01

TABLE H-28 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	19.0	1	2	2.049
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4.0	1	2	1.756
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	5.0	1	2	2.253
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	7.0	1	2	2.575
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	113	1	2	47.980

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen' (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.049	10	6	3.414	0.5	15	20	0.560
1,2-Dichloroethene	1.756	10	6	2.927	0.5	15	20	0.480
1,1-Dichloroethene	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	2.575	10	6	4.292	0.5	15	20	0.704
Xylenes	47.980	10	6	79.967	0.5	15	20	13.121

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CD/RfD	% TOTAL HAZARD
Acetone	19.0	0.9	3.414	35	0.5	15	20	0.129	0.129	3.35E-04	1.00E-01	3.35E-03	3.33%
1,2-Dichloroethene	4.0	0.9	2.927	35	0.5	15	20	0.129	0.129	2.87E-04	2.00E-02	1.44E-02	14.28%
1,1-Dichloroethene	5.0	0.9	3.755	35	0.5	15	20	0.129	0.129	3.68E-04	1.00E-02	3.68E-02	36.63%
Tetrachloroethene	7.0	0.9	4.292	35	0.5	15	20	0.129	0.129	4.21E-04	1.00E-02	4.21E-02	41.86%
Xylenes	113.0	0.9	79.967	35	0.5	15	20	0.129	0.129	7.84E-03	2.00E+00	3.92E-03	3.90%

TOTAL HAZARD INDEX 1.01E-01

TABLE H-28 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	45.1	1	2	4.863
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4	1	2	1.756
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	5	1	2	2.253
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	7	1	2	2.575
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	315	1	2	133.751

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen' (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	4.863	10	6	8.104	0.5	15	20	1.330
1,2-Dichloroethene	1.756	10	6	2.927	0.5	15	20	0.480
1,1-Dichloroethene	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	2.575	10	6	4.292	0.5	15	20	0.704
Xylenes	133.751	10	6	222.918	0.5	15	20	36.576

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	45.1	0.9	8.104	35	0.5	15	20	0.129	7.95E-04	1.00E-01	7.95E-03	7.09%
1,2-Dichloroethene	4.0	0.9	2.927	35	0.5	15	20	0.129	2.87E-04	2.00E-02	1.44E-02	12.80%
1,1-Dichloroethene	5.0	0.9	3.755	35	0.5	15	20	0.129	3.68E-04	1.00E-02	3.68E-02	32.84%
Tetrachloroethene	7.0	0.9	4.292	35	0.5	15	20	0.129	4.21E-04	1.00E-02	4.21E-02	37.53%
Xylenes	315.0	0.9	222.918	35	0.5	15	20	0.129	2.19E-02	2.00E+00	1.09E-02	9.75%

TOTAL HAZARD INDEX 1.12E-01

**TABLE H-29. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING (FS-7)
FUTURE-USE SCENARIO RESIDENTIAL - OFF-SITE WELLS**

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CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	8.5	1	2	3.392
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	11	1	2	4.047

STEP 2- VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	3.392	10	6	5.653	0.5	15	20	0.927
Tetrachloroethene	4.047	10	6	6.744	0.5	15	20	1.107

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	8.5	0.83	5.653	70	0.5	15	20	0.129	2.56E-04	1.70E-02	4.35E-06	88.8%
Tetrachloroethene	11.0	0.83	6.744	70	0.5	15	20	0.129	3.05E-04	1.80E-03	5.49E-07	11.2%
TOTAL RISK											4.90E-06	

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	11.9	1	2	4.748
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	11	1	2	4.047

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ ·min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	4.748	10	6	7.914	0.5	15	20	1.298
Tetrachloroethene	4.047	10	6	6.744	0.5	15	20	1.107

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc ($\mu\text{g/L}$)	Inh Rate (m^3/min)	VOC Gen ($\mu\text{g}/\text{m}^3\cdot\text{min}$)	Body wt (kg)	Air Exch Rate (min^{-1})	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI ($\text{mg}/\text{kg}\cdot\text{day}$)	SF	RISK ($\text{CDI}\cdot\text{SF}$)	% TOTAL RISK
Trichloroethene	11.9	0.83	7.914	70	0.5	15	20	0.429	1.19E-03	1.70E-02	2.03E-05	91.7%
Tetrachloroethene	11.0	0.83	6.744	70	0.5	15	20	0.429	1.02E-03	1.80E-03	1.83E-06	8.3%
TOTAL RISK											2.21E-05	

TABLE H-29 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1671.26	17.42	45	0.5960	2.543	3.428	27.5	1	2	2.969
1,2-Dichloroethane	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	111.5	1	2	48.957
1,1-Dichloroethane	97	2.29E-02	1292.72	13.47	45	0.5960	13.329	17.968	5	1	2	2.253
Tetrachloroethane	166	2.68E-02	987.88	10.30	45	0.5960	10.201	13.753	11	1	2	4.045
Xylenes	106	5.35E-03	1236.25	12.89	45	0.5960	12.309	16.594	323	1	2	137.230

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.969	10	6	4.949	0.5	15	20	0.812
1,2-Dichloroethane	48.957	10	6	81.595	0.5	15	20	13.388
1,1-Dichloroethane	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethane	4.045	10	6	6.742	0.5	15	20	1.106
Xylenes	137.230	10	6	228.717	0.5	15	20	37.528

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	27.5	0.83	4.949	70	0.5	15	20	0.129	2.24E-04	1.00E-01	2.24E-03	0.9%
1,2-Dichloroethane	111.5	0.83	81.595	70	0.5	15	20	0.129	3.69E-03	2.00E-02	1.85E-01	77.1%
1,1-Dichloroethane	5.0	0.83	3.755	70	0.5	15	20	0.129	1.70E-04	1.00E-02	1.70E-02	7.1%
Tetrachloroethane	11.0	0.83	6.742	70	0.5	15	20	0.129	3.05E-04	1.00E-02	3.05E-02	12.7%
Xylenes	323.0	0.83	228.717	70	0.5	15	20	0.129	1.03E-02	2.00E+00	5.17E-03	2.2%

TOTAL HAZARD INDEX 2.39E-01

TABLE H-29 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1671.26	17.42	45	0.5960	2.543	3.428	47	1	2	5.075
1,2-Dichloroethane	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	188.4	1	2	82.722
1,1-Dichloroethane	97	2.29E-02	1292.72	13.47	45	0.5960	13.329	17.968	5	1	2	2.253
Tetrachloroethane	166	2.68E-02	987.88	10.30	45	0.5960	10.201	13.753	11	1	2	4.045
Xylenes	106	5.35E-03	1236.25	12.89	45	0.5960	12.309	16.594	460.7	1	2	195.733

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	5.075	10	6	8.458	0.5	15	20	1.388
1,2-Dichloroethane	82.722	10	6	137.870	0.5	15	20	22.622
1,1-Dichloroethane	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethane	4.045	10	6	6.742	0.5	15	20	1.106
Xylenes	195.733	10	6	326.222	0.5	15	20	53.526

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	47.0	0.83	8.458	70	0.5	15	20	0.429	0.429	1.28E-03	1.00E-01	1.28E-02	1.0%
1,2-Dichloroethane	188.4	0.83	137.870	70	0.5	15	20	0.429	0.429	2.08E-02	2.00E-02	1.04E+00	84.2%
1,1-Dichloroethane	5.0	0.83	3.755	70	0.5	15	20	0.429	0.429	5.66E-04	1.00E-02	5.66E-02	4.6%
Tetrachloroethane	11.0	0.83	6.742	70	0.5	15	20	0.429	0.429	1.02E-03	1.00E-02	1.02E-01	8.2%
Xylenes	460.7	0.83	326.222	70	0.5	15	20	0.429	0.429	4.92E-02	2.00E+00	2.46E-02	2.0%

TOTAL HAZARD INDEX 1.24E+00

TABLE H-29 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1671.26	17.42	45	0.5960	2.543	3.428	27.5	1	2	2.969
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	111.5	1	2	48.957
1,1-Dichloroethane	97	2.29E-02	1292.72	13.47	45	0.5960	13.329	17.968	5	1	2	2.253
Tetrachloroethene	166	2.68E-02	987.88	10.30	45	0.5960	10.201	13.753	11	1	2	4.045
Xylenes	106	5.35E-03	1236.25	12.89	45	0.5960	12.309	16.594	323	1	2	137.230

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen' (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.969	10	6	4.949	0.5	15	20	0.812
1,2-Dichloroethene	48.957	10	6	81.595	0.5	15	20	13.388
1,1-Dichloroethane	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	4.045	10	6	6.742	0.5	15	20	1.106
Xylenes	137.230	10	6	228.717	0.5	15	20	37.528

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	27.5	0.9	4.949	35	0.5	15	20	0.129	4.85E-04	1.00E-01	4.85E-03	0.93%
1,2-Dichloroethene	111.5	0.9	81.595	35	0.5	15	20	0.129	8.00E-03	2.00E-02	4.00E-01	77.07%
1,1-Dichloroethane	5.0	0.9	3.755	35	0.5	15	20	0.129	3.68E-04	1.00E-02	3.68E-02	7.09%
Tetrachloroethene	11.0	0.9	6.742	35	0.5	15	20	0.129	6.61E-04	1.00E-02	6.61E-02	12.74%
Xylenes	323.0	0.9	228.717	35	0.5	15	20	0.129	2.24E-02	2.00E+00	1.12E-02	2.16%

TOTAL HAZARD INDEX 5.19E-01

TABLE H-29 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1671.26	17.42	45	0.5960	2.543	3.428	47	1	2	5.075
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	188.4	1	2	82.722
1,1-Dichloroethane	97	2.29E-02	1292.72	13.47	45	0.5960	13.329	17.968	5	1	2	2.253
Tetrachloroethene	166	2.68E-02	987.88	10.30	45	0.5960	10.201	13.753	11	1	2	4.045
Xylenes	106	5.35E-03	1236.25	12.89	45	0.5960	12.309	16.594	460.7	1	2	195.733

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen' (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	5.075	10	6	8.458	0.5	15	20	1.388
1,2-Dichloroethene	82.722	10	6	137.870	0.5	15	20	22.622
1,1-Dichloroethane	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	4.045	10	6	6.742	0.5	15	20	1.106
Xylenes	195.733	10	6	326.222	0.5	15	20	53.526

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	47.0	0.9	8.458	35	0.5	15	20	0.129	8.30E-04	1.00E-01	8.30E-03	1.03%
1,2-Dichloroethene	188.4	0.9	137.870	35	0.5	15	20	0.129	1.35E-02	2.00E-02	6.76E-01	84.16%
1,1-Dichloroethane	5.0	0.9	3.755	35	0.5	15	20	0.129	3.68E-04	1.00E-02	3.68E-02	4.58%
Tetrachloroethene	11.0	0.9	6.742	35	0.5	15	20	0.129	6.61E-04	1.00E-02	6.61E-02	8.23%
Xylenes	460.7	0.9	326.222	35	0.5	15	20	0.129	3.20E-02	2.00E+00	1.60E-02	1.99%

TOTAL HAZARD INDEX 8.04E-01

Table H-30. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners)
CALCULATION OF FOOD CHEMICAL CONCENTRATIONS

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Off-Site Groundwater Use - Upper Bedrock (MW-71, 161)

Chemical concentration in root crops (e.g., carrots)

<u>Mean Concentrations</u>					<u>UCL Concentrations</u>				
Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
1,2-Dichloroethene	1.48	1.24	1.15E-01	1.42E-01	1,2-Dichloroethene	1.48	1.24	2.00E-01	2.47E-01
Trichloroethene	2.53	3.50	8.50E-03	2.97E-02	Trichloroethene	2.53	3.50	1.20E-02	4.20E-02
Toluene	2.69	4.38	1.20E-02	5.25E-02	Toluene	2.69	4.38	1.90E-02	8.32E-02
Xylenes	2.95	6.46	3.95E-01	2.55E+00	Xylenes	2.95	6.46	4.90E-01	3.17E+00
Phenol	1.46	1.22	1.45E-02	1.77E-02	Phenol	1.46	1.22	2.40E-02	2.93E-02
2-Methylphenol	1.95	1.78	7.50E-03	1.33E-02	2-Methylphenol	1.95	1.78	1.40E-02	2.49E-02
4-Methylphenol	1.92	1.73	6.40E-03	1.11E-02	4-Methylphenol	1.92	1.73	1.20E-02	2.07E-02
2,4-Dimethylphenol	2.42	3.02	6.00E-04	1.81E-03	2,4-Dimethylphenol	2.42	3.02	6.00E-04	1.81E-03
o-Toluic acid	2.54	3.55	3.43E+01	1.22E+02	o-Toluic acid	2.54	3.55	6.40E+01	2.27E+02
m-Toluic acid	2.37	2.84	2.16E+01	6.13E+01	m-Toluic acid	2.37	2.84	4.20E+01	1.19E+02
p-Toluic acid	2.27	2.51	8.10E+00	2.03E+01	p-Toluic acid	2.27	2.51	1.60E+01	4.02E+01

Chemical concentrations in stems and leaves (e.g., lettuce)

<u>Mean Concentrations</u>					<u>UCL Concentrations</u>				
Chemical	Log Kow	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
1,2-Dichloroethene	1.48	0.76	1.15E-01	8.69E-02	1,2-Dichloroethene	1.48	0.76	2.00E-01	1.51E-01
Trichloroethene	2.53	0.62	8.50E-03	5.29E-03	Trichloroethene	2.53	0.62	1.20E-02	7.47E-03
Toluene	2.69	0.56	1.20E-02	6.70E-03	Toluene	2.69	0.56	1.90E-02	1.06E-02
Xylenes	2.95	0.45	3.95E-01	1.77E-01	Xylenes	2.95	0.45	4.90E-01	2.19E-01
Phenol	1.46	0.75	1.45E-02	1.09E-02	Phenol	1.46	0.75	2.40E-02	1.80E-02
2-Methylphenol	1.95	0.77	7.50E-03	5.81E-03	2-Methylphenol	1.95	0.77	1.40E-02	1.08E-02
4-Methylphenol	1.92	0.78	6.40E-03	4.98E-03	4-Methylphenol	1.92	0.78	1.20E-02	9.33E-03
2,4-Dimethylphenol	2.42	0.66	6.00E-04	3.98E-04	2,4-Dimethylphenol	2.42	0.66	6.00E-04	3.98E-04
o-Toluic acid	2.54	0.62	3.43E+01	2.12E+01	o-Toluic acid	2.54	0.62	6.40E+01	3.96E+01
m-Toluic acid	2.37	0.68	2.16E+01	1.47E+01	m-Toluic acid	2.37	0.68	4.20E+01	2.86E+01
p-Toluic acid	2.27	0.71	8.10E+00	5.75E+00	p-Toluic acid	2.27	0.71	1.60E+01	1.14E+01

TABLE H-30 (Continued)

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Off-Site Groundwater Use - Deep Bedrock (MW-7D, 16D, 17D)

Chemical concentration in root crops (e.g., carrots)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.84	1.96E-02	1.65E-02	Acetone	-0.24	0.84	4.51E-02	3.79E-02
1,1-Dichloroethane	1.79	1.54	5.00E-03	7.71E-03	1,1-Dichloroethane	1.79	1.54	5.00E-03	7.71E-03
1,2-Dichloroethene	1.48	1.24	4.00E-03	4.95E-03	1,2-Dichloroethene	1.48	1.24	4.00E-03	4.95E-03
Trichloroethene	2.53	3.50	4.00E-03	1.40E-02	Trichloroethene	2.53	3.50	4.00E-03	1.40E-02
Tetrachloroethene	2.53	3.50	7.00E-03	2.45E-02	Tetrachloroethene	2.53	3.50	1.07E-02	3.74E-02
Toluene	2.69	4.38	4.00E-03	1.75E-02	Toluene	2.69	4.38	4.00E-03	1.75E-02
Xylenes	2.95	6.46	1.13E-01	7.32E-01	Xylenes	2.95	6.46	3.15E-01	2.04E+00
Phenol	1.46	1.22	1.50E-02	1.83E-02	Phenol	1.46	1.22	3.36E-02	4.11E-02
2-Methylphenol	1.95	1.78	6.70E-03	1.19E-02	2-Methylphenol	1.95	1.78	9.80E-03	1.74E-02
Naphthalene	3.37	12.70	1.00E-03	1.27E-02	Naphthalene	3.37	12.70	1.00E-03	1.27E-02
o-Toluic acid	2.54	3.55	5.68E+00	2.02E+01	o-Toluic acid	2.54	3.55	1.62E+01	5.76E+01
m-Toluic acid	2.37	2.84	5.68E+00	1.61E+01	m-Toluic acid	2.37	2.84	1.62E+01	4.60E+01
p-Toluic acid	2.27	2.51	4.50E-01	1.13E+00	p-Toluic acid	2.27	2.51	1.24E+00	3.12E+00

Chemical concentrations in stems and leaves (e.g., lettuce)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.15	1.96E-02	2.89E-03	Acetone	-0.24	0.15	4.51E-02	6.64E-03
1,1-Dichloroethane	1.79	0.78	5.00E-03	3.92E-03	1,1-Dichloroethane	1.79	0.78	5.00E-03	3.92E-03
1,2-Dichloroethane	1.48	0.76	4.00E-03	3.02E-03	1,2-Dichloroethane	1.48	0.76	4.00E-03	3.02E-03
Trichloroethene	2.53	0.62	4.00E-03	2.49E-03	Trichloroethene	2.53	0.62	4.00E-03	2.49E-03
Tetrachloroethene	2.53	0.62	7.00E-03	4.36E-03	Tetrachloroethene	2.53	0.62	1.07E-02	6.66E-03
Toluene	2.69	0.56	4.00E-03	2.23E-03	Toluene	2.69	0.56	4.00E-03	2.23E-03
Xylenes	2.95	0.45	1.13E-01	5.07E-02	Xylenes	2.95	0.45	3.15E-01	1.41E-01
Phenol	1.46	0.75	1.50E-02	1.13E-02	Phenol	1.46	0.75	3.36E-02	2.53E-02
2-Methylphenol	1.95	0.77	6.70E-03	5.19E-03	2-Methylphenol	1.95	0.77	9.80E-03	7.59E-03
Naphthalene	3.37	0.28	1.00E-03	2.78E-04	Naphthalene	3.37	0.28	1.00E-03	2.78E-04
<i>o</i> -Toluic acid	2.54	0.62	5.68E+00	3.52E+00	<i>o</i> -Toluic acid	2.54	0.62	1.62E+01	1.00E+01
<i>m</i> -Toluic acid	2.37	0.68	5.68E+00	3.86E+00	<i>m</i> -Toluic acid	2.37	0.68	1.62E+01	1.10E+01
<i>p</i> -Toluic acid	2.27	0.71	4.50E-01	3.20E-01	<i>p</i> -Toluic acid	2.27	0.71	1.24E+00	8.82E-01

TABLE H-30 (Continued)

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Off-Site Groundwater Use - Mixed Bedrock (MW-71, 161, 7D, 16D, 17D)

Chemical concentration in root crops (e.g., carrots)

Mean Concentrations		UCL Concentrations				
Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow
Acetone	-0.24	0.84	2.75E-02	2.31E-02	Acetone	-0.24
1,1-Dichloroethane	1.79	1.54	5.00E-03	7.71E-03	1,1-Dichloroethane	1.79
1,2-Dichloroethane	1.48	1.24	1.12E-01	1.38E-01	1,2-Dichloroethane	1.48
Trichloroethane	2.53	3.50	8.50E-03	2.97E-02	Trichloroethane	2.53
Tetrachloroethane	2.53	3.50	1.10E-02	3.85E-02	Tetrachloroethane	2.53
Toluene	2.69	4.38	7.60E-03	3.33E-02	Toluene	2.69
Xylenes	2.95	6.46	3.23E-01	2.09E+00	Xylenes	2.95
Phenol	1.46	1.22	1.48E-02	1.81E-02	Phenol	1.46
2-Methylphenol	1.95	1.78	6.20E-03	1.10E-02	2-Methylphenol	1.95
4-Methylphenol	1.92	1.73	5.50E-03	9.51E-03	4-Methylphenol	1.92
2,4-Dimethylphenol	2.42	3.02	6.00E-04	1.81E-03	2,4-Dimethylphenol	2.42
Naphthalene	3.37	12.70	1.00E-03	1.27E-02	Naphthalene	3.37
o-Toluic acid	2.54	3.55	1.80E+01	6.39E+01	o-Toluic acid	2.54
m-Toluic acid	2.37	2.84	1.23E+01	3.49E+01	m-Toluic acid	2.37
p-Toluic acid	2.27	2.51	3.54E+00	8.89E+00	p-Toluic acid	2.27

Chemical concentrations in stems and leaves (e.g., lettuce)

Mean Concentrations		UCL Concentrations				
Chemical	Log Kow	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow
Acetone	-0.24	0.15	2.75E-02	4.05E-03	Acetone	-0.24
1,1-Dichloroethane	1.79	0.78	5.00E-03	3.92E-03	1,1-Dichloroethane	1.79
1,2-Dichloroethane	1.48	0.76	1.12E-01	8.43E-02	1,2-Dichloroethane	1.48
Trichloroethane	2.53	0.62	8.50E-03	5.29E-03	Trichloroethane	2.53
Tetrachloroethane	2.53	0.62	1.10E-02	6.85E-03	Tetrachloroethane	2.53
Toluene	2.69	0.56	7.60E-03	4.24E-03	Toluene	2.69
Xylenes	2.95	0.45	3.23E-01	1.45E-01	Xylenes	2.95
Phenol	1.46	0.75	1.48E-02	1.11E-02	Phenol	1.46
2-Methylphenol	1.95	0.77	6.20E-03	4.80E-03	2-Methylphenol	1.95
4-Methylphenol	1.92	0.78	5.50E-03	4.28E-03	4-Methylphenol	1.92
2,4-Dimethylphenol	2.42	0.66	6.00E-04	3.98E-04	2,4-Dimethylphenol	2.42
Naphthalene	3.37	0.28	1.00E-03	2.78E-04	Naphthalene	3.37
o-Toluic acid	2.54	0.62	1.80E+01	1.11E+01	o-Toluic acid	2.54
m-Toluic acid	2.37	0.68	1.23E+01	8.35E+00	m-Toluic acid	2.37
p-Toluic acid	2.27	0.71	3.54E+00	2.52E+00	p-Toluic acid	2.27

TABLE H-30 (Continued)

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On-Site Groundwater Use - Upper Bedrock - Round 1 (MW-11, 21, 31, 31 Dup, 41, 51, 61, 71, 71 Dup, 81, 91, 101, 111)

Chemical concentration in root crops (e.g., carrots)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Vinyl chloride	0.60	0.91	3.00E-03	2.72E-03	Vinyl chloride	0.60	0.91	3.00E-03	2.72E-03
Benzene	2.13	2.14	1.00E-03	2.14E-03	Benzene	2.13	2.14	1.00E-03	2.14E-03
1,2-Dichloroethene	1.48	1.24	5.35E-02	6.62E-02	1,2-Dichloroethene	1.48	1.24	8.96E-02	1.11E-01
Trichloroethene	2.53	3.50	3.79E-02	1.33E-01	Trichloroethene	2.53	3.50	7.43E-02	2.60E-01
Toluene	2.69	4.38	2.02E-02	8.85E-02	Toluene	2.69	4.38	3.44E-02	1.51E-01
Xylenes	2.95	6.46	5.82E-01	3.76E+00	Xylenes	2.95	6.46	1.06E+00	6.87E+00
Phenol	1.46	1.22	3.48E-02	4.25E-02	Phenol	1.46	1.22	5.63E-02	6.88E-02
2-Methylphenol	1.95	1.78	1.06E-02	1.88E-02	2-Methylphenol	1.95	1.78	1.51E-02	2.69E-02
4-Methylphenol	1.92	1.73	1.63E-02	2.82E-02	4-Methylphenol	1.92	1.73	2.25E-02	3.89E-02
Benzoic acid	1.87	1.65	6.40E-02	1.06E-01	Benzoic acid	1.87	1.65	1.16E-01	1.92E-01
o-Toluic acid	2.54	3.55	2.28E+01	8.08E+01	o-Toluic acid	2.54	3.55	3.94E+01	1.40E+02
m-Toluic acid	2.37	2.84	1.03E+01	2.93E+01	m-Toluic acid	2.37	2.84	1.89E+01	5.37E+01
p-Toluic acid	2.27	2.51	1.18E+00	2.97E+00	p-Toluic acid	2.27	2.51	2.25E+00	5.64E+00

Chemical concentrations in stems and leaves (e.g., lettuce)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Vinyl chloride	0.60	0.44	1.15E-01	5.10E-02	Vinyl chloride	0.60	0.44	2.00E-01	8.86E-02
Benzene	2.13	0.75	8.50E-03	6.34E-03	Benzene	2.13	0.75	1.20E-02	8.95E-03
1,2-Dichloroethene	1.48	0.76	1.20E-02	9.07E-03	1,2-Dichloroethene	1.48	0.76	1.90E-02	1.44E-02
Trichloroethene	2.53	0.62	3.95E-01	2.46E-01	Trichloroethene	2.53	0.62	4.90E-01	3.05E-01
Toluene	2.69	0.56	1.45E-02	8.10E-03	Toluene	2.69	0.56	2.40E-02	1.34E-02
Xylenes	2.95	0.45	7.50E-03	3.36E-03	Xylenes	2.95	0.45	1.40E-02	6.26E-03
Phenol	1.46	0.75	6.40E-03	4.81E-03	Phenol	1.46	0.75	1.20E-02	9.02E-03
2-Methylphenol	1.95	0.77	6.00E-04	4.65E-04	2-Methylphenol	1.95	0.77	6.00E-04	4.65E-04
4-Methylphenol	1.92	0.78	3.43E+01	2.66E+01	4-Methylphenol	1.92	0.78	6.40E+01	4.98E+01
Benzoic acid	1.87	0.78	3.43E+01	2.68E+01	Benzoic acid	1.87	0.78	6.40E+01	5.00E+01
o-Toluic acid	2.54	0.62	3.43E+01	2.12E+01	o-Toluic acid	2.54	0.62	6.40E+01	3.96E+01
m-Toluic acid	2.37	0.68	2.16E+01	1.47E+01	m-Toluic acid	2.37	0.68	4.20E+01	2.86E+01
p-Toluic acid	2.27	0.71	8.10E+00	5.75E+00	p-Toluic acid	2.27	0.71	1.60E+01	1.14E+01

TABLE H-30 (Continued)

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On-Site Groundwater Use - Upper Bedrock - Round 2 (MW-11, 21, 31, 41, 51, 61, 71, 81, 81 Dup, 91, 101, 111, 121, 131, 141, 181)

Chemical concentration in root crops (e.g., carrots)

Mean Concentrations					UCL Concentrations				
Chemical	Log K _{ow}	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log K _{ow}	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.84	1.59E-02	1.34E-02	Acetone	-0.24	0.84	2.52E-02	2.12E-02
Vinyl chloride	0.60	0.91	1.44E-02	1.31E-02	Vinyl chloride	0.60	0.91	2.10E-02	1.91E-02
1,1-Dichloroethane	1.79	1.54	2.33E-02	3.59E-02	1,1-Dichloroethane	1.79	1.54	4.33E-02	6.68E-02
1,2-Dichloroethene	1.48	1.24	1.44E-01	1.78E-01	1,2-Dichloroethene	1.48	1.24	3.42E-01	4.23E-01
Trichloroethene	2.53	3.50	1.18E-02	4.13E-02	Trichloroethene	2.53	3.50	1.90E-02	6.65E-02
Tetrachloroethene	2.53	3.50	2.87E-02	1.00E-01	Tetrachloroethene	2.53	3.50	5.53E-02	1.94E-01
Benzene	2.13	2.14	4.00E-03	8.55E-03	Benzene	2.13	2.14	4.00E-03	8.55E-03
Toluene	2.69	4.38	1.53E-02	6.70E-02	Toluene	2.69	4.38	2.41E-02	1.06E-01
Xylenes	2.95	6.46	4.54E-01	2.93E+00	Xylenes	2.95	6.46	7.97E-01	5.15E+00
Phenol	1.46	1.22	1.81E-01	2.22E-01	Phenol	1.46	1.22	5.00E-01	6.11E-01
2-Methylphenol	1.95	1.78	8.10E-03	1.44E-02	2-Methylphenol	1.95	1.78	1.25E-02	2.22E-02
4-Methylphenol	1.95	1.78	1.29E-02	2.29E-02	4-Methylphenol	1.95	1.78	2.33E-02	4.14E-02
Naphthalene	3.37	12.70	8.00E-03	1.02E-01	Naphthalene	3.37	12.70	8.00E-03	1.02E-01
o-Toluic acid	2.54	3.55	3.46E+01	1.23E+02	o-Toluic acid	2.54	3.55	7.15E+01	2.54E+02
m-Toluic acid	2.37	2.84	2.18E+01	6.18E+01	m-Toluic acid	2.37	2.84	4.48E+01	1.27E+02
p-Toluic acid	2.27	2.51	2.30E+01	5.76E+01	p-Toluic acid	2.27	2.51	5.60E+01	1.40E+02

Chemical concentrations in stems and leaves (e.g., lettuce)

Mean Concentrations					UCL Concentrations				
Chemical	Log K _{ow}	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log K _{ow}	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.15	1.59E-02	2.34E-03	Acetone	-0.24	0.15	2.52E-02	3.71E-03
Vinyl chloride	0.60	0.44	1.44E-02	6.38E-03	Vinyl chloride	0.60	0.44	2.10E-02	9.30E-03
1,1-Dichloroethane	1.79	0.78	2.33E-02	1.83E-02	1,1-Dichloroethane	1.79	0.78	4.33E-02	3.39E-02
1,2-Dichloroethene	1.48	0.76	1.44E-01	1.09E-01	1,2-Dichloroethene	1.48	0.76	3.42E-01	2.59E-01
Trichloroethene	2.53	0.62	1.18E-02	7.35E-03	Trichloroethene	2.53	0.62	1.90E-02	1.18E-02
Tetrachloroethene	2.53	0.62	2.87E-02	1.79E-02	Tetrachloroethene	2.53	0.62	5.53E-02	3.44E-02
Benzene	2.13	0.75	4.00E-03	2.98E-03	Benzene	2.13	0.75	4.00E-03	2.98E-03
Toluene	2.69	0.56	1.53E-02	8.54E-03	Toluene	2.69	0.56	2.41E-02	1.35E-02
Xylenes	2.95	0.45	4.54E-01	2.03E-01	Xylenes	2.95	0.45	7.97E-01	3.57E-01
Phenol	1.46	0.75	1.81E-01	1.36E-01	Phenol	1.46	0.75	5.00E-01	3.76E-01
2-Methylphenol	1.95	0.77	8.10E-03	6.28E-03	2-Methylphenol	1.95	0.77	1.25E-02	9.68E-03
4-Methylphenol	1.95	0.77	1.29E-02	9.99E-03	4-Methylphenol	1.95	0.77	2.33E-02	1.81E-02
Naphthalene	3.37	0.28	8.00E-03	2.23E-03	Naphthalene	3.37	0.28	8.00E-03	2.23E-03
o-Toluic acid	2.54	0.62	3.46E+01	2.14E+01	o-Toluic acid	2.54	0.62	7.15E+01	4.43E+01
m-Toluic acid	2.37	0.68	2.18E+01	1.48E+01	m-Toluic acid	2.37	0.68	4.48E+01	3.04E+01
p-Toluic acid	2.27	0.71	2.30E+01	1.63E+01	p-Toluic acid	2.27	0.71	5.60E+01	3.98E+01

TABLE H-30 (Continued)

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On-Site Groundwater Use - Deep Bedrock - Round 1 (MW-1D, 2D Split, 3D, 4D, 5D, 6D, 9D, 10D, 11D)

Chemical concentration in root crops (e.g., carrots)

<u>Mean Concentrations</u>					<u>UCL Concentrations</u>				
Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.84	7.80E-03	6.55E-03	Acetone	-0.24	0.84	1.10E-02	9.24E-03
1,1-Dichloroethane	1.79	1.54	2.00E-03	3.08E-03	1,1-Dichloroethane	1.79	1.54	2.00E-03	3.08E-03
1,2-Dichloroethane	1.48	1.24	1.26E-02	1.56E-02	1,2-Dichloroethane	1.48	1.24	3.02E-02	3.73E-02
Trichloroethene	2.53	3.50	2.70E-03	9.45E-03	Trichloroethene	2.53	3.50	3.00E-03	1.05E-02
Tetrachloroethene	2.53	3.50	3.80E-03	1.33E-02	Tetrachloroethene	2.53	3.50	5.10E-03	1.78E-02
Benzene	2.13	2.14	2.50E-03	5.35E-03	Benzene	2.13	2.14	2.60E-03	5.56E-03
Toluene	2.69	4.38	5.20E-03	2.28E-02	Toluene	2.69	4.38	9.10E-03	3.98E-02
Xylenes	2.95	6.46	7.64E-02	4.94E-01	Xylenes	2.95	6.46	1.76E-01	1.14E+00
Phenol	1.46	1.22	6.90E-03	8.43E-03	Phenol	1.46	1.22	1.02E-02	1.25E-02
2-Methylphenol	1.95	1.78	5.20E-03	9.25E-03	2-Methylphenol	1.95	1.78	5.60E-03	9.96E-03
4-Methylphenol	1.92	1.73	5.40E-03	9.33E-03	4-Methylphenol	1.92	1.73	6.20E-03	1.07E-02
2,4-Dimethylphenol	2.42	3.02	7.70E-03	2.33E-02	2,4-Dimethylphenol	2.42	3.02	1.23E-02	3.72E-02
Benzic acid	1.87	1.65	3.07E-02	5.07E-02	Benzic acid	1.87	1.65	4.05E-02	6.69E-02
o-Toluic acid	2.54	3.55	2.91E+00	1.03E+01	o-Toluic acid	2.54	3.55	6.74E+00	2.39E+01
m-Toluic acid	2.37	2.84	1.42E+00	4.04E+00	m-Toluic acid	2.37	2.84	3.20E+00	9.07E+00
p-Toluic acid	2.27	2.51	1.89E-01	4.74E-01	p-Toluic acid	2.27	2.51	3.98E-01	9.99E-01

Chemical concentrations in stems and leaves (e.g., lettuce)

<u>Mean Concentrations</u>					<u>UCL Concentrations</u>				
Chemical	Log Kow	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.15	7.80E-03	1.15E-03	Acetone	-0.24	0.15	1.10E-02	1.62E-03
1,1-Dichloroethane	1.79	0.78	2.00E-03	1.57E-03	1,1-Dichloroethane	1.79	0.78	2.00E-03	1.57E-03
1,2-Dichloroethane	1.48	0.76	1.26E-02	9.52E-03	1,2-Dichloroethane	1.48	0.76	3.02E-02	2.28E-02
Trichloroethene	2.53	0.62	2.70E-03	1.68E-03	Trichloroethene	2.53	0.62	3.00E-03	1.87E-03
Tetrachloroethene	2.53	0.62	3.80E-03	2.37E-03	Tetrachloroethene	2.53	0.62	5.10E-03	3.18E-03
Benzene	2.13	0.75	2.50E-03	1.86E-03	Benzene	2.13	0.75	2.60E-03	1.94E-03
Toluene	2.69	0.56	5.20E-03	2.90E-03	Toluene	2.69	0.56	9.10E-03	5.08E-03
Xylenes	2.95	0.45	7.64E-02	3.42E-02	Xylenes	2.95	0.45	1.76E-01	7.89E-02
Phenol	1.46	0.75	6.90E-03	5.19E-03	Phenol	1.46	0.75	1.02E-02	7.67E-03
2-Methylphenol	1.95	0.77	5.20E-03	4.03E-03	2-Methylphenol	1.95	0.77	5.60E-03	4.34E-03
4-Methylphenol	1.92	0.78	5.40E-03	4.20E-03	4-Methylphenol	1.92	0.78	6.20E-03	4.82E-03
2,4-Dimethylphenol	2.42	0.66	7.70E-03	5.10E-03	2,4-Dimethylphenol	2.42	0.66	1.23E-02	8.15E-03
Benzic acid	1.87	0.78	3.07E-02	2.40E-02	Benzic acid	1.87	0.78	4.05E-02	3.16E-02
o-Toluic acid	2.54	0.62	2.91E+00	1.80E+00	o-Toluic acid	2.54	0.62	6.74E+00	4.17E+00
m-Toluic acid	2.37	0.68	1.42E+00	9.67E-01	m-Toluic acid	2.37	0.68	3.20E+00	2.17E+00
p-Toluic acid	2.27	0.71	1.89E-01	1.34E-01	p-Toluic acid	2.27	0.71	3.98E-01	2.83E-01

TABLE H-30 (Continued)

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On-Site Groundwater Use - Deep Bedrock - Round 2 (MW-7D, 9D, 13D, 15D, 17D)

Chemical concentration in root crops (e.g., carrots)

[UCL Concentrations]					[Mean Concentrations]				
Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.84	1.34E-02	1.13E-02	Acetone	-0.24	0.84	2.64E-02	2.22E-02
1,1-Dichloroethane	1.79	1.54	5.00E-03	7.71E-03	1,1-Dichloroethane	1.79	1.54	5.00E-03	7.71E-03
1,2-Dichloroethane	1.48	1.24	4.00E-03	4.95E-03	1,2-Dichloroethane	1.48	1.24	4.00E-03	4.95E-03
Trichloroethene	2.53	3.50	4.00E-03	1.40E-02	Trichloroethene	2.53	3.50	4.00E-03	1.40E-02
Tetrachloroethene	2.53	3.50	6.20E-03	2.17E-02	Tetrachloroethene	2.53	3.50	8.10E-03	2.83E-02
Toluene	2.69	4.38	4.00E-03	1.75E-02	Toluene	2.69	4.38	4.00E-03	1.75E-02
Xylenes	2.95	6.46	7.00E-02	4.52E-01	Xylenes	2.95	6.46	1.71E-01	1.10E+00
Phenol	1.46	1.22	1.10E-02	1.34E-02	Phenol	1.46	1.22	2.03E-02	2.48E-02
2-Methylphenol	1.95	1.78	6.00E-03	1.07E-02	2-Methylphenol	1.95	1.78	7.60E-03	1.35E-02
Pentachlorophenol	5.01	218.44	2.20E-02	4.81E+00	Pentachlorophenol	5.01	218.44	3.67E-02	8.02E+00
Naphthalene	3.37	12.70	1.00E-03	1.27E-02	Naphthalene	3.37	12.70	1.00E-03	1.27E-02
o-Toluic acid	2.54	3.55	3.42E+00	1.21E+01	o-Toluic acid	2.54	3.55	8.69E+00	3.08E+01
m-Toluic acid	2.37	2.84	3.42E+00	9.71E+00	m-Toluic acid	2.37	2.84	8.69E+00	2.47E+01
p-Toluic acid	2.27	2.51	2.80E-01	7.03E-01	p-Toluic acid	2.27	2.51	6.76E-01	1.70E+00
4,4'-DDE	5.69	727.43	6.80E-05	4.95E-02	4,4'-DDE	5.69	727.43	9.59E-05	6.98E-02

Chemical concentrations in stems and leaves (e.g., lettuce)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.15	1.34E-02	1.97E-03	Acetone	-0.24	0.15	2.64E-02	3.89E-03
1,1-Dichloroethane	1.79	0.78	5.00E-03	3.92E-03	1,1-Dichloroethane	1.79	0.78	5.00E-03	3.92E-03
1,2-Dichloroethane	1.48	0.76	4.00E-03	3.02E-03	1,2-Dichloroethane	1.48	0.76	4.00E-03	3.02E-03
Trichloroethene	2.53	0.62	4.00E-03	2.49E-03	Trichloroethene	2.53	0.62	4.00E-03	2.49E-03
Tetrachloroethene	2.53	0.62	6.20E-03	3.86E-03	Tetrachloroethene	2.53	0.62	8.10E-03	5.04E-03
Toluene	2.69	0.56	4.00E-03	2.23E-03	Toluene	2.69	0.56	4.00E-03	2.23E-03
Xylenes	2.95	0.45	7.00E-02	3.13E-02	Xylenes	2.95	0.45	1.71E-01	7.65E-02
Phenol	1.46	0.75	1.10E-02	8.27E-03	Phenol	1.46	0.75	2.03E-02	1.53E-02
2-Methylphenol	1.95	0.77	6.00E-03	4.65E-03	2-Methylphenol	1.95	0.77	7.60E-03	5.89E-03
Pentachlorophenol	5.01	0.01	2.20E-02	2.40E-04	Pentachlorophenol	5.01	0.01	3.67E-02	4.00E-04
Naphthalene	3.37	0.28	1.00E-03	2.78E-04	Naphthalene	3.37	0.28	1.00E-03	2.78E-04
o-Toluic acid	2.54	0.62	3.42E+00	2.12E+00	o-Toluic acid	2.54	0.62	8.69E+00	5.38E+00
m-Toluic acid	2.37	0.68	3.42E+00	2.32E+00	m-Toluic acid	2.37	0.68	8.69E+00	5.91E+00
p-Toluic acid	2.27	0.71	2.80E-01	1.99E-01	p-Toluic acid	2.27	0.71	6.76E-01	4.80E-01
4,4'-DDE	5.69	0.00	6.80E-05	1.01E-07	4,4'-DDE	5.69	0.00	9.59E-05	1.43E-07

TABLE H-30 (Continued)

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On-Site Groundwater Use - Mixed Bedrock - Round 1 (MW-11, 21, 31, 31 Dup, 41, 51, 61, 71, 71 Dup, 81, 91, 101, 111, 1D, 2D, 3D, 4D, 5D, 6D, 9D, 10D, 11D)

Chemical concentration in root crops (e.g., carrots)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.84	2.30E-02	1.93E-02	Acetone	-0.24	0.84	4.19E-02	3.52E-02
Vinyl chloride	0.60	0.91	3.00E-03	2.72E-03	Vinyl chloride	0.60	0.91	3.00E-03	2.72E-03
1,1-Dichloroethene	1.48	1.24	7.60E-03	9.40E-03	1,1-Dichloroethene	1.48	1.24	1.00E-02	1.24E-02
1,2-Dichloroethene	1.48	1.24	3.68E-02	4.55E-02	1,2-Dichloroethene	1.48	1.24	6.66E-02	8.23E-02
Trichloroethene	2.53	3.50	2.35E-02	8.22E-02	Trichloroethene	2.53	3.50	5.13E-02	1.80E-01
Tetrachloroethene	2.53	3.50	2.19E-01	7.66E-01	Tetrachloroethene	2.53	3.50	5.69E-01	1.99E+00
Benzene	2.13	2.14	3.00E-03	6.42E-03	Benzene	2.13	2.14	3.00E-03	6.42E-03
Toluene	2.69	4.38	1.40E-02	6.13E-02	Toluene	2.69	4.38	2.53E-02	1.11E-01
Xylenes	2.95	6.46	3.75E-01	2.43E+00	Xylenes	2.95	6.46	7.50E-01	4.85E+00
Phenol	1.46	1.22	2.29E-02	2.80E-02	Phenol	1.46	1.22	3.97E-02	4.85E-02
2-Methylphenol	1.95	1.78	8.40E-03	1.49E-02	2-Methylphenol	1.95	1.78	1.20E-02	2.13E-02
4-Methylphenol	1.92	1.73	1.17E-02	2.02E-02	4-Methylphenol	1.92	1.73	1.68E-02	2.90E-02
Benzoic acid	1.87	1.65	4.97E-02	8.21E-02	Benzoic acid	1.87	1.65	8.81E-02	1.46E-01
Naphthalene	3.37	12.70	7.70E-03	9.78E-02	Naphthalene	3.37	12.70	9.00E-03	1.14E-01
o-Toluic acid	2.54	3.55	1.31E+01	4.63E+01	o-Toluic acid	2.54	3.55	2.85E+01	1.01E+02
m-Toluic acid	2.37	2.84	5.91E+00	1.68E+01	m-Toluic acid	2.37	2.84	1.39E+01	3.94E+01
p-Toluic acid	2.27	2.51	7.05E-01	1.77E+00	p-Toluic acid	2.27	2.51	1.69E+00	4.25E+00

Chemical concentrations in stems and leaves (e.g., lettuce)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.15	2.30E-02	3.39E-03	Acetone	-0.24	0.15	4.19E-02	6.17E-03
Vinyl chloride	0.60	0.44	3.00E-03	1.33E-03	Vinyl chloride	0.60	0.44	3.00E-03	1.33E-03
1,1-Dichloroethene	1.48	0.76	7.60E-03	5.74E-03	1,1-Dichloroethene	1.48	0.76	1.00E-02	7.56E-03
1,2-Dichloroethene	1.48	0.76	3.68E-02	2.78E-02	1,2-Dichloroethene	1.48	0.76	6.66E-02	5.03E-02
Trichloroethene	2.53	0.62	2.35E-02	1.46E-02	Trichloroethene	2.53	0.62	5.13E-02	3.19E-02
Tetrachloroethene	2.53	0.62	2.19E-01	1.36E-01	Tetrachloroethene	2.53	0.62	5.69E-01	3.54E-01
Benzene	2.13	0.75	3.00E-03	2.24E-03	Benzene	2.13	0.75	3.00E-03	2.24E-03
Toluene	2.69	0.56	1.40E-02	7.82E-03	Toluene	2.69	0.56	2.53E-02	1.41E-02
Xylenes	2.95	0.45	3.75E-01	1.68E-01	Xylenes	2.95	0.45	7.50E-01	3.36E-01
Phenol	1.46	0.75	2.29E-02	1.72E-02	Phenol	1.46	0.75	3.97E-02	2.98E-02
2-Methylphenol	1.95	0.77	8.40E-03	6.51E-03	2-Methylphenol	1.95	0.77	1.20E-02	9.30E-03
4-Methylphenol	1.92	0.78	1.17E-02	9.10E-03	4-Methylphenol	1.92	0.78	1.68E-02	1.31E-02
Benzoic acid	1.87	0.78	4.97E-02	3.88E-02	Benzoic acid	1.87	0.78	8.81E-02	6.88E-02
Naphthalene	3.37	0.28	7.70E-03	2.14E-03	Naphthalene	3.37	0.28	9.00E-03	2.50E-03
o-Toluic acid	2.54	0.62	1.31E+01	8.08E+00	o-Toluic acid	2.54	0.62	2.85E+01	1.77E+01
m-Toluic acid	2.37	0.68	5.91E+00	4.02E+00	m-Toluic acid	2.37	0.68	1.39E+01	9.45E+00
p-Toluic acid	2.27	0.71	7.05E-01	5.01E-01	p-Toluic acid	2.27	0.71	1.69E+00	1.20E+00

TABLE H-30 (Continued)

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On-Site Groundwater Use - Mixed Bedrock - Round 2 (MW-11, 21, 31, 41, 51, 61, 71, 81, 81 Dup, 91, 101, 111, 121, 131, 141, 181, 7D, 9D, 13D, 15D, 17D)

