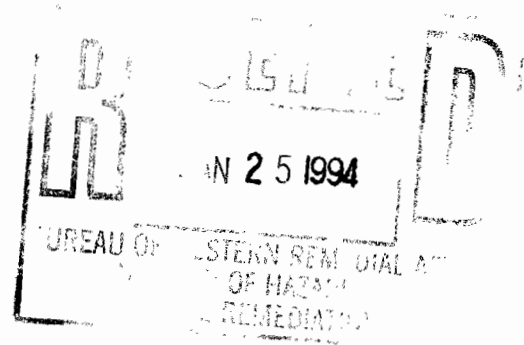




**PHASE I REMEDIAL INVESTIGATION REPORT
DEARCOP FARM SITE
GATES, NEW YORK
SITE NUMBER 8-28-016
Volume I**

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Prepared for:

**NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, New York 12205**



ecology and environment engineering, p.c.

BUFFALO CORPORATE CENTER 368 Pleasantview Drive, Lancaster, New York 14086
Tel: 716/684-8060, Fax: 716/684-0844

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EXECUTIVE SUMMARY

Ecology and Environment Engineering, P.C. (E & E), under contract to the New York State Department of Environmental Conservation (NYSDEC) (Work Assignment No. D002625-10) performed a Phase I Remedial Investigation (RI) between October 1991 and April 1993 at the Dearcop Farm site (NYSDEC Site No. 8-28-016) in Gates, New York. The purposes of this investigation were to determine the nature, extent, and source of contamination present at the site and to evaluate the extent to which the contamination poses a threat to human health or the environment.

The 16-acre site is situated in an urban area west of the New York State Barge Canal (Barge Canal) and the City of Rochester. The northern 10 acres of the site are overlain by the interchanges of Interstate Routes 390 (I-390) and 490 (I-490) since the late 1950s. The southern 6 acres of the site are an undeveloped parcel adjacent to a residential area to the south. The site was used as a disposal area from 1919 to 1970, allegedly receiving wastes from General Railway Signal Company, E.I. DuPont DeNemours and Company, Inc. (DuPont), American Brakeshoe Company, and Pfaunder Company. The wastes included rubbish, office paper, wood, debris, scrap iron, foundry dirt, sand blasting debris, sand castings, and 1,000 gallons of unknown substances from DuPont reportedly disposed of in a burn pit on site. The burn pit was located beneath the median between eastbound and westbound I-490, east of I-390, and west of the Barge Canal. Other wastes disposed of at the site included acids, heavy metals, waste oil and oil sludges, and halogenated organics.

Phase I RI

In October 1991, an initial site walkover survey was performed by E & E with NYSDEC representatives present prior to the project scoping meeting. A Phase I RI work

plan was developed by E & E and approved by NYSDEC in May 1992. The Phase I RI fieldwork began in August 1992 and was completed in April 1993. The fieldwork was described in detail in the work plan and included the following:

- A preliminary on-site surface radiation survey to locate areas of elevated radiation levels and/or radioactive contamination to facilitate development of health and safety protocols;
- A soil gas survey in the vacant lot area, highway median, barge canal area, and yards of selected residential lots to screen the site and its surrounding areas for volatile organic contamination, and to aid in the placement of monitoring wells and other sample locations;
- A magnetic and electromagnetic (EM) geophysical survey to estimate fill boundaries and to determine any subsurface anomalies;
- Test pit excavations to verify geophysical anomalies and characterize fill materials;
- Sampling of subsurface soils to characterize the nature and extent of subsurface soil contamination and aid in subsurface geologic interpretations;
- Installation and sampling of several groundwater monitoring well pairs to characterize shallow and deep aquifer gradients and chemical composition;
- Aquifer testing (i.e., Packer Testing) during monitoring well drilling to calculate the hydraulic conductivity of the underlying bedrock; and
- Sampling of surface soils, surface water, sediments, water from manholes, and a quarry seep to characterize the extent of contamination in the media.

During drilling activities, natural gas was encountered at the base of the Lockport formation. The gas was detected by organic vapor analyzer (OVA) readings greater than 1,000 parts per million (ppm), explosimeter readings of 100% of the lower explosive limit (LEL), and strong hydrogen sulfide or mercaptan odors. Sampling of gas produced from deep bedrock monitoring wells was performed to determine the presence or absence of contaminants that may have been incorporated by the natural gas from disposed materials at the site.

The preliminary surface radiation survey indicated only low levels of radiation (i.e., less than or equal to three times background) throughout the site. Areas with slightly elevated readings (up to three times background) were characterized by blue fine-grained material (i.e., glass fines).

The soil gas survey indicated two purgeable halocarbon plumes separated by Interstate 490 eastbound lanes. One plume was located in the northwest portion of the vacant lot area, and the other on the interstate median between the eastbound and westbound lanes. Based on this data, the soil gas plume probably extends beneath the interstate. Isolated positive soil gas readings were also detected at various other locations in the vacant lot area, and some of the residential lots up to 1,000 feet south of the site. Not all of the lots were tested for soil gas contamination (i.e., 35 of the 80 lots along Dearcop Drive and Varian Lane). Purgeable aromatics were mainly detected on the I-490 median; however, localized areas of elevated concentrations were also found in the vacant lot area. The overall results of the soil gas survey were helpful for placing test pits, soil borings, and monitoring wells.

The magnetic and electromagnetic geophysical survey identified areas of highly conductive fill materials which apparently define fill boundaries based upon visual observations, subsurface excavation, and drilling data. Results of the geophysical survey were used in choosing test pit locations.

Test pit excavations provided valuable data in characterizing the nature of the materials disposed at the Dearcop Farm site. These materials included: metal and glass slag, other industrial and municipal debris, and rusted drums filled with oily substances in localized areas. Subsurface soils collected from the various test pits contained elevated levels of purgeable halocarbons and aromatics, semivolatiles, polychlorinated biphenyls (PCBs), pesticides, and metals. The highest PCB concentration (Aroclor 1248) of 210 ppm was detected in a soil sample soaked with oil from one of the leaking drums.

Subsurface soils collected from residential lots indicated the presence fill materials believed to have originated from the site in three of the 12 lots sampled within a 1,000 feet of the site. Elevated levels of polynuclear aromatic hydrocarbons (PAHs) and metals (cadmium, copper, lead, and nickel) were detected in some of the residential subsurface soil samples. Additionally, 6.5% asbestos fibers were detected in one of the samples.

Subsurface soils from monitoring well installations contained low levels of volatile organic compounds (VOCs), semivolatiles, PCBs, and pesticides; cadmium was detected above the common range for eastern United States soils.

Groundwater was encountered in two aquifer systems with different hydraulic heads: overburden/shallow bedrock interface aquifer, and deep bedrock aquifer. The aquifer systems are separated by a leaky, massive dolomite bed within the Lockport Dolomite. The aquifer hydraulic heads converge adjacent to the Barge Canal to the east of the site. Groundwater in the overburden/shallow bedrock interface aquifer was contaminated with elevated levels exceeding drinking water standards, of 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethene (total), 1,1,1-trichloroethane, trichloroethene, and vinyl chloride. Several metals were also detected in the groundwater; however, due to high turbidity of the samples, it cannot be determined whether the metals are dissolved in the groundwater or the metals sorbed on the particulates. The deep bedrock aquifer also contained one or more of the volatile organic compounds listed above, however, at much lower concentrations. The presence of these contaminants in the deep aquifer confirms that the intervening layer is leaky and there is downward migration. Concentrations of contaminants in the monitoring wells varied considerably across the site, indicating multiple source areas.

Surface soil samples from the site indicated the presence of low levels of VOCs, semivolatiles, PCBs, pesticides, and levels of cadmium, cobalt, copper, and lead elevated above the common range of metals in soil of the eastern United States. A surface soil sample collected off site from a residential lot contained low levels of VOCs and pesticides.

Surface water samples collected from a drainage ditch that passes through the site did not contain significant levels of contaminants other than iron which exceeded surface water standards. Low levels of 2-chloropyridine were detected in the three surface water samples collected from the Barge Canal. Pyridine compounds are indicative of contaminants originating from the Olin Chemical Site located to the southeast of the Dearcop Farm site. Sediments collected from the drainage ditch contained elevated levels of semivolatiles, with phenanthrene exceeding a NYSDEC sediment criterion, and low levels of pesticides. Samples from the Barge Canal contained VOCs and PCBs. Cadmium, copper, lead, and mercury exceeded one or more environmental criteria in samples from both the drainage ditch and the Barge Canal. Based on current data it is not evident that the Dearcop site is the source of the sediment contamination detected.

Water samples collected from sanitary sewer manholes located on and adjacent to the site indicated the presence of VOCs and several metals. Based upon the concentration of these contaminants, and their relative presence (both upgradient and downgradient of the site), there is no conclusive evidence that contaminants are entering the sewer system beneath the site.

A seep sample was collected from the quarry located approximately 0.5 miles southwest of the site. No apparent site contaminants were detected in this sample. It was later determined that the quarry is upgradient of the site and the direction of groundwater flow beneath the site is apparently unaffected by the presence of the quarry.

Finally, analysis of gas samples collected from monitoring wells producing natural gas indicated that 99% of the gas was petroleum hydrocarbons, and less than 1% sulfides were detected in some of the well samples. Due to the potential hazards to the public from explosive gases emanating from the monitoring wells or migrating below ground surface, several wells were decommissioned. The decommissioning of the wells was performed using special procedures and techniques to ensure that the wells were properly plugged.

Contaminant Fate and Transport

The Phase I RI results indicate that the fill material is the primary source of contamination at the Dearcop Farm site. As a result of the leaching of contaminants from the fill material, soil gas, soil, and groundwater on and in the vicinity of the site were found to contain contaminants of potential concern. Surface water and sediment appear to be minimally affected by site-related contaminants because runoff is minimal relative to infiltration and, due to site topography, overland flow from the site to the Barge Canal is limited to the drainage ditches.

VOCs were detected in numerous soil gas samples. The highest concentrations were detected in the vacant lot south of I-490 and in the I-490 eastbound/westbound median. The overall direction of groundwater flow is east/northeast in both the shallow and deep bedrock aquifers. The shallow groundwater discharges into the Barge Canal. Groundwater flow is predominately through rock fractures and joints. Seasonal water level fluctuations in the Barge Canal affect the groundwater contaminant migration, causing a seasonal variation in groundwater velocity and volume of discharge to the canal, with a similar variation in contaminant discharge.

Risk Evaluation

The results of the Phase I RI investigation of the Dearcop Farm site indicate that the site contamination could pose a potential threat to human health. COPCs were detected in soils, sediments, groundwater, and surface water on and near the site. Of the potential exposure pathways, the pathways most likely to pose the greatest risks are:

- Direct contact (dermal contact and incidental ingestion) by site trespassers with PAHs, PCBs, metals, and radionuclides in site surface soils.
- Inhalation of resuspended soil particles by site trespassers and possibly off-site residents.

An important data gap that could affect the risk assessment is the lack of local background soil samples. Background soil data is particularly important because metals are naturally occurring in soils and because most of the NYSDEC criteria for soils are based on local background concentrations. Radionuclides are also naturally present in soil and comparisons with background data are needed to separate background levels from these potentially due to site contamination. During the Phase II RI, background surface soil samples will be collected from nearby areas that are not affected by the site and the results will be presented as a Phase II RI addendum to this report.

Additional sediment sampling and analysis is also recommended to determine if the site is the source of the Aroclor 1254 and mercury contamination detected in the Barge Canal. This additional sediment chemical data would be used to determine if fish consumption is a potential exposure pathway for site-derived chemicals that is likely to pose a risk to human health.

Another data gap is the lack of off-site surface soil data from yards where site materials were used as fill. This data is needed to evaluate potential, direct exposures of residents to soil contaminants in their yards.

Habitat-Based Assessment

The sampling of the sediments from the drainage ditch, intermittent stream, and the Barge Canal indicates contamination above levels of concern for benzo(a)pyrene, phenanthrene, and PCBs. Further investigation is needed to determine if the source of contamination is the Dearcop Farm site or from other sources (e.g., industries and Interstates 390 and 490).

If the source of sediment contamination is determined to be the Dearcop Farm site, then additional site-specific information such as identification of benthic communities, toxicity tests, and tissue analysis would be necessary to further characterize the potential risk posed by site-related contaminants. Additionally, due to the lack of criteria-specific standards and guidance values for soils, a detailed toxicological effects analysis using indicator species would also be recommended. This analysis would fully characterize the potential risks posed by elevated levels of metals detected on the Dearcop Farm site.

Phase II RI

Based on the results of the Phase I RI, E & E recommends that the following samples be collected during the Phase II RI:

- Composite surface soil samples from residential lots believed to contain fill material from the site based on previous questionnaires;
- Grab surface soil samples of debris found during the above-mentioned composite sampling;
- Several background surface soil samples to better characterize background conditions;
- Subsurface soil from 331 Dearcop Drive to better characterize the thickness and chemical content of site debris noted on this property;
- Soil gas samples from 206 and 331 Dearcop Drive, from soils that are known to contain fill materials from the site;
- Vegetable samples from residential lots known to contain fill materials from the site; and
- Surface water and sediment samples from the drainage ditch passing through the site and the barge canal adjacent to the site.

The results of these samples will help verify existing data and characterize off-site and background conditions to better evaluate the human health risk assessment.

Results of the Phase II RI will be summarized as an addendum to the Phase I RI Report. The scope of the Phase II RI is outlined in Appendix G.

1. INTRODUCTION

1.1 PURPOSE OF REMEDIAL INVESTIGATION

Ecology and Environment Engineering, P.C. (E & E), under contract to the New York State Department of Environmental Conservation (NYSDEC), was tasked to perform a Phase I Remedial Investigation/Feasibility Study (RI/FS) at the Dearcop Farm site (#8-28-016) in the Town of Gates, New York. This RI/FS is being performed under work assignment #D002625-10 of E & E's State Superfund Standby Contract.

The objectives of the Phase I RI/FS are to:

- Characterize physical and environmental conditions at the site;
- Determine the nature, extent, and source of contamination present at the site;
- Determine past, present, and anticipated pathways of contaminant release;
- Present maps illustrating contaminant concentrations, potential migration pathways, and data summaries;
- Compare analytical data against federal and state regulatory standards; and
- Identify potential remedial alternatives to mitigate contamination problems that pose threats to public health and the environment as determined by the fieldwork and risk assessment.

1.2 SITE DESCRIPTION

The Dearcop Farm site is an approximately 16-acre inactive landfill according to former Dearcop property boundaries located at the north end of Dearcop Drive and Varian

Lane in the Town of Gates, Monroe County, New York (see Figures 1-1 and 1-2). The southern 6 acres of the site are owned commonly by Mr. William L. Dearcop and Mr. Charles R. Dearcop, Jr. The northern 10 acres of the site are owned by the New York State Department of Transportation (NYSDOT).

The site is situated in an urban area just west of the New York State Barge Canal (Barge Canal) and the City of Rochester. Presently, the interchange for Interstate Routes 390 and 490 are situated on the northern 10 acres of the original 16-acre landfill. The remaining 6 acres of the site are open in the west and central portion with evidence of past grading. The eastern portion is wooded with some low-lying, seasonally wet areas. The site is bordered to the south and southwest by a residential area consisting of 80 homes along Dearcop Drive and Varian Lane. The nearest homes are located immediately adjacent to the site. The nearest business is approximately 0.5 mile south of the site along Buffalo Road (Route 33). Along the east side of the site a man-made embankment of soil and rock from canal construction trends north-south, about 50 to 75 feet west of the canal. A biking/jogging path is located adjacent to the canal. The Barge Canal is commonly used for navigation, swimming, and fishing in the vicinity of the site. North of Interstate Route 490 is undeveloped wooded land. Two Class 2 inactive hazardous waste sites, Olin Chemicals Corporation (Site No. 8-28-018A) and McKee Road Industrial Dump (Site No. 8-28-018B), are situated southeast of the site on the eastern side of the Barge Canal, and one Class 2A site, Chevron USA Tank Farm (Site No. 8-28-060) is located approximately 0.5 mile south of the site. Further discussion of these other sites is presented in Section 1.5.

The aquifer of concern beneath the site is the underlying dolomite bedrock of the Lockport Formation. This aquifer is not used for water supply in the immediate vicinity. There are no community or municipal wells within a 3-mile radius of the site. The area is serviced by public water supplies, which are surface water sources (EA Science and Technology 1988).

Monroe County Water Authority's water source is Lake Ontario, and the City of Rochester's water sources are Hemlock Lake, Canadice Lake, and Lake Ontario. These three lakes are located more than 3 miles from the site. One private well is located within a 3-mile radius of the site (EA Science and Technology 1988).

The portion of the site south of Interstate 490 (the vacant lot area) is well vegetated with weeds, brush, and trees. Foundry sand, slag, scrap metal, wood, glass, and other debris

can be seen at the surface in this area. The terrain is uneven (5% to 15% slope), but basically the slope and drainage trend north and east to the canal. Access to the site is from the south off Dearcop Drive and Varian Lane. In 1990, NYSDEC installed chain-link fencing in some areas (i.e., at the end of Dearcop Drive and Varian Lane, and along the bikepath) in an attempt to control site access. However, during the RI investigation, trespassers were observed on site on numerous occasions. In January 1993, NYSDOT installed a chain-link fence along the west side of the bike path adjacent to the site, which further restricted access by trespassers.

1.3 SITE HISTORY

The site was used as a disposal area in 1919, shortly after the property was purchased by Mr. Charles L. Dearcop, and operated until 1970. In 1931, after Charles L. Dearcop died, the site was inherited by Charles R. Dearcop, Sr. and Herbert Dearcop. More recently, Mr. Charles R. Dearcop, Jr. and Mr. William L. Dearcop inherited an interest in the site after Charles R. Dearcop, Sr. and Herbert Dearcop died.

A detailed aerial photograph analysis and maximum boundary map indicates the site was active from 1930 through 1970 (Monroe County Environmental Management Council). Reportedly, the site received industrial wastes from General Railway Signal Company, E.I. DuPont DeNemours and Company, Inc. (DuPont), American Brakeshoe Company, and Pfaudler Company during its operation (EA Science and Technology 1988). An analysis of a 1961 aerial photograph showed the highway interchange was under construction by the NYSDOT. A NYSDOT drilling log for a boring completed at the site dated November 26, 1958 suggests the property was purchased by the NYSDOT from the Dearcops around that time and dumping in the northern section had ceased.

A representative for Charles R. Dearcop, Jr. stated in a letter to NYSDEC that the Dearcops had contracts with Pfaudler, General Railway Signal, and DuPont for hauling and disposing waste, but never hauled wastes from American Brakeshoe (EA Science and Technology 1988). The waste disposed of at the site included rubbish, office paper, wood, debris, scrap iron, foundry dirt, sand blasting debris, and sand castings. Also, 1,000 gallons of unknown substances from DuPont were reportedly burned in an open pit at the site. According to information supplied by DuPont to NYSDEC, DuPont first used the Dearcop site to dispose of waste beginning in 1945, and the practice continued for an unknown period

of time. Waste disposed of at the site by DuPont included acids, heavy metals, waste oil and oil sludges, halogenated organics, and other compounds. Total amounts of these wastes at the site is unknown. The method of disposal was through open burning. The solvent burning area was located beneath the current location of the Interstate Route 490 (I-490) eastbound/westbound highway median (EA Science and Technology 1988). Recent reconstruction of I-490 (which began in the spring of 1991) necessitated the placement of a geotextile liner over the former burn pit area. When construction was completed (spring/summer 1993), the liner was left in place, additional fill material (approximately 1 to 2 feet) was placed over the area, and the area was regraded.

According to information supplied by Pfaudler Company to NYSDEC, there were no written records indicating Pfaudler used the Dearcop Farm site for any hazardous waste disposal. Employees recall only non-hazardous materials such as trash, fines from glass-making operations, wood, paper and rubble disposed at the Dearcop site. General Railway Signal and American Brakeshoe both stated that they did not dispose of hazardous waste at the Dearcop site.

1.4 PREVIOUS INVESTIGATIONS

Previous environmental investigations have been conducted at the Dearcop Farm site and the nearby Olin Chemicals Corporation, Chevron USA Tank Farm, and McKee Road Industrial Dump. These investigations are summarized by site below.

Dearcop Farm

A Phase II investigation report for the Dearcop Farm site was completed in April 1988 by EA Engineering, Science, and Technology, Inc. The investigation consisted of the installation and sampling of three groundwater monitoring wells, an electromagnetic (EM) conductivity survey and a magnetometer survey, surface water sampling, sediment sampling, drum sampling, and records research. Analytical results of samples collected from the three monitoring wells indicated that the groundwater beneath of the site was contaminated with halogenated and aromatic volatile organic compounds (VOCs). The highest concentrations were detected in samples from well DR-2 and well DR-3 (see Table 1-1). Surface water and sediments were not found to be contaminated. The magnetometer survey detected several

acres with high magnetic readings in the landfill north of the residential area, and in the I-490 median.

Sampling activities conducted by NYSDEC during 1990 included the analysis of groundwater, surface water, and soil/sediment. In June 1990, NYSDEC collected soil/sediment samples from six locations at the Dearcop Farm site. These samples were identified as 1 through 6 and their approximate locations are presented in Figure 1-3. Elevated concentrations of polychlorinated biphenyls (PCBs) were detected in samples 2 and 3 at 0.34 milligrams per kilogram (mg/kg) and 0.24 mg/kg, respectively. Sample 2 also exhibited the highest concentration of cobalt (504 mg/kg). The highest concentrations of zinc (1,270 mg/kg) and copper (137 mg/kg) were detected in samples 4 and 5, respectively. Elevated levels of radioactive isotopes were detected in a soil sample collected on July 18, 1990, from a blue-stained surface soil deposit located on the northwest section of the vacant lot area. Radium-226 and Radium-228 were detected at 5.1 picocuries per gram (pCi/g) and 3.4 pCi/g, respectively. These results indicated that additional soil/sediment sampling is required to determine the extent of this type of contamination at or adjacent to the site.

In September 1990, at the request of the Monroe County Health Department (MCHD), the New York State Department of Health (NYSDOH) collected eight soil samples from residential yards (93, 94, and 181 Dearcop Drive and 5, 6, 24, 69, and 74 Varian Lane), and three vegetable samples from residential yards (94 Dearcop Drive and 24 and 69 Varian Lane). The levels of metals, pesticides, and polynuclear aromatic hydrocarbons (PAHs) in soil samples were at concentrations normally expected in a suburban residential neighborhood. PCBs were also found in some yards, but at levels far below those considered to be a health concern. Vegetable samples indicated the presence of lead, which showed elevated levels in the sample obtained from 69 Varian Lane as compared to previous vegetable sampling data. Therefore, an additional vegetable and soil sample was collected on July 23, 1991, from 69 Varian Lane. The lead concentration in the 1991 soil sample (134 ppm) was similar to the lead concentration in the 1990 sample (174 ppm). The levels of lead in the vegetable samples were also similar (i.e., 0.44 ppm in 1991, and 0.48 ppm in 1990). NYSDOH determined that these levels are within the common range of lead found in vegetable studies in New York State and other locations.

On October 17, 1990, groundwater samples were collected from the three existing site wells (DR-1, DR-2, and DR-3), surface water and sediment were collected upgradient and

downgradient (DR-S1 and DR-S2) of the site from a stream which runs parallel and north of I-490, and a sediment sample was collected from a seasonally dried up pond located to the northeast of the north end of Varian Lane (see Figure 1-3). The results of these analyses confirmed VOC contamination of the groundwater at levels exceeding New York State Class GA groundwater standards in all three wells (see Table 1-2). Numerous chlorinated organics were detected at concentrations above Class GA groundwater standards in well DR-2, which was originally thought to be an upgradient well. Therefore, these findings indicated that groundwater flow direction needed further investigation in order to determine true upgradient conditions, and that deeper bedrock investigations for chemical contamination were necessary. Furthermore, analytical results from surface soil/sediment samples indicated elevated levels of PCBs, heavy metals (cobalt, copper, zinc), and radioactive isotopes (Radium-226 and Radium-228). No elevated contaminants were detected in the sediment from the dried-up pond.

On May 14, 1991, representatives of NYSDEC and MCHD collected samples from basement sumps at three residences along Dearcop Drive (93, 94, and 181 Dearcop Drive) and three along Varian Lane (5, 6, and 24 Varian Lane) and analyzed them for VOCs. Five of the six samples did not contain VOCs; however, the sample from 94 Dearcop Drive contained 1,000 ppb acetone and 14 ppb toluene. The source of these VOCs was believed to be common household paint and paint and varnish remover present in the basement of 94 Dearcop Drive. When the sump was resampled on September 13, 1991, results indicated a lower concentration of acetone (15 ppb). Once again, the source of acetone was believed to be household products.

Olin Chemicals Corporation

The Rochester plant of Olin Corporation (Olin) is a 15.3-acre site located 1,500 feet east of the Barge Canal in the southwestern section of Rochester on McKee Road in Monroe County, New York. It is approximately 0.4 miles southwest of the Dearcop site (see Figure 1-1). Under a Consent Agreement between NYSDEC and Olin (Index no. D8-003-85-06), Olin performed a groundwater investigation at the site. The groundwater investigation was submitted to NYSDEC in September 1990 and presents the results of the groundwater study along with other investigation work and remedial actions taken by Olin since 1981 (Olin 1990).

Natural groundwater flow beneath the Olin facility was determined to be predominantly west/southwest toward the Barge Canal, with a smaller easterly component. In May 1989, remedial interception of groundwater in the bedrock was initiated through the use of two pumping wells. Pumping at 1 to 2 gallons per minute (gpm), the wells create a cone-of-depression in the southern half of the Olin property where contamination was identified. The cone causes drawdowns of 25 feet in the pumping wells, 4.5 feet within a 150-foot radius in the southern end of the site, and 2 feet within a 650-foot radius in the northern end of the site. Treatment of the water is through carbon adsorption. Treated water is then discharged via the plant's permitted outflow.

The primary contaminants found during the groundwater investigation include: monochloropyridines, pyridine, carbon tetrachloride, methylene chloride, and chloroform. Other organic compounds detected at the site include several benzenes, chlorinated benzenes, aliphatic hydrocarbons, chlorinated aliphatic hydrocarbons, and aromatics. Total organic compounds range from 10 micrograms per liter ($\mu\text{g/L}$) at the northern end of the property to 700,000 $\mu\text{g/L}$ at the southern end of the property.

The Barge Canal to the west of Olin and the Genesee River to the south and east of Olin have been designated as receptors of groundwater contaminants from the Olin Plant. Since the Barge Canal is a groundwater divide between the Olin site and the Dearcop site, samples collected from the Barge Canal and groundwater wells on the west side of the canal, and upgradient of the Dearcop site (i.e., wells on Dearcop Drive) were tested for compounds which are specific to the Olin site (e.g., pyridines) (see Section 4).

In August 1993, Olin entered into a Consent Order with NYSDEC to conduct an RI/FS at the site.

Chevron USA Tank Farm

The Chevron USA Tank Farm (Chevron) is a 15-acre site located just west of Rochester adjacent to the Barge Canal on the south side of Buffalo Road (NY Route 33) within the Town of Gates, Monroe County, New York. It is approximately 0.4 miles south of the Dearcop Farm site (see Figure 1-1).

An investigation conducted by MCHD and NYSDEC Region 8 as a result of a major oil spill from the facility in 1980 indicated that local groundwater flow appears to be from the south (URS 1988; Albert 1993). However, northwest trending bedrock fracture systems are

reported in areas which could influence groundwater flow patterns. In addition, de-watering wells are reportedly in operation at a quarry located approximately 1,000 feet west of the site which could influence groundwater flow patterns.

Chevron disposed of an estimated 5.5 tons of tank bottom sludges during tank cleaning in the 1960s on the ground surface in diked containment areas. These sludges consisted of No. 2 fuel oil, No. 6 fuel oil, and leaded gasoline. There were several oil leaks and spills at the facility which have resulted in discharges to the Barge Canal. In 1980, analyses of oil samples confirmed that the canal and groundwater were contaminated with No. 2 fuel oil. Furthermore, in 1980, NYSDEC conducted a Phase I investigation involving data searches and site inspections from which they obtained preliminary Hazard Ranking System (HRS) scores. NYSDEC proposed a Phase II investigation consisting of air monitoring, sub-surface boring sampling and analysis, monitoring well installations, and groundwater and surface water sampling and analysis.

The Barge Canal to the east of the Chevron site has been designated as a receptor of groundwater contamination.

McKee Road Industrial Dump

The McKee Road Industrial Dump (McKee) is located west of McKee Road directly east of the Barge Canal along the western boundary of Rochester, New York within Monroe County. It is approximately 0.15 miles southeast of the Dearcop site (see Figure 1-1). This site includes two separate areas, namely the "Aid to Hospitals" area and the "Monroe Forgings" area.

A Preliminary Site Assessment was performed by URS Consultants (1991) for NYSDEC. The following describes the results of this study.

The westerly flow of groundwater prior to May 1989 suggests there may have been a source of contamination upgradient of the McKee site. Groundwater from the Olin overburden wells analyzed in 1982 were found to contain volatile organics, base/neutral acid extractables (BNAs), and phenols. In May 1989, groundwater flow direction was reversed via remedial interception of groundwater in bedrock on the Olin site, as a result, groundwater now flows toward the Olin property.

The Aid to Hospitals area contains a construction and demolition (C&D) debris pile north of the Aid to Hospitals building. This pile was sampled in 1989 by NYSDEC and

analyzed for metals; however, none of the results exceed the average range for soils in the eastern United States. In addition, fly ash (coal ash) is located in an area west of the Aid to Hospitals building. A NYSDEC memo dated 1986 lists chromium, cobalt, copper, barium, nickel, and vanadium as being detected in the soil of the Aid to Hospitals area. Also, 4,4'-dichlorodiphenyltrichloroethane (4,4'-DDT) was detected at levels up to 2,200 micrograms per kilogram ($\mu\text{g/kg}$). Drums containing an oily looking sludge were removed in 1981 from the Aid to Hospitals area.

In 1986, the Ring Mill Building was constructed in the Monroe Forgings area, and required excavation. Soil borings and test pits were advanced by Lozier Engineers. Samples were taken of the soil and water in the borings and of stockpiled soil and rock from the borings, which to date remains on site. Soil composites from borings showed contamination by oil and grease. The toxicity characteristic leaching procedure (TCLP) also showed low-level barium and methylethylketone contamination. The water from the borings was also contaminated with oil and grease. Toluene was detected at 5.3 parts per billion (ppb).

In 1990, URS Consultants, under contract to NYSDEC (contract No. D002340) performed Task 1 of a Preliminary Site Assessment which included file reviews and a site inspection. In addition, four samples for metals analysis were taken from the C&D debris pile in the Aid to Hospitals area. The results did not exceed the average range for the Eastern United States.

The Barge Canal to the west and the Genesee River to the south and east have been determined to be receptors of groundwater contaminants from the McKee Road site.

On April 1, 1992, the McKee Road Industrial Dump was delisted due to no determination of hazardous waste disposal (Marvin 1993).

Table 1-1 SUMMARY OF ORGANIC AND INORGANIC CONTAMINANTS DETECTED IN GROUNDWATER COLLECTED AT THE DEARCOP FARM SITE IN NOVEMBER 1985					
Compound	DR-1	DR-2	DR-3	Trip Blank	Method Blank
Volatiles (µg/L)					
Methylene chloride ^a	BCRDL	220	BDL	9	BCRDL
Vinyl chloride	BCRDL	BDL	660	—	—
Acetone ^a	BCRDL	BDL	BDL	BCRDL	BCRDL
1,1-Dichloroethane	12	6,600	1,200	—	—
Trans-1,2-Dichloroethene	23	960	4,000	—	—
2-Butanone ^a	BCRDL	BDL	BDL	BCRDL	BCRDL
1,1,1-Trichloroethane	16	390	170	—	—
Trichloroethene	10	360	730	—	—
1,1-Dichloroethene	—	610	BDL	—	—
1,2-Dichloroethane	—	BDL	—	—	—
Benzene	—	—	300	—	—
Toluene	—	—	BDL	—	—
Semivolatiles (µg/L)					
Bis(2-ethylhexyl)phthalate ^a	22	36	BCRDL	14	BCRDL
Di-n-octyl phthalate	—	—	—	BCRDL	—
Metals (mg/L)					
Aluminum	0.6	0.5	0.3	<0.2	<0.2
Arsenic	<0.002	BCRDL	<0.002	<0.0002	<0.0002
Barium	BCRDL	BCRDL	BCRDL	<0.02	<0.02
Cadmium	BCRDL	BCRDL	BCRDL	<0.0002	<0.0002
Calcium	50	180	190	<1.0	<1.0
Chromium	<0.002	BCRDL	<0.002	<0.002	<0.002
Copper	<0.05	BCRDL	0.074	<0.005	<0.005
Iron	1.11	7.9	3.1	<0.05	<0.05
Lead	0.036	0.022	0.021	<0.005	<0.005
Magnesium	12.0	100	83	<0.5	<0.5
Manganese	0.03	0.30	0.10	<0.01	<0.01

Key at end of table.

Table 1-1 SUMMARY OF ORGANIC AND INORGANIC CONTAMINANTS DETECTED IN GROUNDWATER COLLECTED AT THE DEARCOP FARM SITE IN NOVEMBER 1985					
Compound	DR-1	DR-2	DR-3	Trip Blank	Method Blank
Potassium	BCRDL	BCRDL	17	<1.0	<1.0
Silver	<0.0005	<0.0005	BCRDL	<0.0005	<0.0005
Sodium	20.0	140	650	<5.0	<5.0
EA Number	11,410	—	11,411	11,412	11,416

*Parameter was detected in the method blank.

Note: Due to missed holding times, pesticides and PCBs were analyzed from additional samples collected on June 3 and 5, 1987.

This analytical program included the full Hazardous Substance List (HSL), however, this summary table includes only those parameters detected in at least one sample.

Key:

BCRDL = Detected Below Contract Required Detection Limit.

BDL = Detected Below Detection limits effected by concentration of other constituents.

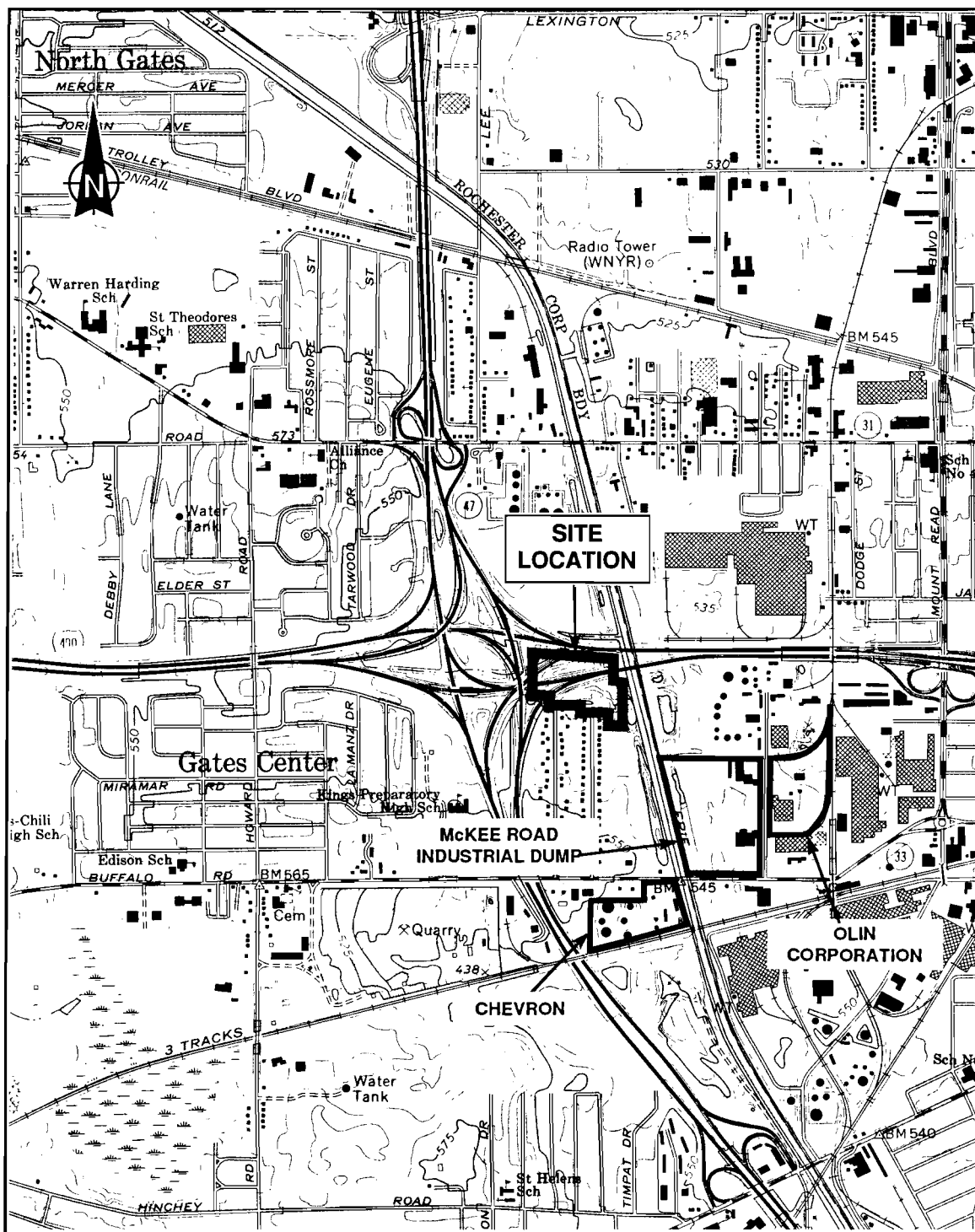
Source: NYSDEC 1991.

Table 1-2 SUMMARY OF ORGANIC CONTAMINANTS DETECTED IN GROUNDWATER COLLECTED AT THE DEARCOP FARM SITE OCTOBER 1990 ($\mu\text{g/L}$)				
Compound	DR-1	DR-2	DR-3	NYS Class GA Groundwater Standard
Benzene	—	19	370	0.7
Chloroethane	—	40	—	5
1,1-Dichloroethane	53	1,300	780	5
1,2-Dichloroethane	—	86	25	5
1,1-Dichloroethene	—	490	73	5
1,2-Dichloroethene (total)	25	820	2,500	5
Ethyl benzene	—	—	6	5
1,1,1-Trichloroethane	20	640	140	5
Trichloroethene	6	690	630	5
Toluene	—	—	10	5
Vinyl chloride	—	230	690	2
Xylenes (each individual isomer)	—	—	8	5

Key:

— = Non-detect.

Source: NYSDEC 1991.



SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangle: Rochester West, NY, 1971, Photorevised 1978.

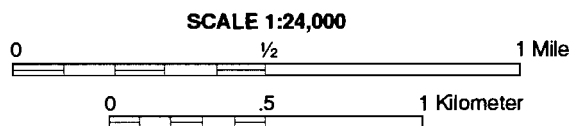
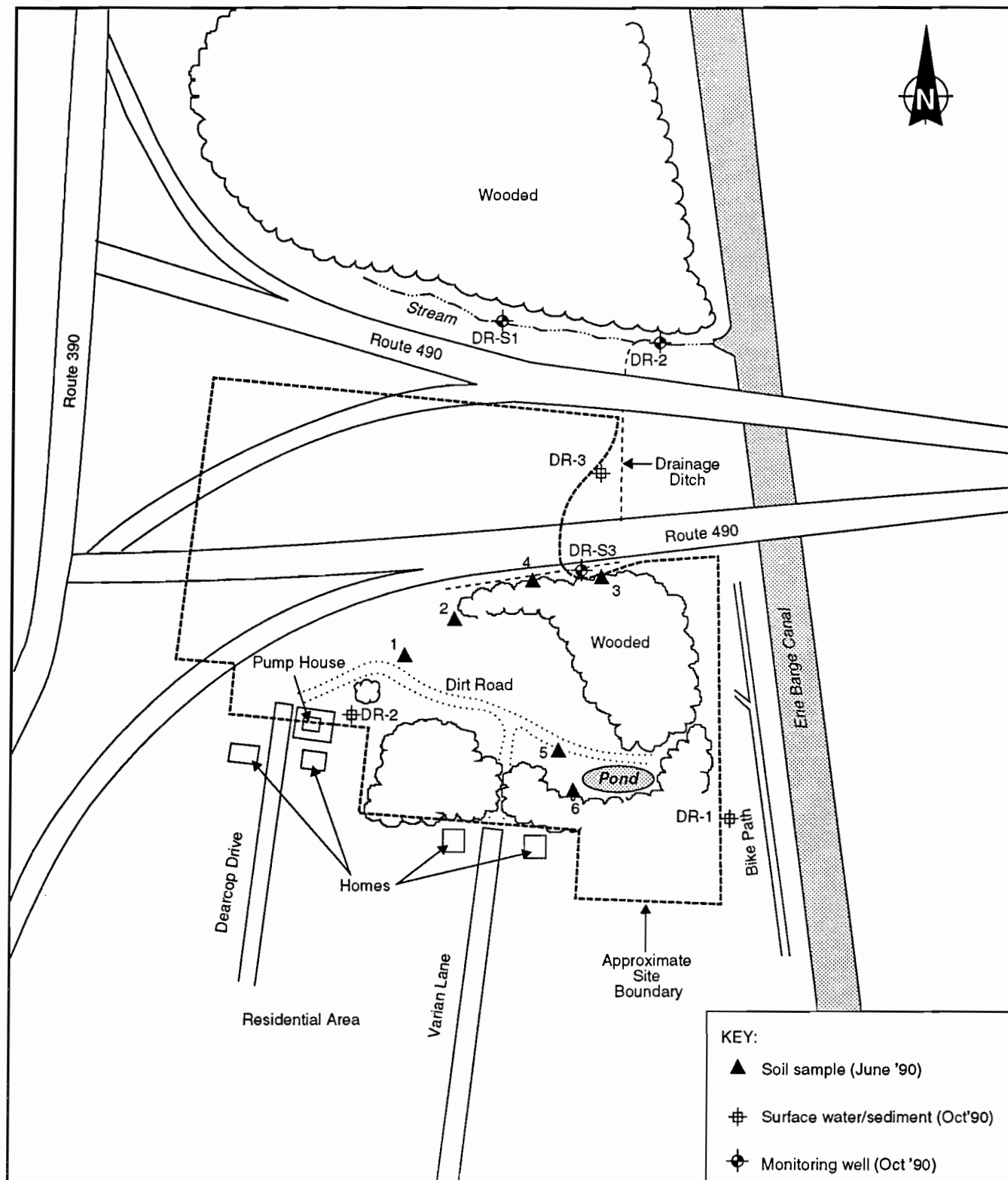


Figure 1-1
SITE LOCATION MAP, DEARCOP FARM SITE

Figure 1-2 EXISTING SITE PLAN
DEARCOP FARM SITE



SOURCE: NYSDEC 1993

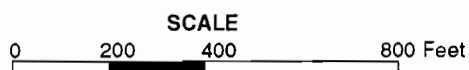


Figure 1-3
SAMPLE LOCATION MAP FOR NYSDEC 1990 SAMPLING EVENTS

2. STUDY AREA ENVIRONMENTAL DESCRIPTION

2.1 PHYSIOGRAPHY AND TOPOGRAPHY

The Dearcop Farm site is located in the Central Lowland physiographic province. This province is the largest in the United States and is characterized by glacial erosion and deposition of the Pleistocene Epoch. The province is divided into six sections on the basis of glacial history and features (Pirkle and Yoho 1977). The site is located within the Eastern Lake Section or Ontario Lake Plain, which is described as a plains region covered by a blanket of relatively young glacial drift that has created a hummocky topography containing many moraines, lakes, and lake plains (see Section 2.2.1 for greater detail).

The topography of Monroe County changes generally from north to south with the northern portion being flat to gently sloping where a former glacial lake plain existed from the bed of glacial Lake Iroquois, which now is occupied by the smaller Lake Ontario. South of the lake plain is a beach ridge left behind by glacial Lake Iroquois, which crosses the county in a generally east-west band of sand and gravel. South of the beach ridge, most areas are made up of end moraines, till plains, and drumlins with some small lake beds. Slopes in the area range from nearly level to steep. Elevation in the county range from approximately 400 feet above mean sea level (MSL) in the northern lake plain area to a maximum of 900 feet above MSL to the south where drumlins are found (USDA 1973).

Elevations at the site range from less than 535 feet MSL in the southeastern portion to as high as over 550 feet MSL in the area between I-490 eastbound and Varian Lane. The site topography is primarily the result of fill material that had been dumped at the site, creating a general rolling surface (USGS 1978).

2.2 REGIONAL GEOLOGY

2.2.1 Surficial Geology

Monroe County is primarily mantled by glacial till, laminated lacustrine clay, and silt deposits. The till consists of unconsolidated, poorly sorted clay, silt, and/or sand deposits of relatively low permeability. Till thickness ranges from 1 to 165 feet. Lacustrine deposits extend southward nearly 10 miles from the southern shore of Lake Ontario and exhibit moderate bedding plane permeability. Eskers, trending southwest, exist in the western part of the county. Eskers are glacial features represented by sinuous ridges of fluvial materials (e.g., sands and gravels) that were deposited by streams flowing in or beneath the ice while the glacier was stagnant or retreating. The area between Rochester and Syracuse has been estimated to include approximately 10,000 drumlins (Broughton *et al.* 1973). Drumlins are also glacial features characterized by their elongated mounded shape and clay-rich till composition. Some drumlins have cores of solid rock or preexisting glacial drift.

The most prominent surficial geological features of Monroe County have been shaped by numerous advances and retreats of glaciers during the Pleistocene Epoch which began approximately 1 million years ago. The features visible today are the result of the last stage of glaciation, the Wisconsin Stage, which began approximately 110,000 years ago and lasted until approximately 10,000 years ago (Olsson 1970; Turekian 1971; Wright 1972; Shackleton and Opdyke 1973) and may have lasted as recently as 5,000 years ago (USDA 1973). In the United States, the Wisconsin Laurent ice sheet behaved very erratically. In the east, the maximum advance is estimated to have occurred between 17,000 and 18,000 years ago; in Illinois, Iowa, and Wisconsin, the maximum advance is estimated at 19,000 years ago; and along the northwest margin, the maximum advance is estimated at 13,000 years ago (Frye 1973). The retreat of the ice was not uniform, but took place as a series of retreats separated by minor advances. There are numerous conflicting published views on the age of the terminal Wisconsin Moraine. Efforts toward resolving these differences of opinion still remain inconclusive (Muller *et al.* 1988).

As the ice sheet retreated from the higher elevations of its farthest southward advance to lower elevations to the north, glacial meltwater and north-flowing streams became impounded between the highlands to the south and the massive ice to the north. The ice mass in Western New York was manifested as lobes that flowed along paths of least resistance. Movement of the glacier resulted in the filling and modifying of valleys leaving intervening

ridges. As the ice retreated northward, the major preexisting north-trending valleys were uncovered, thus becoming the loci for the accumulation of glacial meltwater and debris. East-west trending channels were also cut along the front of the ice sheet. These channels, several of which were mapped by Fairchild in 1909, have been used for correlation purposes where morainal material is absent.

As the glacial ice retreated for the last time, a series of relatively short lived post-glacial lakes formed. The lakes extended to the south from the retreating glacial front, and generally drained toward the east. The oldest post-glacial lake in Monroe County was Lake Warren. This lake was ponded at an elevation of approximately 880 to 900 feet above MSL. The only remnants of this lake are the sandy deposits at the highest elevations in the southeastern corner of the county. The next post-glacial lake to form was Lake Dana at an elevation of 700 feet above MSL. The remnants of this lake are the red clay deposits in the town of Henrietta and the sandy deposits in the Turk-Bake Hill area. The next lake to form was Lake Scottsville at an elevation of 540 feet above MSL. The remnants of this lake are the silty deposits that extend along the present Genesee River. Post-glacial Lake Dawson, with an elevation of 480 feet above MSL, began to form as Lake Scottsville and drained northward through a moraine. The most prominent remnant of Lake Dawson is its outflow channel that passes through the Village of Fairport. The last post-glacial lake was Lake Iroquois at an elevation of 435 feet above MSL. This lake was the predecessor to Lake Ontario. Remnants of Lake Iroquois include a well-defined beach ridge followed to the north by a sand plain that extends across the county in an east-west direction (USDA 1973; Young and Rhodes 1973; Young 1980). According to the surficial geological map of New York (Muller and Cadwell 1986), the surficial geology at the Dearcop site consists of glacial till. However, subsurface investigations indicate the presence of lacustrine sediments (see Section 4.4.3).

2.2.2 Bedrock Geology

The Dearcop site is underlain by a sedimentary rock sequence approximately 3,000 feet in thickness, which unconformably rests on top of a Precambrian-age granite basement (see Figure 2-1). In Monroe County, the sedimentary rock formations gently dip to the south at a rate of approximately 50 feet per mile. Beneath a relatively thin blanket of glacially deposited overburden, the bedrock formations within the county range in age from the Upper

Ordovician Queenston Shale, along the northern extent of the county at Lake Ontario to the Middle Devonian Onondaga Limestone formation, at the southern limit of the county (USDA 1973).