Chemical concentration in root crops (e.g., carrots)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.84	1.53E-02	1.28E-02	Acetone	-0.24	0.84	2.36E-02	1.98E-02
Vinyl chloride	0.60	0.91	1.22E-02	1.11E-02	Vinyl chloride	0.60	0.91	1.88E-02	1.71E-02
1,1-Dichloroethane	1.79	1.54	1.89E-02	2.91E-02	1,1-Dichloroethane	1.79	1.54	3.46E-02	5.33E-02
1,2-Dichloroethane	1.48	1.24	1.11E-01	1.37E-01	1,2-Dichloroethane	1.48	1.24	2.64E-01	3.26E-01
Trichloroethane	2.53	3.50	1.01E-02	3.53E-02	Trichloroethane	2.53	3.50	1.58E-02	5.53E-02
Tetrachloroethane	2.53	3.50	2.33E-02	8.15E-02	Tetrachloroethane	2.53	3.50	4.41E-02	1.54E-01
Benzene	2.13	2.14	4.00E-03	8.55E-03	Benzene	2.13	2.14	4.00E-03	8.55E-03
Toluene	2.69	4.38	1.28E-02	5.60E-02	Toluene	2.69	4.38	1.98E-02	8.67E-02
Xylenes	2.95	6.46	3.63E-01	2.34E+00	Xylenes	2.95	6.46	6.36E-01	4.11E+00
Phenol	1.46	1.22	1.41E-01	1.72E-01	Phenol	1.46	1.22	3.85E-01	4.70E-01
2-Methylphenol	1.95	1.78	7.60E-03	1.35E-02	2-Methylphenol	1.95	1.78	1.10E-02	1.96E-02
4-Methylphenol	1.92	1.73	1.10E-02	1.90E-02	4-Methylphenol	1.92	1.73	1.91E-02	3.30E-02
Pentachlorophenol	5.01	218.44	1.55E-02	3.39E+00	Pentachlorophenol	5.01	218.44	2.34E-02	5.11E+00
Naphthalene	3.37	12.70	8.00E-03	1.02E-01	Naphthalene	3.37	12.70	8.00E-03	1.02E-01
o-Toluic acid	2.54	3.55	2.72E+01	9.65E+01	o-Toluic acid	2.54	3.55	5.59E+01	1.98E+02
m-Toluic acid	2.37	2.84	1.74E+01	4.94E+01	m-Toluic acid	2.37	2.84	3.53E+01	1.00E+02
p-Toluic acid	2.27	2.51	1.76E+01	4.41E+01	p-Toluic acid	2.27	2.51	4.30E+01	1.08E+02

Chemical concentrations in stems and leaves (e.g., lettuce)

Mean Concentrations					UCL Concentrations				
Chemical	Log Kow	Calc TSCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)	Chemical	Log Kow	Calc RCF	GW Conc (mg/L)	Calc Plant Conc (mg/kg)
Acetone	-0.24	0.15	1.53E-02	2.25E-03	Acetone	-0.24	0.15	2.36E-02	3.48E-03
Vinyl chloride	0.60	0.44	1.22E-02	5.41E-03	Vinyl chloride	0.60	0.44	1.88E-02	8.33E-03
1,1-Dichloroethane	1.79	0.78	1.89E-02	1.48E-02	1,1-Dichloroethane	1.79	0.78	3.46E-02	2.71E-02
1,2-Dichloroethane	1.48	0.76	1.11E-01	8.39E-02	1,2-Dichloroethane	1.48	0.76	2.64E-01	1.99E-01
Trichloroethane	2.53	0.62	1.01E-02	6.29E-03	Trichloroethane	2.53	0.62	1.58E-02	9.84E-03
Tetrachloroethane	2.53	0.62	2.33E-02	1.45E-02	Tetrachloroethane	2.53	0.62	4.41E-02	2.75E-02
Benzene	2.13	0.75	4.00E-03	2.98E-03	Benzene	2.13	0.75	4.00E-03	2.98E-03
Toluene	2.69	0.56	1.28E-02	7.15E-03	Toluene	2.69	0.56	1.98E-02	1.11E-02
Xylenes	2.95	0.45	3.63E-01	1.62E-01	Xylenes	2.95	0.45	6.36E-01	2.84E-01
Phenol	1.46	0.75	1.41E-01	1.06E-01	Phenol	1.46	0.75	3.85E-01	2.89E-01
2-Methylphenol	1.95	0.77	7.60E-03	5.89E-03	2-Methylphenol	1.95	0.77	1.10E-02	8.52E-03
4-Methylphenol	1.92	0.78	1.10E-02	8.56E-03	4-Methylphenol	1.92	0.78	1.91E-02	1.49E-02
Pentachlorophenol	5.01	0.01	1.55E-02	1.69E-04	Pentachlorophenol	5.01	0.01	2.34E-02	2.55E-04
Naphthalene	3.37	0.28	8.00E-03	2.23E-03	Naphthalene	3.37	0.28	8.00E-03	2.23E-03
o-Toluic acid	2.54	0.62	2.72E+01	1.68E+01	o-Toluic acid	2.54	0.62	5.59E+01	3.46E+01
m-Toluic acid	2.37	0.68	1.74E+01	1.18E+01	m-Toluic acid	2.37	0.68	3.53E+01	2.40E+01
p-Toluic acid	2.27	0.71	1.76E+01	1.25E+01	p-Toluic acid	2.27	0.71	4.30E+01	3.06E+01

Table H-31. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners)
OFF-SITE GROUNDWATER USE - Upper Bedrock

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ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Days/Yr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	=	Chronic Daily Intake (mg/kg-day)
mg/kg	x	$\frac{15 \text{ g}}{\text{day}}$	x	1.0	x	1	x	$\frac{350 \text{ days}}{\text{Days/Yr}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{\text{Days expd}}{\text{Days/Yr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	SF	RISK (CDI*SF)	% TOTAL RISK		
Trichloroethene	2.97E-02	15	1.0	70	0.959	0.129	7.87E-07	1.10E-02	8.66E-09	100.00%		

TOTAL RISK 8.66E-09

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Chronic Daily Intake (mg/kg-day)												
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	=	
mg/kg	x	$\frac{24 \text{ g}}{\text{day}}$	x	1.0	x	1	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{30 \text{ yrs}}{70 \text{ yrs}}$	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{\text{Days expd}}{\text{Days/Yr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	SF	RISK (CDI*SF)	% TOTAL RISK		
Trichloroethane	4.20E-02	24	1	70	0.959	0.429	5.92E-06	1.10E-02	6.51E-08	100.00%		

TOTAL RISK 6.51E-08

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum).
Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989).
Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

TABLE H-31 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult**

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK
	mg/kg	15 g day	1.0	1 70 kg	350 days Days/Yr	9 yrs 70 yrs	= CDI	= CDI			
1,2-Dichloroethene	1.42E-01	15	1	70	0.959	0.129		3.76E-06	2.00E-02	1.88E-04	8.89%
Toluene	5.25E-02	15	1	70	0.959	0.129		1.39E-06	2.00E-01	6.96E-06	0.33%
Xylenes	2.55E+00	15	1	70	0.959	0.129		6.76E-05	2.00E+00	3.38E-05	1.60%
o-Toluic acid	1.22E+02	15	1	70	0.959	0.129		3.23E-03	3.00E+00	1.08E-03	50.90%
m-Toluic acid	6.13E+01	15	1	70	0.959	0.129		1.62E-03	3.00E+00	5.42E-04	25.58%
p-Toluic acid	2.03E+01	15	1	70	0.959	0.129		5.38E-04	2.00E+00	2.69E-04	12.71%

TOTAL HAZARD INDEX 2.12E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	24 g day	1.0	1 70 kg	350 days year	30 yrs 70 yrs	= CDI	= CDI			
1,2-Dichloroethene	2.47E-01	24	1	70	0.959	0.429		3.48E-05	2.00E-02	1.74E-03	8.25%
Toluene	8.32E-02	24	1	70	0.959	0.429		1.17E-05	2.00E-01	5.86E-05	0.28%
Xylenes	3.17E+00	24	1	70	0.959	0.429		4.47E-04	2.00E+00	2.23E-04	1.06%
o-Toluic acid	2.27E+02	24	1	70	0.959	0.429		3.20E-02	3.00E+00	1.07E-02	50.52%
m-Toluic acid	1.19E+02	24	1	70	0.959	0.429		1.68E-02	3.00E+00	5.59E-03	26.48%
p-Toluic acid	4.02E+01	24	1	70	0.959	0.429		5.66E-03	2.00E+00	2.83E-03	13.42%

TOTAL HAZARD INDEX 2.11E-02

TABLE H-31 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child**

Chronic Daily Intake (mg/kg-day)												
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	=	Chronic Daily Intake (mg/kg-day)
mg/kg	x	15 g day	x	1.0	x	1 35 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK		
1,2-Dichloroethene	1.42E-01	15	1	35	0.959	0.129	7.53E-06	2.00E-02	3.76E-04	8.89%		
Toluene	5.25E-02	15	1	35	0.959	0.129	2.78E-06	2.00E-01	1.39E-05	0.33%		
Xylenes	2.55E+00	15	1	35	0.959	0.129	1.35E-04	2.00E+00	6.76E-05	1.60%		
o-Toluic acid	1.22E+02	15	1	35	0.959	0.129	6.47E-03	3.00E+00	2.16E-03	50.90%		
m-Toluic acid	6.13E+01	15	1	35	0.959	0.129	3.25E-03	3.00E+00	1.08E-03	25.58%		
p-Toluic acid	2.03E+01	15	1	35	0.959	0.129	1.08E-03	2.00E+00	5.38E-04	12.71%		

TOTAL HAZARD INDEX 4.24E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	= CDI
mg/kg	x	24 $\frac{\text{g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	= CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{350 \text{ days}}{\text{Days/Yr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	SF	RISK (CDI*SF)	% TOTAL RISK	
1,2-Dichloroethene	2.47E-01	24	1	35	0.959	0.129	2.09E-05	2.00E-02	1.04E-03	8.25%	
Toluene	8.32E-02	24	1	35	0.959	0.129	7.03E-06	2.00E-01	3.52E-05	0.28%	
Xylenes	3.17E+00	24	1	35	0.959	0.129	2.68E-04	2.00E+00	1.34E-04	1.06%	
o-Toluic acid	2.27E+02	24	1	35	0.959	0.129	1.92E-02	3.00E+00	6.40E-03	50.52%	
m-Toluic acid	1.19E+02	24	1	35	0.959	0.129	1.01E-02	3.00E+00	3.35E-03	26.48%	
p-Toluic acid	4.02E+01	24	1	35	0.959	0.129	3.40E-03	2.00E+00	1.70E-03	13.42%	

TOTAL HAZARD INDEX 1.27E-02

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

TOTAL RISK	2.57E-09

$$\text{Plant Intake} \times \text{Fraction} \times \frac{1}{\text{Days expd}} \times \frac{\text{Yrs expd}}{\text{Yrs expd}} = \text{Chronic Daily Intake (mg/kg-day)}$$

TOTAL RISK	1.93E-08

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VERAGE PLANT INGESTION EXPOSURE - Adult

Plant	x	Intake	x	Fraction	x	1	x	Days expd	x	Yrs expd	=	Chronic Daily Intake (mg/kg-day)

Plant	x	Intake	x	Fraction	x	$\frac{1}{\text{Days expd}}$	x	$\frac{1}{\text{Yrs expd}}$	x	Chronic Daily Intake (mg/kg-day)

TOTAL HAZRD INDEX	8.53E-04

Plant	x	Intake	x	Fraction	x	1	x	Days expd	x	Yrs expd	=	Chronic Daily Intake (mg/kg-day)

TOTAL HAZARD INDEX	8.49E-03

TABLE H-31 (Continued)

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LEAF CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child**

Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Days/Yr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	=	Chronic Daily Intake (mg/kg-day)
mg/kg	x	25 $\frac{\text{g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{Days/Yr}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{\text{Days expd}}{\text{Days/Yr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK		
1,2-Dichloroethene	8.69E-02	25	1	35	0.959	0.129	7.68E-06	2.00E-02	3.84E-04	22.50%		
Toluene	6.70E-03	25	1	35	0.959	0.129	5.92E-07	2.00E-01	2.96E-06	0.17%		
Xylenes	1.77E-01	25	1	35	0.959	0.129	1.56E-05	2.00E+00	7.82E-06	0.46%		
o-Toluic acid	2.12E+01	25	1	35	0.959	0.129	1.87E-03	3.00E+00	6.24E-04	36.60%		
m-Toluic acid	1.47E+01	25	1	35	0.959	0.129	1.30E-03	3.00E+00	4.33E-04	25.38%		
p-Toluic acid	5.75E+00	25	1	35	0.959	0.129	5.08E-04	2.00E+00	2.54E-04	14.89%		

TOTAL HAZARD INDEX 1.71E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	=	Chronic Daily Intake (mg/kg-day)
mg/kg	x	40 $\frac{\text{g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{350 \text{ days}}{\text{Days/Yr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	SF	RISK (CDI*SF)	% TOTAL RISK		
1,2-Dichloroethene	1.51E-01	40	1	35	0.959	0.129	2.13E-05	2.00E-02	1.06E-03	20.89%		
Toluene	1.06E-02	40	1	35	0.959	0.129	1.49E-06	2.00E-01	7.47E-06	0.15%		
Xylenes	2.19E-01	40	1	35	0.959	0.129	3.09E-05	2.00E+00	1.54E-05	0.30%		
o-Toluic acid	3.96E+01	40	1	35	0.959	0.129	5.58E-03	3.00E+00	1.86E-03	36.52%		
m-Toluic acid	2.86E+01	40	1	35	0.959	0.129	4.03E-03	3.00E+00	1.34E-03	26.37%		
p-Toluic acid	1.14E+01	40	1	35	0.959	0.129	1.61E-03	2.00E+00	8.03E-04	15.77%		

TOTAL HAZARD INDEX 5.09E-03

Table H-32. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners) - FS-8
OFF-SITE GROUNDWATER USE - Deep Bedrock

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ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Plant Conc	mg/kg	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight 70 kg	x	Days expd Days/Yr	x	Yrs expd Yrs LT	=	Chronic Daily Intake (mg/kg-day)	
Compound	(mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs LT		CDI	% TOTAL RISK
Trichloroethene	1.40E-02		15		1.0		70		0.959		0.129		3.71E-07	10.97%
Tetrachloroethene	2.45E-02		15		1.0		70		0.959		0.129		6.49E-07	89.03%
TOTAL RISK														3.72E-08

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Plant Conc	mg/kg	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight 70 kg	x	Days expd Year	x	Yrs expd Yrs LT	=	Chronic Daily Intake (mg/kg-day)	
Compound	(mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs LT		CDI	% TOTAL RISK
Trichloroethene	4.20E-02		24		1		70		0.959		0.429		5.92E-06	17.74%
Tetrachloroethene	4.20E-02		24		1		70		0.959		0.429		5.92E-06	82.26%
TOTAL RISK														3.67E-07

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum).
Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989).
Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

TABLE H-32 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult**

Compound	Plant Conc (mg/kg)	Intake rate (g/day)	Fraction absorbed	Body weight (kg)	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI/RfD)	% TOTAL RISK
1,2-Dichloroethene	4.95E-03	15	1	70	0.959	0.129	1.31E-07	2.00E-02	6.56E-06	1.56%
Tetrachloroethene	2.45E-02	15	1	70	0.959	0.129	6.49E-07	1.00E-02	6.49E-05	15.49%
Toluene	1.75E-02	15	1	70	0.959	0.129	4.64E-07	2.00E-01	2.32E-06	0.55%
Xylenes	7.32E-01	15	1	70	0.959	0.129	1.94E-05	2.00E+00	9.70E-06	2.31%
o-Toluic acid	2.02E+01	15	1	70	0.959	0.129	5.35E-04	3.00E+00	1.78E-04	42.57%
m-Toluic acid	1.61E+01	15	1	70	0.959	0.129	4.27E-04	3.00E+00	1.42E-04	33.93%
p-Toluic acid	1.13E+00	15	1	70	0.959	0.129	3.00E-05	2.00E+00	1.50E-05	3.57%

TOTAL HAZARD INDEX 4.19E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

Compound	Plant Conc (mg/kg)	Intake rate (g/day)	Fraction absorbed	Body weight (kg)	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
1,2-Dichloroethene	4.95E-03	24	1	70	0.959	0.429	6.97E-07	2.00E-02	3.49E-05	0.60%
Tetrachloroethene	3.74E-02	24	1	70	0.959	0.429	5.27E-06	1.00E-02	5.27E-04	9.08%
Toluene	1.75E-02	24	1	70	0.959	0.429	2.47E-06	2.00E-01	1.23E-05	0.21%
Xylenes	2.04E+00	24	1	70	0.959	0.429	2.87E-04	2.00E+00	1.44E-04	2.48%
o-Toluic acid	5.76E+01	24	1	70	0.959	0.429	8.12E-03	3.00E+00	2.71E-03	46.62%
m-Toluic acid	4.60E+01	24	1	70	0.959	0.429	6.48E-03	3.00E+00	2.16E-03	37.23%
p-Toluic acid	3.12E+00	24	1	70	0.959	0.429	4.40E-04	2.00E+00	2.20E-04	3.79%

TOTAL HAZARD INDEX 5.80E-03

TABLE H-32 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child**

Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	=
mg/kg	x	15 g day	x	1.0	x	1 35 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	= CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK	
1,2-Dichloroethene	4.95E-03	15	1	35	0.959	0.129	2.62E-07	2.00E-02	1.31E-05	1.56%	
Tetrachloroethene	2.45E-02	15	1	35	0.959	0.129	1.30E-06	1.00E-02	1.30E-04	15.49%	
Toluene	1.75E-02	15	1	35	0.959	0.129	9.28E-07	2.00E-01	4.64E-06	0.55%	
Xylenes	7.32E-01	15	1	35	0.959	0.129	3.88E-05	2.00E+00	1.94E-05	2.31%	
o-Toluic acid	2.02E+01	15	1	35	0.959	0.129	1.07E-03	3.00E+00	3.57E-04	42.57%	
m-Toluic acid	1.61E+01	15	1	35	0.959	0.129	8.54E-04	3.00E+00	2.85E-04	33.93%	
p-Toluic acid	1.13E+00	15	1	35	0.959	0.129	5.99E-05	2.00E+00	3.00E-05	3.57%	

TOTAL HAZARD INDEX

8.38E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	=	Chronic Daily Intake (mg/kg-day)
mg/kg	x	$\frac{24 \text{ g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{350 \text{ days}}{\text{Days/Yr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	SF	RISK (CDI*SF)	% TOTAL RISK		
1,2-Dichloroethene	4.95E-03	24	1	35	0.959	0.129	4.18E-07	2.00E-02	2.09E-05	0.60%		
Tetrachloroethene	3.74E-02	24	1	35	0.959	0.129	3.16E-06	1.00E-02	3.16E-04	9.08%		
Toluene	1.75E-02	24	1	35	0.959	0.129	1.48E-06	2.00E-01	7.40E-06	0.21%		
Xylenes	2.04E+00	24	1	35	0.959	0.129	1.72E-04	2.00E+00	8.62E-05	2.48%		
o-Toluic acid	5.76E+01	24	1	35	0.959	0.129	4.87E-03	3.00E+00	1.62E-03	46.62%		
m-Toluic acid	4.60E+01	24	1	35	0.959	0.129	3.89E-03	3.00E+00	1.30E-03	37.23%		
p-Toluic acid	3.12E+00	24	1	35	0.959	0.129	2.64E-04	2.00E+00	1.32E-04	3.79%		
TOTAL HAZARD INDEX											3.48E-03	

TOTAL HAZARD INDEX

3.48E-03

LEAF CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Days/Yr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	= Chronic Daily Intake (mg/kg-day)	
	mg/kg	x	<u>25 g</u> day	x	1.0	x	1 70 kg	x	<u>350 days</u> Days/Yr	x	<u>9 yrs</u> 70 yrs	= CDI	
Compound	Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		$\frac{\text{Days expd}}{\text{Days/Yr}}$		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	2.49E-03		25		1		70		0.959		0.129	1.10E-07	1.21E-09
Tetrachloroethene	4.36E-03		25		1		70		0.959		0.129	1.93E-07	9.82E-09
												TOTAL RISK	1.10E-08

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

[illegible]

TABLE H-32 (Continued)

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LEAF CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult**

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI/RfD)	% TOTAL RISK
	mg/kg	25 g day	1.0	70 kg	350 days	9 yrs	= CDI			
	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT		CDI	RISK (CDI/RfD)	% TOTAL RISK
1,2-Dichloroethene	3.02E-03	25	1	70	0.959	0.129		1.33E-07	2.00E-02	6.67E-06
Tetrachloroethene	4.36E-03	25	1	70	0.959	0.129		1.93E-07	1.00E-02	1.93E-05
Toluene	2.23E-03	25	1	70	0.959	0.129		9.85E-08	2.00E-01	4.93E-07
Xylenes	5.07E-02	25	1	70	0.959	0.129		2.24E-06	2.00E+00	1.12E-06
o-Toluic acid	3.52E+00	25	1	70	0.959	0.129		1.56E-04	3.00E+00	5.18E-05
m-Toluic acid	3.86E+00	25	1	70	0.959	0.129		1.71E-04	3.00E+00	5.68E-05
p-Toluic acid	3.20E-01	25	1	70	0.959	0.129		1.41E-05	2.00E+00	7.07E-06
TOTAL HAZARD INDEX									1.43E-04	

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI/RfD)	% TOTAL RISK
	mg/kg	40 g day	1.0	70 kg	350 days year	30 yrs	= CDI			
	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT		CDI	RISK (CDI/RfD)	% TOTAL RISK
1,2-Dichloroethene	3.02E-03	40	1	70	0.959	0.429		7.09E-07	2.00E-02	3.55E-05
Tetrachloroethene	6.66E-03	40	1	70	0.959	0.429		1.56E-06	1.00E-02	1.56E-04
Toluene	2.23E-03	40	1	70	0.959	0.429		5.24E-07	2.00E-01	2.62E-06
Xylenes	1.41E-01	40	1	70	0.959	0.429		3.31E-05	2.00E+00	1.66E-05
o-Toluic acid	1.00E+01	40	1	70	0.959	0.429		2.35E-03	3.00E+00	7.83E-04
m-Toluic acid	1.10E+01	40	1	70	0.959	0.429		2.58E-03	3.00E+00	8.61E-04
p-Toluic acid	8.82E-01	40	1	70	0.959	0.429		2.07E-04	2.00E+00	1.04E-04
TOTAL HAZARD INDEX									1.96E-03	

LEAF CROPS - Continued

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child

	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Days/Yr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	=	Chronic Daily Intake (mg/kg-day)			
	mg/kg	x	$\frac{25 \text{ g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{Days/Yr}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	=	CDI			
Compound	Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		$\frac{\text{Days expd}}{\text{Days/Yr}}$		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$		RID	RISK (CDI/RID)	% TOTAL RISK	
1,2-Dichloroethene	3.02E-03		25		1		35		0.959		0.129		2.67E-07	2.00E-02	1.33E-05	4.66%
Tetrachloroethene	4.36E-03		25		1		35		0.959		0.129		3.85E-07	1.00E-02	3.85E-05	13.44%
Toluene	2.23E-03		25		1		35		0.959		0.129		1.97E-07	2.00E-01	9.85E-07	0.34%
Xylenes	5.07E-02		25		1		35		0.959		0.129		4.48E-06	2.00E+00	2.24E-06	0.78%
o-Toluic acid	3.52E+00		25		1		35		0.959		0.129		3.11E-04	3.00E+00	1.04E-04	36.17%
m-Toluic acid	3.86E+00		25		1		35		0.959		0.129		3.41E-04	3.00E+00	1.14E-04	39.67%
p-Toluic acid	3.20E-01		25		1		35		0.959		0.129		2.83E-05	2.00E+00	1.41E-05	4.93%

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

Plant		x	Intake	x	Fraction	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	= Chronic Daily Intake (mg/kg-day)			
mg/kg	mg/kg	x	$\frac{40 \text{ g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	= CDI			
Conc	Conc		IR (g/day)		Fraction absorbed		Body wt (kg)		$\frac{350 \text{ days}}{\text{Days/Yr}}$		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	RfD	RISK (CDI*SF)	
Compound	(mg/kg)													% TOTAL RISK	
1,2-Dichloroethene Tetrachloroethene Toluene Xylenes o-Toluic acid m-Toluic acid p-Toluic acid	3.02E-03		40		1		35		0.959		0.129	4.26E-07	2.00E-02	2.13E-05	1.81%
	6.66E-03		40		1		35		0.959		0.129	9.38E-07	1.00E-02	9.38E-05	7.99%
	2.23E-03		40		1		35		0.959		0.129	3.14E-07	2.00E-01	1.57E-06	0.13%
	1.41E-01		40		1		35		0.959		0.129	1.99E-05	2.00E+00	9.93E-06	0.85%
	1.00E+01		40		1		35		0.959		0.129	1.41E-03	3.00E+00	4.70E-04	39.97%
	1.10E+01		40		1		35		0.959		0.129	1.55E-03	3.00E+00	5.17E-04	43.97%
	8.82E-01		40		1		35		0.959		0.129	1.24E-04	2.00E+00	6.21E-05	5.29%
	TOTAL HAZARD INDEX														1.18E-03

Table H-33. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners) - FS-8 OFF-SITE GROUNDWATER USE - Mixed Bedrock

ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	
mg/kg	x	15 g day	x	1.0	x	1 70 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	= CDI
Compound	Conc (mg/kg)	IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs LT	
									CDI	SF	RISK (CDI*SF)
Trichloroethene	2.97E-02	15		1.0		70		0.959		0.129	7.87E-07 1.10E-02 8.66E-09
Tetrachloroethene	3.85E-02	15		1.0		70		0.959		0.129	1.02E-06 5.10E-02 5.20E-08
TOTAL RISK											6.07E-08
											14.27% 85.73%

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs Lt	= Chronic Daily Intake (mg/kg-day)			
	mg/kg	x	<u>24 g</u> day	x	1.0	x	1 70 kg	x	<u>350 days</u> year	x	<u>30 yrs</u> 70 yrs	= CDI			
Compound	Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		Yrs expd Yrs Lt	RISK (CDI*SF)	% TOTAL RISK		
Trichloroethene	4.16E-02		24		1		70		0.959		0.429	5.86E-06	1.10E-02	6.45E-08	18.90%
Tetachloroethene	3.85E-02		24		1		70		0.959		0.429	5.42E-06	5.10E-02	2.77E-07	81.10%
												TOTAL RISK	3.41E-07		

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum). Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989). Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

TABLE H-33 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult**

Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	
mg/kg	x	15 g day	x	1.0	x	1 70 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	
Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs LT	
Compound							CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK	
1,2-Dichloroethene	1.38E-01	15	1	1	70	0.959	0.129	3.66E-06	2.00E-02	1.83E-04	14.42%
Tetrachloroethene	3.85E-02	15	1	1	70	0.959	0.129	1.02E-06	1.00E-02	1.02E-04	8.04%
Toluene	3.33E-02	15	1	1	70	0.959	0.129	8.83E-07	2.00E-01	4.41E-06	0.35%
Xylenes	2.09E+00	15	1	1	70	0.959	0.129	5.54E-05	2.00E+00	2.77E-05	2.18%
o-Toluic acid	6.39E+01	15	1	1	70	0.959	0.129	1.69E-03	3.00E+00	5.65E-04	44.51%
m-Toluic acid	3.49E+01	15	1	1	70	0.959	0.129	9.25E-04	3.00E+00	3.08E-04	24.31%
p-Toluic acid	8.89E+00	15	1	1	70	0.959	0.129	2.36E-04	3.00E+00	7.85E-05	6.19%

TOTAL HAZARD INDEX 1.27E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	
mg/kg	x	24 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	
Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		Yrs expd Yrs LT	
Compound								CDI	RfD	RISK (CDI/SF)	% TOTAL RISK
1,2-Dichloroethene	2.45E-01	24	1	70	0.959	0.429	3.45E-05	2.00E-02	1.73E-03	8.36%	
Tetrachloroethene	3.85E-02	24	1	70	0.959	0.429	5.42E-06	1.00E-02	5.42E-04	2.63%	
Toluene	5.25E-02	24	1	70	0.959	0.429	7.40E-06	2.00E-01	3.70E-05	0.18%	
Xylenes	2.98E+00	24	1	70	0.959	0.429	4.20E-04	2.00E+00	2.10E-04	1.02%	
o-Toluic acid	2.27E+02	24	1	70	0.959	0.429	3.20E-02	3.00E+00	1.07E-02	51.62%	
m-Toluic acid	1.19E+02	24	1	70	0.959	0.429	1.68E-02	3.00E+00	5.59E-03	27.06%	
p-Toluic acid	4.02E+01	24	1	70	0.959	0.429	5.66E-03	3.00E+00	1.89E-03	9.14%	

TOTAL HAZARD INDEX 2.07E-02

TABLE H-33 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child**

Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	=
mg/kg	x	15 g day	x	1.0	x	35 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	=
Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs LT	
Compound							CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK	
1,2-Dichloroethene	1.38E-01	15	1	35	0.959	0.129	7.32E-06	2.00E-02	3.66E-04	14.42%	
Tetrachloroethene	3.85E-02	15	1	35	0.959	0.129	2.04E-06	1.00E-02	2.04E-04	8.04%	
Toluene	3.33E-02	15	1	35	0.959	0.129	1.77E-06	2.00E-01	8.83E-06	0.35%	
Xylenes	2.09E+00	15	1	35	0.959	0.129	1.11E-04	2.00E+00	5.54E-05	2.18%	
o-Toluic acid	6.39E+01	15	1	35	0.959	0.129	3.39E-03	3.00E+00	1.13E-03	44.51%	
m-Toluic acid	3.49E+01	15	1	35	0.959	0.129	1.85E-03	3.00E+00	6.17E-04	24.31%	
p-Toluic acid	8.89E+00	15	1	35	0.959	0.129	4.71E-04	3.00E+00	1.57E-04	6.19%	

TOTAL HAZARD INDEX 2.54E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	=
mg/kg	x	24 g day	x	1.0	x	35 kg	x	350 days year	x	9 yrs 70 yrs	= CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	350 days Days/Yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI/SF)	% TOTAL RISK	
1,2-Dichloroethene	2.45E-01	24	1	35	0.959	0.129	2.07E-05	2.00E-02	1.04E-03	8.36%	
Tetrachloroethene	3.85E-02	24	1	35	0.959	0.129	3.25E-06	1.00E-02	3.25E-04	2.63%	
Toluene	5.25E-02	24	1	35	0.959	0.129	4.44E-06	2.00E-01	2.22E-05	0.18%	
Xylenes	2.98E+00	24	1	35	0.959	0.129	2.52E-04	2.00E+00	1.26E-04	1.02%	
o-Toluic acid	2.27E+02	24	1	35	0.959	0.129	1.92E-02	3.00E+00	6.40E-03	51.62%	
m-Toluic acid	1.19E+02	24	1	35	0.959	0.129	1.01E-02	3.00E+00	3.35E-03	27.06%	
p-Toluic acid	4.02E+01	24	1	35	0.959	0.129	3.40E-03	3.00E+00	1.13E-03	9.14%	

TOTAL HAZARD INDEX 1.24E-02

TABLE H-33. (Continued)

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LEAF CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

■ Chronic Daily Intake (mg/kg-day)															
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Days/Yr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	■				
mg/kg	x	25 g day	x	1.0	x	1 70 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	■	CDI			
Compound	Conc (mg/kg)	IR (g/day)		Fraction absorbed		Body wt (kg)		$\frac{\text{Days expd}}{\text{Days/Yr}}$		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$		CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	8.43E-02	25		1		70		0.959		0.129		3.72E-06	1.10E-02	4.10E-08	77.46%
Tetrachloroethene	5.29E-03	25		1		70		0.959		0.129		2.34E-07	5.10E-02	1.19E-08	22.54%

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

■ Chronic Daily Intake (mg/kg-day)													
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	x	CDI	% TOTAL RISK
mg/kg	x	40 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	x	CDI	
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days/Yr	Yrs expd Yrs LT	CDI	SF	RISK (CDI*SF)	% TOTAL RISK			
Trichloroethene Tetrachloroethene	1.50E-01	40	1	70	0.959	0.429	3.52E-05	1.10E-02	3.87E-07	81.36%			
	7.41E-03	40	1	70	0.959	0.429	1.74E-06	5.10E-02	8.87E-08	18.64%			
TOTAL RISK									4.76E-07				

TABLE H-33 (Continued)

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LEAF CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult**

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd	Yrs expd	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI/RfD)	% TOTAL RISK
	mg/kg	25 g day	1.0	70 kg	350 days	9 yrs	= CDI			
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd	Yrs expd	CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK
1,2-Dichloroethene	8.43E-02	25	1	70	0.959	0.129	3.72E-06	2.00E-02	1.86E-04	22.57%
Tetrachloroethene	6.85E-02	25	1	70	0.959	0.129	3.03E-06	1.00E-02	3.03E-04	36.68%
Toluene	4.24E-02	25	1	70	0.959	0.129	1.87E-06	2.00E-01	9.37E-06	1.14%
Xylenes	1.45E-01	25	1	70	0.959	0.129	6.41E-06	2.00E+00	3.20E-06	0.39%
o-Toluic acid	1.11E+01	25	1	70	0.959	0.129	4.90E-04	3.00E+00	1.63E-04	19.81%
m-Toluic acid	8.35E+00	25	1	70	0.959	0.129	3.69E-04	3.00E+00	1.23E-04	14.91%
p-Toluic acid	2.52E+00	25	1	70	0.959	0.129	1.11E-04	3.00E+00	3.71E-05	4.50%

[TOTAL HAZARD INDEX 8.25E-04]

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd	Yrs expd	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI/RfD)	% TOTAL RISK
	mg/kg	40 g day	1.0	70 kg	350 days	30 yrs	= CDI			
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd	Yrs expd	CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK
1,2-Dichloroethene	1.50E-01	40	1	70	0.959	0.429	3.52E-05	2.00E-02	1.76E-03	21.52%
Tetrachloroethene	6.85E-03	40	1	70	0.959	0.429	1.61E-06	1.00E-02	1.61E-04	1.97%
Toluene	6.70E-03	40	1	70	0.959	0.429	1.57E-06	2.00E-01	7.87E-06	0.04%
Xylenes	2.06E-01	40	1	70	0.959	0.429	4.84E-05	2.00E+00	2.42E-05	0.12%
o-Toluic acid	3.96E+01	40	1	70	0.959	0.429	9.30E-03	3.00E+00	3.10E-03	15.01%
m-Toluic acid	2.86E+01	40	1	70	0.959	0.429	6.72E-03	3.00E+00	2.24E-03	10.84%
p-Toluic acid	1.14E+01	40	1	70	0.959	0.429	2.68E-03	3.00E+00	8.92E-04	4.32%

[TOTAL HAZARD INDEX 8.19E-03]

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child

TOTAL HAZRD INDEX	1.65E-03

$$\text{Plant Intake} \times \text{Fraction} \times \frac{1}{\text{Days expd}} \times \frac{\text{Yrs expd}}{\text{Chronic Daily Intake (mg/kg-day)}}$$

TOTAL HAZARD INDEX	4.91E-03

TABLE H-34. RESIDENTIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY (FS-6)
FUTURE-USE SCENARIO - On-Site Upper Bedrock Well Use
Round 1 Data

p 1 of 3

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body weight (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	RISK (CDI*SF)	% Total
	mg L	x 1.4 L day	x 1.0	x 1 70 kg	x 7 days 7 days/wk	50 52	9 yrs 70 yrs	= CDI		
Vinyl chloride	3.00E-03	1.4	1.00	70	1	0.962	0.129	7.42E-06	1.90E+00	1.41E-05
Trichloroethene	3.79E-02	1.4	1.00	70	1	0.962	0.129	9.37E-05	1.10E-02	1.03E-06
Benzene	1.00E-03	1.4	1.00	70	1	0.962	0.129	2.47E-06	2.90E-02	7.17E-08
Tetrachloroethene	3.68E-01	1.4	1.00	70	1	0.962	0.129	9.10E-04	5.10E-02	4.64E-05
Total c-PAHs	5.00E-03	1.4	1.00	70	1	0.962	0.129	1.24E-05	7.30E+00	9.02E-05
TOTAL RISK									1.52E-04	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body weight (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Yrs Lifetime	Chronic Daily Intake (mg/kg-day)	RISK (CDI*SF)	% Total
	mg L	x 2 L day	x 1.0	x 1 70 kg	x 7 days 7 days/wk	50 52	30 yrs 70 yrs	= CDI		
Vinyl chloride	3.00E-03	2	1.00	70	1	0.962	0.429	3.67E-05	1.90E+00	6.98E-05
Trichloroethene	7.43E-02	2	1.00	70	1	0.962	0.429	9.10E-04	1.10E-02	1.00E-05
Benzene	1.00E-03	2	1.00	70	1	0.962	0.429	1.22E-05	2.90E-02	3.55E-07
Tetrachloroethene	8.35E-01	2	1.00	70	1	0.962	0.429	1.02E-02	5.10E-02	5.22E-04
Total c-PAHs	5.00E-03	2	1.00	70	1	0.962	0.429	6.12E-05	7.30E+00	4.47E-04
TOTAL RISK									1.05E-03	

TOTAL RISK 1.05E-03

TABLE H-34 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
1,2-Dichloroethene	5.35E-02	1.4	1.00	70	1	0.962	0.129	1.32E-04	3.70%
Tetrachloroethene	3.68E-01	1.4	1.00	70	1	0.962	0.129	9.10E-04	50.92%
o-Toluic acid	2.28E+01	1.4	1.00	70	1	0.962	0.129	5.63E-02	10.50%
m-Toluic acid	1.03E+01	1.4	1.00	70	1	0.962	0.129	2.55E-02	4.77%
p-Toluic acid	1.18E+00	1.4	1.00	70	1	0.962	0.129	2.93E-03	0.55%
Arsenic	1.24E-01	1.4	0.05	70	1	0.962	0.129	1.54E-05	28.65%
Barium	1.34E-01	1.4	0.05	70	1	0.962	0.129	1.65E-05	0.13%
Lead	2.55E-02	1.4	0.05	70	1	0.962	0.129	3.15E-06	0.06%
Vanadium	7.30E-02	1.4	0.05	70	1	0.962	0.129	9.02E-06	0.72%

HAZ INDEX 1.79E-01

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
1,2-Dichloroethene	8.96E-02	2	1.00	70	1	0.962	0.429	1.05E-03	3.34%
Tetrachloroethene	8.35E-01	2	1.00	70	1	0.962	0.429	9.83E-03	62.25%
o-Toluic acid	3.94E+01	2	1.00	70	1	0.962	0.429	4.64E-01	9.80%
m-Toluic acid	1.89E+01	2	1.00	70	1	0.962	0.429	2.23E-01	4.70%
p-Toluic acid	2.25E+00	2	1.00	70	1	0.962	0.429	2.65E-02	0.56%
Arsenic	1.49E-01	2	0.05	70	1	0.962	0.429	8.78E-05	18.53%
Barium	1.88E-01	2	0.05	70	1	0.962	0.429	1.11E-04	0.10%
Lead	5.03E-02	2	0.05	70	1	0.962	0.429	2.96E-05	0.06%
Vanadium	1.26E-01	2	0.05	70	1	0.962	0.429	7.39E-05	0.67%

HAZ INDEX 1.58E+00

TABLE H-34 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
1,2-Dichloroethene	5.35E-02	1.5	1.00	35	1	0.962	0.129	2.83E-04	3.70%
Tetrachloroethene	3.68E-01	1.5	1.00	35	1	0.962	0.129	1.95E-03	50.92%
o-Toluic acid	2.28E+01	1.5	1.00	35	1	0.962	0.129	1.21E-01	10.50%
m-Toluic acid	1.03E+01	1.5	1.00	35	1	0.962	0.129	5.47E-02	4.77%
p-Toluic acid	1.18E+00	1.5	1.00	35	1	0.962	0.129	6.27E-03	0.55%
Arsenic	1.24E-01	1.5	0.05	35	1	0.962	0.129	3.29E-05	28.65%
Barium	1.34E-01	1.5	0.05	35	1	0.962	0.129	3.54E-05	0.13%
Lead	2.55E-02	1.5	0.05	35	1	0.962	0.129	6.76E-06	0.06%
Vanadium	7.30E-02	1.5	0.05	35	1	0.962	0.129	1.93E-05	0.72%

HAZARD INDEX 3.83E-01

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
1,2-Dichloroethene	8.96E-02	2	1.00	35	1	0.962	0.129	6.33E-04	3.35%
Tetrachloroethene	8.35E-01	2	1.00	35	1	0.962	0.129	5.90E-03	62.45%
o-Toluic acid	3.94E+01	2	1.00	35	1	0.962	0.129	2.79E-01	9.83%
m-Toluic acid	1.89E+01	2	1.00	35	1	0.962	0.129	1.34E-01	4.71%
p-Toluic acid	2.25E+00	2	1.00	35	1	0.962	0.129	1.59E-02	0.56%
Arsenic	1.49E-01	2	0.05	35	1	0.962	0.129	5.27E-05	18.59%
Barium	1.88E-01	2	0.05	35	1	0.962	0.129	6.64E-05	0.10%
Lead	5.03E-02	2	0.05	35	1	0.962	0.129	1.78E-05	0.06%
Vanadium	1.26E-01	2	0.05	70	1	0.962	0.129	2.22E-05	0.34%

HAZARD INDEX 9.45E-01

TABLE H-35. RESIDENTIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY (FS-8)
FUTURE-USE SCENARIO - On-Site Upper Bedrock Well Use
Round 2 Data

p 1 of 3

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body weight (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	RISK (CDI*SF)	% Total
	mg L	x 1.4 L day	x 1.0	x 1 70 kg	x 7 days 7 days/wk	50 52	9 yrs 70 yrs	= CDI		
Vinyl chloride	1.44E-02	1.4	1.00	70	1	0.962	0.129	3.56E-05	1.90E+00 6.76E-05	94.12%
Trichloroethene	1.18E-02	1.4	1.00	70	1	0.962	0.129	2.92E-05	1.10E-02 3.21E-07	0.45%
Benzene	4.00E-03	1.4	1.00	70	1	0.962	0.129	9.89E-06	2.90E-02 2.87E-07	0.40%
Tetrachloroethene	2.87E-02	1.4	1.00	70	1	0.962	0.129	7.10E-05	5.10E-02 3.62E-06	5.04%
TOTAL RISK									7.19E-05	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body weight (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Years Lifetime	Chronic Daily Intake (mg/kg-day)	RISK (CDI*SF)	% Total
	mg L	x 2 L day	x 1.0	x 1 70 kg	x 7 days 7 days/wk	50 52	30 yrs 70 yrs	= CDI		
Vinyl chloride	2.28E-02	2	1.00	70	1	0.962	0.429	2.79E-04	1.90E+00 5.30E-04	93.23%
Trichloroethene	1.90E-02	2	1.00	70	1	0.962	0.429	2.33E-04	1.10E-02 2.56E-06	0.45%
Benzene	4.00E-03	2	1.00	70	1	0.962	0.429	4.90E-05	2.90E-02 1.42E-06	0.25%
Tetrachloroethene	5.53E-02	2	1.00	70	1	0.962	0.429	6.77E-04	5.10E-02 3.45E-05	6.07%
TOTAL RISK									5.69E-04	

Note: Database does not include off-site well MW-16I.