Directly beneath the site fill material and soil lies the Lockport Dolomite formation. This Upper Silurian-aged formation was formed by the shallow sea which covered western and central New York approximately 415 to 420 million years ago after the Taconic Orogeny which formed the Taconic mountain range in eastern New York during the late Ordovician period (Zenger 1965). The Lockport Formation is underlain by the Rochester shale. The relationship between the Lockport and the Rochester has been subject to dispute. Some areas show a sharp lithologic change, while other areas show an interbedded gradation. Some authors, based on fossil correlations, have suggested a considerable break in the time of deposition between the two formations, while others have suggested continuous deposition. In the Rochester area, the contact between the two formations is gradational without physical signs of any break in time (New York State Geological Association 1956). Work by Zenger (1965) includes the Decew member as part of the Lockport Formation, conformably overlying the Gates member of the Rochester shale (see Figure 4-6). However, later works by Rickard and Fisher (1970) place the Decew member as part of the Rochester shale. In either case, the contact between the Lockport and Rochester is gradational beneath the Dearcop site. The theory that the Decew member is the uppermost member of the Rochester shale is the more favored geologic interpretation used presently. Therefore, the Lockport is currently considered to be divided into the Penfield and the Oak Orchard, and the Rochester shale incorporates both the Decew dolomite and Gates dolomite.

The Rochester shale is approximately 85-feet thick at its type locality in the Genesee gorge. It is mostly dark-bluish gray in color, except for the basal 10 feet, which is brownish gray. Limestone layers are plentiful throughout the formation, with the exception of the basal 10 feet. The lower 25 to 30 feet of the formation is a weak shale, and the upper 20 to 25 feet (represented by the Decew and Gates members) is more massively bedded and slightly dolomitic (New York State Geological Association 1956).

The Gates member is a dark-gray, fine-grained, thin- to medium-bedded, argillaceous and siliceous dolomite with abundant intercalated shale. Laminations and cross-laminations are present throughout, and bituminous beds were observed in the Gates quarry (Zenger 1965).

The Decew member is an olive-gray to brownish-gray, medium-grained, silicious dolomite. The Decew is believed to grade into the Gates member in the Rochester quadrangle (Zenger 1965).

The Penfield member is approximately 50 feet thick at the quarry located approximately 0.5 mile southwest of the site. The Penfield is mostly a quartz dolostone, but the quartz content exceeds 50% at its base and is then classified as a dolomitic sandstone. Crinoid fossil fragments are characteristic of this member, which ranges from medium dark gray to dark brownish gray. Vugs are present primarily in the upper portion and are usually filled with either dolomite, sphalerite, gypsum or selenite. Both the lower and upper contacts are conformable and gradational (Zenger 1965).

The uppermost member, the Oak Orchard, is approximately 80 to 100 feet thick where not eroded. Approximately 20 feet of the Oak Orchard is exposed in the quarry southwest of the site (Williams 1971). The total thickness therefore of the Lockport Formation beneath the site is approximately 80 to 90 feet. Below this is the Upper Silurian-age Rochester Shale.

2.3 REGIONAL HYDROLOGY

2.3.1 Surface Hydrology

Precipitation infiltrates into the overburden and recharges the water table aquifer. Standing water was observed on site in topographic depressions during early spring 1992. Overland flow was only observed at the site during heavy rains or extreme snow melts. Where runoff does occur, it flows off site via drainage ditches which flow to the east and north into the Barge Canal. Drainage ditches exist on either side of the I-490. Water in the Barge Canal is generally slow moving to static with locks providing control of elevations. The water level is lowered several feet in the canal at the close of the shipping season (November to April) for flood control purposes. The canal has been observed, during the course of the Phase I RI, to be flowing in a northerly direction adjacent to the site.

2.3.2 Hydrogeology

Domestic water supply for the Rochester area is municipal water drawn from Lake Ontario, and from Hemlock Lake, and other upland reservoirs. Water supply for suburbs of Rochester (including the vicinity of the Dearcop site) is municipal water drawn predominantly

from Lake Ontario. Water supply in the rural area of Monroe County (greater than a 3-mile radius from the site) is from groundwater wells in both unconsolidated deposits (i.e., overburden) and underlying bedrock (USDA 1973).

Groundwater drawn from the Queenston Shale is of poor quality and usually insufficient quantity. This is due to the high concentrations of sulfur and salts, and low permeability of the rock itself (USDA 1973). Groundwater in the Queenston shale principally occurs within a fractured and weathered zone at the top of the formation. Most wells penetrating the Queenston draw water from both this formation and overlying formations (Johnson 1964).

Limestones and sandstones within the overlying Clinton Group are water-bearing units. However, the Rochester shale in the upper Clinton is relatively impermeable and impedes recharge to the underlying more permeable limestones and sandstones. Therefore, the Clinton is a less productive aquifer than the overlying Lockport Group (Johnson 1964).

The Lockport Group (which underlies the Dearcop site) transmits groundwater through bedding planes, vertical fractures, and solution cavities. Some of these fractures can extend for several miles, thus constituting effective water conduits. However, vertical fractures are generally too short and sparse to account for significant groundwater storage and transmission, except in the top 10 to 25 feet of bedrock (Oak Orchard member).

Solution cavities, formed when gypsum is dissolved, are not important components of groundwater flow in the aquifer. Although solution cavities increase the porosity of the rock, they are generally isolated and do not contribute to groundwater transmission (Johnson 1964).

Regional groundwater flow in the vicinity of the site is to the north-northeast, however, the site is located just north of a groundwater divide south of which groundwater flows east-southeast (Young 1980).

2.4 SOILS

Most of the Dearcop site is covered with dumped fill material that is not described in the USDA soil survey. Site investigations, in particular, the test pit excavations revealed that the site contains abundant solid waste from both domestic and industrial sources. These include, large pieces of metal slag, glass fragments, steel drums (some with oily liquid still inside), construction and demolition debris and, to a lesser degree, household trash such as plastic sheeting, lumber, bottles, cans, cloth etc. This dumped fill material covers most of the

site including the I-490 median. Along the eastern boundary of the site, west of the Barge Canal is a long strip of canal spoils. This made land is composed primarily of rock spoils from the excavation of the canal. The rock debris is mounded to form a steep ridge approximately 10 to 20 feet high and is generally covered with vegetation.

In areas where neither dumped fill nor made land was placed on the site, the native soil type mapped by the USDA, is the Hilton Loam. The Hilton Loam is found on 3% to 8% of slopes in drumlin areas and side slopes of low ridges on till plains. Typical of the Hilton soil series, the Hilton Loam, is made up of deep moderately well-drained, medium-textured, and moderately coarse textured soils, that formed in calcareous glacial till (USDA 1973).

However, the mapping of this soil on the site appears to be in error. Actual soil conditions encountered during the drilling program are described in Section 4.3.3.

Four subsurface soil samples were collected for grain size (sieve) analysis and moisture content. These samples were collected from monitoring well borings MW-1D (7 to 9 feet below ground surface [BGS]), MW-6D (19 to 21 feet BGS), MW-9D (4 to 6 feet BGS), and MW-10D (10 to 12 feet BGS). Approximately 50% of each sample passed through the No. 200 sieve designating the material as very fine sand or smaller (i.e., silt and clay). Most of the visual descriptions of the subsurface soils designate the materials as predominantly very fine sand. The moisture content as percent of dry weight ranged from 7.8% to 16.4%. Appendix F contains geotechnical results.

2.5 CLIMATOLOGY

The weather at the Dearcop Farm site is directly affected by Lake Ontario, which is located approximately 10 miles north of the site. In the summer, the lake's cooling effect inhibits the temperature from rising much above the low to mid 80s (degrees Fahrenheit). In winter, the modifying temperature effect prevents temperatures from falling below -15° (F) most of the time. The lake effect creates wide variations in snow fall depths along the lake since the lake water rarely freezes due to its depth. The area is also prone to more regional snowstorms and blizzards. The average yearly snowfall is approximately 89 inches (NOAA 1987).

Precipitation is rather evenly distributed throughout the year with the yearly totals averaging at approximately 33 inches. The average windspeed is 9.7 miles per hour with a

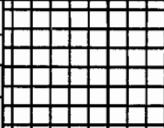
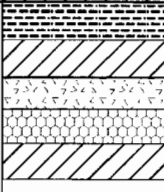
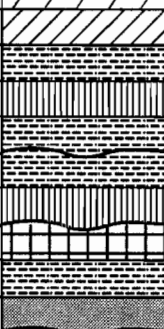
prevailing direction from the west/southwest. Hail occurs occasionally and heavy fog is rare. Table 2-1 contains pertinent weather data for the site.

Table 2-1
WEATHER DATA AVERAGES IN THE ROCHESTER AREA

	January	February	March	April	May	June	July	August	September	October	November	December	Year
Daily Maximum Temp (°F)	30.8	32.2	41.2	56.0	67.7	77.7	82.3	80.1	72.8	61.5	48.0	35.5	57.2
Daily Minimum Temp (°F)	16.3	16.7	25.3	36.1	46.0	55.7	60.3	58.7	51.6	41.8	33.2	22.3	38.7
Total Precipitation (inches)	2.48	2.36	2.61	2.59	2.88	3.00	3.08	2.89	2.77	2.75	2.70	2.60	32.69
Total Snow Fall (inches)	23.3	22.0	14.0	3.5	0.1	0	0	0	0	0.1	6.6	19.3	89.0
Wind Speed (MPH)	11.8	11.4	11.2	10.8	9.3	8.5	8.0	7.6	8.0	8.7	10.2	10.8	9.7

Note: Temperature and wind averaged from 1951 through 1980 and precipitation and snowfall averaged from 1958 through 1987.

Source: NOAA 1987.

System	Series	Group	Formation	Rock Type	Thickness in Feet	Description	
Middle Devonian	Erian	Onondaga	Seneca LS		75-150	Gray, coarse-textured limestone, very fossiliferous and cherty	
			Moorehouse LS				
			Nedrow LS				
			Edgecliff LS				
Upper Silurian	Cayugan	Salina	Akron and Bertie Dolostones		75	Interbedded dolostone and shale	
			Camilus and Syracuse		300	Green and grey shales with dolomite, gypsum, anhydrite, and halite	
			Vernon		600	Red shale with green and grey interbeds, dolomite becoming common near the top	
	Niagaran	Lockport	Oak Orchard		160	Siliceous dolostone with shaly partings	
			Penfield				
		Clinton	Decew DS		197	Red, green, and grey shales and mudstones with interbedded dolostones, sandstones, limestones, hematite, and hematitic and oolitic limestone	
			Rochester SH				
			Irondequoit LS				
			Williamson SH				
			Sodus SH				
			Wallington LS				
			Furnaceville Hematite				
			Maplewood SH				
Lower Silurian		Medina	Kodak SS		55	Red and green mottled sandstone and shale exhibiting depositional features	
			Grimsby				
Upper Ordovician	Cincinnatian	Queenston	Queenston SH		1,100	Thinly bedded micaceous red shales, siltstones, and sandstones	

NOT TO SCALE

NOT TO SCALE

SOURCE: Revised from Fisher 1962, Rickard & Fisher 1970; Rickard 1975.

KEY:  Unconformable contact

Figure 2-1 BEDROCK UNITS OF MONROE COUNTY

3. PHASE I RI INVESTIGATION METHODOLOGY

3.1 INTRODUCTION

The Phase I RI consisted of various activities conducted to identify the physical characteristics of the study area. These activities were performed between August 1992 and April 1993 and consisted of the following:

- Background data compilation;
- Site reconnaissance;
- Health and safety monitoring;
- Radiation survey;
- Base map development;
- Soil gas survey;
- Geophysical survey;
- Test pit excavations;
- Subsurface soil sampling;
- Groundwater monitoring well installation and sampling;
- Aquifer testing;
- Surface water/sediment sampling;
- Surface soil sampling;
- Manhole sampling;

- Quarry seep sampling; and
- Gas sampling from monitoring wells.

The methodology and specific goals of each of the aforementioned tasks completed in conjunction with the Phase I RI are described in Section 3.2. A quality assurance/quality control (QA/QC) summary is presented in Section 3.3, and decontamination procedures are described in Section 3.4.

The primary objectives of the Phase I RI field investigation were as follows:

- Determine the nature, extent, and source of contamination present at and in the vicinity of the Dearcop Farm site; and
- Determine the geologic and hydrogeologic characteristics of the site that might affect contamination migration.

During the initiation of the field program, a temporary office trailer equipped with telephone and electric services was set up on site. A 6-foot-high barbed wire fence was erected in conjunction with existing fences to enclose the trailer, which served as a secure area for the decontamination pad, equipment storage, and drum and polyethylene (poly) storage tank staging.

3.2 PHASE I RI ACTIVITIES

3.2.1 Background Data Compilation

Background data were provided by NYSDEC to E & E for review prior to the site reconnaissance in October 1991. An additional literature search was performed in November 1991 at several agencies to organize all available existing data. Information was obtained from state, county, municipal, and private company files (see Table 3-1).

3.2.2 Site Reconnaissance

On October 30, 1991, E & E personnel, accompanied by NYSDEC representatives, conducted a site reconnaissance. The purposes of the site reconnaissance included:

- Conduct an air monitoring survey using an organic vapor analyzer (OVA);
- Inspect site for visible signs of contamination;

- Identify tentative locations for soil gas and geophysical surveys; and
- Identify drill rig access problems.

A site safety plan was developed prior to the site reconnaissance and included pertinent emergency phone numbers, a map showing the route to the nearest hospital, and a list of dangers to human health potentially posed by the contaminants at the site. Following the site reconnaissance, this site safety plan was refined for use by personnel involved in field activities, which are discussed in the following sections. Photographs taken at the site during the site reconnaissance are presented in Appendix A.

3.2.3 Health and Safety Monitoring

A site-specific health and safety plan was prepared for the RI/FS field work at the Dearcop Farm site based on sampling activities conducted by NYSDEC in 1990. Groundwater analysis from on-site wells indicated that water was contaminated with VOCs, including numerous chlorinated organics. Surface soil and sediment samples indicated elevated levels of PCBs, heavy metals (cobalt, copper, zinc), and radioactive isotopes (Radium-226 and Radium-228).

A health and safety officer was maintained on site throughout the field activities to ensure that personnel were protected from health hazards. Appropriate protective clothing (tyvek or saranex) were worn by all site personnel while performing intrusive field activities. An OVA was used to assess the concentration of VOCs in the workers' breathing zone. When necessary, site personnel utilized supplied air respirators as a means of respiratory protection against possible exposure to chlorinated organic compounds. All site personnel were monitored for exposure to radiologic hazards using thermoluminescent dosimeters (TLDs), pocket dosimeters, and a Ludlum Model 19 micro R meter. All samples were monitored for radiological activity using a Bicron Surveyor M equipped with a pancake geiger mueller (PGM) probe and a G2 2-inch sodium iodide detector. During ground intrusive activities, ambient air conditions in the immediate vicinity of the drill rig were monitored for organic vapor concentrations, explosive atmospheres, and hydrogen sulfide. If possible, VOC concentrations above background were screened for methane using a charcoal filter and for vinyl chloride using compound-specific Draeger tubes. Due to the moist soil conditions and snow cover, it was not necessary to monitor particulate dust concentrations as specified in the

site health and safety plan. Results of air monitoring activities are presented in Section 4.2 of this report.

3.2.4 Pre-Investigation Radiation Survey

Prior to the start of investigation activities, the E & E project manager and an E & E health physicist performed a walkover radiation survey of the Dearcop Farm site. The purpose of the survey was to locate areas of elevated radiation and/or radioactive contamination in order to define the radiation hazards and establish the radiation safety protocol for subsequent site activities. The E & E team conducted the walkover radiation survey using a Ludlum Model 19 micro R meter and a Bicorn Surveyor M ratemeter with an attached Bicorn G2 2-inch sodium iodide detector. Both instruments had been newly purchased by NYSDEC and factory calibrated. Operational checks were performed before the instruments were used. Background readings were obtained with these instruments at an off-site location.

The walkover radiation survey was conducted over as much of the site as possible. The G2 detector was swung by a cord as close to the surface as possible; additional G2 measurements were obtained approximately 1 meter above the ground at areas of elevated radiation. Micro R meter measurements were obtained approximately 1 meter above the ground. The only area of elevated radiation (i.e., greater than approximately 2 to 3 times the background measurements) that was found was a blue-stained surface area previously described by NYSDEC (NYSDEC 1990). Radiation measurements at this area were approximately 15,000 counts per minute (cpm) as measured at surface level by the detector (the G2 background measurement was approximately 4,500 cpm) and 15 microRoentgens per hour ($\mu\text{R/hr}$) as measured 1 meter above the surface by the micro R meter (the background measurement was approximately 7 $\mu\text{R/hr}$). Another similar blue-stained area was observed and surveyed, but the measurements did not significantly exceed background.

3.2.5 Base Map Development

A boundary survey and base map of the site and its surrounding areas was developed by Lu Engineers, a subcontractor. The boundary survey was conducted to identify property owner boundaries, and the base map was developed to delineate pertinent topographic features and man-made structures (see Figure 1-2).

The base map was derived from aerial photos taken on May 4, 1992. The base map was later supplemented by a ground survey conducted by Lu Engineers in April 1993 under the supervision of the E & E field team leader.

3.2.6 Soil Gas Survey

A soil gas survey was performed at the site by E & E between August 14 and December 1, 1992. The soil gas survey was designed to achieve several general goals: to screen the entire site and adjacent areas (e.g., residential yards) for VOCs in the subsurface, and to obtain background and downgradient soil gas levels. The results of this survey were used to better define the areas to be investigated during the other Phase I RI tasks.

A grid with 100-foot station spacings was established over the entire site area (including the I-490 shoulders and median). Additional grid points were later added, based upon initial sample results, to the center of various 100-square-foot blocks. Samples were also collected from residential lots adjacent to the site and randomly spaced along Dearcop Drive and Varian Lane. Sample locations are presented on Figure 3-1.

The soil gas survey was conducted in two phases. During the first phase, 177 samples were collected from the survey grid by filling 1-liter tedlar bags with soil gas. Nine of these samples were not analyzed due to bag deflation prior to sample analysis. During the second phase, 23 samples were collected by passing the appropriate amount of soil gas through two steel tubes connected in series containing sorbent materials. The first tube contained Tenax and the second contained spherocarb (i.e., charcoal). The purpose of the spherocarb tube was to adsorb contaminants that are not effectively adsorbed by the Tenax (e.g., vinyl chloride).

Tenax/spherocarb samples were collected from selected tedlar bag sample locations with positive soil gas contamination results (i.e., mainly from residential lots). The purpose of these samples was to attain lower detection limits to verify and define soil gas plume boundaries in areas having the greatest potential for receptors to be impacted by inhalation of VOCs. All soil gas samples were hand delivered to E & E's Analytical Services Center (ASC) in Buffalo, New York, on the day they were collected. Tedlar bag samples were analyzed within 48 to 72 hours of collection by E & E's ASC using a gas chromatograph equipped with photoionization and electrolytic conductivity detectors (PID/ECLD) in series. The soil gas sample from the tedlar bag was passed through Tenax in the laboratory, then

introduced to the PID/ECLD via thermal desorption of the Tenax. Tenax/spherocarb tubes collected in the field were analyzed within 14 days of sample collection by gas chromatograph/mass spectrometer (GC/MS) methods. In addition, 10 tedlar duplicates and 15 field blank samples, and three tenax/spherocarb duplicate and four field blank samples were collected for QA/QC purposes (see Table 3-2).

Soil gas samples were collected by driving a nickel-plated, hardened-steel sample probe approximately 3 feet into the ground at each grid point using an electric hammer drill. Tedlar bag samples were collected by placing the bag in an evacuation chamber and connecting the bag (using clean tygon tubing) to the sample probe. The chamber was evacuated with an air pump causing the bag to fill with soil gas. Tenax/spherocarb samples were collected by passing soil gas through the tubes (which were connected in series) by connecting one end of the tubes to the sample probe (using clean tygon tubing) and the other end to a calibrated, low-flow air pump. The pump was calibrated to draw 0.5 liter per minute through the tubes. Prior to collecting each type of sample, at least three probe volumes of soil gas were purged through the system before attaching the sample bag or tubes.

3.2.7 Geophysical Survey

Geophysical surveys were performed by an E & E geotechnical team at the Dearcop Farm site on September 23, October 9, and November 30, 1992. The site was surveyed using an EG&G Geometrics Model G-856 Proton Precession Magnetometer and a Geonics Ltd. Model EM31 Ground Conductivity Meter. The magnetometer was used to collect total earth's magnetic field readings to delineate subsurface ferromagnetic objects. The EM31 was used to collect ground conductivity readings to identify changes in soil and/or rock conductivity resulting from natural geohydrologic conditions or unnatural conditions (i.e., man made) such as buried wastes or contaminant plumes.

Two survey grids were established at the site. The first grid encompassed 162,500 square feet in the vacant lot area north of the residences between Dearcop Drive and Varian Lane, south of the I-490 right-of-way fence, and between the Monroe County Pure Waters pump station and the Barge Canal spoils further to the east (see Figure 3-2). The second grid encompassed 166,250 square feet of the highway median between the I-490 eastbound and westbound lanes, from the I-390 interchange to the Barge Canal.

The grids consisted of lines spaced at 25-foot intervals with station spacings of 25 feet along each line. The X and Y axes of the first survey grid were oriented east-west and north-south, respectively, and the axes of the second grid were S83W and N7W, respectively. These areas were chosen to identify and confirm previous results of a geophysical survey performed by EA Science and Technology, Inc. in 1985.

Magnetic readings were corrected for diurnal drift using periodic data collected throughout each day of the survey at an on-site base station.

Ground conductivity measurements (both Quadrature-phase component and In-phase component) were collected at each survey station. The Quadrature-phase component is linearly related to ground conductivity, and the In-phase component is more sensitive to buried objects. The unit of measure for the Quadrature-phase component is milli Siemens/meter (mS/m) or millimhos/meter (mmhos/m) (i.e., 1 Siemen = 1 mho), which is the unit of measure for terrain conductivity. The unit of measure for the In-phase component is parts per thousand (ppt) which represents the ratio between the primary magnetic field generated by the EM31 and the secondary magnetic field generated in the earth. Measurements were also made in both the vertical dipole mode and in the horizontal dipole mode. The vertical dipole mode allows for greater instrument penetration (i.e., up to 18 feet below ground surface), as opposed to lesser instrument sensitivity and penetration in the horizontal mode (i.e., less than 9 feet below ground surface). Therefore, a total of four different readings were collected with the EM31 at each survey station.

All instrument readings were electronically recorded and stored by the instruments, and the readings were later transferred to Surfer Version 4.15 (Golden Software 1991) for data processing. Section 4.3.2 of this report provides geophysical interpretations.

3.2.8 Test Pit Excavations

On November 5 and December 3 and 4, 1992, seven test pits (TP-1 through TP-7) were excavated, sampled, and backfilled. The purpose of the test pit excavation and sampling was to determine the composition of the subsurface soil/fill material through visual observation and chemical analyses.

Two test pits (TP-1 and TP-2) were included in the NYSDEC approved May 1992 work plan. However, based on visual results and efficiency in completing the test pit excavations, five additional test pits (TP-3 through TP-7) were requested by NYSDEC in

order to more adequately characterize subsurface fill materials and natural soils at the site. The location of all seven test pits were chosen based on the results of the geophysical and soil gas surveys (see Sections 4.3.2 and 4.5.1). Locations of the test pits are illustrated on Figure 3-2.

The test pits were excavated and backfilled using a backhoe operated by the drilling subcontractor of Parratt Wolff, Inc. Each test pit was excavated the width of the backhoe bucket until rock refusal or to the depth limit of the backhoe which was 14 to 15 feet. One exception to this was test pit TP-6 which was terminated at 6 feet due to the presence of several oil-filled drums of very poor condition. The excavated subsurface material was temporarily piled along the side of each pit during excavation. The soil/fill material was logged by the E & E field geologist. Samples collected during test pit excavations are described in Section 3.2.11.1. Table 3-3 provides a summary of test pit data including lithology of excavated materials.

After attaining total depth of the test pit, sample collection, and measurement of pit dimensions, the test pit was backfilled with the materials removed, and the backhoe bucket was steam cleaned over the backfilled pit.

3.2.9 Groundwater Monitoring Well Installation

Sixteen of the proposed 17 monitoring wells were drilled and installed between December 9, 1992 and March 11, 1993 by Parratt Wolff, Inc. (Parratt Wolff) under the supervision of an E & E geologist and health and safety officer (see Figure 3-2). In addition, Parratt Wolff repaired broken casings on two of the three existing wells by installing a locking protective steel casing around the wells. One shallow overburden/bedrock interface well and one deeper bedrock well were installed as well pairs at six different locations. One deeper bedrock well was also installed adjacent to each of three existing shallow bedrock wells. Finally, only one shallow well was installed at a scheduled well pair location because this well (MW-7S) was drilled deeper than the other shallow wells due to the seasonal low water table caused by its proximity to the Barge Canal. The deep well was not installed because the screened interval MW-7S would have been close to the screened interval in the proposed deep bedrock well. Three of the wells were decommissioned due to venting of pressurized petroleum hydrocarbon gas (see Section 4.2). Each of these wells were sampled

prior to decommissioning. One well, MW-2D, was replaced by MW-2D(N) due to the presence of contamination in the original well sample (see Section 4.5.3).

Table 3-4 summarizes drilling methods, Table 3-5 summarizes well construction, and Appendix B contains monitoring well boring logs.

3.2.9.1 Overburden/Bedrock Interface Well Installation

The overburden/bedrock interface well borings were installed as described in the May 1992 work plan. The overburden was drilled using 4.25-inch inside diameter (ID) hollow-stem augers until refusal. On several occasions, refusal was several feet above top of bedrock due to the presence of boulders in the overburden. Temporary 4-inch flush-joint steel casing was then spun through the augers and seated a few inches into the top of bedrock. The borehole was then advanced using a water-lubricated HX core bit (3 15/16-inch outer diameter [OD]) until the depth of completion. Water used for drilling was municipal water obtained from the Monroe County Pure Waters pumping station located at the north end of Dearcop Drive. Some drill water was lost to the formation via fractures during well drilling.

Upon attaining total depth, each well was screened across the overburden/bedrock interface using 2-inch ID, polyvinyl chloride (PVC), machine-slotted (0.010) screen with a threaded bottom cap. The screen was followed by threaded, flush-mount, 2-inch ID PVC casing to an elevation of approximately 2 feet above ground surface for most wells, and a few inches below ground surface for flush mount wells along Dearcop Drive and the bike path. A quartz/silica sand filter pack was then placed around the screen from the bottom of the borehole to approximately 2 feet above the top of the screen. The filter pack was sealed with a layer of bentonite pellets approximately 2 feet thick. The remainder of the annulus around the casing above the seal was filled with a bentonite/cement grout mixture consisting of Portland cement and 3% to 5% bentonite. A locking, protective steel surface casing was then installed around the PVC casing for wells completed aboveground, and a flush mount housing was placed over the PVC casing for flush mount wells. Flush mount wells had bolt and covers and locking well caps. Concrete drainage pads were poured around the base of the surface casing and flush mount housings. Table 3-4 presents pertinent well construction data.

All drill cuttings were placed in U.S. Department of Transportation (DOT)-approved 55-gallon drums, labeled, and staged on site in the secure area.

3.2.9.2 Bedrock Well Installation

The deeper bedrock well installation was modified in the field with NYSDEC's approval due to difficulties encountered in grouting the originally proposed 3-inch ID PVC well casings, MW-2D, MW-3D, and MW-5D. It was determined after several attempts with various grouting procedures that a proper grout seal could not be obtained with the well design proposed in the work plan due to the highly fractured nature of the bedrock and the loss of grout to the formation. Therefore, the well design was modified to be the same as the overburden/bedrock interface wells (i.e., 3-inch well casing and open hole completion was changed to 2-inch well casing and 2-inch well screen with sand pack and bentonite seal). The three partially installed wells with 3-inch PVC casing (i.e., MW-2D, MW-3D, and MW-5D) were then to be re-drilled and re-constructed. Split-spoon samples were collected from the deep monitoring well borings to characterize the overburden both geologically and analytically.

In addition, natural gas was encountered during the drilling of several of the deep bedrock wells. The gas was initially expected to vent out of the wells and dissipate over a short period of time. However, due to high explosive levels during the drilling of MW-4D along Dearcop Drive, special emergency procedures were taken to seal up the gas-bearing zone. In order to try and salvage the monitoring well, at NYSDEC's request, a 20-foot bentonite seal using bentonite hole plug was placed in the bottom of MW-4D and the well was capped to seal off the gases flowing out of the well bore while the bentonite was expanding. Representatives from the Town of Gates Police and Fire Departments, NYSDEC, and MCHD were present for these procedures.

Upon returning the next day, an additional 10 feet of bentonite hole plug, at the request of NYSDEC, was added to the borehole due to high OVA and explosimeter readings inside the borehole. After the additional bentonite expanded, sand was added to the bottom of the borehole, and a 2-inch PVC well was constructed with 20 feet of screen. Subsequently, a mutual decision between NYSDEC and E & E was made not to drill into the gas-bearing zones for the remaining wells. However, the three above-mentioned wells partially installed with 3-inch casings (MW-2D, MW-3D, and MW-5D) and three other completed wells (MW-8D, MW-9D, and MW-10D) already penetrated the gas zone. The same procedures used to seal off MW-4D were planned for the re-drilling of MW-2D, MW-3D, and MW-5D. The

remaining wells already installed were allowed to vent and were closely monitored for organic vapors and explosive conditions several times throughout the day on a daily basis.

Monitoring well MW-2D was re-drilled, a 20-foot bentonite plug was placed in the bottom of the borehole, and a 2-inch well with a 20-foot screen was installed. After further monitoring, it was determined that MW-2D and MW-4D were still producing gas (i.e., the bentonite plugs were leaking). Due to risks of gas migration in fractures that normally do not contain gas, and the unknown circumstances and potential explosive hazards of the migrating gas, E & E recommended re-drilling of all the gas-producing wells, especially MW-2D and MW-4D which were partially sealed, thus potentially causing unknown underground gas migration. Monitoring well MW-8D, located along the bike path, was also recommended for decommissioning due to the strong organic odors (e.g., hydrogen sulfide) detectable up to 100 feet from the well head and the high exposure and explosion hazard to the public who actively use the bike path.

Well abandonment procedures involved re-drilling of the wells by spinning 4-inch flush joint casing into the top few inches of bedrock via a carbide casing shoe. The casing and shoe remained in the ground to facilitate pressure grouting procedures. The PVC casing, grout, seal, sand, and screen were removed using 3 1/4-inch ID mud rotary methods. The mud helped lift the well fragments from the borehole, and helped block natural gas flow. Once the total depth was achieved, the mud was displaced by cement bentonite grout injected under pressure. When the borehole was completely filled with grout, additional grout was forced into the borehole via a specially designed pressure cap to a pressure exceeding the natural gas pressure (i.e., 30 psi as opposed to 9 psi measured in MW-8D which produced the highest gas pressure). The cap was sealed and the grout was allowed to set with minimal pressure loss. Section 4.3.4 describes in detail the location of the gas-bearing zones within the bedrock. Monitoring wells MW-9D and MW-10D were not decommissioned during the Phase I RI because of low levels of gas emanating from the wells in April 1993 and the low risk of exposure based upon the well locations. The wells were allowed to vent until the second round of groundwater sampling performed during the Phase II RI. At that time, the wells were emitting negligible amounts of natural gas, therefore voiding abandonment procedures.

All drill cuttings and fluids were containerized in USDOT-approved 55-gallon drums, labeled, and staged on site in the secure area.

3.2.9.3 Monitoring Well Development

Monitoring well development was performed at all the newly installed wells. The development of the wells was performed using bailers and/or a submersible pump. Well development was performed between February 4 and April 8, 1993 by E & E personnel. Periodic pH, temperature, conductivity, and turbidity readings were recorded in logbooks throughout the development of each well. The wells initially had excessive turbidities (i.e., > 50 nephelometric turbidity units [NTUs]). After a significant effort, many of the wells still had high turbidities. Therefore, a determination was made whether turbidity would decrease to under 50 NTUs through further development. If pH, temperature, and conductivity were stable and the development water did not improve after significant effort, development was then considered complete. Table 3-6 provides a summary of well development and Appendix B contains development logs.

Development water from the overburden/bedrock interface wells was discharged to the ground surface as specified in the work plan. Development water from the deep bedrock wells was containerized in 55-gallon drums and the on-site 1,500-gallon poly storage tanks located in the secured area on site.

3.2.10 Aquifer Testing

Packer tests were performed on four shallow well borings (MW-4S, MW-6S, MW-7S, and MW-10S) and four deep well borings (MW-3D, MW-8D, MW-9D and MW-10D) at the Dearcop site in order to obtain hydraulic conductivity values at specific depth intervals of the dolomite bedrock. Two-inch-diameter by 24-inch-long inflatable rubber pneumatic packers were used to isolate selected intervals within the HX coreholes for aquifer testing. All testing was performed after well drilling and before well construction. Most wells were tested using a double packer assembly which provided a 7-foot test zone between the packers. Two wells, MW-4S and MW-10S, were tested using only one packer and the bottom of the well as upper and lower limits, respectively, of the test zone. Each well was packer tested at several different depths depending on the total depth of the well, the depth of the temporary surface casing, and the preliminary results of the tests themselves.

The testing procedure involved lowering the packer assembly to the desired test interval and inflating the packer(s) with nitrogen to seal off the zone of interest. Once the packers were confirmed sufficiently sealed (by steady nitrogen pressure and ability of the

assembly to support its own weight) and the borehole given sufficient time to return to static water conditions, water was pumped into the borehole through perforated conduction pipe attached to the base of the upper packer and to the top of the bottom packer (when used). The water was obtained from a pre-approved, clean, municipal water source and pumped into the well using the water pump from the drill rig. Each depth interval was tested using five different water pressures (P1 through P5) which were calculated based on the total depth of the borehole, the top of the test interval, and the height of the inlet hose (swivel). The water pressures are listed below:

- $P1 = 0.4 \times$ computed maximum gauge pressure. The maximum pressure (PSI) equals the depth gauge in feet to the top of the tested section, and is the sum of the pressure of the water column in the standpipe above the top packer and the applied gauge pressure.
- $P2 = 0.7 \times$ the maximum gauge in feet pressure;
- $P3 =$ the computed maximum gauge pressure;
- $P4 = P2$ pressure actually achieved; and
- $P5 = P1$ pressure actually achieved.

The maximum gauge pressure, P3, was calculated by subtracting one half of the total stand pipe length above the top of the test interval (depth to top of test interval plus height of water inlet line above the ground surface) from the total depth of the top of the test interval from the ground surface.

Each pressure interval was used for a period of five minutes before changing to the next pressure. The pressures increased in steps from P1 to P3 and decreased in steps from P3 to P5. Table 3-7 summarizes packer test parameters for each well bore. During each pressure step, the water flow rate and volume used was measured using a flow meter which was graduated in 1/10th of a gallon and recorded at one minute increments using a stop watch. All packer test data was recorded in the field on forms and reduced in the office. Section 4.4.2 contains results which were calculated from the packer test data.

3.2.11 Sampling

The sampling program began on November 20, 1992 and was completed on April 28, 1993. The sampling program consisted of the collection of the following:

- Thirty subsurface soil samples;
- Three initial groundwater samples from existing site wells, 17 new groundwater monitoring well samples, and three existing on-site well samples;
- Six surface water and sediment samples;
- Twenty surface soil samples;
- Four manhole water samples;
- One quarry seep sample; and
- Three gas samples from monitoring wells.

In addition to standard chemical analyses, several samples were tested for radionuclides and the presence of asbestos fibers. Radionuclide analyses were performed due to the presence of elevated readings detected during the previous studies. Asbestos fibers were also of concern due to the alleged disposal wastes from American Breakshoe Company (see Section 1.3).

All samples for chemical and asbestos analyses were sent to E & E's ASC. Samples for radionuclide analysis were sent to Teledyne Isotopes in Westwood, New Jersey. Samples for geotechnical analyses (i.e., grain size and moisture content) were sent to Parratt Wolff, Inc. in Syracuse, New York.

Sample methods were performed in conjunction with the site work plan and Quality Assurance Project Plan (QAPjP) for this site. Additional samples were collected for QA/QC for purposes as described in aforementioned plans. The following sections describe the methodology for each sample medium.

3.2.11.1 Subsurface Soil Sampling

Test Pit Sampling

Samples were collected by E & E personnel from each test pit from materials exhibiting evidence of contamination (i.e., oil staining, unnatural coloration, OVA readings, or texture). Where present, native soil from beneath the fill material was also sampled. Samples were collected from the backhoe bucket operated by Parratt Wolff, using new,

dedicated stainless steel spoons to fill the appropriate sample containers. All samples were collected in Level B respiratory protection. Table 3-2 summarizes sample locations and depths, and Section 4.5.2 contains analyses performed and results of subsurface soil samples.

Residential Subsurface Soil Sampling

Six subsurface soil samples were collected from residential lots along Dearcop Drive, and seven were collected along Varian Lane between January 4 and 7, 1993 (see Figure 3-2). The samples were collected from locations which had positive detection of soil gas contaminants and/or the results of the November 1991 questionnaire prepared by NYSDEC.

The samples were collected using 2-inch and 3-inch outer diameter (OD) split-spoon samplers driven by a 140-pound weight suspended from a tripod. The samplers were driven until refusal by Parratt Wolff, Inc., under the supervision of an E & E geologist and health and safety officer. Samples were collected from the interval exhibiting the highest degree of contamination (i.e., OVA readings, color, odor, etc.). If no contamination was detected, the sample was collected from the 2- to 4-foot depth interval. All samples were collected in Level D respiratory protection and sent to E & E's ASC for analysis.

Standard penetration tests were performed on each split-spoon sample by recording the number of blow counts for each 6-inch interval. Blow counts (see Table 3-8) and soil descriptions were recorded on appropriate log forms (see Appendix B). The split-spoon samplers and drive rods were decontaminated as described in Section 3.3.4. The holes created by the split-spoon samplers were backfilled with soil and bentonite hole plug.

Monitoring Well Borehole Sampling

Split-spoon samples were collected, as described in Section 3.2.9, from the deep well borings at each monitoring well location, except well MW-7S which was not paired with a deep well based on geologic and hydrogeologic information obtained after its completion. Therefore, a subsurface soil sample was not collected from this location. Split-spoon samplers were driven by the drill rig using a 140-pound hammer. Standard penetration tests were performed in the same manner as described above.

3.2.11.2 Groundwater Sampling

Groundwater samples were collected from all 17 monitoring wells installed during the Phase I RI, as well as from the three existing on-site groundwater wells (see Figure 3-2 for well locations). The three existing wells were initially sampled for VOCs in November 1992 to determine the level of personal protection for the drilling task.

Prior to groundwater sampling, static water levels were measured to within ± 0.01 feet in each well before purging was initiated. At least three volumes of water standing in the casing (when available) were evacuated to purge each well. pH, temperature, conductivity, and turbidity measurements were taken periodically throughout the purging process and immediately prior to sampling to check for stabilization (see Appendix B). Wells which had very low yield were purged dry and allowed to recharge prior to sampling. All purge water from deep wells was placed in the storage tanks or 55-gallon drums in the secure area on site. Shallow overburden wells were purged with decontaminated stainless steel bailers, and bedrock wells were purged with either a decontaminated stainless steel bailer or submersible pump with dedicated PVC tubing. After purging, water samples were collected from each of the 20 wells using decontaminated stainless steel bailers. If the turbidity of water samples exceeded 50 NTUs, the well was allowed to settle no longer than 24 hours prior to sampling as described in the May 1992 work plan.

Sample analyses are identified in Table 3-2 and the results of these analyses are presented in Section 4.5.3 of this report. Samples identified with "R" in Table 3-2 represent groundwater wells that were resampled due to initial improper development procedures. Resampling of these wells was performed at no additional cost to NYSDEC.

3.2.11.3 Surface Water and Sediment Sampling

Surface water and sediment samples were collected at six locations on and adjacent to the site during the Phase I RI (see Figure 3-2 for sample locations and Table 3-2 for sample identification). Samples SW-1 and SED-1 were considered background at the time of sampling. The surface water samples were collected by submerging the sampling containers directly into the surface water. The sediment samples were collected using dedicated, precleaned, stainless steel spoons and transferred into the appropriate sampling container. A dredge sampler was used to obtain SED-4 from the Barge Canal. Sediment was then transferred to the sample containers with a dedicated, precleaned, stainless steel spoon.

Sample analyses are identified in Table 3-2, and the results of these analyses are presented in Section 4.5.4 of this report.

3.2.11.4 Surface Soil Sampling

Surface soil samples were collected at 19 locations on site and at one off-site location (see Figure 3-2 for sample locations). The samples were collected using dedicated, pre-cleaned, stainless steel spoons and transferred into the appropriate sample containers. The samples were collected from the top 6 inches of soil.

Sample analyses are identified in Table 3-2, and the results of these analyses are described in Section 4.5.5 of this report.

3.2.11.5 Manhole Sampling

One water sample from the manhole located to the northwest of the north end of Varian Lane (MH-1) was proposed in the scope of work. However, during the site investigation, three additional manhole samples were recommended by E & E and approved by NYSDEC. Therefore, a manhole observed on the I-490 median (MH-2), one of the manholes (MH-3) at the Monroe County Pure Water's Pump Station at the north end of Dearcop Drive, and a manhole at the north end of Dearcop Drive (MH-4) were also sampled (see Figure 3-2). MH-1 and MH-2 were sampled on December 7, 1992, MH-3 was sampled on April 7, 1993, and MH-4 was sampled on April 14, 1993. MH-1 contained water which enters the site from Varian Lane, MW-3 receives water from MH-1 that flows beneath the southern portion of the site, MH-2 receives water which enters the site from the north onto the I-490 highway median, and MH-4 receives water that flows beneath the site from MH-2.

Sample analyses are identified in Table 3-2, and the results of these analyses are presented in Section 4.4.6 of this report.

3.2.11.6 Quarry Seep Sampling

One quarry seep sample was collected during the Phase I RI on December 8, 1993. The Quarry is located approximately 0.5 mile southwest of the site on the south side of Buffalo Road (Route 33), west of I-390 (see Figure 1-1).

The sample was collected from a pool of water beneath a seep cascading from the north quarry wall in the northeast corner of the quarry at the apparent gradational contact of

the Lockport Dolomite and Rochester shale. This sample was collected to determine if site contaminants were migrating to the quarry.

Sample analyses are identified in Table 3-2, and the results of these analyses are presented in Section 4.5.7 of this report.

3.2.11.7 Gas Sampling from Monitoring Wells

Well gas samples were collected from MW-4D on January 26, 1993 and from MW-8D and MW-10D on January 28, 1993. Samples were collected to satisfy health and safety concerns regarding the composition of the venting well gases.

Samples were collected using tedlar bags which were filled using the same procedures as described in Section 3.2.6 (i.e., a pump was used to evacuate the chamber containing the sample bag, thus drawing in gases from the well head through a tube placed in the well). Two tedlar bags were collected for each sample to assure a sufficient volume of gas was available for analysis. Samples were collected from within the well head immediately upon opening the pressure-capped wells in an attempt to characterize the worst possible case prior to dilution of well gases with ambient air. New tygon tubing was used to collect each sample. A field blank was collected in a background area for quality control. Sample analyses are identified in Table 3-2, and the results of these analyses are described in Section 4.5.8 of this report.

3.3 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

This section describes the sampling procedures to be utilized for each environmental medium that will be collected and analyzed for this project. All procedures described are consistent with United States Environmental Protection Agency (EPA) sampling procedures as described in SW-846, Third Edition, September 1986.

3.3.1 Field Quality Control Samples

Field QC samples were used to check the cleanliness and effectiveness of field handling methods. The samples were analyzed at E & E's ASC as discrete samples. The purpose was to assess the sampling and transport procedures as possible sources of sampling contamination and to document overall sampling and analytical precision. Field QC samples consisted of trip blanks for water samples, duplicates, and rinsates.

Trip blanks were prepared by adding organic-free deionized water to a 40-ml volatile organic analysis (VOA) vial. One trip blank was used with every batch of water samples shipped for VOA. Each trip blank was transported to the sampling location, handled like a sample, and returned to the laboratory for analysis without being opened in the field. Duplicate samples consisted of aliquots of sample media placed in separate sample containers and labeled as separate samples. Rinsates consisted of deionized water passed through a decontaminated stainless steel bailer or submersible pump into the appropriate sample containers.

In addition to trip blanks, field personnel collected extra sample volumes for matrix spike/matrix spike duplicate (MS/MSD) analysis. MS/MSD requirements are listed below under laboratory QC samples.

3.3.2 Laboratory Quality Control Samples

Laboratory QC consisted of analysis of laboratory blanks, duplicates, spikes, standards, and QC check samples as appropriate to the methodology. These laboratory QC samples are described below.

Laboratory Blanks

Method blanks consisting of analyte-free water were subjected to every step of the analytical procedure to determine possible contamination. Calibration blanks consisting of pure reagent matrix were used to zero the ICP instrument's response, thus establishing the baseline. One method blank per batch or per 20 samples was analyzed. For inorganics, one calibration blank was analyzed every 2 hours or every 10 samples, whichever was more frequent.

Spike Sample

A sample spike was prepared by adding to an environmental sample (before extraction or digestion) a known amount of pure compound of the same type that is to be assayed for in the environmental sample. Spikes were added at one to 10 times the expected sample concentration or approximately 10 times the method detection limit. These blank spikes simulate the background and interferences found in the actual samples, and the calculated

percent recovery of the spike was taken as a measure of the accuracy of the total analytical method. One blank spike was analyzed for every MS/MSD set, except volatiles.

Laboratory Duplicate or Matrix Spike Duplicate

Laboratory duplicates were aliquots of the same sample that were split prior to analysis and treated exactly the same throughout the analytical method. Spikes and duplicates for the batch were aliquots the same sample. For organics, spikes were added at approximately 10 times the method detection limit. The relative percent difference (RPD) between the values of the MS and MSD for organics or between the original and the duplicate for inorganics was taken as a measure of the precision of the analytical method. For organics, one MS/MSD set was analyzed per batch or per 20 samples, whichever was more frequent.

Check Standard/Samples

Inorganic and organic check standards or samples were prepared with reference standards or were available from the EPA. They were used as a means of evaluating analytical techniques of the analyst. Check standards or samples were subjected to the entire sample procedure, including extraction, digestion, etc., as appropriate for the analytical method utilized. The check standard or sample provided information on the accuracy of the analytical method independent of various sample matrices. One check standard was analyzed per 20 samples for each analysis.

3.4 DECONTAMINATION PROCEDURES

All decontamination was performed in accordance with NYSDEC-approved procedures. Sampling methods and equipment were chosen to minimize decontamination requirements and to prevent the possibility of cross contamination. Decontamination of all sampling instrumentation and/or equipment was accomplished using the following procedure:

- Initially cleaned of all foreign matter;
- Sanitized with a steam cleaner or scrubbed with brushes in trisodium phosphate (TSP) solution;
- Rinsed with clean water;
- Soil gas probes were rinsed with pesticide-grade methanol;

- Stainless steel bailers were rinsed with a 10% nitric acid solution;
- Triple rinsed with deionized water; and
- Air dried.

A temporary decontamination area for drilling equipment was constructed at the site using heavy plastic sheeting. At the completion of decontamination, solids were placed in 55-gallon drums adjacent to the decontamination pad, and liquids were pumped into the 1,500-gallon poly storage tanks in the secure area. All drums containing wastes were properly labeled and stored on site in the secure area.

Currently remaining on site are 43 drums. Thirty-four of these drums are filled with soil and rock cuttings, and six drums are filled with development and purge water from monitoring wells MW-3D and MW-6D on the I-490 median. Two other drums are filled with sediments, and one drum is filled with sediments and plastic sheeting from the decontamination pad. The drums will be disposed of in accordance with state guidelines under a separate contract.

Table 3-1 SUMMARY OF BACKGROUND DATA COMPILATION	
Agency Contacted	Information Obtained
Monroe County Environmental Management Council 47 South Fitzhugh Street Rochester, New York 14614 Contact: Louise Hartshorn 716/428-3023	Aerial photographs.
New York State Department of Transportation 1530 Jefferson Road Rochester, New York 15423 Contact: Kevin Miller 716/272-3667	Boring logs and construction plans for I-390/I-490 interchange.
New York State Department of Environmental Conservation Division of Hazardous Waste Remediation 50 Wolf Road Albany, New York 12233-0001 Contact: David Chiusano 518/457-3373	Engineering investigations of Chevron, McKee and Olin Chemical Sites. Tax map. Ortho photo map of site. NYSDEC letters and memorandums.
New York State Department of Transportation 2255 Lyell Avenue Rochester, New York Contract: K. McClenathan	Plans for I-390/I-490 construction.

Table 3-2			
SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
Soil Gas			
SG-1	8/14/92	VOCs	Dearcop Drive entrance to vacant lot ^c
SG-2	8/14/92	VOCs	Vacant lot ^c
SG-3	8/17/92	VOCs	Vacant lot ^c
SG-4	8/17/92	VOCs	Vacant lot ^c
SG-5	8/15/92	VOCs	Vacant lot ^c
SG-6	8/17/92	VOCs	Vacant lot ^c
SG-7	8/17/92	VOCs	Vacant lot ^c
SG-8	8/17/92	VOCs	Vacant lot ^c
SG-9	8/18/92	VOCs	Vacant lot ^c
SG-10	8/17/92	VOCs	Vacant lot ^c
SG-11	8/18/92	VOCs	Vacant lot ^c
SG-12	8/18/92	VOCs	Vacant lot ^c
SG-13	8/18/92	VOCs	Varian Lane entrance to vacant lot ^c
SG-14	8/14/92	VOCs	Vacant lot ^c
SG-15	8/16/92	VOCs	Vacant lot ^c
SG-16	8/18/92	VOCs	Vacant lot ^c
SG-17	8/18/92	VOCs	Vacant lot ^c
SG-18	9/14/92	VOCs	Vacant lot ^c
SG-19	9/28/92	VOCs	Vacant lot ^c
SG-19D	9/28/92	VOCs	Duplicate of SG-19 ^c
SG-20	9/16/92	VOCs	Vacant lot ^c
SG-21	9/15/92	VOCs	Vacant lot ^c
SG-21D	9/15/92	VOCs	Duplicate of SG-21 ^c
SG-22	9/15/92	VOCs	Vacant lot ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-23	9/15/92	VOCs	Vacant lot ^c
SG-24	9/15/92	VOCs	Vacant lot ^c
SG-25	9/16/92	VOCs	Vacant lot ^c
SG-25D	9/16/92	VOCs	Duplicate of SG-25 ^c
SG-26	9/14/92	VOCs	Northeast corner of 6 Varian Lane property ^c
SG-27	9/14/92	VOCs	East-central portion of 14 Varian Lane property ^c
SG-28	9/14/92	VOCs	Southeast corner of 24 Varian Lane property ^c
SG-29	9/16/92	VOCs	Area between canal spoils and residences on Varian Lane ^c
SG-30	9/16/92	VOCs	Area between canal spoils and residences on Varian Lane ^c
SG-31	9/17/92	VOCs	Area between canal spoils and residences on Varian Lane ^c
SG-32	9/16/92	VOCs	Vacant lot ^c
SG-33	9/15/92	VOCs	Vacant lot ^c
SG-34	9/15/92	VOCs	Vacant lot ^c
SG-35	9/15/92	VOCs	Vacant lot ^c
SG-36	9/11/92	VOCs	West side of canal spoils ^c
SG-36A	9/11/92	VOCs	Duplicate of SG-36 ^c
SG-37	9/15/92	VOCs	West side of canal spoils ^c
SG-38	9/15/92	VOCs	West side of canal spoils ^c
SB-39	9/15/92	VOCs	West side of canal spoils ^c
SG-40	9/16/92	VOCs	West side of canal spoils ^c
SG-41	9/16/92	NS	Probe refusal
SG-42	9/16/92	VOCs	West side of canal spoils ^c
SG-43	9/11/92	VOCs	East side of canal spoils ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-44	9/11/92	NS	Probe refusal
SG-45	9/11/92	VOCs	East side of canal spoils ^c
SG-46	9/11/92	NS	Probe refusal
SG-47	9/16/92	VOCs	East side of canal spoils ^c
SG-48	9/11/92	NS	Probe refusal
SG-49	9/11/92	NS	Probe refusal
SG-50	9/11/92	NS	Probe refusal
SG-51	9/11/92	VOCs	West side of bike path ^c
SG-51A	9/11/92	VOCs	Duplicate of SG-51 ^c
SG-52	9/10/92	VOCs	East of side of bike path
SG-53	9/10/92	VOCs	East of side of bike path
SG-54	9/10/92	VOCs	East of side of bike path
SG-55	9/10/92	VOCs	East of side of bike path
SG-56	9/10/92	VOCs	East of side of bike path
SG-57	9/10/92	VOCs	East of side of bike path
SG-58	9/9/92	VOCs	East of side of bike path
SG-59	9/9/92	VOCs	East of side of bike path
SG-60	9/9/92	VOCs	East of side of bike path
SG-61	9/9/92	VOCs	East of side of bike path
SG-62	9/10/92	VOCs	East of side of bike path
SG-63	9/10/92	VOCs	West side of bike path ^c
SG-64	9/14/92	VOCs	Between I-490 right-of-way fence and I-490 eastbound ^c
SG-65	9/14/92	VOCs	South of I-490 eastbound ^c
SG-65D	9/1/92	VOCs	Duplicate of SG-65 ^c
SG-66	9/1/92	VOCs	South of I-490 eastbound ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-67	9/1/92	VOCs	East side of bike path below south side of I-490 eastbound bridge ^c
SG-68	9/1/92	VOCs	East side of bike path below north side of I-490 bridge ^c
SG-69	9/1/92	VOCs	West side of bike path on I-490 eastbound/westbound median ^c
SG-70	9/1/92	VOCs	West side of bike path on I-490 eastbound/westbound median ^c
SG-71	9/1/92	VOCs	West side of bike path on I-490 eastbound/westbound median ^c
SG-72	9/1/92	VOCs	West side of bike path on I-490 eastbound/westbound median ^c
SG-73	9/1/92	VOCs	West side of bike path on I-490 eastbound/westbound median ^c
SG-74	9/1/92	VOCs	West side of bike path on I-490 eastbound/westbound median ^c
SG-75	9/1/92	VOCs	West side of bike path on I-490 eastbound/westbound median ^c
SG-76	9/1/92	VOCs	West side of bike path on I-490 eastbound/westbound median ^c
SG-77	9/1/92	VOCs	East side of bike path near south side of I-490 westbound bridge ^c
SG-78	9/1/92	VOCs	East side of bike path, north of I-490 westbound ^c
SG-79	9/1/92	VOCs	West of bike path, north of I-490 westbound ^c
SG-80	9/1/92	VOCs	West of bike path, north of I-490 westbound ^c
SG-81	9/1/92	VOCs	West of bike path, north of I-490 westbound ^c
SG-82	9/1/92	VOCs	I-490 eastbound/westbound median ^c
SG-83	9/1/92	VOCs	Backyard of 94 Dearcop Drive ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-84	9/1/92	VOCs	Backyard of 102 Dearcop Drive ^c
SG-85	9/1/92	VOCs	North side of 116 Dearcop Drive ^c
SG-86	9/1/92	VOCs	Backyard of 149 Dearcop Drive ^c
SG-87	9/1/92	VOCs	Front yard of 181 Dearcop Drive ^c
SG-88	9/1/92	VOCs	Backyard of 93 Dearcop Drive ^c
SG-89	9/1/92	VOCs	Backyard of 115 Dearcop Drive ^c
SG-90	9/1/92	VOCs	Backyard of 15 Varian Lane ^c
SG-90D	9/1/92	VOCs	Duplicate of SG-90 ^c
SG-91	10/6/92	VOCs	I-490 eastbound/westbound median ^c
SG-92	10/6/92	VOCs	I-490 eastbound/westbound median ^c
SG-93	10/6/92	VOCs	I-490 eastbound/westbound median ^c
SG-94	10/5/92	VOCs	Between I-490 eastbound and right-of-way fence on north side of the vacant lot ^c
SG-95	10/5/92	VOCs	Between I-490 eastbound and right-of-way fence on north side of the vacant lot ^c
SG-96	10/5/92	VOCs	Between I-490 eastbound and right-of-way fence on north side of the vacant lot ^c
SG-97	10/6/92	VOCs	North of 93 Dearcop Drive, north of I-490 eastbound right-of-way fence ^c
SG-97D	10/6/92	VOCs	Duplicate of SG-97 ^c
SG-98	10/6/92	VOCs	Backyard of 105 Dearcop Drive ^c
SG-99	10/6/92	VOCs	Backyard of 5 Varian Lane ^c
SG-100	10/6/92	VOCs	Backyard of 15 Varian Lane ^c
SG-101	10/6/92	VOCs	Backyard of 21 Varian Lane ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-102	10/6/92	VOCs	Backyard of 33 Varian Lane ^c
SG-103	10/6/92	VOCs	Backyard of 32 Varian Lane ^c
SG-104	10/6/92	VOCs	Backyard of 168 Dearcop Drive ^c
SG-105	10/6/92	VOCs	Backyard of 205 Dearcop Drive ^c
SG-106	10/6/92	VOCs	Backyard of 244 Dearcop Drive ^c
SG-107	10/8/92	VOCs	Backyard of 270 Dearcop Drive ^c
SG-108	10/8/92	VOCs	Backyard of 320 Dearcop Drive ^c
SG-109	10/8/92	VOCs	Backyard of 253 Dearcop Drive ^c
SG-110	10/8/92	VOCs	Backyard of 206 Dearcop Drive ^c
SG-111	10/8/92	VOCs	Backyard of 123 Varian Lane ^c
SG-112	10/8/92	VOCs	Backyard of 98 Varian Lane ^c
SG-113	10/8/92	VOCs	Backyard of 79 Varian Lane ^c
SG-113D	10/8/92	VOCs	Duplicate of SG-113 ^c
SG-114	10/8/92	VOCs	Backyard of 74 Varian Lane ^c
SG-115	--	NS	Not collected
SG-116	10/19/92	VOCs	Backyard of 193 Dearcop Drive ^c
SG-117	10/19/92	VOCs	Backyard of 221 Dearcop Drive ^c
SG-118	10/19/92	VOCs	Backyard of 218 Dearcop Drive ^c
SG-119	10/19/92	VOCs	Backyard of 194 Dearcop Drive ^c
SG-120	10/20/92	VOCs	Backyard of 41 Varian Lane ^c
SG-121	10/20/92	VOCs	Backyard of 59 Varian Lane ^c
SG-122	10/20/92	VOCs	Backyard of 176 Varian Lane ^c
SG-123	10/20/92	VOCs	Backyard of 85 Varian Lane ^c
SG-124	10/20/92	VOCs	Backyard of 97 Varian Lane ^c
SG-124D	10/20/92	VOCs	Backyard of 97 Varian Lane ^c
SG-125	10/20/92	VOCs	Backyard of 109 Varian Lane ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-126	10/20/92	VOCs	I-490 eastbound/westbound median ^c
SG-127	10/20/92	VOCs	I-490 eastbound/westbound median ^c
SG-128	10/20/92	VOCs	I-490 eastbound/westbound median ^c
SG-129	10/20/92	VOCs	Between I-390/I-490 interchange ramp and 93 Dearcop Drive property ^c
SG-130	10/20/92	VOCs	Backyard of 205 Dearcop Drive, 120 feet west of SG-105 ^c
SG-131	10/20/92	VOCs	Backyard of 221 Dearcop Drive 120 feet west of SG-117 ^c
SG-132	10/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-133	10/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-134	10/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-135	10/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-136	12/01/92	VOCs	I-490 eastbound/westbound median ^c
SG-137	10/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-138	10/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-139	10/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-140	10/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-141	10/29/92	VOCs	I-490 eastbound/westbound median ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-A	08/14/92	VOCs	Vacant lot
SG-A	09/24/92	VOCs	Collected at same location as SG-A, 41 days after original sample ^c
SG-B	08/17/92	VOCs	Between SG-3 and SG-4 ^c
SG-B	09/28/92	VOCs	100 feet north of SG-1 between I-390 ramp and right-of-way fence ^c
SG-C	09/28/92	VOCs	Between I-390 ramp and right-of-way fence ^c
SG-D	09/28/92	VOCs	Between I-390 ramp and right-of-way fence ^c
SG-E	09/24/92	VOCs	Vacant lot ^c
SG-F	09/24/92	VOCs	Vacant lot ^c
SG-G	09/24/92	VOCs	Vacant lot ^c
SG-H	09/24/92	VOCs	Vacant lot ^c
SG-I	09/28/92	VOCs	Vacant lot ^c
SG-J	09/25/92	VOCs	Vacant lot ^c
SG-JD	09/25/92	VOCs	Duplicate of SG-J ^c
SG-K	09/24/92	VOCs	Vacant lot ^c
SG-L	09/24/92	VOCs	Vacant lot ^c
SG-M	09/24/92	VOCs	Vacant lot ^c
SG-N	09/24/92	VOCs	Vacant lot ^c
SG-O	09/24/92	VOCs	Vacant lot ^c
SG-P	09/24/92	VOCs	Vacant lot ^c
SG-PD	09/24/92	VOCs	Duplicate of SG-P ^c
SG-Q	09/28/92	VOCs	Vacant lot ^c
SG-R	09/29/92	VOCs	Between I-490 eastbound and right-of-way fence to south ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-S	09/25/92	VOCs	Vacant lot ^c
SG-T	09/25/92	VOCs	Vacant lot ^c
SG-U	09/25/92	VOCs	Vacant lot ^c
SG-V	09/25/92	VOCs	Vacant lot ^c
SG-W	09/25/92	VOCs	Vacant lot ^c
SG-X	09/25/92	VOCs	Vacant lot ^c
SG-Y	09/25/92	VOCs	Vacant lot ^c
SG-Z	09/25/92	VOCs	Vacant lot ^c
SG-AA	09/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-AAD	09/29/92	VOCs	Duplicate of SG-AA ^c
SG-BB	09/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-CC	09/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-DD	09/29/92	VOCs	I-490 eastbound/westbound median ^c
SG-EE	10/05/92	VOCs	Between I-390/I-490 ramp and right-of-way fence ^c
SG-FF	10/05/92	VOCs	Between I-390/I-490 ramp and right-of-way fence ^c
SG-GG	10/05/92	VOCs	Between I-390/I-490 ramp and right-of-way fence ^c
SG-HH	10/05/92	VOCs	Between I-390/I-490 ramp and right-of-way fence ^c
SG-II	10/05/92	VOCs	Between I-390/I-490 ramp and right-of-way fence ^c
BL-1	08/14/92	VOCs	Ambient air drawn through clean probe adjacent to SG-2 ^c
SG-BL-2	08/17/92	VOCs	Ambient air drawn through clean probe adjacent to SG-6 ^c

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-BL-3	08/18/92	VOCs	Ambient air drawn through clean probe adjacent to SG-5 ^c
SG-FB	09/14/92	VOCs	Ambient air drawn through clean probe adjacent to SG-18 ^c
SG-FB	09/15/92	VOCs	Ambient air drawn through clean probe adjacent to SG-24 ^c
SG-FB	09/16/92	VOCs	Ambient air drawn through clean probe adjacent to SG-20 ^c
SG-FB	09/24/92	VOCs	Ambient air drawn through clean probe adjacent to SG-0 ^c
SG-FB	09/25/92	VOCs	Ambient air drawn through clean probe adjacent to SG-S ^c
SG-FB	09/28/92	VOCs	Ambient air drawn through clean probe adjacent to SG-B ^c
SG-FB	09/29/92	VOCs	Ambient air drawn through clean probe adjacent to SG-85 ^c
SG-FB-10-5	10/05/92	VOCs	Ambient air drawn through clean probe ^c
SG-FB-10-6	10/06/92	VOCs	Ambient air drawn through clean probe adjacent to SG-93 ^c
SG-FB-10-8	10/08/92	VOCs	Ambient air drawn through clean probe in backyard of 98 Varian Lane ^c
SG-FB-10-20	10/20/92	VOCs	Ambient air drawn through clean probe in backyard of 85 Varian Lane ^c
SG-FB-12-1	12/01/92	VOCs	Ambient air drawn through clean probe adjacent to SG-136 ^c
SG-1-T-20	10/13/92	VOCs	20-liter Tenax sample collected at SG-1 location ^d
SG-11-T-10	10/07/92	VOCs	10-liter Tenax sample collected at SG-11 location ^d
SG-14-T20	10/08/92	VOCs	20-liter Tenax sample collected at SG-14 location ^d

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-18-T20	10/19/92	VOCs	20-liter Tenax sample collected at SG-18 location ^d
SG-20-T20	10/19/92	VOCs	20-liter Tenax sample collected at SG-20 location ^d
SG-27-T20	10/13/92	VOCs	20-liter Tenax sample collected at SG-27 location ^d
SG-54-T1	10/07/92	VOCs	1-liter Tenax sample collected at SG-54 location ^d
SG-83-T20	10/08/92	VOCs	20-liter Tenax sample collected at SG-11 location ^d
SG-83-T20D	10/08/92	VOCs	Duplicate of SG-83-T20 ^d
SG-84-T20	10/13/92	VOCs	20-liter Tenax sample collected at SG-84 location ^d
SG-85-T20	10/13/92	VOCs	20-liter Tenax sample collected at SG-85 location ^d
SG-88-T20	10/19/92	VOCs	20-liter Tenax sample collected at SG-88 location ^d
SG-97-T20	10/13/92	VOCs	20-liter Tenax sample collected at SG-97 location ^d
SG-98-T20	10/19/92	VOCs	20-liter Tenax sample collected at SG-98 location ^d
SG-98-T20	10/19/92	VOCs	20-liter Tenax sample collected at SG-98 location ^d
SG-99-T20	10/08/92	VOCs	20-liter Tenax sample collected at SG-99 location ^d
SG-100-T20	10/12/92	VOCs	20-liter Tenax sample collected at SG-100 location ^d
SG-101-T20	10/12/92	VOCs	20-liter Tenax sample collected at SG-101 location ^d
SG-102-T20	10/12/92	VOCs	20-liter Tenax sample collected at SG-102 location ^d
SG-103-T20	10/13/92	VOCs	20-liter Tenax sample collected at SG-103 location ^d

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SG-105-T20	10/19/92	VOCs	20-liter Tenax sample collected at SG-105 location ^d
SG-110-T20	10/19/92	VOCs	20-liter Tenax sample collected at SG-110 location ^d
SG-110-T20D	10/19/92	VOCs	Duplicate of SG-110-T20 ^d
SG-115-T20	10/13/92	VOCs	20-liter Tenax sample collected in backyard of 115 Dearcop Drive ^d
SG-129-T20	10/29/92	VOCs	20-liter Tenax sample collected at SG-T29 location ^d
SG-130-T20	10/29/92	VOCs	20-liter Tenax sample collected at SG-130 location ^d
SG-FB-T20-10-7	10/7/92	VOCs	20-liter Tenax sample of ambient air upwind of SG-54 ^d
SG-FB-TO-10-13	10/13/92	VOCs	Exposed tubes to ambient air same length of time as those used to collect samples ^d
SG-FB-TO-10-19	10/19/92	VOCs	Exposed tubes to ambient air same length of time as those used to collect samples ^d
SG-FB-TO-10-29	10/29/92	VOCs	Exposed tubes to ambient air same length of time as those used to collect samples ^d
Subsurface Soil From Backyards of Residences			
BH-93D (2-4 feet BGS)	01/04/93	Full TCL and asbestos	Collected in backyard of 93 Dearcop Drive near SG-83
BH-102D (2-4 feet BGS)	01/05/93	Full TCL	Collected in backyard of 102 Dearcop Drive near SG-84
BH-105D (2-4 feet BGS)	01/05/93	Full TCL	Collected in backyard of 105 Dearcop Drive at SG-98
BH-181D (2-4 feet BGS)	01/07/93	Full TCL	Collected in backyard of 181 Dearcop Drive between rock garden and vegetable garden
BH-205D (2-4 feet BGS)	01/05/93	Full TCL	Collected in backyard of 205 Dearcop Drive at SG-105

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
BH-206D (2-4 feet BGS)	01/05/93	Full TCL and asbestos	Collected in backyard of 206 Dearcop Drive at SG-110
BH-5V (2-4 feet BGS)	01/06/93	Full TCL	Collected in backyard of 5 Varian Lane 12 feet SW of SG-99
BH-14V (2-4 feet BGS)	01/07/93	Full TCL	Collected in backyard of 14 Varian Lane at SG-27
BH-15V (2-4 feet BGS)	01/06/93	Full TCL	Collected in backyard of 15 Varian Lane at SG-100
BH-21V (2-4 feet BGS)	01/06/93	Full TCL	Collected in backyard of 21 Varian Lane at SG-101
BH-32V (0-2 feet BGS)	01/07/93	Radionuclides	Collected in backyard of 32 Varian Lane at SG-103
BH-32V (2-4 feet BGS)	01/07/93	Full TCL	Collected in backyard of 32 Varian Lane at SG-103
BH-33V (1.5-1.75 feet BGS)	01/06/93	Full TCL and asbestos	Collected in backyard of 33 Varian Lane at SG-102
BH-TB-1-4 (2-4 feet BGS)	01/04/93	TCL VOCs	Deionized water from E & E's ASC
BH-R-1-5 (2-4 feet BGS)	01/05/93	Full TCL	Deionized water passed through a decontaminated split spoon sample
Subsurface Soil from Monitoring Well Borings			
MW-1D (7-9 feet BGS)	02/02/92	Full TCL, asbestos, total organic matter, TCLP, grain size, moisture content	West side of bike path and barge canal, approximately 500 feet south of I-490
MW-1DD (7-9 feet BGS)	12/12/92	Full TCL, asbestos, total organic matter, TCLP	Duplicate of MW-1D (7-9 feet BGS)
MW-2D (6-7.2 feet BGS)	12/09/92	Full TCL, asbestos	Vacant lot area, approximately 70 feet east of Monroe County Pure Water Pump Station

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
MW-3D (7-8 feet BGS)	12/15/92	Full TCL, asbestos	I-490 median
MS-4S (18-19.3 feet BGS)	01/04/93	Full TCL, asbestos	Between 228 and 244 Dearcop Drive
MW-5D (8-10 feet BGS)	08/29/91	Full TCL	Between 142 and 168 Dearcop Drive
MW-6D (8-10 feet BGS)	03/02/93	Full TCL, asbestos, Total organic matter (MS/MSD)	I-490 median
MW-6D (10-12 feet BGS)	03/02/93	Radionuclides	I-490 median
MW-6D (19-21 feet BGS)	03/02/93	Grain size, moisture content	I-490 median
MW-8D (6-8 feet BGS)	01/06/93	Full TCL, asbestos, Total organic matter, TCLP	East of bike path, west of barge canal, approximately 100 feet south of I-490
MW-9D (4-6 feet BGS)	01/14/93	Grain size, moisture content	Vacant lot approximately 30 feet north of Varian Lane
MW-9D (11-13 feet BGS)	01/14/93	Total organic matter, TCLP	Vacant lot approximately 30 feet north of Varian Lane
MW-10D (10-12 feet BGS)	01/19/93	Grain size, moisture content	Vacant lot approximately 30 feet north of Varian Lane
MW-10D (12-14 feet BGS)	01/19/93	Full TCL, asbestos, TCLP	Vacant lot approximately 300 feet north of Varian Lane
MW-10D (16-18 feet BGS)	01/19/93	Radionuclides	Vacant lot approximately 300 feet north of Varian Lane
Groundwater			
DR-1	11/23/92 (VOC only) 4/23/93	Full TCL, radionuclides	West of bike path and barge canal, 500 feet south of I-490
MW-1D	02/18/93	Full TCL, radionuclides	West of bike path and barge canal, 500 feet south of I-490

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
DR-2	11/20/92 (VOC only) 03/23/93	Full TCL, radionuclides	Vacant lot, approximately 70 feet east of Monroe County Pure Waters Pump Station
MW-2D	02/08/93	Full TCL, radionuclides	Vacant lot, approximately 70 feet east of Monroe County Pure Waters Pump Station
MW-2D(N)	03/26/93	Full TCL, radionuclides	New well adjacent to former MW-2D
DR-3	11/20/92 (VOC only) 03/26/93	Full TCL, radionuclides	I-490 median
MW-3D(N)	03/26/93	Full TCL, radionuclides	I-490 median
MW-4S	02/17/93	Full TCL, pyridines and radionuclides	Between 228 and 244 Dearcop Drive
MW-4SD	02/17/93	Full TCL, pyridines	Duplicate of MW-4S
MW-4D	02/05/93	Full TCL, pyridines, radionuclides	Between 228 and 244 Dearcop Drive
MW-5S	02/18/93	Full TCL, radionuclides	Between 142 and 168 Dearcop Drive
MW-5D(N)	4/14/93	Full TCL, radionuclides	Between 142 and 168 Dearcop Drive
MW-6S	03/24/93	Full TCL, radionuclides	I-490 median
MW-6SD	03/24/93	Full TCL	Duplicate of MW-6S
MW-6D	03/26/93	Full TCL, radionuclides	I-490 median
MW-7S	02/17/93	Full TCL, pyridines ^b , radionuclides	West of bike path and barge canal, approximately 50 feet north of I-490

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
MW-8S(R)	03/26/93	Full TCL, pyridines, radionuclides	Re-sample of MW-8S. West of bike path and Barge Canal, approximately 100 feet south of I-490
MW-8D	02/05/93	Full TCL, pyridines ^b , radionuclides	West of bike path and barge canal, approximately 100 feet south of I-490. Re-sample of MW-8.5
MW-9S	02/17/93	Full TCL, radionuclides	Vacant lot approximately 30 feet north of Varian Lane
MW-9D(R)	03/19/93	Full TCL, radionuclides	Re-sample of MW-9D. Vacant lot approximately 30 feet north of Varian Lane
MW-10S(R)	03/23/93	Full TCL, radionuclides (MS/MSD)	Re-sample of MW-10S. Vacant lot approximately 300 feet north of Varian Lane
MW-10D(R)	03/19/93	Full TCL, radionuclides	Re-sample of MW-10D. Vacant lot approximately 300 feet north of Varian Lane
DR-TB-1	11/20/92	VOCs	Trip Blank
MW-TB-2-4	02/04/93	VOCs	Trip Blank
TB-2	02/18/93	VOCs	Trip Blank
MW-TB-3-19	03/19/93	VOCs	Trip Blank
MW-TB-3-23	03/23/93	VOCs	Trip Blank
MW-TB-3-26	03/26/93	VOCs	Trip Blank
Rinsate	02/18/93	Full TCL	Rinsate of Deionized water through decontaminated stainless steel pump
MW-RIN-9DR	03/19/93	Full TCL	Rinsate of Deionized water through decontaminated stainless steel bailer

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
Surface Water			
SW-1	12/07/92	Full TCL, TSS, alkalinity, hardness, radionuclides (MS/MSD)	North of 93 Dearcop between I-390 ramp and right-of-way fence
SW-2	12/07/92	Full TCL, TSS, alkalinity, hardness, radionuclides	I-490 median
SW-3	12/07/92	Full TCL, TSS, alkalinity, hardness, radionuclides	North of I-490, west of bike path
SW-3D	12/07/92	Full TCL, TSS, alkalinity, hardness, radionuclides	Duplicate of SW-3
SW-4	12/08/92	Full TCL, TSS, alkalinity, hardness, pyridines ^b , radionuclides	Barge Canal below Route 33 bridge
SW-5	12/08/92	Full TCL, TSS, alkalinity, hardness, pyridines ^b , radionuclides	Barge Canal 50 feet south of I-490 eastbound
SW-6	12/08/92	Full TCL, TSS, alkalinity, hardness, pyridines ^b , radionuclides	Barge Canal 20 feet north of I-490 westbound, south of stream inlet
SW-TB-12-7	12/07/92	VOCs	Trip Blank
SW-TB-12-8	12/08/92	VOCs	Trip Blank

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
Sediment			
SED-1	12/07/92	Full TCL, total organic matter (MS/MSD), radionuclides	North of 93 Dearcop between I-390 ramp and right-of-way fence
SED-2	12/07/92	Full TCL, total organic matter	I-490 median
SED-3	12/07/92	Full TCL, total organic matter	North of I-490, west of bike path
SED-3D	12/07/92	Full TCL, total organic matter	Duplicate of SED-3
SED-4	12/07/92	Full TCL, total organic matter, pyridines ^b	Barge Canal below Route 33 bridge
SED-5	12/07/92	Full TCL, total organic matter, pyridines ^b	Barge Canal 50 south of I-490 eastbound
SED-6	12/07/92	Full TCL, total organic matter, pyridines ^b	Barge Canal 20 feet north of I-490 westbound, south of stream inlet.
Surface Soils			
SS-1	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected at SG-F location
SS-2	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected at SG-6 location
SS-3	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected at SG-M location

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SS-4	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected at SG-12 location
SS-5	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected 25 feet north of SG-15 location
SS-6	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected at SG-W location
SS-7	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected 50 feet north of SG-31 location
SS-7D	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Duplicate of SS-7
SS-8	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected 30 feet east of SG-39 location
SS-9	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected 25 feet south of SG-38 location
SS-10	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected 25 feet south of SG-37 location

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SS-11	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected approximately 50 feet northeast of SG-37 location
SS-12	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected approximately 30 feet northwest of SG-33 location
SS-13	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected at SG-17 location
SS-14	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected at SG-11 location
SS-15	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected approximately 30 feet northwest of SG-10 location
SS-16	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected at SG-22 location
SS-17	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos and radionuclides	Collected at blue-stained soil in northern portion of vacant lot
SS-18	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected approximately 50 feet northeast of SG-4 location

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
SS-19	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos	Collected approximately 10 feet southeast of SG-4 location
SS-20	12/01/92, 01/4/93 (resampled for BNAs only)	Full TCL, Asbestos and radionuclides	Off site on front lawn of the lot between 142 and 168 Dearcop Drive
Test Pit Subsurface Soil			
TP-1A (8 feet BGS)	11/05/92	Full TCL, asbestos, TCLP-organics (metals) ^a , and radionuclides	Sampled from TP-1: 20-foot long centered between SG-4 and SG-8, oriented east/west in vacant lot area
TP-1B (12.5 feet BGS)	11/05/92	Full TCL, asbestos	Sampled from TP-1: 20-foot long centered between SG-4 and SG-8, oriented east/west in vacant lot area
TP-2A (3 feet BGS)	11/05/92	Full TCL, asbestos, TCLP-organics (metals) ^a , radionuclides	Sampled from TP-2: 20 feet long, starting 25 feet east of SG-15 to west in the vacant lot area
TP-2AD (3 feet BGS)	11/05/92	Full TCL, asbestos	Sampled from TP-2: 20 feet long, starting 25 feet east of SG-15 to west in the vacant lot area
TP-2B (11 feet BGS)	11/05/92	Full TCL, asbestos	Sampled from TP-2: 20 feet long, starting 25 feet east of SG-15 to west in the vacant lot area
TP-2C (6 feet BGS)	11/05/92	Full TCL, asbestos, radionuclides	Sampled from TP-2: 20 feet long, starting 25 feet east of SG-15 to west in the vacant lot area

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
TP-3A (5 feet BGS)	12/04/92	Full, TCL, asbestos, radionuclides	Sample from TP-3: 20 feet long, centered on soil gas sample SG-24, oriented north/south
TP-3AD (5 feet BGS)	12/04/92	Full, TCL, asbestos	Sample from TP-3: 20 feet long, centered on soil gas sample SG-24, oriented north/south
TP-3B (11 feet BGS)	12/04/92	Full, TCL, asbestos	Sample from TP-3: 20 feet long, centered on soil gas sample SG-24, oriented north/south
TP-4A (4 feet BGS)	12/04/92	Full, TCL, asbestos, radionuclides	Sampled from TP-4: 20 feet long, centered 25 feet east of soil gas sample SG-11, oriented northwest/southeast
TP-4B (9 feet BGS)	12/04/92	Full, TCL, asbestos	Sampled from TP-4: 20 feet long, centered 25 feet east of soil gas sample SG-11, oriented northwest/southeast
TP-5A (2 feet BGS)	12/03/92	Full, TCL, asbestos, radionuclides	Sampled from TP-5: 20 feet long, centered 50 feet west of soil gas sample SG-J oriented east/west
TP-5B (7.5 feet BGS)	12/03/92	Full, TCL, asbestos	Sampled from TP-5: 20 feet long, centered 50 feet west of soil gas sample SG-J oriented east/west
TP-5C (11 feet BGS)	12/03/92	Full, TCL, asbestos	Sampled from TP-5: 20 feet long, centered 50 feet west of soil gas sample SG-J oriented east/west
TP-6A (6 feet BGS NW)	12/03/92	Full, TCL, asbestos	Sampled from TP-6: 20 feet long, centered 20 feet east of soil gas sample SG-J, oriented northwest/southeast
TP-6B (6 feet BGS SE)	12/03/92	Full, TCL, asbestos, radionuclides	Sampled from TP-6: 20 feet long, centered 20 feet east of soil gas sample SG-J, oriented northwest/southeast

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
TP-7A (6 feet BGS)	12/04/92	Full, TCL, asbestos	Sampled from TP-7: 20 feet long, located on highway median, centered on geophysical grid point 125 north 550 west, oriented north/south
TP-7B (13 feet BGS)	12/04/92	Full, TCL, asbestos, radionuclides	Sampled from TP-7: 20 feet long, located on highway median, centered on geophysical grid point 125 north 550 west, oriented north/south
Manhole Water			
MH-1	12/07/92	Full TCL	Located northwest of north end of Varian Lane
MH-2	12/07/92	Full TCL	Located on I-490 eastward/westbound median
MH-3	04/07/93	Full TCL	Located at southwest corner of Monroe County Pure Waters Pump Station at north end of Dearcop Drive
MH-4	04/13/93	Full TCL	Located in center of street at north end of Dearcop Drive
MH-TB-4-7	04/06/93	VOCs	Trip Blank
Quarry Seep			
QW-1	12/08/92	Full TCL	Water pooled on quarry floor seeping from north wall near northeast corner at gradational contact between Lockport and Rochester formations
Gas From Monitoring Wells			
WG-MW4D-95TD	01/26/93	VOCs	Sample of gas emitted from well bore prior to well installation
WG-MW-8D	01/28/93	VOCs	Sample of gas emitted from monitoring well

Key at end of table.

Table 3-2 SUMMARY OF SAMPLES COLLECTED AT THE DEARCOP FARM SITE			
Sample Identification Number	Date Collected	Analysis	Comments
WG-MW-10D	01/28/93	VOCs	Sample of gas emitted from monitoring well
WG-MWFB-OTD	01/28/93	VOCs	Field blank of on site ambient air

- ^a TCLP metals were only analyzed for if metals analysis indicated that individual analytes are present at concentrations which could exceed regulatory levels were high.
- ^b Pyridines include: pyridine, 2-chloropyridine, 3-chloropyridine, 2,6-chloropyridine, and P-fluoranthiline.
- ^c Sample collected using a 1-liter Tedlar bag.
- ^d Sample collected using Tenax/spherocarb tubes.

Key:

ASC = Analytical Services Center.
 BGS = below ground surface.
 NA = Not analyzed.
 NS = Not sampled.
 TCL = Target Compound List.
 TSS = Total Suspended Solids.
 VOCs = Volatile Organic Compounds.

Table 3-3

**PHASE I RI
TEST PIT EXCAVATION SUMMARY**

Test Pit Number	Date Excavated	Total Depth (feet)	Total Length (feet)	Depths Sampled	Materials Excavated/Comments
TP-1	11-5-92	15.0	18	8 feet (Fill) 12.5 feet (Native soil)	0 to 12.0 feet: Fill, including slag, plastic sheeting, scrap wood, and metal, and glass 12.0 feet to 12.5 feet: Native soil-tan clayey silt. 12.5 to 15.0 feet: Native soil and loose rock. 15.0 feet: Rock refusal.
TP-2	11-5-92	11.5	20	3 feet (Purple fines) 6 feet (Blue waste from a drum) 11 feet (Native soil)	0 to 11 feet: Fill, including rubber, plastic, slag, scrap wood and metal. At 3 to 5 feet, light blue to purple sandy clay layer. Small metal container with blue low density sandy material. 11.0 feet to 11.5 feet: Native soil, tan clayey silt. 11.5 feet: Rock refusal.
TP-3	12-4-92	12.0	20	5 feet (Fill) 11 feet (Native soil)	0 to 11 feet: Disturbed soil, reddish silt and clay, large chunks of metal slag (up to 3 feet diameter). Other waste included domestic debris such as seat cushion foam, tin cans, and scrap wood. 11 feet to 12 feet: Native soil-tan clayey silt. 12 feet: Rock refusal.
TP-4	12-4-92	10.0	20	4 feet (Fill) 9 feet (Native soil)	0 to 8 feet: Fill. Mostly disturbed soils with small pieces of debris. 8 feet to 10 feet: Native, soil-tan clayey silt. 10 feet: Rock refusal.

Table 3-3

PHASE I RI
TEST PIT EXCAVATION SUMMARY

Test Pit Number	Date Excavated	Total Depth (feet)	Total Length (feet)	Depths Sampled	Materials Excavated/Comments
TP-5	12-3-92	12	20	2 feet (Blue fines) 7.5 feet (Amber liquid stained fill) 11 feet (Native soil)	0 to 11 feet: Fill, including demolition debris, drums, cloth, brick, and wood. At 2 feet blue fines and at 3 feet, a breached drum of amber colored oily liquid. 11 feet to 12 feet: Native soil-tan clayey silt. 12 feet: Rock refusal.
TP-6	12-3-92	6	20	3 feet (fill) 6 feet (NW end of test pit: oil-stained fill) 6 feet (SE end of test pit: fill)	0 to 6 feet: Fill, several deteriorated 55-gallon drums at 2 feet to 6 feet. Some drums leaking black oil within the pit, white plastic, and an electric insulator were also present. Pit terminated at 6.0 feet BGS due leaking drums.
TP-7	12-4-92	14.0	20	6 feet (Fill) 13 feet (Oil-stained fill)	0 to 1.5 feet: Top soil, organic rich. 1.5 to 13.0 feet: Fill, disturbed soil, brick, rebar, wood logs, glass. 13 feet: Water flowing into pit. No native soil or rock refusal encountered. Test pit terminated at 14 feet due to limitation of the backhoe relative to surface topography.

Table 3-4

PHASE I RI DRILLING SUMMARY

Boring/Well Number	Date Started	Date Completed	Total Depth Drilled (feet BGS)	Number of Split-Spoon Samples		Tripod Split-spoon Advancement via 1401b Weight Drop	Hollow-Stem Auger 4¼-inch ID (feet BGS)	Rotary		Rock Coring HX (feet BGS)	Comments
				2-Inch ID	3-Inch ID			4-inch ID Temporary Spin Casing (feet BGS)	3½-inch OD (feet BGS)		
BH-93D	1/4/93	1/3/93	12	4	3	0 - 12	--	--	--	--	Split spoon refusal at 12 feet bgs.
BH-102D	1/5/93	1/5/93	7.7	1	3	0 - 7.7	--	--	--	--	Split spoon refusal at 7.7 feet bgs.
BH-105D	1/5/93	1/5/93	9.8	2	3	0 - 9.8	--	--	--	--	Split spoon refusal at 9.8 feet bgs.
BH-205D	1/5/93	1/5/93	14	7	--	0 - 14	--	--	--	--	Split spoon refusal at 14 feet bgs.
BH-206D	1/5/93	1/5/93	12	3	3	0 - 12	--	--	--	--	Split spoon refusal at 12 feet bgs.
BH-181D	1/7/93	1/7/93	8.7	10	--	0 - 8.7	--	--	--	--	Split spoon refusal at 8.7 feet bgs.
BH-5V	1/6/93	1/6/93	12	7	1	0 - 12	--	--	--	--	Split spoon refusal at 12 feet bgs.
BH-14V	1/7/93	1/7/93	9.2	4	1	0 - 9.2	--	--	--	--	Split spoon refusal at 9.2 feet bgs.
BH-15V	1/6/93	1/6/93	12	6	--	0 - 12	--	--	--	--	Split spoon refusal at 12 feet bgs.
BH-21V	1/6/93	1/6/93	10.2	6	--	0 - 10.2	--	--	--	--	Split spoon refusal at 10.2 feet bgs.
BH-32V	1/7/93	1/7/93	10	4	1	0 - 10	--	--	--	--	Split spoon refusal at 10 feet bgs.

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Key at end of table.

Table 3-4

PHASE I RI DRILLING SUMMARY

Boring/Well Number	Date Started	Date Completed	Total Depth Drilled (feet BGS)	Number of Split-Spoon Samples		Tripod Split-spoon Advancement via 140lb Weight Drop	Hollow-Stem Auger 4¼-inch ID (feet BGS)	Rotary		Rock Coring HX (feet BGS)	Comments
				2-Inch ID	3-Inch ID			4-inch ID Temporary Spin Casing (feet BGS)	3¾-inch OD (feet BGS)		
BH-33V	1/6/93	1/6/93	8	3	1	0 - 8	--	--	--	--	Split spoon refusal at 8 feet bgs.
MW-1D	2/2/93	2/4/93	67.1	4	--	--	0 - 13	0 - 13.7	13 - 13.7	13.7 - 67.1	Deep bedrock well
MW-2D	12/9/92	12/15/92	81.5	4	--	--	0 - 7.2	0 - 22.0	7.2 - 22.0	22 - 81.5	Partially installed well with 3-inch ID PVC casing
	1/28/93	2/2/93	85.0	--	--	--	--	0 - 22.0	0 - 85.0	--	Replacement well for the partially installed MW-2D. Decommissioned due to natural gas production.
MW-2D(N)	2/22/93	2/23/93	60.0	--	--	--	0 - 23	0 - 23.0	0 - 23.0	23 - 60.0	Replacement well for MW-2D at shallower depth
MW-3D	12/15/92	12/17/92	81.8	10	--	--	0 - 22.5	0 - 23.5	0 - 82.0	--	Partially installed well with 3" ID pvc casing
MW-3D(N)	3/8/93	3/9/93	62.3	--	--	--	0 - 20	0 - 23.5	20 - 23.5	23.5 - 62.3	Replacement well for the partially installed MW-3D at shallower depth
MW-4S	1/4/93	1/6/93	39.5	10	--	--	0 - 24	0 - 24.4	24.0- 24.4	24.4 - 39.6	Shallow overburden/bedrock interface well

3-50

Key at end of table.

Table 3-4

PHASE I RI DRILLING SUMMARY

Boring/Well Number	Date Started	Date Completed	Total Depth Drilled (feet BGS)	Number of Split-Spoon Samples		Tripod Split-spoon Advancement via 140lb Weight Drop	Hollow-Stem Auger 4½-inch ID (feet BGS)	Rotary		Rock Coring HX (feet BGS)	Comments
				2-Inch ID	3-Inch ID			4-inch ID Temporary Spin Casing (feet BGS)	3¾-inch OD (feet BGS)		
MW-4D	1/22/93	1/27/93	92.0	--	--	--	0 - 20	0 - 24.5	20 - 92.0	24.5 - 91.6	Decommissioned deep bedrock well due to natural gas production.
MW-5S	12-28-92	12-28-92	26.3	--	--	--	0 - 10.6	0 - 11.3	10.55 - 11.3	11.3 - 26.3	Shallow overburden/bedrock interface well
MW-5D	12/18/92	12/22/92	75.8	5	--	--	0 - 10.2	0 - 11.0	0 - 77.0	11.0 - 75.7	Partially installed well with 3-inch ID PVC casing.
MW-5D(N)	2/26/93	3/1/93	50.7	--	--	--	--	0 - 11.5	0 - 11.5	11.5 - 50.7	Replacement well for the partially installed MW-5D at shallower depth.
MW-6S	3/10/93	3/11/93	46.4	--	--	--	0 - 25	0 - 29.0	25 - 29.0	29 - 44.0	Shallow overburden/bedrock interface well
MW-6D	3/2/93	3/3/93	67.5	13	--	--	0 - 24.9	0 - 28.0	24.9 - 28.0	28 - 65.5	Deep bedrock well
MW-7S	12/30/92	12/31/92	41.0	--	--	--	0 - 11.0	0 - 11.0	--	11 - 41.0	Deeper shallow overburden/bedrock interface well.
MW-8S	1/13/93	1/13/93	36.2	--	--	--	0 - 10.0	0 - 10.0	--	10 - 36.2	Shallow overburden/bedrock interface well.

Key at end of table.

Table 3-4

PHASE I RI DRILLING SUMMARY

Boring/Well Number	Date Started	Date Completed	Total Depth Drilled (feet BGS)	Number of Split-Spoon Samples		Tripod Split-spoon Advancement via 1401b Weight Drop	Hollow-Stem Auger 4 1/4-inch ID (feet BGS)	Rotary		Rock Coring HX (feet BGS)	Comments
				2-Inch ID	3-Inch ID			4-inch ID Temporary Spin Casing (feet BGS)	3 7/8-inch OD (feet BGS)		
MW-8D	1/6/93	1/12/93	91.1	5	--	--	0 - 8.7	0 - 9.4	0 - 92.0	9.4 - 91.1	Deep bedrock well. Decommissioned due to natural gas production.
MW-9S	12/22/92	12/23/92	29.0	7	--	--	0 - 13.9	0 - 14.0	13.9 - 14.0	14 - 29.0	Shallow overburden/bedrock interface well.
MW-9D	1/14/93	1/19/93	97.3	--	--	--	0 - 13.7	0 - 14.3	13.7 - 14.3	14.3 - 97.3	Deep bedrock well.
MW-10S	12/29/92	12/30/92	34.0	--	--	--	0 - 12	0 - 19.0	12 - 19.0	12 - 34.0	Shallow overburden/bedrock interface well.
MW-10D	1/19/93	1/21/93	92.5	8	--	--	0 - 14.2	0 - 19.0	14.2 - 19.0	19 - 92.5	Deep bedrock well.

Key:

BGS = Below ground surface.

-- = Method not used.

Source: Ecology and Environment Engineering, P.C. 1993.

Table 3-5

PHASE I RI WELL CONSTRUCTION INFORMATION

Well Number	TOIC Elevation (feet above MSL)	Ground Elevation (feet above MSL)	Total Depth of Well (feet below TOIC)	Depth to Bedrock (feet BGS)	Thickness of Bedrock Cored (feet)	Casing		Screen		Open Hole Interval (feet BGS)	Sand Pack Interval (feet BGS)	Bentonite Seal Interval (feet BGS)
						ID Size (inches)	Length (feet)	ID Size (inches)	Interval (feet BGS)			
DR-1 (existing well)	536.21	534.77	34.12	8	27	3	16.8	--	--	15 - 35	--	--
MW-1D	536.12	534.27	68.82	13.7	53.4	2	44.14	2	42.14 - 67.14	--	39.9 - 67.14	37.2 - 39.9
DR-2 (existing well)	539.41 ^a	537.52	31.75 ^a	15	15	3	20.9	--	--	19 - 30	--	--
MW-2D	NA	--	81.5	22.0	59.5	3	83.45	--	--	--	--	--
MW-2D (redrilled)	NA	539.68	67.2	22.0	63	2	47.0	--	45.0 - 65.0	--	42.6 - 65.0	40.1 - 42.6
MW-2D(N)	542.56	540.23	61.68	23.0	37	2	47.0	2	40.0 - 60.0	--	37.5 - 60.0	35.0 - 37.5
DR-3 (existing well)	540.03	539.91	37.04	16	14	3	20.5	--	--	11 - 30	--	--
MW-3D	NA	539.21	81.8	23.5	58.3	3	83.75	--	--	--	--	--
MW-3D(N)	540.75	538.92	63.34	23.5	38.8	2	44.25	2	42.25 - 62.25	--	40.8 - 62.25	37.7 - 40.8
MW-4S	546.37	546.64	38.7	24.1	15.5	2	14.55	2	14.55 - 39.55	--	42.8 - 65.7	39.9 - 42.8
MW-4D	NA	547.17	64.96	24.0	68	2	45.0	2	45.0 - 65.0	--	11.8 - 39.6	9.8 - 11.8
MW-5S	536.72	537.45	25.41	11.0	15.3	2	6.3	2	6.3 - 26.3	--	4 - 26.3	2.0 - 4.0
MW-5D	NA	537.12	75.8	10.2	65.6	3	75.78	--	--	--	--	--
MW-5D(N)	536.36	536.90	49.96	11.0	39.7	2	35.7	2	35.7 - 50.7	--	33.2 - 50.7	31.1 - 33.2
MW-6S	547.88	545.78	46.35	28.5	17.9	2	26.35	2	23.85 - 43.85	--	21.2 - 43.9	19.0 - 21.2
MW-6D	547.38	545.43	67.52	24.5	43.0	2	47.52	2	50.5 - 65.5	--	48.2 - 65.5	45.9 - 48.2
MW-7S	527.64	527.78	39.06	11.0	30.0	2	5.5	2	5.5 - 40.5	--	4.0 - 40.5	2.0 - 4.0

Table 3-5

PHASE I RI WELL CONSTRUCTION INFORMATION

Well Number	TOIC Elevation (feet above MSL)	Ground Elevation (feet above MSL)	Total Depth of Well (feet below TOIC)	Depth to Bedrock (feet BGS)	Thickness of Bedrock Cored (feet)	Casing		Screen		Open Hole Interval (feet BGS)	Sand Pack Interval (feet BGS)	Bentonite Seal Interval (feet BGS)
						ID Size (inches)	Length (feet)	ID Size (inches)	Interval (feet BGS)			
MW-8S	532.56	532.93	35.64	10.0	26.2	2	6.15	2	6.15 - 36.15	—	5.0 - 36.15	3.8 - 5.0
MW-8D	NA	533.70	90.75	8.7	82.4	2	56.1	2	56.1 - 91.1	—	53.8 - 91.1	51.0 - 53.8
MW-9S	541.23	539.38	31.22	13.9	15.1	2	11.0	2	9.0 - 29.0	—	7.0 - 29.0	7.0 - 9.0
MW-9D	541.03	538.98	98.72	13.7	83.6	2	63.72	2	61.31 - 96.31	—	58.1 - 96.31	55.7 - 58.1
MW-10S	542.14	540.07	36.08	19.0	15.0	2	16.15	2	14.0 - 34.0	—	12.0 - 34.0	10.0 - 12.0
MW-10D	542.39	540.14	94.36	19.0	73.5	2	59.36	2	57.49 - 92.49	—	54.7 - 92.5	52.0 - 54.7

^a Total depth of well measured from top of casing (TOC) since there is no inner or outer casing for this well.