TABLE H-35 (Continued)

p 2 of 3

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
1,2-Dichloroethene	1.44E-01	1.4	1.00	70	1	0.962	0.129	3.57E-04	14.00%
Tetrachloroethene	2.87E-02	1.4	1.00	70	1	0.962	0.129	7.10E-05	5.57%
Xylenes	4.54E-01	1.4	1.00	70	1	0.962	0.129	1.12E-03	0.44%
o-Toluic acid	3.46E+01	1.4	1.00	70	1	0.962	0.129	8.56E-02	22.37%
m-Toluic acid	2.18E+01	1.4	1.00	70	1	0.962	0.129	5.38E-02	14.07%
p-Toluic acid	2.30E+01	1.4	1.00	70	1	0.962	0.129	5.68E-02	14.84%
Arsenic	8.60E-02	1.4	0.05	70	1	0.962	0.129	1.06E-05	27.79%
Barium	1.24E-01	1.4	0.05	70	1	0.962	0.129	1.54E-05	0.17%
Lead	2.49E-02	1.4	0.05	70	1	0.962	0.129	3.08E-06	0.08%
Vanadium	4.77E-02	1.4	0.05	70	1	0.962	0.129	5.90E-06	0.66%

HAZ INDEX 1.28E-01

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
1,2-Dichloroethene	3.42E-01	2	1.00	70	1	0.962	0.429	4.03E-03	15.26%
Tetrachloroethene	5.53E-02	2	1.00	70	1	0.962	0.429	6.51E-04	4.93%
Xylenes	7.97E-01	2	1.00	70	1	0.962	0.429	9.38E-03	0.36%
o-Toluic acid	7.15E+01	2	1.00	70	1	0.962	0.429	8.42E-01	21.26%
m-Toluic acid	4.48E+01	2	1.00	70	1	0.962	0.429	5.27E-01	13.31%
p-Toluic acid	5.60E+01	2	1.00	70	1	0.962	0.429	5.59E-01	16.63%
Arsenic	1.85E-01	2	0.05	70	1	0.962	0.429	1.09E-04	27.55%
Barium	1.70E-01	2	0.05	70	1	0.962	0.429	9.98E-05	0.11%
Lead	4.61E-02	2	0.05	70	1	0.962	0.429	2.71E-05	0.07%
Vanadium	8.37E-02	2	0.05	70	1	0.962	0.429	4.93E-05	0.53%

HAZ INDEX 1.32E+00

TABLE H-35 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	1.44E-01	1.5	1.00	35	1	0.962	0.129	7.65E-04	2.00E-02	3.83E-02	14.00%
Tetrachloroethene	2.87E-02	1.5	1.00	35	1	0.962	0.129	1.52E-04	1.00E-02	1.52E-02	5.57%
Xylenes	4.54E-01	1.5	1.00	35	1	0.962	0.129	2.41E-03	2.00E+00	1.20E-03	0.44%
o-Toluic acid	3.46E+01	1.5	1.00	35	1	0.962	0.129	1.83E-01	3.00E+00	6.11E-02	22.37%
m-Toluic acid	2.18E+01	1.5	1.00	35	1	0.962	0.129	1.15E-01	3.00E+00	3.84E-02	14.07%
p-Toluic acid	2.30E+01	1.5	1.00	35	1	0.962	0.129	1.22E-01	3.00E+00	4.06E-02	14.84%
Arsenic	8.60E-02	1.5	0.05	35	1	0.962	0.129	2.28E-05	3.00E-04	7.59E-02	27.79%
Barium	1.24E-01	1.5	0.05	35	1	0.962	0.129	3.29E-05	7.00E-02	4.70E-04	0.17%
Lead	2.49E-02	1.5	0.05	35	1	0.962	0.129	6.60E-06	3.00E-02	2.20E-04	0.08%
Vanadium	4.77E-02	1.5	0.05	35	1	0.962	0.129	1.26E-05	7.00E-03	1.81E-03	0.66%

HAZARD INDEX 2.73E-01

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	3.42E-01	2	1.00	35	1	0.962	0.129	2.42E-03	2.00E-02	1.21E-01	15.30%
Tetrachloroethene	5.53E-02	2	1.00	35	1	0.962	0.129	3.91E-04	1.00E-02	3.91E-02	4.94%
Xylenes	7.97E-01	2	1.00	35	1	0.962	0.129	5.63E-03	2.00E+00	2.81E-03	0.36%
o-Toluic acid	7.15E+01	2	1.00	35	1	0.962	0.129	5.05E-01	3.00E+00	1.68E-01	21.31%
m-Toluic acid	4.48E+01	2	1.00	35	1	0.962	0.129	3.16E-01	3.00E+00	1.05E-01	13.35%
p-Toluic acid	5.60E+01	2	1.00	35	1	0.962	0.129	3.95E-01	3.00E+00	1.32E-01	16.68%
Arsenic	1.85E-01	2	0.05	35	1	0.962	0.129	6.55E-05	3.00E-04	2.18E-01	27.62%
Barium	1.70E-01	2	0.05	35	1	0.962	0.129	5.99E-05	7.00E-02	8.56E-04	0.11%
Lead	4.61E-02	2	0.05	35	1	0.962	0.129	1.63E-05	3.00E-02	5.43E-04	0.07%
Vanadium	8.37E-02	2	0.05	70	1	0.962	0.129	1.48E-05	7.00E-03	2.11E-03	0.27%

HAZARD INDEX 7.90E-01

TABLE H-36. RESIDENTIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY (FS-8)
FUTURE-USE SCENARIO - On-Site Deep Bedrock Well Use
Round 1 Data

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CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

■ Chronic Daily Intake (mg/kg-day)																		
Compound	Water Conc	mg/L	x	Intake 1.4 L day	x	Fraction absorbed	x	1 Body weight 70 kg	x	Exp (days) Week (days)	x	Wks expd Wks/year	x	Yrs exposed Years lifetime	■ CDI	9 yrs 70 yrs	RISK (CDI*SF)	% Total
Trichloroethene Benzene Tetrachloroethene	2.70E-03			1.4		1.00		70		1		0.962		0.129	6.68E-06	1.10E-02	7.34E-08	10.03%
	2.50E-03			1.4		1.00		70		1		0.962		0.129	6.18E-06	2.90E-02	1.79E-07	24.49%
	3.80E-03			1.4		1.00		70		1		0.962		0.129	9.40E-06	5.10E-02	4.79E-07	65.47%
TOTAL RISK																	7.32E-07	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Water Conc		x	Intake	x	Fraction absorbed	x	1	x	Exp (days)	x	Wks expd	x	Yrs Exposed	=	Chronic Daily Intake (mg/kg-day)
mg/L		x	$\frac{2 \text{ L}}{\text{day}}$	x	1.0	x	1	x	$\frac{7 \text{ days}}{7 \text{ days/wk}}$	x	$\frac{50}{52}$	x	$\frac{30 \text{ yrs}}{70 \text{ yrs}}$	=	CDI
Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days)	Wks expd	Yrs Exposed	CDI	SF	RISK (CDI*SF)	% Total				
Trichloroethene	3.00E-03	2	1.00	70	1	0.962	0.429	3.67E-05	1.10E-02	4.04E-07	8.96%				
	2.60E-03	2	1.00	70	1	0.962	0.429	3.18E-05	2.90E-02	9.23E-07	20.46%				
Tetrachloroethene	5.10E-03	2	1.00	70	1	0.962	0.429	6.24E-05	5.10E-02	3.18E-06	70.58%				
TOTAL RISK										4.51E-06					

TABLE H-36 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	7.80E-03	1.4	1.00	70	1	0.962	0.129	1.93E-05	1.00E-01	1.93E-04	0.75%
1,2-Dichloroethene	1.26E-02	1.4	1.00	70	1	0.962	0.129	3.12E-05	2.00E-02	1.56E-03	6.07%
Tetrachloroethene	3.80E-03	1.4	1.00	70	1	0.962	0.129	9.40E-06	1.00E-02	9.40E-04	3.66%
Xylenes	7.64E-02	1.4	1.00	70	1	0.962	0.129	1.89E-04	2.00E-00	9.45E-05	0.37%
2-methyl phenol	5.20E-03	1.4	1.00	70	1	0.962	0.129	1.29E-05	5.00E-02	2.57E-04	1.00%
4-methyl phenol	5.40E-03	1.4	1.00	70	1	0.962	0.129	1.34E-05	5.00E-02	2.67E-04	1.04%
o-Toluic acid	2.91E+00	1.4	1.00	70	1	0.962	0.129	7.19E-03	3.00E+00	2.40E-03	9.34%
m-Toluic acid	1.42E+00	1.4	1.00	70	1	0.962	0.129	3.52E-03	3.00E+00	1.17E-03	4.57%
p-Toluic acid	1.89E-01	1.4	1.00	70	1	0.962	0.129	4.67E-04	3.00E+00	1.56E-04	0.61%
Arsenic	1.91E-02	1.4	0.05	70	1	0.962	0.129	2.36E-06	3.00E-04	7.87E-03	30.68%
Antimony	2.93E-02	1.4	0.05	70	1	0.962	0.129	3.62E-06	4.00E-04	9.06E-03	35.30%
Barium	7.72E-02	1.4	0.05	70	1	0.962	0.129	9.54E-06	7.00E-02	1.36E-04	0.53%
Mercury	6.50E-04	1.4	0.05	70	1	0.962	0.129	8.04E-08	3.00E-04	2.68E-04	1.04%
Lead	2.00E-03	1.4	0.05	70	1	0.962	0.129	2.47E-07	3.00E-02	8.24E-06	0.03%
Thallium	7.00E-04	1.4	0.05	70	1	0.962	0.129	8.65E-08	8.00E-05	1.08E-03	4.22%
Vanadium	1.12E-02	1.4	0.05	70	1	0.962	0.129	1.38E-06	7.00E-03	1.98E-04	0.77%

HAZARD INDEX 2.57E-02

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	1.10E-02	2	1.00	70	1	0.962	0.429	1.30E-04	1.00E-01	1.30E-03	0.61%
1,2-Dichloroethene	3.02E-02	2	1.00	70	1	0.962	0.429	3.56E-04	2.00E-02	1.78E-02	8.40%
Tetrachloroethene	5.10E-03	2	1.00	70	1	0.962	0.429	6.00E-05	1.00E-02	6.00E-03	2.84%
Xylenes	1.76E-01	2	1.00	70	1	0.962	0.429	2.08E-03	2.00E-00	1.04E-03	0.49%
2-methyl phenol	5.60E-03	2	1.00	70	1	0.962	0.429	6.59E-05	5.00E-02	1.32E-03	0.62%
4-methyl phenol	6.20E-03	2	1.00	70	1	0.962	0.429	7.30E-05	5.00E-02	1.46E-03	0.69%
o-Toluic acid	6.74E+00	2	1.00	70	1	0.962	0.429	7.93E-02	3.00E+00	2.64E-02	12.49%
m-Toluic acid	3.20E+00	2	1.00	70	1	0.962	0.429	3.76E-02	3.00E+00	1.25E-02	5.93%
p-Toluic acid	3.98E-01	2	1.00	70	1	0.962	0.429	4.69E-03	3.00E+00	1.56E-03	0.74%
Arsenic	3.98E-02	2	0.05	70	1	0.962	0.429	2.34E-05	3.00E-04	7.81E-02	36.89%
Antimony	3.60E-02	2	0.05	70	1	0.962	0.429	2.12E-05	4.00E-04	5.30E-02	25.03%
Barium	1.82E-01	2	0.05	70	1	0.962	0.429	1.07E-04	7.00E-02	1.53E-03	0.72%
Mercury	9.30E-04	2	0.05	70	1	0.962	0.429	5.47E-07	3.00E-04	1.82E-03	0.86%
Lead	3.10E-03	2	0.05	70	1	0.962	0.429	1.82E-06	3.00E-02	6.08E-05	0.03%
Thallium	8.00E-04	2	0.05	70	1	0.962	0.429	4.71E-07	8.00E-05	5.89E-03	2.78%
Vanadium	2.20E-02	2	0.05	70	1	0.962	0.429	1.30E-05	7.00E-03	1.85E-03	0.87%

HAZARD INDEX 2.12E-01

TABLE H-36 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	7.80E-03	1.5	1.00	35	1	0.962	0.129	4.13E-05	1.00E-01	4.13E-04	0.75%
1,2-Dichloroethene	1.26E-02	1.5	1.00	35	1	0.962	0.129	6.68E-05	2.00E-02	3.34E-03	6.07%
Tetrachloroethene	3.80E-03	1.5	1.00	35	1	0.962	0.129	2.01E-05	1.00E-02	2.01E-03	3.66%
Xylenes	7.64E-02	1.5	1.00	35	1	0.962	0.129	4.05E-04	2.00E+00	2.02E-04	0.37%
2-methyl phenol	5.20E-03	1.5	1.00	35	1	0.962	0.129	2.76E-05	5.00E-02	5.51E-04	1.00%
4-methyl phenol	5.40E-03	1.5	1.00	35	1	0.962	0.129	2.86E-05	5.00E-02	5.72E-04	1.04%
o-Toluic acid	2.91E+00	1.5	1.00	35	1	0.962	0.129	1.54E-02	3.00E+00	5.13E-03	9.34%
m-Toluic acid	1.42E+00	1.5	1.00	35	1	0.962	0.129	7.53E-03	3.00E+00	2.51E-03	4.57%
p-Toluic acid	1.89E-01	1.5	1.00	35	1	0.962	0.129	1.00E-03	3.00E+00	3.34E-04	0.61%
Arsenic	1.91E-02	1.5	0.05	35	1	0.962	0.129	5.06E-06	3.00E-04	1.69E-02	30.68%
Antimony	2.93E-02	1.5	0.05	35	1	0.962	0.129	7.76E-06	4.00E-04	1.94E-02	35.30%
Barium	7.72E-02	1.5	0.05	35	1	0.962	0.129	2.05E-05	7.00E-02	2.92E-04	0.53%
Mercury	6.50E-04	1.5	0.05	35	1	0.962	0.129	1.72E-07	3.00E-04	5.74E-04	1.04%
Lead	2.00E-03	1.5	0.05	35	1	0.962	0.129	5.30E-07	3.00E-02	1.77E-03	0.03%
Thallium	7.00E-04	1.5	0.05	35	1	0.962	0.129	1.85E-07	8.00E-05	2.32E-03	4.22%
Vanadium	1.12E-02	1.5	0.05	35	1	0.962	0.129	2.97E-06	7.00E-03	4.24E-04	0.77%

HAZARD INDEX 5.50E-02

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	1.10E-02	2	1.00	35	1	0.962	0.129	7.77E-05	1.00E-01	7.77E-04	0.61%
1,2-Dichloroethene	3.02E-02	2	1.00	35	1	0.962	0.129	2.13E-04	2.00E-02	1.07E-02	8.40%
Tetrachloroethene	5.10E-03	2	1.00	35	1	0.962	0.129	3.60E-05	1.00E-02	3.60E-03	2.84%
Xylenes	1.76E-01	2	1.00	35	1	0.962	0.129	1.25E-03	2.00E+00	6.23E-04	0.49%
2-methyl phenol	5.60E-03	2	1.00	35	1	0.962	0.129	3.96E-05	5.00E-02	7.91E-04	0.62%
4-methyl phenol	6.20E-03	2	1.00	35	1	0.962	0.129	4.38E-05	5.00E-02	8.76E-04	0.69%
o-Toluic acid	6.74E+00	2	1.00	35	1	0.962	0.129	4.76E-02	3.00E+00	1.59E-02	12.49%
m-Toluic acid	3.20E+00	2	1.00	35	1	0.962	0.129	2.26E-02	3.00E+00	7.53E-03	5.93%
p-Toluic acid	3.98E-01	2	1.00	35	1	0.962	0.129	2.81E-03	3.00E+00	9.37E-04	0.74%
Arsenic	3.98E-02	2	0.05	35	1	0.962	0.129	1.41E-05	3.00E-04	4.69E-02	36.89%
Antimony	3.60E-02	2	0.05	35	1	0.962	0.129	1.27E-05	4.00E-04	3.18E-02	25.03%
Barium	1.82E-01	2	0.05	35	1	0.962	0.129	6.44E-05	7.00E-02	9.20E-02	0.72%
Mercury	9.30E-04	2	0.05	35	1	0.962	0.129	3.28E-07	3.00E-04	1.09E-03	0.86%
Lead	3.10E-03	2	0.05	35	1	0.962	0.129	1.09E-06	3.00E-02	3.65E-05	0.03%
Thallium	8.00E-04	2	0.05	35	1	0.962	0.129	2.83E-07	8.00E-05	3.53E-03	2.78%
Vanadium	2.20E-02	2	0.05	35	1	0.962	0.129	7.77E-06	7.00E-03	1.11E-03	0.87%

HAZARD INDEX 1.27E-01

TABLE H-37. RESIDENTIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY (FS-6)
FUTURE-USE SCENARIO - On-Site Deep Bedrock Well Use
Round 2 Data

p 1 of 3

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Water Conc	x	Intake	x	Fraction absorbed	x	1	x	Exp (days) Week (days)	x	Wks expd Wks/year	x	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)			% Total
														CDI	SF	RISK (CDI*SF)	
	mg/L	x	1.4 L day	x	1.0	x	1	x	7 days 7 days/wk	x	50 52	x	9 yrs 70 yrs	CDI			
	Water Conc (mg/L)		Intake (L/day)		Fraction absorbed		Body Wt (kg)		Exp (days) Week (days)		Wks expd Wks/year		Yrs exposed Years lifetime	CDI	SF	RISK (CDI*SF)	% Total
Trichloroethene	4.00E-03		1.4		1.00		70		1		0.962		0.129	9.89E-06	1.10E-02	1.09E-07	12.2%
Tetrachloroethene	6.20E-03		1.4		1.00		70		1		0.962		0.129	1.53E-05	5.10E-02	7.82E-07	87.8%

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Yrs Lifetime	CDI	SF	RISK (CDI*SF)	% Total
Trichloroethene	4.00E-03	2	1.00	70	1	0.962	0.429	4.90E-05	1.10E-02	5.39E-07	9.6%
Tetrachloroethene	8.10E-03	2	1.00	70	1	0.962	0.429	9.92E-05	5.10E-02	5.06E-06	90.4%

Note: Database does not include off-site well MW-16D.

TABLE H-37 (Continued)

p 2 of 3

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs expd Years lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	1.34E-02	1.4	1.00	70	1	0.962	0.129	3.31E-05	1.00E-01	3.31E-04	1.4%
1,2-Dichloroethene	4.00E-03	1.4	1.00	70	1	0.962	0.129	9.89E-06	2.00E-02	4.95E-04	2.1%
Tetrachloroethene	6.20E-03	1.4	1.00	70	1	0.962	0.129	1.53E-05	1.00E-02	1.53E-03	6.5%
Xylenes	7.00E-02	1.4	1.00	70	1	0.962	0.129	1.73E-04	2.00E+00	8.65E-05	0.4%
2-methyl phenol	6.00E-03	1.4	1.00	70	1	0.962	0.129	1.48E-05	5.00E-02	2.97E-04	1.3%
Pentachlorophenol	2.20E-02	1.4	1.00	70	1	0.962	0.129	5.44E-05	3.00E-02	1.81E-03	7.7%
o-Toluic acid	3.42E+00	1.4	1.00	70	1	0.962	0.129	8.46E-03	3.00E+00	2.82E-03	11.9%
m-Toluic acid	3.42E+00	1.4	1.00	70	1	0.962	0.129	8.46E-03	3.00E+00	2.82E-03	11.9%
p-Toluic acid	2.80E-01	1.4	1.00	70	1	0.962	0.129	6.92E-04	3.00E+00	2.31E-04	1.0%
Arsenic	3.08E-02	1.4	0.05	70	1	0.962	0.129	3.81E-06	3.00E-04	1.27E-02	53.7%
Antimony	1.60E-03	1.4	0.05	70	1	0.962	0.129	1.98E-07	4.00E-04	4.95E-04	2.1%
Cadmium	2.00E-03	1.4	0.05	70	1	0.962	0.129	2.47E-07	7.00E-03	3.53E-05	0.1%

HAZARD INDEX 2.36E-02

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs expd Years lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	2.64E-02	2	1.00	70	1	0.962	0.429	3.11E-04	1.00E-01	3.11E-03	1.2%
1,2-Dichloroethene	4.00E-03	2	1.00	70	1	0.962	0.429	4.71E-05	2.00E-02	2.35E-03	0.9%
Tetrachloroethene	8.10E-03	2	1.00	70	1	0.962	0.429	9.54E-05	1.00E-02	9.54E-03	3.8%
Xylenes	1.71E-01	2	1.00	70	1	0.962	0.429	2.01E-03	2.00E+00	1.01E-03	0.4%
2-methyl phenol	7.60E-03	2	1.00	70	1	0.962	0.429	8.95E-05	5.00E-02	1.79E-03	0.7%
Pentachlorophenol	3.67E-02	2	1.00	70	1	0.962	0.429	4.32E-04	5.00E-02	8.64E-03	3.4%
o-Toluic acid	8.69E+00	2	1.00	70	1	0.962	0.429	1.02E-01	3.00E+00	3.41E-02	13.6%
m-Toluic acid	8.67E+00	2	1.00	70	1	0.962	0.429	1.02E-01	3.00E+00	3.40E-02	13.5%
p-Toluic acid	6.76E-01	2	1.00	70	1	0.962	0.429	7.96E-03	2.65E-03	3.00E-03	1.1%
Arsenic	2.50E-03	2	0.05	70	1	0.962	0.429	4.52E-05	3.00E-04	1.51E-01	59.9%
Antimony	2.50E-03	2	0.05	70	1	0.962	0.429	1.47E-06	4.00E-04	3.68E-03	1.5%
Cadmium	2.70E-03	2	0.05	70	1	0.962	0.429	1.59E-06	7.00E-02	2.27E-05	0.0%

HAZARD INDEX 2.51E-01

TABLE H-37 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs expd Yrs lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	1.34E-02	1.5	1.00	35	1	0.962	0.129	7.10E-05	1.00E-01	7.10E-04	1.4%
1,2-Dichloroethene	4.00E-03	1.5	1.00	35	1	0.962	0.129	2.12E-05	2.00E-02	1.06E-03	2.1%
Tetrachloroethene	6.20E-03	1.5	1.00	35	1	0.962	0.129	3.28E-05	1.00E-02	3.28E-03	6.5%
Xylenes	7.00E-02	1.5	1.00	35	1	0.962	0.129	3.71E-04	2.00E+00	1.85E-04	0.4%
2-methyl phenol	6.00E-03	1.5	1.00	35	1	0.962	0.129	3.18E-05	5.00E-02	6.36E-04	1.3%
Pentachlorophenol	2.20E-02	1.5	1.00	35	1	0.962	0.129	1.17E-04	3.00E-02	3.89E-03	7.7%
o-Toluic acid	3.42E+00	1.5	1.00	35	1	0.962	0.129	1.81E-02	3.00E+00	6.04E-03	11.9%
m-Toluic acid	3.42E+00	1.5	1.00	35	1	0.962	0.129	1.81E-02	3.00E+00	6.04E-03	11.9%
p-Toluic acid	2.80E-01	1.5	1.00	35	1	0.962	0.129	1.48E-03	3.00E+00	4.95E-04	1.0%
Arsenic	3.08E-02	1.5	0.05	35	1	0.962	0.129	8.16E-06	3.00E-04	2.72E-02	53.7%
Antimony	1.60E-03	1.5	0.05	35	1	0.962	0.129	4.24E-07	4.00E-04	1.06E-03	2.1%
Cadmium	2.00E-03	1.5	0.05	35	1	0.962	0.129	5.30E-07	7.00E-03	7.57E-05	0.1%

HAZARD INDEX 5.07E-02

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs expd Yrs lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	2.64E-02	2	1.00	35	1	0.962	0.129	1.86E-04	1.00E-01	1.86E-03	1.2%
1,2-Dichloroethene	4.00E-03	2	1.00	35	1	0.962	0.129	2.83E-05	2.00E-02	1.41E-03	0.6%
Tetrachloroethene	8.10E-03	2	1.00	35	1	0.962	0.129	5.72E-05	1.00E-02	5.72E-03	2.3%
Xylenes	1.71E-01	2	1.00	35	1	0.962	0.129	1.21E-03	2.00E+00	6.04E-04	0.2%
2-methyl phenol	7.60E-03	2	1.00	35	1	0.962	0.129	5.37E-05	5.00E-02	1.07E-03	0.4%
Pentachlorophenol	3.67E-02	2	1.00	35	1	0.962	0.129	2.59E-04	5.00E-02	5.19E-03	2.1%
o-Toluic acid	8.69E+00	2	1.00	35	1	0.962	0.129	6.14E-02	3.00E+00	2.05E-02	8.1%
m-Toluic acid	8.67E+00	2	1.00	35	1	0.962	0.129	6.12E-02	3.00E+00	2.04E-02	8.1%
p-Toluic acid	6.76E-01	2	1.00	35	1	0.962	0.129	4.77E-03	3.00E+00	1.59E-03	0.6%
Arsenic	7.67E-02	2	0.05	35	1	0.962	0.129	2.71E-05	3.00E-04	9.03E-02	35.9%
Antimony	2.50E-03	2	0.05	35	1	0.962	0.129	8.83E-07	4.00E-04	2.21E-03	0.9%
Cadmium	2.70E-03	2	0.05	35	1	0.962	0.129	9.54E-07	7.00E-02	1.36E-05	0.0%

HAZARD INDEX 1.51E-01

TABLE H-38. RESIDENTIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY (FS-6)
FUTURE-USE SCENARIO - On-Site Mixed Bedrock Well Use
Round 1 Data

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CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Water		Intake	Fraction		Body	Exp (days)	Wks expd	Yrs exposed	Chronic Daily Intake (mg/kg-day)		RISK (CDI*SF)	% Total
	Conc (mg/L)	Conc	(L/day)	absorbed	absorbed	Wt (kg)	Week (days)	Wks/year	Years lifetime	CDI	SF		
Vinyl chloride Trichloroethene Benzene Tetrachloroethene Total c-PAHs	3.00E-03	mg	1.4 L/day	1.0	x	1	7 days	50	9 yrs	= CDI		1.90E+00	1.41E-05
	2.35E-02	L				70 kg	7 days/wk	52	70 yrs			1.10E-02	6.39E-07
	3.00E-03											2.90E-02	2.15E-07
	2.19E-01											5.10E-02	2.76E-05
	5.00E-03											7.30E+00	9.02E-05

TOTAL RISK 1.33E-04

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Water		Intake	Fraction		Body	Exp (days)	Wks expd	Yrs Exposed	Chronic Daily Intake (mg/kg-day)		RISK (CDI*SF)	% Total
	Conc (mg/L)	Conc	(L/day)	absorbed	absorbed	Wt (kg)	Week (days)	Wks/year	Years Lifetime	CDI	SF		
Vinyl chloride Trichloroethene Benzene Tetrachloroethene Total c-PAHs	3.00E-03	mg	2 L/day	1.0	x	1	7 days	50	30 yrs	= CDI		1.90E+00	6.98E-05
	5.13E-02	L				70 kg	7 days/wk	52	70 yrs			1.10E-02	6.91E-06
	3.00E-03											2.90E-02	1.07E-06
	5.69E-01											5.10E-02	3.56E-04
	5.00E-03											7.30E+00	4.47E-04

TOTAL RISK 8.80E-04

TABLE H-38 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child

Compound	Water x Intake x Fraction x		Body weight	Exp (days)	Wks expd	Yrs exposed	Chronic Daily Intake (mg/kg-day)		% TOTAL HAZARD
	Conc (mg/L)	Intake (L/day)					CDI	RfD	
1,2-Dichloroethene	3.68E-02	1.5	1.00	1	0.962	0.129	1.95E-04	2.00E-02	9.75E-03
Tetrachloroethene	2.19E-01	1.5	1.00	1	0.962	0.129	1.16E-03	1.00E-02	1.16E-01
Xylenes	3.75E-01	1.5	1.00	1	0.962	0.129	1.99E-03	2.00E+00	9.94E-04
o-Toluic acid	1.31E+01	1.5	1.00	1	0.962	0.129	6.91E-02	3.00E+00	2.30E-02
m-Toluic acid	5.91E+00	1.5	1.00	1	0.962	0.129	3.13E-02	3.00E+00	1.04E-02
p-Toluic acid	7.05E-01	1.5	1.00	1	0.962	0.129	3.74E-03	3.00E+00	1.25E-03
Arsenic	7.17E-02	1.5	0.05	1	0.962	0.129	1.90E-05	3.00E-04	6.33E-02
Barium	1.38E-01	1.5	0.05	1	0.962	0.129	3.65E-05	7.00E-02	5.22E-04
Lead	1.30E-03	1.5	0.05	1	0.962	0.129	3.44E-07	3.00E-02	1.15E-05
Vanadium	4.65E-02	1.5	0.05	1	0.962	0.129	1.23E-05	7.00E-03	1.76E-03

HAZARD INDEX 2.27E-01

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Child

Compound	Water x Intake x Fraction x		Body weight	Exp (days)	Wks expd	Yrs exposed	Chronic Daily Intake (mg/kg-day)		% TOTAL HAZARD
	Conc (mg/L)	Intake (L/day)					CDI	RfD	
1,2-Dichloroethene	6.66E-02	2	1.00	1	0.962	0.129	4.70E-04	2.00E-02	2.35E-02
Tetrachloroethene	5.69E-01	2	1.00	1	0.962	0.129	4.02E-03	1.00E-02	4.02E-01
Xylenes	7.50E-01	2	1.00	1	0.962	0.129	5.30E-03	2.00E+00	2.65E-03
o-Toluic acid	2.85E+01	2	1.00	1	0.962	0.129	2.02E-01	3.00E+00	6.72E-02
m-Toluic acid	1.39E+01	2	1.00	1	0.962	0.129	9.82E-02	3.00E+00	3.27E-02
p-Toluic acid	2.85E+01	2	1.00	1	0.962	0.129	2.02E-01	3.00E+00	6.72E-02
Arsenic	9.26E-02	2	0.05	1	0.962	0.129	3.27E-05	3.00E-04	1.09E-01
Barium	2.03E-01	2	0.05	1	0.962	0.129	7.16E-05	7.00E-02	1.02E-03
Lead	2.91E-02	2	0.05	1	0.962	0.129	1.03E-05	3.00E-02	3.43E-04
Vanadium	8.73E-02	2	0.05	1	0.962	0.129	1.54E-05	7.00E-03	2.20E-03

HAZARD INDEX 7.08E-01

TABLE H-39. RESIDENTIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY (FS-6)
FUTURE-USE SCENARIO - On-Site Mixed Bedrock Well Use
Round 2 Data

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CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Chronic Daily Intake (mg/kg-day)														
Compound	Water Conc mg/L	Intake x mg/L	x 1.4 L day	x 1.0	x 1	Body weight 70 kg	x 1	x 7 days 7 days/wk	x Wks expd Wks/year	x Yrs exposed Years lifetime	CDI	SF	RISK (CDI*SF)	% Total
Vinyl chloride Trichloroethene Benzene	1.22E-02	1.4		1.00		70		1	0.962	0.129	3.02E-05	1.90E+00	5.73E-05	94.13%
	1.01E-02	1.4		1.00		70		1	0.962	0.129	2.50E-05	1.10E-02	2.75E-07	0.45%
	4.00E-03	1.4		1.00		70		1	0.962	0.129	9.89E-06	2.90E-02	2.87E-07	0.47%
Tetrachloroethene 4,4'-DDE	2.33E-02	1.4		1.00		70		1	0.962	0.129	5.76E-05	5.10E-02	2.94E-06	4.83%
	9.00E-05	1.4		1.00		70		1	0.962	0.129	2.23E-07	3.40E-01	7.57E-08	0.12%
TOTAL RISK													6.09E-05	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Chronic Daily Intake (mg/kg-day)											
Water Conc	Intake	Fraction absorbed	1	Body weight	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Yrs Lifetime	CDI	SF	RISK (CDI*SF)	% Total
mg/L	$\frac{2L}{day}$	1.0	x	1	$\frac{7\ days}{7\ days/wk}$	$\frac{50}{52}$	$\frac{30\ yrs}{70\ yrs}$	CDI			
Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Yrs Lifetime	CDI	SF	RISK (CDI*SF)	% Total
Vinyl chloride	1.88E-02	2	1.00	70	1	0.962	0.429	2.30E-04	1.90E+00	4.37E-04	97.93%
Trichloroethene	1.58E-02	2	1.00	70	1	0.962	0.429	1.93E-04	1.10E-02	2.13E-06	0.48%
Benzene	4.00E-03	2	1.00	70	1	0.962	0.429	4.90E-05	1.10E-02	5.39E-07	0.12%
Tetrachloroethene	4.41E-02	2	1.00	70	1	0.962	0.429	5.40E-04	1.10E-02	5.94E-06	1.33%
4,4'-DDE	1.50E-04	2	1.00	70	1	0.962	0.429	1.84E-06	3.40E-01	6.24E-07	0.14%
TOTAL RISK										4.47E-04	

Note: Database does not include off-site well cluster MW-16U16D.

TABLE H-39 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	1.53E-02	1.4	1.00	70	1	0.962	0.129	3.78E-05	1.00E-01	3.78E-04	0.37%
1,2-Dichloroethene	1.11E-01	1.4	1.00	70	1	0.962	0.129	2.75E-04	2.00E-02	1.37E-02	13.26%
Tetrachloroethene	2.33E-02	1.4	1.00	70	1	0.962	0.129	5.76E-05	1.00E-02	5.76E-03	5.56%
Xylenes	3.63E-01	1.4	1.00	70	1	0.962	0.129	8.97E-04	2.00E-02	4.48E-04	0.43%
2-methyl phenol	7.60E-03	1.4	1.00	70	1	0.962	0.129	1.88E-05	5.00E-02	3.76E-04	0.36%
4-methyl phenol	1.10E-02	1.4	1.00	70	1	0.962	0.129	2.72E-05	5.00E-02	5.44E-04	0.53%
o-Toluic acid	2.72E+01	1.4	1.00	70	1	0.962	0.129	6.72E-02	3.00E+00	2.24E-02	21.64%
m-Toluic acid	1.74E+01	1.4	1.00	70	1	0.962	0.129	4.30E-02	3.00E+00	1.43E-02	13.85%
p-Toluic acid	1.76E+01	1.4	1.00	70	1	0.962	0.129	4.34E-02	3.00E+00	1.45E-02	13.98%
Arsenic	7.30E-02	1.4	0.05	70	1	0.962	0.129	9.02E-06	3.00E-04	3.01E-02	29.05%
Barium	1.14E-01	1.4	0.05	70	1	0.962	0.129	1.41E-05	7.00E-02	2.02E-04	0.19%
Mercury	1.70E-04	1.4	0.05	70	1	0.962	0.129	2.10E-08	3.00E-04	7.01E-05	0.07%
Lead	2.03E-02	1.4	0.05	70	1	0.962	0.129	2.51E-06	3.00E-02	8.37E-05	0.08%
Vanadium	3.69E-02	1.4	0.05	70	1	0.962	0.129	4.56E-06	7.00E-03	6.52E-04	0.63%

HAZARD INDEX

1.04E-01

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	2.36E-02	2	1.00	70	1	0.962	0.429	2.78E-04	1.00E-01	2.78E-03	0.26%
1,2-Dichloroethene	2.64E-01	2	1.00	70	1	0.962	0.429	3.11E-03	2.00E-02	1.55E-01	14.78%
Tetrachloroethene	4.41E-02	2	1.00	70	1	0.962	0.429	5.19E-04	1.00E-02	5.19E-02	4.94%
Xylenes	6.54E-01	2	1.00	70	1	0.962	0.429	7.70E-03	2.00E+00	3.85E-03	0.37%
2-methyl phenol	1.10E-02	2	1.00	70	1	0.962	0.429	1.30E-04	5.00E-02	2.59E-03	0.25%
4-methyl phenol	1.91E-02	2	1.00	70	1	0.962	0.429	2.25E-04	5.00E-02	4.50E-03	0.43%
o-Toluic acid	5.59E+01	2	1.00	70	1	0.962	0.429	6.59E-01	3.00E+00	2.20E-01	20.88%
m-Toluic acid	3.53E+01	2	1.00	70	1	0.962	0.429	4.16E-01	3.00E+00	1.39E-01	13.19%
p-Toluic acid	4.30E+01	2	1.00	70	1	0.962	0.429	5.06E-01	3.00E+00	1.69E-01	16.06%
Arsenic	1.50E-01	2	0.05	70	1	0.962	0.429	8.86E-05	3.00E-04	2.95E-01	28.09%
Barium	1.50E-01	2	0.05	70	1	0.962	0.429	8.85E-05	7.00E-02	1.26E-03	0.12%
Mercury	2.20E-04	2	0.05	70	1	0.962	0.429	1.30E-07	3.00E-04	4.32E-04	0.04%
Lead	3.69E-02	2	0.05	70	1	0.962	0.429	2.17E-05	3.00E-02	7.22E-04	0.07%
Vanadium	6.57E-02	2	0.05	70	1	0.962	0.429	3.87E-05	7.00E-03	5.53E-03	0.53%

HAZARD INDEX

1.05E+00

TABLE H-39 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	1.53E-02	1.5	1.00	35	1	0.962	0.129	8.11E-05	1.00E-01	8.11E-04	0.37%
1,2-Dichloroethene	1.11E-01	1.5	1.00	35	1	0.962	0.129	5.89E-04	2.00E-02	2.94E-02	13.26%
Tetrachloroethene	2.33E-02	1.5	1.00	35	1	0.962	0.129	1.23E-04	1.00E-02	1.23E-04	5.56%
Xylenes	3.63E-01	1.5	1.00	35	1	0.962	0.129	1.92E-03	2.00E-00	9.61E-04	0.43%
2-methyl phenol	7.60E-03	1.5	1.00	35	1	0.962	0.129	4.03E-05	5.00E-02	8.05E-04	0.36%
4-methyl phenol	1.10E-02	1.5	1.00	35	1	0.962	0.129	5.83E-05	5.00E-02	1.17E-03	0.53%
o-Toluic acid	2.72E+01	1.5	1.00	35	1	0.962	0.129	1.44E-01	3.00E+00	4.80E-02	21.64%
m-Toluic acid	1.74E+01	1.5	1.00	35	1	0.962	0.129	9.22E-02	3.00E+00	3.07E-02	13.85%
p-Toluic acid	7.30E-02	1.5	1.00	35	1	0.962	0.129	9.30E-02	3.00E+00	3.10E-02	13.98%
Arsenic	1.14E-01	1.5	0.05	35	1	0.962	0.129	1.93E-05	3.00E-04	6.45E-02	29.05%
Barium	1.70E-04	1.5	0.05	35	1	0.962	0.129	3.03E-05	7.00E-02	4.32E-04	0.19%
Mercury	2.03E-02	1.5	0.05	35	1	0.962	0.129	4.50E-08	3.00E-04	1.50E-04	0.07%
Lead	3.69E-02	1.5	0.05	35	1	0.962	0.129	5.38E-06	3.00E-02	1.79E-04	0.08%
Vanadium						0.962	0.129	9.78E-06	7.00E-03	1.40E-03	0.63%

HAZARD INDEX 2.22E-01

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Child

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	ADD	RfD	ADD/RfD	% TOTAL HAZARD
Acetone	2.36E-02	2	1.00	35	1	0.962	0.129	1.67E-04	1.00E-01	1.67E-03	0.26%
1,2-Dichloroethene	2.64E-01	2	1.00	35	1	0.962	0.129	1.86E-03	2.00E-02	9.32E-02	14.78%
Tetrachloroethene	4.41E-02	2	1.00	35	1	0.962	0.129	3.12E-04	1.00E-02	3.12E-02	4.94%
Xylenes	6.54E-01	2	1.00	35	1	0.962	0.129	4.62E-03	2.00E+00	2.31E-03	0.37%
2-methyl phenol	1.10E-02	2	1.00	35	1	0.962	0.129	7.77E-05	5.00E-02	1.55E-03	0.25%
4-methyl phenol	1.91E-02	2	1.00	35	1	0.962	0.129	1.35E-04	5.00E-02	2.70E-03	0.43%
o-Toluic acid	5.59E+01	2	1.00	35	1	0.962	0.129	3.95E-01	3.00E+00	1.32E-01	20.88%
m-Toluic acid	3.53E+01	2	1.00	35	1	0.962	0.129	2.50E-01	3.00E+00	8.32E-02	13.19%
p-Toluic acid	4.30E+01	2	1.00	35	1	0.962	0.129	3.04E-01	3.00E+00	1.01E-01	16.06%
Arsenic	1.50E-01	2	0.05	35	1	0.962	0.129	5.32E-05	3.00E-04	1.77E-01	28.09%
Barium	1.50E-01	2	0.05	35	1	0.962	0.129	5.31E-05	7.00E-02	7.58E-04	0.12%
Mercury	2.20E-04	2	0.05	35	1	0.962	0.129	7.77E-08	3.00E-04	2.59E-04	0.04%
Lead	3.68E-02	2	0.05	35	1	0.962	0.129	1.30E-05	3.00E-02	4.33E-04	0.07%
Vanadium	6.57E-02	2	0.05	35	1	0.962	0.129	2.32E-05	7.00E-03	3.32E-03	0.53%

HAZARD INDEX 6.31E-01

TABLE H-40. RESIDENTIAL USE OF GROUNDWATER - INGESTION PATHWAY (FS-6)
FUTURE-USE SCENARIO - On-Site Deep Bedrock Well Use
(Data from wells SPW-01, SPW-02 and SPW-03)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

CDI (mg/kg-day)									
Water x Intake x Fraction x $\frac{1}{\text{Body weight}}$ x $\frac{\text{Yrs exposed}}{\text{Years lifetime}}$ =		CDI (mg/kg-day)							
Conc		absorbed							
mg/L x 1.4 L/day x 1.0 x $\frac{1}{70\text{kg}}$ x $\frac{9}{70}$ =				CDI (mg/kg-day)					
Chemical	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Yrs expd Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Arsenic	2.60E-03	1.4	0.05	70	1.29E-01	2.60E-06	3.00E-04	8.67E-03	89.00%
Barium	6.00E-02	1.4	0.05	70	1.29E-01	6.00E-05	7.00E-02	8.57E-04	8.80%
Lead	2.50E-03	1.4	0.05	70	1.29E-01	2.50E-06	3.00E-02	8.33E-05	0.86%
Zinc	3.93E-02	1.4	0.05	70	1.29E-01	3.93E-05	3.00E-01	1.31E-04	1.35%
HAZARD INDEX									9.74E-03

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Child (0-17 years)

Water x Intake x Fraction x $\frac{1}{\text{Body weight}}$ x $\frac{\text{Yrs exposed}}{\text{Years lifetime}}$ =		CDI (mg/kg-day)							
Conc		absorbed							
mg/L x 1.15 L/day x 1.0 x $\frac{1}{35\text{ kg}}$ x $\frac{9}{70}$ =				CDI (mg/kg-day)					
Chemical	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Arsenic	2.60E-03	1.15	0.05	35	1.29E-01	5.51E-07	3.00E-04	1.84E-03	89.00%
Barium	6.00E-02	1.15	0.05	35	1.29E-01	1.27E-05	7.00E-02	1.82E-04	8.80%
Lead	2.50E-03	1.15	0.05	35	1.29E-01	5.30E-07	3.00E-02	1.77E-05	0.86%
Zinc	3.93E-02	1.15	0.05	35	1.29E-01	8.33E-06	3.00E-01	2.78E-05	1.35%
HAZARD INDEX									2.06E-03

TABLE H-40 (Continued)

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NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Chemical	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Arsenic	6.00E-03	2	0.05	70	4.29E-01	8.57E-06	3.00E-04	2.86E-02	92.73%
Barium	8.89E-02	2	0.05	70	4.29E-01	1.27E-04	7.00E-02	1.81E-03	5.89%
Lead	3.50E-03	2	0.05	70	4.29E-01	5.00E-06	3.00E-02	1.67E-04	0.54%
Zinc	5.46E-02	2	0.05	70	4.29E-01	7.80E-05	3.00E-01	2.60E-04	0.84%

HAZARD INDEX 3.08E-02

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Child (0-17 years)

Chemical	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Yrs exposed Years lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Arsenic	6.00E-03	2	0.05	35	1.29E-01	2.21E-06	3.00E-04	7.37E-03	92.73%
Barium	8.89E-02	2	0.05	35	1.29E-01	3.28E-05	7.00E-02	4.68E-04	5.89%
Lead	3.50E-03	2	0.05	35	1.29E-01	1.29E-06	3.00E-02	4.30E-05	0.54%
Zinc	5.46E-02	2	0.05	35	1.29E-01	2.01E-05	3.00E-01	6.71E-05	0.84%

HAZARD INDEX 7.95E-03

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp x	Skin Surface Area (cm ²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	3.79E-02	8.00E-04	2.6	26	0.129	18,150	70	6.83E-05	1.10E-02	7.52E-07	1.05%
	1.00E-03	4.10E-01	2.6	26	0.129	18,150	70	9.24E-04	2.90E-02	2.68E-05	37.39%
	3.00E-03	8.00E-04	2.6	26	0.129	18,150	70	5.41E-06	1.90E+00	1.03E-05	14.34%
Tetrachloroethene	3.68E-01	8.00E-04	2.6	26	0.129	18,150	70	6.63E-04	5.10E-02	3.38E-05	47.22%

CARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x Yrs lifetime	Skin Surface area x	1 Body wt	1 liter 1000 cm ³	= CDI	RISK	% TOTAL RISK
Trichloroethene Benzene Vinyl chloride Tetrachloroethene	GW Conc	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)	
	7.43E-02	8.00E-04	2.6	26	0.429	18,150	70	4.47E-04	1.10E-02	4.91E-06	1.04%
	2.00E-03	4.10E-01	2.6	26	0.429	18,150	70	6.16E-03	2.90E-02	1.79E-04	37.70%
	3.00E-03	8.00E-04	2.6	26	0.429	18,150	70	1.80E-05	1.90E+00	3.43E-05	7.23%
	8.35E-01	8.00E-04	2.6	26	0.429	18,150	70	5.02E-03	5.10E-02	2.56E-04	54.03%
TOTAL RISK										4.74E-04	

TABLE H-41. Continued

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area cm ²	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	5.35E-02	8.00E-04	2.6	26	0.129	18,150	70	9.65E-05	2.00E-02	4.82E-03	6.73%
Xylenes	5.82E-01	8.00E-04	2.6	26	0.129	18,150	70	1.05E-03	2.00E+00	5.25E-04	0.73%
Tetrachloroethene	3.68E-01	8.00E-04	2.6	26	0.129	18,150	70	6.63E-04	1.00E-02	6.63E-02	92.54%

HAZ INDEX 7.17E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area cm ²	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	5.35E-02	8.00E-04	2.6	45	0.129	9,400	35	1.73E-04	2.00E-02	8.65E-03	6.73%
Xylenes	5.82E-01	8.00E-04	2.6	45	0.129	9,400	35	1.88E-03	2.00E+00	9.41E-04	0.73%
Tetrachloroethene	3.68E-01	8.00E-04	2.6	45	0.129	9,400	35	1.19E-03	1.00E-02	1.19E-01	92.54%

HAZ INDEX 1.29E-01

TABLE H-41. Continued

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	8.96E-02	8.00E-04	2.6	26	0.429	18,150	70	5.38E-04	2.00E-02	2.69E-02	3.17%
Xylenes	1.06E+00	8.00E-04	2.6	26	0.429	18,150	70	6.39E-03	2.00E-02	3.19E-01	37.64%
Tetrachloroethene	8.35E-01	8.00E-04	2.6	26	0.429	18,150	70	5.02E-03	1.00E-02	5.02E-01	59.18%

HAZ INDEX 8.48E-01

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal Permability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	8.96E-02	8.00E-04	2.6	45	0.129	9,400	35	2.90E-04	2.00E-02	1.45E-02	1.71%
Xylenes	1.06E+00	8.00E-04	2.6	45	0.129	9,400	35	3.43E-03	2.00E-02	1.72E-01	20.25%
Tetrachloroethene	8.35E-01	8.00E-04	2.6	45	0.129	9,400	35	2.70E-03	1.00E-02	2.70E-01	31.83%

HAZ INDEX 4.56E-01

TABLE H-42. DERMAL CONTACT WITH GROUNDWATER WHILE SWIMMING - Residential Exposure
FUTURE-USE SCENARIO - On-Site Upper Bedrock Wells - Round 2

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CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area (cm ²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	1.18E-02	8.00E-04	2.6	26	0.129	18,150	70	2.13E-05	1.10E-02	2.34E-07	0.15%
Benzene	4.00E-03	4.10E-01	2.6	26	0.129	18,150	70	3.70E-03	2.90E-02	1.07E-04	67.25%
Vinyl chloride	1.44E-02	8.00E-04	2.6	26	0.129	18,150	70	2.60E-05	1.90E+00	4.93E-05	30.95%
Tetrachloroethene	2.87E-02	8.00E-04	2.6	26	0.129	18,150	70	5.17E-05	5.10E-02	2.64E-06	1.66%
TOTAL RISK										1.59E-04	

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area (cm ²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	1.90E-02	8.00E-04	2.6	26	0.429	18,150	70	1.14E-04	1.10E-02	1.26E-06	0.20%
Benzene	4.00E-03	4.10E-01	2.6	26	0.429	18,150	70	1.23E-02	2.90E-02	3.57E-04	58.07%
Vinyl chloride	2.10E-02	8.00E-04	2.6	26	0.429	18,150	70	1.26E-04	1.90E+00	2.40E-04	38.97%
Tetrachloroethene	5.53E-02	8.00E-04	2.6	26	0.429	18,150	70	3.32E-04	5.10E-02	1.69E-05	2.75%
TOTAL RISK										6.15E-04	