Key:

-- = Construction material or method not used.

MSL = Mean sea level.

BGS = Below ground surface.

ID = Inner diameter.

NA = Not available.

TOIC = Top of inner casing.

Table 3-6							
SUMMARY OF PHASE I RI WELL DEVELOPMENT							
Well Number	Start Date	Completion Date	Well Volume (gallons)	Volume Purged		Method	Final Turbidity (NTUs)
				(gallons)	(well volumes)		
MW-1D	2-18-93	2-18-93	5.89	17.5	3.0	Submersible pump	47.9
MW-2D	3-17-93	3-19-93	4.14	23.0	5.6	Submersible pump/bailer	> 200
MW-2D(N)	3-17-93	3-25-93	4.14	48.0	11.6	Submersible pump/bailer	> 200
MW-3D(N)	3-24-93	3-25-93	4.11	113.0	27.5	Submersible pump	104.3
MW-4S	2-16-93	2-16-93	2.86	8.5	3.0	Bailer	NA (Turbid)
MW-4D	2-4-93	2-4-93	4.95	10	2	Submersible pump	> 200
MW-5S	4-8-93	4-14-93	1.75	45.5	26	Bailer	490
MW-5D(N)	3-23-93	4-8-93	3.86	32.0	8.3	Submersible pump/bailer/surge block	> 1,000
MW-6S	3-18-93	3-23-93	3.33	60.0	18	Bailer	> 200
MW-6D	3-24-93	3-25-93	3.72	112	30.1	Submersible pump	> 200
MW-7S	2-16-93	2-16-93	2.37	7	3.0	Bailer	Slightly turbid
MW-8S	2-16-93	3-12-93	0.91	52.5	57.7	Bailer	163.9
MW-8D	2-5-93	2-5-93	9.96	150	15.1	Submersible pump	< 50
MW-9S	2-16-93	2-16-93	2.28	7	3.1	Bailer	Turbid
MW-9D	2-18-93	3-17-93	9.82	140	14.3	Submersible pump	0.8
MW-10S	2-16-93	3-12-93	3.61	61.5	17.0	Bailer	> 200
MW-10D	2-18-93	3-17-93	8.87	137	15.4	Submersible pump	> 200

Key:

NA = Not available.

NTUs = Nephelometric Turbidity Units.

Table 3-7								
PHASE I RI PACKER TEST PARAMETER SUMMARY								
Well Number	Date(s) Packer Tested	Interval Tested (feet BGS)	Water Injection Pressure (psi)/ Water Flow Rate Achieved (gpm)					Total Volume Pumped (gallons)
			P1	P2	P3	P4	P5	
MW-3D	3-9-93	21 - 28	4.2/10.2	NA	NA	NA	NA	51.1
		28 - 35	5.7/0.7	13.3/0.9	19.0/1.0	13.30.8	NA	17.0
		35 - 42	4.2/-9.6	9.8/-6.9	14/0.3	9.8/-0.04	NA	-93.2
		42 - 49	7.2/26.0	NA	NA	NA	NA	130.0
		49 - 56	6.9/26.7	NA	NA	NA	NA	133.5
MW-4S	1-5-93	25.0 - 39.5	2.7/0	6.2/0	8.9/0	NA	NA	0
		30.0 - 39.5	4.0/0	9.3/0	13.3/0	NA	NA	0
		33.0 - 39.5	4.3/0	10.1/0	14.4/0	NA	NA	0
MW-6S	3-11-93	29.0 - 36.0	3.8/0.6	8.8/1.3	12.5/0	NA	NA	16.0
		33.0 - 40.0	4.1/6.1	9.8/5.5	13.7/6.0	9.8/2.0	4.1/0.9	102.3
MW-7S	12-31-92	15.5 - 22.5	2.5/20.6	4.0/25	6.0/28.4	NA	NA	414.0
		22.5 - 29.5	3.3/22.3	5.8/28.8	8.0/30.7	NA	NA	389.5
		29.5 - 36.5	5.1/0	8.9/0	12.8/0	NA	NA	0

Key at end of table.

Table 3-7

PHASE I RI PACKER TEST PARAMETER SUMMARY

Well Number	Date(s) Packer Tested	Interval Tested (feet BGS)	Water Injection Pressure (psi)/ Water Flow Rate Achieved (gpm)					Total Volume Pumped (gallons)
			P1	P2	P3	P4	P5	
MW-8D	1-12-93	7 - 14	3.0/4.0	NA	NA	NA	NA	19.8
		14 - 21	3.0/0.5	NA	NA	NA	NA	2.3
		21 - 28	7.5/14.7	NA	NA	NA	NA	58.8
	1-7-93	28 - 35	3.5/38.1	18.3/36.7	11.8/40.2	8.3/34.7	3.5/32.5	1098.5
		35 - 40	4.1/20.0	9.5/19.6	13.5/20.6	NA	NA	328.0
	1-12-93	44 - 51	5.4/21.6	NA	NA	NA	NA	108.0
		51 - 58	6.75/25.1	NA	NA	NA	NA	125.4
		58 - 65	8.1/27.1	18.9/38.0	27.0/30.7	18.9/37.1	8.1/18.2	881.1
		65 - 72	8.8/0.06	20.5/2.0	29.3/2.7	20.5/-0.3	8.8/-1.1	17.1
	1-11-93	72 - 79	60.5/0.2	24.5/0.6	35.0/0.8	24.5/0.1	10.5/-0.04	8.9
		79 - 86	13.4/0	31.2/0.9	44.5/1.4	31.2/0.1	13.4/-0.6	10.0
MW-9D	1-18-93	67.5 - 74.5	9.2/0.3	21.5/0.6	30.8/1.2	21.5/0.3	9.2/-0.06	11.4
		74.5 - 81.5	10.5/0.1	24.5/0.4	35.0/0.1	24.5/0.1 ^a	10.5/-0.1	2.4
		81.5 - 88.5	11.2/0	24.0/0	37.2/0	24.0/0	11.2/0	0

Key at end of table.

Table 3-7								
PHASE I RI PACKER TEST PARAMETER SUMMARY								
Well Number	Date(s) Packer Tested	Interval Tested (feet BGS)	Water Injection Pressure (psi)/ Water Flow Rate Achieved (gpm)					Total Volume Pumped (gallons)
			P1	P2	P3	P4	P5	
MW-10D	1-21-93	43.5 - 51.5	5.9/0	13.7/0	19.5/0	NA	NA	0
		51.5 - 58.5	7.4/0	17.2/7.9	24.6/5.5	NA	NA	59.8
		58.5 - 65.5	7.8/35.3	NA	NA	NA	NA	176.5
		65.5 - 72.5	9.2/18.6	NA	NA	NA	NA	92.3
		72.5 - 79.5	10.2/0	26.4/0	37.7/0.06	26.0/0.02	10.2/-0.1 ^a	0
		79.5 - 86.5	11.2/0	26.0/0	42.3/0	26.0/0	11.2/0	0
		86.5 - 93.5	12.5/0.02	29.0/0.1	41.4/0.4	29.0/0.02	12.5/-0.04 ^a	12.3
MW-10S	12-29-92	21.0 - 34.0	8.4/0.04	14.7/4.5	21.0/8.8	14.7/2.1	8.4/0.7	85
		25.3 - 34.0	10.1/0	17.7/1.2	25.3/2.4	17.7/4.7	10.1/-0.2 ^a	44.0
		29.5 - 34.0	11.8/0	20.7/0	29.6/0	NA	NA	0

^a Negative flow was encountered in zones of very low permeability. This was caused by compression of air trapped in the test water by the pressure generated by the pump during injection resulting in positive flow on the flow meter. After the pressure is decreased, the air decompressed and caused the flow meter to run backward, indicating negative flow.

Table 3-7 (Cont.)

Key:

- P1 = 0.4 x computed maximum gauge pressure. The maximum pressure (PSI) equals the depth gauge in feet to the top of the tested section, and is the sum of the pressure of the water column in the standpipe above the top packer and the applied gauge pressure.
- P2 = 0.7 x the maximum gauge in feet pressure;
- P3 = the computed maximum gauge pressure;
- P4 = P2 pressure actually achieved; and
- P5 = P1 pressure actually achieved.
- BGS = Below ground surface.
- NA = Not available because of lack of flow into the rock formation caused by natural low permeability conditions (i.e., good to excellent rock quality).

Table 3-8 PHASE I RI SUMMARY OF STANDARD PENETRATION TESTS			
Hole No.	Depth Interval (feet BGS)	No. Blows Per Foot	Relative Density
BH-93D	0.0 - 6.0	20	Medium
	6.0 - 7.0	7	Loose
	7.0 - 8.0	11	Medium
	8.0 - 10.0	40	Dense
	10.0 - 12.0	> 50	Very dense
BG-102D	0.0 - 1.0	5	Loose
	1.0 - 3.0	12	Medium
	3.0 - 7.7	> 50	Very dense
BH-105D	0.0 - 2.0	7	Loose
	2.0 - 4.0	44	Dense
	4.0 - 6.0	> 50	Very dense
	6.0 - 7.0	48	Dense
	7.0 - 10.0	> 50	Very dense
BH-205D	0.0 - 6.0	19	Medium
	6.0 - 14.0	> 50	Very dense
BH-206D	0.0 - 1.0	40	Dense
	1.0 - 2.0	> 50	Very dense
	2.0 - 5.0	19	Medium
	5.0 - 6.0	35	Dense
	6.0 - 7.0	26	Medium
	7.0 - 8.0	49	Dense
	8.0 - 12.0	> 50	Very dense
BH-5V	0.0 - 1.0	5	Loose
	1.0 - 4.0	16	Medium
	4.0 - 6.0	40	Dense
	6.0 - 12.0	> 50	Very dense
BH-15V	0.0 - 1.0	2	Very loose
	1.0 - 2.0	12	Medium

Table 3-8			
PHASE I RI SUMMARY OF STANDARD PENETRATION TESTS			
Hole No.	Depth Interval (feet BGS)	No. Blows Per Foot	Relative Density
	2.0 - 4.0	42	Dense
	4.0 - 8.0	> 50	Very dense
	8.0 - 9.0	25	Medium
	9.0 - 12.0	> 50	Very dense
BH-21V	0.0 - 1.0	2	Very loose
	1.0 - 2.0	7	Loose
	2.0 - 4.0	17	Medium
	4.0 - 5.0	47	Dense
	5.0 - 10.0	> 50	Very dense
BH-33V	0.0 - 1.0	7	Loose
	1.0 - 2.0	33	Dense
	2.0 - 3.0	19	Medium
	3.0 - 4.0	31	Dense
	4.0 - 5.0	23	Medium
	5.0 - 6.0	46	Dense
	6.0 - 8.0	> 50	Very dense
BH-14V	0.0 - 4.0	18	Medium
	4.0 - 5.0	41	Dense
	5.0 - 6.0	> 50	Very dense
	6.0 - 7.0	27	Medium
	7.0 - 9.2	> 50	Very dense
BH-32V	0.0 - 1.0	5	Loose
	1.0 - 2.0	14	Medium
	2.0 - 3.0	30	Dense
	3.0 - 6.0	> 50	Very dense
	6.0 - 7.0	26	Medium
	7.0 - 10.0	> 50	Very dense

Table 3-8 PHASE I RI SUMMARY OF STANDARD PENETRATION TESTS			
Hole No.	Depth Interval (feet BGS)	No. Blows Per Foot	Relative Density
BH-181D	0.0 - 1.0	3	Very loose
	1.0 - 2.0	10	Medium
	2.0 - 8.7	> 50	Very dense
MW-1D	0.0 - 1.0	26	Medium
	1.0 - 3.0	33	Dense
	3.0 - 9.0	> 50	Very dense
MW-2D	0.0 - 1.0	5	Loose
	1.0 - 3.0	15	Medium
	3.0 - 4.0	6	Loose
	4.0 - 5.0	14	Medium
	5.0 - 6.0	32	Dense
	6.0 - 7.0	21	Medium
MW-3D	0.0 - 4.0	17	Medium
	4.0 - 5.0	7	Loose
	5.0 - 6.0	3	Very loose
	6.0 - 7.0	9	Loose
	7.0 - 10.0	16	Medium
	10.0 - 14.0	> 50	Very dense
	14.0 - 15.0	36	Dense
	15.0 - 20.0	> 50	Very dense
MW-4S	0.0 - 2.0	18	Medium
	2.0 - 4.0	8	Loose
	4.0 - 5.0	4	Very loose
	5.0 - 6.0	10	Medium
	6.0 - 8.0	35	Dense
	8.0 - 13.0	20	Medium
	13.0 - 14.0	32	Dense
	14.0 - 15.0	> 50	Very dense

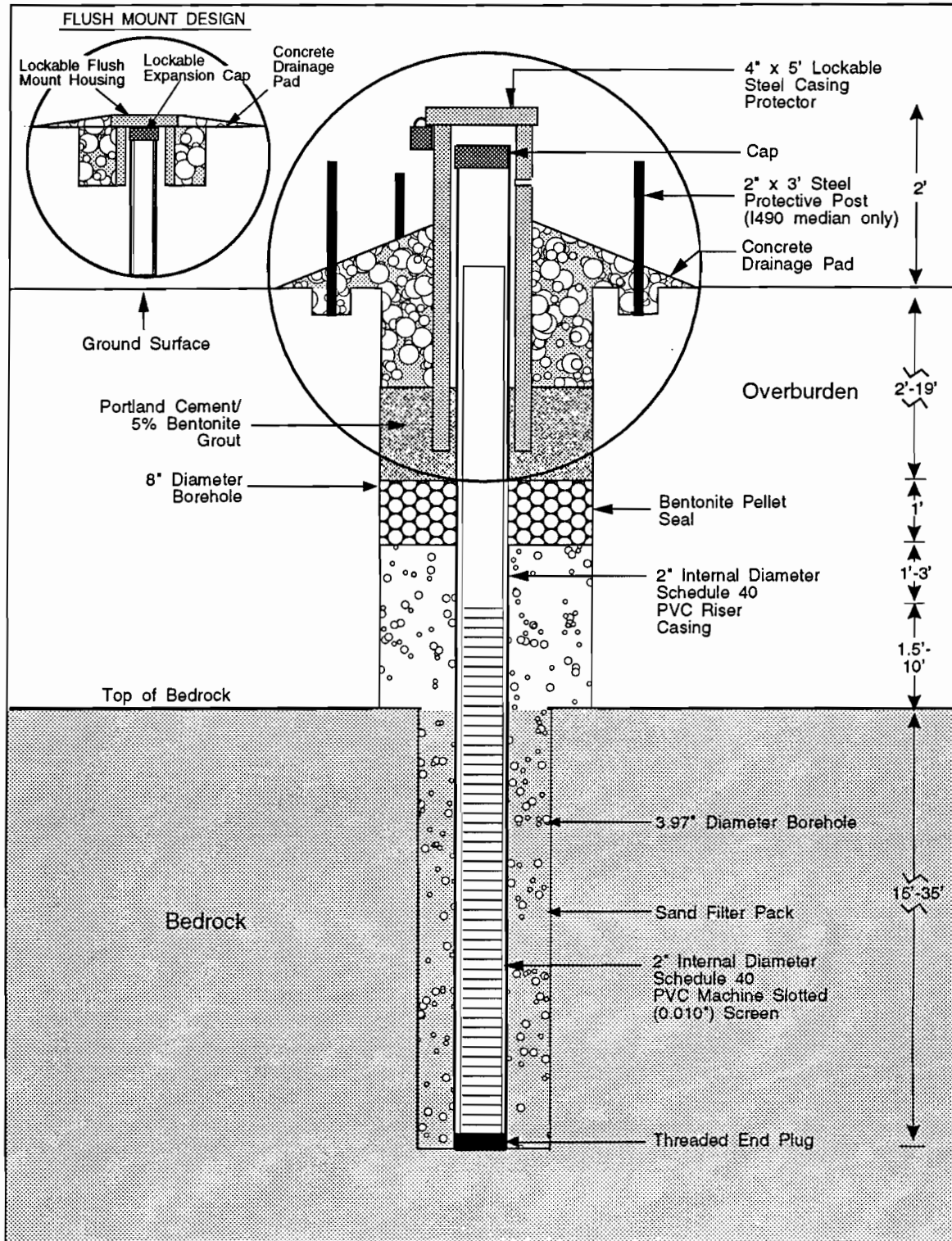
Table 3-8			
PHASE I RI SUMMARY OF STANDARD PENETRATION TESTS			
Hole No.	Depth Interval (feet BGS)	No. Blows Per Foot	Relative Density
	15.0 - 16.0	20	Medium
	16.0 - 17.0	> 50	Very dense
	17.0 - 18.0	47	Dense
	18.0 - 19.3	> 50	Very dense
MW-5D	0.0 - 1.0	15	Medium
	1.0 - 2.0	38	Dense
	2.0 - 4.0	14	Medium
	4.0 - 5.0	7	Loose
	5.0 - 6.0	> 50	Very dense
	6.0 - 9.0	13	Medium
	9.0 - 10.0	> 50	Very dense
MW-6D	0.0 - 1.0	22	Medium
	1.0 - 3.0	34	Dense
	3.0 - 8.0	> 50	Very dense
	8.0 - 9.0	24	Medium
	9.0 - 10.0	31	Dense
	10.0 - 11.0	10	Medium
	11.0 - 12.0	5	Loose
	12.0 - 13.0	12	Medium
	12.0 - 18.0	6	Loose
	18.0 - 21.0	15	Medium
	21.0 - 22.0	46	Dense
	22.0 - 26.0	> 50	Very dense
MW-8D	0.0 - 1.0	7	Loose
	1.0 - 7.0	20	Medium
	7.0 - 8.7	> 50	Very dense

Table 3-8 PHASE I RI SUMMARY OF STANDARD PENETRATION TESTS			
Hole No.	Depth Interval (feet BGS)	No. Blows Per Foot	Relative Density
MW-9S	0.0 - 1.0	4	Very loose
	1.0 - 4.0	7	Loose
	4.0 - 5.0	> 50	Very dense
	5.0 - 6.0	4	Very loose
	6.0 - 8.0	24	Medium
	8.0 - 13.9	> 50	Very dense
MW-10D	0.0 - 1.0	5	Loose
	1.0 - 4.0	17	Medium
	4.0 - 6.0	4	Very loose
	6.0 - 7.0	8	Loose
	7.0 - 11.0	16	Medium



Figure 3-1 SOIL GAS LOCATION MAP
DEARCOP FARM SITE

Figure 3-2 SAMPLE LOCATION MAP
DEARCOP FARM SITE



NOT TO SCALE

Figure 3-3
TYPICAL CONSTRUCTION FOR OVERBURDEN/BEDROCK INTERFACE WELLS

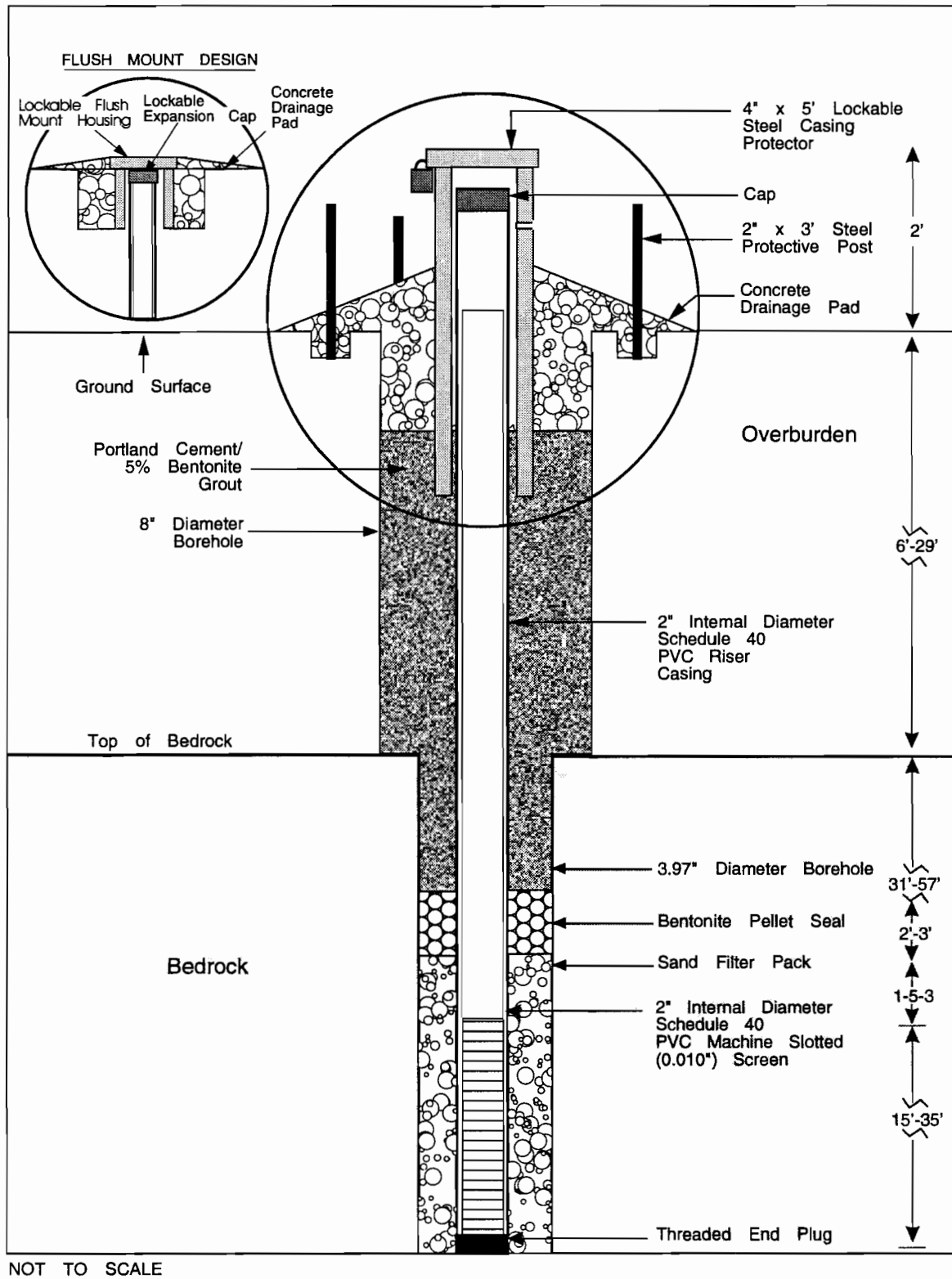


Figure 3-4
TYPICAL CONSTRUCTION FOR DEEP BEDROCK WELLS

4. NATURE AND EXTENT OF CONTAMINATION

4.1 INTRODUCTION

This section discusses the physical characteristics of the primary environmental media (i.e., geology and hydrology) of the Dearcop Farm site and adjacent areas, and presents analytical results in order to develop an understanding of the nature and extent of contamination originating on site. This information will be used to assess the fate and transport of contaminants (presented in Section 5) that pose a potential threat to human health or the environment.

All analytical data are provided in Appendix C. Tables summarizing concentrations of organic and inorganic substances detected in each sample medium are referenced in Section 4.5 of this report.

4.2 SPECIAL HEALTH AND SAFETY CONDITIONS

During drilling of deep bedrock monitoring wells both on and off site, very high levels of organic vapors (mostly methane) were detected in the well bores and in the work zone, thus raising health and safety concerns. Special precautions were taken to protect the workers and the general public when those conditions occurred. The following paragraphs describe the special procedures undertaken during the drilling program.

During the drilling of groundwater monitoring well MW-2D (the first well drilled in conjunction with the Phase I RI), organic vapor readings in the work area reached explosive atmosphere concentrations in excess of safe working levels ($> 25\%$ of the lower explosive limit [LEL]). To maintain worker safety, all activities were ceased. Explosive atmosphere levels quickly returned to background levels.

The vapors were screened with a carbon filter probe on the OVA to determine the methane fraction. The carbon adsorbs most organic compounds, but allows methane to pass through. Therefore, if the meter reading is the same with and without the carbon filter, then the vapors are assumed to be methane. However, breakthrough of other contaminants can occur if the carbon is saturated. Therefore, confirmation of the organic constituents in the gas could only be confirmed by laboratory analysis. A mercaptan odor was detected in conjunction with most of the high organic readings that indicated the presence of methane. Readings with hydrogen sulfide monitors indicated that work zone concentrations were at background. Since the permissible exposure limit (PEL) for hydrogen sulfide compounds is 10 ppm for an 8-hour time-weighted average, it was determined that there was no health hazard to the workers. Therefore there was no chemical breathing hazard identified for the workers.

To allow work to continue without the risk of explosion, explosive well gases were drawn from the well hole using an industrial vacuum with a hose attached to the well head. The gases were allowed to vent a safe distance from workers, the general public, and all potential ignition sources. Monitoring was conducted at the exhaust point to determine dispersion patterns and the point at which explosive atmospheres returned to background levels. Monitoring of the ambient air conditions near the vacuum exhaust indicated that explosive concentrations of well gases were still accumulating within the well and being drawn through the vacuum.

The vacuum was not used to ventilate explosive gases that were greater than 25% of the LEL, because it was not intrinsically safe (explosion proof) in nature. An intrinsically safe Venturi ventilation system was later devised and implemented. The Venturi ventilation system was used while drilling MW-2D, MW-3D, MW-4D, MW-5D, MW-7S, MW-8S, MW-8D, MW-9D, and MW-10D and while decommissioning MW-2D. In instances where the venturi was exhausted in the residential area, an action level was set at which work would stop to ensure public safety. Any reading above background on the OVA within 100 feet of a residence indicated work would cease. Table 4-1 summarizes OVA readings recorded during monitoring well installations.

To help assess the health hazards associated with the venting gases, well gas samples were collected from MW-4D, MW-8D, and MW-10D using the methods described in Section 3.2.11.7. Laboratory analysis by gas chromatography/mass spectrometer (GC/MS) of the

samples indicated less than 0.1% chlorinated organics and benzene, toluene, ethylbenzene, and xylene (BTEX) compounds (see Section 4.5.8). Therefore, greater than 99% of the sample was petroleum hydrocarbons (C₃-C₈). Because of the extremely low concentration of chlorinated organics and BTEX compounds, it was determined that an action level of 100 ppm for organic vapors in the work zone was safe. An action level of 50 ppm was set for exposures to the general public as an added measure of safety. A rough laboratory analysis of the hydrogen sulfide gas concentration was also conducted on the well gas from monitoring wells MW-4D, MW-8D, and MW-10D. Hydrogen sulfide concentrations were as high as 800 milligrams per cubic meter (mg/m³) (approximately 500 ppm) in MW-8D. This is well above the permissible exposure limits. Work zone hydrogen sulfide concentrations continued to be measured at background levels.

The atmosphere around each of the wells emitting natural gas was periodically monitored throughout the remainder of the Phase I RI. It was determined that several of these wells should be decommissioned to prevent exposure to the general public. Well decommissioning is discussed in Section 3.2.9.2. Periodic monitoring of MW-9D and MW-10D revealed that the natural gas emitted from these wells had dissipated and the wells need not be decommissioned.

4.3 SITE GEOLOGY

4.3.1 Introduction

Site-specific interpretations regarding the overburden and bedrock geology underlying the Dearcop Farm site were developed primarily using the following information:

- Interpretation of the geophysical surveys;
- Examination of split-spoon samples and rock cores collected during drilling activities;
- Determination of relative overburden densities using blow counts of split-spoons;
- Examination of overburden materials through test pit excavations; and
- Interpretation of aquifer tests performed on the monitoring well boreholes.

Boring logs were developed for each subsurface soil sample location and monitoring well (see Appendix B). Overburden thickness and top of bedrock were contoured and geologic cross sections were developed using borings log data (see Figures 4-1 through 4-5).

4.3.2 Interpretation of Geophysical Survey

The geophysical survey consisted of a total earth's magnetic field survey and a ground conductivity survey in the vacant lot area and I-490 highway median of the Dearcop Farm site. Survey procedures are described in Section 3.2.7 of this report. All raw data and contour plots are presented in Appendix D of this report.

4.3.2.1 Vacant Lot Area

Magnetic Survey Results

The magnetic survey conducted on the vacant lot at the Dearcop Farm site revealed several unusual and distinct patterns (see Appendix D, Figure D-1). The magnetic highs or anomalies were all associated with topographic highs while the low-lying areas (i.e., the southwest and southeast corners of the grid) were free from magnetic anomalies. During the survey, the topographic highs were noted to be littered with slag, metallic debris, and glass at ground surface. Only one major anomaly, located at grid coordinates 150, 0; 175, 0; and 200, 0 can be attributed to a readily identifiable source: the entrance gate on Varian Lane.

There is a large general anomaly which has the shape of large asymmetric "V," running across the entire survey grid from the northwest corner of the grid to grid coordinate 350, 0 (the bottom of the "V"), and up to the northeast corner of the grid. This anomaly coincides with the topographic high and is littered with slag and metallic debris at the surface. The shape of the anomaly and the intensity of the contours, together with changes in surface elevations and the presence of surface debris, suggest that it outlines the landfill boundary.

Superimposed on this large anomaly are several small but dense anomalies. There are at least five dense anomalies located in the northwest corner of the survey grid, with very little interference from surficial debris. These anomalies had very sharp magnetic highs and lows which form the "sine waveform" that is typically generated by an large, distinct, source. However, because of the number of magnetic peaks and depressions within a small area, it is impossible to determine definitely any alignment for these anomalies. Such alignment (as can

be estimated) suggests a northwest-southeast trend, parallel to the topographic high. There are three "point source" anomalies, at grid coordinates 0, 250; 25, 300; and 125, 300 which are not entirely covered by survey grid, and lie partly outside the survey area.

There are several more distinct dense anomalies in the eastern portion of the grid. All of these anomalies are the type generated by large metallic "point sources." These anomalies are associated with slag and melted metal debris visible on the surface at grid coordinates 475, 150; 500, 175; and the northeast corner of the grid. There are at least three anomalous area in the northeast corner of the survey area which lie partly outside the survey area.

Conductivity Survey Results

The ground conductivity survey conducted on the vacant lot at the Dearcop Farm site also revealed several distinct anomalous areas coinciding with the results of the magnetic survey. The same general trend, the asymmetrical "V," can be seen in both the vertical and horizontal dipole conductivity contour plots confirming the approximate landfill boundaries identified in the magnetic contour plot (see Appendix D, Figures D-2 and D-3). Once again, several localized anomalies are also superimposed on the larger anomalous area with strong anomalies located in the northwest corner at grid coordinates 50, 200; the south-central portion at grid coordinates 330, 100 and 375, 25; and the west and northwest corner of the survey grid at grid coordinates 525, 225; 550, 150; 550, 175; and 550, 200. The anomalies in these three areas (northwest, south central, and northeast) appear to extend outside the survey grid area. Again, the anomaly between grid coordinates 175, 0 and 200, 0 represents the gate at Varian Lane. As with the magnetic survey results, the actual cause of these anomalies cannot be determined, but apparently represent disseminated metallic debris along with larger buried metallic objects which are typical of landfills. The presence of metallic debris is confirmed by the contour plots of both vertical and horizontal dipole In-phase component data (see Appendix D, Figures D-4 and D-5). The conductivity meter used in the In-phase mode is especially sensitive to the presence metallic objects. Therefore, more localized dense anomalies were detected and displayed on the contour plot. In addition to the confirmation of the localized anomalies, a linear feature has been identified in both Figures D-4 and D-5, trending north-south along the 550-foot Y-axis. This linear feature could be an electric cable or gas pipeline, and should, therefore, be avoided during future subsurface

investigations. No electric cables or pipelines were identified during the initial utilities assessment, but this does not preclude the possibility due to incomplete records.

4.3.2.2 I-490 Median

Magnetic Survey Results

The magnetic survey conducted on the I-490 median at the Dearcop Farm site revealed several very steep gradient anomalies (see Appendix D, Figure D-6). Due to the high magnetic gradients, contour lines on the drawings in these areas appear as solid black areas. The two distinct steep gradient anomalies in the southern portion of the grid are the result of two buried Buckeye Pipeline high-pressure gas mains trending north-south, a large overhead road sign near grid coordinate 175, 125, and the I-490 bridge which crosses the Barge Canal. The bridge is located in the northeast corner of the grid (i.e., lower right) adjacent to grid coordinate 175, 0, and 175, 25. The other steep gradient anomaly located in the central portion of the grid is mainly the result of surface interference (i.e., NYSDOT 55-gallon drums, light posts, trucks, and trailers, steel I-beams, steel posts, etc.). Information regarding the subsurface in this area is unavailable due to the masking effect of the surface interference. A somewhat east-west trending large scale magnetic anomaly was also detected on the mounded area between grid coordinates 125, 475 and 125, 775. The cause of this anomaly is due to subsurface ferro-magnetic materials.

Conductivity Survey Results

The ground conductivity survey conducted on the I-490 median at the Dearcop Farm site also revealed several distinct anomalous areas, generally coinciding with the results of the magnetic survey. However, the intensity of the anomalies are not as prominent because the EM31 is less sensitive to surface interference than the magnetometer. Interference from the I-490 road sign and bridge in the lower right corner of the grid, and metallic objects in the central portion of the grid are readily apparent in both the vertical and horizontal conductivity contour plots (see Appendix D, Figures D-7 and D-8). The elongated anomalous area defined by the magnetometer is not as prominent in the EM plots. However, depressions in ground conductivity are noted in Figure D-7 at grid coordinates 100, 525, 150, 675, and 100, 850; and Figure D-8 at grid coordinates 75, 650 and 125, 750. Numerous anomalous areas are

evident in the In-phase vertical dipole plot (see Figure D-9). The lack of anomalies in the northern portion of the In-phase horizontal dipole plot (see Figure D-10) indicates that the anomalies are greater than 10 feet BGS.

4.3.2.3 Conclusions

The magnetic and conductivity surveys on the vacant lot area identified apparent landfill boundaries and revealed that the landfill is probably filled with disseminated metallic debris, but also contains several localized larger metallic objects. The localized anomalies are likely caused by large masses of buried metallic objects typical of landfills (e.g., foundry waste, drums, appliances, and possibly vehicles). A linear feature trending north-south along the 550-foot Y-axis is probably a utility line such as a cable or pipe which should be avoided in future subsurface investigations (i.e., test pits, and borehole and monitoring well drilling, etc.).

The magnetic and conductivity surveys on the I-490 median indicated the presence of subsurface metallic debris beneath the mounded area of the median. The central portion of the survey grid had too much surface interference to determine the presence or absence of subsurface anomalies.

Based upon the above-mentioned results, seven test pits were dug, six in the vacant lot area, and one on the I-490 median. Test pits TP-1, TP-2, TP-3, TP-4, and TP-7 were placed in areas with high magnetic and conductivity readings, and in some cases (i.e., TP-2, TP-4, and TP-7) high soil gas readings. Test pits TP-5 and TP-6 were located based upon high soil gas readings and the presence of partially decayed 55-gallon drums exposed at the surface. The purpose of the test pits were to identify the causes of the subsurface anomalies. Section 3.2.8 describes test pit excavation methodology; Section 4.5.2 describes test pit observations and analytical results of subsurface soil samples. Section 4.5.1 presents soil gas analytical results.

4.3.3 Characterization of the Overburden

As described in Section 2.1, the topography at the Dearcop Farm site is slightly undulating but generally of low relief. The undulations are apparently caused by man-made fill placed atop a flat plain of natural deposits.

The nature of the overburden was characterized during the Phase I RI by subsurface investigations which included, test pits, split-spoon sampling, and well drilling. The thickness of the overburden ranged from less than 10 feet, east of the site along the barge canal, to greater than 30 feet north of the site in the I-490 median (see Figure 4-1 and Figures 4-3 through 4-5). The thicknesses of the overburden in this area, however, is a direct consequence of human impact. The natural undisturbed materials were about 14 feet thick, at well MW-4D, which is approximately 1,200 feet south of the site. The naturally occurring overburden was measured to a depth of about 11 feet BGS at MW-5D, which is approximately 600 feet south of the site.

The entire area of investigation may be divided into three zones. The northern portion beneath the I-390/I-490 interchange is characterized by two or more units of fill, which consist of both landfill and natural fill materials. A thin covering of overburden exists on the east side of the site, along the Barge Canal where the surface was excavated for the canal. Finally, the residential area south of the site is composed of mostly undisturbed natural materials with some patchy areas of fill materials which apparently originated from the site.

The area within the I-490 median is characterized as having up to seven feet of apparently natural fill materials, which are composed mainly of light-brown fine sand. These materials are part of the regrading which took place during the I-390/490 road construction by NYSDOT in the late 1950s and early 1960s. Beneath the natural fill is another fill unit. The lower fill unit ranged between three feet in thickness at MW-3D and 12 feet at MW-6D. The lower fill unit is landfill material consisting of black soils with assorted metallic, glass, and brick debris and is presumed to be part of the Dearcop Farm landfill.

South of the I-490 there is only one fill unit present, the black landfill material which extends throughout the site itself and was detected in soil borings at 33 Varian Lane (BH-33V) and at 93 and 206 Dearcop Drive (BH-93D and BH-206D). The thickness of the industrial fill observed was up to 11 feet on site and ranged from 1.5 to 8 feet in the residential lots south of the site.

Natural materials were beneath the on-site fill unit(s) and throughout the southern portion of the study area. Generally, the uppermost of these natural units is a tan-brown, well-bedded, fine sand. This bedded sand unit contains occasional rounded pebbles. The origin of these soils is probably postglacial lake bottom sediments. Thickness of this sand

was generally 4 to 6 feet throughout the study area, but a maximum of 14 feet was found in MW-4D well boring. This particular unit was dry during trenching and drilling activities.

Conformably underlying the fine sand deposits at all of the well locations except MW-4D, was a glacial till deposit which overlaid the bedrock. Based upon the ASTM Standard Blow Count Method D1586-84, the till is medium to high in density (see Table 3-8). The till is red-brown in color, and composed of sand with a significant portion of silt, clay, and very angular broken rock fragments. The till was dry, with no saturated zones.

In well boring MW-4S/MW-4D, a fourth overburden unit was encountered. Between the bedded sands and the till was approximately three feet of brown, coarse, sand with a high portion of rounded pebbles. There were no fine materials in this well sorted sand: therefore, it is probably a shoreline or beach deposit from a post-glacial lake. This coarse sand unit was saturated, and was the only overburden water bearing zone encountered in the natural overburden.

4.3.4 Characterization of the Bedrock

The study area is underlain by the upper Silurian-age Lockport Formation as described in Section 2.2.2. The Lockport Formation is composed of two members, the Oak Orchard and Penfield (Rickard and Fisher 1970). Earlier works by Zenger (1965) included the DeCew member as part of the Lockport Formation. The DeCew is now accepted by several authors as part of the Rochester Shale. The uppermost Oak Orchard member, which is generally 80 to 100 feet thick, was only 20 feet thick in the study area due to glacial erosion (Williams 1991). Conformably underlying the Oak Orchard member is the Penfield member, which is approximately 50 feet thick. This member is underlain by the DeCew member of the Rochester shale, which is 15 to 20 feet thick. The DeCew conformably overlies the upper Silurian-age Gates member of the Rochester Shale (see Figure 4-6). Appendix A contains photographs of the Lockport and underlying Rochester Shale Formations from the Gates quarry.

Sixteen wells were cored using a HX (3 15/16 inch OD) core bit between 15 and 83 feet of bedrock. The cores were remarkably similar, indicating a horizontal consistency across the study area. The Oak Orchard member, as it appeared in the cores (see photographs in Appendix A and well logs in Appendix B) was initially highly weathered with weathering decreasing and Rock Quality Designation (RQD) increasing with depth (see Table

4-2). The rock is light to medium gray, thinly bedded, with uneven bedding surfaces. Carbonaceous, biostromal beds are common with zones, described by Zenger (1965) as bituminous. Several zones displayed minor vugs (i.e., small dissolution cavities); however, beds containing chert nodules (as described in existing scientific literature) were not observed. These beds were probably removed by erosion. The Oak Orchard member contained numerous fractures, mostly bedding plane fractures and some vertical fractures. Bedding plane fractures were observed both in the vertical cores and in outcrops in the nearby quarry and were spaced from 6 inches to 1 foot apart. Vertical fractures observed in the quarry generally trend 70° east of north. The lowest beds of the Oak Orchard member were well indurated and had a massive blocky structure, several feet thick. This massive unit is believed to have a much lower hydraulic conductivity based on observations of water-bearing zones and fractures in the rock cores from the site and rock exposure in the Gates quarry. Two prominent water-bearing zones were noted as seeps in the quarry walls. The first water-bearing zone was within the top 30 to 35 feet of rock, and the second water-bearing zone was noted at the gradational contact between the base of the Lockport and the top of the Rochester shale (i.e., approximately 70 to 90 feet below top of bedrock). Although these water-bearing zones appear to be separate, it is very likely that they are interconnected by vertical fractures observed in the quarry walls. The upper water-bearing zone is monitored by the shallow wells.

The Penfield member of the Lockport Formation is reportedly 52 to 58 feet thick in the Gates area (Zenger 1965). The thickness of the formation in a nearby quarry is about 50 feet (Williams 1991). The bedding in the Penfield ranges from thin to thick. The rock is well indurated, yielding high RQDs. Some zones near the top of the Penfield member are sandy and have a distinctly coarse appearance. Secondary mineralization of gypsum, which occurs as fracture and cavity fillings, was conspicuous and present in the cores of all the deep wells. The carbonaceous content of the matrix was less noticeable than in the Oak Orchard member. The upper portion of the Penfield member is also characterized by the presence of open fractures and constitutes the lower water-bearing zone, in which the deep wells were screened. Also encountered at this depth were natural gas and hydrogen sulfide (H₂S), which increased with depth. The occurrence of these gases was not expected prior to installation of the wells, but both were abundant below the level of the mid-Penfield member. Table 4-1 summarizes organic vapors recorded during monitoring well installations. Natural gas has

been reported to occur in abundant concentrations in the Rochester shale, and to a lesser extent in the Lockport formation (Haley and Aldrich 1976). However, review of rock boring logs for the 1976 study indicated the presence of natural gas only in the Rochester Shale and its underlying formations. The high levels of natural gas and H₂S have resulted in the abandonment of five wells to date, due to potential exposure and explosion hazards to the public from the gas venting from the wells.

The lower portion of the Penfield member conformably overlies the DeCew member, which is about 20 feet thick at the Gates quarry (Williams 1991). The contact was observed as gradational with the bedding becoming convolute to subconchoidal. No distinct change in lithology was noted in the cores. Minor local changes in the shaley carbonaceous to bituminous material were noted in the cores. Based on the depth drilled and the known stratigraphy of the local bedrock, it is believed that up to seven of the deep bedrock wells (MW-2D, MW-3D, MW-4D, MW-5D, MW-8D, MW-9D, and MW-10D) were terminated within the DeCew member. Five of these wells were later plugged and abandoned, leaving only wells MW-9D and MW-10D completed in this formation.

Based upon monitoring well boring logs, the bedrock surface elevation beneath the site and its surrounding areas was contoured, see Figure 4-2. A topographic high in the bedrock surface trends northeast/southwest between MW-5S/MW-5D/MW-5D(N), MW-9S/MW-9D, and MW-8S/MW-8D. This high extends diagonally across the site from the bike path, through the southern portion of the vacant lot area and into the residential area. Another bedrock topographic high exists at the MW-6S/MW-6D well pair on the I-490 median. The high bedrock elevation on the median is associated with a surface topographic high; however, the bedrock high crossing the site is not paralleled by surface topography in the vacant lot and residential area, which may be the result of regrading. Figures 4-1 and 4-2 illustrate the relationship of overburden thickness and bedrock topography. The bedrock topography does not appear to have an effect on the direction of groundwater flow in the overburden/shallow bedrock aquifer (see Section 4.4.3). Regionally, the Lockport Formation strikes 71° east of north to 82° east of north, dips 47 to 58 feet per mile to the south, and the top of the bedrock slopes north to south (Haley and Aldrich 1976).

4.4 SITE HYDROLOGY

4.4.1 Surface Water and Runoff

Due to differing surface characteristics within the study area, the direction of surface water runoff varies. Generally south of I-490 there is very little runoff because of the high permeability of the overburden material. Most precipitation infiltrates the overburden. Bodies of standing water were noted in depressions at the south and east ends of the site (to the east and west of Varian Lane and west of the canal spoils). These wet areas are seasonal.

In the area of I-490, surface water drains to ditches north and south of the highway. The southern ditch flows eastward along the northern boundary of the site and passes beneath the highway adjacent to DR-3, MW-3D, and MW-3D(N). The surface waters then flow north and drain to an unnamed stream which flows eastward into the Barge Canal.

4.4.2 Aquifer Test Results

Several aquifer tests (i.e., packer tests) were performed on discrete bedrock intervals prior to the installation of the monitoring wells. Section 3.2.10 describes methodologies used to perform these tests, and Table 3-7 provides a summary of packer test parameters.

The data collected from each packer test interval was then reduced to calculate hydraulic conductivity using the following formula (Bureau of Reclamation 1963):

$$K = \frac{Q}{2\pi LH} \left(\log_e \frac{L}{r} \right) \quad L \geq 10r$$

where:

- K = Hydraulic conductivity in gallons/day/ft²;
- Q = Constant rate of flow into the hole (gallons/day);
- L = Length of the portion of the hole tested (in feet);
- H = Differential head of water:
 - H = H (gravity) + H (pressure)
 - H (gravity) for test interval below the water table = distance from groundwater level to swivel on packer test equipment (in feet);
 - H (pressure) = pressure recorded on pressure gauge x 2.31 (in feet)
- r = Radius of hole tested (in feet); and
- log_e = Natural logarithm.

Hydraulic conductivity values for various borehole conditions were calculated (where possible) using the following guidelines: Laminar flow was calculated using the average of all five pressure test pressures (P1 through P5) (see Section 3.2.10), turbulent flow was calculated using the highest test pressure (P3), and void filling was calculated using P1. Table 4-3 summarizes packer test results. Laminar flow was only calculated if all five pressures were achieved. In some cases, due to either tight sections of the formation or highly permeable sections of the formation, test pressures were not achieved. In those cases, hydraulic conductivity values for turbulent flow and/or void filling (where applicable) were calculated.

Laminar flow is defined as a fluid flow pattern where fluid particles follow paths that are smooth, straight, and parallel to channel walls. In laminar flow, the viscosity of the fluid damps out turbulent motion. Turbulent flow, on the other hand, is when fluid particles move along very irregular paths (Fetter 1988). Void filling, as the term implies, refers to the filling of air-filled void space with fluid. This process is assumed in cases where some or all of the test interval is above the water table.

In general, the calculated hydraulic conductivities indicated typical hydraulic conductivities for fractured limestones and dolomites (Freeze and Cherry 1979). Intervals without any calculated hydraulic conductivities represent very tight rock conditions where water could not be injected into the bedrock due to lack of fractures, and intervals with only void-filling hydraulic conductivities represent areas within the bedrock that accepted more water than the output of the rig pump. Boreholes that were packer tested across almost the entire bedrock interval (MW-8D and MW-10D) exhibited, as expected, decreasing hydraulic conductivities with depth, as the degree of weathering, which causes widening of fractures, usually decreases with depth.

4.4.3 Overburden/Bedrock Interface Aquifer

Groundwater in the overburden beneath the Dearcop site and adjacent areas fluctuates seasonally, especially close to the Barge Canal. Review of boring logs obtained from NYSDOT test holes drilled in conjunction with the construction of the I-390/I-490 interchange in 1958, groundwater was detected in the overburden in 15 of the 19 boreholes. Borings drilled in January 1958 revealed groundwater at a depth of approximately 5 feet BGS (ranging

in elevation from 523.53 to 525.69 feet above MSL), borings drilled in April 1958 revealed groundwater at a depth of 2.5 to 7 feet BGS (ranging in elevation from 532.39 to 534.52 feet above MSL), and borings drilled in May 1958 revealed groundwater at a depth of 3.5 to 9 feet BGS (ranging in elevation from 522.30 to 535.4 feet above MSL). The overburden in these borings ranged in thickness from 10 to 19 feet BGS.