TABLE H-42. Continued

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	3.42E-01	8.00E-04	2.6	26	0.429	18,150	70	2.06E-03	2.00E-02	1.03E-01	27.39%
Xylenes	7.97E-01	8.00E-04	2.6	26	0.429	18,150	70	4.79E-03	2.00E-02	2.39E-01	63.76%
Tetrachloroethene	5.53E-02	8.00E-04	2.6	26	0.429	18,150	70	3.32E-04	1.00E-02	3.32E-02	8.85%

HAZ INDEX 3.76E-01

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	3.42E-01	8.00E-04	2.6	45	0.129	9,400	35	1.11E-03	2.00E-02	5.53E-02	14.73%
Xylenes	7.97E-01	8.00E-04	2.6	45	0.129	9,400	35	2.58E-03	2.00E-02	1.29E-01	34.29%
Tetrachloroethene	5.53E-02	8.00E-04	2.6	45	0.129	9,400	35	1.79E-04	1.00E-02	1.79E-02	4.76%

HAZ INDEX 2.02E-01

**TABLE H-43. DERMAL CONTACT WITH GROUNDWATER WHILE SWIMMING - Residential Exposure
FUTURE-USE SCENARIO - On-Site Deep Bedrock Wells - Round 1**

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal		Hrs exp	Days exp	Yrs exp	Skin		1	1 liter	% TOTAL RISK
		x	Permeability (cm/hr)	x day	x year	x Yrs lifetime	x Surface area (cm ²)	x Body wt (kg)	x 1000 cm ³	== CDI	
Trichloroethene Benzene Tetrachloroethene	4.00E-03	8.00E-04	2.6	26	0.129	18,150	70	7.21E-06	1.10E-02	7.93E-08	0.12%
	2.50E-03	4.10E-01	2.6	26	0.129	18,150	70	2.31E-03	2.90E-02	6.70E-05	99.36%
	3.80E-03	8.00E-04	2.6	26	0.129	18,150	70	6.85E-06	5.10E-02	3.49E-07	0.52%
TOTAL RISK										6.74E-05	

CARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc	Dermal		Hrs exp day	Days exp year	x	Yrs exp Yrs lifetime	Skin		Body wt wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK	
		x	Permeability (cm/hr)					Surface Area (cm ²)	1 1000 cm ³ = CDI						
	mg/L	x	cm/hr	x	26 days year	x	30 yrs 70 yrs	x	18,500 cm ²	x	1/70 kg	x	1/1000	== CDI	== CDI

TABLE H-43. Continued

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal				Skin				Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
		Permeability	Hrs exp day	Days exp year	Yrs exp lifetime	Surface area	x	1 liter 1000 cm ³	= CDI					
1,2-Dichloroethene	1.26E-02	8.00E-04	2.6	26	0.129	18,150	x	70	2.27E-05	70	2.27E-05	2.00E-02	1.14E-03	60.10%
Xylenes	7.64E-02	8.00E-04	2.6	26	0.129	18,150	x	70	1.38E-04	70	1.38E-04	2.00E+00	6.89E-05	3.64%
Tetrachloroethene	3.80E-03	8.00E-04	2.6	26	0.129	18,150	x	70	6.85E-06	70	6.85E-06	1.00E-02	6.85E-04	36.25%

HAZ INDEX 1.89E-03

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal				Skin				Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
		Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Surface area cm ²	Surface area x 1 liter 1000 cm ³	= CDI						
1,2-Dichloroethene	1.26E-02	8.00E-04	2.6	45	0.129	9,400	35	4.07E-05	2.00E-02	2.04E-03	60.10%			
Xylenes	7.64E-02	8.00E-04	2.6	45	0.129	9,400	35	2.47E-04	2.00E+00	1.23E-04	3.64%			
Tetrachloroethene	3.80E-03	8.00E-04	2.6	45	0.129	9,400	35	1.23E-05	1.00E-02	1.23E-03	36.25%			

HAZ INDEX 3.39E-03

[illegible]

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Child

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x Yrs lifetime	Skin Surface area x	1 Body wt	x	1 liter 1000 cm ³	= CDI	% TOTAL HAZARD	
												RISK (CDI/RfD)
1,2-Dichloroethene	3.02E-02	8.00E-04	2.6	45	0.129	9,400	35		9.76E-05	2.00E-02	4.88E-03	7.50%
Xylenes	1.76E-01	8.00E-04	2.6	45	0.129	9,400	35		5.70E-04	2.00E-02	2.85E-02	43.76%
Tetrachloroethene	5.10E-03	8.00E-04	2.6	45	0.129	9,400	35		1.65E-05	1.00E-02	1.65E-03	2.53%

HAZ INDEX

3.50E-02

**TABLE H-44. DERMAL CONTACT WITH GROUNDWATER WHILE SWIMMING - Residential Exposure
FUTURE-USE SCENARIO - On-Site Deep Bedrock Wells - Round 2**

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	x	Yrs exp x	Yrs lifetime	Skin Surface area x	1 Body wt	1 liter 1000 cm ³	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	4.00E-03	8.00E-04	2.6	26	0.129	0.129	18,150	70	7.21E-06	1.10E-02	7.93E-08	12.22%		
	6.20E-03	8.00E-04	2.6	26	0.129	0.129	18,150	70	1.12E-05	5.10E-02	5.70E-07	87.78%		

CARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x	Skin Surface area x	1 Body wt	1 liter 1000 cm ³	= CDI	RISK	% TOTAL RISK					
	mg/L	x	cm/hr	x	26 days year	x	30 yrs 70 yrs	x	18,500 cm ²	x	1/70 kg	x	1/1000	= CDI		

TABLE H-44. Continued

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal					Skin			Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
		Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Surface area cm ²	Surface area cm ²	1 liter 1000 cm ³						
1,2-Dichloroethene	4.00E-03	8.00E-04	2.6	26	0.129	18,150	18,150	70	7.21E-06	2.00E-02	3.61E-04	23.39%		
Xylenes	7.00E-02	8.00E-04	2.6	26	0.129	18,150	18,150	70	1.26E-04	2.00E+00	6.31E-05	4.09%		
Tetrachloroethene	6.20E-03	8.00E-04	2.6	26	0.129	18,150	18,150	70	1.12E-05	1.00E-02	1.12E-03	72.51%		

HAZ INDEX 1.54E-03

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal		Hrs exp	Days exp	Yrs exp	Skin		Body wt (kg)	CDI	RID	RISK (CDI/RfD)	% TOTAL HAZARD
		x	Permeability (cm/hr)	x day	x year	x	Surface area	x					
1,2-Dichloroethene	4.00E-03	x	8.00E-04	x 2.6 hrs day	x 45 days year	x 9 yrs 70 yrs	x	9,400 cm²	x 1/35 kg	x 1/1000	= CDI	2.00E-02	23.39%
Xylenes	7.00E-02											6.46E-04	4.09%
Tetrachloroethene	6.20E-03											2.00E-03	72.51%

HAZ INDEX 2.76E-03

TABLE H-44. Continued

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area x 1000 cm ³	Body wt wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	4.00E-03	8.00E-04	2.6	26	0.429	18,150	70	2.40E-05	2.00E-02	1.20E-03	2.09%
Xylenes	1.71E-01	8.00E-04	2.6	26	0.429	18,150	70	1.03E-03	2.00E-02	5.14E-02	89.43%
Tetrachloroethene	8.10E-03	8.00E-04	2.6	26	0.429	18,150	70	4.87E-05	1.00E-02	4.87E-03	8.48%

HAZ INDEX 5.74E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area x 1000 cm ³	Body wt wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	4.00E-03	8.00E-04	2.6	45	0.129	9,400	35	1.29E-05	2.00E-02	6.46E-04	1.13%
Xylenes	1.71E-01	8.00E-04	2.6	45	0.129	9,400	35	5.52E-04	2.00E-02	2.76E-02	48.10%
Tetrachloroethene	8.10E-03	8.00E-04	2.6	45	0.129	9,400	35	2.62E-05	1.00E-02	2.62E-03	4.56%

HAZ INDEX 3.09E-02

Compound	Dermal		Skin			Body wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK	
	GW Conc (mg/L)	Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime						Surface Area (cm ²)
Trichloroethene	2.35E-02	8.00E-04	2.6	26	0.129	18,150	70	4.24E-05	1.10E-02	4.66E-07	0.42%
Benzene	3.00E-03	4.10E-01	2.6	26	0.129	18,150	70	2.77E-03	2.90E-02	8.04E-05	72.25%
Vinyl chloride	3.00E-03	8.00E-04	2.6	26	0.129	18,150	70	5.41E-06	1.90E+00	1.03E-05	9.24%
Tetrachloroethene	2.19E-01	8.00E-04	2.6	26	0.129	18,150	70	3.95E-04	5.10E-02	2.01E-05	18.10%

TOTAL RISK	1.11E-04

	GW Conc	Dermal Permability	Hrs exp day	x	Days exp year	x	Yrs exp lifetime	x	Skin Surface area	x	Body wt	x	1 liter 1000 cm ³	= CDI		
	mg/L	cm/hr	<u>2.6 hrs</u> day	x	<u>26 days</u> year	x	<u>30 yrs</u> 70 yrs	x	18,500 cm ²	x	1/70 kg	x	1/1000	= CDI		
Compound	GW Conc (mg/L)	Dermal Permability (cm/hr)	Hrs exp day	x	Days exp year	x	Yrs exp lifetime	x	Skin Surface Area (cm ²)	x	Body wt (kg)	x	CDI	RISK (CDI*SF)	% TOTAL RISK	
Trichloroethene	5.13E-02	8.00E-04	2.6	x	26	x	0.429	x	18,150	x	70	x	3.08E-04	1.10E-02	3.39E-06	0.71%
Benzene	3.00E-03	4.10E-01	2.6	x	26	x	0.429	x	18,150	x	70	x	9.24E-03	2.90E-02	2.68E-04	55.81%
Vinyl chloride	3.00E-03	8.00E-04	2.6	x	26	x	0.429	x	18,150	x	70	x	1.80E-05	1.90E+00	3.43E-05	7.13%
Tetrachloroethene	5.69E-01	8.00E-04	2.6	x	26	x	0.429	x	18,150	x	70	x	3.42E-03	5.10E-02	1.75E-04	36.35%

TOTAL RISK	4.80E-04

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x	Skin Surface area x	Body wt x	1 1000 cm ³	1 liter == CDI	% TOTAL HAZARD	
											mg/L
1,2-Dichloroethene	3.68E-02	8.00E-04	2.6	26	0.129	18,150	70	6.63E-05	2.00E-02	3.32E-03	7.69%
Xylenes	3.75E-01	8.00E-04	2.6	26	0.129	18,150	70	6.77E-04	2.00E+00	3.38E-04	0.78%
Tetrachloroethene	2.19E-01	8.00E-04	2.6	26	0.129	18,150	70	3.95E-04	1.00E-02	3.95E-02	91.53%

HAZ INDEX	4.31E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Child

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x	Yrs lifetime	Skin Surface area x	Body wt x	1 1000 cm ³	1 liter 1000 cm ³	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD	
	mg/L	x	cm/hr	x	45 days year	x	9 yrs 70 yrs	x	9,400 cm ²	x	1/35 kg	x	1/1000	== CDI	== CDI
Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD				
1,2-Dichloroethene	3.68E-02	8.00E-04	2.6	45	0.129	9,400	35	1.19E-04	2.00E-02	5.95E-03	7.69%				
Xylenes	3.75E-01	8.00E-04	2.6	45	0.129	9,400	35	1.21E-03	2.00E+00	6.07E-04	0.78%				
Tetrachloroethene	2.19E-01	8.00E-04	2.6	45	0.129	9,400	35	7.08E-04	1.00E-02	7.08E-02	91.53%				

HAZ INDEX	7.73E-02

TABLE H-45. Continued

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	6.66E-02	8.00E-04	2.6	26	0.429	18,150	70	4.00E-04	2.00E-02	2.00E-02	3.41%
Xylenes	7.50E-01	8.00E-04	2.6	26	0.429	18,150	70	4.51E-03	2.00E-02	2.26E-01	38.37%
Tetrachloroethene	5.69E-01	8.00E-04	2.6	26	0.429	18,150	70	3.42E-03	1.00E-02	3.42E-01	58.22%

HAZ INDEX 5.88E-01

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Child

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	6.66E-02	8.00E-04	2.6	45	0.129	9,400	35	2.15E-04	2.00E-02	1.08E-02	1.83%
Xylenes	7.50E-01	8.00E-04	2.6	45	0.129	9,400	35	2.43E-03	2.00E-02	1.21E-01	20.64%
Tetrachloroethene	5.69E-01	8.00E-04	2.6	45	0.129	9,400	35	1.84E-03	1.00E-02	1.84E-01	31.31%

HAZ INDEX 3.16E-01

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x	Skin Surface area x	Body wt x	1 liter 1000 cm ³ x	CDI = CDI	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	1.01E-02	8.00E-04	2.6	26	0.129	18,150	70	1.82E-05	1.10E-02	2.00E-07	0.13%
Benzene	4.00E-03	4.10E-01	2.6	26	0.129	18,150	70	3.70E-03	2.90E-02	1.07E-04	70.83%
Vinyl chloride	1.22E-02	8.00E-04	2.6	26	0.129	18,150	70	2.20E-05	1.90E+00	4.18E-05	27.62%
Tetrachloroethene	2.33E-02	8.00E-04	2.6	26	0.129	18,150	70	4.20E-05	5.10E-02	2.14E-06	1.42%

TOTAL RISK	1.51E-04

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x	Skin Surface area x	Body wt x	1 1000 cm ³	1 liter = CDI	% TOTAL RISK
Trichloroethene	1.58E-02	8.00E-04	2.6	26	0.429	18,150	70	9.50E-05	1.10E-02	1.04E-06
Benzene	4.00E-03	4.10E-01	2.6	26	0.429	18,150	70	1.23E-02	2.90E-02	3.57E-04
Vinyl chloride	1.88E-02	8.00E-04	2.6	26	0.429	18,150	70	1.13E-04	1.90E+00	2.15E-04
Tetrachloroethene	4.41E-02	8.00E-04	2.6	26	0.429	18,150	70	2.65E-04	5.10E-02	1.35E-05

TOTAL RISK	5.86E-04

TABLE H-46. Continued

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	1.11E-01	8.00E-04	2.6	26	0.129	18,150	70	2.00E-04	2.00E-02	1.00E-02	68.87%
Xylenes	3.63E-01	8.00E-04	2.6	26	0.129	18,150	70	6.54E-04	2.00E+00	3.27E-04	2.25%
Tetrachloroethene	2.33E-02	8.00E-04	2.6	26	0.129	18,150	70	4.20E-05	1.00E-02	4.20E-03	28.89%

HAZ INDEX 1.45E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Child

Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	1.11E-01	8.00E-04	2.6	45	0.129	9,400	35	3.59E-04	2.00E-02	1.80E-02	68.87%
Xylenes	3.63E-01	8.00E-04	2.6	45	0.129	9,400	35	1.17E-03	2.00E+00	5.86E-04	2.25%
Tetrachloroethene	2.33E-02	8.00E-04	2.6	45	0.129	9,400	35	7.53E-05	1.00E-02	7.53E-03	28.89%

HAZ INDEX 2.61E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

	GW Conc	Dermal Permeability x	Hrs exp day	x	Days exp year	x	Yrs exp lifetime	x	Skin Surface area	x	Body wt	x	1 liter 1000 cm ³	= CDI		
	mg/L	x	cm/hr	x	26 hrs day	x	30 yrs 70 yrs	x	18,150 cm ²	x	1/70 kg	x	1/1000	= CDI		
	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day		Days exp year		Yrs exp lifetime		Skin Surface Area (cm ²)		Body wt (kg)		CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	2.64E-01	8.00E-04	2.6		26		0.429		18,150		70		1.59E-03	2.00E-02	7.93E-02	26.71%
Xylenes	6.36E-01	8.00E-04	2.6		26		0.429		18,150		70		3.82E-03	2.00E-02	1.91E-01	64.36%
Tetrachloroethene	4.41E-02	8.00E-04	2.6		26		0.429		18,150		70		2.65E-04	1.00E-02	2.65E-02	8.93%

HAZ INDEX	2.97E-01

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Child

Compound	GW Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x	Skin Surface area x	Body wt x	1 1000 cm ³	1 liter = CDI	RISK (CDI/RfD)	% TOTAL HAZARD
	mg/L	x	2.6 hrs day	45 days year	x	9,400 cm ²	x	1/770 kg	x	1/1000	= CDI
	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp x	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD		
1,2-Dichloroethene	2.64E-01	8.00E-04	2.6	45	0.129	9,400	35	8.53E-04	2.00E-02	4.26E-02	14.37%
Xylenes	6.36E-01	8.00E-04	2.6	45	0.129	9,400	35	2.05E-03	2.00E-02	1.03E-01	34.61%
Tetrachloroethene	4.41E-02	8.00E-04	2.6	45	0.129	9,400	35	1.43E-04	1.00E-02	1.43E-02	4.80%

HAZ INDEX	1.60E-01

TABLE H-47. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING
FUTURE-USE SCENARIO RESIDENTIAL - ON-SITE UPPER BEDROCK WELLS

Round 1 Data

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CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	37.9	1	2	15.123
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	1	1	2	0.476
Vinyl chloride	63	2.78E-02	1609.97	16.78	45	0.5960	16.631	22.420	3	1	2	1.579
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	368	1	2	135.377

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Trichloroethene	15.123	10	6	25.205	0.5	15	20	4.136
Benzene	0.476	10	6	0.793	0.5	15	20	0.130
Vinyl chloride	1.579	10	6	2.632	0.5	15	20	0.432
Tetrachloroethene	135.377	10	6	225.628	0.5	15	20	37.021

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	37.9	0.83	25.205	70	0.5	15	20	0.129	1.14E-03	1.70E-02	1.94E-05	26.0%
Benzene	1.0	0.83	0.793	70	0.5	15	20	0.129	3.59E-05	2.90E-02	1.04E-06	1.4%
Vinyl chloride	3.0	0.83	2.632	70	0.5	15	20	0.129	1.19E-04	3.00E-01	3.57E-05	47.9%
Tetrachloroethene	368.0	0.83	225.628	70	0.5	15	20	0.129	1.02E-02	1.80E-03	1.84E-05	24.7%

TOTAL RISK 7.45E-05

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	74.3	1	2	29.647
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	2	1	2	0.952
Vinyl chloride	63	2.78E-02	1609.97	16.78	45	0.5960	16.631	22.420	3	1	2	1.579
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	835.3	1	2	307.284

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Acetone								
Benzene								
Benzonitrile								
Bromobenzene								
Chloroform								
Dibenzyl sulfide								
Diethyl ether								
Ethyl acetate								
Hexane								
Methyl acetate								
Nitrobenzene								
Pentane								
Toluene								
Xylene								

• VOC concentration at end of total time

Compound	Conc ($\mu\text{g/L}$)	Inh Rate (m^3/min)	VOC Gen ($\mu\text{g}/\text{m}^3\cdot\text{min}$)	Body wt (kg)	Air Exch Rate (min^{-1})	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI ($\text{mg}/\text{kg}\cdot\text{day}$)	SF	RISK ($\text{CDI}\cdot\text{SF}$)	% TOTAL RISK
Trichloroethene	74.3	0.83	49.412	70	0.5	15	20	0.429	7.45E-03	1.70E-02	1.27E-04	32.3%
Benzene	2.0	0.83	1.586	70	0.5	15	20	0.429	2.39E-04	2.90E-02	6.93E-06	1.8%
Vinyl chloride	3.0	0.83	2.632	70	0.5	15	20	0.429	3.97E-04	3.00E-01	1.19E-04	30.4%
Tetrachloroethene	835.3	0.83	512.139	70	0.5	15	20	0.429	7.72E-02	1.80E-03	1.39E-04	35.5%

TOTAL RISK

TABLE H-47 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	33.5	1	2	3.612
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	53.5	1	2	23.491
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	10	1	2	4.506
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	368	1	2	135.377
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	582.3	1	2	247.248

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	3.612	10	6	6.020	0.5	15	20	0.988
1,2-Dichloroethene	23.491	10	6	39.151	0.5	15	20	6.424
1,1-Dichloroethene	4.506	10	6	7.510	0.5	15	20	1.232
Tetrachloroethene	135.377	10	6	225.628	0.5	15	20	37.021
Xylenes	247.248	10	6	412.080	0.5	15	20	67.614

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	33.5	0.83	6.020	70	0.5	15	20	0.129	0.129	2.72E-04	1.00E-01	2.72E-03	0.2%
1,2-Dichloroethene	53.5	0.83	39.151	70	0.5	15	20	0.129	0.129	1.77E-03	2.00E-02	8.85E-02	7.7%
1,1-Dichloroethene	10.0	0.83	7.510	70	0.5	15	20	0.129	0.129	3.40E-04	1.00E-02	3.40E-02	2.9%
Tetrachloroethene	368.0	0.83	225.628	70	0.5	15	20	0.129	0.129	1.02E-02	1.00E-02	1.02E+00	88.4%
Xylenes	582.3	0.83	412.080	70	0.5	15	20	0.129	0.129	1.86E-02	2.00E+00	9.32E-03	0.8%

TOTAL HAZARD INDEX 1.16E+00

TABLE H-47 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	57.9	1	2	6.243
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	89.6	1	2	39.341
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	10	1	2	4.506
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	835.3	1	2	307.284
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	1,062.6	1	2	451.186

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	6.243	10	6	10.405	0.5	15	20	1.707
1,2-Dichloroethene	39.341	10	6	65.569	0.5	15	20	10.758
1,1-Dichloroethene	4.506	10	6	7.510	0.5	15	20	1.232
Tetrachloroethene	307.284	10	6	512.139	0.5	15	20	84.031
Xylenes	451.186	10	6	751.977	0.5	15	20	123.384

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	57.9	0.83	10.405	70	0.5	15	20	0.429	1.57E-03	1.00E-01	1.57E-02	0.2%
1,2-Dichloroethene	89.6	0.83	65.569	70	0.5	15	20	0.429	9.89E-03	2.00E-02	4.94E-01	5.9%
1,1-Dichloroethene	10.0	0.83	7.510	70	0.5	15	20	0.429	1.13E-03	1.00E-02	1.13E-01	1.3%
Tetrachloroethene	835.3	0.83	512.139	70	0.5	15	20	0.429	7.72E-02	1.00E-02	7.72E+00	91.9%
Xylenes	1062.6	0.83	751.977	70	0.5	15	20	0.429	1.13E-01	2.00E+00	5.67E-02	0.7%

TOTAL HAZARD INDEX 8.40E+00

NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	33.5	1	2	3.612
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	53.5	1	2	23.491
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	10.0	1	2	4.506
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	368.0	1	2	135.377
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	582.3	1	2	247.248

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Acetone	3,612	10	6	6,020	0.5	15	20	0.988
1,2-Dichloroethene	23,491	10	6	39,151	0.5	15	20	6,424
1,1-Dichloroethene	4,506	10	6	7,510	0.5	15	20	1,232
Tetrachloroethene	135,377	10	6	225,628	0.5	15	20	37,021
Xylenes	247,248	10	6	412,080	0.5	15	20	67,614

• VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed <u>Yrs lifetime</u>	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	33.5	0.9	6.020	35	0.5	15	20	0.129	5.91E-04	1.00E-01	5.91E-03	0.24%
1,2-Dichloroethene	53.5	0.9	39.151	35	0.5	15	20	0.129	3.84E-03	2.00E-02	1.92E-01	7.67%
1,1'-Dichloroethene	10.0	0.9	7.510	35	0.5	15	20	0.129	7.37E-04	1.00E-02	7.37E-02	2.94%
Tetrachloroethene	368.0	0.9	225.628	35	0.5	15	20	0.129	2.21E-02	1.00E-02	2.21E+00	88.35%
Xylenes	582.3	0.9	412.080	35	0.5	15	20	0.129	4.04E-02	2.00E+00	2.02E-02	0.81%
TOTAL HAZARD INDEX											2.51E+00	

TABLE H-47 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	57.9	1	2	6.243
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	89.6	1	2	39.341
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	10	1	2	4.506
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	835.3	1	2	307.284
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	1,062.6	1	2	451.186

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	6.243	10	6	10.405	0.5	15	20	1.707
1,2-Dichloroethene	39.341	10	6	65.569	0.5	15	20	10.758
1,1-Dichloroethene	4.506	10	6	7.510	0.5	15	20	1.232
Tetrachloroethene	307.284	10	6	512.139	0.5	15	20	84.031
Xylenes	451.186	10	6	751.977	0.5	15	20	123.384

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	57.9	0.9	10.405	35	0.5	15	20	0.129	1.02E-03	1.00E-01	1.02E-02	0.19%
1,2-Dichloroethene	89.6	0.9	65.569	35	0.5	15	20	0.129	6.43E-03	2.00E-02	3.22E-01	5.88%
1,1-Dichloroethene	10.0	0.9	7.510	35	0.5	15	20	0.129	7.37E-04	1.00E-02	7.37E-02	1.35%
Tetrachloroethene	835.3	0.9	512.139	35	0.5	15	20	0.129	5.02E-02	1.00E-02	5.02E+00	91.91%
Xylenes	1062.6	0.9	751.977	35	0.5	15	20	0.129	7.38E-02	2.00E+00	3.69E-02	0.67%

TOTAL HAZARD INDEX 5.47E+00

TABLE H-48. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING
FUTURE-USE SCENARIO RESIDENTIAL - ON-SITE UPPER BEDROCK WELLS

Round 2 Data

p 1 of 6

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	11.8	1	2	4.708
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	4	1	2	1.903
Vinyl chloride	63	2.78E-02	1609.97	16.78	45	0.5960	16.631	22.420	14.4	1	2	7.580
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	28.7	1	2	10.558

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Trichloroethene	4.708	10	6	7.847	0.5	15	20	1.288
Benzene	1.903	10	6	3.172	0.5	15	20	0.520
Vinyl chloride	7.580	10	6	12.633	0.5	15	20	2.073
Tetrachloroethene	10.558	10	6	17.597	0.5	15	20	2.887

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	11.8	0.83	7.847	70	0.5	15	20	0.129	0.129	3.55E-04	1.70E-02	6.03E-06	3.3%
Benzene	4.0	0.83	3.172	70	0.5	15	20	0.129	0.129	1.43E-04	2.90E-02	4.16E-06	2.3%
Vinyl chloride	14.4	0.83	12.633	70	0.5	15	20	0.129	0.129	5.71E-04	3.00E-01	1.71E-04	93.6%
Tetrachloroethene	28.7	0.83	17.597	70	0.5	15	20	0.129	0.129	7.96E-04	1.80E-03	1.43E-06	0.8%

TOTAL RISK 1.83E-04

CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	19	1	2	7.581
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	4	1	2	1.903
Vinyl chloride	63	2.78E-02	1609.97	16.78	45	0.5960	16.631	22.420	21	1	2	11.054
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	55.3	1	2	20.343

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	7.581	10	6	12.636	0.5	15	20	2.073
Benzene	1.903	10	6	3.172	0.5	15	20	0.520
Vinyl chloride	11.054	10	6	18.423	0.5	15	20	3.023
Tetrachloroethene	20.343	10	6	33.906	0.5	15	20	5.563

• VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed <u>Yrs lifetime</u>	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	19.0	0.83	12.636	70	0.5	15	20	0.429	1.91E-03	1.70E-02	3.24E-05	3.6%
Benzene	4.0	0.83	3.172	70	0.5	15	20	0.429	4.78E-04	2.90E-02	1.39E-05	1.6%
Vinyl chloride	21.0	0.83	18.423	70	0.5	15	20	0.429	2.78E-03	3.00E-01	8.33E-04	93.8%
Tetrachloroethene	55.3	0.83	33.906	70	0.5	15	20	0.429	5.11E-03	1.80E-03	9.20E-06	1.0%
TOTAL RISK											8.89E-04	

NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	15.9	1	2	1.714
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	144.4	1	2	63.403
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	28.7	1	2	10.558
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	454.1	1	2	192.814

STEP 2- VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Acetone	1.714	10	6	2.857	0.5	15	20	0.469
1,2-Dichloroethene	63.403	10	6	105.671	0.5	15	20	17.338
Tetrachloroethene	10.558	10	6	17.597	0.5	15	20	2.887
Xylenes	192.814	10	6	321.356	0.5	15	20	52.728

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	15.9	0.83	2.857	70	0.5	15	20	0.129	1.29E-04	1.00E-01	1.29E-03	0.4%
1,2-Dichloroethene	144.4	0.83	105.671	70	0.5	15	20	0.129	4.78E-03	2.00E-02	2.39E-01	73.1%
Tetrachloroethene	28.7	0.83	17.597	70	0.5	15	20	0.129	7.96E-04	1.00E-02	7.96E-02	24.3%
Xylenes	454.1	0.83	321.356	70	0.5	15	20	0.129	1.45E-02	2.00E+00	7.27E-03	2.2%
TOTAL HAZARD INDEX											3.27E-01	

TABLE H-48 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	25.2	1	2	2.717
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	342.4	1	2	150.340
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	55.3	1	2	20.343
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	796.9	1	2	338.368

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.717	10	6	4.528	0.5	15	20	0.743
1,2-Dichloroethene	150.340	10	6	250.566	0.5	15	20	41.113
Tetrachloroethene	20.343	10	6	33.906	0.5	15	20	5.563
Xylenes	338.368	10	6	563.947	0.5	15	20	92.532

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	25.2	0.83	4.528	70	0.5	15	20	0.429	6.83E-04	1.00E-01	6.83E-03	0.3%
1,2-Dichloroethene	342.4	0.83	250.566	70	0.5	15	20	0.429	3.78E-02	2.00E-02	1.89E+00	77.1%
Tetrachloroethene	55.3	0.83	33.906	70	0.5	15	20	0.429	5.11E-03	1.00E-02	5.11E-01	20.9%
Xylenes	796.9	0.83	563.947	70	0.5	15	20	0.429	8.50E-02	2.00E+00	4.25E-02	1.7%
TOTAL HAZARD INDEX										2.45E+00		

TABLE H-48 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	25.2	1	2	2.717
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	342.4	1	2	150.340
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	55.3	1	2	20.343
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	796.9	1	2	338.368

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.717	10	6	4.528	0.5	15	20	0.743
1,2-Dichloroethene	150.340	10	6	250.566	0.5	15	20	41.113
Tetrachloroethene	20.343	10	6	33.906	0.5	15	20	5.563
Xylenes	338.368	10	6	563.947	0.5	15	20	92.532

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RIID	CD/RIID	% TOTAL HAZARD
Acetone	25.2	0.9	4.528	35	0.5	15	20	0.129	0.129	4.44E-04	1.00E-01	4.44E-03	0.28%
1,2-Dichloroethene	342.4	0.9	250.566	35	0.5	15	20	0.129	0.129	2.46E-02	2.00E-02	1.23E+00	77.12%
Tetrachloroethene	55.3	0.9	33.906	35	0.5	15	20	0.129	0.129	3.33E-03	1.00E-02	3.33E-01	20.87%
Xylenes	796.9	0.9	563.947	35	0.5	15	20	0.129	0.129	5.53E-02	2.00E+00	2.77E-02	1.74%

TOTAL HAZARD INDEX 1.59E+00

TABLE H-49. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING
FUTURE-USE SCENARIO RESIDENTIAL - ON-SITE DEEP BEDROCK WELLS

Round 1 Data

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	4	1	2	1.596
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	2.5	1	2	1.189
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	3.8	1	2	1.398

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Trichloroethene	1.596	10	6	2.660	0.5	15	20	0.436
Benzene	1.189	10	6	1.982	0.5	15	20	0.325
Tetrachloroethene	1.398	10	6	2.330	0.5	15	20	0.382

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	4.0	0.83	2.660	70	0.5	15	20	0.129	0.129	1.20E-04	1.70E-02	2.05E-06	42.3%
Benzene	2.5	0.83	1.982	70	0.5	15	20	0.129	0.129	8.97E-05	2.90E-02	2.60E-06	53.8%
Tetrachloroethene	3.8	0.83	2.330	70	0.5	15	20	0.129	0.129	1.05E-04	1.80E-03	1.90E-07	3.9%

TOTAL RISK 4.84E-06

TABLE H-49 (Continued)

p 2 of 6

CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	4	1	2	1.596
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	2.6	1	2	1.237
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	5.1	1	2	1.876

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Trichloroethene	1.596	10	6	2.660	0.5	15	20	0.436
Benzene	1.237	10	6	2.062	0.5	15	20	0.338
Tetrachloroethene	1.876	10	6	3.127	0.5	15	20	0.513

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	4.0	0.83	2.660	70	0.5	15	20	0.429	4.01E-04	1.70E-02	6.82E-06	40.9%
Benzene	2.6	0.83	2.062	70	0.5	15	20	0.429	3.11E-04	2.90E-02	9.02E-06	54.0%
Tetrachloroethene	5.1	0.83	3.127	70	0.5	15	20	0.429	4.71E-04	1.80E-03	8.49E-07	5.1%

TOTAL RISK

1.67E-05

TABLE H-49 (Continued)

p 3 of 6

NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	7.8	1	2	0.841
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	12.6	1	2	5.532
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	2	1	2	0.901
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	3.8	1	2	1.398
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	76.4	1	2	32.440

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	0.841	10	6	1.402	0.5	15	20	0.230
1,2-Dichloroethene	5.532	10	6	9.221	0.5	15	20	1.513
1,1-Dichloroethene	0.901	10	6	1.502	0.5	15	20	0.246
Tetrachloroethene	1.398	10	6	2.330	0.5	15	20	0.382
Xylenes	32.440	10	6	54.066	0.5	15	20	8.871

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	7.8	0.83	1.402	70	0.5	15	20	0.129	6.34E-05	1.00E-01	6.34E-04	1.6%
1,2-Dichloroethene	12.6	0.83	9.221	70	0.5	15	20	0.129	4.17E-04	2.00E-02	2.09E-02	52.1%
1,1-Dichloroethene	2.0	0.83	1.502	70	0.5	15	20	0.129	6.79E-05	1.00E-02	6.79E-03	17.0%
Tetrachloroethene	3.8	0.83	2.330	70	0.5	15	20	0.129	1.05E-04	1.00E-02	1.05E-02	26.3%
Xylenes	76.4	0.83	54.066	70	0.5	15	20	0.129	2.45E-03	2.00E+00	1.22E-03	3.1%

TOTAL HAZARD INDEX 4.00E-02

TABLE H-49 (Continued)

p 4 of 6

NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	11	1	2	1.186
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	30.2	1	2	13.260
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	2	1	2	0.901
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	5.1	1	2	1.876
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	176.3	1	2	74.858

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	1.186	10	6	1.977	0.5	15	20	0.324
1,2-Dichloroethene	13.260	10	6	22.100	0.5	15	20	3.626
1,1-Dichloroethene	0.901	10	6	1.502	0.5	15	20	0.246
Tetrachloroethene	1.876	10	6	3.127	0.5	15	20	0.513
Xylenes	74.858	10	6	124.763	0.5	15	20	20.471

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	11.0	0.83	1.977	70	0.5	15	20	0.429	2.98E-04	1.00E-01	2.98E-03	1.2%
1,2-Dichloroethene	30.2	0.83	22.100	70	0.5	15	20	0.429	3.33E-03	2.00E-02	1.67E-01	67.0%
1,1-Dichloroethene	2.0	0.83	1.502	70	0.5	15	20	0.429	2.26E-04	1.00E-02	2.26E-02	9.1%
Tetrachloroethene	5.1	0.83	3.127	70	0.5	15	20	0.429	4.71E-04	1.00E-02	4.71E-02	19.0%
Xylenes	176.3	0.83	124.763	70	0.5	15	20	0.429	1.88E-02	2.00E+00	9.41E-03	3.8%

TOTAL HAZARD INDEX 2.49E-01

TABLE H-49 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	7.8	1	2	0.841
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	12.6	1	2	5.532
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	2.0	1	2	0.901
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	3.8	1	2	1.398
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	76.4	1	2	32.440

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	0.841	10	6	1.402	0.5	15	20	0.230
1,2-Dichloroethene	5.532	10	6	9.221	0.5	15	20	1.513
1,1-Dichloroethene	0.901	10	6	1.502	0.5	15	20	0.246
Tetrachloroethene	1.398	10	6	2.330	0.5	15	20	0.382
Xylenes	32.440	10	6	54.066	0.5	15	20	8.871

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	7.8	0.9	1.402	35	0.5	15	20	0.129	1.38E-04	1.00E-01	1.38E-03	1.58%
1,2-Dichloroethene	12.6	0.9	9.221	35	0.5	15	20	0.129	9.05E-04	2.00E-02	4.52E-02	52.08%
1,1-Dichloroethene	2.0	0.9	1.502	35	0.5	15	20	0.129	1.47E-04	1.00E-02	1.47E-02	16.97%
Tetrachloroethene	3.8	0.9	2.330	35	0.5	15	20	0.129	2.29E-04	1.00E-02	2.29E-02	26.32%
Xylenes	76.4	0.9	54.066	35	0.5	15	20	0.129	5.30E-03	2.00E+00	2.65E-03	3.05%

TOTAL HAZARD INDEX 8.68E-02

TABLE H-49 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	11	1	2	1.186
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	30.2	1	2	13.260
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	2	1	2	0.901
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	5.1	1	2	1.876
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	176.3	1	2	74.858

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	1.186	10	6	1.977	0.5	15	20	0.324
1,2-Dichloroethene	13.260	10	6	22.100	0.5	15	20	3.626
1,1-Dichloroethene	0.901	10	6	1.502	0.5	15	20	0.246
Tetrachloroethene	1.876	10	6	3.127	0.5	15	20	0.513
Xylenes	74.858	10	6	124.763	0.5	15	20	20.471

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	11.0	0.9	1.977	35	0.5	15	20	0.129	0.129	1.94E-04	1.00E-01	1.94E-03	1.20%
1,2-Dichloroethene	30.2	0.9	22.100	35	0.5	15	20	0.129	0.129	2.17E-03	2.00E-02	1.08E-01	66.97%
1,1-Dichloroethene	2.0	0.9	1.502	35	0.5	15	20	0.129	0.129	1.47E-04	1.00E-02	1.47E-02	9.10%
Tetrachloroethene	5.1	0.9	3.127	35	0.5	15	20	0.129	0.129	3.07E-04	1.00E-02	3.07E-02	18.95%
Xylenes	176.3	0.9	124.763	35	0.5	15	20	0.129	0.129	1.22E-02	2.00E+00	6.12E-03	3.78%

TOTAL HAZARD INDEX 1.62E-01

TABLE H-50. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING
FUTURE-USE SCENARIO RESIDENTIAL - ON-SITE DEEP BEDROCK WELLS
Round 2 Data

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	4	1	2	1.596
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	6.2	1	2	2.281

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	1.596	10	6	2.660	0.5	15	20	0.436
Tetrachloroethene	2.281	10	6	3.801	0.5	15	20	0.624

• VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed <u>Yrs lifetime</u>	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	4.0	0.83	2.660	70	0.5	15	20	0.129	1.20E-04	1.70E-02	2.05E-06	86.9%
Tetrachloroethene	6.2	0.83	3.801	70	0.5	15	20	0.129	1.72E-04	1.80E-03	3.10E-07	13.1%
TOTAL RISK											2.36E-06	

CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	4	1	2	1.596
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	8.1	1	2	2.980

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	1,596	10	6	2,660	0.5	15	20	0.436
Tetrachloroethene	2,980	10	6	4,966	0.5	15	20	0.815

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	<u>Yrs exposed</u> <u>Yrs lifetime</u>	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	4.0	0.83	2.660	70	0.5	15	20	0.429	4.01E-04	1.70E-02	6.82E-06	83.5%
Tetrachloroethene	8.1	0.83	4.966	70	0.5	15	20	0.429	7.49E-04	1.80E-03	1.35E-06	16.5%
TOTAL RISK											8.17E-06	

TABLE H-50 (Continued)

p 3 of 6

NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	13.4	1	2	1.445
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4	1	2	1.756
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	5	1	2	2.253
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	6.2	1	2	2.281
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	70	1	2	29.722

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	1.445	10	6	2.408	0.5	15	20	0.395
1,2-Dichloroethene	1.756	10	6	2.927	0.5	15	20	0.480
1,1-Dichloroethene	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	2.281	10	6	3.801	0.5	15	20	0.624
Xylenes	29.722	10	6	49.537	0.5	15	20	8.128

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	13.4	0.83	2.408	70	0.5	15	20	0.129	1.09E-04	1.00E-01	1.09E-03	2.5%
1,2-Dichloroethene	4.0	0.83	2.927	70	0.5	15	20	0.129	1.32E-04	2.00E-02	6.62E-03	15.4%
1,1-Dichloroethene	5.0	0.83	3.755	70	0.5	15	20	0.129	1.70E-04	1.00E-02	1.70E-02	39.5%
Tetrachloroethene	6.2	0.83	3.801	70	0.5	15	20	0.129	1.72E-04	1.00E-02	1.72E-02	40.0%
Xylenes	70.0	0.83	49.537	70	0.5	15	20	0.129	2.24E-03	2.00E+00	1.12E-03	2.6%

TOTAL HAZARD INDEX 4.30E-02

TABLE H-50 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	26.4	1	2	2.846
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4	1	2	1.756
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	5	1	2	2.253
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	8.1	1	2	2.980
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	170.9	1	2	72.565

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.846	10	6	4.744	0.5	15	20	0.778
1,2-Dichloroethene	1.756	10	6	2.927	0.5	15	20	0.480
1,1-Dichloroethene	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	2.980	10	6	4.966	0.5	15	20	0.815
Xylenes	72.565	10	6	120.942	0.5	15	20	19.844

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	26.4	0.83	4.744	70	0.5	15	20	0.429	7.15E-04	1.00E-01	7.15E-03	4.2%
1,2-Dichloroethene	4.0	0.83	2.927	70	0.5	15	20	0.429	4.41E-04	2.00E-02	2.21E-02	13.0%
1,1-Dichloroethene	5.0	0.83	3.755	70	0.5	15	20	0.429	5.66E-04	1.00E-02	5.66E-02	33.3%
Tetrachloroethene	8.1	0.83	4.966	70	0.5	15	20	0.429	7.49E-04	1.00E-02	7.49E-02	44.1%
Xylenes	170.9	0.83	120.942	70	0.5	15	20	0.429	1.82E-02	2.00E+00	9.12E-03	5.4%

TOTAL HAZARD INDEX 1.70E-01

TABLE H-50 (Continued)

p 5 of 6

NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	13.4	1	2	1.445
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4.0	1	2	1.756
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	5.0	1	2	2.253
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	6.2	1	2	2.281
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	70	1	2	29.722

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	1.445	10	6	2.408	0.5	15	20	0.395
1,2-Dichloroethene	1.756	10	6	2.927	0.5	15	20	0.480
1,1-Dichloroethene	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	2.281	10	6	3.801	0.5	15	20	0.624
Xylenes	29.722	10	6	49.537	0.5	15	20	8.128

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	13.4	0.9	2.408	35	0.5	15	20	0.129	2.36E-04	1.00E-01	2.36E-03	2.53%
1,2-Dichloroethene	4.0	0.9	2.927	35	0.5	15	20	0.129	2.87E-04	2.00E-02	1.44E-02	15.39%
1,1-Dichloroethene	5.0	0.9	3.755	35	0.5	15	20	0.129	3.68E-04	1.00E-02	3.68E-02	39.49%
Tetrachloroethene	6.2	0.9	3.801	35	0.5	15	20	0.129	3.73E-04	1.00E-02	3.73E-02	39.98%
Xylenes	70.0	0.9	49.537	35	0.5	15	20	0.129	4.86E-03	2.00E+00	2.43E-03	2.60%

TOTAL HAZARD INDEX 9.33E-02

TABLE H-50 (Continued)

p 6 of 6

NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	26.4	1	2	2.846
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4	1	2	1.756
1,1-Dichloroethene	97	2.29E-02	1292.72	13.47	45	0.5960	13.328	17.968	5	1	2	2.253
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	8.1	1	2	2.980
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	170.9	1	2	72.565

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.846	10	6	4.744	0.5	15	20	0.778
1,2-Dichloroethene	1.756	10	6	2.927	0.5	15	20	0.480
1,1-Dichloroethene	2.253	10	6	3.755	0.5	15	20	0.616
Tetrachloroethene	2.980	10	6	4.966	0.5	15	20	0.815
Xylenes	72.565	10	6	120.942	0.5	15	20	19.844

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	26.4	0.9	4.744	35	0.5	15	20	0.129	0.129	4.65E-04	1.00E-01	4.65E-03	4.21%
1,2-Dichloroethene	4.0	0.9	2.927	35	0.5	15	20	0.129	0.129	2.87E-04	2.00E-02	1.44E-02	12.99%
1,1-Dichloroethene	5.0	0.9	3.755	35	0.5	15	20	0.129	0.129	3.68E-04	1.00E-02	3.68E-02	33.34%
Tetrachloroethene	8.1	0.9	4.966	35	0.5	15	20	0.129	0.129	4.87E-04	1.00E-02	4.87E-02	44.09%
Xylenes	170.9	0.9	120.942	35	0.5	15	20	0.129	0.129	1.19E-02	2.00E+00	5.93E-03	5.37%

TOTAL HAZARD INDEX 1.10E-01

TABLE H-51. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING
FUTURE-USE SCENARIO RESIDENTIAL - ON-SITE MIXED BEDROCK WELLS

Round 1 Data

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CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	23.5	1	2	9.377
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	3	1	2	1.427
Vinyl chloride	63	2.78E-02	1609.97	16.78	45	0.5960	16.631	22.420	3	1	2	1.579
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	219	1	2	80.564

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Trichloroethene	9.377	10	6	15.628	0.5	15	20	2.564
Benzene	1.427	10	6	2.379	0.5	15	20	0.390
Vinyl chloride	1.579	10	6	2.632	0.5	15	20	0.432
Tetrachloroethene	80.564	10	6	134.273	0.5	15	20	22.031

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	23.5	0.83	15.628	70	0.5	15	20	0.129	0.129	7.07E-04	1.70E-02	1.20E-05	19.5%
Benzene	3.0	0.83	2.379	70	0.5	15	20	0.129	0.129	1.08E-04	2.90E-02	3.12E-06	5.1%
Vinyl chloride	3.0	0.83	2.632	70	0.5	15	20	0.129	0.129	1.19E-04	3.00E-01	3.57E-05	57.8%
Tetrachloroethene	219.0	0.83	134.273	70	0.5	15	20	0.129	0.129	6.07E-03	1.80E-03	1.09E-05	17.7%

TOTAL RISK 6.18E-05

TABLE H-51 (Continued)

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CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	51.3	1	2	20.470
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	3	1	2	1.427
Vinyl chloride	63	2.78E-02	1609.97	16.78	45	0.5960	16.631	22.420	3	1	2	1.579
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	569.4	1	2	209.466

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Trichloroethene	20.470	10	6	34.116	0.5	15	20	5.598
Benzene	1.427	10	6	2.379	0.5	15	20	0.390
Vinyl chloride	1.579	10	6	2.632	0.5	15	20	0.432
Tetrachloroethene	209.466	10	6	349.111	0.5	15	20	57.282