In November and December 1992, the overburden was determined to be relatively dry based upon six of the seven test pits excavated. Groundwater was encountered in these pits at the overburden weathered bedrock interface, except for TP-7, which encountered groundwater at a depth of 13 feet BGS. TP-7 was located on a topographic high on the I-490 median where overburden thickness was later determined to be approximately 24 feet BGS. Overburden in the other six test pits ranged in thickness from 10 to 15 feet BGS.

Split-spoon sampling in residential lots along Dearcop Drive and Varian Lane in January 1993 revealed groundwater between 2 to 6 feet BGS. Water levels upon completion of the sampling were as shallow as 0.8 foot BGS in the open split-spoon boring. Overburden thickness (based upon split-spoon refusal) ranged in thickness between 7.7 to 14 feet BGS.

During drilling of the monitoring wells between December 1992 and March 1993, groundwater in the overburden was encountered at several well locations (MW-3D, MW-4S/MW-4D, MW-5S/MW-5D, MW-6S/MW-6D, and MW-9S/MW-9D). Groundwater depths varied from 6 feet BGS (approximate elevation of 531 feet above MSL) in MW-5S/MW-5D; 8 feet BGS (approximate elevation of 531 feet above MSL) in MW-9S/MW-9D; 9 feet BGS (approximate elevation of 530 feet above MSL) in MW-3D in December 1992; 5 feet BGS (approximate elevation of 542 feet above MSL) in MW-4S/MW-4D in January 1993; and 13 feet BGS (approximate elevation of 533 feet above MSL) in MW-6S/MW-6D in March 1993. Overburden along the west side of the Barge Canal, as determined from MW-1D, MW-7S, and MW-8S/MW-8D, was dry during drilling activities (as was expected). Water levels in Barge Canal are controlled by the New York State Thruway Authority for flood control purposes (Martin 1993). The water level in the canal is raised during the first week in May and lowered the first week of November (Martin 1993). Records of these activities are not kept by the Thruway Authority. The raising and lowering of the canal has a direct effect on the water levels in DR-1, DR-3, MW-7S, and MW-8S. Groundwater elevations recorded on April 28, 1993 from both these wells and the Barge Canal were relatively equal (see Table 4-4). In order to obtain accurate Barge Canal

water level elevations, surveyed markers were placed on the west edge of the Barge Canal beneath the I-490 eastbound bridge and on the north side of the Route 33 bridge near the west bank of the canal. The bridge on Route 33 has since been removed and reconstructed. Since a confining layer was not encountered between the overburden and bedrock, the overburden and upper bedrock are considered to be a single aquifer, as evidenced by the groundwater fluctuations as compared to the changing canal levels. The extent of this influence across the site to the west of the canal cannot be determined at this time due to lack of available seasonal water-level measurements from both the monitoring wells and Barge Canal. Water levels will be collected by NYSDEC in November 1993 and results will be presented as an addendum to this report.

Groundwater flow in the overburden/bedrock interface aquifer, based upon groundwater level elevations measured in March, April, May, and June 1993 (see Table 4-4), indicate that flow patterns generally conform to surface topography resulting in groundwater flowing generally in an easterly direction toward the Barge Canal, with localized flow toward the northeast and southeast (see Figure 4-7). The horizontal gradient between the upgradient and downgradient shallow wells is relatively uniform throughout the site, averaging 0.03 feet per foot (see Table 4-5). Horizontal gradients are calculated by dividing the difference in head between an upgradient and downgradient well by the distance between the wells. Therefore, groundwater beneath the site is not likely to flow toward the residences on Dearcop Drive; however, localized flow may result in groundwater from the site flowing toward some of the residences at the north end of Varian Lane. Although groundwater flow in the overburden itself resembles topographic relief, flow in the upper fractured bedrock is determined by the orientation of the fractures and bedding planes and their degree of interconnection. Section 4.3.4 describes permeabilities of the upper bedrock as determined from packer injection tests performed during monitoring well drilling. Vertical gradients between shallow and deep paired wells are discussed in Section 4.4.4.

4.4.4 Deep Bedrock Aquifer

As previously stated in Section 4.4.3, at least two prominent water-bearing zones were observed to occur in the Gates quarry within the Lockport Formation. The water-bearing zones were separated by a more massive layer of dolomite, which partially retards vertical movement of groundwater within the formation. Because numerous vertical joints

and fractures were also observed in the walls of the quarry, these water-bearing zones are believed to be somewhat interconnected. Measurement of water levels from paired shallow and deep bedrock wells have indicated a downward vertical gradient in almost all of the well pairs, signifying recharge areas (see Table 4-6). One well pair (DR-1/MW-1D) exhibited a slight upward flow, indicating a discharge area. This well pair is located adjacent to the Barge Canal and is the only well pair available along the canal; however, upward flow is expected in this area because of discharge to the canal. The strongest downward-flowing vertical gradient was at well pair DR-2/MW-2D(N), followed by MW-6S/MW-6D. Well pairs MW-5S/MW-5D(N), MW-9S/MW-9D, and MW-10S/MW-10D had similar downward vertical gradients. DR-3/MW-3D exhibited the lowest component of downward vertical gradient, possibly indicating that this well pair is close to the discharge area related to the Barge Canal. Vertical gradients were calculated by dividing the difference in head between well pairs by the vertical distance between the midpoints of the screens of the two wells (see Table 4-6). In recharge areas, hydraulic head decreases with depth, indicating downward flow. Recharge areas are areas where rainfall infiltrates to the surface of the water table, and also moves downward into the aquifer. Discharge areas are defined by increasing hydraulic head with depth because groundwater is rising to discharge to surface water.

The upper and lower water bearing zones of the Lockport Formation are both intersected by the Barge Canal along the eastern portion of the site. Groundwater in the bedrock migrates along bedding planes and vertical fractures. Vertical fractures, as observed in the nearby quarry, generally trend 70 degrees east of north, which influences groundwater flow direction. Horizontal gradients calculated for the deep bedrock wells indicated almost negligible gradients between upgradient and downgradient wells throughout the site (see Table 4-7). In fact, some of the gradients between wells across the site indicated slightly negative gradients; that is, westward flow across the site away from the canal. This is probably due to the downward vertical gradients and recharge of the deeper portion of the aquifer from the Barge Canal at times, perhaps seasonally.

In addition to groundwater flow direction, the presence or absence of fractures greatly influence the rate of groundwater flow. The deep groundwater wells drilled on and adjacent to the site have varying yields with some wells (MW-1D, MW-3D[N], MW-6D, MW-9D, and MW-10D) able to sustain pumping rates up to 1.3 gallons per minute (gpm) (5 gpm in

MW-8D) for a period of up to one hour, and very low yields (too low to achieve a steady pump rate) in the remaining wells.

Groundwater flow in the deep bedrock aquifer, based upon water levels measured in March, April, May, and June 1993 is from southwest to northeast (see Figure 4-8). This flow direction is slightly more to the north than the shallow aquifer. Season fluctuations noted in the Barge Canal were also noted in MW-1D, MW-2D(N), MW-3D(N), MW-4D, MW-5D(N), MW-6D, MW-9D, and MW-10D, thus confirming their interconnectedness with the Barge Canal. Since the deep bedrock aquifer flow is to the northeast, the aquifer is apparently unaffected by pumping of the nearby quarry. The quarry pumps can pump up to 1 million gallons per day (gpd) and averages at least 300,000 gpd (Williams 1993).

4.5 EXTENT OF CONTAMINATION OF ENVIRONMENTAL MEDIA

4.5.1 Soil Gas Samples

One hundred and ninety-one soil gas samples were collected on a grid pattern across the entire site using two sample collection methodologies (Tedlar bags [tedlar] and Tenax/sphero carb tubes [Tenax]) as described in Section 3.2.6. QA/QC samples were also collected in conjunction with these field samples, and all of the soil gas samples were analyzed for select VOCs. The samples were collected on 22 different days between August 14, 1992 and December 1, 1992. Soil gas sample locations in the residential area were based on NYSDEC questionnaire responses (see Appendix H), which indicated the presence of fill materials in residential yards.

Patterns of compound distribution in the soil gas, as detected near the surface, can be strongly influenced by irregularities in the near surface and subsurface environment through which the soil gas diffuses. These irregularities include subsurface man-made structures, such as concrete foundations, drainage systems, and wells, and such naturally occurring structures as fractured and unfractured bedrock, and clay lenses. Other factors influencing soil gas include soil moisture, ground and surface water, the free carbon content of soils, microbiotic activity in the soil, and natural and synthetic ground cover. All of these factors indicate that the most powerful use of soil gas data is in reconnaissance: identifying and mapping the relative abundance of the widest array of chemical contaminants. Efforts to relate soil gas response directly to groundwater or soil contaminant concentrations is generally not regarded

as precise owing to the assumptions that are required for heterogeneity and source distribution.

The soil gas survey at the site was a successful reconnaissance tool by providing valuable contaminant identification, concentration, and distribution data. Table 4-8 provides a summary of the soil gas results; Figure 4-9, Figure 4-10, and Appendix E contain soil gas contour plots.

Several VOCs were detected in one or more of 71 of the 168 Tedlar soil gas samples. These compounds are grouped into two categories, purgeable halocarbons and purgeable aromatics. Of the nine purgeable halocarbons detected, three were most prevalent: trichloroethene (TCE) 1,1-dichloroethane (1,1-DCA), and 1,1,1-trichloroethane (1,1,1-TCA). The presence of purgeable halocarbons was found to be mainly in the northwest portion of the vacant lot area and the I-490 median, with high concentrations (total purgeable halocarbons above $1,000 \mu\text{g}/\text{m}^3$) found in two major plumes. The first and largest plume is approximately 300 feet (east/west) by 150 feet (north/south) and centered near sample point SG-8 (see Figure 3-1) in the northwest portion of the vacant lot area. SG-8 was the most contaminated of all soil gas samples. The second plume is smaller and located in the I-490 highway median. This plume is approximately 200 feet east/west by 100 feet north/south and centered near sample point SG-127.

This plume appears to extend beneath the I-490 eastbound lanes. A three-dimensional plot and several contour plots of the soil gas data were generated using Surfer Version 4.15 (Golden Software 1991) (see Figures E-1 through E-7 in Appendix E). Due to the broad range of total purgeable halocarbons detected in the samples (i.e., 0 to $176,000 \mu\text{g}/\text{m}^3$), several contour plots at varying contour intervals (10; 100; 1,000; 5,000; and $10,000 \mu\text{g}/\text{m}^3$) were utilized to display the soil gas anomalies. In addition to the highly concentrated soil gas plumes centered near SG-8 and SG-127 (as mentioned above), three additional point sources were also detected. These point sources occurred at: SG-22, which is located in the northeast portion of the vacant lot area (with a total purgeable halocarbon concentration of $1,820 \mu\text{g}/\text{m}^3$); SG-54 ($134 \mu\text{g}/\text{m}^3$), which is on the east side of the canal spoils; and SG-60 ($69 \mu\text{g}/\text{m}^3$) on the east side of the bike path. The presence of high concentrations purgeable halocarbons in the soil gas was later determined to correspond well with results from groundwater sampling of monitoring wells.

The presence of purgeable aromatics (benzene, ethylbenzene, toluene, and xylene) was also found to be in the same relative locations as the purgeable halocarbons; however, total concentrations were of a lesser magnitude. Highly concentrated total purgeable aromatic compounds were mainly detected on the I-490 median, with smaller localized areas of high concentrations centered at samples SG-1, SG-4, and SG-11 in the vacant lot area. SG-4 and SG-11 were also associated with high concentrations of halocarbon compounds, and most of the samples on the median with aromatics were associated with high halocarbon compounds. Figures E-8 presents a three-dimensional plot of purgeable aromatics, and Figures E-9 through E-12 display contours of the soil gas data (see Appendix E).

Based upon the results of the tedlar samples, Tenax samples were collected randomly and at contaminated tedlar bag sample locations in residential lots or along the bike path. The purpose of these samples was to verify/define the soil gas plume boundaries in areas having the greatest potential for receptors to be impacted by inhalation of VOCs.

Tedlar and/or Tenax samples with positive contaminant readings in the residential area included in the northernmost residents on Dearcop Drive and Varian Lane, and two other residences (205 and 206 Dearcop Drive) located approximately 1,000 feet south of the site. Although fill materials were not present at the surface in these residential lots, some of these soil gas readings may be associated with subsurface fill materials discovered during subsurface soil sampling (see Section 4.5.2).

4.5.2 Subsurface Soil Samples

4.5.2.1 Test Pit Samples

Sixteen subsurface soil (or fill) samples and two field duplicate samples were collected from seven test pits (see Tables 3-2 and 3-3 and Figure 4-11). All 18 samples were analyzed for TCL organics and inorganics. In addition, all samples except TP-2AD were analyzed for asbestos fiber content. Two samples, TP-1A and TP-2A, were analyzed for TCLP organics. Three samples, TP-2A, TP-5B, and TP-7A, were analyzed for specific TCLP inorganics, and eight samples, TP-1A, TP-2A, TP-2L, TP-3A, TP-4A, TP-5A, TP-6B, and TP-7B, were analyzed for radionuclides. Section 4.5.9 contains results of radionuclide analyses. Test pit locations were based on results from the geophysical survey and soil gas survey.

Volatiles

Fourteen different VOCs were detected in one or more of the test pit samples with chlorinated halocarbons with 1,1-DCA, total-1,2-dichloroethene (1,2-DCE), 1,1,1-TCA, TCE, toluene, and xylenes being most frequently detected (see Table 4-9). The two samples that were analyzed for TCLP organic compounds contained no leachable contaminants (see Table 4-7). Samples collected from TP-1 located in the southern portion of the vacant lot area were entirely free of VOCs. Those collected from test pits TP-3, TP-4, TP-5, and TP-7 were found to contain traces to low concentrations of several VOCs. Samples from test pits TP-2 and TP-6 were the most highly contaminated with VOCs, with relatively high concentration of nine different VOCs. In particular, sample TP-6A, which was collected from the northwest end of Test Pit TP-6 at a depth of 6 feet BGS, contained six VOCs (acetone, 1,2-DCA, ethylbenzene, toluene, 1,1,1-TCA, and xylene) in excess of 100,000 $\mu\text{g/kg}$ with toluene at 3,400,000 $\mu\text{g/kg}$. TP-6 contained 55-gallon drums with oily substances. Soil gas sample results associated with the locations of the test pits generally correlated with contaminants detected in the test pit.

Semivolatiles

Several semivolatiles were also detected in test pit samples, most of which were polynuclear aromatic hydrocarbons (PAHs). In general, an inverse relationship was observed between the presence of VOCs and semivolatiles: where VOCs were found most prevalent, semivolatiles were absent or nearly absent and vice versa. Most PAHs were detected in samples collected from test pits TP-3, TP-4, and TP-7, but not in samples collected in test pits TP-2 and TP-6. Sample TP-2C, which was blue material from a rusted drum, contained elevated levels of phenols. Table 4-10 summarizes semivolatiles detected in test pit samples.

Pesticides and PCBs

Pesticides were detected at low levels in samples collected from test pits TP-2, TP-6, and TP-7 (see Table 4-11 and Figure 4-11). PCBs were detected in most samples with samples from Test Pit TP-5 containing highest concentrations. The highest PCB concentration of 200,000 $\mu\text{g/kg}$ (Aroclor 1248) was detected in sample TP-5B which was a soil covered with amber colored oil which leaked from a breached steel drum within the test pit. All

samples from Test Pit TP-5 contained one or more PCB compound at concentrations above 1 ppm. All other test pit samples which contained PCBs were at levels less than 1 ppm.

Inorganics

Inorganic results were compared to the upper limit of the 90th percentile of the common range of element concentrations in soils of the eastern United States (Shacklette and Boerngen 1984). Several inorganics were detected in test pit samples at levels above the common range. Table 4-10 and Figure 4-11 summarize inorganics detected in test pit samples. Of the 13 inorganics which were detected at levels above this guidance level, cadmium, chromium, and lead in test pits TP-2, TP-3, TP-5, TP-6 and TP-7 were detected at levels that could fail the TCLP test and therefore be classified as hazardous waste under the Resource Conservation and Recovery Act (RCRA). Three of these samples, TP-2A, TP-5B, and TP-7A, were analyzed for specific TCLP inorganics (i.e., chromium in TP-2A and TP-5B, and cadmium and lead in TP-7A). Only chromium in sample TP-5B failed the TCLP regulatory limits (see Table 4-12).

Asbestos

Asbestos fibers were detected in five of 17 samples from test pits. All of these samples contained 2% or less asbestos fibers (see Table 4-13). Currently, no regulatory levels exist for asbestos in soil that is in place. However, if the soil is to be removed and transported, it would be regulated if above 1% (12 NYCRR Part 5.6).

4.5.2.2 Residential Subsurface Soil Samples

One subsurface soil sample was collected from each of 12 sampling locations in the backyards of residence on Dearcop Drive and Varian Lane. All subsurface soil samples were analyzed for full TCL organics and inorganics, and three samples containing fill material were also analyzed for percent asbestos fibers and one sample was analyzed for radionuclides (see Table 3-2). Radionuclide analyses are discussed in Section 4.5.9. Locations of subsurface soil sampling in residential lots were based upon soil gas results (i.e., residential lots with positive soil analyses) and/or the results of the November 1991 questionnaire prepared by NYSDEC (i.e., residents stating that man-made fill materials have been found in their yards).

Fill materials were detected in three of the 12 sampling locations: BH-93D to a depth of 8 feet BGS; BH-206D to a depth of 4 feet BGS; and BH-33V to a depth of 1.5 feet BGS.

No VOCs were detected in residential subsurface soils samples. Samples BH-206D and BH-33V each contained several PAHs totalling 25,100 $\mu\text{g/kg}$ and 34,200 $\mu\text{g/kg}$, respectively. Two semivolatiles, butylbenzylphthalate and diethylphthalate, were detected in samples BH-32VD and BH-206D, respectively, at low levels. Although phthalates are generally common laboratory and field contaminants from disposable gloves and PAHs at these levels are common in most soils, these compounds were detected in samples which contained man-made fill materials. Therefore, it is possible that the phthalates are present in the fill material. No pesticides or PCBs were detected in the samples. Table 4-14 and Figure 4-12 summarize organic results of residential subsurface soil samples.

Several metals were detected, with cadmium at levels above the common range of metals in soils of the eastern United States (0.01 to 0.7 mg/kg) in all of the subsurface residential samples. Copper, lead, and nickel were detected above common ranges in sample BH-206D. Table 4-15 and Figure 4-12 summarize inorganic results of residential subsurface soil samples.

One of the three samples analyzed for percent asbestos fibers did contain asbestos. BH-93D contained 6.5% asbestos. Table 4-16 summarizes asbestos results for residential subsurface soil samples.

4.5.2.3 Monitoring Well Subsurface Soil Samples

Nine subsurface soil samples were collected from monitoring well borings during drilling. All subsurface soil samples collected from monitoring well installations were analyzed for full TCL organics and inorganics and percent asbestos fibers. TCLP organic analysis was performed on two samples. Four samples were analyzed for TCLP inorganics and total organic carbon (TOC). Radionuclide analysis was also performed on two samples. Radionuclide analyses are discussed in Section 4.5.9.

Low levels of three VOCs were detected in subsurface soils from monitoring installations (see Table 4-17): acetone was detected in MW-3D (7 to 8 feet) and MW-6D (8 to 10 feet) at concentrations of 140 $\mu\text{g/kg}$ and 85 $\mu\text{g/kg}$, respectively; 2-butanone was detected in samples MW-2D (6 to 7.2 feet), MW-3D (7 to 8 feet), and MW-6D (8 to 10 feet) at concentrations of 3 $\mu\text{g/kg}$, 32 $\mu\text{g/kg}$, and 12 $\mu\text{g/kg}$, respectively; 1,2-DCE (total),

tetrachloroethene, and xylene (total) were detected in MW-6D (8 to 10 feet) at concentrations of 1 µg/kg, 5 µg/kg, and 6 µg/kg, respectively; and toluene was detected in samples MW-1D (7 to 9 feet), MW-2D (6 to 7.2 feet), MW-3D (7 to 8 feet) and MW-6D (8 to 10 feet) at concentrations of 1 µg/kg, 3 µg/kg, 7 µg/kg and 6 µg/kg, respectively.

Several semivolatiles were detected, including diethylphthalate in samples MW-5D (8 to 10 feet) and MW-9S (11 to 13 feet) at concentrations of 140 µg/kg and 50 µg/kg, respectively; bis(2-ethylhexyl)phthalate in samples MW-1D (7 to 9 feet) and MW-6D (8 to 10 feet) at 330 µg/kg and 140 µg/kg, respectively; 4-methylphenol in sample MW-3D (7 to 8 feet) at 310 µg/kg; dibenzofuran in sample MW-6D (8 to 10 feet) at 33 µg/kg; and several PAHs: MW-3D (7 to 8 feet), MW-5D (8 to 10 feet), and MW-6D (8 to 10 feet) at total concentrations of 900 µg/kg, 190 µg/kg and 1,185 µg/kg, respectively.

Two PCBs were detected: Aroclor 1248 at a concentration of 43 µg/kg in MW-2D (6 to 7.2 feet) and Aroclor 1254 in MW-3D (7 to 8 feet) at 16 µg/kg. Two pesticides were detected: 4,4-DDE and 4,4-DDT in MW-6D (7 to 8 feet) at concentrations of 4.6 µg/kg and 4.0 µg/kg, respectively. None of the samples tested for TOC and TCLP organics exceeded regulatory limits (see Table 4-19).

Table 4-18 summarizes inorganics detected in the subsurface soils from monitoring well borings. Several metals were detected, but most were at concentrations within the common range. Cadmium, however, exceeded the common range of metals in soils of the eastern United States (0.01 to 0.7 mg/kg) in samples MW-1D (7 to 9 feet), MW-2D (6 to 7.2 feet), MW-3D (7 to 8 feet), MW-6D (8 to 10 feet), MW-8S (6 to 8 feet), and MW-10D (12 to 14 feet). Lead exceeded the common range in MW-6D (8 to 10 feet) (see Figure 4-12). None of the samples tested for TCLP inorganics exceeded regulatory limits (see Table 4-19).

Asbestos fibers were not present in any monitoring well subsurface soil samples. TCLP organic and inorganic analyses performed on samples MW-1D, MW-8S, and MW-10D, respectively, detected no leachable compounds above EPA regulatory limits. TOC concentrations ranged from 1,500 mg/kg in sample MW-1D to 32,000 mg/kg in MW-6D.

4.5.3 Groundwater Samples

Groundwater samples were collected from the 17 new groundwater monitoring wells and the three existing shallow bedrock wells. Seven of the newly installed wells are shallow

overburden/bedrock interface wells and 10 are deep bedrock wells. All samples were tested for full TCL organics and inorganics and radionuclides. Radionuclide analyses are discussed in Section 4.5.9. Groundwater samples from wells located along the Barge Canal (DR-1, MW-1D, MW-7S, MW-8S, and MW-8D) along with two upgradient wells (MW-4S and MW-4D) were analyzed for several other chemical parameters including: pyridine, 2-chloropyridine, 3-chloropyridine, 2,6-chloropyridine, and p-fluoraniiline (see Table 3-2). These contaminants were included in the sample analyses for these wells to determine if contaminants from other surrounding hazardous waste sites are contributing to the groundwater contamination beneath the Dearcop site. Since these contaminants are characteristic of contaminants originating from the Olin Chemicals site located on the east side of the Barge Canal (see Section 1.5), positive results in these wells would indicate contaminant migration across the canal. No pyridine compounds were detected in any of the above-mentioned groundwater samples. Pyridines were detected in surface water from the Barge Canal (see Section 4.5.4).

VOCs were detected in all of the wells tested except for MW-4S, MW-5S, and MW-6D (see Table 4-20 and Figure 4-13). VOCs exceeded NYSDEC Class GA drinking water standards in all wells except MW-3D(N), MW-4S, MW-5S, MW-5D(N), MW-6S, and MW-6D. Class GA standards refer to groundwater used as a source of potable water according to 6 NYCRR 703.5 and DOW TOGS 1.1.1. Benzene, toluene, and xylenes (BTX) were detected above drinking water standards in the upgradient well MW-4D. Although BTX was present at very low levels in surface and subsurface soils, it was not present in the shallow groundwater. Therefore, the presence of these compounds in the deep groundwater is not believed to be attributable to the wastes disposed of at the site. The source of these compounds is unknown, and they may originate from another site. However, because these compounds are naturally occurring components of petroleum and MW-4D was drilled into a pocket of natural gas at the base of the Lockport Dolomite Formation near its contact with Rochester Shale, the source of the BTX is believed to be natural. Natural occurrences of BTX have been documented in other groundwater studies (Slaine and Barker 1990; Lesage and Lapcevic 1990). This hypothesis is supported by the absence of BTX in almost all of the shallow wells, except DR-1, MW-6S, and MW-10S, and the presence of BTX in MW-2D(N), MW-8D, MW-9D, and MW-10D, which were all drilled in bedrock zones containing natural

gas. Both DR-1 and MW-1D contained one or more of these potentially naturally occurring compounds. Although MW-1D did not produce noticeable amounts of natural gas, gas migration may be occurring at a low level through the fractured bedrock. Since the canal may be acting as a conduit between the upper and lower water-bearing zones, it is also possible that the petroleum products detected in DR-1 are related to the deeper natural source.

Because the source of the BTX in the deep wells is not believed to be from the site, the primary VOCs present in the groundwater that are attributable to the site contamination are halocarbon compounds. Specifically, these compounds include the chlorinated aliphatics 1,1-DCA, 1,1-dichloroethene (1,1-DCE), total 1,2-DCE, 1,1,1-TCA, TCE, and vinyl chloride; all were detected in excess of drinking water standards. One or more of these compounds were detected in both the shallow and deep aquifers indicating a leaky aquitard between the two aquifers. The level of these contaminants is much lower in the deeper aquifer, but concentrations are still high enough to be above standards. The highest concentration of these contaminants are in MW-10S, followed by DR-2, DR-3, then DR-1. The highly variable level of contaminants between these wells and the other wells suggest several source areas on site. Low levels of other VOCs detected in the groundwater samples below drinking water standards are summarized in Table 4-20.

Several semivolatile compounds were also detected in the groundwater samples including several phthalate and phenolic compounds and a very low level of naphthalene (see Table 4-21). Phthalates were detected at very low levels, and are commonly field and/or laboratory artifacts resulting from sample handling with disposable gloves. Phenol was detected above drinking water standards in MW-1D, MW-2D, and MW-8D. 4-Methylphenol was detected in MW-10S above drinking water standards (see Figure 4-13). Phenols are commonly found in landfills and hazardous wastes sites containing industrial or commercial materials. The highest concentration of phenol or phenolic compounds was in MW-8D located along the Barge Canal followed by MW-2D, MW-1D, and MW-10S.

No PCBs or pesticides were detected in any of the groundwater samples tested.

Several inorganics were detected in all of the groundwater samples tested (see Table 4-22). Several of these inorganics exceeded groundwater standards including: arsenic in MW-5S; cadmium, copper, and lead in DR-3 and MW-5S; chromium in DR-3, MW-4D and MW-5S; iron in all wells except MW-2D(N); magnesium in all wells except DR-1 and MW-10S; manganese in DR-3, MW-5S, MW-6S, and MW-9S; selenium in MW-9D; silver in

MW-8S; sodium in all wells except DR-1; and zinc in MW-2D, DR-3, MW-5S, MW-5D(N), and MW-10D all exceeded groundwater standards.

Turbidity in DR-1, MW-2D(N), DR-3, MW-5S, MW-6S, MW-6D, MW-10S, and MW-10D exceeded 50 NTUs, where turbidity in DR-3, MW-5S, and MW-10D exceeded 200 NTUs. Therefore, metal concentrations in these samples are biased by metals adhering to particulates within the groundwater samples. While some of the metals may be soluble, metals sorbed to the suspended particles in the turbid samples will be measured and reported as the detected concentration in groundwater. In addition, all wells penetrated bedrock. The Lockport Dolomite is a calcium magnesium carbonate frequently containing large amounts of iron. Dolomite formations in general are also associated with evaporitic conditions and are high in mineral salts. Six of the wells had elevated levels of aluminum, iron, magnesium, manganese, and sodium which are expected to be elevated in a dolomite aquifer.

Therefore, the source of only a few metals cannot be attributed to high turbidity or natural constituents of the bedrock. These metals include zinc in MW-2D, MW-5D(N), and MW-10D; chromium in MW-4D; and selenium in MW-9D. Since these metals are only present in deep wells, the source is unknown and not believed to be from the site.

In summary, multiple contaminant source areas are believed to be present on site. These areas include the vicinity of DR-2/MW-2D(N), MW-10S/MW-10D, DR-3/MW-3D(N), and possibly DR-1/MW-1D.

Two water-bearing zones were screened by the monitoring wells. The upper water-bearing zone is screened generally from five feet above the bedrock overburden interface to 15 feet below the top of bedrock (except for MW-7S, which was screened to a depth of 30 feet below the top of bedrock because of dry conditions). The deep wells have a screened interval from 15 to 35 feet in a zone 15 to 20 feet deeper than the shallow wells. These water-bearing zones are separated by a thick-bedded, very competent dolomite layer. However, because of the presence of vertical fractures, these water-bearing zones are likely to be somewhat interconnected. The potentiometric surface for the lower water-bearing zone is typically between 20 and 30 feet BGS while the potentiometric surface for the upper water-bearing zone varies between 10 feet and 30 feet BGS. This wide variation is due to the varying thickness of overburden in the study area. Shallow groundwater flow is to the east/northeast and discharges to the Barge Canal. Deep groundwater flow is to the north/northeast and discharges to the Barge Canal and the Genesee River Basin and ultimately

Lake Ontario. Groundwater contamination is not believed to be migrating beneath the adjacent residential area to the south of the site.

Since the contaminants are mainly chlorinated aliphatic compounds which have a higher density than water, it is possible that these contaminants in their immiscible phase (i.e., undissolved in groundwater) will move downward through the overburden via gravity flow to the top of bedrock. They would then follow the bedrock contours and collect in low-lying areas, regardless of the direction of lateral groundwater flow. Contaminants will also enter the bedrock via joints and fractures and flow vertically. Horizontal flow through bedding planes may also occur within the bedrock. Once reaching the semi-confining massive dolomite bed in the upper portion of the Lockport Formation, they may gravity flow along the top of that bedding plane. Since there is an apparent bedrock topographic high trending northeast/southwest along the axis between DR-2/MW-2D, MW-10S/MW-10D, and MW-8S/MW-8D, contaminant migration may be split toward DR-1/MW-1D and MW-7S. Thus, resulting in a lower concentration of contaminants at the MW-8S/MW-8D well pair. Positive determination as to the source of contamination at DR-1/MW-1D is not known at this time.

4.5.4 Surface Water and Sediment Samples

Six sets of surface water and sediment samples were collected during the Phase I RI. Three sets (SW/SED-1 through SW/SED-3) were collected from a drainage ditch which originates off-site to the southwest, flows through the site and empties into the Barge Canal north of the site. The other three sample sets (SW/SED-4 through SW/SED-6) were collected from the Barge Canal adjacent to the site, see Figure 3-2. Sample set SW/SED-1 was collected upstream of the site and was considered an upstream sample. Sample set SW/SED-4 was collected furthest from the site where the Route 33 bridge crosses the Barge Canal. During the navigation season, flow in the canal is predominantly west to east (north to south adjacent to the site) at an average rate of 1,174 cubic feet per second ($0.44 \pm$ feet per second velocity). This rate varies with flow in the Genesee River and water loss caused by factors such as lockages and diversions. During the nonnavigational season (mid-November to early May), some minor flow may occur from east to west (south to north adjacent to the site) because of leakage of water from the Genesee River through the West Guard Lock (Martin 1993). Therefore, no true upgradient or downgradient conditions exist in the Barge Canal adjacent to the site. All surface water samples were analyzed for full TCL organics and

inorganics as well as total alkalinity, total suspended solids, total hardness, and radionuclides. All sediment samples were analyzed for full TCL organics and inorganics as well as total organic carbon. Only one sediment was analyzed for radionuclides. In addition, surface water and sediment samples collected from the Barge Canal were also tested for pyridine, 2-chloropyridine, 3-chloropyridine, 2,6-chloropyridine and p-fluor-aniline. These compounds are characteristic of contaminants from the Olin site (see Section 1.5).

The following two subsections discuss the analytical results for surface water and sediment samples separately. Radionuclide analyses are discussed in Section 4.5.9.

Surface Water

Surface water from the Barge Canal is classified as Class C surface water, and surface water from the drainage ditch is classified as Class D surface water. Class C surface waters are best suited for fishing and are suitable for fish propagation and survival. Class D waters are also suitable for fishing, but due to natural conditions (i.e., intermittent flow), it will not support fish propagation. Both Class C and D waters are suitable for primary and secondary recreation (NYSDEC 1991).

Traces of VOCs including carbon disulfide, toluene, and total-1,2-DCE were detected in some of the surface water samples (see Table 4-23 and Figure 4-14). Carbon disulfide was detected in SW-6 at 130 $\mu\text{g/L}$; 1,2-DCE (total) was detected in SW-3, SW-5, and SW-6 at 2 $\mu\text{g/L}$, 1 $\mu\text{g/L}$, and 2 $\mu\text{g/L}$ respectively; and toluene was detected in SW-2 at 1 $\mu\text{g/L}$. No VOC contaminants were detected in the upstream drainage ditch sample. None of the VOCs detected currently have a Class C or Class D surface water standard.

One semivolatile, bis(2-ethylhexyl)phthalate, was detected in all surface water samples at concentrations up to 4 $\mu\text{g/L}$ except the upstream sample SW-1 (see Table 4-23 and Figure 4-14). Samples collected from the Barge Canal exceeded Class C standards. However, this is a common field and laboratory contaminant often introduced to the sample from the protective rubber surgical gloves used during the sampling and analysis procedures. In addition, all three samples from the Barge Canal contained a low concentration of 2-chloropyridine at almost the same concentration. No regulatory levels currently exist for these compounds.

No pesticides or PCBs were detected in any of the surface water samples.

Fourteen different metals were detected in one or more of the surface water samples (see Table 4-24). Iron was detected at levels above the NYSDEC Class C and Class D surface water standards in samples SW-1, SW-2, SW-4, and SW-6 at concentrations ranging from 329 $\mu\text{g/L}$ in SW-4 to 967 $\mu\text{g/L}$ in SW-1 (see Figure 4-14). It is important to note that iron is often detected naturally at levels above the state standard and based on the concentrations and distribution (i.e., highest concentration in the upstream drainage ditch sample) found at and around the site, it is not considered a site-related contaminant of concern. Aluminum and selenium also exceeded Class C standards from the Barge Canal samples.

Alkalinity results indicate a range of CaCO_3 from 170 mg/L in SW-4 to 490 mg/L in SW-1 (see Table 4-25). Total suspended solids (TSS) values ranged from not-detected in samples SW-4 and SW-5 up to 3,900 mg/L in sample SW-2. Total hardness measured in mg/L of CaCO_3 ranged from 260 $\mu\text{g/L}$ in samples SW-5 and SW-6 to 400 mg/L in SW-1. Water with hardness values greater than 150 mg/L is designed at very hard. Values between 150 mg/L and 60 mg/L are designated as hard; and values less than 60 mg/L are designated as soft (Freeze and Cherry 1979). Table 4-25 contains a summary of the physical parameters of the surface water including pH, temperature, conductivity, and dissolved oxygen. Only levels of dissolved oxygen exceeded both Class C and Class D standards.

Sediment

Low levels of five VOCs were detected in samples SED-1 and SED-6. SED-1 contained carbon disulfide at a concentration of 10 $\mu\text{g/kg}$ and SED-6 contained 1,1-DCA, 1,1-DCE (total), TCE, and xylene (total) at concentrations of 3 $\mu\text{g/L}$, 5 $\mu\text{g/L}$, 2 $\mu\text{g/L}$, and 1 $\mu\text{g/L}$, respectively. There are no sediment criteria available for these compounds. All other sediment samples were free of VOCs (see Table 4-26 and Figure 4-14).

Many semivolatiles were detected in all sediment samples (see Table 4-26 and Figure 4-14). Dibenzofuran was detected in SED-1 at a concentration of 280 $\mu\text{g/kg}$, and carbazole was also detected in the same sample at a concentration of 400 $\mu\text{g/kg}$. Sample SED-5 contained 73 $\mu\text{g/kg}$ of butybenzylphthalate. Up to sixteen other semivolatiles were detected in all sediment samples. Total PAH concentration ranged from 386 $\mu\text{g/kg}$ in sample SED-2 to 23,200 $\mu\text{g/kg}$ in SED-1 of which phenanthrene in SED-1 exceeded sediment criteria.

Although SED-1 is believed to be upstream, fill materials were found to a depth of 8 feet BGS in the backyard of 93 Dearcop which is close to the SED-1 location.

Four pesticides were detected in two sediment samples: one collected from the drainage ditch and one from the Barge Canal (see Table 4-26 and Figure 4-14). Sample SED-1 contained alpha-chlordane, endosulfan sulfate, and endrin ketone at concentrations of 5.7, 16, and 21 $\mu\text{g/kg}$, respectively. Sample SED-3 contained alpha-chlordane and dieldrin at 2.9 and 4.7 $\mu\text{g/kg}$, respectively. Sample SED-6 contained 4,4-DDE at 7 $\mu\text{g/kg}$. Alpha-chlordane exceeded sediment criteria in SED-1 and SED-3. These contaminants are typical for areas such as this where pesticide use was common during past farming operations. Therefore, they are not believed to be waste materials disposed at the site.

PCBs were detected only in those samples collected from the Barge Canal. PCB concentrations in SED-4, SED-5, and SED-6, were 72 $\mu\text{g/kg}$, 110 $\mu\text{g/kg}$, and 94 $\mu\text{g/kg}$, respectively. These levels are below the state sediment criteria of 276 $\mu\text{g/kg}$ (see Table 4-26).

Several metals were detected in each sediment sample. Cadmium was detected in all six samples above the state sediment criteria; chromium exceeded the criteria in SED-6; copper exceeded the criteria in SED-1, SED-4, SED-5, and SED-6; lead exceeded the criteria in all but SED-2 and SED-3; mercury exceeded the criteria in samples SED-1, SED-4, and SED-5; and zinc was exceeded in SED-1, SED-4, SED-5, and SED-6 (see Table 4-27).

Total organic carbon concentrations ranged from 21,000 mg/kg in SED-2 to 110,000 mg/kg in SED-1. Table 4-28 and Figure 4-14 provide a summary of contaminants detected in sediment samples.

4.5.5 Surface Soil Samples

Twenty surface soil samples (SS-1 through SS-20) were collected and analyzed for full TCL organics and inorganics and asbestos content. In addition samples SS-17 and SS-20 were also analyzed for radionuclides (see Section 4.5.9). Samples SS-1 through SS-19 (including field duplicates SS-7D and SS-13D) were collected on site while sample SS-20 was collected off site as a background representative sample. This sample was collected from the front lawn of the property located between 142 and 168 Dearcop Drive. It was later determined, during subsurface soil sampling of residential lots (see Section 4.5.2.2), that fill material from the Dearcop Farm Site is present in some residential lots. Therefore, SS-20

may not be a true representative of background conditions. Additional off-site background surface soil samples will be collected during Phase II RI sampling. Results from these samples will be presented in an addendum to this report.

No VOCs were detected in 13 of the 20 samples (see Table 4-29 and Figure 4-15). Low levels of seven different VOCs were detected in the remaining seven surface soil samples. Six of the seven samples with VOCs were collected from the site and contained VOC totals less than 10 $\mu\text{g}/\text{kg}$, the background sample SS-20 unexpectedly contained higher VOC levels with toluene and 1,1,1-TCA detected at 18 and 20 $\mu\text{g}/\text{kg}$, respectively.

Semivolatiles were detected in 14 of the 20 surface soil samples. Due to laboratory problems, new soil samples for semivolatile analysis were collected from the same locations at a later date. Fifteen different semivolatiles were detected at concentrations ranging from 21 to 430 $\mu\text{g}/\text{kg}$. Twelve of the semivolatiles detected can be grouped as PAHs and the distribution is widespread across the site and present off-site in the background sample.

The pesticide alpha-chlordane was detected in one on-site sample (SS-3) at a concentration of 19 $\mu\text{g}/\text{kg}$. All other on-site samples were free of pesticides. Again, the background sample (SS-20) had higher concentrations with low levels of all of the five pesticides detected than the on-site samples (see Table 4-29).

Two PCBs, Aroclor 1254 and Aroclor 1260, were detected in all but seven on-site surface soil samples. Total PCB concentrations were below 1 ppm at all sample locations except SS-13 when a total of 3.3 ppm was detected (see Table 4-29).

Twenty metals and cyanide were detected in one or more surface soil samples (see Table 4-30). Most of the metals concentrations were within the common range for eastern U.S. soils (Shacklette and Boerngen 1984). However, Sample SS-15 exceeded the ranges for cadmium, cobalt, copper, and lead. Sample SS-17, exceeded the common ranges for barium and cobalt and samples SS-5 and SS-19 both exceeded the common range for cadmium.

Asbestos fibers were detected in one of the 20 surface soil samples (SS-5). Table 4-31 and Figure 4-15 contain a summary of contaminants detected in the surface soil samples.

4.5.6 Manhole Samples

Four water samples collected from each of four sanitary sewer manholes were analyzed for full TCL organics and TAL inorganics. Section 3.2.11.5 contains sample locations and collection methodology.

Low levels of sixteen organics (all volatiles or semivolatiles) were detected in the manhole samples. Each sample contained between seven and nine different organic compounds (see Table 4-32 and Figure 4-13). Total VOCs were relatively consistent between each manhole. They ranged from a low of 6 $\mu\text{g/L}$ in sample MH-03 to a high of 55 $\mu\text{g/L}$ in sample MH-01. Only one compound, chloroform, was detected in all four samples. Chloroform is a common constituent of municipal water which has been chlorinated.

No pesticides or PCBs were detected in any of the manhole samples. Inorganic analysis detected 18 metals and cyanide in one or more of the manhole samples (see Table 4-33).

MH-01 is located at the northwest of the north end of Varian Lane. It receives water flowing from the south from Varian Lane. Therefore, water from this manhole travels only a short distance (i.e., approximately 100 feet) beneath the southern portion of the site. Water from MH-01 then flows west to MH-03, which is located near the Monroe County Pure Water (MCPW) pump station. Water from MH-03 then flows to the north a short distance (i.e., 20 feet) to another manhole (which was not sampled). This manhole receives water which flows from MH-02 and MH-04 and in turn flows into the MCPW pump station, where it is pumped to the south under Dearcop Drive (i.e., away from the site).

MH-02 is located on the highway median. This manhole receives water from the area north of the site, and is therefore considered upgradient. Water from MH-02 then flows south beneath the site to MH-04 located at the north end of Dearcop Drive. MH-04 also receives water flowing north along Dearcop Drive (this water was temporarily cut off while sampling MH-04 to obtain a sample of manhole water flowing only beneath the site from MH-02). Sampling of the above-mentioned manholes was performed to determine whether contaminants from the site were leaching into sewer lines buried beneath the site. Groundwater beneath the site appears to be close to the same elevation as the buried sewer lines (depending upon the season). Therefore, it is possible for groundwater to enter the sewer lines if there are any cracks or breaks in the pipes. However, based on the sample results, there is no conclusive evidence that contaminants are entering the sewer system beneath the site. Although acetone and benzene in MH-04 were higher in concentration than those levels detected in the upgradient sample MH-02, the samples were collected four months apart; therefore, comparison of the data is inappropriate. The same is true for metals detected at elevated levels in both upgradient MH-02 and downgradient MH-04, and in MH-01 and

MH-03. Finally, water chemistry (i.e., pH and conductivity) measured in the field between manhole water and groundwater were significantly different (see Table 4-34). In addition to the potential for contaminated groundwater to enter the sewer system from the site, there is also a potential for contaminated groundwater to migrate along the outside of the sewer lines. Therefore, construction specifications of the sewer lines were researched. According to MCPW (Steinfeldt 1993), the sewer line running north-south beneath I-490 (MH-2 and MH-4) is encased in concrete, and the line running east-west beneath the site between Dearcop Drive and Varian Lane (MH-3 and MH-1, respectively) is encased in concrete cradle (i.e., concrete around the bottom half of the pipe). The remaining portion of the sewer line trench has been backfilled with native materials. Based on this information, migration along the outside of the pipes is expected to be negligible.

In summary, no outstanding levels of contaminants were detected in downgradient manholes that were not also detected in upgradient manholes.

4.5.7 Quarry Sample

One sample was collected from the dolomite quarry located approximately 0.5 mile southwest of the site. The sample was tested for full TCL parameters in order to determine potential impact from the Dearcop Farm site. The sample was not tested for contaminants characteristic of the Olin site (i.e., pyridine). Sample QW-1 contained 6 $\mu\text{g/L}$ of the VOC carbon disulfide and very low levels of two semivolatiles: bis(2-ethylhexyl) phthalate at 1 $\mu\text{g/L}$ and diethylphthalate at 3 $\mu\text{g/L}$ (see Table 4-23). No pesticides or PCBs were detected in this sample. Seven metals were detected (see Table 4-24); however, they were all below the state Class D surface water standards, where available. Therefore, no apparent site contaminants were detected in the quarry seep sample. The sample from the quarry was collected prior to determining that pumping of the quarry has no effect on groundwater flow beneath the Dearcop Farm site. Water level elevations and established groundwater contour maps indicate that the quarry is upgradient. Field measurements of pH, temperature, conductivity, and dissolved oxygen are presented in Table 4-25.

4.5.8 Gas Samples from Monitoring Wells

Three wells were sampled for head-space gas contaminants using Tedlar bags as described in Section 3.2.11.7. The samples were analyzed for VOCs and sulfide to satisfy

hygiene concerns. Due to an extremely high number of petroleum hydrocarbons present in the samples, the results were grouped into three groups of organics (i.e., petroleum hydrocarbons, chlorinated organics, and BTEX compounds) and sulfide. All three wells contained 99% petroleum hydrocarbons. Sulfides were detected in well MW-8D and MW-10D at levels of 720 mg/m³ and 320 mg/m³, respectively (see Table 4-35).

4.5.9 Radiological Analyses

4.5.9.1 Soil and Sediment Samples

Radiological analyses were performed for the samples identified in Section 3.2.11 and Table 3-2. Table 4-36 summarizes the radioanalytical results for soil and sediment samples including test pit soil, subsurface soil, residential subsurface soil, surface soil, and sediment samples. Applicable regulatory standards for radionuclides in soil are not available, although the EPA intends to develop some standards in the near future. In the absence of such standards, radioanalytical results for soil were evaluated two ways:

- Radium-226 and radium-228 results were compared to the standards in 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings. Although these standards are not directly applicable to the Dearcop Farm site, they do provide relevant EPA standards for acceptable levels of radium in soil.
- The other radioanalytical results (non-radium) were compared to the results for sample SS-20. Sample SS-20 is considered to be the soil sample that most closely represents background conditions for radionuclides in soil. Radioanalytical results that exceeded approximately three times the corresponding SS-20 value were noted in Table 4-36. Comparing the analytical results to three times the background value is an industry standard, which provides greater than 90% confidence that the analytical result is greater than background conditions. Radioanalytical results for soil and sediment samples are discussed further below. A new comparison with additional background soils samples collected during the Phase II RI will be performed and results will be presented in an addendum to this report.

Test Pit Samples

Eight test pit soil samples were analyzed for gross alpha, gross beta, and gamma emitters including radium-226 and radium-228. Naturally occurring radionuclides in excess of three times local background concentrations were detected in samples TP-2A and TP-5A.

Both of these sample locations were observed in the field to contain blue sandy material previously identified by NYSDEC as glass fines. Table 4-36 summarizes the radioanalytical results for the test pit samples.

Subsurface Soil Samples

One residential subsurface soil sample (BH-32V) was collected from a property on Varian Lane and analyzed for gross alpha, gross beta, and gamma emitters, including radium-226. Results did not exceed relevant standards or local background values. Two subsurface soil samples were also collected from MW-6D and MW-10D during drilling and analyzed for gross alpha, gross beta, and gamma emitters, including radium-226. Results did not exceed relevant standards or local background values. Table 4-36 summarizes the radioanalytical results for the subsurface soil samples.

Surface Soil Samples

Two surface soil samples, SS-17 and SS-20, were analyzed for gross alpha, gross beta, and gamma emitters, including radium-226. Sample SS-17 was collected from a surface deposit of blue sandy material (previously identified by NYSDEC as glass fines) at the landfill. The gross alpha, gross beta, actinium-228, bismuth-214, lead-212, lead-214, and thorium-234 concentrations in sample SS-17 exceeded the corresponding local background concentrations. The radium-226 concentration in sample SS-17, 7.1 ± 1.0 pCi/g, barely exceeded the relevant standard (40 CFR 192 standard, which is background [approximately 1 pCi/g for this site] plus 5 pCi/g). The contaminants in sample SS-17 confirm that the blue sandy material contains small quantities of naturally occurring radioactive material (NORM). Table 4-36 summarizes the radioanalytical results for the surface soil samples.