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	51.3	0.83	34.116	70	0.5	15	20	0.429	0.429	5.14E-03	1.70E-02	8.74E-05	28.1%
Benzene	3.0	0.83	2.379	70	0.5	15	20	0.429	0.429	3.59E-04	2.90E-02	1.04E-05	3.3%
Vinyl chloride	3.0	0.83	2.632	70	0.5	15	20	0.429	0.429	3.97E-04	3.00E-01	1.19E-04	38.2%
Tetrachloroethene	569.4	0.83	349.111	70	0.5	15	20	0.429	0.429	5.26E-02	1.80E-03	9.48E-05	30.4%

TOTAL RISK 3.12E-04

NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	23	1	2	2.480
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	36.8	1	2	16.158
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	219	1	2	80.564
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	375.4	1	2	159.397

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Acetone	2,480	10	6	4,133	0.5	15	20	0.678
1,2-Dichloroethene	16,158	10	6	26,930	0.5	15	20	4.419
Tetrachloroethene	80,564	10	6	134,273	0.5	15	20	22,031
Xylenes	159,397	10	6	265,662	0.5	15	20	43,590

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc ($\mu\text{g/L}$)	Inh Rate (m^3/min)	VOC Gen ($\mu\text{g}/\text{m}^3\text{-min}$)	Body wt (kg)	Air Exch Rate (min^{-1})	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI ($\text{mg}/\text{kg}\text{-day}$)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	23.0	0.83	4.133	70	0.5	15	20	0.129	1.87E-04	1.00E-01	1.87E-03	0.3%
1,2-Dichloroethene	36.8	0.83	26.930	70	0.5	15	20	0.129	1.22E-03	2.00E-02	6.09E-02	9.0%
Tetrachloroethene	219.0	0.83	134.273	70	0.5	15	20	0.129	6.07E-03	1.00E-02	6.07E-01	89.8%
Xylenes	375.4	0.83	265.662	70	0.5	15	20	0.129	1.20E-02	2.00E+00	6.01E-03	0.9%

TOTAL HAZARD INDEX	6.76E-01

TABLE H-51 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	41.9	1	2	4.518
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	66.6	1	2	29.242
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	569.4	1	2	209.466
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	750.5	1	2	318.667

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³·min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	4.518	10	6	7.529	0.5	15	20	1.235
1,2-Dichloroethene	29.242	10	6	48.737	0.5	15	20	7.997
Tetrachloroethene	209.466	10	6	349.111	0.5	15	20	57.282
Xylenes	318.667	10	6	531.111	0.5	15	20	87.144

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³·min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	41.9	0.83	7.529	70	0.5	15	20	0.429	1.14E-03	1.00E-01	1.14E-02	0.2%
1,2-Dichloroethene	66.6	0.83	48.737	70	0.5	15	20	0.429	7.35E-03	2.00E-02	3.67E-01	6.5%
Tetrachloroethene	569.4	0.83	349.111	70	0.5	15	20	0.429	5.26E-02	1.00E-02	5.26E+00	92.6%
Xylenes	750.5	0.83	531.111	70	0.5	15	20	0.429	8.01E-02	2.00E+00	4.00E-02	0.7%

TOTAL HAZARD INDEX 5.68E+00

TABLE H-51 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	23.0	1	2	2.480
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	36.8	1	2	16.158
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	219.0	1	2	80.564
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	375.4	1	2	159.397

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.480	10	6	4.133	0.5	15	20	0.678
1,2-Dichloroethene	16.158	10	6	26.930	0.5	15	20	4.419
Tetrachloroethene	80.564	10	6	134.273	0.5	15	20	22.031
Xylenes	159.397	10	6	265.662	0.5	15	20	43.590

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	23.0	0.9	4.133	35	0.5	15	20	0.129	4.05E-04	1.00E-01	4.05E-03	0.28%
1,2-Dichloroethene	36.8	0.9	26.930	35	0.5	15	20	0.129	2.64E-03	2.00E-02	1.32E-01	9.01%
Tetrachloroethene	219.0	0.9	134.273	35	0.5	15	20	0.129	1.32E-02	1.00E-02	1.32E+00	89.83%
Xylenes	375.4	0.9	265.662	35	0.5	15	20	0.129	2.61E-02	2.00E+00	1.30E-02	0.89%

TOTAL HAZARD INDEX 1.47E+00

NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	41.9	1	2	4.518
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	66.6	1	2	29.242
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	569.4	1	2	209.466
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	750.5	1	2	318.667

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Acetone	4,518	10	6	7,529	0.5	15	20	1,235
1,2-Dichloroethene	29,242	10	6	48,737	0.5	15	20	7,997
Tetrachloroethene	209,466	10	6	349,111	0.5	15	20	57,282
Xylenes	318,667	10	6	531,111	0.5	15	20	87,144

*** VOC concentration at end of total time**

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed <u>Yrs lifetime</u>	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	41.9	0.9	7.529	35	0.5	15	20	0.129	7.39E-04	1.00E-01	7.39E-03	0.20%
1,2-Dichloroethene	66.6	0.9	48.737	35	0.5	15	20	0.129	4.78E-03	2.00E-02	2.39E-01	6.47%
Tetrachloroethene	569.4	0.9	349.111	35	0.5	15	20	0.129	3.42E-02	1.00E-02	3.42E+00	92.63%
Xylenes	750.5	0.9	531.111	35	0.5	15	20	0.129	5.21E-02	2.00E+00	2.61E-02	0.70%
TOTAL HAZARD INDEX											3.70E+00	

TABLE H-52. INHALATION OF VOLATILE ORGANICS WHILE SHOWERING
FUTURE-USE SCENARIO RESIDENTIAL - ON-SITE MIXED BEDROCK WELLS
Round 2 Data

p 1 of 6

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	10.1	1	2	4.030
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	4	1	2	1.903
Vinyl chloride	63	2.78E-02	1609.97	16.78	45	0.5960	16.631	22.420	12.2	1	2	6.422
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	23.3	1	2	8.571

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	4.030	10	6	6.717	0.5	15	20	1.102
Benzene	1.903	10	6	3.172	0.5	15	20	0.520
Vinyl chloride	6.422	10	6	10.703	0.5	15	20	1.756
Tetrachloroethene	8.571	10	6	14.286	0.5	15	20	2.344

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	10.1	0.83	6.717	70	0.5	15	20	0.129	3.04E-04	1.70E-02	5.17E-06	3.3%
Benzene	4.0	0.83	3.172	70	0.5	15	20	0.129	1.43E-04	2.90E-02	4.16E-06	2.7%
Vinyl chloride	12.2	0.83	10.703	70	0.5	15	20	0.129	4.84E-04	3.00E-01	1.45E-04	93.3%
Tetrachloroethene	23.3	0.83	14.286	70	0.5	15	20	0.129	6.46E-04	1.80E-03	1.16E-06	0.7%

TOTAL RISK 1.56E-04

CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	15.8	1	2	6.304
Benzene	78	5.55E-03	1441.15	15.02	45	0.5960	14.373	19.376	4	1	2	1.903
Vinyl chloride	63	2.78E-02	1609.97	16.78	45	0.5960	16.631	22.420	18.8	1	2	9.896
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	44.1	1	2	16.223

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³)*
Trichloroethene	6.304	10	6	10.507	0.5	15	20	1.724
Benzene	1.903	10	6	3.172	0.5	15	20	0.520
Vinyl chloride	9.896	10	6	16.493	0.5	15	20	2.706
Tetrachloroethene	16.223	10	6	27.039	0.5	15	20	4.436

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed <u>Yrs lifetime</u>	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene	15.8	0.83	10.507	70	0.5	15	20	0.429	1.58E-03	1.70E-02	2.69E-05	3.4%
Benzene	4.0	0.83	3.172	70	0.5	15	20	0.429	4.78E-04	2.90E-02	1.39E-05	1.7%
Vinyl chloride	18.8	0.83	16.493	70	0.5	15	20	0.429	2.49E-03	3.00E-01	7.46E-04	93.9%
Tetrachloroethene	44.1	0.83	27.039	70	0.5	15	20	0.429	4.08E-03	1.80E-03	7.34E-06	0.9%
TOTAL RISK											7.94E-04	

TABLE H-52 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	15.3	1	2	1.650
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	111.1	1	2	48.781
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	23.3	1	2	8.571
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	362.6	1	2	153.962

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	1.650	10	6	2.749	0.5	15	20	0.451
1,2-Dichloroethene	48.781	10	6	81.302	0.5	15	20	13.340
Tetrachloroethene	8.571	10	6	14.286	0.5	15	20	2.344
Xylenes	153.962	10	6	256.604	0.5	15	20	42.103

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CD/RfD	% TOTAL HAZARD
Acetone	15.3	0.83	2.749	70	0.5	15	20	0.129	1.24E-04	1.00E-01	1.24E-03	0.5%
1,2-Dichloroethene	111.1	0.83	81.302	70	0.5	15	20	0.129	3.68E-03	2.00E-02	1.84E-01	72.0%
Tetrachloroethene	23.3	0.83	14.286	70	0.5	15	20	0.129	6.46E-04	1.00E-02	6.46E-02	25.3%
Xylenes	362.6	0.83	256.604	70	0.5	15	20	0.129	1.16E-02	2.00E+00	5.80E-03	2.3%

TOTAL HAZARD INDEX 2.56E-01

TABLE H-52 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	23.6	1	2	2.545
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	263.9	1	2	115.872
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	44.1	1	2	16.223
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	635.8	1	2	269.964

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.545	10	6	4.241	0.5	15	20	0.696
1,2-Dichloroethene	115.872	10	6	193.120	0.5	15	20	31.687
Tetrachloroethene	16.223	10	6	27.039	0.5	15	20	4.436
Xylenes	269.964	10	6	449.941	0.5	15	20	73.826

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	23.6	0.83	4.241	70	0.5	15	20	0.429	0.429	6.39E-04	1.00E-01	6.39E-03	0.3%
1,2-Dichloroethene	263.9	0.83	193.120	70	0.5	15	20	0.429	0.429	2.91E-02	2.00E-02	1.46E+00	76.5%
Tetrachloroethene	44.1	0.83	27.039	70	0.5	15	20	0.429	0.429	4.08E-03	1.00E-02	4.08E-01	21.4%
Xylenes	635.8	0.83	449.941	70	0.5	15	20	0.429	0.429	6.78E-02	2.00E+00	3.39E-02	1.8%
TOTAL HAZARD INDEX											1.90E+00		

TABLE H-52 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Child

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	15.3	1	2	1.650
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	111.1	1	2	48.781
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	23.3	1	2	8.571
Xylenes	106	5.35E-03	1235.25	12.88	45	0.5960	12.300	16.581	362.6	1	2	153.962

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	1.650	10	6	2.749	0.5	15	20	0.451
1,2-Dichloroethene	48.781	10	6	81.302	0.5	15	20	13.340
Tetrachloroethene	8.571	10	6	14.286	0.5	15	20	2.344
Xylenes	153.962	10	6	256.604	0.5	15	20	42.103

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Yrs exposed	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	15.3	0.9	2.749	35	0.5	15	20	0.129	2.70E-04	1.00E-01	2.70E-03	0.49%
1,2-Dichloroethene	111.1	0.9	81.302	35	0.5	15	20	0.129	7.98E-03	2.00E-02	3.99E-01	71.96%
Tetrachloroethene	23.3	0.9	14.286	35	0.5	15	20	0.129	1.40E-03	1.00E-02	1.40E-01	25.29%
Xylenes	362.6	0.9	256.604	35	0.5	15	20	0.129	2.52E-02	2.00E+00	1.26E-02	2.27%

TOTAL HAZARD INDEX 5.54E-01

Table H-53. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners) - FS-8
ON-SITE GROUNDWATER USE - Upper Bedrock - Round 1

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ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Compound	Plant Conc (mg/kg)	Intake rate (g/day)	Fraction absorbed	Body weight (kg)	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	x	x	x	x	x	=	=			
		15 g/day	1.0	70 kg	350 days/Yr	9 yrs/70 yrs	CDI				
Vinyl chloride	2.72E-03	15	1.0	70	0.959	0.129		7.21E-08	1.90E+00	1.37E-07	77.21%
Benzene	2.14E-03	15	1.0	70	0.959	0.129		5.67E-08	2.90E-02	1.65E-09	0.93%
Trichloroethene	1.33E-01	15	1.0	70	0.959	0.129		3.53E-06	1.10E-02	3.88E-08	21.86%
TOTAL RISK											1.77E-07

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Compound	Plant Conc (mg/kg)	Intake rate (g/day)	Fraction absorbed	Body weight (kg)	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	x	x	x	x	x	=	=			
		24 g/day	1.0	70 kg	350 days/year	30 yrs/70 yrs	CDI				
Vinyl chloride	2.72E-03	24	1	70	0.959	0.429		3.83E-07	1.90E+00	7.28E-07	63.88%
Benzene	2.14E-03	24	1	70	0.959	0.429		3.02E-07	2.90E-02	8.74E-09	0.77%
Trichloroethene	2.60E-01	24	1	70	0.959	0.429		3.66E-05	1.10E-02	4.03E-07	35.35%
TOTAL RISK											1.14E-06

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum).
Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989).
Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

TABLE H-53 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult**

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI/RfD)	% TOTAL RISK
	mg/kg	15 g day	1.0	70 kg	350 days Days/Yr	9 yrs 70 yrs	CDI			
1,2-Dichloroethene	6.62E-02	15	1	70	0.959	0.129	1.75E-06	2.00E-02	8.77E-05	7.64%
Toluene	8.85E-02	15	1	70	0.959	0.129	2.35E-06	2.00E-01	1.17E-05	1.02%
Xylenes	3.76E+00	15	1	70	0.959	0.129	9.97E-05	2.00E+00	4.98E-05	4.34%
o-Toluic acid	8.08E+01	15	1	70	0.959	0.129	2.14E-03	3.00E+00	7.14E-04	62.17%
m-Toluic acid	2.93E+01	15	1	70	0.959	0.129	7.77E-04	3.00E+00	2.59E-04	22.54%
p-Toluic acid	2.97E+00	15	1	70	0.959	0.129	7.87E-05	3.00E+00	2.62E-05	2.29%

TOTAL HAZARD INDEX 1.15E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	24 g day	1.0	70 kg	350 days year	30 yrs 70 yrs	CDI			
1,2-Dichloroethene	1.11E-01	24	1	70	0.959	0.429	1.56E-05	2.00E-02	7.82E-04	7.22%
Toluene	1.51E-01	24	1	70	0.959	0.429	2.13E-05	2.00E-01	1.06E-04	0.98%
Xylenes	6.87E+00	24	1	70	0.959	0.429	9.68E-04	2.00E+00	4.84E-04	4.47%
o-Toluic acid	1.42E+02	24	1	70	0.959	0.429	2.00E-02	3.00E+00	6.67E-03	61.59%
m-Toluic acid	5.37E+01	24	1	70	0.959	0.429	7.57E-03	3.00E+00	2.52E-03	23.29%
p-Toluic acid	5.64E+00	24	1	70	0.959	0.429	7.95E-04	3.00E+00	2.65E-04	2.45%

TOTAL HAZARD INDEX 1.08E-02

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child

Chronic Daily Intake (mg/kg-day)													
Compound	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	RISK (CDI/RfD)	% TOTAL RISK
	mg/kg	x	15 g day	x	1.0	x	1 35 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	- CDI	
	Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs LT		
1,2-Dichloroethene	6.62E-02		15		1		35		0.959		0.129	3.51E-06	1.75E-04
Toluene	8.85E-02		15		1		35		0.959		0.129	4.69E-06	2.35E-05
Xylenes	3.76E+00		15		1		35		0.959		0.129	1.99E-04	9.97E-05
o-Toluic acid	8.08E+01		15		1		35		0.959		0.129	4.28E-03	1.43E-03
m-Toluic acid	2.93E+01		15		1		35		0.959		0.129	1.55E-03	5.18E-04
p-Toluic acid	2.97E+00		15		1		35		0.959		0.129	1.57E-04	5.25E-05

TOTAL HAZRD INDEX	2.30E-03

$$\text{Plant Intake} \times \text{Fraction} \times \frac{1}{\text{Days expd}} \times \text{Yrs expd} = \text{Chronic Daily Intake (mg/kg-day)}$$

Compound	Conc (mg/kg)	rate (g/day)	absorbed	Body weight	Year	Yrs LT	% TOTAL RISK				
	mg/kg	x	24 g/day	x	1.0	x	350 days/year	x	9 yrs/70 yrs	= CDI	
	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	350 days/yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI*SF)		
1,2-Dichloroethene	1.11E-01	24	1	35	0.959	0.129	9.38E-06	2.00E-02	4.69E-04	7.22%	
Toluene	1.51E-01	24	1	35	0.959	0.129	1.28E-05	2.00E-01	6.38E-05	0.98%	
Xylenes	6.87E+00	24	1	35	0.959	0.129	5.81E-04	2.00E+00	2.90E-04	4.47%	
<i>o</i> -Toluic acid	1.42E+02	24	1	35	0.959	0.129	1.20E-02	3.00E+00	4.00E-03	61.59%	
<i>m</i> -Toluic acid	5.37E+01	24	1	35	0.959	0.129	4.54E-03	3.00E+00	1.51E-03	23.29%	
<i>p</i> -Toluic acid	5.64E+00	24	1	35	0.959	0.129	4.77E-04	3.00E+00	1.59E-04	2.45%	

TOTAL HAZARD INDEX	6.50E-03

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	
mg/kg	x	40 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	
Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days/Yr		Yrs expd Yrs LT	
Compound										% TOTAL RISK	
Vinyl chloride	8.86E-02	40		1		70		0.959		0.429	
Benzene	8.95E-03	40		1		70		0.959		0.429	
Trichloroethene	3.05E-01	40		1		70		0.959		0.429	
TOTAL RISK										4.04E-05	
											97.90%
											0.15%
											1.95%

LEAF CROPS - Continued

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Days/yr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	% TOTAL RISK
mg/kg	x	25 g day	x	1.0	x	1 70 kg	x	350 days Days/yr	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	
Compound	Conc (mg/kg)	IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/yr		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	RISK (CDI/RfD)
1,2-Dichloroethene	9.07E-03	25		1		70		0.959		0.129	2.00E-02
Toluene	8.10E-03	25		1		70		0.959		0.129	1.79E-06
Xylenes	3.36E-03	25		1		70		0.959		0.129	7.42E-08
o-Toluic acid	2.12E+01	25		1		70		0.959		0.129	3.12E-04
m-Toluic acid	1.47E+01	25		1		70		0.959		0.129	2.16E-04
p-Toluic acid	5.75E+00	25		1		70		0.959		0.129	3.00E+00
TOTAL HAZRD INDEX											6.35E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	% TOTAL RISK
mg/kg	x	40 g/day	x	1.0	x	1 70 kg	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{30 \text{ yrs}}{70 \text{ yrs}}$	
Compound	Conc (mg/kg)	IR (g/day)		Fraction absorbed		Body wt (kg)		$\frac{350 \text{ days}}{\text{Days/Yr}}$		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	RISK (CDI/RfD)
1,2-Dichloroethene	1.44E-02	40		1		70		0.959		0.429	2.00E-02
Toluene	1.34E-02	40		1		70		0.959		0.429	2.00E-01
Xylenes	6.26E-03	40		1		70		0.959		0.429	2.00E+00
o-Toluic acid	3.96E+01	40		1		70		0.959		0.429	3.00E+00
m-Toluic acid	2.86E+01	40		1		70		0.959		0.429	3.00E+00
p-Toluic acid	1.14E+01	40		1		70		0.959		0.429	3.00E+00
TOTAL HAZARD INDEX											6.42E-03

Table H-54. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners) - FS-8
ON-SITE GROUNDWATER USE - Upper Bedrock - Round 2

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ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	15 g/day	1.0	70 kg	350 days/Yr	9 yrs/70 yrs	= CDI				
Vinyl chloride	1.31E-02	15	1.0	70	0.959	0.129		3.47E-07	1.90E+00	6.60E-07	81.10%
Benzene	8.55E-03	15	1.0	70	0.959	0.129		2.27E-07	2.90E-02	6.57E-09	0.81%
Trichloroethene	4.13E-02	15	1.0	70	0.959	0.129		1.09E-06	1.10E-02	1.20E-08	1.48%
Tetrachloroethene	1.00E-01	15	1.0	70	0.959	0.129		2.65E-06	5.10E-02	1.35E-07	16.62%
TOTAL RISK										8.14E-07	

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	24 g/day	1.0	70 kg	350 days/year	30 yrs/70 yrs	= CDI				
Vinyl chloride	1.91E-02	24	1	70	0.959	0.429		2.69E-06	1.90E+00	5.11E-06	76.95%
Benzene	8.55E-03	24	1	70	0.959	0.429		1.20E-06	2.90E-02	3.49E-08	0.53%
Trichloroethene	6.65E-02	24	1	70	0.959	0.429		9.37E-06	1.10E-02	1.03E-07	1.55%
Tetrachloroethene	1.94E-01	24	1	70	0.959	0.429		2.73E-05	5.10E-02	1.39E-06	20.98%
TOTAL RISK										6.65E-06	

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum).
Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989).
Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult

Compound	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	■ Chronic Daily Intake (mg/kg-day)	RISK			% TOTAL RISK
													CDI	RfD	(CDI/RfD)	
1,2-Dichloroethene	1.78E-01	15		1			70		0.959		0.129		4.72E-06	2.00E-02	2.36E-04	9.68%
Xylenes	2.93E+00	15		1			70		0.959		0.129		7.77E-05	2.00E+00	3.88E-05	1.59%
2-Methylphenol	1.44E-02	15		1			70		0.959		0.129		3.82E-07	5.00E-02	7.63E-06	0.31%
4-Methylphenol	2.29E-02	15		1			70		0.959		0.129		6.07E-07	5.00E-02	1.21E-05	0.50%
o-Toluic acid	1.23E+02	15		1			70		0.959		0.129		3.26E-03	3.00E+00	1.09E-03	44.61%
m-Toluic acid	6.18E+01	15		1			70		0.959		0.129		1.64E-03	3.00E+00	5.46E-04	22.41%
p-Toluic acid	5.76E+01	15		1			70		0.959		0.129		1.53E-03	3.00E+00	5.09E-04	20.89%

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

= Chronic Daily Intake (mg/kg-day)												
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT		
mg/kg	x	24 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days/Yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI*SF)	% TOTAL RISK		
1,1,2-Dichloroethene	4.23E-01	24	1	70	0.959	0.429	5.96E-05	2.00E-02	2.98E-03	10.65%		
Xylenes	5.15E+00	24	1	70	0.959	0.429	7.26E-04	2.00E+00	3.63E-04	1.30%		
2-Methylphenol	2.22E-02	24	1	70	0.959	0.429	3.13E-06	5.00E-02	6.26E-05	0.22%		
4-Methylphenol	4.14E-02	24	1	70	0.959	0.429	5.83E-06	5.00E-02	1.17E-04	0.42%		
o-Toluic acid	2.54E+02	24	1	70	0.959	0.429	3.58E-02	3.00E+00	1.19E-02	42.62%		
m-Toluic acid	1.27E+02	24	1	70	0.959	0.429	1.79E-02	3.00E+00	5.96E-03	21.31%		
p-Toluic acid	1.40E+02	24	1	70	0.959	0.429	1.97E-02	3.00E+00	6.58E-03	23.49%		
TOTAL HAZARD INDEX										2.80E-02		

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	Body weight	x	Days expd Days/Nr	x	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)			
	mg/kg	x	25 g day	x	1.0	x	1 70 kg	x	350 days Days/Nr	x	9 yrs 70 yrs	CDI			
Compound	Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Nr		Yrs expd Yrs LT	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Vinyl chloride	2.22E-03		25		1		70		0.959		0.129	9.81E-08	1.90E+00	1.86E-07	61.64%
Benzene	8.45E-02		25		1		70		0.959		0.129	3.73E-06	2.90E-02	1.08E-07	35.81%
Trichloroethene	4.36E-03		25		1		70		0.959		0.129	1.93E-07	1.10E-02	2.12E-09	0.70%
Tetrachloroethene	2.49E-03		25		1		70		0.959		0.129	1.10E-07	5.10E-02	5.61E-09	1.86%
TOTAL RISK														3.02E-07	

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Compound	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	= Chronic Daily Intake (mg/kg-day)	% TOTAL RISK
Vinyl chloride	2.22E-03	x	40 g/day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI	37.55%
Benzene	2.35E-01	x	40 g/day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI	60.67%
Trichloroethene	6.66E-03	x	40 g/day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI	0.65%
Tetrachloroethene	2.49E-03	x	40 g/day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI	1.13%
TOTAL RISK													2.64E-06

LEAF CROPS - Continued

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult

Plant	x	Intake	x	Fraction	x	1	x	Days expd	x	Yrs expd	=	Chronic Daily Intake (mg/kg-day)

TOTAL HAZRD INDEX	1.03E-03

$$\text{Plant Intake} \times \text{Fraction} \times \frac{1}{\text{Days expd}} \times \frac{1}{\text{Yrs expd}} = \text{Chronic Daily Intake (mg/kg-day)}$$

TOTAL HAZARD INDEX	1.21E-02

TABLE H-54 (Continued)

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LEAF CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child**

Compound	Plant Conc (mg/kg)	Intake rate (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI/RfD)	% TOTAL RISK
1,2-Dichloroethene	1.09E-01	25	1	35	0.959	0.129	9.63E-06	2.00E-02	4.82E-04	23.31%
Xylenes	2.03E-01	25	1	35	0.959	0.129	1.79E-05	2.00E+00	8.97E-06	0.43%
2-Methylphenol	6.28E-03	25	1	35	0.959	0.129	5.55E-07	5.00E-02	1.11E-05	0.54%
4-Methylphenol	9.99E-03	25	1	35	0.959	0.129	8.83E-07	5.00E-02	1.77E-05	0.85%
o-Toluic acid	2.14E+01	25	1	35	0.959	0.129	1.89E-03	3.00E+00	6.30E-04	30.51%
m-Toluic acid	1.48E+01	25	1	35	0.959	0.129	1.31E-03	3.00E+00	4.36E-04	21.10%
p-Toluic acid	1.63E+01	25	1	35	0.959	0.129	1.44E-03	3.00E+00	4.80E-04	23.24%

TOTAL HAZARD INDEX 2.07E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

Compound	Plant Conc (mg/kg)	Intake rate (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RfD	RISK (CDI*SF)	% TOTAL RISK
1,2-Dichloroethene	2.59E-01	40	1	35	0.959	0.129	3.65E-05	2.00E-02	1.82E-03	25.05%
Xylenes	3.57E-02	40	1	35	0.959	0.129	5.03E-06	2.00E+00	2.52E-06	0.03%
2-Methylphenol	9.68E-03	40	1	35	0.959	0.129	1.36E-06	5.00E-02	2.73E-05	0.37%
4-Methylphenol	1.81E-02	40	1	35	0.959	0.129	2.55E-06	5.00E-02	5.10E-05	0.70%
o-Toluic acid	4.43E+01	40	1	35	0.959	0.129	6.24E-03	3.00E+00	2.08E-03	28.57%
m-Toluic acid	3.04E+01	40	1	35	0.959	0.129	4.28E-03	3.00E+00	1.43E-03	19.60%
p-Toluic acid	3.98E+01	40	1	35	0.959	0.129	5.61E-03	3.00E+00	1.87E-03	25.67%

TOTAL HAZARD INDEX 7.28E-03

Table H-55. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners)
ON-SITE GROUNDWATER USE - Deep Bedrock - Round 1

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ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	x	x	1	x	x	=				
		15 g day	1.0	70 kg	350 days Days/Yr	9 yrs 70 yrs	=	CDI			
Benzene	5.35E-03	15	1.0	70	0.959	0.129		1.42E-07	2.90E-02	4.11E-09	16.55%
Trichloroethene	9.45E-03	15	1.0	70	0.959	0.129		2.50E-07	1.10E-02	2.76E-09	11.09%
Tetrachloroethene	1.33E-02	15	1.0	70	0.959	0.129		3.53E-07	5.10E-02	1.80E-08	72.36%
TOTAL RISK											2.48E-08

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	x	x	1	x	x	=				
		24 g day	1.0	70 kg	350 days year	30 yrs 70 yrs	=	CDI			
Benzene	5.56E-03	24	1	70	0.959	0.429		7.83E-07	2.90E-02	2.27E-08	13.61%
Trichloroethene	1.05E-02	24	1	70	0.959	0.429		1.48E-06	1.10E-02	1.63E-08	9.75%
Tetrachloroethene	1.78E-02	24	1	70	0.959	0.429		2.51E-06	5.10E-02	1.28E-07	76.64%
TOTAL RISK											1.67E-07

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum).
Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989).
Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

TABLE H-55 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult**

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RID	RISK (CDI/RID)	% TOTAL RISK
	mg/kg	15 g day	1.0	70 kg	350 days Days/Yr	9 yrs 70 yrs	CDI			
1,2-Dichloroethene	1.56E-02	15	1	70	0.959	0.129	4.14E-07	2.00E-02	2.07E-05	8.06%
Xylenes	4.94E-01	15	1	70	0.959	0.129	1.31E-05	2.00E+00	6.55E-06	2.55%
2-Methylphenol	9.25E-02	15	1	70	0.959	0.129	2.45E-06	5.00E-02	4.90E-05	19.11%
4-Methylphenol	9.33E-02	15	1	70	0.959	0.129	2.47E-06	5.00E-02	4.95E-05	19.27%
o-Toluic acid	1.03E+01	15	1	70	0.959	0.129	2.73E-04	3.00E+00	9.10E-05	35.46%
m-Toluic acid	4.04E+00	15	1	70	0.959	0.129	1.07E-04	3.00E+00	3.57E-05	13.91%
p-Toluic acid	4.74E-01	15	1	70	0.959	0.129	1.26E-05	3.00E+00	4.19E-06	1.63%
TOTAL HAZARD INDEX									2.57E-04	

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RID	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	24 g day	1.0	70 kg	350 days year	30 yrs 70 yrs	CDI			
1,2-Dichloroethene	3.73E-02	24	1	70	0.959	0.429	5.26E-06	2.00E-02	2.63E-04	13.16%
Xylenes	1.14E+00	24	1	70	0.959	0.429	1.61E-04	2.00E+00	8.03E-05	4.02%
2-Methylphenol	9.96E-03	24	1	70	0.959	0.429	1.40E-06	5.00E-02	2.81E-05	1.41%
4-Methylphenol	1.07E-02	24	1	70	0.959	0.429	1.51E-06	5.00E-02	3.02E-05	1.51%
o-Toluic acid	2.39E+01	24	1	70	0.959	0.429	3.37E-03	3.00E+00	1.12E-03	56.22%
m-Toluic acid	9.07E+00	24	1	70	0.959	0.429	1.28E-03	3.00E+00	4.26E-04	21.33%
p-Toluic acid	9.99E-01	24	1	70	0.959	0.429	1.41E-04	3.00E+00	4.69E-05	2.35%
TOTAL HAZARD INDEX									2.00E-03	

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Chronic Daily Intake (mg/kg-day)												
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	=	Chronic Daily Intake (mg/kg-day)
mg/kg	x	40 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	=	CDI
Compound	Conc (mg/kg)	IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		Yrs expd Yrs LT		% TOTAL RISK
Benzene	1.94E-03	40		1		70		0.959		0.429		23.54%
Trichloroethene	1.87E-03	40		1		70		0.959		0.429		8.61%
Tetrachloroethene	3.18E-03	40		1		70		0.959		0.429		67.85%
TOTAL RISK												5.61E-08

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult

TOTAL HAZRD INDEX	7.18E-05

$$1 \frac{1}{\text{Days expd}} \times \frac{\text{Yrs expd}}{\text{Days expd}} = \text{Chronic Daily Intake (mg/kg-day)}$$

TOTAL HAZARD INDEX	5.89E-04

LEAF CROPS - Continued

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child

Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Days/Yr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	% TOTAL RISK
mg/kg	x	$\frac{25 \text{ g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{Days/Yr}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	CDI
Compound	Conc (mg/kg)	IR (g/day)		Fraction absorbed		Body wt (kg)		$\frac{\text{Days expd}}{\text{Days/Yr}}$		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	RISK (CDI/RIID)
1,2-Dichloroethene	9.52E-03	25		1		35		0.959		0.129	8.41E-07
Xylenes	3.42E-02	25		1		35		0.959		0.129	2.00E+00
2-Methylphenol	4.03E-03	25		1		35		0.959		0.129	5.00E-02
4-Methylphenol	4.20E-03	25		1		35		0.959		0.129	5.00E-02
o-Toluic acid	1.80E+00	25		1		35		0.959		0.129	1.59E-04
m-Toluic acid	9.67E-01	25		1		35		0.959		0.129	8.54E-05
p-Toluic acid	1.34E-01	25		1		35		0.959		0.129	1.18E-05
TOTAL HAZRD INDEX											1.44E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

$\text{Plant Conc} \times \text{Intake rate (g/day)} \times \text{Fraction absorbed} \times \frac{1}{\text{Body weight}} \times \frac{\text{Days expd}}{\text{Year}} \times \frac{\text{Yrs expd}}{\text{Yrs LT}} = \text{Chronic Daily Intake (mg/kg-day)}$														
	mg/kg	x	$\frac{40 \text{ g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	= CDI		
Compound	Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		$\frac{350 \text{ days}}{\text{Days/Yr}}$		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$		% TOTAL RISK	
1,2-Dichloroethene	2.28E-03		40		1		35		0.959		0.129		1.61E-05	4.54%
Xylenes	7.89E-03		40		1		35		0.959		0.129		5.56E-07	0.16%
2-Methylphenol	4.34E-03		40		1		35		0.959		0.129		1.22E-05	3.46%
4-Methylphenol	4.82E-03		40		1		35		0.959		0.129		1.36E-05	3.84%
o-Toluic acid	4.17E+00		40		1		35		0.959		0.129		1.96E-04	55.40%
m-Toluic acid	2.17E+00		40		1		35		0.959		0.129		1.02E-04	28.83%
p-Toluic acid	2.83E-01		40		1		35		0.959		0.129		1.33E-05	3.76%
													TOTAL HAZARD INDEX	3.53E-04

Table H-56. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners)
ON-SITE GROUNDWATER USE - Deep Bedrock - Round 2

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ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Yrs	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	x	x	x	x	x	=	=			
		15 g/day	1.0	70 kg	350 days Yrs	9 yrs 70 yrs		CDI			
4,4'-DDE	4.95E-02	15	1.0	70	0.959	0.129		1.31E-06	3.40E-01	4.46E-07	93.03%
Trichloroethene	1.40E-02	15	1.0	70	0.959	0.129		3.71E-07	1.10E-02	4.08E-09	0.85%
Tetrachloroethene	2.17E-02	15	1.0	70	0.959	0.129		5.75E-07	5.10E-02	2.93E-08	6.12%
TOTAL RISK											4.80E-07

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	x	x	x	x	x	=	=			
		24 g/day	1.0	70 kg	350 days year	30 yrs 70 yrs		CDI			
4,4'-DDE	6.98E-02	24	1	70	0.959	0.429		9.83E-06	3.40E-01	3.34E-06	93.69%
Trichloroethene	1.40E-02	24	1	70	0.959	0.429		1.97E-06	1.10E-02	2.17E-08	0.61%
Tetrachloroethene	2.83E-02	24	1	70	0.959	0.429		3.99E-06	5.10E-02	2.03E-07	5.70%
TOTAL RISK											3.57E-06

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum).
Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989).
Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult

- Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/yr	x	Yrs expd Yrs LT	% TOTAL RISK
mg/kg	x	15 g day	x	1.0	x	1 70 kg	x	350 days Days/yr	x	9 yrs 70 yrs	
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI/RfD)		
1,2-Dichloroethene	4.95E-03	15	1	70	0.959	0.129	1.31E-07	2.00E-02	6.56E-06		2.39%
Xylenes	4.52E-01	15	1	70	0.959	0.129	1.20E-05	2.00E+00	5.99E-06		2.18%
Tetrachloroethene	2.17E-02	15	1	70	0.959	0.129	5.75E-07	1.00E-02	5.75E-05		20.94%
2-Methylphenol	1.07E-02	15	1	70	0.959	0.129	2.84E-07	5.00E-02	5.67E-06		2.07%
o-Toluic acid	1.21E+01	15	1	70	0.959	0.129	3.21E-04	3.00E+00	1.07E-04		38.92%
m-Toluic acid	9.71E+00	15	1	70	0.959	0.129	2.57E-04	3.00E+00	8.58E-05		31.24%
p-Toluic acid	7.03E-01	15	1	70	0.959	0.129	1.86E-05	3.00E+00	6.21E-06		2.26%

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

= Chronic Daily Intake (mg/kg-day)															
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT					
mg/kg	x	24 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI				
Compound	Conc (mg/kg)	IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		Yrs expd Yrs LT	CDI	RID	RISK (CDI*SF)	% TOTAL RISK	
1,2-Dichloroethene	4.95E-03	24		1		70		0.959		0.429	6.97E-07	2.00E-02	3.49E-05	1.08%	
Xylenes	1.10E+00	24		1		70		0.959		0.429	1.55E-04	2.00E+00	7.75E-05	2.40%	
Tetrachloroethene	2.83E-02	24		1		70		0.959		0.429	3.99E-06	1.00E-02	3.99E-04	12.32%	
2-Methylphenol	1.35E-02	24		1		70		0.959		0.429	1.90E-06	5.00E-02	3.80E-05	1.18%	
o-Toluic acid	3.08E+01	24		1		70		0.959		0.429	4.34E-03	3.00E+00	1.45E-03	44.71%	
m-Toluic acid	2.47E+01	24		1		70		0.959		0.429	3.48E-03	3.00E+00	1.16E-03	35.85%	
p-Toluic acid	1.70E+00	24		1		70		0.959		0.429	2.40E-04	3.00E+00	7.98E-05	2.47%	
													TOTAL HAZARD INDEX		3.24E-03

LEAF CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Compound	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	RISK			% TOTAL RISK
													CDI	SF	(CDI*SF)	
4,4'-DDE	1.01E-07		25		1		70		0.959		0.129	4.46E-12	3.40E-01	1.52E-12	0.02%	
Trichloroethene	2.49E-03		25		1		70		0.959		0.129	1.10E-07	1.10E-02	1.21E-09	12.21%	
Tetrachloroethene	3.86E-03		25		1		70		0.959		0.129	1.71E-07	5.10E-02	8.70E-09	87.77%	

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

= Chronic Daily Intake (mg/kg-day)										
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT
mg/kg	x	40 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs
Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		Yrs expd Yrs LT
Compound								CDI	SF	RISK (CDI*SF)
4,4'-DDE	1.43E-07	40		1		70		0.959	0.429	3.36E-11 3.40E-01 1.14E-11
Trichloroethene	2.49E-03	40		1		70		0.959	0.429	5.85E-07 1.10E-02 6.43E-09
Tetrachloroethene	5.04E-03	40		1		70		0.959	0.429	1.18E-06 5.10E-02 6.04E-08
TOTAL RISK										6.68E-08

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult

Chronic Daily Intake (mg/kg-day)												
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	=	% TOTAL RISK
mg/kg	x	25 g day	x	1.0	x	1 70 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	=	
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI/RfD)			
1,2-Dichloroethene	3.02E-03	25	1	70	0.959	0.129	1.33E-07	2.00E-02	6.67E-06			6.89%
Xylenes	3.13E-02	25	1	70	0.959	0.129	1.38E-06	2.00E+00	6.91E-07			0.71%
Tetrachloroethene	3.86E-03	25	1	70	0.959	0.129	1.71E-07	1.00E-02	1.71E-05			17.61%
2-Methylphenol	4.65E-03	25	1	70	0.959	0.129	2.05E-07	5.00E-02	4.11E-06			4.24%
o-Toluic acid	2.12E+00	25	1	70	0.959	0.129	9.37E-05	3.00E+00	3.12E-05			32.24%
m-Toluic acid	2.32E+00	25	1	70	0.959	0.129	1.02E-04	3.00E+00	3.42E-05			35.28%
p-Toluic acid	1.99E-01	25	1	70	0.959	0.129	8.79E-06	3.00E+00	2.93E-06			3.03%
TOTAL HAZARD INDEX										9.68E-05		

= Chronic Daily Intake (mg/kg-day)														
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	% TOTAL RISK			
mg/kg	x	40 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI			
Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	RfD (CDI/RfD)	% TOTAL RISK	
1,2-Dichloroethene	3.02E-03	40		1		70		0.959		0.429	7.09E-07	2.00E-02	3.55E-05	3.19%
Xylenes	7.65E-02	40		1		70		0.959		0.429	1.80E-05	2.00E+00	8.98E-06	0.28%
Tetrachloroethene	5.04E-03	40		1		70		0.959		0.429	1.18E-06	1.00E-02	1.18E-04	3.66%
2-Methylphenol	5.89E-03	40		1		70		0.959		0.429	1.38E-06	5.00E-02	2.77E-05	0.85%
o-Toluic acid	5.38E+00	40		1		70		0.959		0.429	1.26E-03	3.00E+00	4.21E-04	13.02%
m-Toluic acid	5.91E+00	40		1		70		0.959		0.429	1.39E-03	3.00E+00	4.63E-04	14.30%
p-Toluic acid	4.80E-01	40		1		70		0.959		0.429	1.13E-04	3.00E+00	3.76E-05	1.16%
											TOTAL HAZARD INDEX		1.11E-03	

TABLE H-56 (Continued)

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LEAF CROPS - Continued

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child

Compound	Plant Conc (mg/kg)	Intake rate (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	CDI	RID	RISK (CDI/RID)	% TOTAL RISK
1,2-Dichloroethene	3.02E-03	25	1	35	0.959	0.129	2.67E-07	2.00E-02	1.33E-05	6.89%
Xylenes	3.13E-02	25	1	35	0.959	0.129	2.77E-06	2.00E+00	1.38E-06	0.71%
Tetrachloroethene	3.86E-03	25	1	35	0.959	0.129	3.41E-07	1.00E-02	3.41E-05	17.61%
2-Methylphenol	4.65E-03	25	1	35	0.959	0.129	4.11E-07	5.00E-02	8.22E-06	4.24%
o-Toluic acid	2.12E+00	25	1	35	0.959	0.129	1.87E-04	3.00E+00	6.24E-05	32.24%
m-Toluic acid	2.32E+00	25	1	35	0.959	0.129	2.05E-04	3.00E+00	6.83E-05	35.28%
p-Toluic acid	1.99E-01	25	1	35	0.959	0.129	1.76E-05	3.00E+00	5.86E-06	3.03%
TOTAL HAZARD INDEX									1.94E-04	

= Chronic Daily Intake (mg/kg-day)

= CDI

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

Compound	Plant Conc (mg/kg)	Intake rate (g/day)	Fraction absorbed	Body wt (kg)	Days expd Year	Yrs expd Yrs LT	CDI	RID	RISK (CDI*SF)	% TOTAL RISK
1,2-Dichloroethene	3.02E-03	40	1	35	0.959	0.129	4.26E-07	2.00E-02	2.13E-05	3.19%
Xylenes	7.65E-02	40	1	35	0.959	0.129	1.08E-05	2.00E+00	5.39E-06	0.81%
Tetrachloroethene	5.04E-03	40	1	35	0.959	0.129	7.10E-07	1.00E-02	7.10E-05	10.65%
2-Methylphenol	5.89E-03	40	1	35	0.959	0.129	8.30E-07	5.00E-02	1.66E-05	2.49%
o-Toluic acid	5.38E+00	40	1	35	0.959	0.129	7.58E-04	3.00E+00	2.53E-04	37.88%
m-Toluic acid	5.91E+00	40	1	35	0.959	0.129	8.33E-04	3.00E+00	2.78E-04	41.61%
p-Toluic acid	4.80E-01	40	1	35	0.959	0.129	6.76E-05	3.00E+00	2.25E-05	3.38%
TOTAL HAZARD INDEX									6.67E-04	

= Chronic Daily Intake (mg/kg-day)

= CDI

Table H-57. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners)
ON-SITE GROUNDWATER USE - Mixed Bedrock - Round 1

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ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Compound	Conc (mg/kg)	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	= Chronic Daily Intake (mg/kg-day)	RISK (CDI*SF)	% TOTAL RISK
		mg/kg	x	15 g day	x	1.0	x	1 70 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	= CDI		
		Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs LT			
Benzene	6.42E-03		x	15	x	1.0	x	70	x	0.959	x	0.129	1.70E-07	2.90E-02	4.94E-09
Vinyl chloride	2.72E-03		x	15	x	1.0	x	70	x	0.959	x	0.129	7.21E-08	1.90E+00	1.37E-07
Trichloroethene	8.22E-02		x	15	x	1.0	x	70	x	0.959	x	0.129	2.18E-06	1.10E-02	2.40E-08
Tetrachloroethene	7.66E-01		x	15	x	1.0	x	70	x	0.959	x	0.129	2.03E-05	5.10E-02	1.04E-06
TOTAL RISK														1.20E-06	86.19%

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Compound	Conc (mg/kg)	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	= Chronic Daily Intake (mg/kg-day)	RISK (CDI*SF)	% TOTAL RISK
		mg/kg	x	24 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI		
		Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs LT			
Benzene	6.42E-03		x	24	x	1	x	70	x	0.959	x	0.429	9.05E-07	2.90E-02	0.17%
Vinyl chloride	2.72E-03		x	24	x	1	x	70	x	0.959	x	0.429	3.83E-07	1.90E+00	4.75%
Trichloroethene	1.80E-01		x	24	x	1	x	70	x	0.959	x	0.429	2.54E-05	1.10E-02	1.82%
Tetrachloroethene	1.99E+00		x	24	x	1	x	70	x	0.959	x	0.429	2.80E-04	5.10E-02	93.26%
TOTAL RISK														1.53E-05	

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum).
Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989).
Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

TABLE H-57 (Continued)

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ROOT CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child**

Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	=
mg/kg	x	15 g day	x	1.0	x	1 35 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	=
CDI											
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK	
1,2-Dichloroethene	4.55E-02	15	1	35	0.959	0.129	2.41E-06	2.00E-02	1.21E-04	2.22%	
Xylenes	2.43E+00	15	1	35	0.959	0.129	1.29E-04	2.00E+00	6.44E-05	1.19%	
Tetrachloroethene	7.66E-01	15	1	35	0.959	0.129	4.06E-05	1.00E-02	4.06E-03	74.79%	
2-Methylphenol	1.49E-02	15	1	35	0.959	0.129	7.90E-07	5.00E-02	1.58E-05	0.29%	
4-Methylphenol	2.02E-02	15	1	35	0.959	0.129	1.07E-06	5.00E-02	2.14E-05	0.39%	
o-Toluic acid	4.63E+01	15	1	35	0.959	0.129	2.45E-03	3.00E+00	8.18E-04	15.07%	
m-Toluic acid	1.68E+01	15	1	35	0.959	0.129	8.91E-04	3.00E+00	2.97E-04	5.47%	
p-Toluic acid	1.77E+00	15	1	35	0.959	0.129	9.38E-05	3.00E+00	3.13E-05	0.58%	
TOTAL HAZARD INDEX									5.43E-03		

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	
mg/kg	x	24 $\frac{\text{g}}{\text{day}}$	x	1.0	x	$\frac{1}{35 \text{ kg}}$	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	= CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{350 \text{ days}}{\text{Days/Yr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	RfD	RISK (CDI*SF)	% TOTAL RISK	
1,2-Dichloroethene	8.23E-02	24	1	35	0.959	0.129	6.96E-06	2.00E-02	3.48E-04	1.62%	
Xylenes	4.85E+00	24	1	35	0.959	0.129	4.10E-04	2.00E+00	2.05E-04	0.95%	
Tetrachloroethene	1.99E+00	24	1	35	0.959	0.129	1.68E-04	1.00E-02	1.68E-02	78.11%	
2-Methylphenol	2.13E-02	24	1	35	0.959	0.129	1.80E-06	5.00E-02	3.60E-05	0.17%	
4-Methylphenol	2.90E-02	24	1	35	0.959	0.129	2.45E-06	5.00E-02	4.90E-05	0.23%	
o-Toluic acid	1.01E+02	24	1	35	0.959	0.129	8.54E-03	3.00E+00	2.85E-03	13.21%	
m-Toluic acid	3.94E+01	24	1	35	0.959	0.129	3.33E-03	3.00E+00	1.11E-03	5.16%	
p-Toluic acid	4.25E+00	24	1	35	0.959	0.129	3.59E-04	3.00E+00	1.20E-04	0.56%	
TOTAL HAZARD INDEX									2.15E-02		

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

= Chronic Daily Intake (mg/kg-day)										
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$
mg/kg	x	40 g/day	x	1.0	x	1 70 kg	x	$\frac{350 \text{ days}}{\text{year}}$	x	$\frac{30 \text{ yrs}}{70 \text{ yrs}}$
Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		$\frac{350 \text{ days}}{\text{Days/Yr}}$		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$
Compound								CDI	SF	RISK (CDI*SF)
Benzene	2.24E-03	40		1		70		0.959	0.429	1.53E-08
Vinyl chloride	1.33E-03	40		1		70		0.959	0.429	5.93E-07
Trichloroethene	3.19E-02	40		1		70		0.959	0.429	8.24E-08
Tetrachloroethene	3.54E-01	40		1		70		0.959	0.429	4.24E-06
TOTAL RISK										4.93E-06

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{Year}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	=	Chronic Daily Intake (mg/kg-day)			
mg/kg	x	40 $\frac{\text{g}}{\text{day}}$	x	1.0	x	1 70 kg	x	350 $\frac{\text{days}}{\text{year}}$	x	30 yrs 70 yrs	=	CDI			
Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		$\frac{\text{Yrs expd}}{\text{Yrs LT}}$		RfD	RISK (CDI/RfD)	% TOTAL RISK	
1,2-Dichloroethene	5.03E-03	40		1		70		0.959		0.429		1.18E-06	2.00E-02	5.91E-05	0.55%
Xylenes	3.36E-01	40		1		70		0.959		0.429		7.89E-05	2.00E+00	3.95E-05	0.11%
Tetrachloroethene	3.54E-01	40		1		70		0.959		0.429		8.31E-05	1.00E-02	8.31E-03	23.16%
2-Methylphenol	9.30E-03	40		1		70		0.959		0.429		2.18E-06	5.00E-02	4.37E-05	0.12%
4-Methylphenol	1.31E-02	40		1		70		0.959		0.429		3.08E-06	5.00E-02	6.15E-05	0.17%
o-Toluic acid	1.77E+01	40		1		70		0.959		0.429		4.16E-03	3.00E+00	1.39E-03	3.86%
m-Toluic acid	9.45E+00	40		1		70		0.959		0.429		2.22E-03	3.00E+00	7.40E-04	2.06%
p-Toluic acid	1.20E+00	40		1		70		0.959		0.429		2.82E-04	3.00E+00	9.39E-05	0.26%
TOTAL HAZARD INDEX														1.07E-02	

Table H-58. FOOD CHAIN TRANSFER OF CONTAMINANTS - UPTAKE FROM VEGETABLES (Residential gardeners)
ON-SITE GROUNDWATER USE - Mixed Bedrock - Round 2

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ROOT CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Days/Yr	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	x	x	1	x	x	=				
		15 g day	1.0	70 kg	350 days Days/Yr	9 yrs 70 yrs	=	CDI			
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT		CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Benzene	8.55E-03	15	1.0	70	0.959	0.129		2.27E-07	2.90E-02	6.57E-09	0.97%
Vinyl chloride	1.10E-02	15	1.0	70	0.959	0.129		2.92E-07	1.90E+00	5.54E-07	81.35%
Trichloroethene	3.53E-02	15	1.0	70	0.959	0.129		9.36E-07	1.10E-02	1.03E-08	1.51%
Tetrachloroethene	8.15E-02	15	1.0	70	0.959	0.129		2.16E-06	5.10E-02	1.10E-07	16.18%
TOTAL RISK										6.81E-07	

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

Compound	Plant Conc	Intake rate (g/day)	Fraction absorbed	Body weight	Days expd Year	Yrs expd Yrs LT	Chronic Daily Intake (mg/kg-day)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/kg	x	x	1	x	x	=				
		24 g day	1.0	70 kg	350 days year	30 yrs 70 yrs	=	CDI			
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT		CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Benzene	8.55E-03	24	1	70	0.959	0.429		1.20E-06	2.90E-02	3.49E-08	0.60%
Vinyl chloride	1.71E-02	24	1	70	0.959	0.429		2.41E-06	1.90E+00	4.58E-06	78.86%
Trichloroethene	5.53E-02	24	1	70	0.959	0.429		7.79E-06	1.10E-02	8.57E-08	1.48%
Tetrachloroethene	1.54E-01	24	1	70	0.959	0.429		2.17E-05	5.10E-02	1.11E-06	19.06%
TOTAL RISK										5.81E-06	

Daily ingestion rates are 50 g/day (average) and 80 g/day (plausible maximum).
Root crops represent 30% (15 g/day for average, and 24 g/day plausible maximum) of the total consumption, based upon EPA (1989).
Leaf crops represent 50% (25 g/day for average, and 40 g/day plausible maximum) of the total consumption, based upon EPA (1989).

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{DaysYr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	
mg/kg	x	15 g/day	x	1.0	x	1 70 kg	x	$\frac{350 \text{ days}}{\text{DaysYr}}$	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	= CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{\text{Days expd}}{\text{DaysYr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	RfD	Risk (CDI/RfD)	% TOTAL RISK	
1,2-Dichloroethene	1.37E-01	15	1	70	0.959	0.129	3.63E-06	2.00E-02	1.82E-04	8.55%	
Xylenes	2.34E+00	15	1	70	0.959	0.129	6.20E-05	2.00E+00	3.10E-05	1.46%	
Tetrachloroethene	8.15E-02	15	1	70	0.959	0.129	2.16E-06	1.00E-02	2.16E-04	10.17%	
2-Methylphenol	1.35E-02	15	1	70	0.959	0.129	3.58E-07	5.00E-02	7.16E-06	0.34%	
4-Methylphenol	1.90E-02	15	1	70	0.959	0.129	5.04E-07	5.00E-02	1.01E-05	0.47%	
o-Toluic acid	9.65E+01	15	1	70	0.959	0.129	2.56E-03	3.00E+00	8.53E-04	40.13%	
m-Toluic acid	4.94E+01	15	1	70	0.959	0.129	1.31E-03	3.00E+00	4.36E-04	20.54%	
p-Toluic acid	4.41E+01	15	1	70	0.959	0.129	1.17E-03	3.00E+00	3.90E-04	18.34%	

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Adult

	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	= Chronic Daily Intake (mg/kg-day)			
	mg/kg	x	24 g day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI			
Compound	Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		Yrs expd Yrs LT	CDI	RFD	RISK (CDI*SF)	% TOTAL RISK
1,2-Dichloroethene	3.26E-01		24		1		70		0.959		0.429	4.59E-05	2.00E-02	2.30E-03	9.58%
Xylenes	4.11E+00		24		1		70		0.959		0.429	5.79E-04	2.00E+00	2.90E-04	1.21%
Tetrachloroethene	1.54E-01		24		1		70		0.959		0.429	2.17E-05	1.00E-02	2.17E-03	9.05%
2-Methylphenol	1.96E-02		24		1		70		0.959		0.429	2.76E-06	5.00E-02	5.52E-05	0.23%
4-Methylphenol	3.30E-02		24		1		70		0.959		0.429	4.65E-06	5.00E-02	9.30E-05	0.39%
o-Toluic acid	1.98E+02		24		1		70		0.959		0.429	3.79E-02	3.00E+00	9.30E-03	38.79%
m-Toluic acid	1.00E+02		24		1		70		0.959		0.429	1.41E-02	3.00E+00	4.70E-03	19.59%
p-Toluic acid	1.08E+02		24		1		70		0.959		0.429	1.52E-02	3.00E+00	5.07E-03	21.16%
TOTAL HAZARD INDEX=														2.40E-02	

LEAF CROPS

CARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE

Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs Lt	% TOTAL RISK
mg/kg	x	25 g day	x	1.0	x	1 70 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	= CDI
Compound	Conc (mg/kg)	IR (g/day)		Fraction absorbed		Body wt (kg)		Days expd Days/Yr		Yrs expd Yrs Lt	RISK (CDI*SF)
Benzene	2.98E-03	25		1		70		0.959		0.129	3.82E-09
Vinyl chloride	5.41E-03	25		1		70		0.959		0.129	4.54E-07
Trichloroethene	6.29E-03	25		1		70		0.959		0.129	3.06E-09
Tetrachloroethene	1.45E-02	25		1		70		0.959		0.129	3.27E-08
TOTAL RISK											4.94E-07

CARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE

$\text{Plant Conc} \times \text{Intake rate (g/day)} \times \text{Fraction absorbed} \times \text{Body weight} \times \frac{\text{Days expd}}{\text{Year}} \times \frac{\text{Yrs expd}}{\text{Yrs LT}} = \text{Chronic Daily Intake (mg/kg-day)}$										
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{350 \text{ days}}{\text{Days/Yr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Benzene	2.98E-03	40	1	70	0.959	0.429	7.00E-07	2.90E-02	2.03E-08	0.50%
Vinyl chloride	8.33E-03	40	1	70	0.959	0.429	1.96E-06	1.90E+00	3.72E-06	90.83%
Trichloroethene	9.84E-03	40	1	70	0.959	0.429	2.31E-06	1.10E-02	2.54E-08	0.62%
Tetrachloroethene	2.75E-02	40	1	70	0.959	0.429	6.46E-06	5.10E-02	3.29E-07	8.05%
TOTAL RISK									4.09E-06	

NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Adult

= Chronic Daily Intake (mg/kg-day)											
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	$\frac{1}{\text{Body weight}}$	x	$\frac{\text{Days expd}}{\text{DaysYr}}$	x	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	% TOTAL RISK
mg/kg	x	25 g day	x	1.0	x	1 70 kg	x	350 days DaysYr	x	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	= CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	$\frac{\text{Days expd}}{\text{DaysYr}}$	$\frac{\text{Yrs expd}}{\text{Yrs LT}}$	CDI	RfD	RISK (CDI/RfD)		
1,2-Dichloroethene	8.39E-02	25	1	70	0.959	0.129	3.71E-06	2.00E-02	1.85E-04	21.28%	
Xylenes	1.62E-01	25	1	70	0.959	0.129	7.16E-06	2.00E+00	3.58E-06	0.41%	
Tetrachloroethene	1.45E-02	25	1	70	0.959	0.129	6.41E-07	1.00E-02	6.41E-05	7.35%	
2-Methylphenol	5.89E-03	25	1	70	0.959	0.129	2.60E-07	5.00E-02	5.20E-06	0.60%	
4-Methylphenol	8.56E-03	25	1	70	0.959	0.129	3.78E-07	5.00E-02	7.56E-06	0.87%	
o-Toluic acid	1.68E+01	25	1	70	0.959	0.129	7.42E-04	3.00E+00	2.47E-04	28.40%	
m-Toluic acid	1.18E+01	25	1	70	0.959	0.129	5.21E-04	3.00E+00	1.74E-04	19.95%	
p-Toluic acid	1.25E+01	25	1	70	0.959	0.129	5.52E-04	3.00E+00	1.84E-04	21.13%	
TOTAL HAZRD INDEX										8.71E-04	

	Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	= Chronic Daily Intake (mg/kg-day)			
	mg/kg	x	40 <u>g</u> day	x	1.0	x	1 70 kg	x	350 days year	x	30 yrs 70 yrs	= CDI			
Compound	Conc (mg/kg)		IR (g/day)		Fraction absorbed		Body wt (kg)		350 days Days/Yr		Yrs expd Yrs LT	RISK (CDI/RfD)	% TOTAL RISK		
1,2-Dichloroethene	1.99E-01		40		1		70		0.959		0.429	4.67E-05	2.34E-03	22.32%	
Xylenes	2.84E-01		40		1		70		0.959		0.429	6.67E-05	2.00E+00	3.33E-05	0.14%
Tetrachloroethene	2.75E-02		40		1		70		0.959		0.429	6.46E-06	1.00E-02	6.46E-04	2.69%
2-Methylphenol	8.52E-02		40		1		70		0.959		0.429	2.00E-05	5.00E-02	4.00E-04	1.67%
4-Methylphenol	1.49E-02		40		1		70		0.959		0.429	3.50E-06	5.00E-02	7.00E-05	0.29%
o-Toluic acid	3.46E+01		40		1		70		0.959		0.429	8.13E-03	3.00E+00	2.71E-03	11.30%
m-Toluic acid	2.40E+01		40		1		70		0.959		0.429	5.64E-03	3.00E+00	1.88E-03	7.84%
p-Toluic acid	3.06E+01		40		1		70		0.959		0.429	7.19E-03	3.00E+00	2.40E-03	9.99%
												TOTAL HAZARD INDEX	1.05E-02		

TABLE H-58 (Continued)

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LEAF CROPS - Continued**NONCARCINOGENS - AVERAGE PLANT INGESTION EXPOSURE - Child**

Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Days/Yr	x	Yrs expd Yrs LT	=	Chronic Daily Intake (mg/kg-day)
mg/kg	x	25 g day	x	1.0	x	1 35 kg	x	350 days Days/Yr	x	9 yrs 70 yrs	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI/RfD)	% TOTAL RISK		
1,2-Dichloroethene	8.39E-02	25	1	35	0.959	0.129	7.41E-06	2.00E-02	3.71E-04	21.28%		
Xylenes	1.62E-01	25	1	35	0.959	0.129	1.43E-05	2.00E+00	7.16E-06	0.41%		
Tetrachloroethene	1.45E-02	25	1	35	0.959	0.129	1.28E-06	1.00E-02	1.28E-04	7.35%		
2-Methylphenol	5.89E-03	25	1	35	0.959	0.129	5.20E-07	5.00E-02	1.04E-05	0.60%		
4-Methylphenol	8.56E-03	25	1	35	0.959	0.129	7.56E-07	5.00E-02	1.51E-05	0.87%		
o-Toluic acid	1.68E+01	25	1	35	0.959	0.129	1.48E-03	3.00E+00	4.95E-04	28.40%		
m-Toluic acid	1.18E+01	25	1	35	0.959	0.129	1.04E-03	3.00E+00	3.48E-04	19.95%		
p-Toluic acid	1.25E+01	25	1	35	0.959	0.129	1.10E-03	3.00E+00	3.68E-04	21.13%		

NONCARCINOGENS - PLAUSIBLE MAXIMUM PLANT INGESTION EXPOSURE - Child

Chronic Daily Intake (mg/kg-day)												
Plant Conc	x	Intake rate (g/day)	x	Fraction absorbed	x	1 Body weight	x	Days expd Year	x	Yrs expd Yrs LT	=	Chronic Daily Intake (mg/kg-day)
mg/kg	x	40 g day	x	1.0	x	1 35 kg	x	350 days year	x	9 yrs 70 yrs	=	CDI
Compound	Conc (mg/kg)	IR (g/day)	Fraction absorbed	Body wt (kg)	Days expd Days/Yr	Yrs expd Yrs LT	CDI	RfD	RISK (CDI*SF)	% TOTAL RISK		
1,2-Dichloroethene	1.99E-01	40	1	35	0.959	0.129	2.80E-05	2.00E-02	1.40E-03	22.32%		
Xylenes	2.84E-01	40	1	35	0.959	0.129	4.00E-05	2.00E+00	2.00E-05	0.32%		
Tetrachloroethene	2.75E-02	40	1	35	0.959	0.129	3.87E-06	1.00E-02	3.87E-04	6.17%		
2-Methylphenol	8.52E-02	40	1	35	0.959	0.129	1.20E-05	5.00E-02	2.40E-04	3.82%		
4-Methylphenol	1.49E-02	40	1	35	0.959	0.129	2.10E-06	5.00E-02	4.20E-05	0.67%		
o-Toluic acid	3.46E+01	40	1	35	0.959	0.129	4.88E-03	3.00E+00	1.63E-03	25.87%		
m-Toluic acid	2.40E+01	40	1	35	0.959	0.129	3.38E-03	3.00E+00	1.13E-03	17.95%		
p-Toluic acid	3.06E+01	40	1	35	0.959	0.129	4.31E-03	3.00E+00	1.44E-03	22.88%		

TABLE H-59. INDUSTRIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY (FS-9)
FUTURE-USE SCENARIO - On-Site Upper Bedrock Well Use
Round 1 Data

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CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Water Conc		Intake (L/day)	Fraction absorbed		Body weight (kg)	Exp (days)		Wks expd	Yrs exposed	Chronic Daily Intake (mg/kg-day)		RISK (CDI*SF)	% Total
	mg/L	mg/L		1	x		Week	days		Years lifetime	CDI	SF		
Vinyl chloride	3.00E-03	1.4	1.4	1.0	x	1	5 days	7 days/wk	50	9 yrs	5.30E-06	1.90E+00	1.01E-05	9.28%
Trichloroethene	3.79E-02	1.4	1.4	1.0	x	70 kg	7 days/wk	7 days/wk	52	70 yrs	6.69E-05	1.10E-02	7.36E-07	0.68%
Benzene	1.00E-03	1.4	1.4	1.0	x	70	7 days/wk	7 days/wk	50	9 yrs	1.77E-06	2.90E-02	5.12E-08	0.05%
Tetrachloroethene	3.68E-01	1.4	1.4	1.0	x	70	7 days/wk	7 days/wk	50	9 yrs	6.50E-04	5.10E-02	3.31E-05	30.56%
Total c-PAHs	5.00E-03	1.4	1.4	1.0	x	70	7 days/wk	7 days/wk	52	70 yrs	8.83E-06	7.30E+00	6.45E-05	59.43%
TOTAL RISK 1.08E-04														

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Water Conc		Intake (L/day)	Fraction absorbed		Body weight (kg)	Exp (days)		Wks expd	Yrs Exposed	Chronic Daily Intake (mg/kg-day)		RISK (CDI*SF)	% Total
	mg/L	mg/L		1	x		Week	days		Years lifetime	CDI	SF		
Vinyl chloride	3.00E-03	2	2	1.0	x	70	7 days/wk	7 days/wk	50	20 yrs	1.68E-05	1.90E+00	3.20E-05	6.66%
Trichloroethene	7.43E-02	2	2	1.0	x	70	7 days/wk	7 days/wk	50	20 yrs	4.17E-04	1.10E-02	4.58E-06	0.95%
Benzene	1.00E-03	2	2	1.0	x	70	7 days/wk	7 days/wk	50	20 yrs	5.61E-06	2.90E-02	1.63E-07	0.03%
Tetrachloroethene	8.35E-01	2	2	1.0	x	70	7 days/wk	7 days/wk	50	20 yrs	4.68E-03	5.10E-02	2.39E-04	49.74%
Total c-PAHs	5.00E-03	2	2	1.0	x	70	7 days/wk	7 days/wk	50	20 yrs	2.80E-05	7.30E+00	2.05E-04	42.62%
TOTAL RISK 4.80E-04														

TABLE H-59 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

= Chronic Daily Intake (mg/kg-day)														
Water Conc	x	Intake	x	Fraction absorbed	x	1 Body weight	x	Exp (days) Week (days)	x	Wks expd Wks/year	x	Yrs exposed Years lifetime		
mg/L	x	1.4 <u>L</u> day	x	1.0	x	1 70 kg	x	5 days 7 days/wk	x	50 52	x	9 yrs 70 yrs	= CDI	
Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD			
1,2-Dichloroethene	5.35E-02	1.4	1.00	70	0.714	0.962	0.129	9.45E-05	2.00E-02	4.72E-03	3.70%			
Tetrachloroethene	3.68E-01	1.4	1.00	70	0.714	0.962	0.129	6.50E-04	1.00E-02	6.50E-02	50.95%			
o-Toluic acid	2.28E+01	1.4	1.00	70	0.714	0.962	0.129	4.02E-02	3.00E+00	1.34E-02	10.51%			
m-Toluic acid	1.03E+01	1.4	1.00	70	0.714	0.962	0.129	1.82E-02	3.00E+00	6.08E-03	4.77%			
p-Toluic acid	1.18E+00	1.4	1.00	70	0.714	0.962	0.129	2.09E-03	3.00E+00	6.97E-04	0.55%			
Arsenic	1.24E-01	1.4	0.05	70	0.714	0.962	0.129	1.10E-05	3.00E-04	3.66E-02	28.66%			
Barium	1.34E-01	1.4	0.05	70	0.714	0.962	0.129	1.18E-05	7.00E-02	1.69E-04	0.13%			
Vanadium	7.30E-02	1.4	0.05	70	0.714	0.962	0.129	6.45E-06	7.00E-03	9.21E-04	0.72%			

HAZARD INDEX 1.28E-01

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	$\frac{\text{Exp (days)}}{\text{Week (days)}}$	$\frac{\text{Wks expd}}{\text{Wks/year}}$	$\frac{\text{Yrs exposed}}{\text{Years lifetime}}$	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	8.96E-02	2	1.00	70	0.714	0.962	0.286	5.02E-04	2.00E-02	2.51E-02	3.34%
Tetrachloroethene	8.35E-01	2	1.00	70	0.714	0.962	0.286	4.68E-03	1.00E-02	4.68E-01	62.28%
o-Toluic acid	3.94E+01	2	1.00	70	0.714	0.962	0.286	2.21E-01	3.00E+00	7.37E-02	9.80%
m-Toluic acid	1.89E+01	2	1.00	70	0.714	0.962	0.286	1.06E-01	3.00E+00	3.54E-02	4.70%
p-Toluic acid	2.25E+00	2	1.00	70	0.714	0.962	0.286	1.26E-02	3.00E+00	4.20E-03	0.56%
Arsenic	1.49E-01	2	0.05	70	0.714	0.962	0.286	4.18E-05	3.00E-04	1.39E-01	18.54%
Barium	1.88E-01	2	0.05	70	0.714	0.962	0.286	5.27E-05	7.00E-02	7.52E-04	0.10%
Vanadium	1.26E-01	2	0.05	70	0.714	0.962	0.286	3.52E-05	7.00E-03	5.03E-03	0.67%

HAZARD INDEX 7.52E-01

Round 2 Data

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

TOTAL RISK	5.13E-05

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

TOTAL RISK 2.41E-04

Note: Database from all upper bedrock wells *except* MW-161.

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

= Chronic Daily Intake (mg/kg-day)												
Water Conc	x	Intake	x	Fraction absorbed	x	1 Body weight	x	Exp (days) Week (days)	x	Wks expd Wks/year	x	Yrs exposed Years lifetime
mg/L	x	1.4 L day	x	1.0	x	1 70 kg	x	5 days 7 days/week	x	50 52	x	9 yrs 70 yrs
= CDI												
Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD	
	1.44E-01	1.4	1.00	70	0.714	0.962	0.129	2.55E-04	2.00E-02	1.28E-02	14.01%	
	2.87E-02	1.4	1.00	70	0.714	0.962	0.129	5.07E-05	1.00E-02	5.07E-03	5.57%	
	4.54E-01	1.4	1.00	70	0.714	0.962	0.129	8.02E-04	2.00E+00	4.01E-04	0.44%	
	3.46E+01	1.4	1.00	70	0.714	0.962	0.129	6.11E-02	3.00E+00	2.04E-02	22.39%	
	2.18E+01	1.4	1.00	70	0.714	0.962	0.129	3.84E-02	3.00E+00	1.28E-02	14.08%	
	2.30E+01	1.4	1.00	70	0.714	0.962	0.129	4.06E-02	3.00E+00	1.35E-02	14.85%	
	8.60E-02	1.4	0.05	70	0.714	0.962	0.129	7.59E-06	3.00E-04	2.53E-02	27.82%	
	1.24E-01	1.4	0.05	70	0.714	0.962	0.129	1.10E-05	7.00E-02	1.57E-04	0.17%	
	4.77E-02	1.4	0.05	70	0.714	0.962	0.129	4.21E-06	7.00E-03	6.02E-04	0.66%	
HAZARD INDEX											9.10E-02	

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

= Chronic Daily Intake (mg/kg-day)															
Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) / Week (days)	Wks expd / Wks/year	Yrs exposed / Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD				
1,2-Dichloroethene	3.42E-01	2	1.00	70	0.714	0.962	0.286	1.92E-03	2.00E-02	9.60E-02	15.27%				
Tetrachloroethene	5.53E-02	2	1.00	70	0.714	0.962	0.286	3.10E-04	1.00E-02	3.10E-02	4.93%				
Xylenes	7.97E-01	2	1.00	70	0.714	0.962	0.286	4.47E-03	2.00E+00	2.23E-03	0.36%				
o-Toluic acid	7.15E+01	2	1.00	70	0.714	0.962	0.286	4.01E-01	3.00E+00	1.34E-01	21.27%				
m-Toluic acid	4.48E+01	2	1.00	70	0.714	0.962	0.286	2.51E-01	3.00E+00	8.37E-02	13.32%				
p-Toluic acid	5.60E+01	2	1.00	70	0.714	0.962	0.286	3.14E-01	3.00E+00	1.05E-01	16.64%				
Arsenic	1.85E-01	2	0.05	70	0.714	0.962	0.286	5.20E-05	3.00E-04	1.73E-01	27.56%				
Barium	1.70E-01	2	0.05	70	0.714	0.962	0.286	4.75E-05	7.00E-02	6.79E-04	0.11%				
Vanadium	8.37E-02	2	0.05	70	0.714	0.962	0.286	2.35E-05	7.00E-03	3.35E-03	0.53%				
HAZARD INDEX											6.29E-01				

TABLE H-61. INDUSTRIAL USE OF GROUNDWATER · DRINKING WATER INGESTION PATHWAY (FS-9)
FUTURE-USE SCENARIO · On-Site Deep Bedrock Well Use
Round 1 Data

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE																	
	Water Conc	x	Intake	x	Fraction absorbed	x	1 Body weight	x	$\frac{\text{Exp (days)}}{\text{Week (days)}}$	x	$\frac{\text{Wks expd}}{\text{Wks/year}}$	x	$\frac{\text{Yrs exposed}}{\text{Years lifetime}}$	= Chronic Daily Intake (mg/kg-day)			
	mg/L	x	$\frac{1.4 \text{ L}}{\text{day}}$	x	1.0	x	$\frac{1}{70 \text{ kg}}$	x	$\frac{5 \text{ days}}{7 \text{ days/wk}}$		$\frac{50}{52}$		$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	= CDI			
Compound	Water Conc (mg/L)		Intake (L/day)		Fraction absorbed		Body Wt (kg)		$\frac{\text{Exp (days)}}{\text{Week (days)}}$		$\frac{\text{Wks expd}}{\text{Wks/year}}$		$\frac{\text{Yrs exposed}}{\text{Years lifetime}}$	CDI	SF	RISK (CDI*SF)	% Total
Trichloroethene	2.70E-03		1.4		1.00		70		0.714		0.962		0.129	4.77E-06	1.10E-02	5.25E-08	10.03%
Benzene	2.50E-03		1.4		1.00		70		0.714		0.962		0.129	4.42E-06	2.90E-02	1.28E-07	24.49%
Tetrachloroethene	3.80E-03		1.4		1.00		70		0.714		0.962		0.129	6.71E-06	5.10E-02	3.42E-07	65.47%
TOTAL RISK																5.23E-07	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE																		
	Water Conc	x	Intake	x	Fraction absorbed	x	1	x	$\frac{\text{Exp (days)}}{\text{Week (days)}}$	x	$\frac{\text{Wks expd}}{\text{Wks/year}}$	x	$\frac{\text{Yrs Exposed}}{\text{Yrs Lifetime}}$	=	Chronic Daily Intake (mg/kg-day)			
	mg/L	x	$\frac{2 \text{ L}}{\text{day}}$	x	1.0	x	1	x	$\frac{5 \text{ days}}{7 \text{ days/wk}}$		$\frac{50}{52}$		$\frac{20 \text{ yrs}}{70 \text{ yrs}}$	=	CDI			
Compound	Water Conc (mg/L)		Intake (L/day)		Fraction absorbed		Body Wt (kg)		$\frac{\text{Exp (days)}}{\text{Week (days)}}$		$\frac{\text{Wks expd}}{\text{Wks/year}}$		$\frac{\text{Yrs Exposed}}{\text{Yrs Lifetime}}$		RISK (CDI*SF)	% Total		
Trichloroethene	3.00E-03		2		1.00		70		0.714		0.962		0.286		1.68E-05	1.10E-02	1.85E-07	8.96%
Benzene	2.60E-03		2		1.00		70		0.714		0.962		0.286		1.46E-05	2.90E-02	4.23E-07	20.46%
Tetrachloroethene	5.10E-03		2		1.00		70		0.714		0.962		0.286		2.86E-05	5.10E-02	1.46E-06	70.58%
TOTAL RISK																2.07E-06		

TABLE H-61 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Chronic Daily Intake (mg/kg-day)											
Water Conc	Intake	Fraction absorbed	Body weight	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD	
mg/L	1.4 mL/day	1.0	1 70 kg	5 days 7 days/wk	50 52	9 yrs 70 yrs	CDI				
Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	7.80E-03	1.4	1.00	70	0.714	0.962	0.129	1.38E-05	1.00E-01	1.38E-04	0.75%
1,2-Dichloroethene	1.26E-02	1.4	1.00	70	0.714	0.962	0.129	2.23E-05	2.00E-02	1.11E-03	6.07%
Tetrachloroethene	3.80E-03	1.4	1.00	70	0.714	0.962	0.129	6.71E-06	1.00E-02	6.71E-04	3.66%
Xylenes	7.64E-02	1.4	1.00	70	0.714	0.962	0.129	1.35E-04	2.00E+00	6.75E-05	0.37%
2-methyl phenol	5.20E-03	1.4	1.00	70	0.714	0.962	0.129	9.18E-06	5.00E-02	1.84E-04	1.00%
4-methyl phenol	5.40E-03	1.4	1.00	70	0.714	0.962	0.129	9.54E-06	5.00E-02	1.91E-04	1.04%
o-Toluic acid	2.91E+00	1.4	1.00	70	0.714	0.962	0.129	5.13E-03	3.00E+00	1.71E-03	9.34%
m-Toluic acid	1.42E+00	1.4	1.00	70	0.714	0.962	0.129	2.51E-03	3.00E+00	8.37E-04	4.57%
p-Toluic acid	1.89E-01	1.4	1.00	70	0.714	0.962	0.129	3.34E-04	3.00E+00	1.11E-04	0.61%
Arsenic	1.91E-02	1.4	0.05	70	0.714	0.962	0.129	1.69E-06	3.00E-04	5.62E-03	30.69%
Antimony	2.93E-02	1.4	0.05	70	0.714	0.962	0.129	2.59E-06	4.00E-04	6.47E-03	35.31%
Barium	7.72E-02	1.4	0.05	70	0.714	0.962	0.129	6.82E-06	7.00E-02	9.74E-05	0.53%
Mercury	6.50E-04	1.4	0.05	70	0.714	0.962	0.129	5.74E-08	3.00E-04	1.91E-04	1.04%
Thallium	7.00E-04	1.4	0.05	70	0.714	0.962	0.129	6.18E-08	8.00E-05	7.73E-04	4.22%
Vanadium	1.12E-02	1.4	0.05	70	0.714	0.962	0.129	9.89E-07	7.00E-03	1.41E-04	0.77%
HAZARD INDEX										1.83E-02	

TABLE H-61 (Continued)

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NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Chronic Daily Intake (mg/kg-day)											
Water Conc	Intake	Fraction absorbed	Body weight	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD	
mg/L	2 L day	1.0	1 70 kg	5 days 7 days/wk	50 52	20 yrs 70 years	CDI (mg/kg-day)				
Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	1.10E-02	2	1.00	70	0.714	0.962	0.286	6.17E-05	1.00E-01	6.17E-04	0.61%
1,2-Dichloroethene	3.02E-02	2	1.00	70	0.714	0.962	0.286	1.69E-04	2.00E-02	8.47E-03	8.40%
Tetrachloroethene	5.10E-03	2	1.00	70	0.714	0.962	0.286	2.86E-05	1.00E-02	2.86E-03	2.84%
Xylenes	1.76E-01	2	1.00	70	0.714	0.962	0.286	9.88E-04	2.00E+00	4.94E-04	0.49%
2-methyl phenol	5.60E-03	2	1.00	70	0.714	0.962	0.286	3.14E-05	5.00E-02	6.28E-04	0.62%
4-methyl phenol	6.20E-03	2	1.00	70	0.714	0.962	0.286	3.48E-05	5.00E-02	6.95E-04	0.69%
o-Toluic acid	6.74E+00	2	1.00	70	0.714	0.962	0.286	3.78E-02	3.00E+00	1.26E-02	12.50%
m-Toluic acid	3.20E+00	2	1.00	70	0.714	0.962	0.286	1.79E-02	3.00E+00	5.97E-03	5.93%
p-Toluic acid	3.98E-01	2	1.00	70	0.714	0.962	0.286	2.23E-03	3.00E+00	7.44E-04	0.74%
Arsenic	3.98E-02	2	0.05	70	0.714	0.962	0.286	1.12E-05	3.00E-04	3.72E-02	36.90%
Antimony	3.60E-02	2	0.05	70	0.714	0.962	0.286	1.01E-05	4.00E-04	2.52E-02	25.04%
Barium	1.82E-01	2	0.05	70	0.714	0.962	0.286	5.11E-05	7.00E-02	7.30E-04	0.72%
Mercury	9.30E-04	2	0.05	70	0.714	0.962	0.286	2.61E-07	3.00E-04	8.69E-04	0.86%
Thallium	8.00E-04	2	0.05	70	0.714	0.962	0.286	2.24E-07	8.00E-05	2.80E-03	2.78%
Vanadium	2.20E-02	2	0.05	70	0.714	0.962	0.286	6.17E-06	7.00E-03	8.81E-04	0.87%

HAZARD INDEX

1.01E-01

TABLE H-62. INDUSTRIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY
FUTURE-USE SCENARIO - On-Site Deep Bedrock Well Use
Round 2 Data

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Water		Intake (L/day)	Fraction absorbed	x	1	x	Exp (days) Week (days)	x	Wks expd Wks/year	x	Yrs exposed Years lifetime	= Chronic Daily Intake (mg/kg-day)		RISK (CDI*SF)	% Total
	Conc (mg/L)	Conc											CDI	SF		
	mg/L	x	1.4 L day	x	1.0	x	1	x	5 days 7 days/wk	x	50 52	x	9 yrs 70 yrs	= CDI		
Trichloroethene	4.00E-03	1.4											7.06E-06	1.10E-02	7.77E-08	12.2%
Tetrachloroethene	6.20E-03	1.4											1.09E-05	5.10E-02	5.58E-07	87.8%
TOTAL RISK 6.36E-07																

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Water		Intake (L/day)	Fraction absorbed	x	1	x	Exp (days) Week (days)	x	Wks expd Wks/year	x	Yrs Exposed Yrs Lifetime	= Chronic Daily Intake (mg/kg-day)		RISK (CDI*SF)	% Total
	Conc (mg/L)	Conc											CDI	SF		
	mg/L	x	2 L day	x	1.0	x	1	x	5 days 7 days/wk	x	50 52	x	20 yrs 70 yrs	= CDI		
Trichloroethene	4.00E-03	2											2.24E-05	1.10E-02	2.47E-07	9.6%
Tetrachloroethene	8.10E-03	2											4.54E-05	5.10E-02	2.32E-06	90.4%
TOTAL RISK 2.56E-06																

Note: Database from all wells except MW-16D.

TABLE H-62 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
Acetone	1.34E-02	1.4	1.00	70	0.714	0.962	0.129	2.37E-05	1.4%
1,2-Dichloroethene	4.00E-03	1.4	1.00	70	0.714	0.962	0.129	7.06E-06	2.1%
Tetrachloroethene	6.20E-03	1.4	1.00	70	0.714	0.962	0.129	1.09E-05	6.5%
Xylenes	7.00E-02	1.4	1.00	70	0.714	0.962	0.129	1.24E-04	0.4%
2-methyl phenol	6.00E-03	1.4	1.00	70	0.714	0.962	0.129	1.06E-05	1.3%
Pentachlorophenol	2.20E-02	1.4	1.00	70	0.714	0.962	0.129	3.89E-05	7.7%
o-Toluic acid	3.42E+00	1.4	1.00	70	0.714	0.962	0.129	6.04E-03	11.9%
m-Toluic acid	3.42E+00	1.4	1.00	70	0.714	0.962	0.129	6.04E-03	11.9%
p-Toluic acid	2.80E-01	1.4	1.00	70	0.714	0.962	0.129	4.95E-04	1.0%
Arsenic	3.08E-02	1.4	0.05	70	0.714	0.962	0.129	3.00E-04	53.7%
Antimony	1.60E-03	1.4	0.05	70	0.714	0.962	0.129	1.41E-07	2.1%
Cadmium	2.00E-03	1.4	0.05	70	0.714	0.962	0.129	1.77E-07	0.1%

HAZ INDEX

1.69E-02

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
Acetone	2.64E-02	2	1.00	70	0.714	0.962	0.286	1.48E-04	1.4%
1,2-Dichloroethene	4.00E-03	2	1.00	70	0.714	0.962	0.286	2.24E-05	1.1%
Tetrachloroethene	8.10E-03	2	1.00	70	0.714	0.962	0.286	4.54E-05	4.3%
Xylenes	1.71E-01	2	1.00	70	0.714	0.962	0.286	9.58E-04	0.5%
2-methyl phenol	7.60E-03	2	1.00	70	0.714	0.962	0.286	5.00E-05	0.8%
Pentachlorophenol	3.67E-02	2	1.00	70	0.714	0.962	0.286	2.06E-04	3.9%
o-Toluic acid	6.76E-01	2	1.00	70	0.714	0.962	0.286	3.79E-03	1.2%
m-Toluic acid	8.69E+00	2	1.00	70	0.714	0.962	0.286	4.87E-02	15.5%
p-Toluic acid	6.76E-01	2	1.00	70	0.714	0.962	0.286	3.79E-03	1.2%
Arsenic	7.67E-02	2	0.05	70	0.714	0.962	0.286	2.15E-05	68.4%
Antimony	2.50E-03	2	0.05	70	0.714	0.962	0.286	7.01E-07	1.7%
Cadmium	2.70E-03	2	0.05	70	0.714	0.962	0.286	7.57E-07	0.0%

HAZ INDEX

1.05E-01

Round 1 Data

$$\text{Water} \times \text{Intake} \times \text{Fraction} \times 1 \times \frac{\text{Exp (days)}}{\text{Wks expd}} \times \text{Yrs exposed} = \text{Chronic Daily Intake (mg/kg-day)}$$

TOTAL RISK	9.49E-05

$$\text{Water} \times \text{Intake} \times \text{Fraction} \times 1 \times \frac{\text{Exp (days)}}{\text{Wks expd}} \times \text{Yrs Exposed} = \text{Chronic Daily Intake (mg/kg-day)}$$

TOTAL RISK	4.03E-04

TABLE H-63 (Continued)

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
	mg/L	$1.4 \frac{L}{day}$	1.0	70 kg	5 days 7 days/wk	50 52	$\frac{9 yrs}{70 yrs}$	CDI	
1,2-Dichloroethene	3.68E-02	1.4	1.00	70	0.714	0.962	0.129	6.50E-05	4.29%
Tetrachloroethene	2.19E-01	1.4	1.00	70	0.714	0.962	0.129	3.87E-04	51.09%
Xylenes	3.75E-01	1.4	1.00	70	0.714	0.962	0.129	6.63E-04	0.44%
o-Toluic acid	1.31E+01	1.4	1.00	70	0.714	0.962	0.129	2.30E-02	10.15%
m-Toluic acid	5.91E+00	1.4	1.00	70	0.714	0.962	0.129	1.04E-02	4.60%
p-Toluic acid	7.05E-01	1.4	1.00	70	0.714	0.962	0.129	1.25E-03	0.55%
Arsenic	7.17E-02	1.4	0.05	70	0.714	0.962	0.129	6.33E-06	27.88%
Barium	1.38E-01	1.4	0.05	70	0.714	0.962	0.129	1.22E-05	0.23%
Lead	1.30E-03	1.4	0.05	70	0.714	0.962	0.129	1.15E-07	0.01%
Vanadium	4.65E-02	1.4	0.05	70	0.714	0.962	0.129	4.11E-06	0.77%

HAZ INDEX 7.57E-02

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
	mg/L	$2 \frac{L}{day}$	1.0	70 kg	5 days 7 days/wk	50 52	$\frac{20 yrs}{70 years}$	CDI (mg/kg-day)	
1,2-Dichloroethene	6.66E-02	2	1.00	70	0.714	0.962	0.286	3.73E-04	3.31%
Tetrachloroethene	5.69E-01	2	1.00	70	0.714	0.962	0.286	3.19E-03	56.62%
Xylenes	7.50E-01	2	1.00	70	0.714	0.962	0.286	4.21E-03	0.37%
o-Toluic acid	2.85E+01	2	1.00	70	0.714	0.962	0.286	1.60E-01	9.46%
m-Toluic acid	1.39E+01	2	1.00	70	0.714	0.962	0.286	7.79E-02	4.61%
p-Toluic acid	2.85E+01	2	1.00	70	0.714	0.962	0.286	1.60E-01	9.46%
Arsenic	9.26E-02	2	0.05	70	0.714	0.962	0.286	2.60E-05	15.35%
Barium	2.03E-01	2	0.05	70	0.714	0.962	0.286	5.69E-05	0.14%
Lead	2.91E-02	2	0.05	70	0.714	0.962	0.286	8.16E-06	0.05%
Vanadium	8.73E-02	2	0.05	70	0.714	0.962	0.286	2.45E-05	0.62%

HAZ INDEX 5.64E-01

TABLE H-64. INDUSTRIAL USE OF GROUNDWATER - DRINKING WATER INGESTION PATHWAY
FUTURE-USE SCENARIO - On-Site Mixed Bedrock Well Use
Round 2 Data

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CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

■ Chronic Daily Intake (mg/kg-day)												
Water Conc	x	Intake	x	Fraction absorbed	x	1 Body weight	x	Exp (days) Week (days)	x	Wks expd Wks/year	x	Yrs exposed Years lifetime
mg L	x	1.4 L day	x	1.0	x	1 70 kg	x	5 days 7 days/wk	x	50 52	x	9 yrs 70 yrs
■ CDI												
Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	SF	RISK (CDI*SF)	% Total	
Vinyl chloride	1.22E-02	1.4	1.00	70	0.714	0.962	0.129	2.15E-05	1.90E+00	4.09E-05	94.13%	
Trichloroethene	1.01E-02	1.4	1.00	70	0.714	0.962	0.129	1.78E-05	1.10E-02	1.96E-07	0.45%	
Benzene	4.00E-03	1.4	1.00	70	0.714	0.962	0.129	7.06E-06	2.90E-02	2.05E-07	0.47%	
Tetrachloroethene	2.33E-02	1.4	1.00	70	0.714	0.962	0.129	4.11E-05	5.10E-02	2.10E-06	4.83%	
4,4'-DDE	9.00E-05	1.4	1.00	70	0.714	0.962	0.129	1.59E-07	3.40E-01	5.40E-08	0.12%	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Chronic Daily Intake (mg/kg-day)												
Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	1	Body weight	Exp (days) Week (days)	Wks expd Wks/year	x	Yrs Exposed Yrs Lifetime	= CDI		
	mg L	x 2 L day	x 1.0	x	1 70 kg	x 5 days 7 days/wk	x 50 52	x	20 yrs 70 yrs	= CDI		
Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	1	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Yrs Lifetime	CDI	SF	RISK (CDI*SF)	% Total
Vinyl chloride	1.88E-02	2	1.00	70		0.714	0.962	0.286	1.05E-04	1.90E+00	2.00E-04	93.24%
Trichloroethene	1.58E-02	2	1.00	70		0.714	0.962	0.286	8.86E-05	1.10E-02	9.74E-07	0.45%
Benzene	4.00E-03	2	1.00	70		0.714	0.962	0.286	2.24E-05	2.90E-02	6.50E-07	0.30%
Tetrachloroethene	4.41E-02	2	1.00	70		0.714	0.962	0.286	2.47E-04	5.10E-02	1.26E-05	5.87%
4,4'-DDE	1.50E-04	2	1.00	70		0.714	0.962	0.286	8.41E-07	3.40E-01	2.86E-07	0.13%

TABLE H-64 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	1.11E-01	1.4	1.00	70	0.714	0.962	0.129	1.96E-04	2.00E-02	9.81E-03	13.44%
Tetrachloroethene	2.33E-02	1.4	1.00	70	0.714	0.962	0.129	4.11E-05	1.00E-02	4.11E-03	5.64%
Xylenes	3.63E-01	1.4	1.00	70	0.714	0.962	0.129	6.40E-04	2.00E+00	3.20E-04	0.44%
o-Toluic acid	2.72E+01	1.4	1.00	70	0.714	0.962	0.129	4.80E-02	3.00E+00	1.60E-02	21.94%
m-Toluic acid	1.74E+01	1.4	1.00	70	0.714	0.962	0.129	3.07E-02	3.00E+00	1.02E-02	14.03%
p-Toluic acid	1.76E+01	1.4	1.00	70	0.714	0.962	0.129	3.10E-02	3.00E+00	1.03E-02	14.16%
Arsenic	7.30E-02	1.4	0.05	70	0.714	0.962	0.129	6.45E-06	3.00E-04	2.15E-02	29.44%
Barium	1.14E-01	1.4	0.05	70	0.714	0.962	0.129	1.01E-05	7.00E-02	1.44E-04	0.20%
Lead	2.03E-02	1.4	0.05	70	0.714	0.962	0.129	1.79E-06	3.00E-02	5.98E-05	0.08%
Vanadium	3.69E-02	1.4	0.05	70	0.714	0.962	0.129	3.26E-06	7.00E-03	4.65E-04	0.64%

HAZ INDEX 7.30E-02

NC CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	2.64E-01	2	1.00	70	0.714	0.962	0.286	1.48E-03	2.00E-02	7.40E-02	14.93%
Tetrachloroethene	4.41E-02	2	1.00	70	0.714	0.962	0.286	2.47E-04	1.00E-02	2.47E-02	4.99%
Xylenes	6.36E-01	2	1.00	70	0.714	0.962	0.286	3.56E-03	2.00E+00	1.78E-03	0.36%
o-Toluic acid	5.59E+01	2	1.00	70	0.714	0.962	0.286	3.14E-01	3.00E+00	1.05E-01	21.10%
m-Toluic acid	3.53E+01	2	1.00	70	0.714	0.962	0.286	1.98E-01	3.00E+00	6.60E-02	13.32%
p-Toluic acid	4.30E+01	2	1.00	70	0.714	0.962	0.286	2.41E-01	3.00E+00	8.04E-02	16.22%
Arsenic	1.50E-01	2	0.05	70	0.714	0.962	0.286	4.21E-05	3.00E-04	1.40E-01	28.35%
Barium	1.50E-01	2	0.05	70	0.714	0.962	0.286	4.21E-05	7.00E-02	6.02E-04	0.12%
Lead	3.68E-02	2	0.05	70	0.714	0.962	0.286	1.03E-05	3.00E-02	3.44E-04	0.07%
Vanadium	6.57E-02	2	0.05	70	0.714	0.962	0.286	1.84E-05	7.00E-03	2.63E-03	0.53%

HAZ INDEX 4.95E-01

Round 1 Data

- Chronic Daily Intake (mg/kg-day)

TOTAL RISK	1.16E-06

Chronic Daily Intake (mg/kg-day)

TOTAL RISK	1.75E-05

TABLE H-65 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
	mg/L	x 25 mL day	x 1.0	x 1 70 kg	x 3 days 7 days/wk	x 50 52	x 9 yrs 70 yrs	= CDI	
1,2-Dichloroethene	5.35E-02	0.025	1.00	70	0.429	0.962	0.129	1.01E-06	3.70%
Tetrachloroethene	3.68E-01	0.025	1.00	70	0.429	0.962	0.129	6.96E-06	50.95%
o-Toluic acid	2.28E+01	0.025	1.00	70	0.429	0.962	0.129	4.31E-04	10.51%
m-Toluic acid	1.03E+01	0.025	1.00	70	0.429	0.962	0.129	1.95E-04	4.77%
p-Toluic acid	1.18E+00	0.025	1.00	70	0.429	0.962	0.129	2.24E-05	0.55%
Arsenic	1.24E-01	0.025	0.05	70	0.429	0.962	0.129	1.18E-07	28.66%
Barium	1.34E-01	0.025	0.05	70	0.429	0.962	0.129	1.27E-07	0.13%
Vanadium	7.30E-02	0.025	0.05	70	0.429	0.962	0.129	6.91E-08	0.72%

HAZARD INDEX 1.37E-03

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
	mg/L	x 50 mL day	x 1.0	x 1 70 kg	x 3 days 7 days/wk	x 50 52	x 20 yrs 70 years	= CDI (mg/kg-day)	
1,2-Dichloroethene	8.96E-02	0.025	1.00	70	0.429	0.962	0.286	3.77E-06	3.34%
Tetrachloroethene	8.35E-01	0.025	1.00	70	0.429	0.962	0.286	3.51E-05	62.28%
o-Toluic acid	3.94E+01	0.025	1.00	70	0.429	0.962	0.286	1.66E-03	9.80%
m-Toluic acid	1.89E+01	0.025	1.00	70	0.429	0.962	0.286	7.95E-04	4.70%
p-Toluic acid	2.25E+00	0.025	1.00	70	0.429	0.962	0.286	9.45E-05	0.56%
Arsenic	1.49E-01	0.025	0.05	70	0.429	0.962	0.286	3.14E-07	18.54%
Barium	1.88E-01	0.025	0.05	70	0.429	0.962	0.286	3.95E-07	0.10%
Vanadium	1.26E-01	0.025	0.05	70	0.429	0.962	0.286	2.64E-07	0.67%

HAZARD INDEX 5.64E-03

TABLE H-66. INDUSTRIAL USE OF GROUNDWATER - ACCIDENTAL INGESTION PATHWAY
FUTURE-USE SCENARIO - On-Site Upper Bedrock Well Use
Round 2 Data

p 1 of 2

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

= Chronic Daily Intake (mg/kg-day)											
Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	SF	RISK (CDI*SF)	% Total
	mg/L	x 25 mL/day	x 1.0	x 1 70 kg	x 3 days 7 days/wk	50 52	9 yrs 70 yrs	= CDI			
Vinyl chloride	1.44E-02	0.025	1.00	70	0.429	0.962	0.129	2.72E-07	1.90E+00	5.18E-07	94.12%
Trichloroethene	1.18E-02	0.025	1.00	70	0.429	0.962	0.129	2.23E-07	1.10E-02	2.46E-09	0.45%
Benzene	4.00E-03	0.025	1.00	70	0.429	0.962	0.129	7.57E-08	2.90E-02	2.19E-09	0.40%
Tetrachloroethene	2.87E-02	0.025	1.00	70	0.429	0.962	0.129	5.43E-07	5.10E-02	2.77E-08	5.04%
TOTAL RISK										5.50E-07	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Chronic Daily Intake (mg/kg-day)											
Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Yrs Lifetime	CDI	SF	RISK (CDI*SF)	% Total
Vinyl chloride	2.10E-02	0.025	1.00	70	0.429	0.962	0.286	8.83E-07	1.90E+00	1.68E-06	92.69%
Trichloroethene	1.90E-02	0.025	1.00	70	0.429	0.962	0.286	7.99E-07	1.10E-02	8.79E-09	0.49%
Benzene	4.00E-03	0.025	1.00	70	0.429	0.962	0.286	1.68E-07	2.90E-02	4.88E-09	0.27%
Tetrachloroethene	5.53E-02	0.025	1.00	70	0.429	0.962	0.286	2.33E-06	5.10E-02	1.19E-07	6.55%
TOTAL RISK										1.81E-06	

Note: Database from all wells except MW-16I.