Sediment Samples

One sediment sample (SED-1) was analyzed for gross alpha, gross beta, and gamma emitters, including radium-226. Results did not exceed the corresponding relevant standards. Table 4-36 summarizes the radioanalytical results for the sediment samples.

4.5.9.2 Water Samples

Tables 4-37 and 4-38 summarize the radioanalytical results for groundwater from monitoring wells and surface water, respectively. NYSDEC Water Quality Standards were used where available. Because NYSDEC does not have groundwater standards for individual gamma emitters and does not have surface water standards for radionuclides at all, radioanalytical results were also compared to radionuclide concentrations listed in 6 NYCRR 380.9, Preservation and Control of Environmental Pollution by Radioactive Materials, Table of Concentrations of Radioactive Material, Schedule 2. Although these standards are not directly applicable to the Dearcop Farm site, they do provide relevant NYSDEC standards for acceptable levels of certain radionuclides in water. Radioanalytical results for surface water and groundwater are discussed further below.

It is worth noting that Teledyne Isotopes did not consistently analyze for the same set of gamma emitters throughout the project. However, they always analyze for naturally occurring gamma emitters, at a minimum.

Groundwater Samples

Groundwater samples were collected from 17 new groundwater monitoring wells and three existing shallow bedrock wells and analyzed for gross alpha, gross beta, gamma emitters, including radium-226, and radium-228. Although the NYSDEC groundwater standard for gross alpha includes any contribution from uranium, the gross alpha analysis for the groundwater samples excludes uranium because it was not deemed cost-effective to include isotopic uranium analyses in the RI Phase I sampling program, based on historical knowledge of the site and the scope of the RI. Radium-226 and radium-228 were analyzed by radiochemistry to yield low detection limits.

Teledyne Isotopes failed to provide the proper detection limit for most of the gross alpha analyses and, for 11 of the samples, the detection limit exceeded the NYSDEC groundwater standard of 15 pCi/L, making it impossible to compare the analytical result with the standard. However, subsequent radium-226 and radium-228 analyses were performed for all of the groundwater samples, allowing further interpretation of the gross alpha results. The gross alpha content for sample MW-4D may exceed the groundwater standard, but this can conclusively be determined only if the sample is analyzed for uranium. The gross beta content of all of the samples did not exceed the groundwater standard.

The radium-226 content of sample MW-8D, $1.6 \pm 0.2 \text{ E}+01 \text{ pCi/L}$, exceeded the groundwater standard (3 pCi/L). The radium-226 content of samples DR-3 and MW-5D(N) exceeded the groundwater standard if the analytical uncertainty was added to the base analytical value. The radium-228 content of sample MW-8D, $2.8 \pm 0.3 \text{ E}+01 \text{ pCi/L}$, exceeded the relevant standard ($3.0 \text{ E}+01 \text{ pCi/L}$) if the analytical uncertainty was added to the base analytical value. The radium-226 plus radium-228 content of samples DR-3, MW-2D(N), and MW-8D exceeded the groundwater standard (5 pCi/L), and the radium-226 plus radium-228 content of samples MW-4D and MW-9DR exceeded the groundwater standard if the analytical uncertainty was added to the base analytical value. The source of the elevated radium content in these samples is believed to be due to the NORM typical of the bedrock, and not due to the NORM found in the landfill. This hypothesis is supported by the presence of the radium in deep wells, and by the fact that the radium is found in both upgradient and downgradient wells. It is also important to note that, for those samples where the radium concentrations exceeded the groundwater standards, that only the radium concentrations of sample MW-8D significantly exceeded the standards.

No other groundwater sample results exceeded the relevant standards. Table 4-37 summarizes the radioanalytical results for the groundwater samples.

Surface Water Samples

Six surface water samples (plus one duplicate) were analyzed for gross alpha, gross beta, and gamma emitters, including radium-226 (see Table 4-38). Radium-226 and radium-228 were not analyzed by radiochemistry because the gross alpha contents for these samples did not exceed 5 pCi/L.

4.5.10 Data Assessment

All chemical analysis data for the Phase I RI sample media except soil gas and miscellaneous analyses (asbestos, TOC, TCLP, alkalinity, hardness, and total suspended solids) have been reviewed by a third party validator for compliance, accuracy, and completeness. Internal data review was performed on the soil gas and miscellaneous analyses. Quality assurance/quality control (QA/QC) concerns that may have an effect on data usability are summarized below along with the appropriate data qualifiers.

4.5.10.1 Third-Party Validation - TCL Parameters

Method/Field Blanks

Methylene chloride and acetone were detected in several volatile method blanks and are attributable to laboratory background. Bis(2-ethylhexyl)phthalate was detected in some semivolatile method blanks and one rinsate blank. It is attributable to field/laboratory background from the gloves used in handling samples. These compounds are considered as undetected in associated samples at levels up to 10 times the maximum method blank levels.

Carbon disulfide (CS₂) was detected in one rinsate sample (MW-RIN-9DR) at 12 µg/L. Due to the presence of H₂S at low levels at the site and the acid preservation of volatile samples, the presence of CS₂ is attributed to an instrumental artifact. Levels of CS₂ up to five times the rinsate level are considered as undetected in the monitoring well samples for this reason.

Four of the trip blanks from the monitoring well samples contained 1,2-dichloroethane (1,2-DCA) at levels ranging from 4 to 23 µg/L and one of them contained chloromethane at 24 µg/L. 1,2-DCA and chloromethane up to five times the maximum levels are considered as undetected in the monitoring well samples due to trip blank contamination.

The two rinsate for the monitoring well samples, MW-RIN-9DR and RBLANK, contained low levels of aluminum, iron, sodium, zinc, and thallium. For all of these analytes except thallium, either the analyte was also detected in the preparation blank or the samples contained more than five times the rinsate blank level. Thallium up to five times the RBLANK level of 2.2 µg/L is considered as undetected in the monitoring well samples.

Holding Time

The volatile analysis holding time of seven days was exceeded by 1 to 2 days for soil samples TP-2C, TP-5A, TP-6A, TP-6BDL, and MW-6D. Results for aromatic volatiles in these samples are qualified "J" as estimated.

The semivolatile extraction holding time of five days was exceeded by seven to nine days for soil samples TP-B, TP-2C, TP-3A, BH-5V, BH-14V, and BH-102D. It was exceeded by 20 and 23 days, respectively, for water samples MH-02 and SW-2 and by one day for water samples MW-4D and MW-8D. Semivolatile results in these samples are qualified "J" as estimated.

The pesticide/PCB extraction holding time of five days was exceeded by two to 27 days for soil samples SS-15, SED-4, SED-5, SED-6, TP-2AD, TP-2ADDL, TP-3ADRE, TP-3BRE, TP-4BRE, and TP-7ARE. The TP-2AD analysis is considered more acceptable than the diluted analysis. The reanalyzed samples are considered more acceptable than the original analyses due to surrogate recovery problems in the latter (see below). Pesticide/PCB results in these samples are qualified "J" as estimated.

The cyanide analysis holding time of 12 days was exceeded by one day for soil sample TP-7B. The cyanide result in this sample is qualified "J" as estimated.

Surrogate Recovery

Surrogate recovery for bromofluorobenzene was below QC limits for the volatile analysis of soil samples TP-3AD, SS-2RE, and SS-15RE. The original analyses for SS-2 and SS-15 are considered more acceptable. Volatile results in TP-3AD are qualified "J" as estimated.

Surrogate recoveries for acid phenols in the semivolatile analysis of soil sample MW-1DD were below 10%. The sample was reanalyzed with acceptable surrogate recoveries. The reanalysis results are considered more acceptable and no qualification is necessary.

The soil samples, SS-1 to SS-20, were resampled on January 4, 1993 and reanalyzed for semivolatiles. Most of the initial samples collected on December 1, 1992 gave poor surrogate recoveries due to matrix problems with the GPC cleanup. Only the semivolatile results for the SS-19 and SS-20 samples collected on December 1, 1992 were reported. However, the January 4, 1993 sample results for all twenty samples are considered more acceptable.

The pesticide surrogate tetrachloro-m-xylene (TCX) and the PCB surrogate decachlorobiphenyl (DCB) gave recoveries of less than 10% for soil samples TP-3B and TP-4B. The pesticide surrogate TCX gave recoveries of less than 10% in soil samples TP-7A and TP-3AD. The samples were reanalyzed and gave acceptable surrogate recoveries. The reanalysis results are considered more acceptable and no qualification is necessary.

In soil sample BH-206D, the PCB surrogate DCB gave 0% recoveries and the pesticide surrogate TCX gave recoveries slightly below the advisory limit of 60%. PCB quantitation limits in this sample are qualified "R" as rejected and unusable.

Internal Standards

Internal standard (IS) areas for volatile analyses of soil samples SS-2RE, SS-3RE, SS-4RE, SS-15, SS-18, and TP-3ADRE were below acceptable limits. The original analyses for SS-2, SS-3, SS-4, and TP-3AD are considered more acceptable. Results for compounds quantitated by chlorobenzene-d5 in SS-15 and SS-18 are qualified "J" as estimated.

IS areas were below acceptable limits for semivolatile analysis of soil samples TP-2A, TP-2AD, TP-2C, TP-3B, TP-3BRE, TP-4B, TP-4BRE, TP-5C, TP-5CRE, SS-13, and SS-13RE. Similar results occurred upon reanalysis and upon MS/MSD analysis of TP-2AD, indicating matrix interference. The original analyses for TP-3B, TP-4B, TP-5C, and SS-13 are considered more acceptable. IS areas for all three internal standards, phenanthrene-d10 (PHN), chrysene-d12 (CHR), and perylene-d12 (PRY), were low for TP-2A, TP-2AD, and TP-4B. The PRY area was low for TP-3B and TP-5C, and the CHR and PRY areas were low for TP-2C and SS-13. Results for compounds quantitated by PH, CHR, and PRY are qualified "J" as estimated in the appropriate samples.

Initial and Continuing Calibration

Continuing calibration for volatile analysis gave a percent difference (%D) value greater than 25% for total 1,2-dichloroethene (total 1,2-DCE) in water sample SW-6. The total 1,2-DCE result in SW-6 is already qualified "J" as estimated due to presence below the contract required quantitation limit (CRQL).

Continuing calibration for semivolatile analysis gave a %D value greater than 25% for pyrene in soil sample MW-6D. The pyrene result in this sample is qualified "J" as estimated.

Pesticide calibration verification using performance evaluation mixtures (PEM) gave relative percent difference (RPD) values greater than 25% in some instances. Results for methoxychlor and 4,4'-DDT in soil samples TP-6A and TP-6B are qualified "J" as estimated.

Pesticide GPC calibration recovery was 0% for endrin and between 50% and 80% for gamma-BHC, heptachlor, aldrin, dieldrin, and 4,4'-DDT for several borehole soil samples and soil sample MW-8S. Endrin breakdown occurred due to residual acid in the glassware; all other endrin QC results were acceptable. Matrix interference may account for the other poor recoveries. Quantitation limits are considered estimated for these compounds in associated samples.

Compound Quantitation

Pesticide/PCB analyses of the soil samples gave %D values above 15% for the two GC column quantitation of several compounds. Matrix interference is most likely responsible for these differences. The compounds and the associated samples include alpha-BHC in TP-2A; beta-BHC in TP-2AD; gamma-BHC in TP-1A, TP-2A, TP-2AD, TP-2ADL, and TP-2B; alpha-chlordane in SED-1, SED-3, SED-3D, TP-2A, SS-3, and SS-20; gamma-chlordane in TP-2A and SED-3, endrin in TP-2AD and TP-6A; endosulfan I in TP-2A; endosulfan sulfate in SED-1 and TP-7B; heptachlor in TP-2A, TP-2AD, and TP-6A; heptachlor epoxide in SS-20, TP-6ADL, and TP-7B; methoxychlor in TP-6A; 4,4'-DDE in MW-6D; 4,4'-DDT in MW-6D and TP-6B; Aroclor 1248 in TP-5A; Aroclor 1254 in MW-3D, TP-4A, and TP-6B; and Aroclor-1260 in SS-17, TP-1A, and TP-3A. Positive results for these compounds were qualified "J" as estimated in the associated samples. For the diluted analyses (DL), the original (more concentrated) sample results are considered more acceptable.

Laboratory Duplicates

Laboratory duplicate analysis for inorganics gave high relative percent difference (RPD) values for the following analytes with associated samples in parentheses:

- Cobalt and iron (soil samples TP-1A, TP-1B, TP-2A, TP-2AD, TP-2B, and TP-2C);
- Arsenic (soil samples MW-3D, MW-5D, MW-9S);
- Zinc (soil samples MW-2D, SED-4, SED-5, and SED-6);
- Calcium (soil samples BH-21V, BH-32V, BH-32VD, BH-5V, BH-93D, BH-102D, BH-105D, BH-14V, BH-15V, BH-181D, BH-206D, BH-33V, BH-205D, MW-4S, and MW-8S);
- Barium, chromium, iron, silver, and zinc (soil sample MW-6D);
- Copper in SS-1 to SS-20;
- Aluminum (water samples MH-01, MH-02, SW-1, SW-3, SW-3D, SW-4, SW-5, and SW-6)

Positive results for these analytes in the associated samples were qualified "J" as estimated.

Matrix Spikes

Matrix spike analysis for inorganics gave percent recovery (%R) values between 30% and 75% for the following analytes with associated samples in parentheses:

- Barium, chromium, cobalt, manganese, nickel, and zinc (soil samples TP-1A, TP-1B, TP-2A, TP-2AD, TP-2B, and TP-2C);
- Chromium and lead (soil samples SED-1, SED-2, SED-3, SED-3D, TP-3A, TP-3AD, TP-3B, TP-4A, TP-4B, TP-5A, TP-5B, TP-5C, TP-6A, TP-6B, TP-7A, and TP-7B);
- Manganese (soil samples MW-10D);
- Arsenic and manganese (soil samples MW-2D, SED-4, SED-5, and SED-6);
- Selenium (soil samples MW-3D, BH-33V, BH-93D, BH-105D, BH-205D, and BH-206D);
- Chromium and cyanide (soil samples SS-1, SS-2, SS-3, SS-4, SS-5, SS-6, SS-7, SS-8, SS-9, SS-10, SS-11, SS-12, SS-13, SS-13D, SS-14, SS-15, SS-16, SS-17, SS-18, SS-19 and SS-20);
- Arsenic and barium (soil sample MW-6D);
- Mercury, selenium, and cyanide (water samples MH-01, MH-02, SW-1, SW-4, SW-5, SW-6, and QW-1);
- Chromium, manganese, and nickel (water samples MW-2D, MW-4D, and MW-8D).

Positive results for these analytes in the associated samples were qualified "J", as estimated.

Matrix spike analysis for inorganics gave %R values below 30% for the following analytes with associated samples in parentheses:

- Antimony and selenium (soil samples SS-1, SS-2, SS-3, SS-4, SS-5, SS-6, SS-7, SS-7D, SS-8, SS-9, SS-10, SS-11, SS-12, SS-13, SS-13D, SS-14, SS-15, SS-16, SS-17, SS-18, SS-19, and SS-20).

Nondetectable results for these analytes in the associated samples were qualified "R," as unusable and rejected.

Serial Dilutions

ICP serial dilution for inorganics gave percent difference values greater than 10% for the following analytes with associated samples in parentheses:

- Zinc (soil samples SS-3, SS-4, SS-5, SS-12, SS-13, SS-13D, and SS-14 and water samples MW-9DR and MW-10DR);
- Iron and manganese (soil samples MW-1D and MW-1DD);
- Manganese (water samples MW-1D, MW-4S, MW-5S, MW-6S, MW-6SD, MW-8SR, MW-9S, and DR-3); and
- Iron (water samples MW-2D, MW-4D, MW-8D).

Positive results for these analytes in the associated samples were qualified "J", as estimated, if greater than 50 times the instrument detection limit (IDL).

4.5.10.2 Internal Data Review

Internal data review was performed on soil gas analyses, asbestos, TOC, TCLP, alkalinity, hardness, and TSS. No problems were noted, except for soil gas and TCLP analyses as stated below.

Soil Gas Analyses

Field Blanks. Field blank contamination consisted mainly of low levels of aromatic volatiles due to gasoline exhaust fumes from vehicles on nearby roadways. Since field blanks were not collected each day, aromatic volatile results were qualified based on the overall maximum field levels. For Tedlar bag analysis, the maximum field blank levels are: 70 $\mu\text{g}/\text{m}^3$ for benzene, 23 $\mu\text{g}/\text{m}^3$ for ethylbenzene, 160 $\mu\text{g}/\text{m}^3$ for toluene, and 79 $\mu\text{g}/\text{m}^3$ for total xylenes. Sample results up to five times these levels are considered not detected in all Tedlar bag analyses. For Tenax tubes, the three field blanks for zero volume indicated no contamination, while the field blank for 20 liters of sample volume indicated 1,1,1-trichloroethane at 3.2 $\mu\text{g}/\text{m}^3$, trichloroethene at 0.7 $\mu\text{g}/\text{m}^3$, benzene at 1.7 $\mu\text{g}/\text{m}^3$, ethylbenzene at 1.7 $\mu\text{g}/\text{m}^3$, toluene at 9.0 $\mu\text{g}/\text{m}^3$, and total xylenes at 7.6 $\mu\text{g}/\text{m}^3$. Sample results up to five times these levels are considered as not detected in all Tenax tubes of 20 liters volume.

Some of the field blanks contained minor volatile compounds, but these compounds were used to assess only the samples collected on that day. The Tedlar field blank collected on August 16, 1992 contained 1,1-dichloroethane (1,1-DCA) at $26 \mu\text{g}/\text{m}^3$ and trichloroethene (TCE) at $91 \mu\text{g}/\text{m}^3$. TCE results in SG-6 and SG-7 are considered as not detected, since they are less than five times the blank level. Tedlar blanks collected on September 8, 1992 and December 1, 1992 indicated methylene chloride (MC) at $36 \mu\text{g}/\text{m}^3$ and $11 \mu\text{g}/\text{m}^3$, respectively. MC results in associated samples SG-19 and SG-137 are considered not detected. The Tedlar field blank collected on September 16, 1992 had 1,1,1-trichloroethane (1,1,1-TCA) at $10 \mu\text{g}/\text{m}^3$, but no sample results were affected. The Tedlar blank collected on September 28, 1992 contained trans-1,2-dichloroethene (trans-1,2-DCE) at $10 \mu\text{g}/\text{m}^3$, but no sample results were affected.

Method Blanks. Method blank contamination consisted mainly of methylene chloride, at maximum levels of $52 \mu\text{g}/\text{m}^3$ for Tedlar bags and $6.2 \mu\text{g}/\text{m}^3$ for Tenax tubes. Sample results up to 10 times these levels are considered not detected in the respective samples. For the Tedlar bag analyses, there were a few instances of contamination by toluene, xylene, and trichloroethene (TCE), due to carryover from high standards or contaminated samples. Associated sample results for toluene and xylene are considered not detected based on field blank contamination (see above). TCE results in samples SG-133, SG-134, and SG-135 are considered not detected since they are less than five times the blank level of $14 \mu\text{g}/\text{m}^3$. The TCE result in sample SG-132 at $2,500 \mu\text{g}/\text{m}^3$ is greater than five times the blank level, and thus is not qualified.

Holding Time. Tedlar bag analyses were performed one day past the 48-day holding time for the following: SG-11 (20-fold dilution for aromatics), SG-3, SG-8, and SG-B (20-fold dilutions for halocarbons), and SG-4 (10-fold dilution for aromatics and halocarbons). The associated sample results are qualified "J" as estimated. These were reanalyses due to the high levels found. Subsequent analyses were reported as exceeding the calibration limit rather than exceed the holding time.

Miscellaneous. The detection limit for vinyl chloride was elevated from $10 \mu\text{g}/\text{m}^3$ to $50 \mu\text{g}/\text{m}^3$ for most of the Tedlar bag analyses. The instrument response for vinyl chloride

was non-linear in the 10- to 50- $\mu\text{g}/\text{m}^3$ range and a false positive peak was present in the same retention time window. Those vinyl chloride results reported between 10 and 50 $\mu\text{g}/\text{m}^3$ are qualified "J" as estimated.

For Tedlar bag analyses, total xylene results are considered "J" as estimated due to coelution of an artifact with o-xylene, if not already considered not detected.

TCLP Analyses

In the TCLP organic analysis of soil sample MW-1DD (field duplicate of MW-1D), acid phenol surrogate recoveries were 0%. The acid phenol TCLP compounds are qualified "R" as rejected and unusable in this sample. The not detected results obtained for acid phenols in MW-1D are acceptable data.

Table 4-1							
PHASE I RI SUMMARY OF ORGANIC VAPOR READINGS COLLECTED DURING MONITORING WELL INSTALLATION							
Depth Interval (ft. BGS)	OVA Reading (ppm)						
	MW-1D	MW-2D	MW-2D (Well Abandonment)	MW-3D	MW-4S	MW-4D	MW-5S
0 - 5	35 W	—	—	3 SS	0	0	—
5 - 10	0	—	—	450 SS	0	0	6 A
10 - 15	0	—	—	250 SS	0	0	4 D
15 - 20	0	—	—	7 SS	0	7 A	5.5 D
20 - 25	0	—	0	200 W	1 W	0	45 D
25 - 30	0	—	0	0	3.5 D	0	0
30 - 35	25 D	—	0	0	16 D	800 D	—
35 - 40	35 D	4	—	4 D	6 D	0	—
40 - 45	0	2	1 D	9 D	—	15 D	—
45 - 50	2 D	—	3 D	2 D	—	0	—
50 - 55	2 D	—	150 D	120 D	—	6 D	—
55 - 60	0	—	350 D	140 D	—	15 D	—
60 - 65	8 D	65	400 D	700 D	—	45 D	—
65 - 70	0	—	150 D	>1,000 D	—	50 D	—
70 - 75	—	—	100 D	>1,000 V	—	15 D	—
75 - 80	—	>1,000	75 D	>1,000 V	—	25 D	—
80 - 85	—	>1,000	—	—	—	700 D	—
85 - 90	—	—	—	—	—	>1,000 D	—
90 - 95	—	—	—	—	—	>1,000 D	—
95 - 100	—	—	—	—	—	—	—

Table 4-1							
PHASE I RI SUMMARY OF ORGANIC VAPOR READINGS COLLECTED DURING MONITORING WELL INSTALLATIONS							
Depth Interval (ft. BGS)	OVA (ppm)						
	MW-5D	MW-6S	MW-6D	MW-7S	MW-8S	MW-8D	MW-9S
0 - 5	0	0	0.5 SS	0	25 A	0	0
5 - 10	0	60 SS	500 A	1.5 A	30 A	0	0
10 - 15	0	100 A	350 A	0		32 D	4.5 SS
15 - 20	1 D	150 A	300 SS	2 D	0	15 D	1 D
20 - 25	5 D	500 SS	650 A	2 D	100 D	42 D	4.5 D
25 - 30	1 D	0		25 D	2 D	42 D	4 D
30 - 35	3.5 D	65 D	250 D	300 D	>1,000 D	32 D	—
35 - 40	18 D	20 D		0 V		35 V	—
40 - 45	350 D	18 D	80 D	0 V	—		—
45 - 50	>1,000 D		150 D	—	—	25 V	—
50 - 55	>1,000 D	—	450 D	—	—	1.5 V	—
55 - 60	80 V	—	575 D	—	—	3 V	—
60 - 65	20 V	—	800 D	—	—	50 V	—
65 - 70	25 V	—	>1,000 D	—	—	>1,000 V	—
70 - 75	>1,000 V	—	—	—	—	>1,000 V	—
75 - 80	—	—	—	—	—		—
80 - 85	—	—	—	—	—		—
85 - 90	—	—	—	—	—	>1,000 V	—
90 - 95	—	—	—	—	—		—
95 - 100	—	—	—	—	—	—	—

Table 4-1			
PHASE I RI SUMMARY OF ORGANIC VAPOR READINGS COLLECTED DURING MONITORING WELL INSTALLATIONS			
Depth Interval (ft. BGS)	OVA (ppm)		
	MW-9D	MW-10S	MW-10D
0 - 5	0		15 A
5 - 10	0		> 1,000 A
10 - 15	0	220 W	105 A
15 - 20	6 D	15 D	650 W
20 - 25	0	14 D	0
25 - 30	0	15 D	2.5 D
30 - 35	20 D	2 W	1.5 D
35 - 40	0	—	150 D
40 - 45	17 D	—	45 D
45 - 50	75 D	—	200 D
50 - 55	20 D	—	40 D
55 - 60	5 C	—	0
60 - 65	35 D	—	750 D
65 - 70	200 D	—	> 1,000 D
70 - 75	> 1,000 D	—	> 1,000 D
75 - 80	> 1,000 D	—	> 1,000 D
80 - 85	> 1,000 D	—	> 1,000 D
85 - 90	> 1,000 D	—	15 V
90 - 95	> 1,000 D	—	> 1,000 V
95 - 100	> 1,000 D	—	—

Key:

— = Beyond total depth of borehole.
 A = In the auger.
 C = From the rock core.
 D = In the drill stem/diverter.
 SS = From the opened split spoon.
 V = From Venturi exhaust.
 W = Open temporary well casing.

Table 4-2 PHASE I RI ROCK QUALITY DESIGNATION (RQD) FROM MONITORING WELLS				
Well Number	RQD Range (Percent)	RQD Average (Percent)	Depth Interval (feet BGS)	Average RQD Description
MW-1	45 - 100	82	13.7 - 67.1	Good
MW-2D	69 - 100	80	22.0 - 81.5	Good
MW-2D (N)	66 - 100	92	23.0 - 59.8	Excellent
MW-3D	62 - 100	83	23.5 - 82.8	Good
MW-3D (N)	74 - 100	89	23.5 - 62.3	Good
MW-4S	60 - 92	76	24.4 - 39.5	Good
MW-4D	50 - 100	85	24.5 - 91.6	Good
MW-5S	68 - 100	83	11.3 - 26.3	Good
MW-5D	67 - 100	90	11.0 - 75.8	Excellent
MS-5D (N)	23 - 98	88	11.5 - 50.7	Good
MW-6S	70 - 100	86	29.0 - 44.1	Good
MW-6D	73 - 100	92	28.0 - 65.5	Excellent
MW-7S	65 - 91	69	11.0 - 41.0	Fair
MW-8S	70 - 88	78	10.0 - 36.2	Good
MW-8D	60 - 95	79	8.7 - 91.5	Good
MW-9S	49 - 96	80	14.0 - 29.0	Good
MW-9D	55 - 95	82	13.7 - 97.0	Good
MW-10S	74 - 90	83	19.0 - 34.0	Good
MW-10D	50 - 95	79	19.0 - 92.5	Good

Table 4-3				
PHASE I RI SUMMARY OF PACKER TEST RESULTS				
Well Number	Test Interval (feet BGS)	Laminar Flow Permeability (gpd/ft ²)	Turbulent Flow Permeability (gpd/ft ²)	Void Filling Permeability (gpd/ft ²)
MW-3D	21 - 28	NC	NC	1.49×10^{-8}
MW-3D	28 - 35	NC	8.27×10^{-10}	9.34×10^{-10}
MW-3D	35 - 42	NC	2.74×10^{-10}	1.27×10^{-8}
MW-3D	42 - 49	NC	NC	3.07×10^{-8}
MW-3D	49 - 56	NC	NC	3.38×10^{-8}
MW-4S	25 - 39.5	NA	NA	NA
MW-4S	30 - 39.5	NA	NA	NA
MW-4S	33 - 39.5	NA	NA	NA
MW-6S	29 - 36	NC	NA	1.11×10^{-9}
MW-6S	33 - 40	5.61×10^{-9}	6.59×10^{-9}	1.05×10^{-8}
MW-7S	15.5 - 22.5	NC	4.67×10^{-8}	4.23×10^{-8}
MW-7S	22.5 - 29.5	NC	4.27×10^{-8}	4.00×10^{-8}
MW-7S	29.5 - 36.5	NA	NA	NA
MW-8D	7 - 14	NC	NC	6.06×10^{-9}
MW-8D	14 - 21	NC	NC	6.18×10^{-10}
MW-8D	21 - 28	NC	NC	1.62×10^{-8}
MW-8D	28 - 35	4.33×10^{-8}	4.00×10^{-8}	5.30×10^{-8}
MW-8D	35 - 40	NC	2.24×10^{-8}	3.51×10^{-8}
MW-8D	44 - 51	NC	NC	2.46×10^{-8}
MW-8D	51 - 58	NC	NC	2.86×10^{-8}
MW-8D	58 - 65	2.38×10^{-8}	2.02×10^{-8}	3.13×10^{-8}
MW-8D	65 - 72	NC	1.62×10^{-9}	6.22×10^{-11}
MW-8D	72 - 79	NC	4.18×10^{-10}	2.77×10^{-10}
MW-8D	79 - 86	NC	6.33×10^{-10}	NA
MW-9D	67.5 - 74.5	NC	7.15×10^{-10}	3.22×10^{-10}
MW-9D	74.5 - 81.5	NC	5.56×10^{-11}	1.05×10^{-10}
MW-9D	81.5 - 88.5	NA	NA	NA

Key at end of table.

Table 4-3				
PHASE I RI SUMMARY OF PACKER TEST RESULTS				
Well Number	Test Interval (feet BGS)	Laminar Flow Permeability (gpd/ft ²)	Turbulent Flow Permeability (gpd/ft ²)	Void Filling Permeability (gpd/ft ²)
MW-10S	21 - 34	2.53×10^{-9}	5.20×10^{-9}	4.00×10^{-11}
MW-10S	25.3 - 34	1.63×10^{-9}	1.70×10^{-9}	NA
MW-10S	29.6 - 34	NA	NA	NA
MW-10D	43.5 - 51.5	NA	NA	NA
MW-10D	51.5 - 58.5	NC	3.84×10^{-9}	NA
MW-10D	58.5 - 65.5	NC	NC	4.14×10^{-8}
MW-10D	65.5 - 72.5	NC	NC	2.00×10^{-8}
MW-10D	72.5 - 79.5	NC	3.07×10^{-11}	NA
MW-10D	79.5 - 86.5	NA	NA	NA
MW-10D	86.5 - 93.5	NC	1.97×10^{-10}	1.93×10^{-11}

Key:

gpd/ft² = Gallons per day per square foot.

BGS = Below ground surface.

NA = Not available due to lack of flow into the rock formation due to natural low permeability conditions (i.e., good to excellent rock quality).

NC = Not calculable due to lack of sufficient data (i.e., permeability too low to achieve flow, or permeability too high exceeding limitations of pump).

Table 4-4					
PHASE I RI SUMMARY OF MONITORING WELL WATER LEVEL ELEVATIONS					
Well Number	Water Elevations (Feet Above MSL)				
	3/29/93	4/13/93	4/28/93	5/17/93	6/3/93
DR-1	503.37	502.40	509.47	510.63	511.46
MW-1D	503.58	502.11	509.49	510.69	511.46
DR-2	527.78	526.90	526.49	524.99	524.26
MW-2D(N)	501.79	502.46	509.43	510.48	511.33
DR-3	508.56	508.00	510.91	511.48	512.15
MW-3D(N)	503.71	502.15	509.56	510.71	511.41
MW-4S	539.95	538.57	537.50	536.04	534.75
MW-4D	NA	NA	NA	NA	NA
MW-5S	525.94	522.71	522.64	522.29	522.30
MW-5D(N)	502.19	510.55	513.40	514.43	515.18
MW-6S	522.55	521.91	522.76	522.40	522.48
MW-6D	503.70	502.15	509.53	510.67	511.42
MW-7S	503.88	503.08	509.70	510.85	511.89
MW-8S	503.67	502.29	509.58	510.56	511.50
MW-8D	NA	NA	NA	NA	NA
MW-9S	526.20	526.07	525.86	524.94	524.29
MW-9D	503.48	501.99	509.38	510.53	511.16
MW-10S	519.70	524.85	526.62	526.39	526.24
MW-10D	503.68	502.14	509.55	510.68	511.33
Barge Canal ^a	—	—	509.52	510.54	511.36

^a Canal water elevation measured from the Rt. 33 bridge based upon the surveyed elevation at a paint mark on the bridge of 544.87 feet above MSL.

Key:

MSL = Mean sea level.

NA = Not available, well decommissioned.

Table 4-5				
HORIZONTAL GRADIENT IN SHALLOW WELLS				
Upgradient Well	Downgradient Well	Distance Between Wells (feet)	Difference in Head Between Wells (April 28, 1993) (feet)	Horizontal Gradient (feet/foot)
MW-4S	MW-5S	560	14.86	0.03
MW-5S	DR-1	1,050	13.17	0.01
DR-2	DR-1	770	17.02	0.02
MW-9S	DR-1	470	16.39	0.03
MW-10S	MW-8S	530	17.04	0.03
MW-6S	DR-3	420	11.85	0.03
MW-6S	MW-7S	660	13.06	0.02

Table 4-6				
VERTICAL GRADIENT BETWEEN SHALLOW AND DEEP WELL PAIRS				
Well Pair	Difference in Head from Shallow Wells to Deep Wells (April 28, 1993) (feet)	Vertical Difference from the Midpoint of Shallow Well Screen to Midpoint of Deep Well Screen (feet)	Vertical Gradient (feet/foot)	Discharge or Recharge Area
DR-1/MW-1D	-0.02	-30.14	+0.0007	Discharge
DR-2/MW-2D(N)	17.06	-21.79	-0.78	Recharge
DR-3/MW-3D(N)	1.35	-32.74	-0.04	Recharge
MW-4S/MW-4D	NA	-27.42	NA	Recharge
MW-5S/MW-5D(N)	9.24	-27.45	-0.34	Recharge
MW-6S/MW-6D	13.23	-24.50	-0.54	Recharge
MW-7S/NA	NA	NA	NA	Recharge
MW-8S/MW-8D	NA	-51.68	NA	Recharge
MW-9S/MW-9D	16.48	-60.17	-0.27	Recharge
MW-10S/MW-10D	17.07	-50.92	-0.34	Recharge

Table 4-7				
HORIZONTAL GRADIENT IN DEEP BEDROCK WELLS				
Upgradient Well	Downgradient Well	Distance Between Wells (feet)	Difference in Head Between Wells (April 28, 1993) (feet)	Horizontal Gradient (feet/foot)
MW-5D(N)	MW-9D	610	4.02	0.0065
MW-5D(N)	MW-1D	1,040	3.91	0.0038
MW-2D(N)	MW-1D	800	-0.06	-0.0001
MW-9D	MW-1D	495	-0.11	-0.0002
MW-10D	MW-1D	600	0.06	0.0001
MW-6D	MW-3D(N)	475	-0.03	-0.0001

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-1 Tedlar 1 8-14-92	SG-2 Tedlar 1 8-14-92	SG-3 Tedlar 1 8-17-92	SG-4 Tedlar 1 8-17-92	SG-5 Tedlar 1 8-18-92	SG-6 Tedlar 1 8-17-92	SG-7 Tedlar 1 8-17-92	SG-8 Tedlar 1 8-17-92	SG-9 Tedlar 1 8-18-92	SG-10 Tedlar 1 8-17-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane		ND	ND	17,000 J	13,000 ^a J	26	140	ND	70,000 J	1,100	520 ^b
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		58	ND	ND	4,500 ^a J	ND	38	ND	15,000 J	ND	130
Methylene Chloride		ND	ND	2,600 J	30,000 ^a J	ND	ND	ND	40,000 J	ND	ND
1,1,1-trichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene		62	ND	20,000 J	4,800 ^a J	32	ND	ND	51,000 J	1,600	700 ^b
Vinyl Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		240	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	600 ^a J	ND	ND	ND	ND	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-11 Tedlar 1 8-18-92	SG-12 Tedlar 1 8-18-92	SG-13 Tedlar 1 8-18-92	SG-14 Tedlar 1 9-14-92	SG-15 Tedlar 1 9-16-92	SG-16 Tedlar 1 8-18-92	SG-17 Tedlar 1 8-18-92	SG-18 Tedlar 1 9-14-92	SG-19 Tedlar 1 9-28-92	SG-19D Tedlar 1 9-28-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane		ND	ND	ND	ND	ND	15	98	ND	ND	ND
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		110	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		1,700 ^b	ND	ND	ND	ND	ND	120	ND	ND	ND
Methylene Chloride		ND	ND	ND	ND	ND	ND	160	ND	ND	ND
1,1,1-trichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene		330	340	38	ND	ND	76	530	ND	ND	ND
Vinyl Chloride		36 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		200 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		2,900 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		940 J	ND	ND	ND	ND	600	ND	ND	ND	ND
Xylene (Total)		560 J	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-20 Tedlar 1 9-16-92	SG-21 Tedlar 1 9-15-92	SG-21D Tedlar 1 9-15-92	SG-22 Tedlar 1 9-15-92	SG-23 Tedlar 1 9-15-92	SG-24 Tedlar 1 9-15-92	SG-25 Tedlar 1 9-16-92	SG-25D Tedlar 1 9-16-92	SG-26 Tedlar 1 9-14-92	SG-27 Tedlar 1 9-14-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	ND	ND	31	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	ND	ND	ND	60	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	ND	ND	75	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	1,700	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-28 Tedlar 1 9-14-92	SG-29 Tedlar 1 9-16-92	SG-30 Tedlar 1 9-16-92	SG-31 Tedlar 1 9-17-92	SG-32 Tedlar 1 9-16-92	SG-33 Tedlar 1 9-15-92	SG-34 Tedlar 1 9-15-92	SG-35 Tedlar 1 9-15-92	SG-36 Tedlar 1 9-11-92	SG-36A Tedlar 1 9-11-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane		ND	ND	ND	ND	ND	ND	20	ND	ND	ND
Trichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

02:OB5901_D4238-12/16/93-D1

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-37 Tedlar 1 9-15-92	SG-38 Tedlar 1 9-15-92	SG-39 Tedlar 1 9-15-92	SG-40 Tedlar 1 9-16-92	SG-41 Tedlar 1 —	SG-42 Tedlar 1 9-16-92	SG-43 Tedlar 1 9-11-92	SG-44 Tedlar 1 —	SG-45 Tedlar 1 9-11-92	SG-46 Tedlar 1 —
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
1,1-dichloroethane		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
1,2-dichloroethane		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
cis-1,2-dichloroethene		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
1,1-dichloroethene		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
trans-1,2-dichloroethene		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
Methylene Chloride		ND	ND	750	ND	NS	ND	ND	NS	ND	NS
1,1,1-trichloroethane		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
Trichloroethene		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
Vinyl Chloride		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
Ethylbenzene		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
Toluene		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS
Xylene (Total)		ND	ND	ND	ND	NS	ND	ND	NS	ND	NS

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-47 Tedlar 1 9-16-92	SG-48 Tedlar 1 —	SG-49 Tedlar 1 —	SG-50 Tedlar 1 —	SG-51 Tedlar 1 9-11-92	SG-51A Tedlar 1 9-11-92	SG-52 Tedlar 1 9-10-92	SG-53 Tedlar 1 9-10-92	SG-54 Tedlar 1 9-10-92	SG-55 Tedlar 1 9-10-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NS	NS	NS	ND	ND	ND	ND	35	ND
Vinyl Chloride	ND	NS	NS	NS	ND	ND	ND	ND	99	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
Toluene	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND
Xylene (Total)	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-56 Tedlar 1 9-10-92	SG-57 Tedlar 1 9-10-92	SG-58 Tedlar 1 9-9-92	SG-59 Tedlar 1 9-9-92	SG-60 Tedlar 1 9-9-92	SG-61 Tedlar 1 9-9-92	SG-62 Tedlar 1 9-10-92	SG-63 Tedlar 1 9-10-92	SG-64 Tedlar 1 9-14-92	SG-65 Tedlar 1 9-14-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	69	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

4-62

Key at end of table.

02:083901_D4238-12/16/93-D1

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-65D Tedlar 1 9-14-92	SG-66 Tedlar 1 9-12-92	SG-67 Tedlar 1 9-10-92	SG-68 Tedlar 1 9-9-92	SG-69 Tedlar 1 9-9-92	SG-70 Tedlar 1 9-9-92	SG-71 Tedlar 1 9-9-92	SG-72 Tedlar 1 9-9-92	SG-73 Tedlar 1 9-9-92	SG-74 Tedlar 1 9-9-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	ND	ND	ND	17	ND	ND	3,800 ^b	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	53	ND	ND
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	2,900 ^b	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	560	ND	ND
Methylene Chloride	ND	ND	ND	ND	18	ND	23	23	ND	ND
1,1,1-trichloroethane	ND	ND	ND	ND	140	ND	ND	100	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	2,600	ND	ND
Vinyl Chloride	ND	ND	ND	ND	24 J	19 J	ND	1,400 ^b	25 J	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	ND	ND
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	ND	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-75 Tedlar 1 9-9-92	SG-76 Tedlar 1 9-9-92	SG-77 Tedlar 1 9-9-92	SG-78 Tedlar 1 9-9-92	SG-79 Tedlar 1 9-14-92	SG-80 Tedlar 1 9-14-92	SG-81 Tedlar 1 9-14-92	SG-82 Tedlar 1 9-29-92	SG-83 Tedlar 1 9-29-92	SG-84 Tedlar 1 9-29-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	19	ND	ND
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ND	ND	ND	ND	13	ND	ND	280	ND	ND
Methylene Chloride		15	ND	ND	ND	ND	ND	ND	12	ND	ND
1,1,1-trichloroethane		ND	ND	ND	ND	ND	ND	ND	93	ND	ND
Trichloroethene		ND	ND	ND	ND	ND	ND	ND	160	ND	ND
Vinyl Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		390 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		120 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		600 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)		230 J	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Key at end of table.

02:OB5901_D4238-12/16/93-D1

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-85 Tedlar 1 9-29-92	SG-86 Tedlar 1 9-30-92	SG-87 Tedlar 1 9-30-92	SG-88 Tedlar 1 9-30-92	SG-89 Tedlar 1 9-30-92	SG-90 Tedlar 1 9-30-92	SG-90D Tedlar 1 9-30-92	SG-91 Tedlar 1 10-6-92	SG-92 Tedlar 1 10-6-92	SG-93 Tedlar 1 10-6-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND ^b	ND ^b	ND
1,1-dichloroethane		ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	320	ND
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	> 5,000 ^b	ND
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	400	ND	ND
trans-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	150	> 5,000 ^b	ND
Methylene Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane		ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	17	ND
Trichloroethene		ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	> 5,000 ^b	ND
Vinyl Chloride		ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	ND	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	85	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	> 5,000 ^b	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-94 Tedlar 1 10-5-92	SG-95 Tedlar 1 10-5-92	SG-96 Tedlar 1 10-5-92	SG-97 Tedlar 1 10-6-92	SG-97D Tedlar 1 10-6-92	SG-98 Tedlar 1 10-6-92	SG-99 Tedlar 1 10-6-92	SG-100 Tedlar 1 10-6-92	SG-101 Tedlar 1 10-6-92	SG-102 Tedlar 1 10-6-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	F	ND	ND	ND	ND	F	ND
1,1-dichloroethane	ND	ND	ND	F	ND	ND	ND	ND	F	ND
1,2-dichloroethane	ND	ND	ND	F	ND	ND	ND	ND	F	ND
cis-1,2-dichloroethene	ND	ND	ND	F	ND	ND	ND	ND	F	ND
1,1-dichloroethene	ND	ND	ND	F	ND	ND	ND	ND	F	ND
trans-1,2-dichloroethene	ND	ND	ND	F	ND	ND	ND	ND	F	ND
Methylene Chloride	ND	ND	ND	F	ND	ND	ND	ND	F	ND
1,1,1-trichloroethane	ND	11	ND	F	ND	ND	ND	30	F	16
Trichloroethene	46	ND	55	F	87	120	ND	84	F	110
Vinyl Chloride	ND	ND	ND	F	ND	ND	ND	ND	F	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	ND	F	ND	ND	ND	ND	F	ND
Ethylbenzene	ND	ND	ND	F	ND	ND	ND	ND	F	ND
Toluene	ND	ND	ND	F	ND	ND	ND	ND	F	ND
Xylene (Total)	ND	ND	ND	F	ND	ND	ND	ND	F	ND

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Key at end of table.

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Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.:	SG-103	SG-104	SG-105	SG-106	SG-107	SG-108	SG-109	SG-110	SG-111	SG-112
Sampling method:	Tedlar	Tedlar	Tedlar	Tedlar	Tedlar	Tedlar	Tedlar	Tedlar	Tedlar	Tedlar
Sample volume (liters):	1	1	1	1	1	1	1	1	1	1
Sampling date:	10-6-92	10-6-92	10-6-92	10-6-92	10-8-92	10-8-92	10-8-92	10-8-92	10-8-92	10-8-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	59	ND	ND	ND	ND	200	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

02:OB5901_D4238-12/16/93-D1

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Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-113 Tedlar 1 10-8-92	SG-113D Tedlar 1 10-8-92	SG-114 Tedlar 1 10-8-92	SG-116 Tedlar 1 10-19-92	SG-117 Tedlar 1 10-19-92	SG-118 Tedlar 1 10-19-92	SG-119 Tedlar 1 10-19-92	SG-120 Tedlar 1 10-20-92	SG-121 Tedlar 1 10-20-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		100	40	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-122 Tedlar 1 10-20-92	SG-123 Tedlar 1 10-20-92	SG-124 Tedlar 1 10-20-92	SG-124D Tedlar 1 10-20-92	SG-125 Tedlar 1 10-20-92	SG-126 Tedlar 1 10-20-92	SG-127 Tedlar 1 10-20-92	SG-128 Tedlar 1 10-20-92	SG-129 Tedlar 1 10-20-92	SG-130 Tedlar 1 10-20-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	F
1,1-dichloroethane	ND	ND	ND	ND	ND	ND	2,600	ND	ND	F
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	F
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	890	400	ND	ND	F
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	F
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	85	42	ND	ND	F
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	F
1,1,1-trichloroethane	ND	ND	ND	ND	ND	ND	880	ND	ND	F
Trichloroethene	ND	ND	ND	ND	ND	1,500	2,100	ND	ND	F
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	F
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	F
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	F
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	F
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	F

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-131 Tedlar 1 10-20-92	SG-132 Tedlar 1 10-29-92	SG-133 Tedlar 1 10-29-92	SG-134 Tedlar 1 10-29-92	SG-135 Tedlar 1 10-29-92	SG-136 Tedlar 1 12-1-92	SG-137 Tedlar 1 12-1-92	SG-138 Tedlar 1 12-1-92	SG-139 Tedlar 1 12-1-92	SG-140 Tedlar 1 12-1-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	F
1,1-dichloroethane		ND	230	ND	ND	ND	ND	ND	ND	ND	F
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	F
cis-1,2-dichloroethene		ND	100	ND	24	ND	ND	ND	ND	ND	F
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	F
trans-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	F
Methylene Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND	F
1,1,1-trichloroethane		ND	750	ND	ND	ND	ND	ND	ND	ND	F
Trichloroethene		ND	2,500	ND	ND	ND	ND	ND	ND	ND	F
Vinyl Chloride		ND	ND	ND	73	ND	ND	ND	ND	ND	F
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		ND	ND	ND	49	ND	ND	ND	ND	ND	F
Ethylbenzene		ND	ND	ND	1,000	ND	ND	ND	ND	ND	F
Toluene		ND	ND	ND	> 5,000 ^b	ND	ND	ND	ND	ND	F
Xylene (Total)		ND	ND	ND	ND	ND	ND	ND	ND	ND	F

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-141 Tedlar 1 12-1-92	SG-A Tedlar 1 8-14-92	SG-A Tedlar 1 9-24-92	SG-B Tedlar 1 8-17-92	SG-B Tedlar 1 9-28-92	SG-C Tedlar 1 9-28-92	SG-D Tedlar 1 9-28-92	SG-E Tedlar 1 9-24-92	SG-F Tedlar 1 9-24-92	SG-G Tedlar 1 9-24-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane		ND	ND	ND	44,000 J	ND	26	ND	> 5,000 ^b	ND	24
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	310	ND	15
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	72	ND	ND
Methylene Chloride		ND	ND	22	17,000 J	ND	ND	ND	22	ND	ND
1,1,1-trichloroethane		46	ND	ND	ND	ND	14	14	> 5,000 ^b	ND	17
Trichloroethene		250	ND	ND	18,000 J	16	44	23	> 5,000 ^b	34	79
Vinyl Chloride		ND	ND	ND	ND	ND	ND	200	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)		ND J	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

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Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-H Tedlar 1 9-24-92	SG-I Tedlar 1 9-28-92	SG-J Tedlar 1 9-25-92	SG-JD Tedlar 1 9-25-92	SG-K Tedlar 1 9-24-92	SG-L Tedlar 1 9-24-92	SG-M Tedlar 1 9-24-92	SG-N Tedlar 1 9-25-92	SG-O Tedlar 1 9-24-92	SG-P Tedlar 1 9-24-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	> 5,000 ^b	2,400	2,500	710	ND	ND	10	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	> 5,000 ^b	46	140	27	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	14	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	240	25	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	43	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	> 5,000 ^b	3,000	5,000 ^a J	5,000 ^a J	ND	ND	ND	ND	ND	ND
Trichloroethene	> 5,000 ^b	2,400	1,400	350	ND	ND	43	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-PD Tedlar 1 9-24-92	SG-Q Tedlar 1 9-28-92	SG-R Tedlar 1 9-29-92	SG-S Tedlar 1 9-25-92	SG-T Tedlar 1 9-25-92	SG-U Tedlar 1 9-25-92	SG-V Tedlar 1 9-25-92	SG-W Tedlar 1 9-25-92	SG-X Tedlar 1 9-25-92	SG-Y Tedlar 1 9-25-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	81	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	540	ND	ND	ND	10	ND	ND	ND	ND
Trichloroethene	ND	380	ND	ND	390	ND	59	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

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ecology and environment

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-Z Tedlar 1 9-25-92	SG-AA Tedlar 1 9-29-92	SG-AAD Tedlar 1 9-29-92	SG-BB Tedlar 1 9-29-92	SG-CC Tedlar 1 9-29-92	SG-DD Tedlar 1 9-29-92	SG-EE Tedlar 1 10-5-92	SG-FF Tedlar 1 10-5-92	SG-GG Tedlar 1 10-5-92	SG-HH Tedlar 1 10-5-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)											
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane		ND	> 5,000 ^b	> 5,000 ^b	> 5,000 ^b	ND	ND	ND	ND	560 J	ND
1,2-dichloroethane		ND	ND	ND	63	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	> 5,000 ^b	> 5,000 ^b	90	ND	ND	ND	240	180	ND
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ND	420	430	ND	ND	ND	ND	ND	19	ND
Methylene Chloride		ND	ND	12	ND	88	ND	ND	ND	ND	ND
1,1,1-trichloroethane		39	> 5,000 ^b	> 5,000 ^b	ND	ND	10	ND	ND	2,100 J	> 5,000 ^b
Trichloroethene		99	> 5,000 ^b	> 5,000 ^b	970	ND	ND	37	290	2,100 J	ND
Vinyl Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)											
Benzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-II Tedlar 1 10-5-92	SG-BL1 Tedlar 1 8-14-92	SG-BL2 Tedlar 1 8-17-92	SG-BL3 Tedlar 1 8-18-92	SG-FB-9-14 Tedlar 1 9-14-92	SG-FB-9-15 Tedlar 1 9-15-92	SG-FB-9-16 Tedlar 1 9-16-92	SG-FB-9-24 Tedlar 1 9-24-92	SG-FB-9-25 Tedlar 1 9-25-92	SG-FB-9-28 Tedlar 1 9-28-92
Parameter										
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	ND	26	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	10
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	36
1,1,1-trichloroethane	ND	ND	ND	ND	ND	ND	10	ND	ND	ND
Trichloroethene	66	ND	91	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene	ND	ND	28	ND	ND	ND	70	ND	10	52
Ethylbenzene	ND	ND	11	ND	ND	ND	23	ND	12	11
Toluene	ND	19	92	97	ND	46	210	54	48	160
Xylene (Total)	ND	13 J	33 J	19 J	ND	25 J	79 J	27 J	21 J	65 J

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-FB-9-29 Tedlar 1 9-29-92	SG-FB-10-5 Tedlar 1 10-5-92	SG-FB-10-6 Tedlar 1 10-6-92	SG-FB-10-8 Tedlar 1 10-8-92	SG-FB-10-20 Tedlar 1 10-20-92	SG-FB-12-1 Tedlar 1 12-1-92	SG-1-T20 Tenax 20 10-13-92	SG-11-T1 Tenax 1 10-7-92	SG-11-T10 Tenax 10 10-7-92
Parameter									
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)									
Chloroethane	ND	ND	ND	ND	ND	ND	ND	NA	ND
1,1-dichloroethane	ND	ND	ND	ND	ND	ND	ND	NA	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	NA	ND
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	NA	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND	ND	NA	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	NA	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	NA	ND
1,1,1-trichloroethane	ND	ND	ND	ND	ND	ND	ND	NA	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	9.9	NA	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	NA	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)									
Benzene	ND	ND	11	ND	ND	12	15	NA	ND
Ethylbenzene	ND	ND	22	ND	ND	23	ND	NA	ND
Toluene	34	24	56	34	41	96	52 ^b	NA	ND
Xylene (Total)	27 J	15 J	60 J	27 J	22 J	46 J	ND	NA	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-11-T20 Tenax 20 10-7-92	SG-14-T20 Tenax 1 10-8-92	SG-18-T20 Tenax 1 10-19-92	SG-20-T20 Tenax 1 10-19-92	SG-27-T20 Tenax 1 10-13-92	SG-54-T1 Tenax 1 10-7-92	SG-54-T10 Tenax 10 10-7-92	SG-54-T20 Tenax 20 10-7-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)									
Chloroethane		NA	ND	ND	ND	ND	ND	NA	NA
1,1-dichloroethane		NA	ND	ND	ND	ND	ND	NA	NA
1,2-dichloroethane		NA	ND	ND	ND	ND	ND	NA	NA
cis-1,2-dichloroethene		NA	ND	ND	ND	ND	ND	NA	NA
1,1-dichloroethene		NA	ND	ND	ND	ND	ND	NA	NA
trans-1,2-dichloroethene		NA	ND	ND	ND	ND	ND	NA	NA
Methylene Chloride		NA	ND	ND	ND	ND	ND	NA	NA
1,1,1-trichloroethane		NA	1.0	ND	18	1.2	ND	NA	NA
Trichloroethene		NA	ND	ND	ND	ND	ND	NA	NA
Vinyl Chloride		NA	ND	ND	ND	ND	ND	NA	NA
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)									
Benzene		NA	ND	2.1	3.4	3.3	ND	NA	NA
Ethylbenzene		NA	ND	4.6	3.8	5.2	ND	NA	NA
Toluene		NA	ND	28 ^b	18	20	ND	NA	NA
Xylene (Total)		NA	ND	24	22	25	ND	NA	NA

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-83-T20 Tenax 20 10-8-92	SG-84-T20 Tenax 20 10-13-92	SG-85-T20 Tenax 20 10-13-92	SG-88-T20 Tenax 20 10-19-92	SG-97-T20 Tenax 20 10-13-92	SG-98-T20 Tenax 20 10-19-92	SG-98-T20D Tenax 20 10-19-92	SG-99-T20 Tenax 20 10-8-92	SG-100-T20 Tenax 20 10-12-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)										
Chloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)										
Benzene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Parameter	Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-101-T20 Tenax 20 10-12-92	SG-102-T20 Tenax 20 10-12-92	SG-103-T20 Tenax 20 10-13-92	SG-105-T20 Tenax 20 10-19-92	SG-110-T20 Tenax 20 10-19-92	SG-110-T20D Tenax 20 10-19-92	SG-115-T20 Tenax 20 10-13-92	SG-129-T20 Tenax 20 10-29-92
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)									
Chloroethane		ND	ND	ND	ND	A	M	ND	ND
1,1-dichloroethane		ND	ND	ND	ND	ND	M	ND	ND
1,2-dichloroethane		ND	ND	ND	ND	ND	M	ND	ND
cis-1,2-dichloroethene		ND	ND	ND	ND	ND	M	ND	ND
1,1-dichloroethene		ND	ND	ND	ND	ND	M	ND	ND
trans-1,2-dichloroethene		ND	ND	ND	ND	ND	M	ND	ND
Methylene Chloride		ND	ND	ND	ND	ND	M	ND	ND
1,1,1-trichloroethane		ND	ND	ND	ND	ND	M	ND	ND
Trichloroethene		ND	ND	ND	ND	190 ^b	M	ND	ND
Vinyl Chloride		ND	ND	ND	ND	A	M	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)									
Benzene		ND	ND	ND	ND	ND	M	ND	19
Ethylbenzene		ND	ND	ND	ND	ND	M	ND	58 J
Toluene		ND	ND	ND	ND	ND	M	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND	M	ND	ND

Key at end of table.

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Table 4-8

PHASE I RI SUMMARY OF VOC RESULTS FOR SOIL GAS

Sample no.: Sampling method: Sample volume (liters): Sampling date:	SG-130-T20 Tenax 20 10-29-92	SG-FB-T20-10-7 Tenax 20 10-7-92	SG-FB-TO-10-13 Tenax 0 10-13-92	SG-FB-TO-10-19 Tenax 0 10-19-92	SG-FB-TO-10-29 Tenax 0 10-29-92
Parameter					
Purgeable Halocarbon Compounds ($\mu\text{g}/\text{m}^3$)					
Chloroethane	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	ND	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	3.2	ND	ND	ND
Trichloroethene	ND	0.7	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND
Purgeable Aromatic Compounds ($\mu\text{g}/\text{m}^3$)					
Benzene	11	1.7	ND	ND	ND
Ethylbenzene	33 J	1.7	ND	ND	ND
Toluene	68 J	9.0	ND	ND	ND
Xylene (Total)	ND	7.6	ND	ND	ND

Key at end of table.

Table 4-8 (Cont.)

a Re-analyzed at a second dilution factor.

b Reported value is estimated due to quantitation above the calibration range.

Key:

A = Compound could not be determined due to analytical problems.

F = Flat bag; sample not analyzed.

J = The associated numerical value is an estimated quantity.

M = Sample lost due to instrument malfunction.

NA = Not analyzed.

ND = Not detected above the sample quantitation limit.

NS = Not sampled due to probe refusal caused by underlying bedrock.

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Table 4-9 PHASE I RI SUMMARY OF VOC RESULTS FOR TEST PIT SOIL SAMPLES (µg/kg)							
Parameter	Sample no.: Depth: Sampling date:	TP-1A (8 feet) 11-5-92	TP-1B (12.5 feet) 11-5-92	TP-2A (3 feet) 11-5-92	TP-2AD (3 feet) 11-5-92	TP-2B (11 feet) 11-5-92	TP-2C (6 feet) 11-5-92
Acetone		ND	ND	ND	ND	ND	ND
Benzene		ND	ND	ND	ND	ND	ND
2-Butanone		ND	ND	ND	ND	ND	ND
Carbon disulfide		ND	ND	ND	ND	ND	ND
Chlorobenzene		ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		ND	ND	52 J	110	95	3,700
1,2-Dichloroethane		ND	ND	ND	ND	ND	1,300 J
Total 1,2-Dichloroethene		ND	ND	ND	ND	34	1,100 J
Ethylbenzene		ND	ND	ND	ND	3 J	ND
4-Methyl-2-Pentanone		ND	ND	ND	ND	ND	ND
Methylene chloride		ND	ND	ND	ND	ND	ND
Tetrachloroethene		ND	ND	84	240	ND	ND
Toluene		ND	ND	6 J	10 J	99	18,000 J
Trichloroethene		ND	ND	120	310	7 J	23,000
1,1,1-Trichloroethane		ND	ND	310	670	34 D,J	7,400
Xylene (Total)		ND	ND	28 J	60	68	3,800 J

Key at end of table.

Table 4-9 PHASE I RI SUMMARY OF VOC RESULTS FOR TEST PIT SOIL SAMPLES ($\mu\text{g/kg}$)							
Parameter	Sample no.: Depth: Sampling date:	TP-3A (5 feet) 12-4-92	TP-3AD (5 feet) 12-4-92	TP-3B (11 feet) 12-4-92	TP-4A (4 feet) 12-4-92	TP-4B (9 feet) 12-4-92	TP-5A (2 feet) 12-3-92
Acetone		ND	ND	ND	ND	ND	ND
Benzene		ND	ND	ND	ND	ND	ND
2-Butanone		4 J	ND	4 J	15	ND	3 J
Carbon disulfide		ND	ND	ND	ND	ND	ND
Chlorobenzene		ND	ND	ND	ND	ND	3 J
1,1-Dichloroethane		ND	ND	ND	ND	ND	ND
1,2-Dichloroethane		ND	ND	ND	ND	ND	ND
Total 1,2-Dichloroethene		ND	ND	ND	ND	ND	2 J
Ethylbenzene		ND	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone		ND	ND	ND	ND	ND	ND
Methylene chloride		ND	ND	ND	ND	ND	ND
Tetrachloroethene		ND	ND	ND	ND	ND	ND
Toluene		2 J	1 J	ND	2 J	ND	2 J
Trichloroethene		ND	ND	ND	ND	ND	5 J
1,1,1-Trichloroethane		ND	ND	ND	ND	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-9

PHASE I RI SUMMARY OF VOC RESULTS FOR TEST PIT SOIL SAMPLES
($\mu\text{g/kg}$)

Parameter	Sample no.: Depth: Sampling date:	TP-5B (7.5 feet) 12-3-92	TP-5C (11 feet) 12-3-92	TP-6A (6 feet NW) 12-3-92	TP-6B (6 feet SE) 12-3-92	TP-7A (6 feet) 12-4-92	TP-7B (13 feet) 12-4-92
Acetone		ND	ND	260,000 J	3,200 D	ND	ND
Benzene		ND	ND	ND	ND	ND	2 J
2-Butanone		2 J	ND	ND	44 J	ND	6 J
Carbon disulfide		ND	ND	ND	ND	ND	2 J
Chlorobenzene		ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		53	6 J	ND	24 J	ND	4 J
1,2-Dichloroethane		ND	ND	320,000	340	ND	2 J
Total 1,2-Dichloroethene		42	5 J	ND	19 J	ND	4 J
Ethylbenzene		ND	ND	110,000 J	ND	ND	ND
4-Methyl-2-Pentanone		ND	ND	ND	310	ND	ND
Methylene chloride		ND	ND	70,000 J	ND	ND	ND
Tetrachloroethene		ND	ND	ND	4 J	ND	ND
Toluene		ND	ND	3,400,000 E	230 J	1 J	2 J
Trichloroethene		59	4 J	ND	53	24	4 J
1,1,1-Trichloroethane		47	2 J	880,000	56	ND	ND
Xylene (Total)		ND	ND	580,000 J	29 J	ND	6 J

Key:

D = Reported result taken from diluted sample analysis.

E = Reported value is estimated due to quantitation above the calibration range.

J = The associated numerical value is an estimated quantity.

ND = Not detected above the sample quantitation limit.

Table 4-10

**PHASE I RI SUMMARY OF SEMIVOLATILE RESULTS
FOR TEST PIT SOIL SAMPLES
($\mu\text{g/kg}$)**

Parameter	Sample no.: Depth: Sampling date:	TP-1A (8 feet) 11-5-92	TP-1B (12.5 feet) 11-5-92	TP-2A (3 feet) 11-5-92	TP-2AD (3 feet) 11-5-92	TP-2B (11 feet) 11-5-92	TP-2C (6 feet) 11-5-92
Semivolatiles							
Bis(2-Ethylhexyl)phthalate		28 J	ND	ND	ND	ND	ND
Dibenzofuran		ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		ND	ND	ND	ND	ND	ND
2-Methylphenol		ND	ND	ND	ND	ND	3,900 J
4-Methylphenol		ND	ND	ND	ND	ND	4,000 J
N-Nitrosodiphenylamine		ND	ND	ND	ND	ND	140,000 J
Phenol		ND	ND	ND	ND	ND	540,000 E
Semivolatiles (PAHs)							
Acenaphthene		ND	ND	ND	ND	ND	ND
Anthracene		36 J	ND	ND	ND	ND	ND
Benzo(a)anthracene		ND	ND	ND	ND	ND	ND
Benzo(a)pyrene		ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene		ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene		ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene		ND	ND	ND	ND	ND	ND
Chrysene		ND	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene		ND	ND	ND	ND	ND	ND
Fluoranthene		ND	ND	ND	ND	ND	ND
Fluorene		ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		ND	ND	ND	ND	ND	ND
Naphthalene		20 J	ND	ND	ND	ND	ND
2-Methylnaphthalene		28 J	ND	ND	ND	ND	ND
Phenanthrene		31 J	ND	ND	ND	ND	ND
Pyrene		18 J	ND	ND	ND	ND	ND

Table 4-10

**PHASE I RI SUMMARY OF SEMIVOLATILE RESULTS
FOR TEST PIT SOIL SAMPLES
($\mu\text{g/kg}$)**

Sample no.: Depth: Parameter Sampling date:	TP-3A (5 feet) 12-4-92	TP-3AD (5 feet) 12-4-92	TP-3B (11 feet) 12-4-92	TP-4A (4 feet) 12-4-92	TP-4B (9 feet) 12-4-92	TP-5A (2 feet) 12-3-92
Semivolatiles						
Bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	ND	ND
Dibenzofuran	63 J	53 J	ND	ND	ND	ND
Di-n-butylphthalate	ND	40 J	ND	27 J	ND	110 J
2-Methylphenol	ND	ND	ND	ND	ND	ND
4-Methylphenol	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND	ND
Semivolatiles (PAHs)						
Acenaphthene	92 J	74 J	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	86 J	48 J	ND	78 J	ND	50 J
Benzo(a)pyrene	54 J	29 J	ND	90 J	ND	ND
Benzo(g,h,i)perylene	41 J	ND	ND	150 J	ND	48 J
Benzo(b)fluoranthene	76 J	84 J	ND	130 J	ND	89 J
Benzo(k)fluoranthene	62 J	ND	ND	110 J	ND	59 J
Chrysene	91 J	54 J	ND	87 J	ND	78 J
Dibenz(a,h)anthracene	ND	ND	ND	ND	ND	ND
Fluoranthene	230 J	180 J	ND	120 J	ND	93 J
Fluorene	65 J	52 J	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	52 J	ND	ND	170 J	ND	55 J
Naphthalene	97 J	82 J	ND	43 J	ND	ND
2-Methylnaphthalene	71 J	61 J	ND	48 J	ND	ND
Phenanthrene	360 J	250 J	ND	120 J	ND	75 J
Pyrene	270 J	140 J	ND	100 J	ND	79 J

Key at end of table.

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Table 4-10						
PHASE I RI SUMMARY OF SEMIVOLATILE RESULTS FOR TEST PIT SOIL SAMPLES (µg/kg)						
Sample no.: Depth: Parameter Sampling date:	TP-5B (7.5 feet) 12-3-92	TP-5C (11 feet) 12-3-92	TP-6A (6 feet NW) 12-3-92	TP-6B (6 feet SE) 11-3-92	TP-7A (6 feet) 12-4-92	TP-7B (13 feet) 12-4-92
Semivolatiles						
Bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	ND	ND
Dibenzofuran	ND	ND	ND	ND	29 J	55 J
Di-n-butylphthalate	ND	ND	500	ND	43 J	ND R
2-Methylphenol	ND	ND	ND	ND	ND	ND
4-Methylphenol	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	200 J	ND	ND	ND
Semivolatiles (PAHs)						
Acenaphthene	ND	ND	ND	ND	ND	32 J
Anthracene	ND	ND	ND	ND	33 J	71 J
Benzo(a)anthracene	ND	ND	ND	ND	220 J	480
Benzo(a)pyrene	ND	ND	ND	ND	180 J	330 J
Benzo(g,h,i)perylene	ND	ND	ND	ND	290 J	360 J
Benzo(b)fluoranthene	ND	ND	ND	ND	330 J	600
Benzo(k)fluoranthene	ND	ND	ND	ND	200 J	670
Chrysene	41 J	ND	ND	ND	280 J	580
Dibenz(a,h)anthracene	ND	ND	ND	ND	71 J	140 J
Fluoranthene	ND	ND	ND	ND	330 J	830
Fluorene	ND	ND	ND	ND	ND	58 J
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	340 J	510
Naphthalene	ND	ND	48 J	ND	49 J	89 J
2-Methylnaphthalene	ND	ND	ND	ND	43 J	84 J
Phenanthrene	ND	ND	ND	ND	240 J	640
Pyrene	ND	ND	ND	ND	330 J	680

Key:

E = Reported value is due to quantitation above the calibration range.

J = The associated numerical value is an estimated quantity.

ND = Not detected above the sample quantitation limit.

Table 4-11							
PHASE I RI SUMMARY OF PESTICIDE/PCB RESULTS FOR TEST PIT SOIL SAMPLES							
Parameter	Sample no.: Depth: Sampling date:	TP-1A (8 feet) 11-5-92	TP-1B (12.5 feet) 11-5-92	TP-2A (3 feet) 11-5-92	TP-2AD (3 feet) 11-5-92	TP-2B (11 feet) 11-5-92	TP-2C (6 feet) 11-5-92
Pesticides (µg/kg)							
Alpha-BHC		ND	ND	100 J	ND	ND	ND
Beta-BHC		ND	ND	ND	180 J	ND	ND
Delta-BHC		ND	ND	ND	ND	ND	ND
Gamma-BHC (Lindane)		4.7 J	ND	310 J	250 J	12 J	ND
Heptachlor		ND	ND	93 J	22 J	ND	ND
Aldrin		ND	ND	ND	ND	ND	ND
Heptachlor epoxide		ND	ND	ND	ND	ND	ND
Endosulfan I		ND	ND	150 J	97 J	ND	ND
Dieldrin		ND	ND	39 J	ND	ND	ND
4,4'-DDE		ND	ND	ND	ND	ND	ND
Endrin		ND	ND	ND	48 J	ND	ND
Endosulfan II		ND	ND	ND	ND	ND	ND
4,4'-DDD		ND	ND	ND	ND	ND	ND
Methoxychlor		ND	ND	ND	ND	ND	ND
Endrin ketone		ND	ND	ND	ND	ND	ND
Endrin aldehyde		ND	ND	ND	ND	ND	ND
Alpha-Chlordane		ND	ND	69 J	28 J	ND	ND
Gamma-Chlordane		ND	ND	100 J	37 J	ND	ND
4,4'-DDT		ND	ND	ND	ND	ND	ND
Endosulfan sulfate		ND	ND	ND	ND	ND	ND
Toxaphene		ND	ND	ND	ND	ND	ND
PCBs (µg/kg)							
Aroclor-1016		ND	ND	ND	ND	ND	ND
Aroclor-1221		ND	ND	ND	ND	ND	ND
Aroclor-1232		ND	ND	ND	ND	ND	ND
Aroclor-1242		ND	ND	ND	ND	ND	ND
Aroclor-1248		ND	ND	ND	ND	ND	ND
Aroclor-1254		71	ND	ND	ND	ND	ND
Aroclor-1260		35 J	ND	ND	ND	ND	ND

Key at end of table.

Table 4-11						
PHASE I RI SUMMARY OF PESTICIDE/PCB RESULTS FOR TEST PIT SOIL SAMPLES						
Sample no.: Depth: Parameter Sampling date:	TP-3A (5 feet) 12-4-92	TP-3AD ^a (5 feet) 12-4-92	TP-3B ^a (11 feet) 12-4-92	TP-4A (4 feet) 12-4-92	TP-4B ^a (9 feet) 12-4-92	TP-5A (2 feet) 12-3-92
Pesticides (µg/kg)						
Alpha-BHC	ND	ND	ND	ND	ND	ND
Beta-BHC	ND	ND	ND	ND	ND	ND
Delta-BHC	ND	ND	ND	ND	ND	ND
Gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND	ND	ND
Alpha-Chlordane	ND	ND	ND	ND	ND	ND
Gamma-Chlordane	ND	ND	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND	ND
PCBs (µg/kg)						ND
Aroclor-1016	ND	ND	ND	ND	ND	ND
Aroclor-1221	ND	ND	ND	ND	ND	ND
Aroclor-1232	ND	ND	ND	ND	ND	ND
Aroclor-1242	ND	ND	ND	ND	ND	ND
Aroclor-1248	ND	ND	ND	ND	ND	2,500 J,C
Aroclor-1254	370	390 J,C	23 J	33 J	ND	3,300 C
Aroclor-1260	97 J	ND	ND	ND	ND	4,200 C

Key at end of table.

Table 4-11						
PHASE I RI SUMMARY OF PESTICIDE/PCB RESULTS FOR TEST PIT SOIL SAMPLES						
Sample no.: Depth: Parameter Sampling date:	TP-5B (7.5 feet) 12-3-92	TP-5C (3 feet) 11-5-92	TP-6A (6 feet NW) 11-5-92	TP-6B (6 feet SE) 12-3-92	TP-7A ^a (6 feet) 12-4-92	TP-7B (13 feet) 12-4-92
Pesticides/PCBs (µg/kg)						
Alpha-BHC	ND	ND	ND	ND	ND	ND
Beta-BHC	ND	ND	ND	ND	ND	ND
Delta-BHC	ND	ND	ND	ND	ND	ND
Gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	180 J	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	870	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	200 J	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND	41
Methoxychlor	ND	ND	1,400 J	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND	ND	ND
Alpha-Chlordane	ND	ND	ND	ND	ND	ND
Gamma-Chlordane	ND	ND	170 J	ND	ND	ND
4,4'-DDT	ND	ND	ND	20 J	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	10 J
PCBs (µg/kg)						
Toxaphene	ND	ND	ND	ND	ND	ND
Aroclor-1016	ND	ND	ND	ND	ND	ND
Aroclor-1221	ND	ND	ND	ND	ND	ND
Aroclor-1232	ND	ND	ND	ND	ND	ND
Aroclor-1242	ND	ND	ND	ND	ND	ND
Aroclor-1248	200,000 C	1,500 C	ND	ND	ND	ND
Aroclor-1254	ND	ND	ND	86 J	380 J,C	660 J
Aroclor-1260	ND	ND	ND	ND	ND	530

Key at end of table.

Table 4-11 (Cont.)

^a Result of a re-analysis.

Key:

- C = Identification confirmed by GC/MS.
- D = Reported result taken from diluted sample analysis.
- J = The associated numerical value is an estimated quantity.
- ND = Not detected above the sample quantitation limit.

Table 4-12 PHASE I RI SUMMARY OF INORGANIC RESULTS FOR TEST PIT SOIL SAMPLES (mg/kg)						
Parameter	Sample no.: Depth: Sampling date:	TP-1A (8 feet) 11-5-92	TP-1B (12.5 feet) 11-5-92	TP-2A (3 feet) 11-5-92	TP-2AD (3 feet) 11-5-92	Common Range^a
Aluminum		1,340	2,250	3,750	2,660	7,000 - >100,000
Arsenic		2.8	1.8	4.1	4.4	<0.1 - 73
Barium		30.7 J	25.9 J	1,380 J	913 J	10 - 1,500
Beryllium		ND	ND	ND	ND	<1 - 7
Cadmium		3.0	0.75	3.8	3.7	0.01 - 0.7 ^b
Calcium		781	43,600	3,590	1,990	10 - 280,000
Chromium		43.6 J	5.7 J	432 J	403 J	1 - 1,000
Cobalt		9.5 J	4.0 J	1,330 J	648 J	<0.3 - 70
Copper		174	10.0	89.5	85.6	<1 - 700
Iron		31,000 J	8,050 J	38,500 J	33,900 J	10 - >100,000
Lead		19.9	3.4	56.3	71.7	<10 - 300
Magnesium		308	10,500	389	276	50 - 50,000
Manganese		419 J	290 J	1,700 J	1,420 J	<2 - 7,000
Mercury		ND	ND	ND	ND	0.01 - 3.4
Nickel		46.2 J	7.5 J	420 J	351 J	<5 - 700
Potassium		93.4	356	2,390	1,180	50 - 3,700
Selenium		0.22	ND	0.36	0.29	<0.1 - 3.9
Silver		ND	ND	0.86	ND	NA
Sodium		125	151	6,880	3,260	50 - 50,000
Thallium		0.24	0.24	ND	0.25	NA
Vanadium		ND	8.3	14.4	8.8	<7 - 300
Zinc		283 J	23.1 J	110 J	88.1 J	<5 - 2,900
Cyanide		ND	ND	ND	1.7	NA

Key at end of table.

Table 4-12					
PHASE I RI SUMMARY OF INORGANIC RESULTS FOR TEST PIT SOIL SAMPLES (mg/kg)					
Sample no.: Depth: Parameter Sampling date:	TP-2B (11 feet) 11-5-92	TP-2C (6 feet) 11-5-92	TP-3A (5 feet) 12-4-92	TP-3AD (5 feet) 12-4-92	Common Range ^a
Aluminum	2,950	846	1,710	1,980	7,000 - >100,000
Arsenic	1.7	0.79	3.9	2.5	<0.1 - 73
Barium	35.9 J	15.8 J	50.0	63.2	10 - 1,500
Beryllium	0.25	ND	ND	ND	<1 - 7
Cadmium	0.94	1.0	12.3	12.4	0.01 - 0.7 ^b
Calcium	45,600	342	861	695	10 - 280,000
Chromium	68.9 J	38.5 J	80.0 J	111 J	1 - 1,000
Cobalt	20.4 J	21.3 J	17.7	19.4	<0.3 - 70
Copper	15.2	30.1	322	426	<1 - 700
Iron	9,860 J	8,170 J	56,000	55,700	10 - >100,000
Lead	3.8	7.5	41.8 J	50.6 J	<10 - 300
Magnesium	9,710	264	498	351	50 - 50,000
Manganese	390 J	116 J	807	1,030	<2 - 7,000
Mercury	ND	ND	ND	ND	0.01 - 3.4
Nickel	84.7 J	30.3 J	105	120	<5 - 700
Potassium	433	113	50.9	51.7	50 - 3,700
Selenium	0.28	0.58	0.34	0.36	<0.1 - 3.9
Silver	ND	ND	ND	ND	NA
Sodium	137	335	ND	ND	50 - 50,000
Thallium	0.26	0.24	ND	ND	NA
Vanadium	9.6	ND	ND	ND	<7 - 300
Zinc	42.3 J	110 J	150	113	<5 - 2,900
Cyanide	ND	ND	ND	ND	NA

Key at end of table.

Table 4-12					
PHASE I RI SUMMARY OF INORGANIC RESULTS FOR TEST PIT SOIL SAMPLES (mg/kg)					
Sample no.: Depth: Parameter Sampling date:	TP-3B (11 feet) 12-4-92	TP-4A (4 feet) 12-4-92	TP-4B (9 feet) 12-4-92	TP-5A (2 feet) 12-3-92	Common Range ^a
Aluminum	2,770	2,070	2,550	1,540	7,000 - >100,000
Arsenic	1.7	1.7	1.9	2.6	<0.1 - 73
Barium	24.5	15.3	31.6	374	10 - 1,500
Beryllium	ND	ND	ND	ND	<1 - 7
Cadmium	1.9	2.5	1.4	1.9	0.01 - 0.7 ^b
Calcium	62,400	680	49,800	3,080	10 - 280,000
Chromium	8.7 J	15.4 J	3.8 J	21.6	1 - 1,000
Cobalt	5.9	ND	5.5	563	<0.3 - 70
Copper	12.3	51.2	13.3	790	<1 - 700
Iron	10,000	12,500	8,610	8,180	10 - >100,000
Lead	8.7 J	26.5 J	3.8 J	72.6 J	<10 - 300
Magnesium	21,200	338	14,000	659	50 - 50,000
Manganese	354	3,320	298	377	<2 - 7,000
Mercury	ND	ND	ND	0.59	0.01 - 3.4
Nickel	8.2	13.3	5.7	82.3	<5 - 700
Potassium	444	136	414	929	50 - 3,700
Selenium	0.34	ND	ND	ND	<0.1 - 3.9
Silver	ND	ND	ND	3.3	NA
Sodium	99.0	326	ND	2,590	50 - 50,000
Thallium	ND	ND	ND	ND	NA
Vanadium	8.0	ND	6.5	ND	<7 - 300
Zinc	35.1	24.3	23.2	136	<5 - 2,900
Cyanide	ND	ND	ND	ND	NA

Key at end of table.

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Table 4-12					
PHASE I RI SUMMARY OF INORGANIC RESULTS FOR TEST PIT SOIL SAMPLES (mg/kg)					
Sample no.: Depth: Parameter Sampling date:	TP-5B (7.5 feet) 12-3-92	TP-5C (11 feet) 12-3-92	TP-6A (6 feet NW) 12-3-92	TP-6B (6 feet SE) 12-3-92	Common Range ^a
Aluminum	2,620	3,220	5,110	1,680	7,000 - >100,000
Arsenic	3.3	2.0	2.0	3.6	<0.1 - 73
Barium	850	46.7	387	53.6	10 - 1,500
Beryllium	0.27	ND	ND	ND	<1 - 7
Cadmium	8.9	2.1	6.2	10.7	0.01 - 0.7 ^b
Calcium	4,900	50,400	3,270	970	10 - 280,000
Chromium	15,300 J	141 J	55.0 J	31.2 J	1 - 1,000
Cobalt	54.9	7.8	14.1	18.7	<0.3 - 70
Copper	345	11.9	755	600	<1 - 700
Iron	17,200	10,200	20,600	40,400	10 - >100,000
Lead	82.5 J	6.0 J	235 J	42.5 J	<10 - 300
Magnesium	713	12,600	726	455	50 - 50,000
Manganese	179	359	292	526	<2 - 7,000
Mercury	0.13	ND	0.25	ND	0.01 - 3.4
Nickel	3,620	53.6	96.0	72.4	<5 - 700
Potassium	287	530	386	135	50 - 3,700
Selenium	ND	ND	0.42	ND	<0.1 - 3.9
Silver	3.3	ND	8.6	ND	NA
Sodium	1,360	123	334	ND	50 - 50,000
Thallium	ND	ND	ND	ND	NA
Vanadium	ND	8.3	ND	ND	<7 - 300
Zinc	828	35.7	754	369	<5 - 2,900
Cyanide	ND	ND	ND	ND	NA

Key at end of table.

Table 4-12					
PHASE I RI SUMMARY OF INORGANIC RESULTS FOR TEST PIT SOIL SAMPLES (mg/kg)					
Parameter	Sample no.: Depth: Sampling date:	TP-7A (6 feet) 12-4-92	TP-7B (13 feet) 12-4-92	Common Range ^a	Samples Exceeding Common Range
Aluminum		3,180	4,350	7,000 - >100,000	—
Arsenic		4.8	7.0	<0.1 - 73	—
Barium		656	601	10 - 1,500	—
Beryllium		ND	ND	<1 - 7	—
Cadmium		23.2	14.8	0.01 - 0.7 ^b	TP-1A, TP-1B, TP-2A, TP-2AD, TP-2B, TP-2C, TP-3A, TP-3AD, TP-3B, TP-4A, TP-4B, TP-5A, TP-5B, TP-5C, TP-6A, TP-6B, TP-7A, TP-7B
Calcium		3,810	10,900	10 - 280,000	—
Chromium		53.5 J	95.5 J	1 - 1,000	TP-5B
Cobalt		27.2	34.6	<0.3 - 70	TP-2A, TP-2AD, TP-5A
Copper		1,210	626	<1 - 700	TP-5A, TP-6A, TP-7A
Iron		66,200	45,200	10 - >100,000	—
Lead		1,900 J	254 J	<10 - 300	TP-7A
Magnesium		1,200	2,700	50 - 50,000	—
Manganese		1,270	658	<2 - 7,000	—
Mercury		0.28	0.43	0.01 - 3.4	—
Nickel		94.8	166	<5 - 700	—
Potassium		257	474	50 - 3,700	—
Selenium		ND	0.60	<0.1 - 3.9	—
Silver		51.9	22.8	NA	—
Sodium		ND	142	50 - 50,000	—
Thallium		ND	ND	NA	—
Vanadium		ND	ND	<7 - 300	—
Zinc		1,740	794	<5 - 2,900	—
Cyanide		ND	0.66 J	NA	—

Key at end of table.

Table 4-12 (Cont.)

^a According to Shacklette and Boerngen 1984, for soils of the Eastern United States.

^b According to Lindsay 1979.

Key:

— = No sample exceeded common range.

J = The associated numerical value is an estimated quantity.

NA = Not available.

ND = Not detected above the sample quantitation limit.

Table 4-13

**PHASE I RI SUMMARY OF ASBESTOS FIBER AND TCLP
INORGANIC RESULTS FOR TEST PIT SAMPLES**

Parameter	Sampling no.: Depth: Sampling date:	TP-1A (8 feet) 11-5-92	TP-1B (12.5 feet) 11-5-92	TP-2A (3 feet) 11-5-92	TP-2B (11 feet) 11-5-92	TP-2C (6 feet) 11-5-92	TP-3A (5 feet) 12-4-92	TP-3AD (5 feet) 12-4-92	TP-3B (11 feet) 12-4-92	TP-4A (4 feet) 12-4-92	TP-4B (9 feet) 12-4-92	EPA Regulatory Limits
Asbestos Fibers (%)												
Chrysotile		ND	ND	TR	ND	ND	ND	ND	TR	ND	ND	
Amosite		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
TCLP Inorganics (mg/L)												
Cadmium		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	1.0
Chromium		NR	NR	0.81	NR	NR	NR	NR	NR	NR	NR	5.0
Lead		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.0

Key at end of table.

Table 4-13

**PHASE I SUMMARY OF ASBESTOS FIBER AND TCLP
INORGANIC RESULTS FOR TEST PIT SAMPLES**

Parameter	Sample no. Depth: Sampling date:	TP-5A (2 feet) 12-3-92	TP-5B (7.5 feet) 12-3-92	TP-5C (11 feet) 12-3-92	TP-6A (6 feet NW) 12-3-92	TP-6B (6 feet SE) 12-3-92	TP-7A (6 feet) 12-4-92	TP-7B (13 feet) 12-4-92	EPA Regulatory Limit	Samples Exceeding Regulatory Limits
Asbestos Fibers (%)										
Chrysotile		2.0	ND	ND	ND	ND	1.5	1.8		—
Amosite		ND	ND	ND	ND	ND	<1.0	ND		—
TCLP Inorganics (mg/L)										
Cadmium		NR	NR	NR	NR	NR	0.24	NR	1.0	—
Chromium		NR	28.9	NR	NR	NR	NR	NR	5.0	TP-5B
Lead		NR	NR	NR	NR	NR	0.40	NR	5.0	—

Key:

— = No samples exceeded regulatory limit.
 ND = Not detected.
 NR = Not requested.
 TR = Trace.

Table 4-14 PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SUBSURFACE SOILS FROM RESIDENTIAL LOTS ($\mu\text{g/kg}$)						
Parameter	Sample no.: Depth: Sampling date:	BH-93D (2-4 feet) 1-4-93	BH-102D (2-4 feet) 1-5-93	BH-105D (2-4 feet) 1-5-93	BH-14V (2-4 feet) 1-7-93	BH-15V (2-4 feet) 1-6-93
Volatile Organics						
Toluene		ND	ND	ND	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND
Semivolatiles						
Bis(2-ethylhexyl)phthalate		ND	ND	ND	ND	ND
Butylbenzylphthalate		ND	ND	ND	ND	ND
Diethylphthalate		ND	ND	ND	ND	ND
Semivolatiles (PAHs)						
Acenaphthylene		ND	ND	ND	ND	ND
Anthracene		ND	ND	ND	ND	ND
Benzo(a)anthracene		ND	ND	ND	ND	ND
Benzo(a)pyrene		ND	ND	ND	ND	ND
Benzo(b)fluoranthene		ND	ND	ND	ND	ND
Benzo(g,h,i)perylene		ND	ND	ND	ND	ND
Benzo(k)fluoranthene		ND	ND	ND	ND	ND
Chrysene		ND	ND	ND	ND	ND
Dibenz(a,h)anthracene		ND	ND	ND	ND	ND
Fluoranthene		ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		ND	ND	ND	ND	ND
Phenanthrene		ND	ND	ND	ND	ND
Pyrene		ND	ND	ND	ND	ND

Key at end of table.

Table 4-14						
PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SUBSURFACE SOILS FROM RESIDENTIAL LOTS (µg/kg)						
Parameter	Sample no.: Depth: Sampling date:	BH-181D (2-4 feet) 1-7-93	BH-205D (2-4 feet) 1-5-93	BH-206D (2-4 feet) 1-5-93	BH-21V (2-4 feet) 1-6-93	BH-32V (2-4 feet) 1-7-93
Volatile Organics						
Toluene		ND	ND	ND	ND	ND
Xylene (Total)		ND	ND	ND	ND	ND
Semivolatiles						
Bis(2-Ethylhexyl)phthalate		ND	ND	ND	ND	ND
Butylbenzylphthalate		ND	ND	ND	ND	ND
Diethylphthalate		ND	ND	50 J	ND	ND
Semivolatiles (PAHs)						
Acenaphthylene		ND	ND	160 J	ND	ND
Anthracene		ND	ND	98 J	ND	ND
Benzo(a)anthracene		ND	ND	1,800	ND	ND
Benzo(a)pyrene		ND	ND	2,000	ND	ND
Benzo(b)fluoranthene		ND	ND	2,400 D,J	ND	ND
Benzo(g,h,i)perylene		ND	ND	2,000	ND	ND
Benzo(k)fluoranthene		ND	ND	2,400 D,J	ND	ND
Chrysene		ND	ND	1,600	ND	ND
Dibenz(a,h)anthracene		ND	ND	580	ND	ND
Fluoranthene		ND	ND	4,700 D,E	ND	ND
Indeno(1,2,3-cd)pyrene		ND	ND	2,100	ND	ND
Phenanthrene		ND	ND	310 J	ND	ND
Pyrene		ND	ND	5,000 D,E	ND	ND

Key at end of table.

4-101

Table 4-14

**PHASE I RI SUMMARY OF ORGANIC RESULTS
FOR SUBSURFACE SOILS FROM RESIDENTIAL LOTS
($\mu\text{g/kg}$)**

Parameter	Sample no.: Depth: Sampling date:	BH-32VD (2-4 feet) 1-7-93	BH-33V (1.5-1.75 feet) 1-6-93	BH-5V (0-4 feet) 1-6-93	BH-R-1-5 Rinsate ($\mu\text{g/L}$) 1-5-93	BH-TB-1-4 Trip Blank ($\mu\text{g/L}$) 1-4-93
Volatile Organics						
Toluene		ND	ND	ND	2 J	ND
Xylene (Total)		ND	ND	ND	1 J	ND
Semivolatiles						
Bis(2-Ethylhexyl)phthalate		ND	ND	ND	4 J	NR
Butylbenzylphthalate		48 J	ND	ND	ND	NR
Diethylphthalate		ND	ND	ND	ND	NR
Semivolatiles (PAHs)						
Acenaphthylene		ND	ND	ND	ND	NR
Anthracene		ND	63 J	ND	ND	NR
Benzo(a)anthracene		ND	2,200 J	ND	ND	NR
Benzo(a)pyrene		ND	3,100 J	ND	ND	NR
Benzo(b)fluoranthene		ND	8,300	ND	ND	NR
Benzo(g,h,i)perylene		ND	5,000	ND	ND	NR
Benzo(k)fluoranthene		ND	ND	ND	ND	NR
Chrysene		ND	3,700 J	ND	ND	NR
Dibenz(a,h)anthracene		ND	2,000 J	ND	ND	NR
Fluoranthene		ND	2,300 J	ND	ND	NR
Indeno(1,2,3-cd)pyrene		ND	4,900	ND	ND	NR
Phenanthrene		ND	550 J	ND	ND	NR
Pyrene		ND	2,100 J	ND	ND	NR

Key:

D = Reported result taken from diluted sample analysis.

E = Reported value is estimated due to quantitation above the calibration range.

J = The associated numerical value is an estimated quantity.

ND = Not detected above the sample quantitation limit.

NR = Not requested.

Table 4-15

**PHASE I RI SUMMARY OF INORGANIC RESULTS
FOR SUBSURFACE SOILS FROM RESIDENTIAL LOTS
(mg/kg)**

Parameter	Sample no.: Depth: Sampling date:	BH-93D (2-4 feet) 1-4-93	BH-102D (2-4 feet) 1-5-93	BH-105D (2-4 feet) 1-5-93	BH-14V (2-4 feet) 1-7-93	Common Range^a
Aluminum		3,510	4,160	11,300	4,830	7,000 - 100,000
Arsenic		2.2	2.2	3.7	2.2	<0.1 - 73
Barium		106	37.2	91.1	42.8	10 - 1,500
Beryllium		0.53	0.26	0.71	0.30	<1 - 7
Cadmium		0.99	1.4	2.4	1.3	0.01 - 0.7 ^b
Calcium		7,810	87,500	3,920	65,100	10 - 280,000
Chromium		4.8	6.3	15.1	8.3	1 - 1,000
Cobalt		5.7	5.5	8.1	6.1	<0.3 - 70
Copper		12.4	12.5	14.0	8.6	<1 - 700
Iron		5,730	10,000	18,700	10,400	10 - >100,000
Lead		18.2	4.5	15.8	3.4	<10 - 300
Magnesium		603	13,400	2,360	14,200	50 - 50,000
Manganese		1,080	337	429	285	<2 - 7,000
Mercury		0.51	ND	0.17	ND	0.01 - 3.4
Nickel		6.0	9.0	13.1	10.4	<5 - 700
Potassium		ND	564	901	1,060	50 - 3,700
Selenium		0.68 J	ND	0.90 J	ND	<0.1 - 3.9
Silver		0.26	ND	ND	ND	NA
Sodium		453	120	79.8	129	50 - 50,000
Vanadium		8.8	10.9	26.9	13.1	<7 - 300
Zinc		ND	ND	61.3	23.4	<5 - 2,900
Cyanide		ND	ND	ND	ND	NA

Key at end of table.

Table 4-15

**PHASE I RI SUMMARY OF INORGANIC RESULTS
FOR SUBSURFACE SOIL FROM RESIDENTIAL LOTS
(mg/kg)**

Parameter	Sample no.: Depth: Sampling date:	BH-15V (2-4 feet) 1-6-93	BH-181D (2-4 feet) 1-7-93	BH-205D (2-4 feet) 1-5-93	BH-206D (2-4 feet) 1-5-93	Common Range^a
Aluminum		4,530	3,800	5,320	3,400	7,000 - 100,000
Arsenic		2.9	1.5	2.8	4.7	< 0.1 - 73
Barium		34.2	36.1	58.0	113	10 - 1,500
Beryllium		0.25	0.30	0.41	ND	< 1 - 7
Cadmium		1.3	0.93	2.0	111	0.01 - 0.7 ^b
Calcium		60,400	62,400	2,020	27,800	10 - 280,000
Chromium		7.5	7.0	8.6	31.7	1 - 1,000
Cobalt		6.1	5.0	7.8	12.5	< 0.3 - 70
Copper		12.0	9.7	12.2	1,960	< 1 - 700
Iron		10,600	9,830	14,700	13,300	10 - > 100,000
Lead		7.5	3.9	9.6	774	< 10 - 300
Magnesium		14,200	20,200	2,190	3,140	50 - 50,000
Manganese		447	343	929	214	< 2 - 7,000
Mercury		ND	ND	ND	ND	0.01 - 3.4
Nickel		11.4	8.4	16.4	1,210	< 5 - 700
Potassium		637	997	1,130	656	50 - 3,700
Selenium		ND	ND	0.46 J	0.52 J	< 0.1 - 3.9
Silver		ND	ND	0.56	10.2	NA
Sodium		109	151	111	421	50 - 50,000
Vanadium		12.6	12.1	15.4	9.2	< 7 - 300
Zinc		ND	ND	36.3	1,070	< 5 - 2,900
Cyanide		ND	ND	ND	8.2	NA

Key at end of table.

Table 4-15

**PHASE I RI SUMMARY OF INORGANIC RESULTS
FOR SUBSURFACE SOIL FROM RESIDENTIAL LOT
(mg/kg)**

Parameter	Sample no.: Depth: Sampling date:	BH-206DDL (2-4 feet) 1-5-93	BH-21V (2-4 feet) 1-6-93	BH-32V (2-4 feet) 1-7-93	BH-32VD (2-4 feet) 1-7-93	Common Range^a
Aluminum		NS	5,490	3,430	3,580	7,000 - 100,000
Arsenic		NS	2.0	1.5	1.8	<0.1 - 73
Barium		NS	43.5	28.1	34.7	10 - 1,500
Beryllium		NS	0.30	0.25	0.25	<1 - 7
Cadmium		NS	1.6	0.87	0.91	0.01 - 0.7 ^b
Calcium		NS	49,100	52,100	49,200	10 - 280,000
Chromium		NS	9.5	7.0	7.0	1 - 1,000
Cobalt		NS	7.4	4.4	4.3	<0.3 - 70
Copper		NS	12.3	6.7	6.4	<1 - 700
Iron		NS	13,200	8,600	8,720	10 - >100,000
Lead		NS	3.6	6.4	2.9	<10 - 300
Magnesium		NS	11,100	12,800	12,800	50 - 50,000
Manganese		NS	393	269	297	<2 - 7,000
Mercury		NS	ND	ND	ND	0.01 - 3.4
Nickel		NS	13.1	7.2	7.7	<5 - 700
Potassium		NS	832	828	769	50 - 3,700
Selenium		NS	ND	ND	ND	<0.1 - 3.9
Silver		NS	ND	ND	ND	NA
Sodium		NS	169	125	121	50 - 50,000
Vanadium		NS	19.3	11.4	11.1	<7 - 300
Zinc		NS	23.6	ND	ND	<5 - 2,900
Cyanide		NS	ND	ND	ND	NA

Key at end of table.