TABLE H-66 (Continued)

p 2 of 2

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

= Chronic Daily Intake (mg/kg-day)																	
Compound	Water Conc	x	Intake x	Fraction absorbed	x	1 Body weight	x	Exp (days) Week (days)	x	Wks expd Wks/year	x	Yrs exposed Years lifetime	= CDI	CDI	RfD	CDI/RfD	% TOTAL HAZARD
	mg/L	x	25 mL/day	x	1.0	x	1	3 days	x	50	x	9 yrs					
							70 kg	7 days/wk		52		70 yrs					
													</				

HAZ INDEX 5.20E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

= Chronic Daily Intake (mg/kg-day)											
Water Conc	x	Intake	x	Fraction absorbed	x	1	x	$\frac{\text{Exp (days)}}{\text{Week (days)}}$	x	$\frac{\text{Wks expd}}{\text{Wks/year}}$ x $\frac{\text{Yrs exposed}}{\text{Years lifetime}}$	
mg/L	x	2 L/day	x	1.0	x	1	x	$\frac{3 \text{ days}}{7 \text{ days/wk}}$	x	$\frac{50}{52}$ x $\frac{20 \text{ yrs}}{70 \text{ years}}$	= CDI (mg/kg-day)
Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	$\frac{\text{Exp (days)}}{\text{Week (days)}}$	$\frac{\text{Wks expd}}{\text{Wks/year}}$	$\frac{\text{Yrs exposed}}{\text{Years lifetime}}$	CDI	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	3.42E-01	0.025	1.00	70	0.429	0.962	0.286	1.44E-05	2.00E-02	7.20E-04	28.53%
Tetrachloroethene	5.53E-02	0.025	1.00	70	0.429	0.962	0.286	2.33E-06	1.00E-02	2.33E-04	9.21%
o-Toluic acid	7.15E+01	0.025	0.10	70	0.429	0.962	0.286	3.01E-04	3.00E+00	1.00E-04	3.97%
m-Toluic acid	4.48E+01	0.025	0.10	70	0.429	0.962	0.286	1.88E-04	3.00E+00	6.28E-05	2.49%
p-Toluic acid	5.60E+01	0.025	0.10	70	0.429	0.962	0.286	2.35E-04	3.00E+00	7.84E-05	3.11%
Arsenic	1.85E-01	0.025	0.05	70	0.429	0.962	0.286	3.90E-07	3.00E-04	1.30E-03	51.49%
Barium	1.70E-01	0.025	0.05	70	0.429	0.962	0.286	3.57E-07	7.00E-02	5.09E-06	0.20%
Vanadium	8.37E-02	0.025	0.05	70	0.429	0.962	0.286	1.76E-07	7.00E-03	2.51E-05	1.00%

HAZ INDEX 2.52E-03

TABLE H-67. INDUSTRIAL USE OF GROUNDWATER - ACCIDENTAL INGESTION PATHWAY
FUTURE-USE SCENARIO - On-Site Deep Bedrock Well Use
Round 1 Data

p 1 of 3

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Chronic Daily Intake (mg/kg-day)										RISK (CDI*SF)	% Total
	Water Conc	Intake (L/day)	Fraction absorbed	1	Body weight kg	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	SF		
	mg/L	x 25 mL/day	1.0	x	1	x 3 days 7 days/wk	50 52	9 yrs 70 yrs	CDI			
Trichloroethene	2.70E-03	0.025	1.00		70	0.429	0.962	0.129	5.11E-08	1.10E-02	5.62E-10	10.03%
Benzene	2.50E-03	0.025	1.00		70	0.429	0.962	0.129	4.73E-08	2.90E-02	1.37E-09	24.49%
Tetrachloroethene	3.80E-03	0.025	1.00		70	0.429	0.962	0.129	7.19E-08	5.10E-02	3.67E-09	65.47%
TOTAL RISK										5.60E-09		

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Chronic Daily Intake (mg/kg-day)										RISK (CDI*SF)	% Total
	Water Conc	Intake (L/day)	Fraction absorbed	1	Body weight kg	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Yrs Lifetime	CDI	SF		
	mg/L	x 50 mL day	1.0	x	1	x 3 days 7 days/wk	50 52	20 yrs 70 yrs	CDI			
Trichloroethene	3.00E-03	0.05	1.00		70	0.429	0.962	0.286	2.52E-07	1.10E-02	2.78E-09	8.96%
Benzene	2.60E-03	0.05	1.00		70	0.429	0.962	0.286	2.19E-07	2.90E-02	6.34E-09	20.46%
Tetrachloroethene	5.10E-03	0.05	1.00		70	0.429	0.962	0.286	4.29E-07	5.10E-02	2.19E-08	70.58%
TOTAL RISK										3.10E-08		

TABLE H-67 (Continued)

p 2 of 3

NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)		Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	Chronic Daily Intake (mg/kg-day)		CD/RID	% TOTAL HAZARD
	mg/L	Conc							Wks expd Wks/year	Yrs exposed Yrs lifetime		
Acetone	7.80E-03	0.025	0.025	1.00	70	0.429	0.962	0.129	1.48E-07	1.00E-01	1.48E-06	0.75%
1,2-Dichloroethene	1.26E-02	0.025	0.025	1.00	70	0.429	0.962	0.129	2.38E-07	2.00E-02	1.19E-05	6.07%
Tetrachloroethene	3.80E-03	0.025	0.025	1.00	70	0.429	0.962	0.129	7.19E-08	1.00E-02	7.19E-06	3.66%
Xylenes	7.64E-02	0.025	0.025	1.00	70	0.429	0.962	0.129	1.45E-06	2.00E+00	7.23E-07	0.37%
2-methyl phenol	5.20E-03	0.025	0.025	1.00	70	0.429	0.962	0.129	9.84E-08	5.00E-02	1.97E-06	1.00%
4-methyl phenol	5.40E-03	0.025	0.025	1.00	70	0.429	0.962	0.129	1.02E-07	5.00E-02	2.04E-06	1.04%
o-Toluic acid	2.91E+00	0.025	0.025	1.00	70	0.429	0.962	0.129	5.50E-05	3.00E+00	1.83E-05	9.34%
m-Toluic acid	1.42E+00	0.025	0.025	1.00	70	0.429	0.962	0.129	2.69E-05	3.00E+00	8.97E-06	4.57%
p-Toluic acid	1.89E-01	0.025	0.025	1.00	70	0.429	0.962	0.129	3.58E-06	3.00E+00	1.19E-06	0.61%
Arsenic	1.91E-02	0.025	0.025	0.05	70	0.429	0.962	0.129	1.81E-08	3.00E-04	6.02E-05	30.69%
Antimony	2.93E-02	0.025	0.025	0.05	70	0.429	0.962	0.129	2.77E-08	4.00E-04	6.93E-05	35.31%
Barium	7.72E-02	0.025	0.025	0.05	70	0.429	0.962	0.129	7.30E-08	7.00E-02	1.04E-06	0.53%
Mercury	6.50E-04	0.025	0.025	0.05	70	0.429	0.962	0.129	6.15E-10	3.00E-04	2.05E-06	1.04%
Thallium	7.00E-04	0.025	0.025	0.05	70	0.429	0.962	0.129	6.62E-10	8.00E-05	8.28E-06	4.22%
Vanadium	1.12E-02	0.025	0.025	0.05	70	0.429	0.962	0.129	1.06E-08	7.00E-03	1.51E-06	0.77%

HAZARD INDEX 1.96E-04

TABLE H-67 (Continued)

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NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

= Chronic Daily Intake (mg/kg-day)											
Water Conc	Intake	Fraction absorbed	Body weight	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	= CDI (mg/kg-day)				
mg/L	x 50 mL day	x 1.0	x 1 70 kg	x 3 days 7 days/wk	x 50 52	x 20 yrs 70 years	CDI	RfD	CDI/RfD	% TOTAL HAZARD	
Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	1.10E-02	0.05	1.00	70	0.429	0.962	0.286	9.25E-07	1.00E-01	9.25E-06	0.61%
1,2-Dichloroethene	3.02E-02	0.05	1.00	70	0.429	0.962	0.286	2.54E-06	2.00E-02	1.27E-04	8.40%
Tetrachloroethene	5.10E-03	0.05	1.00	70	0.429	0.962	0.286	4.29E-07	1.00E-02	4.29E-05	2.84%
Xylenes	1.76E-01	0.05	1.00	70	0.429	0.962	0.286	1.48E-05	2.00E+00	7.41E-06	0.49%
2-methyl phenol	5.60E-03	0.05	1.00	70	0.429	0.962	0.286	4.71E-07	5.00E-02	9.42E-06	0.62%
4-methyl phenol	6.20E-03	0.05	1.00	70	0.429	0.962	0.286	5.21E-07	5.00E-02	1.04E-05	0.69%
o-Toluic acid	6.74E+00	0.05	1.00	70	0.429	0.962	0.286	5.67E-04	3.00E+00	1.89E-04	12.50%
m-Toluic acid	3.20E+00	0.05	1.00	70	0.429	0.962	0.286	2.69E-04	3.00E+00	8.96E-05	5.93%
p-Toluic acid	3.98E-01	0.05	1.00	70	0.429	0.962	0.286	3.35E-05	3.00E+00	1.12E-05	0.74%
Arsenic	3.98E-02	0.05	0.05	70	0.429	0.962	0.286	1.67E-07	3.00E-04	5.58E-04	36.90%
Antimony	3.60E-02	0.05	0.05	70	0.429	0.962	0.286	1.51E-07	4.00E-04	3.78E-04	25.04%
Barium	1.82E-01	0.05	0.05	70	0.429	0.962	0.286	7.67E-07	7.00E-02	1.10E-05	0.72%
Mercury	9.30E-04	0.05	0.05	70	0.429	0.962	0.286	3.91E-09	3.00E-04	1.30E-05	0.86%
Thallium	8.00E-04	0.05	0.05	70	0.429	0.962	0.286	3.36E-09	8.00E-05	4.20E-05	2.78%
Vanadium	2.20E-02	0.05	0.05	70	0.429	0.962	0.286	9.25E-08	7.00E-03	1.32E-05	0.87%
HAZARD INDEX										1.51E-03	

TABLE H-68. INDUSTRIAL USE OF GROUNDWATER - ACCIDENTAL INGESTION PATHWAY
FUTURE-USE SCENARIO - On-Site Deep Bedrock Well Use
Round 2 Data

p 1 of 2

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	Water		Intake	Fraction		Body weight	Exp (days)	Wks expd	Yrs exposed	Chronic Daily Intake (mg/kg-day)		RISK	% Total
	Conc (mg/L)	Conc	(L/day)	absorbed	x	(kg)	Week (days)	Wks/year	Years lifetime	CDI	SF	(CDI*SF)	
Trichloroethene	4.00E-03		0.025	1.00	x	70	0.429	0.962	0.129	7.57E-08	1.10E-02	8.33E-10	12.6%
Tetrachloroethene	6.00E-03		0.025	1.00	x	70	0.429	0.962	0.129	1.14E-07	5.10E-02	5.79E-09	87.4%
										TOTAL RISK		6.62E-09	

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	Water		Intake	Fraction		Body weight	Exp (days)	Wks expd	Yrs Exposed	Chronic Daily Intake (mg/kg-day)		RISK	% Total
	Conc (mg/L)	Conc	(L/day)	absorbed	x	(kg)	Week (days)	Wks/year	Yrs Lifetime	CDI	SF	(CDI*SF)	
Trichloroethene	4.00E-03		0.05	1.00	x	70	0.429	0.962	0.286	3.36E-07	1.10E-02	3.70E-09	10.2%
Tetrachloroethene	7.60E-03		0.05	1.00	x	70	0.429	0.962	0.286	6.39E-07	5.10E-02	3.26E-08	89.8%
										TOTAL RISK		3.63E-08	

Note: Database from all wells except MW-16D.

TABLE H-68 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

■ Chronic Daily Intake (mg/kg-day)												
Water Conc	×	Intake	×	Fraction absorbed	×	1 Body weight	×	Exp (days) Week (days)	×	Wks expd Wks/year	×	Yrs exposed Years lifetime
mg/L	×	25 mL day	×	1.0	×	1 70kg	×	3 days 7 days/wk	×	50 52	×	9 yrs 70 yrs
■ CDI												
Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Yrs lifetime	CDI	RfD	CDI/RfD	% TOTAL HAZARD	
Acetone	1.20E-02	0.025	1.00	70	0.429	0.962	0.129	2.27E-07	1.00E-01	2.27E-06	1.5%	
1,2-Dichloroethene	4.00E-03	0.025	1.00	70	0.429	0.962	0.129	7.57E-08	2.00E-02	3.78E-06	2.4%	
Tetrachloroethene	6.00E-03	0.025	1.00	70	0.429	0.962	0.129	1.14E-07	1.00E-02	1.14E-05	7.3%	
Xylenes	5.92E-02	0.025	1.00	70	0.429	0.962	0.129	1.12E-06	2.00E+00	5.60E-07	0.4%	
2-methyl phenol	5.80E-03	0.025	1.00	70	0.429	0.962	0.129	1.10E-07	5.00E-02	2.19E-06	1.4%	
Pentachlorophenol	2.04E-02	0.025	1.00	70	0.429	0.962	0.129	3.86E-07	3.00E-02	1.29E-05	8.3%	
o-Toluic acid	2.85E+00	0.025	1.00	70	0.429	0.962	0.129	5.40E-05	3.00E+00	1.80E-05	11.5%	
m-Toluic acid	2.85E+00	0.025	1.00	70	0.429	0.962	0.129	5.40E-05	3.00E+00	1.80E-05	11.5%	
p-Toluic acid	2.37E-01	0.025	1.00	70	0.429	0.962	0.129	4.49E-06	3.00E+00	1.50E-06	1.0%	
Arsenic	2.58E-02	0.025	0.05	70	0.429	0.962	0.129	2.44E-08	3.00E-04	8.14E-05	52.2%	
Antimony	1.50E-03	0.025	0.05	70	0.429	0.962	0.129	1.42E-09	4.00E-04	3.55E-06	2.3%	
Cadmium	3.20E-03	0.025	0.05	70	0.429	0.962	0.129	3.03E-09	7.00E-03	4.33E-07	0.3%	

HAZARD INDEX

1.56E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (l/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	x Wks expd Wks/year	x Yrs exposed Years lifetime	= Chronic Daily Intake (mg/kg-day)			% TOTAL HAZARD
								Intake (l/day)	Fraction absorbed	Body Wt (kg)	
Acetone	2.30E-02	0.05	1.00	70	0.429	0.962	0.286	1.93E-06	1.00E-01	1.93E-05	1.3%
1,2-Dichloroethene	4.00E-03	0.05	1.00	70	0.429	0.962	0.286	3.36E-07	2.00E-02	1.68E-05	1.1%
Tetrachloroethene	7.60E-03	0.05	1.00	70	0.429	0.962	0.286	6.39E-07	1.00E-02	6.39E-05	4.2%
Xylenes	1.44E-01	0.05	1.00	70	0.429	0.962	0.286	1.21E-05	2.00E+00	6.07E-06	0.4%
2-methyl phenol	7.10E-03	0.05	1.00	70	0.429	0.962	0.286	5.97E-07	5.00E-02	1.19E-05	0.8%
Pentachlorophenol	3.29E-02	0.05	1.00	70	0.429	0.962	0.286	2.77E-06	5.00E-02	5.53E-05	3.6%
o-Toluic acid	7.31E+00	0.05	1.00	70	0.429	0.962	0.286	6.15E-04	3.00E+00	2.05E-04	13.4%
m-Toluic acid	7.31E+00	0.05	1.00	70	0.429	0.962	0.286	6.15E-04	3.00E+00	2.05E-04	13.4%
p-Toluic acid	5.72E-01	0.05	1.00	70	0.429	0.962	0.286	4.81E-05	3.00E+00	1.60E-05	1.0%
Arsenic	6.46E-02	0.05	0.05	70	0.429	0.962	0.286	2.72E-07	3.00E-04	9.05E-05	59.3%
Antimony	2.20E-03	0.05	0.05	70	0.429	0.962	0.286	9.25E-09	4.00E-04	2.31E-05	1.5%
Cadmium	5.10E-03	0.05	0.05	70	0.429	0.962	0.286	2.14E-08	7.00E-02	3.06E-07	0.0%

HAZARD INDEX

1.53E-03

TABLE H-69. INDUSTRIAL USE OF GROUNDWATER - ACCIDENTAL INGESTION PATHWAY
FUTURE-USE SCENARIO - On-Site Mixed Bedrock Well Use
Round 1 Data

p 1 of 2

CARCINOGENS - AVERAGE GROUNDWATER INGESTION EXPOSURE

Compound	= Chronic Daily Intake (mg/kg-day)										RISK (CDI*SF)	% Total
	Water Conc	Intake	Fraction absorbed	1	Body weight	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years Lifetime	Chronic Daily Intake (mg/kg-day)	SF		
	mg L	25 mL day	1.0	x	1 70 kg	3 days 7 days/wk	50 52	9 yrs 70 yrs	= CDI			
Vinyl chloride	3.00E-03	0.025	1.00	x	70	0.429	0.962	0.129	5.68E-08	1.90E+00	1.08E-07	10.61%
Trichloroethene	2.35E-02	0.025	1.00	x	70	0.429	0.962	0.129	4.45E-07	1.10E-02	4.89E-09	0.48%
Benzene	3.00E-03	0.025	1.00	x	70	0.429	0.962	0.129	5.68E-08	2.90E-02	1.65E-09	0.16%
Tetrachloroethene	2.19E-01	0.025	1.00	x	70	0.429	0.962	0.129	4.14E-06	5.10E-02	2.11E-07	20.79%
Total c-PAHs	5.00E-03	0.025	1.00	x	70	0.429	0.962	0.129	9.46E-08	7.30E+00	6.91E-07	67.95%
TOTAL RISK										1.02E-06		

CARCINOGENS - PLAUSIBLE MAXIMUM INGESTION EXPOSURE

Compound	= Chronic Daily Intake (mg/kg-day)										RISK (CDI*SF)	% Total
	Water Conc	Intake	Fraction absorbed	1	Body weight	Exp (days) Week (days)	Wks expd Wks/year	Yrs Exposed Yrs Lifetime	Chronic Daily Intake (mg/kg-day)	SF		
	mg L	50 mL day	1.0	x	1 70 kg	3 days 7 days/wk	50 52	20 yrs 70 yrs	= CDI			
Vinyl chloride	3.00E-03	0.05	1.00	x	70	0.429	0.962	0.286	2.52E-07	1.90E+00	4.79E-07	7.93%
Trichloroethene	5.13E-02	0.05	1.00	x	70	0.429	0.962	0.286	4.31E-06	1.10E-02	4.75E-08	0.78%
Benzene	3.00E-03	0.05	1.00	x	70	0.429	0.962	0.286	2.52E-07	2.90E-02	7.32E-09	0.12%
Tetrachloroethene	5.69E-01	0.05	1.00	x	70	0.429	0.962	0.286	4.79E-05	5.10E-02	2.44E-06	40.39%
Total c-PAHs	5.00E-03	0.05	1.00	x	70	0.429	0.962	0.286	4.20E-07	7.30E+00	3.07E-06	50.77%
TOTAL RISK										6.05E-06		

TABLE H-69 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water		Intake	Fraction absorbed	Body weight	Exp (days)	Wks expd	Yrs exposed	Chronic Daily Intake (mg/kg-day)			% TOTAL HAZARD
	Conc (mg/L)	Conc	(L/day)		Wt (kg)	Week (days)	Wks/year	Years lifetime	CDI	RfD	CDI/RfD	
1,2-Dichloroethene	3.68E-02	0.025	1.00	1.00	70	0.429	0.962	0.129	6.96E-07	2.00E-02	3.48E-05	4.29%
Tetrachloroethene	2.19E-01	0.025	1.00	1.00	70	0.429	0.962	0.129	4.14E-06	1.00E-02	4.14E-04	51.09%
Xylenes	3.75E-01	0.025	1.00	1.00	70	0.429	0.962	0.129	7.10E-06	2.00E+00	3.55E-06	0.44%
o-Toluic acid	1.31E+01	0.025	1.00	1.00	70	0.429	0.962	0.129	2.47E-04	3.00E+00	8.23E-05	10.15%
m-Toluic acid	5.91E+00	0.025	1.00	1.00	70	0.429	0.962	0.129	1.12E-04	3.00E+00	3.73E-05	4.60%
p-Toluic acid	7.05E-01	0.025	1.00	1.00	70	0.429	0.962	0.129	1.33E-05	3.00E+00	4.45E-06	0.55%
Arsenic	7.17E-02	0.025	0.05	0.05	70	0.429	0.962	0.129	6.78E-08	3.00E-04	2.26E-04	27.88%
Barium	1.39E-01	0.025	0.05	0.05	70	0.429	0.962	0.129	1.30E-07	7.00E-02	1.86E-06	0.23%
Lead	1.30E-03	0.025	0.05	0.05	70	0.429	0.962	0.129	1.23E-09	3.00E-02	4.10E-08	0.01%
Vanadium	4.65E-02	0.025	0.05	0.05	70	0.429	0.962	0.129	4.40E-08	7.00E-03	6.28E-06	0.77%

HAZ INDEX 8.11E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water		Intake	Fraction absorbed	Body weight	Exp (days)	Wks expd	Yrs exposed	Chronic Daily Intake (mg/kg-day)			% TOTAL HAZARD
	Conc (mg/L)	Conc	(L/day)		Wt (kg)	Week (days)	Wks/year	Years lifetime	CDI	RfD	CDI/RfD	
1,2-Dichloroethene	6.66E-02	0.05	1.00	1.00	70	0.429	0.962	0.286	5.60E-06	2.00E-02	2.80E-04	3.31%
Tetrachloroethene	5.69E-01	0.05	1.00	1.00	70	0.429	0.962	0.286	4.79E-05	1.00E-02	4.79E-03	56.62%
Xylenes	7.50E-01	0.05	1.00	1.00	70	0.429	0.962	0.286	6.31E-05	2.00E+00	3.16E-05	0.37%
o-Toluic acid	2.85E+01	0.05	1.00	1.00	70	0.429	0.962	0.286	2.40E-03	3.00E+00	8.00E-04	9.46%
m-Toluic acid	1.39E+01	0.05	1.00	1.00	70	0.429	0.962	0.286	1.17E-03	3.00E+00	3.90E-04	4.61%
p-Toluic acid	2.85E+01	0.05	1.00	1.00	70	0.429	0.962	0.286	2.40E-03	3.00E+00	8.00E-04	9.46%
Arsenic	9.26E-02	0.05	0.05	0.05	70	0.429	0.962	0.286	3.89E-07	3.00E-04	1.30E-03	15.35%
Barium	2.03E-01	0.05	0.05	0.05	70	0.429	0.962	0.286	8.53E-07	7.00E-02	1.22E-05	0.14%
Lead	2.91E-02	0.05	0.05	0.05	70	0.429	0.962	0.286	1.22E-07	3.00E-02	4.08E-06	0.05%
Vanadium	8.73E-02	0.05	0.05	0.05	70	0.429	0.962	0.286	3.67E-07	7.00E-03	5.24E-05	0.62%

HAZ INDEX 8.46E-03

TABLE H-70. INDUSTRIAL USE OF GROUNDWATER - ACCIDENTAL INGESTION PATHWAY
FUTURE-USE SCENARIO - On-Site Mixed Bedrock Well Use
Round 2 Data

— Chronic Daily Intake (mg/kg-day)

TOTAL RISK	4.66E-07

Chronic Daily Intake (mg/kg-day)

TOTAL RISK	3.22E-06

TABLE H-70 (Continued)

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NONCARCINOGENS - AVERAGE GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
1,2-Dichloroethene	1.11E-01	0.025	1.00	70	0.429	0.962	0.129	2.10E-06	13.43%
Tetrachloroethene	2.33E-02	0.025	1.00	70	0.429	0.962	0.129	4.41E-07	5.64%
Xylenes	3.63E-01	0.025	1.00	70	0.429	0.962	0.129	6.87E-06	0.44%
o-Toluic acid	2.72E+01	0.025	1.00	70	0.429	0.962	0.129	5.15E-04	21.93%
m-Toluic acid	1.74E+01	0.025	1.00	70	0.429	0.962	0.129	3.29E-04	14.03%
p-Toluic acid	1.76E+01	0.025	1.00	70	0.429	0.962	0.129	3.33E-04	14.19%
Arsenic	7.30E-02	0.025	0.05	70	0.429	0.962	0.129	6.91E-08	29.43%
Barium	1.14E-01	0.025	0.05	70	0.429	0.962	0.129	1.08E-07	0.20%
Lead	2.03E-02	0.025	0.05	70	0.429	0.962	0.129	1.92E-08	0.08%
Vanadium	3.69E-02	0.025	0.05	70	0.429	0.962	0.129	3.49E-08	0.64%

HAZ INDEX 7.82E-04

NONCARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER INGESTION : Adults

Compound	Water Conc (mg/L)	Intake (L/day)	Fraction absorbed	Body Wt (kg)	Exp (days) Week (days)	Wks expd Wks/year	Yrs exposed Years lifetime	Chronic Daily Intake (mg/kg-day)	% TOTAL HAZARD
1,2-Dichloroethene	2.64E-01	0.05	1.00	70	0.429	0.962	0.286	2.22E-05	14.89%
Tetrachloroethene	4.41E-02	0.05	1.00	70	0.429	0.962	0.286	3.71E-06	4.98%
Xylenes	6.36E-01	0.05	1.00	70	0.429	0.962	0.286	5.35E-05	0.36%
o-Toluic acid	5.59E+01	0.05	1.00	70	0.429	0.962	0.286	4.70E-03	21.02%
m-Toluic acid	3.63E+01	0.05	1.00	70	0.429	0.962	0.286	3.05E-03	13.65%
p-Toluic acid	4.30E+01	0.05	1.00	70	0.429	0.962	0.286	3.62E-03	16.17%
Arsenic	1.50E-01	0.05	0.05	70	0.429	0.962	0.286	6.31E-07	28.21%
Barium	1.50E-01	0.05	0.05	70	0.429	0.962	0.286	6.31E-07	0.12%
Lead	3.68E-02	0.05	0.05	70	0.429	0.962	0.286	1.55E-07	0.07%
Vanadium	6.57E-02	0.05	0.05	70	0.429	0.962	0.286	2.76E-07	0.53%

HAZ INDEX 7.45E-03

TABLE H-71 (Continued)

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x 1000 cm ²	Body wt x 1000 kg	CDI 1 liter x 1000 cm ³	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	5.35E-02	8.00E-04	2	50	0.129	2,600	70	2.04E-05	2.00E-02	1.02E-03	5.25%
Tetrachloroethene	3.68E-01	8.00E-04	2	50	0.129	2,600	70	1.41E-04	1.00E-02	1.41E-02	72.29%
o-Toluic acid	2.28E+01	8.00E-04	2	50	0.129	2,600	70	8.70E-03	3.00E+00	2.90E-03	14.91%
m-Toluic acid	1.03E+01	8.00E-04	2	50	0.129	2,600	70	3.95E-03	3.00E+00	1.32E-03	6.76%
p-Toluic acid	1.18E+00	8.00E-04	2	50	0.129	2,600	70	4.52E-04	3.00E+00	1.51E-04	0.78%

HAZ INDEX 1.94E-02

NONCARCINOGENIC COMPOUNDS IN CREEK SEEPS - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x 1000 cm ²	Body wt x 1000 kg	CDI 1 liter x 1000 cm ³	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	4.49E-01	8.00E-04	2	100	0.286	2,600	70	7.62E-04	2.00E-02	3.81E-02	21.81%
Tetrachloroethene	3.78E-01	8.00E-04	2	100	0.286	2,600	70	6.42E-04	1.00E-02	6.42E-02	36.77%
o-Toluic acid	7.46E+01	8.00E-04	2	100	0.286	2,600	70	1.27E-01	3.00E+00	4.22E-02	24.15%
m-Toluic acid	4.15E+01	8.00E-04	2	100	0.286	2,600	70	7.05E-02	3.00E+00	2.35E-02	13.45%
p-Toluic acid	1.18E+01	8.00E-04	2	100	0.286	2,600	70	2.00E-02	3.00E+00	6.68E-03	3.82%

HAZ INDEX 1.75E-01

Seep Conc	Dermal Permeability	$\frac{\text{Hrs exp}}{\text{day}}$	$\frac{\text{Days exp}}{\text{year}}$	$\frac{\text{Yrs exp}}{\text{Yrs lifetime}}$	Skin Surface area	$\frac{1}{\text{Body wt}}$	$\frac{1 \text{ liter}}{1000 \text{ cm}^3}$	CDI
mg/L	x	x	x	x	x	x	x	= CDI
	x	$\frac{2 \text{ hrs}}{\text{day}}$	$\frac{50 \text{ days}}{\text{year}}$	$\frac{9 \text{ yrs}}{70 \text{ yrs}}$	x	$\frac{1}{170 \text{ kg}}$	x	= CDI

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Seep Conc	Dermal Permeability	Hrs exp day	Days exp year	Yrs exp x Yrs lifetime	Skin Surface area	1 Body wt	1 liter 1000 cm³	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/L	x	cm/hr	x 2 hrs/day	x 100 days year	x 20 yrs 70 yrs	x 2,600 cm²	x 1/70 kg	x 1/1000	== CDI		
Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK	
Vinyl chloride	2.10E-02	8.00E-04	2	100	0.286	2,600	70	3.57E-05	1.90E+00	6.77E-05	38.97%	
Trichloroethene	1.90E-02	8.00E-04	2	100	0.286	2,600	70	3.23E-05	1.10E-02	3.55E-07	0.20%	
Benzene	4.00E-03	4.10E-01	2	100	0.286	2,600	70	3.48E-03	2.90E-02	1.01E-04	58.07%	
Tetrachloroethene	5.53E-02	8.00E-04	2	100	0.286	2,600	70	9.39E-05	5.10E-02	4.79E-06	2.75%	
TOTAL RISK										1.74E-04		

TABLE H-72 (Continued)

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x	Body wt wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	1.44E-01	8.00E-04	2	50	0.129	2,600	70	5.50E-05	2.00E-02	2.75E-03	19.72%
Tetrachloroethene	2.87E-02	8.00E-04	2	50	0.129	2,600	70	1.10E-05	1.00E-02	1.10E-03	7.86%
o-Toluic acid	3.46E+01	8.00E-04	2	50	0.129	2,600	70	1.32E-02	3.00E+00	4.41E-03	31.60%
m-Toluic acid	2.18E+01	8.00E-04	2	50	0.129	2,600	70	8.32E-03	3.00E+00	2.77E-03	19.87%
p-Toluic acid	2.30E+01	8.00E-04	2	50	0.129	2,600	70	8.77E-03	3.00E+00	2.92E-03	20.96%

HAZ INDEX 1.40E-02

NONCARCINOGENIC COMPOUNDS IN CREEK SEEPS - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x	Body wt wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
1,2-Dichloroethene	3.42E-01	8.00E-04	2	100	0.286	2,600	70	5.81E-04	2.00E-02	2.90E-02	21.36%
Tetrachloroethene	5.53E-02	8.00E-04	2	100	0.286	2,600	70	9.39E-05	1.00E-02	9.39E-03	6.91%
o-Toluic acid	7.15E+01	8.00E-04	2	100	0.286	2,600	70	1.21E-01	3.00E+00	4.05E-02	29.78%
m-Toluic acid	4.48E+01	8.00E-04	2	100	0.286	2,600	70	7.61E-02	3.00E+00	2.54E-02	18.65%
p-Toluic acid	5.60E+01	8.00E-04	2	100	0.286	2,600	70	9.50E-02	3.00E+00	3.17E-02	23.30%

HAZ INDEX 1.36E-01

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Seep Conc	Dermal Permeability	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area	Body wt	1 1000 cm ³	CDI	% TOTAL RISK
	mg/L	cm/hr	x 2 hrs day	x 50 days year	x 9 yrs 70 yrs	x 2,600 cm ²	x 1/70 kg	x 1/1000	CDI	
Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)
	2.70E-03	8.00E-04	2	50	0.129	2,600	70	1.03E-06	1.10E-02	1.13E-08
	2.50E-03	4.10E-01	2	50	0.129	2,600	70	4.89E-04	2.90E-02	1.42E-05
	3.80E-03	8.00E-04	2	50	0.129	2,600	70	1.45E-06	5.10E-02	7.40E-08

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Seep Conc	Dermal Permissibility	Hrs exp day	Days exp year	Yrs exp x Yrs lifetime	Skin Surface area x	1 Body wt	x	1 liter 1000 cm ³	= CDI	GW Conc (mg/L)	Dermal Permissibility (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
Trichloroethene Benzene Tetrachloroethene	3.00E-03	8.00E-04	2	100	0.286	2,600	70		5.09E-06	1.10E-02	5.60E-08										0.08%
	2.60E-03	4.10E-01	2	100	0.286	2,600	70		2.26E-03	2.90E-02	6.56E-05										99.25%
	5.10E-03	8.00E-04	2	100	0.286	2,600	70		8.66E-06	5.10E-02	4.42E-07										0.67%
										TOTAL RISK		6.61E-05									

TABLE H-73 (Continued)

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
Acetone	7.80E-03	8.00E-04	2	50	0.129	2,600	70	2.98E-06	1.00E-01	2.98E-05	2.95%
1,2-Dichloroethene	1.26E-02	8.00E-04	2	50	0.129	2,600	70	4.81E-06	2.00E-02	2.41E-04	23.84%
Tetrachloroethene	3.90E-03	8.00E-04	2	50	0.129	2,600	70	1.49E-06	1.00E-02	1.49E-04	14.76%
Xylenes	7.64E-02	8.00E-04	2	50	0.129	2,600	70	2.92E-05	2.00E+00	1.46E-05	1.45%
o-Toluic acid	2.91E+00	8.00E-04	2	50	0.129	2,600	70	1.11E-03	3.00E+00	3.70E-04	36.67%
m-Toluic acid	1.42E+00	8.00E-04	2	50	0.129	2,600	70	5.43E-04	3.00E+00	1.81E-04	17.94%
p-Toluic acid	1.89E-01	8.00E-04	2	50	0.129	2,600	70	7.22E-05	3.00E+00	2.41E-05	2.38%

HAZ INDEX 1.01E-03

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Seep Conc	Dermal Permeability	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area	Body wt	1 1000 cm ³	CDI	% TOTAL HAZARD		
mg/L	cm/hr	2 hrs day	100 days year	20 yrs 70 yrs	2600 cm ²	170 kg	1/1000	== CDI			
Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
Acetone	1.10E-02	8.00E-04	2	100	0.286	2,600	70	1.87E-05	1.00E-01	1.87E-04	2.53%
1,2-Dichloroethene	3.02E-03	8.00E-04	2	100	0.286	2,600	70	5.13E-06	2.00E-02	2.56E-04	3.47%
Tetrachloroethene	5.60E-03	8.00E-04	2	100	0.286	2,600	70	9.51E-06	1.00E-02	9.51E-04	12.86%
Xylenes	1.76E-01	8.00E-04	2	100	0.286	2,600	70	2.99E-04	2.00E+00	1.49E-04	2.02%
o-Toluic acid	6.74E+00	8.00E-04	2	100	0.286	2,600	70	1.14E-02	3.00E+00	3.81E-03	51.60%
m-Toluic acid	3.20E+00	8.00E-04	2	100	0.286	2,600	70	5.43E-03	3.00E+00	1.81E-03	24.47%
p-Toluic acid	3.98E-01	8.00E-04	2	100	0.286	2,600	70	6.76E-04	3.00E+00	2.25E-04	3.05%

HAZ INDEX 7.39E-03

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Seep Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x Yrs lifetime	Skin Surface area x	1 Body wt x	1 liter 1000 cm ³	CDI	SF	RISK (CDI*SF)	% TOTAL RISK
	mg/L	x	x	x	x	x	x	x	x	-- CDI		
		x	2 hrs day	50 days year	x	2600 cm ²	x	1/70 kg	x	1/1000	-- CDI	
					9 yrs 70 yrs							
Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)	% TOTAL RISK	
Trichloroethene	4.00E-03	8.00E-04	2	50	0.129	2,600	70	1.53E-06	1.10E-02	1.68E-08	12.57%	
Tetrachloroethene	6.00E-03	8.00E-04	2	50	0.129	2,600	70	2.29E-06	5.10E-02	1.17E-07	87.43%	

TOTAL RISK	1.34E-07

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Seep Conc	Dermal Permeability x	Hrs exp day	Days exp year	Yrs exp x Yrs lifetime	Skin Surface area x	Body wt	1 x	1 liter 1000 cm ³	= CDI	% TOTAL RISK
GW	Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface Area (cm ²)	Body wt (kg)		CDI	SF	RISK (CDI*SF)
Trichloroethene	4.00E-03	8.00E-04	2	100	0.286	2,600	70		6.79E-06	1.10E-02	7.47E-08
	7.60E-03	8.00E-04	2	100	0.286	2,600	70		1.29E-05	5.10E-02	6.58E-07

TOTAL RISK	7.33E-07

TABLE H-74 (Continued)

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x Body wt	1 1000 cm ³	CDI	RID	RISK (CDI/RID)	% TOTAL HAZARD
Acetone	2.30E-02	8.00E-04	2	50	0.129	2,600	70	8.79E-06	1.00E-01	8.79E-05	7.56%
1,2-Dichloroethene	4.00E-03	8.00E-04	2	50	0.129	2,600	70	1.53E-06	2.00E-02	7.64E-05	6.58%
Tetrachloroethene	6.00E-03	8.00E-04	2	50	0.129	2,600	70	2.29E-06	1.00E-02	2.29E-04	19.73%
Xylenes	5.92E-02	8.00E-04	2	50	0.129	2,600	70	2.26E-05	2.00E+00	1.13E-05	0.97%
o-Toluic acid	2.85E+00	8.00E-04	2	50	0.129	2,600	70	1.09E-03	3.00E+00	3.63E-04	31.28%
m-Toluic acid	2.85E+00	8.00E-04	2	50	0.129	2,600	70	1.09E-03	3.00E+00	3.63E-04	31.28%
p-Toluic acid	2.37E-01	8.00E-04	2	50	0.129	2,600	70	9.07E-05	3.00E+00	3.02E-05	2.60%

HAZ INDEX 1.16E-03

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x Body wt	1 1000 cm ³	CDI	RID	RISK (CDI/RID)	% TOTAL HAZARD
Acetone	2.30E-02	8.00E-04	2	100	0.286	2,600	70	3.91E-05	1.00E-01	3.91E-04	3.64%
1,2-Dichloroethene	4.00E-03	8.00E-04	2	100	0.286	2,600	70	6.79E-06	2.00E-02	3.40E-04	3.16%
Tetrachloroethene	7.60E-03	8.00E-04	2	100	0.286	2,600	70	1.29E-05	1.00E-02	1.29E-03	12.02%
Xylenes	1.44E-01	8.00E-04	2	100	0.286	2,600	70	2.45E-04	2.00E+00	1.22E-04	1.14%
o-Toluic acid	7.31E+00	8.00E-04	2	100	0.286	2,600	70	1.24E-02	3.00E+00	4.14E-03	38.52%
m-Toluic acid	7.31E+00	8.00E-04	2	100	0.286	2,600	70	1.24E-02	3.00E+00	4.14E-03	38.52%
p-Toluic acid	5.72E-01	8.00E-04	2	100	0.286	2,600	70	9.71E-04	3.00E+00	3.24E-04	3.02%

HAZ INDEX 1.07E-02

CARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

TOTAL RISK	2.36E-05

TOTAL RISK	1.36E-04

TABLE H-75 (Continued)

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	GW Conc	Dermal Permeability	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area	1 Body wt	1 liter 1000 cm ³	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
	x	x	x	x	x	x	x	x	x	x	x	
	mg/L	cm/hr	2 hrs day	50 days year	9 yrs 70 yrs	2600 cm ²	1/70 kg	1/1000	CDI	CDI	CDI	
Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)		CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
Acetone	2.30E-02	8.00E-04	2	50	0.129	2,600	70		8.79E-06	1.00E-01	8.79E-05	0.75%
1,2-Dichloroethene	3.68E-02	8.00E-04	2	50	0.129	2,600	70		1.41E-05	2.00E-02	7.03E-04	5.99%
Tetrachloroethene	2.19E-01	8.00E-04	2	50	0.129	2,600	70		8.37E-05	1.00E-02	8.37E-03	71.30%
Xylenes	3.75E-01	8.00E-04	2	50	0.129	2,600	70		1.43E-04	2.00E+00	7.17E-05	0.61%
o-Toluic acid	1.31E+01	8.00E-04	2	50	0.129	2,600	70		4.99E-03	3.00E+00	1.66E-03	14.16%
m-Toluic acid	5.91E+00	8.00E-04	2	50	0.129	2,600	70		2.26E-03	3.00E+00	7.53E-04	6.42%
p-Toluic acid	7.05E-01	8.00E-04	2	50	0.129	2,600	70		2.69E-04	3.00E+00	8.98E-05	0.77%

HAZ INDEX 1.17E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal				Skin			RfD	RISK (CDI/RfD)	% TOTAL HAZARD	
		Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Surface area x	Body wt x	1 1000 cm ³				
		x	x	x	x	x	x	x				
	mg/L	x	2 hrs day	100 days year	20 yrs 70 yrs	x	2600 cm ²	x	1/70 kg	x	1/1000	x
</												

HAZ INDEX 6.66E-02

Seep Conc	Dermal Permeability	Hrs exp day	Days exp year	Yrs exp Yrs lifetime	Skin Surface area	Body wt	1 1000 cm ³	CDI
mg/L	x	x	x	x	x	x	x	---
	x	x	x	x	x	x	x	---
	x	x	x	x	x	x	x	---

CARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	Seep Conc	Dermal Permeability	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area	Body wt	1 1000 cm ³	CDI	% TOTAL RISK
	mg/L	cm/hr	2 hrs day	100 days year	20 yrs 70 yrs	2600 cm ²	170 kg	1/1000	CDI	
Compound	GW Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface Area (cm ²)	Body wt (kg)	CDI	SF	RISK (CDI*SF)
Trichloroethene	1.58E-02	8.00E-04	2	100	0.286	2,600	70	2.68E-05	1.10E-02	2.95E-07
Benzene	1.80E-02	4.10E-01	2	100	0.286	2,600	70	1.57E-02	2.90E-02	4.54E-04
Vinyl chloride	1.88E-02	8.00E-04	2	100	0.286	2,600	70	3.19E-05	1.90E+00	6.07E-05
Tetrachloroethene	4.41E-02	8.00E-04	2	100	0.286	2,600	70	7.49E-05	5.10E-02	3.82E-06
4,4'-DDE	1.50E-04	8.00E-04	2	100	0.286	2,600	70	2.55E-07	3.40E-01	8.66E-08
TOTAL RISK										5.19E-04

TABLE H-76 (Continued)

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NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - AVERAGE DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x 2600 cm ²	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
Acetone	1.53E-02	8.00E-04	2	50	0.129	2,600	70	5.85E-06	1.00E-01	5.85E-05	0.39%
1,2-Dichloroethene	2.64E-01	8.00E-04	2	50	0.129	2,600	70	1.01E-04	2.00E-02	5.04E-03	34.01%
Tetrachloroethene	4.41E-02	8.00E-04	2	50	0.129	2,600	70	1.68E-05	1.00E-02	1.68E-03	11.37%
Xylenes	6.36E-01	8.00E-04	2	50	0.129	2,600	70	2.43E-04	2.00E+00	1.21E-04	0.82%
o-Toluic acid	2.72E+01	8.00E-04	2	50	0.129	2,600	70	1.04E-02	3.00E+00	3.46E-03	23.36%
m-Toluic acid	1.74E+01	8.00E-04	2	50	0.129	2,600	70	6.65E-03	3.00E+00	2.22E-03	14.95%
p-Toluic acid	1.76E+01	8.00E-04	2	50	0.129	2,600	70	6.71E-03	3.00E+00	2.24E-03	15.09%

HAZ INDEX 1.48E-02

NONCARCINOGENIC COMPOUNDS IN GROUNDWATER - PLAUSIBLE MAXIMUM DERMAL CONTACT: Adults

Compound	Water Conc (mg/L)	Dermal Permeability (cm/hr)	Hrs exp day	Days exp year	Yrs exp lifetime	Skin Surface area x 2600 cm ²	Body wt (kg)	CDI	RfD	RISK (CDI/RfD)	% TOTAL HAZARD
Acetone	2.36E-02	8.00E-04	2	100	0.286	2,600	70	4.01E-05	1.00E-01	4.01E-04	0.38%
1,2-Dichloroethene	2.64E-01	8.00E-04	2	100	0.286	2,600	70	4.48E-04	2.00E-02	2.24E-02	20.97%
Tetrachloroethene	4.41E-02	8.00E-04	2	100	0.286	2,600	70	7.49E-05	1.00E-02	7.49E-03	7.01%
Xylenes	6.36E-01	8.00E-04	2	100	0.286	2,600	70	1.08E-03	2.00E+00	5.40E-04	0.51%
o-Toluic acid	5.59E+01	8.00E-04	2	100	0.286	2,600	70	9.50E-02	3.00E+00	3.17E-02	29.64%
m-Toluic acid	3.53E+01	8.00E-04	2	100	0.286	2,600	70	6.00E-02	3.00E+00	2.00E-02	18.71%
p-Toluic acid	4.30E+01	8.00E-04	2	100	0.286	2,600	70	7.30E-02	3.00E+00	2.43E-02	22.79%

HAZ INDEX 1.07E-01

TABLE H-77. INHALATION OF VOLATILE ORGANICS WHILE WASHING VEHICLES
FUTURE-USE INDUSTRIAL SCENARIO - ON-SITE WELLS
Round 1 Upper Bedrock Wells

p 1 of 4

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Vinyl chloride	62	2.78E-02	1616.45	16.85	45	0.5960	16.698	22.511	3	1	2	1.583
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	37.9	1	2	15.123
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	1	1	2	0.476
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	368	1	2	135.377

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Vinyl chloride	1.583	10	7,500	0.002	0.5	15	20	0.000
Trichloroethene	15.123	10	7,500	0.020	0.5	15	20	0.003
Benzene	0.476	10	7,500	0.001	0.5	15	20	0.000
Tetrachloroethene	135.377	10	7,500	0.181	0.5	15	20	0.030

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Vinyl chloride	3.0	0.83	0.002	70	0.5	15	20	0.129	9.55E-08	3.00E-01	2.86E-08	48.00%
Trichloroethene	37.9	0.83	0.020	70	0.5	15	20	0.129	9.12E-07	1.70E-02	1.55E-08	25.98%
Benzene	1.0	0.83	0.001	70	0.5	15	20	0.129	2.87E-08	2.90E-02	8.32E-10	1.39%
Tetrachloroethene	368.0	0.83	0.181	70	0.5	15	20	0.129	8.16E-06	1.80E-03	1.47E-08	24.62%

TOTAL RISK 5.97E-08

TABLE H-77 (Continued)

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CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Vinyl chloride	62	2.78E-02	1616.45	16.85	45	0.5960	16.698	22.511	3	1	2	1.583
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	74.3	1	2	29.647
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	1	1	2	0.476
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	835	1	2	307.173

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Vinyl chloride	1.583	10	7,500	0.002	0.5	15	20	0.000
Trichloroethene	29.647	10	7,500	0.040	0.5	15	20	0.006
Benzene	0.476	10	7,500	0.001	0.5	15	20	0.000
Tetrachloroethene	307.173	10	7,500	0.410	0.5	15	20	0.067

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Vinyl chloride	3.0	0.83	0.002	70	0.5	15	20	0.286	0.286	2.12E-07	3.00E-01	6.37E-08	30.73%
Trichloroethene	74.3	0.83	0.040	70	0.5	15	20	0.286	0.286	3.97E-06	1.70E-02	6.75E-08	32.61%
Benzene	1.0	0.83	0.001	70	0.5	15	20	0.286	0.286	6.37E-08	2.90E-02	1.85E-09	0.89%
Tetrachloroethene	835.0	0.83	0.410	70	0.5	15	20	0.286	0.286	4.12E-05	1.80E-03	7.41E-08	35.77%

TOTAL RISK 2.07E-07

TABLE H-77 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.33E-03	1292.72	13.47	45	0.5960	12.870	17.350	53.5	1	2	23.495
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	368	1	2	135.377

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	23.495	10	7,500	0.031	0.5	15	20	0.005
Tetrachloroethene	135.377	10	7,500	0.181	0.5	15	20	0.030

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	53.5	0.83	0.031	70	0.5	15	20	0.129	0.129	1.42E-06	2.00E-02	7.09E-05	8.0%
Tetrachloroethene	368.0	0.83	0.181	70	0.5	15	20	0.129	0.129	8.16E-06	1.00E-02	8.16E-04	92.0%

TOTAL HAZARD INDEX 8.87E-04

TABLE H-77 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.33E-03	1292.72	13.47	45	0.5960	12.870	17.350	89.6	1	2	39.349
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	835	1	2	307.173

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	39.349	10	7,500	0.052	0.5	15	20	0.009
Tetrachloroethene	307.173	10	7,500	0.410	0.5	15	20	0.067

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	89.6	1.25	0.052	70	0.5	15	20	0.286	0.286	7.94E-06	2.00E-02	3.97E-04	44.8%
Tetrachloroethene	835.0	1.25	0.410	70	0.5	15	20	0.286	0.286	6.20E-05	1.00E-02	6.20E-03	698.7%

TOTAL HAZARD INDEX 6.60E-03

TABLE H-78. INHALATION OF VOLATILE ORGANICS WHILE WASHING VEHICLES
FUTURE-USE INDUSTRIAL SCENARIO - ON-SITE WELLS
Round 2 Upper Bedrock Wells

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CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO TRUCK WAS ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Vinyl chloride	62	2.78E-02	1616.45	16.85	45	0.5960	16.698	22.511	14.4	1	2	7.600
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	11.8	1	2	4.708
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	4	1	2	1.902
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	28.7	1	2	10.558

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Vinyl chloride	7.600	10	7,500	0.010	0.5	15	20	0.002
Trichloroethene	4.708	10	7,500	0.006	0.5	15	20	0.001
Benzene	1.902	10	7,500	0.003	0.5	15	20	0.000
Tetrachloroethene	10.558	10	7,500	0.014	0.5	15	20	0.002

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Vinyl chloride	14.4	0.83	0.010	70	0.5	15	20	0.129	0.129	4.58E-07	3.00E-01	1.38E-07	93.67%
Trichloroethene	11.8	0.83	0.006	70	0.5	15	20	0.129	0.129	2.84E-07	1.70E-02	4.83E-09	3.29%
Benzene	4.0	0.83	0.003	70	0.5	15	20	0.129	0.129	1.15E-07	2.90E-02	3.33E-09	2.27%
Tetrachloroethene	28.7	0.83	0.014	70	0.5	15	20	0.129	0.129	6.37E-07	1.80E-03	1.15E-09	0.78%

TOTAL RISK 1.47E-07

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

STEP 2 - VOLATILE GENERATION RATE

* VOC concentration at end of total time

Compound	Conc ($\mu\text{g/L}$)	Inh Rate (m^3/min)	VOC Gen ($\mu\text{g}/\text{m}^3\cdot\text{min}$)	Body wt (kg)	Air Exch Rate (min^{-1})	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI ($\text{mg}/\text{kg}\cdot\text{day}$)	SF	RISK ($\text{CDI}\cdot\text{SF}$)	% TOTAL RISK
Vinyl chloride	21.0	1.25	0.015	70	0.5	15	20	0.286	2.24E-06	3.00E-01	6.71E-07	93.78%
Trichloroethene	19.0	1.25	0.010	70	0.5	15	20	0.286	1.53E-06	1.70E-02	2.60E-08	3.63%
Benzene	4.0	1.25	0.003	70	0.5	15	20	0.286	3.84E-07	2.90E-02	1.11E-08	1.56%
Tetrachloroethene	55.3	1.25	0.027	70	0.5	15	20	0.286	4.11E-06	1.80E-03	7.39E-09	1.03%

TOTAL RISK

TABLE H-78 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.33E-03	1292.72	13.47	45	0.5960	12.870	17.350	144	1	2	63.239
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	28.7	1	2	10.558

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	63.239	10	7,500	0.084	0.5	15	20	0.014
Tetrachloroethene	10.558	10	7,500	0.014	0.5	15	20	0.002

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RID	CDI/RID	% TOTAL HAZARD
1,2-Dichloroethene	144.0	0.83	0.084	70	0.5	15	20	0.129	0.129	3.81E-06	2.00E-02	1.91E-04	75.0%
Tetrachloroethene	28.7	0.83	0.014	70	0.5	15	20	0.129	0.129	6.37E-07	1.00E-02	6.37E-05	25.0%

TOTAL HAZARD INDEX 2.54E-04

TABLE H-78 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.33E-03	1292.72	13.47	45	0.5960	12.870	17.350	342	1	2	150.192
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	55.3	1	2	20.343

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
1,2-Dichloroethene	150.192	10	7,500	0.200	0.5	15	20	0.033
Tetrachloroethene	20.343	10	7,500	0.027	0.5	15	20	0.004

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	342.0	1.25	0.200	70	0.5	15	20	0.286	3.03E-05	2.00E-02	1.52E-03	595.9%
Tetrachloroethene	55.3	1.25	0.027	70	0.5	15	20	0.286	4.11E-06	1.00E-02	4.11E-04	161.4%

TOTAL HAZARD INDEX 1.93E-03

TABLE H-79. INHALATION OF VOLATILE ORGANICS WHILE WASHING VEHICLES
FUTURE-USE INDUSTRIAL SCENARIO - ON-SITE WELLS
Round 1 Deep Bedrock Wells

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO TRUCK WAS ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	2.7	1	2	1.077
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	2.5	1	2	1.189
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	3.8	1	2	1.398

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	1.077	10	7,500	0.001	0.5	15	20	0.000
Benzene	1.189	10	7,500	0.002	0.5	15	20	0.000
Tetrachloroethene	1.398	10	7,500	0.002	0.5	15	20	0.000

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ .min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed		CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
								Yrs	lifetime				
Trichloroethene	2.7	0.83	0.001	70	0.5	15	20	0.129	0.129	6.50E-08	1.70E-02	1.10E-09	33.11%
Benzene	2.5	0.83	0.002	70	0.5	15	20	0.129	0.129	7.17E-08	2.90E-02	2.08E-09	62.34%
Tetrachloroethene	3.8	0.83	0.002	70	0.5	15	20	0.129	0.129	8.43E-08	1.80E-03	1.52E-10	4.55%
TOTAL RISK												3.34E-09	

CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	3	1	2	1.197
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	2.6	1	2	1.236
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	5.6	1	2	2.060

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ ·min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	1.197	10	7.500	0.002	0.5	15	20	0.000
Benzene	1.236	10	7.500	0.002	0.5	15	20	0.000
Tetrachloroethene	2.060	10	7.500	0.003	0.5	15	20	0.000

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc ($\mu\text{g/L}$)	Inh Rate (m^3/min)	VOC Gen ($\mu\text{g}/\text{m}^3\text{-min}$)	Body wt (kg)	Air Exch Rate (min^{-1})	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI ($\text{mg}/\text{kg}\text{-day}$)	SF	RISK ($\text{CDI}\cdot\text{SF}$)	% TOTAL RISK
Trichloroethene	3.0	1.25	0.002	70	0.5	15	20	0.286	2.42E-07	1.70E-02	4.11E-09	33.96%
Benzene	2.6	1.25	0.002	70	0.5	15	20	0.286	2.50E-07	2.90E-02	7.24E-09	59.85%
Tetrachloroethene	5.6	1.25	0.003	70	0.5	15	20	0.286	4.16E-07	1.80E-03	7.48E-10	6.19%
TOTAL RISK											1.21E-08	

TABLE H-79 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	7.8	1	2	0.841
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	12.6	1	2	5.532
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	3.8	1	2	1.398
Xylenes	107	5.35E-03	1231.20	12.83	45	0.5960	12.259	16.527	76.4	1	2	32.360

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³·min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	0.841	10	7,500	0.001	0.5	15	20	0.000
1,2-Dichloroethene	5.532	10	7,500	0.007	0.5	15	20	0.001
Tetrachloroethene	1.398	10	7,500	0.002	0.5	15	20	0.000
Xylenes	32.360	10	7,500	0.043	0.5	15	20	0.007

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³·min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	7.8	0.83	0.001	70	0.5	15	20	0.129	5.07E-08	1.00E-01	5.07E-07	1.9%
1,2-Dichloroethene	12.6	0.83	0.007	70	0.5	15	20	0.129	3.34E-07	2.00E-02	1.67E-05	62.7%
Tetrachloroethene	3.8	0.83	0.002	70	0.5	15	20	0.129	8.43E-08	1.00E-02	8.43E-06	31.7%
Xylenes	76.4	0.83	0.043	70	0.5	15	20	0.129	1.95E-06	2.00E+00	9.76E-07	3.7%

TOTAL HAZARD INDEX 2.66E-05

TABLE H-79 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	11	1	2	1.186
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	30.2	1	2	13.260
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	5.6	1	2	2.060
Xylenes	107	5.35E-03	1231.20	12.83	45	0.5960	12.259	16.527	176	1	2	74.547

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	1.186	10	7,500	0.002	0.5	15	20	0.000
1,2-Dichloroethene	13.260	10	7,500	0.018	0.5	15	20	0.003
Tetrachloroethene	2.060	10	7,500	0.003	0.5	15	20	0.000
Xylenes	74.547	10	7,500	0.099	0.5	15	20	0.016

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	11.0	1.25	0.002	70	0.5	15	20	0.286	2.39E-07	1.00E-01	2.39E-06	9.0%
1,2-Dichloroethene	30.2	1.25	0.018	70	0.5	15	20	0.286	2.68E-06	2.00E-02	1.34E-04	503.2%
Tetrachloroethene	5.6	1.25	0.003	70	0.5	15	20	0.286	4.16E-07	1.00E-02	4.16E-05	156.3%
Xylenes	176.0	1.25	0.099	70	0.5	15	20	0.286	1.50E-05	2.00E+00	7.52E-06	28.3%

TOTAL HAZARD INDEX 1.85E-04

TABLE H-80. INHALATION OF VOLATILE ORGANICS WHILE WASHING VEHICLES
FUTURE-USE INDUSTRIAL SCENARIO - ON-SITE WELLS
Round 2 Deep Bedrock Wells

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO TRUCK WAS ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276		4	1	2 1.596
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760		6	1	2 2.207

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m ³)	VOC Gen (ug/m ³ ·min)	Air Exch Rate (min ⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Trichloroethene	1.596	10	7,500	0.002	0.5	15	20	0.000
Tetrachloroethene	2.207	10	7,500	0.003	0.5	15	20	0.000

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc ($\mu\text{g/L}$)	Inh Rate (m^3/min)	VOC Gen ($\mu\text{g}/\text{m}^3\cdot\text{min}$)	Body wt (kg)	Exch Rate (min^{-1})	duration (min)	time (min)	Yrs exposed Yrs lifetime	CDI ($\text{mg}/\text{kg}\cdot\text{day}$)	SF	RISK ($\text{CDI}\cdot\text{SF}$)	% TOTAL RISK
Trichloroethene	4.0	0.83	0.002	70	0.5	15	20	0.129	9.63E-08	1.70E-02	1.64E-09	87.23%
Tetrachloroethene	6.0	0.83	0.003	70	0.5	15	20	0.129	1.33E-07	1.80E-03	2.40E-10	12.77%
TOTAL RISK											1.88E-09	

TABLE H-80 (Continued)

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CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	4	1	2	1.596
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	7.6	1	2	2.796

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate		Air volume (m³)	VOC Gen (ug/m³-min)	Air		Shower duration (min)	Total time (min)	Indoor	
		(L/min)	(L/min)			Exch Rate (min⁻¹)	(min⁻¹)			Yrs exposed	Air Conc (ug/m³) *
Trichloroethene	1.596	10		7,500	0.002	0.5		15	20	0.000	
Tetrachloroethene	2.796	10		7,500	0.004	0.5		15	20	0.001	

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed		CDI (mg/kg-day)	SF	RISK (CD*SF)	% TOTAL RISK
								Yrs	lifetime				
Trichloroethene	4.0	1.25	0.002	70	0.5	15	20	0.286		3.22E-07	1.70E-02	5.48E-09	84.35%
Tetrachloroethene	7.6	1.25	0.004	70	0.5	15	20	0.286		5.64E-07	1.80E-03	1.02E-09	15.65%

TOTAL RISK

6.49E-09

TABLE H-80 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	12	1	2	1.294
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4	1	2	1.756
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	6	1	2	2.207
Xylenes	107	5.35E-03	1231.20	12.83	45	0.5960	12.259	16.527	59.2	1	2	25.075

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	1.294	10	7,500	0.002	0.5	15	20	0.000
1,2-Dichloroethene	1.756	10	7,500	0.002	0.5	15	20	0.000
Tetrachloroethene	2.207	10	7,500	0.003	0.5	15	20	0.000
Xylenes	25.075	10	7,500	0.033	0.5	15	20	0.005

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	12.0	0.83	0.002	0.002	70	0.5	15	20	0.129	7.80E-08	1.00E-01	7.80E-07	3.9%
1,2-Dichloroethene	4.0	0.83	0.002	0.002	70	0.5	15	20	0.129	1.06E-07	2.00E-02	5.30E-06	26.3%
Tetrachloroethene	6.0	0.83	0.003	0.003	70	0.5	15	20	0.129	1.33E-07	1.00E-02	1.33E-05	66.1%
Xylenes	59.2	0.83	0.033	0.033	70	0.5	15	20	0.129	1.51E-06	2.00E+00	7.56E-07	3.8%

TOTAL HAZARD INDEX 2.01E-05

TABLE H-80 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Acetone	58	4.28E-05	1670.11	17.41	45	0.5960	2.539	3.423	23	1	2	2.480
1,2-Dichloroethene	97	5.30E-03	1292.72	13.47	45	0.5960	12.866	17.345	4	1	2	1.756
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	7.6	1	2	2.796
Xylenes	107	5.35E-03	1231.20	12.83	45	0.5960	12.259	16.527	144	1	2	60.993

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Acetone	2.480	10	7,500	0.003	0.5	15	20	0.001
1,2-Dichloroethene	1.756	10	7,500	0.002	0.5	15	20	0.000
Tetrachloroethene	2.796	10	7,500	0.004	0.5	15	20	0.001
Xylenes	60.993	10	7,500	0.081	0.5	15	20	0.013

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
Acetone	23.0	1.25	0.003	70	0.5	15	20	0.286	5.01E-07	1.00E-01	5.01E-06	24.8%
1,2-Dichloroethene	4.0	1.25	0.002	70	0.5	15	20	0.286	3.55E-07	2.00E-02	1.77E-05	88.0%
Tetrachloroethene	7.6	1.25	0.004	70	0.5	15	20	0.286	5.64E-07	1.00E-02	5.64E-05	280.1%
Xylenes	144.0	1.25	0.081	70	0.5	15	20	0.286	1.23E-05	2.00E+00	6.16E-06	30.6%

TOTAL HAZARD INDEX 8.53E-05

TABLE H-81. INHALATION OF VOLATILE ORGANICS WHILE WASHING VEHICLES
FUTURE-USE INDUSTRIAL SCENARIO - ON-SITE WELLS
Round 1 Mixed Bedrock Wells

CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Vinyl chloride	62	2.78E-02	1616.45	16.85	45	0.5960	16.698	22.511	3	1	2	1.583
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	23.5	1	2	9.377
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	3	1	2	1.427
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	219	1	2	80.564

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Vinyl chloride	1.583	10	7,500	0.002	0.5	15	20	0.000
Trichloroethene	9.377	10	7,500	0.013	0.5	15	20	0.002
Benzene	1.427	10	7,500	0.002	0.5	15	20	0.000
Tetrachloroethene	80.564	10	7,500	0.107	0.5	15	20	0.018

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc ($\mu\text{g/L}$)	Inh Rate (m^3/min)	VOC Gen ($\mu\text{g}/\text{m}^3\cdot\text{min}$)	Body wt (kg)	Air Exch Rate (min^{-1})	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI ($\text{mg/kg}\cdot\text{day}$)	SF	RISK ($\text{CDI}\cdot\text{SF}$)	% TOTAL RISK
Vinyl chloride	3.0	0.83	0.002	70	0.5	15	20	0.129	9.55E-08	3.00E-01	2.86E-08	57.87%
Trichloroethene	23.5	0.83	0.013	70	0.5	15	20	0.129	5.66E-07	1.70E-02	9.61E-09	19.42%
Benzene	3.0	0.83	0.002	70	0.5	15	20	0.129	8.60E-08	2.90E-02	2.50E-09	5.04%
Tetrachloroethene	219.0	0.83	0.107	70	0.5	15	20	0.129	4.86E-06	1.80E-03	8.75E-09	17.67%
TOTAL RISK											4.95E-08	

CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	trans. temp (C)	Mu2	KL	KaL	conc (ug/L)	Exptl (mm)	time (sec)	Cwd
Vinyl chloride	62	2.78E-02	1616.45	16.85	45	0.5960	16.698	22.511	3	1	2	1.583
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	51.3	1	2	20.470
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	3	1	2	1.427
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	569	1	2	209.319

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ ·min)	Air Exch Rate (min ⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
Vinyl chloride	1.583	10	7,500	0.002	0.5	15	20	0.000
Trichloroethene	20.470	10	7,500	0.027	0.5	15	20	0.004
Benzene	1.427	10	7,500	0.002	0.5	15	20	0.000
Tetrachloroethene	209.319	10	7,500	0.279	0.5	15	20	0.046

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc ($\mu\text{g/L}$)	Inh Rate (m^3/min)	VOC Gen ($\mu\text{g}/\text{m}^3\cdot\text{min}$)	Body wt (kg)	Air Exch Rate (min^{-1})	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI ($\text{mg/kg}\cdot\text{day}$)	SF	RISK ($\text{CDI}\cdot\text{SF}$)	% TOTAL RISK
Vinyl chloride	3.0	0.83	0.002	70	0.5	15	20	0.286	2.12E-07	3.00E-01	6.37E-08	38.27%
Trichloroethene	51.3	0.83	0.027	70	0.5	15	20	0.286	2.74E-06	1.70E-02	4.66E-08	28.04%
Benzene	3.0	0.83	0.002	70	0.5	15	20	0.286	1.91E-07	2.90E-02	5.55E-09	3.33%
Tetrachloroethene	569.0	0.83	0.279	70	0.5	15	20	0.286	2.81E-05	1.80E-03	5.05E-08	30.36%
TOTAL RISK											1.66E-07	

TABLE H-81 (Continued)

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NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.33E-03	1292.72	13.47	45	0.5960	12.870	17.350	36.8	1	2	16.161
Xylenes	107	5.35E-03	1230.45	12.83	45	0.5960	12.252	16.517	375.4	1	2	158.933
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	219	1	2	80.564

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	16.161	10	7,500	0.022	0.5	15	20	0.004
Xylenes	158.933	10	7,500	0.212	0.5	15	20	0.035
Tetrachloroethene	80.564	10	7,500	0.107	0.5	15	20	0.018

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	36.8	0.83	0.022	70	0.5	15	20	0.129	9.75E-07	2.00E-02	4.87E-05	9.0%
Xylenes	375.4	0.83	0.212	70	0.5	15	20	0.129	9.59E-06	2.00E+00	4.79E-06	0.9%
Tetrachloroethene	219.0	0.83	0.107	70	0.5	15	20	0.129	4.86E-06	1.00E-02	4.86E-04	90.1%

TOTAL HAZARD INDEX 5.39E-04

TABLE H-81 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.33E-03	1292.72	13.47	45	0.5960	12.870	17.350	66.6	1	2	29.248
Xylenes	107	5.35E-03	1230.45	12.83	45	0.5960	12.252	16.517	750.5	1	2	317.738
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	569.4	1	2	209.466

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	29.248	10	7,500	0.039	0.5	15	20	0.006
Xylenes	317.738	10	7,500	0.424	0.5	15	20	0.070
Tetrachloroethene	209.466	10	7,500	0.279	0.5	15	20	0.046

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	66.6	1.25	0.039	70	0.5	15	20	0.286	0.286	5.90E-06	2.00E-02	2.95E-04	54.7%
Xylenes	750.5	1.25	0.424	70	0.5	15	20	0.286	0.286	6.41E-05	2.00E+00	3.21E-05	5.9%
Tetrachloroethene	569.4	1.25	0.279	70	0.5	15	20	0.286	0.286	4.23E-05	1.00E-02	4.23E-03	783.8%

TOTAL HAZARD INDEX 4.56E-03

TABLE H-82. INHALATION OF VOLATILE ORGANICS WHILE WASHING VEHICLES
FUTURE-USE INDUSTRIAL SCENARIO - ON-SITE WELLS
Round 2 Mixed Bedrock Wells

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CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	Kl	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Vinyl chloride	62	2.78E-02	1616.45	16.85	45	0.5960	16.698	22.511	14.4	1	2	7.600
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	11.8	1	2	4.708
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	4	1	2	1.902
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	28.7	1	2	10.558

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (l/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Vinyl chloride	7.600	10	7.500	0.010	0.5	15	20	0.002
Trichloroethene	4.708	10	7.500	0.006	0.5	15	20	0.001
Benzene	1.902	10	7.500	0.003	0.5	15	20	0.000
Tetrachloroethene	10.558	10	7.500	0.014	0.5	15	20	0.002

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Vinyl chloride	14.4	0.83	0.010	70	0.5	15	20	0.129	4.58E-07	3.00E-01	1.38E-07	93.67%
Trichloroethene	11.8	0.83	0.006	70	0.5	15	20	0.129	2.84E-07	1.70E-02	4.83E-09	3.29%
Benzene	4.0	0.83	0.003	70	0.5	15	20	0.129	1.15E-07	2.90E-02	3.33E-09	2.27%
Tetrachloroethene	28.7	0.83	0.014	70	0.5	15	20	0.129	6.37E-07	1.80E-03	1.15E-09	0.78%

TOTAL RISK 1.47E-07

TABLE H-82 (Continued)

p 2 of 4

CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE

STEP 1 - VOC RELEASE TO SHOWER ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
Vinyl chloride	62	2.78E-02	1616.45	16.85	45	0.5960	16.698	22.511	21	1	2	11.084
Trichloroethene	131	1.17E-02	1110.39	11.57	45	0.5960	11.331	15.276	19	1	2	7.581
Benzene	78	5.55E-03	1440.14	15.01	45	0.5960	14.363	19.362	4	1	2	1.902
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	55.3	1	2	20.343

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³·min)	Air Exch Rate (min⁻¹)	Shower duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
Vinyl chloride	11.084	10	7,500	0.015	0.5	15	20	0.002
Trichloroethene	7.581	10	7,500	0.010	0.5	15	20	0.002
Benzene	1.902	10	7,500	0.003	0.5	15	20	0.000
Tetrachloroethene	20.343	10	7,500	0.027	0.5	15	20	0.004

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³·min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	SF	RISK (CDI*SF)	% TOTAL RISK
Vinyl chloride	21.0	0.83	0.015	70	0.5	15	20	0.286	1.49E-06	3.00E-01	4.46E-07	93.78%
Trichloroethene	19.0	0.83	0.010	70	0.5	15	20	0.286	1.02E-06	1.70E-02	1.73E-08	3.63%
Benzene	4.0	0.83	0.003	70	0.5	15	20	0.286	2.55E-07	2.90E-02	7.39E-09	1.56%
Tetrachloroethene	55.3	0.83	0.027	70	0.5	15	20	0.286	2.73E-06	1.80E-03	4.91E-09	1.03%

TOTAL RISK

4.75E-07

TABLE H-82 (Continued)

p 3 of 4

NON-CARCINOGENS - AVERAGE GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.33E-03	1292.72	13.47	45	0.5960	12.870	17.350	144.4	1	2	63.415
Xylenes	107	5.35E-03	1230.45	12.83	45	0.5960	12.252	16.517	454.1	1	2	192.252
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	28.7	1	2	10.558

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m³)	VOC Gen (ug/m³-min)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m³) *
1,2-Dichloroethene	63.415	10	7,500	0.085	0.5	15	20	0.014
Xylenes	192.252	10	7,500	0.256	0.5	15	20	0.042
Tetrachloroethene	10.558	10	7,500	0.014	0.5	15	20	0.002

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m³/min)	VOC Gen (ug/m³-min)	Body wt (kg)	Air Exch Rate (min⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed	Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	144.4	0.83	0.085	70	0.5	15	20	0.129	0.129	3.82E-06	2.00E-02	1.91E-04	73.4%
Xylenes	454.1	0.83	0.256	70	0.5	15	20	0.129	0.129	1.16E-05	2.00E+00	5.80E-06	2.2%
Tetrachloroethene	28.7	0.83	0.014	70	0.5	15	20	0.129	0.129	6.37E-07	1.00E-02	6.37E-05	24.4%
TOTAL HAZARD INDEX											2.61E-04		

TABLE H-82 (Continued)

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NON-CARCINOGENS - PLAUSIBLE MAXIMUM GROUNDWATER EXPOSURE: Adult

STEP 1 - VOC RELEASE TO TRUCK WASH ROOM AIR

Compound	MW	HLC	Kg	KI	Water temp (C)	Mu2	KL	KaL	Conc (ug/L)	Drop Diam (mm)	Drop time (sec)	Cwd
1,2-Dichloroethene	97	5.33E-03	1292.72	13.47	45	0.5960	12.870	17.350	342.4	1	2	150.368
Xylenes	107	5.35E-03	1230.45	12.83	45	0.5960	12.252	16.517	796.9	1	2	337.383
Tetrachloroethene	166	2.68E-02	988.38	10.30	45	0.5960	10.207	13.760	55.3	1	2	20.343

STEP 2 - VOLATILE GENERATION RATE

Compound	Cwd	Flow rate (L/min)	Air volume (m ³)	VOC Gen (ug/m ³ -min)	Air Exch Rate (min ⁻¹)	Wash duration (min)	Total time (min)	Indoor Air Conc (ug/m ³) *
1,2-Dichloroethene	150.368	10	7,500	0.200	0.5	15	20	0.033
Xylenes	337.383	10	7,500	0.450	0.5	15	20	0.074
Tetrachloroethene	20.343	10	7,500	0.027	0.5	15	20	0.004

* VOC concentration at end of total time

STEP 3 - RISK CALCULATION

Compound	Conc (ug/L)	Inh Rate (m ³ /min)	VOC Gen (ug/m ³ -min)	Body wt (kg)	Air Exch Rate (min ⁻¹)	Wash duration (min)	Total time (min)	Yrs exposed Yrs lifetime	CDI (mg/kg-day)	RfD	CDI/RfD	% TOTAL HAZARD
1,2-Dichloroethene	342.4	1.25	0.200		70	0.5	15	20	0.286	2.00E-02	1.52E-03	582.1%
Xylenes	796.9	1.25	0.450		70	0.5	15	20	0.286	2.00E+00	3.41E-05	13.1%
Tetrachloroethene	55.3	1.25	0.027		70	0.5	15	20	0.286	1.00E-02	4.11E-04	157.5%

TOTAL HAZARD INDEX

1.96E-03

TABLE H-83. BASEMENT MODEL - INHALATION OF VOLATILE ORGANIC COMPOUNDS ENTERING BASEMENT FROM SOIL VAPOR
FUTURE-USE SCENARIO - Industrial building

p 1 of 3

STEP 1 - Calculate average emission rate of vapors into basement

Analyte	SV Conc (ug/m ³)	SV Conc (g/cm ³)	MW (g/mol)	SV Conc (mol/cm ³)	Diff coeff ¹ (cm ² /sec)	Contact Surface area (cm ²)	Soil porosity	Mole fraction (M)	Soil cover (cm)	Emission rat (g/sec)
1,1,1-Trichloroethane	1.00E+03	1.001E-09	133	7.526E-12	0.08447	4.01E+08	0.35	1.002E-02	15.2	5.517E-06
Trichloroethene	5.89E+02	5.894E-10	131	4.499E-12	0.08606	4.01E+08	0.35	5.991E-03	15.2	1.978E-06
Toluene	1.20E+03	1.204E-09	92	1.309E-11	0.08301	4.01E+08	0.35	1.743E-02	15.2	1.134E-05
Tetrachloroethene	1.74E+03	1.745E-09	166	1.051E-11	0.07852	4.01E+08	0.35	1.400E-02	15.2	1.249E-05
Ethyl benzene	1.95E+03	1.951E-09	106	1.840E-11	0.07070	4.01E+08	0.35	2.451E-02	15.2	2.201E-05
Xylenes	7.39E+04	7.387E-08	106	6.969E-10	0.07597	4.01E+08	0.35	9.281E-01	15.2	3.391E-02
			(SUM)	7.510E-10						

STEP 2 - Calculate average basement air concentration

Analyte	Soil Emission rate (g/sec)	Bldg Entry Rate (g/sec)	Ventilation rate (hr ⁻¹)	Bldg volume (m ³)	Bldg air conc (mg/m ³)
1,1,1-Trichloroethane	5.52E-06	5.52E-07	1	1,133	1.35E-09
Trichloroethene	1.98E-06	1.98E-07	1	1,133	4.85E-10
Toluene	1.13E-05	1.13E-06	1	1,133	2.78E-09
Tetrachloroethene	1.25E-05	1.25E-06	1	1,133	3.06E-09
Ethyl benzene	2.20E-05	2.20E-06	1	1,133	5.40E-09
Xylenes	3.39E-02	3.39E-03	1	1,133	8.32E-06

Building characteristics:

Soil total porosity:	0.35
Clean fill depth ² (feet):	0.5
Building length (ft):	100
Building width (ft):	50
Soil contact depth (ft):	4
Length contact area (ft ²):	400
Width contact area (ft ²):	200
Total contact area (ft ²):	6,200
Soil contact depth (ft):	4
Basement depth (ft):	8
Total basement volume (ft ³):	40,000

Notes:

- 1 Diffusion coefficients from USEPA (1988)
- 2 Clean fill depth is the thickness of drainage layer fill separating foundation from existing (contaminated) soils.

TABLE H-83 (Continued)

p 2 of 3

STEP 1 - Calculate UCL emission rate of vapors into basement

Analyte	SV Conc (ug/m ³)	SV Conc (g/cm ³)	MW (g/mol)	SV Conc (mol/cm ³)	Diff coeff (cm ² /sec)	Surface area (cm ²)	Soil porosity	Mole fraction (M)	Soil cover (cm)	Emission Rate (g/sec)
1,1,1-Trichloroethane	2.12E+03	2.116E-09	133	1.591E-11	0.08447	4.01E+08	0.35	2.119E-02	15.2	2.466E-05
Trichloroethene	1.18E+03	1.179E-09	131	8.998E-12	0.08606	4.01E+08	0.35	1.198E-02	15.2	7.914E-06
Toluene	2.03E+03	2.032E-09	92	2.209E-11	0.08301	4.01E+08	0.35	2.941E-02	15.2	3.230E-05
Tetrachloroethene	3.20E+03	3.205E-09	166	1.930E-11	0.07852	4.01E+08	0.35	2.571E-02	15.2	4.212E-05
Ethyl benzene	3.95E+03	3.945E-09	106	3.722E-11	0.07070	4.01E+08	0.35	4.956E-02	15.2	9.001E-05
Xylenes	2.30E+05	2.296E-07	106	2.166E-09	0.07597	4.01E+08	0.35	2.884E+00	15.2	3.276E-01
			(SUM)	2.270E-09						

STEP 2 - Calculate UCL basement air concentration

Analyte	Soil Emission rate (g/sec)	Bldg Entry Rate (g/sec)	Ventilation rate (hr ⁻¹)	Bldg volume (m ³)	Bldg air conc (mg/m ³)
1,1,1-Trichloroethane	2.47E-05	2.47E-06	1	1,133	6.05E-09
Trichloroethene	7.91E-06	7.91E-07	1	1,133	1.94E-09
Toluene	3.23E-05	3.23E-06	1	1,133	7.92E-09
Tetrachloroethene	4.21E-05	4.21E-06	1	1,133	1.03E-08
Ethyl benzene	9.00E-05	9.00E-06	1	1,133	2.21E-08
Xylenes	3.28E-01	3.28E-02	1	1,133	8.03E-05

STEP 3 - Risk Calculations

CARCINOGENS - AVERAGE INHALATION EXPOSURE: Adults

Compound	Air conc (mg/m ³)	Inhalation rate (m ³ /hr)	Hrs/week exposed	Body weight (kg)	Yrs exp Yrs ft	Wks exp Year	CDI	SF	Risk (CDI*SF)	% total risk
Trichloroethene	4.85E-10	0.83	40	70	0.129	50	4.07E-12	1.70E-02	6.91E-14	59.94%
Tetrachloroethene	3.06E-09	0.83	40	70	0.129	50	2.57E-11	1.80E-03	4.62E-14	40.06%
							Total Risk		1.15E-13	

CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE

Compound	Air conc (mg/m ³)	Inhalation rate (m ³ /hr)	Hrs/week exposed	Body weight (kg)	Yrs exp Yrs ft	Wks exp Year	CDI	SF	Risk (CDI*SF)	% total risk
Trichloroethene	1.94E-09	1.25	40	70	0.286	50	5.43E-11	1.70E-02	9.23E-13	63.96%
Tetrachloroethene	1.03E-08	1.25	40	70	0.286	50	2.89E-10	1.80E-03	5.20E-13	36.04%
							Total Risk		1.44E-12	

TABLE H-83 (cont)

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NON-CARCINOGENS - AVERAGE INHALATION EXPOSURE; Adults

Analyte	Air conc (mg/m ³)	Inhalation rate (m ³ /hr)	Hrs/week exposed	Body weight (kg)	Yrs exp Yrs lt	Wks exp year	CDI	RfD	CDI/RfD	% Total Hazard
1,1,1-Trichloroethane	1.35E-09	0.83	40	70	0.129	50	1.13E-11	3.00E-01	3.77E-11	0.10%
Toluene	2.78E-09	0.83	40	70	0.129	50	2.32E-11	1.10E-01	2.11E-10	0.56%
Tetrachloroethene	3.06E-09	0.83	40	70	0.129	50	2.56E-11	1.00E-02	2.56E-09	6.79%
Ethyl benzene	5.40E-09	0.83	40	70	0.129	50	4.51E-11	2.90E-01	1.55E-10	0.41%
Xylenes	8.32E-06	0.83	40	70	0.129	50	6.95E-08	2.00E+00	3.47E-08	92.14%

HAZARD INDEX 3.77E-08

NON-CARCINOGENS - PLAUSIBLE MAXIMUM INHALATION EXPOSURE

Analyte	Air conc (mg/m ³)	Inhalation rate (m ³ /hr)	Hrs/week exposed	Body weight (kg)	Yrs exp Yrs lt	Wks exp year	CDI	RfD	CDI/RfD	% Total Hazard
1,1,1-Trichloroethane	6.05E-09	1.25	40	70	0.286	50	1.69E-10	3.00E-01	5.63E-10	0.05%
Toluene	7.92E-09	1.25	40	70	0.286	50	2.21E-10	1.10E-01	2.01E-09	0.17%
Tetrachloroethene	1.03E-08	1.25	40	70	0.286	50	2.89E-10	1.00E-02	2.89E-08	2.50%
Ethyl benzene	2.21E-08	1.25	40	70	0.286	50	6.17E-10	2.90E-01	2.13E-09	0.18%
Xylenes	8.03E-05	1.25	40	70	0.286	50	2.25E-06	2.00E+00	1.12E-06	97.10%

HAZARD INDEX 1.16E-06

TABLE H-84. CALCULATED SEDIMENT CRITERIA FOR ORGANICS PRESENT IN SKANEATELES CREEK SEDIMENTS
STAUFFER MANAGEMENT COMPANY REMEDIAL INVESTIGATION
SKANEATELES FALLS, NEW YORK

Analyte	K _{ow} (L/kg)	Sediment Criteria ^{1,2} (Human, bioaccum)		Sediment Criteria ^{1,2} (Benthic, acute)		Sediment Criteria ^{1,2} (Benthic, chronic)		Sediment Criteria ^{1,2} (Wildlife, bioaccum)		USEPA Acute ³ (ug/L)		Sediment Criteria ¹ Calc ug/gOC		USEPA Chronic ³ (ug/L)		Sediment Criteria ¹ Calc ug/gOC		Sediment Criteria ¹ ug/kg	
		ug/gOC	ug/kg	ug/gOC	ug/kg	ug/gOC	ug/kg	ug/gOC	ug/kg	(ug/L)	ug/gOC	ug/kg	(ug/L)	ug/gOC	ug/kg				
VOLATILES																			
Vinyl chloride	3.98E+00	0.07	8.05E-01																
Acetone	5.80E-01																		
Carbon disulfide	1.45E+02																		
1,2-Dichloroethene	3.02E+01																		
Methyl ethyl ketone	1.80E+00																		
Toluene	3.00E+02																		
Ethyl benzene	1.10E+03																		
Tetrachloroethene	3.64E+02	0.8	9.20E+00																
Xylenes	2.40E+02																		
SEMI-VOLATILES																			
2-Methylphenol	8.91E+01																		
Naphthalene	1.95E+03																		
2-Methyl naphthalene	4.60E+03																		
Acenaphthene	1.32E+04																		
Dibenzofuran	7.30E+03																		
Fluorene	1.40E+04																		
Phenanthrene	2.83E+04																		
Anthracene	1.95E+03																		
Carbazole	3.80E+04																		
Fluoranthene	3.80E+04																		
Pyrene	1.38E+06																		
Benzo(a)anthracene	2.00E+04	1.3	1.50E+01																
Chrysene	5.50E+05	1.3	1.50E+01																
Benzo(b)fluoranthene	5.50E+05	1.3	1.50E+01																
Benzo(k)fluoranthene	5.50E+05	1.3	1.50E+01																
Benzo(a)pyrene	5.50E+05	1.3	1.50E+01																
Indeno(1,2,3-cd)pyrene	1.60E+06	1.3	1.50E+01																
Dibenzo(a,h)anthracene	9.33E+05																		
Benzo(ghi)perylene	1.60E+06																		
o-Toluic acid	3.47E+02																		
m-Toluic acid	2.34E+02																		
p-Toluic acid	1.86E+02																		
PESTICIDES/PCBs																			
PCBs	1.38E+06	8.00E-04	9.20E-03	2.761	3.17E+04	0.014	1.61E-01	1.4	1.61E+01	2.5		8.75E+00	1.01E+02	0.0018		6.65E-03	7.65E-02		
Dieldrin	3.50E+03														0.03	1.44E+00	1.65E+01		
Methoxychlor	4.79E+04																		
Endrin ketone																			
gamma-Chlordane	6.03E+02									2		1.21E+00	1.39E+01	0.08		4.82E-02	5.54E-01		

Notes:
¹ Values calculated using method presented in Section IV of NYSDEC Sediment Criteria (11/93).
² Values from Table 1 of NYSDEC Sediment Criteria (11/93).
³ Values from USEPA (1992).

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