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Table 4-15

**PHASE I RI SUMMARY OF INORGANIC RESULTS
FOR SUBSURFACE SOIL FROM RESIDENTIAL LOTS
(mg/kg)**

Parameter	Sample no.: Depth: Sampling date:	BH-33V (1.5-1.75 feet) 1-6-93	BH-5V (0-4 feet) 1-6-93	BH-R-1-5 Rinsate (µg/L) 1-5-93	Common Range^a	Samples Exceeding Common Range
Aluminum		4,010	5,290	ND	7,000 - 100,000	--
Arsenic		2.3	3.4	ND	<0.1 - 73	—
Barium		31.2	40.0	ND	10 - 1,500	—
Beryllium		ND	0.35	ND	<1 - 7	—
Cadmium		0.99	1.9	ND	0.01 - 0.7 ^b	BH-33V, BH-93D, BH-102D, BH-105D, BH-5V, BH-14V, BH-15V, BH-181D, BH-205D, BH-206D, BH-21V, BH-32V, BH-32VD
Calcium		1,250	14,100	524	10 - 280,000	—
Chromium		7.1	10.3	ND	1 - 1,000	—
Cobalt		2.9	7.0	ND	<0.3 - 70	—
Copper		13.7	14.7	ND	<1 - 700	BH-206D
Iron		7,210	15,700	333	10 - >100,000	—
Lead		18.2	8.4	ND	<10 - 300	BH-206D
Magnesium		538	8,070	109	50 - 50,000	—
Manganese		91.7	638	5.4	<2 - 7,000	—
Mercury		ND	ND	ND	0.01 - 3.4	—
Nickel		6.3	12.4	ND	<5 - 700	BH-206D
Potassium		ND	699	ND	50 - 3,700	—
Selenium		0.53 J	ND	ND	<0.1 - 3.9	—
Silver		0.23	ND	ND	NA	—
Sodium		74.9	88.6	ND	50 - 50,000	—
Vanadium		9.1	17.1	ND	<7 - 300	—
Zinc		34.9	22.5	21.1	<5 - 2,900	—
Cyanide		ND	ND	ND	NA	—

Key at end of table.

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Table 4-15 (Cont.)

^a According to Shacklette and Boerngen, 1984, for soils of the eastern United States.

^b According to Lindsay 1979.

Key:

— = No sample exceeded common range.

NA = Not available.

ND = Not detected.

Table 4-16 PHASE I RI SUMMARY OF ASBESTOS FIBER RESULTS FOR SUBSURFACE SOILS FROM RESIDENTIAL LOTS (%)				
Parameter	Sample no.: Depth: Sampling date:	BH-93D (2-4 feet) 1-4-93	BH-206D (2-4 feet) 1-5-93	BH-33V (1.5-1.75 feet) 1-6-93
Chrysotile		6.5	ND	ND

Key:

ND = Not detected.

Source: Ecology and Environment Engineering, P.C. 1993.

Table 4-17

**PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SUBSURFACE
SOILS FROM MONITORING WELL INSTALLATIONS**

Sample no.: Depth: Parameter Sampling date:	MW-1D (7-9 feet) 2-2-93	MW-1DD ^a (7-9 feet) 2-2-93	MW-2D (6.0-7.2 feet) 12-9-92	MW-3D (7-8 feet) 12-15-92	MW-4S (18-19.3 feet) 1-4-93	MW-5D (8-10 feet) 12-18-92	MW-6D (8-10 feet) 3-2-93	MW-8S (6-8 feet) 1-6-93	MW-9S (11-13 feet) 12-22-92	MW-10D (12-14 feet) 1-19-93
Volatile Organics (µg/kg)										
Acetone	ND	ND	ND	140 J	ND	ND	85 J	ND	ND	ND
2-Butanone	ND	ND	3 J	32 J	ND	ND	12	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	5 J	ND	ND	ND
Toluene	1 J	ND	3 J	7 J	ND	ND	6 J	ND	ND	ND
Total 1,2-dichloroethene	ND	ND	ND	ND	ND	ND	1 J	ND	ND	ND
Xylene (Total)	ND	ND	ND	ND	ND	ND	6 J	ND	ND	ND
Semivolatiles (µg/kg)										
bis(2-ethylhexyl)phthalate	330 J	ND	ND	ND	ND	ND	140 J	ND	ND	ND
Dibenzofuran	ND	ND	ND	ND	ND	ND	33 J	ND	ND	ND
Diethylphthalate	ND	ND	ND	ND	ND	140 J	ND	ND	50 J	ND
4-Methylphenol	ND	ND R	ND	310 J	ND	ND	ND	ND	ND	ND
Semivolatiles-PAHs (µg/kg)										
Acenaphthene	ND	ND	ND	ND	ND	ND	30 J	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	22 J	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	67 J	ND	ND	65 J	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	69 J	ND	ND	56 J	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	100 J	ND	40 J	91 J	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	77 J	ND	29 J	56 J	ND	ND	ND

Key at end of table.

Table 4-17

**PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SUBSURFACE
SOILS FROM MONITORING WELL INSTALLATIONS**

Sample no.: Depth: Parameter Sampling date:	MW-1D (7-9 feet) 2-2-93	MW-1DD* (7-9 feet) 2-2-93	MW-2D (6.0-7.2 feet) 12-9-92	MW-3D (7-8 feet) 12-15-92	MW-4S (18-19.3 feet) 1-4-93	MW-5D (8-10 feet) 12-18-92	MW-6D (8-10 feet) 3-2-93	MW-8S (6-8 feet) 1-6-93	MW-9S (11-13 feet) 12-22-92	MW-10D (12-14 feet) 1-19-93
Benzo(k)fluoranthene	ND	ND	ND	68 J	ND	ND	68 J	ND	ND	ND
Chrysene	ND	ND	ND	100 J	ND	24 J	100 J	ND	ND	ND
Dibenz(g,h)anthracene	ND	ND	ND	ND	ND	ND	19 J	ND	ND	ND
Fluoranthene	ND	ND	ND	120 J	ND	32 J	130 J	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	40 J	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	84 J	ND	27 J	65 J	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	50 J	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	73 J	ND	ND	ND
Phenanthrene	ND	ND	ND	91 J	ND	ND	190 J	ND	ND	ND
Pyrene	ND	ND	ND	130 J	ND	38 J	130 J	ND	ND	ND
Pesticides (µg/kg)										
4,4'-DDE	ND	ND	ND	ND	ND	ND	4.6 J	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND	ND	4.0 J	ND	ND	ND
PCBs (µg/kg)										
Aroclor 1248	ND	ND	43	ND	ND	ND	ND	ND	ND	ND
Aroclor 1254	ND	ND	ND	16 J	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-17 (Cont.)

^a Semivolatile results are obtained from reanalysis.

Key:

J = The associated numerical value is an estimated quantity.

ND = Not detected above the sample quantitation limit.

R = Reported value is unusable and rejected due to variance from quality control limits.

Source: Ecology and Environment Engineering, P.C. 1993.

Table 4-18

**PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SUBSURFACE
SOILS FROM MONITORING WELL INSTALLATIONS**
(mg/kg)

Parameter	Sample No.: Depth: Sampling Date:	MW-1D (7-9 feet) 2-2-93	MW-1DD (7-9 feet) 2-2-93	MW-2D (6.0-7.2 feet) 12-9-92	MW-3D (7-8 feet) 12-15-92	Common Range ^a
Aluminum		3,850	3,240	6,250	9,110	7,000 - >100,000
Arsenic		2.5	1.6	3.7 J	3.2 J	<0.1 - 73
Barium		22.9	25.8	35.9	205	10 - 1,500
Beryllium		ND	ND	0.36	0.42	<1 - 7
Cadmium		ND	0.78	1.2	1.9	0.01 - 0.7 ^b
Calcium		65,700	56,900	3,690	6,660	10 - 280,000
Chromium		10.6	7.4	11.7	18.0	1 - 1,000
Cobalt		7.5	5.8	7.7	7.7	<0.3 - 70
Copper		8.7	9.7	15.9	99.8	<1 - 700
Iron		12,500 J	9,840 J	15,500	13,500	10 - >100,000
Lead		6.8	4.2	7.3	44.5	<10 - 300
Magnesium		26,000	21,000	2,950	2,920	50 - 50,000
Manganese		317 J	296 J	382 J	181	<2 - 7,000
Mercury		ND	ND	0.24	ND	0.01 - 3.4
Nickel		11.0	7.4	14.0	16.3	<5 - 700
Potassium		960	665	652	782	50 - 3,700
Selenium		ND	ND	ND	0.62 J	<0.1 - 3.9
Silver		ND	ND	ND	7.9	NA
Sodium		156	127	219	245	50 - 50,000
Vanadium		13.8	11.3	16.4	16.9	<7 - 300
Zinc		26.7	20.1	42.2 J	147	<5 - 2,900

Key at end of table.

Table 4-18

**PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SUBSURFACE
SOILS FROM MONITORING WELL INSTALLATIONS**
(mg/kg)

Parameter	Sample No.: Depth: Sampling Date:	MW-4S (18-19.3 feet) 1-4-93	MW-5D (8-10 feet) 12-18-92	MW-6D (8-10 feet) 3-2-93	MW-8S (6-8 feet) 1-6-93	Common Range ^a
Aluminum		372	900	3,320	5,590	7,000 - >100,000
Arsenic		0.50	0.70 J	6.1 J	2.1	<0.1 - 73
Barium		14.0	14.7	391 J	47.7	10 - 1,500
Beryllium		ND	ND	ND	0.33	<1 - 7
Cadmium		ND	ND	4.6 J	1.4	0.01 - 0.7 ^b
Calcium		48,000 J	54,000	3,770	46,800 J	10 - 280,000
Chromium		6.5	2.4	33.5 J	12.0	1 - 1,000
Cobalt		1.8	2.1	16.7	7.9	<0.3 - 70
Copper		7.4	10.5	294	14.3	<1 - 700
Iron		3,410	4,670	25,900 J	13,000	10 - >100,000
Lead		2.0	13.9	904	3.5	<10 - 300
Magnesium		11,700	7,990	1,700	11,000	50 - 50,000
Manganese		212	206	726	360	<2 - 7,000
Mercury		ND	ND	ND	ND	0.01 - 3.4
Nickel		ND	4.7	44.7	13.8	<5 - 700
Potassium		ND	117	402	1,220	50 - 3,700
Selenium		ND	ND	ND	ND	<0.1 - 3.9
Silver		ND	0.27	14.1 J	ND	NA
Sodium		72.3	93.4	465	178	50 - 50,000
Vanadium		1.9	4.5	5.4	16.8	<7 - 300
Zinc		ND	14.8	672 J	26.5	<5 - 2,900

Key at end of table.

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ecology and environment

Table 4-18 PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SUBSURFACE SOILS FROM MONITORING WELL INSTALLATIONS (mg/kg)					
Parameter	Sample No.: Depth: Sampling Date:	MW-9S (11-13 feet) 12-22-92	MW-10D (12-14 feet) 1-19-93	Sample Exceeding Common Range	Common Range^a
Aluminum		758	3,430	--	7,000 - > 100,000
Arsenic		0.89 J	2.4	--	< 0.1 - 73
Barium		16.5	42.0	--	10 - 1,500
Beryllium		ND	ND	--	< 1 - 7
Cadmium		ND	0.91	MW-1DD, MW-2D, MW-3D, MW-6D, MW-8S, MW-10D	0.01 - 0.7 ^b
Calcium		82,600	43,800	--	10 - 280,000
Chromium		2.7	8.0	--	1 - 1,000
Cobalt		2.5	7.4	--	< 0.3 - 70
Copper		8.4	11.4	--	< 1 - 700
Iron		4,880	9,250	--	10 - > 100,000
Lead		3.0	5.7	MW-6D	< 10 - 300
Magnesium		20,700	10,200	--	50 - 50,000
Manganese		334	312 J	--	< 2 - 7,000
Mercury		ND	ND	--	0.01 - 3.4
Nickel		5.2	12.5	--	< 5 - 700
Potassium		453	715	--	50 - 3,700
Selenium		ND	ND	--	< 0.1 - 3.9
Silver		ND	ND	--	NA
Sodium		140	419	--	50 - 50,000
Vanadium		4.1	10.6	--	< 7 - 300
Zinc		9.1	23.5	--	< 5 - 2,900

^a According to Shacklette and Boerngen 1984, for soils of the Eastern United States.

^b According to Lindsey 1979.

Key:

-- = No sample exceeded common range.

J = Report value is estimated due to variance from QC limits.

NA = Not available.

ND = Not detected.

Table 4-19

**PHASE I RI SUMMARY OF TCLP ORGANICS AND INORGANICS, AND TOC RESULTS FOR SUBSURFACE
SOILS FROM MONITORING WELL INSTALLATIONS**

Parameter	EPA Regulatory Limits	Sample No.: Depth: Sampling Date:	MW-1D (7-9 feet) 2-2-93	MW-1DD (7-9 feet) 2-2-93	MW-6D (8-10 feet) 3-2-93	MW-8S (6-8 feet) 1-6-93	MW-10D (12-14 feet) 1-19-93	MW-9D (11-13 feet) 2-18-93	Samples Exceeding Regulatory Limits
Other Parameters									
Total Organic Carbon (mg/kg)	NA		1,500	880	32,000	2,600	NR	2,300	--
TCLP Organics (mg/L)									
Chloroform	6.0		0.005	ND	NR	NR	NR	ND	--
TCLP Inorganics (µg/L)									
Barium	100,000		555	573	NR	773	618	221	--
Cadmium	1,000		ND	2.0	NR	2.7	ND	2.0	--
Chromium	5,000		12.1	15.8	NR	ND	ND	NR	--
Lead	5,000		ND	90.4	NR	ND	24.7	29.6	--
Silver	5,000		ND	1.3	NR	1.8	ND	1.4	--

Key:

-- = No sample exceeded common range.

NA = Not available.

ND = Not detected.

NR = Not requested.

Table 4-20

PHASE I RI SUMMARY OF VOLATILE ORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS
(µg/L)

Parameter	NYSDEC Class GA Groundwater Standard ^a	DR-1 11-23-92	DR-1 4-28-93	MW-1D 2-18-93	DR-2 11-20-92	DR-2 3-23-93	MW-2D 2-8-93	MW-2D(N) 3-26-93	DR-3 11-20-92	DR-3 3-26-93
Acetone	50 ^b	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.002	35 J	ND	ND	ND	ND	14	ND	ND	ND
2-Butanone	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	MD	ND	ND	ND	ND	ND	ND
Chlorobenzene	NA	11 J	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	NA	ND	ND	3 J	ND	ND	ND	ND	ND	ND
Chloromethane	NA	ND	MD	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5	1,000	7 J	14	1,900	2,500	61	10	250	380
1,1-Dichloroethene	5	27 J	ND	ND	120 J	310	1 J	ND	26	52 J
1,2-Dichloroethane	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total-1,2-Dichloroethene	5	640	10	9 J	250	290	6 J	ND	1,700 J	2,300
Ethylbenzene	5	ND	ND	5 J	ND	ND	ND	2 J	ND	ND
Methylene chloride	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	2 J	ND	ND	ND	ND	ND	ND
Toluene	5	20 J	ND	16	ND	ND	16	3 J	ND	ND
Trichloroethene	5	59 J	6 J	1 J	200	350	3 J	ND	76 J	150 J
1,1,1-Trichloroethane	5	110	1 J	ND	93 J	600	ND	ND	30 J	64 J
Vinyl chloride	2	320	ND	ND	ND	ND	ND	ND	340	660
Xylene (Total)	5 (each isomer)	ND	ND	21	ND	ND	9 J	4 J	ND	ND

Key at end of table.

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Table 4-20

PHASE I RI SUMMARY OF VOLATILE ORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS
(µg/L)

Parameter	NYSDEC Class GA Groundwater Standard ^a	MW-3D(N) 3-26-93	MW-4S 2-17-93	MW-4SD 2-17-93	MW-4D 2-5-93	MW-5S 2-18-93	MW-5D(N) 4-14-93	MW-6S 3-24-93	MW-6SD 3-24-93	MW-6D 3-26-93
Acetone	50 ^b	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.002	ND	ND	ND	19	ND	ND	ND	ND	ND
2-Butanone	NA	ND	ND	ND	14	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total-1,2-Dichloroethene	5	17	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5	ND	ND	ND	1 J	ND	ND	ND	ND	ND
Methylene chloride	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	1 J	ND	ND	18	ND	2 J	1 J	2 J	ND
Trichloroethene	5	3 J	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5	2 J	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	5 (each isomer)	1 J	ND	ND	19	ND	3 J	2 J	2 J	ND

Key at end of table.

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Table 4-20

PHASE I RI SUMMARY OF VOLATILE ORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS
(µg/L)

Parameter	NYSDEC Class GA Groundwater Standard ^a	MW-7S 2-17-93	MW-8SR 3-26-93	MW-8D 2-5-93	MW-9S 2-17-93	MW-9DR 3-19-93	MW-10SR 3-23-93	MW-10DR 3-19-93	MW-TB-1 Trip Blank 2/17/93	MW-TB-2 Trip Blank 2/18/93
Acetone	50 ^b	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.002	ND	ND	57	ND	10	ND	15	ND	ND
2-Butanone	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5	19	15	ND	5 J	39	4,300	94	ND	ND
1,1-Dichloroethene	5	2 J	ND	ND	ND	2 J	70 J	ND	ND	ND
1,2-Dichloroethane	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total-1,2-Dichloroethene	5	29	9 J	ND	37	140	470 J	12	ND	ND
Ethylbenzene	5	ND	ND	3 J	ND	1 J	ND	1 J	ND	ND
Methylene chloride	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	ND	ND	42	ND	11	480 J	24	ND	ND
Trichloroethene	5	12	ND	ND	12	45	ND	2	ND	ND
1,1,1-Trichloroethane	5	21	2 J	ND	ND	ND	1,700	ND	ND	ND
Vinyl chloride	2	ND	ND	ND	ND	ND	170 J	ND	ND	ND
Xylene (Total)	5 (each isomer)	ND	ND	20	ND	9 J	ND	13	ND	ND

Key at end of table.

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Table 4-20

PHASE I RI SUMMARY OF VOLATILE ORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS
(µg/L)

Parameter	NYSDEC Class GA Groundwater Standard ^a	Blank Rinsate 2-18-93	DR-TB-1 Trip Blank 11-20-92	MW-TB-2-4 Trip Blank 2-4-93	MW-TB-3-19 Trip Blank 3-19-93	MW-RIN-9DR Rinsate 3-19-93	MW-TB-3-23 Trip Blank 3-23-93	MW-TB-3-24 Trip Blank 3-24-93	MW-TB-3-26 Trip Blank 3-26-93
Acetone	50 ^b	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.002	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	NA	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	12	ND	ND	ND
Chlorobenzene	NA	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	NA	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.8	ND	ND	4 J	5 J	ND	4 J	ND	4 J
Total-1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	NA	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	2	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	5 (each isomer)	ND	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

02:085901_D4238-12/28/93-F1

Table 4-20

PHASE I RI SUMMARY OF VOLATILE ORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS
(µg/L)

Parameter	NYSDEC Class GA Groundwater Standard ^a	MW-TB-4-7 Trip Blank 4/7/93	MW-TB-4-13 Trip Blank 4/13/93	DR-TB-4-28 Trip Blank 4/28/93	Samples Exceeding Groundwater Standards
Acetone	50 ^b	ND	ND	ND	--
Benzene	0.002	ND	ND	ND	DR-1, MW-2D, MW-4D, MW-8D, MW-9DR, MW-10DR
2-Butanone	NA	ND	ND	ND	--
Carbon disulfide	NA	ND	ND	ND	--
Chlorobenzene	NA	ND	ND	ND	--
Chloroform	NA	ND	ND	ND	--
Chloromethane	NA	ND	24 J	ND	--
1,1-Dichloroethane	5	ND	ND	ND	DR-1, MW-1D, DR-2, MW-2D, MW-2D(N), DR-3, MW-7S, MW-8SR, MW-9DR, MW-10SR, MW-10DR
1,1-Dichloroethene	5	ND	ND	ND	DR-1, DR-2, DR-3, MW-10SR
1,2-Dichloroethane	0.8	ND	23	ND	DR-1, DR-2
Total-1,2-Dichloroethene	5	ND	ND	ND	MW-1D, DR-1, MW-2D, DR-2, DR-3, MW-7S, MW-8, MW-9S, MW-9DR, MW-10SR, MW-10DR
Ethylbenzene	5	ND	ND	ND	--
Methylene chloride	NA	ND	ND	ND	--
Tetrachloroethene	5	ND	ND	ND	--
Toluene	5	ND	ND	ND	DR-1, MW-1D, MW-2D, MW-4D, MW-4DDL, MW-8D, MW-9DR, MW-10SR, MW-10DR
Trichloroethene	5	ND	ND	ND	DR-1, DR-2, DR-3, MW-7S, MW-9S, MW-9DR
1,1,1-Trichloroethane	5	ND	ND	ND	DR-2, DR-3, MW-7S, MW-10SR
Vinyl chloride	2	ND	ND	ND	DR-1, DR-3, MW-10SR
Xylene (Total)	5 (each isomer)	ND	ND	ND	MW-1D, MW-4D, MW-8D

^a NYSDEC October 1993, Ambient Water Quality Standards and Guidance Values. Class GA groundwater is best suited as a potable water supply.

^b Guidance value.

Key:

-- = No sample exceeded NYSDEC Standard.

J = The associated numerical value is an estimated quantity.

NA = Not available.

ND = Not detected.

Table 4-21

PHASE I RI SUMMARY OF SEMIVOLATILE RESULTS FOR GROUNDWATER FROM MONITORING WELLS
($\mu\text{g/L}$)

Parameter	NYSDEC Class GA Groundwater Standard ^a	DR-1 11-23-92	DR-1 4-28-93	MW-1D 2-18-93	DR-2 11-20-92	DR-2 3-23-93	MW-2D 2-8-93	MW-2D(N) 3-26-93	DR-3 11-20-92	DR-3 3-26-93
Semivolatiles										
Bis(2-Ethylhexyl)phthalate	50	NR	ND	ND	NR	ND	20	ND	NR	ND
Diethylphthalate	NA	NR	ND	1 J	NR	ND	ND	ND	NR	ND
Di-n-octylphthalate	NA	NR	ND	ND	NR	ND	1 J	ND	NR	ND
2-Methylphenol	1 (total phenolic compounds)	NR	ND	ND	NR	ND	ND	ND	NR	ND
4-Methylphenol	1 (total phenolic compounds)	NR	ND	ND	NR	ND	ND	ND	NR	ND
Phenol	1.0	NR	ND	9 J	NR	ND	10	ND	NR	ND
Semivolatiles (PAHs)										
Naphthalene	NA	NR	ND	1 J	NR	ND	ND	ND	NR	ND

Key at end of table.

02:OB5901_D4238-12/30/93-F1

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Table 4-21 PHASE I RI SUMMARY OF SEMIVOLATILE RESULTS FOR GROUNDWATER FROM MONITORING WELLS (µg/L)								
Parameter	NYSDEC Class GA Groundwater Standard^a	MW-3D(N) 3-26-93	MW-4S 2-17-93	MW-4SD 2-17-93	MW-4D 2-5-93	MW-5S 2-18-93	MW-5D(N) 4-14-93	MW-6S 3-24-93
Semivolatiles								
Bis(2-Ethylhexyl)phthalate	50	ND	ND	ND	2 J	ND	ND	ND
Diethylphthalate	NA	ND	ND	ND	ND	ND	ND	ND
Di-n-octylphthalate	NA	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	1 (total phenolic compounds)	ND	ND	ND	ND	ND	ND	ND
4-Methylphenol	1 (total phenolic compounds)	ND	ND	ND	ND	ND	ND	ND
Phenol	1.0	ND	ND	ND	41 J	ND	ND	ND
Semivolatiles (PAHs)								
Naphthalene	NA	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

02:OB5901_D4238-01/11

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Table 4-21

PHASE I RI SUMMARY OF SEMIVOLATILE RESULTS FOR GROUNDWATER FROM MONITORING WELLS
(µg/L)

Parameter	NYSDEC Class GA Groundwater Standard ^a	MW-6SD 3-24-93	MW-6D 3-26-93	MW-7S 2-17-93	MW-8SR 3-26-93	MW-8D 2-5-93	MW-9S 2-17-93	MW-9DR 3-19-93
Semivolatiles								
Bis(2-Ethylhexyl)phthalate	50	ND	ND	1 J	ND	19 J	4 J	ND
Diethylphthalate	NA	ND	ND	ND	ND	ND	ND	ND
Di-n-octylphthalate	NA	ND	ND	ND	ND	1 J	ND	ND
2-Methylphenol	1 (total phenolic compounds)	ND	ND	ND	ND	ND	ND	ND
4-Methylphenol	1 (total phenolic compounds)	ND	ND	ND	ND	ND	ND	ND
Phenol	1.0	ND	ND	ND	ND	72 J	ND	ND
Semivolatiles (PAHs)								
Naphthalene	NA	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-21 PHASE I RI SUMMARY OF SEMIVOLATILE RESULTS FOR GROUNDWATER FROM MONITORING WELLS ($\mu\text{g/L}$)						
Parameter	NYSDEC Class GA Groundwater Standard^a	MW-10SR 3-23-93	MW-10SR 3-19-93	RBLANK Rinsate 2-18-93	MW-RIN-9DR Rinsate 3-19-93	Samples Exceeding Groundwater Standards
Semivolatiles						
Bis(2-Ethylhexyl)phthalate	50	ND	ND	ND	1 J	–
Diethylphthalate	NA	ND	ND	ND	ND	–
Di-n-octylphthalate	NA	ND	ND	ND	ND	–
2-Methylphenol	1 (total phenolic compounds)	1 J	ND	ND	ND	–
4-Methylphenol	1 (total phenolic compounds)	4 J	ND	ND	ND	MW-10SR
Phenol	1.0	ND	ND	ND	ND	MW-1D, MW-2D, MW-4D, MW-8D
Semivolatiles (PAHs)						
Naphthalene	NA	ND	ND	ND	ND	–

^a NYSDEC September 1, 1991 Water Quality Regulations for Surface Waters and Groundwaters. Class GA groundwater is best suited as a potable water supply.

Key:

- = No sample exceeded NYSDEC standard.
- J = The associated numerical value is an estimated quantity.
- NA = Not available.
- ND = Not detected.
- NR = Not requested.

Table 4-22

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS

Parameter	NYSDEC Class GA Groundwater Standard ^a	DR-1 4-28-93	MW-1D 2-18-93	DR-2 3-23-93	MW-2D 2-8-93	MW-2D(N) 3-26-93	DR-3 3-26-93	MW-3D(N) 3-24-93
Turbidity (NTUs)	—	76	47.9	41.5	49.6	63.8	> 200	39.8
Inorganics (µg/L)								
Aluminum	NA	886 J	3,580	158	877	282	1,750	195
Arsenic	25	6.3	3.3	4.3	ND	4.2	10	1.3
Barium	1,000	23.8	34.6	95.6	42.8	ND	43.6	ND
Beryllium	NA	ND	ND	ND	ND	ND	ND	ND
Cadmium	10	ND	ND	ND	ND	ND	19.0	ND
Calcium	NA	37,900	857,000	141,000	453,000	692,000	356,000	190,000
Chromium	50	ND	14.7	ND	27.9 J	ND	101	12.0
Cobalt	NA	ND	6.1	ND	ND	ND	50.4	ND
Copper	200	4.2	30.1	ND	89.9	ND	341	ND
Iron	300	1,920	10,700	5,370	2,450 J	170	170,000	1,210
Lead	25	2.2	1.8	5.7	6.4	ND	68.0	ND
Magnesium	3,500 ^b	10,200	230,000	66,000	119,000	203,000	99,000	57,100
Manganese	300	27.4	137 J	ND	64.8 J	ND	771 J	ND
Nickel	NA	ND	12.8	10.5	11.0 J	ND	142	ND
Potassium	NA	3,190	80,500	3,530	32,900	47,500	19,900	11,900
Selenium	10	ND	ND	ND	ND	ND	ND	ND
Silver	50	ND	ND	ND	ND	ND	ND	ND
Sodium	20,000	20,000	6,000,000	274,000	685,000	2,290,000	446,000	106,000
Thallium	NA	ND	ND	ND	ND	ND	ND	ND
Vanadium	NA	ND	ND	ND	ND	ND	ND	ND
Zinc	300	139 J	121	ND	282	ND	1,690	ND
Cyanide	100	ND	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-22

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS

Parameter	NYSDEC Class GA Groundwater Standard ^a	MW-4S 2-17-93	MW-4SD 2-17-93	MW-4D 2-5-93	MW-5S 2-18-93	MW-5D(N) 4-14-93	MW-6S 3-24-93	MW-6SD 3-24-93
Turbidity (NTUs)	--	29.3	29.3	<50	>1,000	37	65.7	65.7
Inorganics (µg/L)								
Aluminum	NA	1,040	808	745	90,300	1,390 J	316	2,850
Arsenic	25	ND	ND	ND	37.9	1.3 J	5.6	6.7
Barium	1,000	154	149	73.9	612	22.0	264	293
Beryllium	NA	ND	ND	ND	4.5	ND	ND	ND
Cadmium	10	ND	ND	ND	24.3	7.7	ND	2.2
Calcium	NA	137,000	130,000	248,000	1,400,000	230,000	54,800	81,200
Chromium	50	ND	ND	87.3 J	144	ND	ND	11.2
Cobalt	NA	ND	ND	ND	91.3	ND	ND	7.2
Copper	200	4.0	3.3	7.0	206	23.5	ND	ND
Iron	300	2,110	1,440	2,010 J	169,000	3,090	2,080	6,820
Lead	25	2.9	1.5	2.4	107	9.7	1.1	4.7
Magnesium	3,500 ^b	48,500	46,400	51,500	363,000	64,600	38,500	46,100
Manganese	300	57.2 J	38.6	29.2 J	5,760 J	114	206 J	363 J
Nickel	NA	ND	ND	55.9 J	144	25.1	ND	ND
Potassium	NA	1,940	1,460	21,700	21,100	18,700	7,160	8,040
Selenium	10	ND	ND	ND	ND	ND	ND	ND
Silver	50	ND	ND	ND	2.1	ND	ND	ND
Sodium	20,000	64,200	63,300	492,000	105,000	482,000	366,000	391,000
Thallium	NA	ND	ND	ND	ND	ND	2.4	ND
Vanadium	NA	ND	ND	ND	205	5.5	ND	ND
Zinc	300	47.0	41.6	ND	461	251	ND	ND
Cyanide	100	ND	ND	ND	ND	ND	67.0	17.0

Key at end of table

Table 4-22

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS

Parameter	NYSDEC Class GA Groundwater Standard ^a	MW-6D 3-26-93	MW-7S 2-17-93	MW-8SR 3-26-93	MW-8D 2-5-93	MW-9S 2-17-93	MW-9DR 3-19-93
Turbidity (NTUs)	--	88.4	13.4	16.18	< 50	21.4	39.8
Inorganics (µg/L)							
Aluminum	NA	275	1,160	1,460	663	4,460	432
Arsenic	25	ND	ND	1.8	ND	2.3	1.1
Barium	1,000	ND	123	65.0	25.4	69.7	26.7
Beryllium	NA	ND	ND	ND	ND	ND	ND
Cadmium	10	ND	ND	ND	ND	ND	ND
Calcium	NA	247,000	162,000	200,000	815,000	224,000	711,000
Chromium	50	ND	ND	14.4	6.5 J	6.8	ND
Cobalt	NA	ND	ND	ND	ND	5.4	ND
Copper	200	ND	5.0	ND	7.6	12.7	ND
Iron	300	421	1,830	7,460	2,030 J	11,100	317
Lead	25	1.3	7.5	5.8	ND	13.2	ND
Magnesium	3,500 ^b	83,300	43,300	60,600	221,000	82,300	138,000
Manganese	300	ND	45.0	197 J	48.3 J	424 J	17.5
Nickel	NA	ND	ND	9.0	ND	7.3	ND
Potassium	NA	23,300	4,150	5,590	72,400	4,380	43,600
Selenium	10	ND	ND	1.1	ND	ND	13.2
Silver	50	ND	ND	ND	ND	ND	ND
Sodium	20,000	565,000	680,000	145,000	5,110,000	129,000	2,410,000
Thallium	NA	ND	ND	ND	ND	ND	ND
Vanadium	NA	ND	ND	4.7	ND	10.5	ND
Zinc	300	ND	71.5	ND	36.7	144	109 J
Cyanide	100	ND	ND	ND	ND	ND	24.0

Key at end of table.

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Table 4-22

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR GROUNDWATER FROM MONITORING WELLS

Parameter	NYSDEC Class GA Groundwater Standard ^a	MW-10SR 3-23-93	MW-10DR 3-19-93	RBLANK Rinsate 2-18-93	MW- RIN-9DR Rinsate 3-19-93	Samples Exceeding Groundwater Standards
Turbidity (NTUs)	--	72	>200		ND	
Inorganics (µg/L)						
Aluminum	NA	487	1,920	ND	12.4	--
Arsenic	25	7.0	1.9	ND	ND	MW-5S
Barium	1,000	280	26.3	ND	ND	--
Beryllium	NA	ND	ND	ND	ND	--
Cadmium	10	ND	ND	ND	ND	DR-3, MW-5S
Calcium	NA	66,400	411,000	ND	ND	--
Chromium	50	ND	7.0	ND	ND	DR-3, MW-4D, MW-5S
Cobalt	NA	ND	ND	ND	ND	--
Copper	200	ND	10.8	ND	ND	DR-3, MW-5S
Iron	300	3,020	4,890	11.5	23.2	DR-1, MW-1D, DR-2, MW-2D, DR-3, MW-3D(N), MW-4S, MW-4SD, MW-4D, MW-5S, MW-5D(N), MW-6S, MW-6SD, MW-6D, MW-7S, MW-8SR, MW-8D, MW-9S, MW-9DR, MW-10SR, MW-10DR
Lead	25	ND	ND	ND	ND	DR-3, MW-5S
Magnesium	3,500 ^b	32,500	143,000	ND	ND	MW-1D, DR-2, MW-2D, MW-2D(N), DR-3, MW-3D(N), MW-4S, MW-4SD, MW-4D, MW-5S, MW-5D(N), MW-6S, MW-6SD, MW-6D, MW-7S, MW-8SR, MW-8D, MW-9S, MW-9DR, MW-10DR
Manganese	300	ND	89.7	ND	ND	DR-3, MW-5S, MW-6SD, MW-9S
Nickel	NA	ND	ND	ND	ND	--
Potassium	NA	2,790	31,100	ND	ND	--
Selenium	10	1.1	ND	ND	ND	MW-9DR
Silver	50	ND	ND	ND	ND	MW-8SR
Sodium	20,000	275,000	820,000	546	ND	MW-1D, DR-2, MW-2D MW-2D(N), DR-3, MW-3D(N), MW-4S, MW-4SD MW-4D, MW-5S, MW-5D(N), MW-6S, MW-6SD, MW-6D, MW-7S, MW-8D, MW-8SR, MW-9S, MW-9DR, MW-10SR, MW-10DR
Thallium	NA	ND	ND	2.2	ND	--
Vanadium	NA	48.0	4.8	ND	ND	--
Zinc	300	ND	219	ND	ND	MW-2D, DR-3, MW-5S, MW-5D(N), MW-10DR
Cyanide	100	ND	ND	ND	ND	--

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Table 4-22 (Cont.)

^a NYSDEC October 1993, Ambient Water Quality Standards and Guidance Values. Class GA groundwater is best suited as a potable water supply.

^b Guidance value.

Key:

~ = No sample exceeded common range.

NA = Not available.

ND = Not detected above the sample quantitation limit.

NR = Not requested.

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Table 4-23 PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SURFACE WATERS (µg/L)								
Parameter	NYSDEC Class C Surface Water Standards^a	NYSDEC Class D Surface Water Standards^a	SW-1^b 12-7-92	SW-2^b 12-7-92	SW-3^b 12-7-92	SW-3D^b 12-7-92	SW-4^b 12-8-92	SW-5^c 12-8-92
Volatile Organics								
Carbon disulfide	NA	NA	ND	ND	ND	ND	ND	ND
Toluene	NA	NA	ND	1 J	ND	ND	ND	ND
Total-1,2-Dichloroethene	NA	NA	ND	ND	2 J	1 J	ND	1 J
Semivolatiles								
Bis(2-Ethylhexyl)phthalate	0.6	NA	ND	4 J	2 J	1 J	2 J	1 J
Diethylphthalate	NA	NA	ND	ND	ND	ND	ND	ND
2-Chloropyridine	NA	NA	NR	NS	NS	NS	3	3

Key at end of table.

Table 4-23
PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SURFACE WATERS
 (µg/L)

Parameter	NYSDEC Class C Surface Water Standards ^a	NYSDEC Class D Surface Water Standards ^a	SW-6 ^c 12-8-92	QW-1 ^b 12-8-92	SW-TB-12-7 12-7-92	SW-TB-12-8 12-8-92
Volatile Organics						
Carbon disulfide	NA	NA	130 J	ND	8 J	4 J
Toluene	NA	NA	ND	ND	ND	ND
Total-1,2-Dichloroethene	NA	NA	2 J	ND	ND	ND
Semivolatiles						
Bis(2-ethylhexyl)phthalate	0.6	NA	3 J	1 J	NS	NS
Diethylphthalate	NA	NA	ND	3 J	NS	NS
2-Chloropyridine	NA	NA	2	ND	NS	NS

^a NYSDEC October 1993, Ambient Water Quality Standards and Guidance Values. Class C surface waters are best suited for fishing and are suitable for fish propagation and survival. Class D surface water is also best suited for fishing, but due to natural conditions (i.e., intermittent flow), it will not support fish propagation. Both Class C and Class D fresh surface waters are suitable for primary and secondary recreation, although other factors may limit their use for these purposes.

^b Class D surface water.

^c Class C surface water.

Key:

J = The associated numerical value is an estimated quantity.

NA = Not available.

ND = Not detected above sample quantitation limit.

NR = Not requested.

NS = Not sampled.

Table 4-24

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SURFACE WATERS
(µg/L)

Parameter	NYSDEC Class C Surface Water Standards ^a	NYSDEC Class D Surface Water Standards ^b	SW-1 ^e 12-7-92	SW-2 ^e 12-7-92	SW-3 ^e 12-7-92	SW-3D ^e 12-7-92	SW-4 ^e 12-8-92	SW-5 ^f 12-8-92
Aluminum	100 (ionic)	NA	1,230 J	ND	158 J	157 J	201 J	175 J
Arsenic	190	360	ND	1.6	ND	ND	ND	ND
Barium	NA	NA	89.7	89.7	50.3	51.9	41.9	43.4
Calcium	NA	NA	128,000	101,000	90,800	89,200	82,800	83,700
Copper	26.8 - 27.6 ^c	45 - 65 ^c	11.3	9.0	ND	ND	ND	ND
Iron	300	300	967	805	253	216	329	275
Lead	10.8 - 11.3 ^c	290 - 478 ^c	11.8	1.9	3.0	1.8	ND	ND
Magnesium	NA	NA	19,100	30,000	24,900	24,600	19,000	19,300
Manganese	NA	NA	96.3	600	52.3	32.3	46.1	45.3
Mercury	NA	NA	0.33 J	ND	ND	ND	ND	ND
Potassium	NA	NA	3,390	3,700	2,510	2,460	2,840	2,890
Selenium	1.0 ^d	NA	ND	ND	ND	ND	1.4 J	1.7 J
Sodium	NA	NA	533,000	160,000	158,000	159,000	46,900	49,200
Zinc	30	733 - 1,020 ^c	52.2	260	ND	ND	ND	ND

Key at end of table.

Table 4-24

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SURFACE WATERS
($\mu\text{g/L}$)

Parameter	NYSDEC Class C Surface Water Standards ^a	NYSDEC Class D Surface Water Standards ^b	SW-6 ^f 12-8-92	QW-1 ^e 12-8-92	Samples Exceeding Class C Surface Water Standards	Samples Exceeding Class D Surface Water Standards
Aluminum	100 (ionic)	NA	318 J	ND	SW-4, SW-5, SW-6	—
Arsenic	190	360	ND	ND	—	—
Barium	NA	NA	41.8	51.6	—	—
Calcium	NA	NA	81,200	86,600	—	—
Copper	26.8 - 27.6 ^c	45 - 65 ^c	ND	ND	—	—
Iron	300	300	346	ND	SW-4, SW-6	SW-1, SW-2, SW-4, SW-6
Lead	10.8 - 11.3 ^c	290 - 478 ^c	11.1	ND	SW-6	—
Magnesium	NA	NA	18,700	27,700	—	—
Manganese	NA	NA	45.6	9.4	—	—
Mercury	NA	NA	ND	ND	—	—
Potassium	NA	NA	2,810	3,790	—	—
Selenium	1.0 ^d	NA	1.8 J	1.6 J	—	—
Sodium	NA	NA	52,100	56,600	—	—
Zinc	30	733 - 1,020 ^c	ND	ND	SW-6	—

Key at end of table.

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Table 4-24 (Cont.)

- ^a NYSDEC October 1993, Ambient Water Quality Standards and Guidance Values. Class C surface water is best suited for fishing and is suitable for fish propagation and survival.
- ^b NYSDEC October 1993, Ambient Water Quality Standards and Guidance Values. Class D surface water is best suited for fishing, but due to natural conditions (i.e., intermittent flow), it will not support fish propagation.
- ^c Value based upon hardness.
- ^d Aquatic standard applies acid-soluble form.
- ^e Class D surface waters.
- ^f Class C surface waters.

Key:

- = No sample exceeded NYSDEC standard.
- J = Reported value is estimated due to variance from QC limits.
- NA = Not available.
- ND = Not detected above quantitation limit.

Table 4-25

PHASE I RI SUMMARY OF WATER QUALITY PARAMETERS FOR SURFACE WATERS

Parameter	NYSDEC Class C Surface Water Standards ^a	NYSDEC Class D Surface Water Standards ^a	SW-1 ^c 12-7-92	SW-2 ^c 12-7-92	SW-3 ^c 12-7-92	SW-3D ^c 12-7-92	SW-4 ^d 12-8-92	SW-5 ^d 12-8-92	SW-6 ^d 12-8-92	QW-1 ^d 12-8-92
Total alkalinity (CaCO ₃) (mg/L)	NA	NA	490	480	260	270	170	180	180	NS
Total suspended solids (mg/L)	A	NA	180	3,900	6.0	ND	ND	ND	17	NS
Total hardness (CaCO ₃) (mg/L)	NA	NA	400	360	310	270	270	260	260	NS
pH ^b (s.u.)	6.5 - 8.5	6.0 - 9.5	7.41	7.21	8.3	8.3	6.8	6.53	6.74	7.06
Temperature ^b (°C)	NA	NA	1.0	1.6	4.2	4.2	2.0	2.6	2.7	5.2
Conductivity ^b (μmhos)	NA	NA	55.8	1,700	1,747	1,747	939	942	948	1,115
Dissolved Oxygen ^b (mg/L)	≥4.0	≥3.0	3.25	8.57	11.52	11.52	9.74	8.36	7.51	8.37

^a NYSDEC October 1993, Ambient Water Quality Standards and Guidance Values. Class C surface waters are best suited for fishing and are suitable for fish propagation and survival. Class D surface water is also best suited for fishing, but due to natural conditions (i.e., intermittent flow), it will not support fish propagation. Both Class C and Class D fresh surface waters are suitable for primary and secondary recreation, although other factors may limit their use for these purposes.

^b Measured in the field directly from the surface water sampling point.

^c Class D surface waters.

^d Class C surface waters.

Key:

A = No suspended solids from sewage, industrial wastes, or other wastes that will cause deposition or impair the waters for their best usages.

NA = Not available.

ND = Not detected above sample quantitation limits.

NS = Not sampled.

Table 4-26

PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SEDIMENTS
($\mu\text{g}/\text{kg}$)

Parameter	NYSDEC ^a Sediment Criteria	SED-1 12-7-92	SED-2 12-7-92	SED-3 12-7-92	SED-3D 12-7-92	SED-4 12-8-92	SED-5 12-8-92	SED-6 12-8-92	Samples Exceeding Sediment Criteria
Volatile Organics									
Carbon Disulfide	—	10 J	ND	ND	ND	ND	ND	ND	—
1,1-Dichloroethane	—	ND	ND	ND	ND	ND	ND	3 J	—
Total-1,2-dichloroethene	—	ND	ND	ND	ND	ND	ND	5 J	—
Trichloroethene	—	ND	ND	ND	ND	ND	ND	2 J	—
Xylene (Total)	—	ND	ND	ND	ND	ND	ND	1 J	—
Semivolatiles									
Butylbenzylphthalate	—	ND	ND	ND	ND	ND	73 J	ND	—
Carbazole	—	400 J	ND	ND	ND	ND	ND	ND	—
Dibenzofuran	—	280 J	ND	ND	ND	ND	ND	ND	—
Semivolatiles (PAHs)									
Acenaphthene	7,300	490 J	ND	ND	ND	ND	ND	ND	—
Anthracene	—	790	ND	86 J	ND	ND	56 J	42 J	—
Benzo(a)Anthracene	—	1,900	ND	280 J	91 J	170 J	230 J	180 J	—
Benzo(a)Pyrene	—	1,500	ND	270 J	100 J	190 J	ND	ND	—
Benzo(b)Fluoranthene	—	2,300 J	61 J	490 J	ND	380 J	510 J	410 J	—

Key at end of table.

Table 4-26
PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SEDIMENTS
($\mu\text{g/kg}$)

Parameter	NYSDEC ^a Sediment Criteria	SED-1 12-7-92	SED-2 12-7-92	SED-3 12-7-92	SED-3D 12-7-92	SED-4 12-8-92	SED-5 12-8-92	SED-6 12-8-92	Samples Exceeding Sediment Criteria
Benzo(g,h,i)Perylene	—	1,000	ND	210 J	75 J	170 J	270 J	190 J	—
Benzo(k)Fluoranthene	—	ND	ND	ND	450	ND	ND	ND	—
Chrysene	—	2,000	53 J	370 J	130 J	280 J	310 J	260 J	—
Dibenz(a,h)Anthracene	—	540	ND	100 J	ND	93 J	110 J	91 J	—
Fluoranthene	—	3,900	110 J	870	360 J	530 J	580	520 J	—
Fluorene	—	450 J	ND	92 J	ND	ND	59 J	53 J	—
Indeno(1,2,3-cd)Pyrene	—	1,400	ND	300 J	100 J	240 J	290 J	230 J	—
2-Methylnaphthalene	—	130 J	ND	ND	ND	ND	ND	ND	—
Naphthalene	—	260 J	ND	ND	ND	ND	69 J	45 J	—
Phenanthrene	1,390	3,100	68 J	580	220 J	230 J	420 J	350 J	SED-1
Pyrene	—	3,400	94 J	670	270 J	440 J	540 J	420 J	—
Pesticides									
Alpha-chlordane	0.006	5.7 J	ND	2.8 J	2.9 J	ND	ND	ND	SED-1, SED-3
4,4'-DDE	—	ND	ND	ND	ND	ND	ND	7.0 J	—
Dieldrin	195	ND	ND	4.7 J	ND	ND	ND	ND	—
Endosulfan sulfate	—	16 J	ND	ND	ND	ND	ND	ND	—

Key at end of table.

Table 4-26 PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SEDIMENTS (µg/kg)									
Parameter	NYSDEC ^a Sediment Criteria	SED-1 12-7-92	SED-2 12-7-92	SED-3 12-7-92	SED-3D 12-7-92	SED-4 12-8-92	SED-5 12-8-92	SED-6 12-8-92	Samples Exceeding Sediment Criteria
Endrin ketone	—	21	ND	ND	ND	ND	ND	ND	—
PCBs									
Aroclor 1254	2,760	ND	ND	ND	ND	72 J	110 J	94 J	—

^a Division of Fish and Wildlife Sediment Criteria Guidance Document (December 1989).

Key:

J = The associated numerical value is an estimated quantity.
 ND = Not detected above sample quantitation limits.

Table 4-27
PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SEDIMENTS
(mg/kg)

Parameter	NYSDEC Sediment Criteria ^a	SED-1 12-7-92	SED-2 12-7-92	SED-3 12-7-92	SED-3D 12-7-92	SED-4 12-8-92	SED-5 12-8-92	SED-6 12-8-92	Samples Exceeding Criteria
Aluminum	NA	2,090	2,240	2,300	2,330	2,850	2,470	2,920	NA
Arsenic	5	2.3	0.79	1.1	0.98	3.4 J	3.2 J	3.7 J	—
Barium	NA	55.7	15.8	18.9	21.2	48.5	43.2	57.9	NA
Beryllium	NA	ND	ND	ND	ND	0.38	ND	0.43	—
Cadmium	0.8	1.5	2.4	1.9	1.6	2.0	1.6	2.3	SED-1, SED-2, SED-3, SED-4, SED-5, SED-6
Calcium	NA	21,200	38,500	37,500	35,800	33,100	27,900	56,900	NA
Chromium	26	7.5 J	5.0 J	9.1 J	7.2 J	23.4	23.9	27.1	SED-6
Cobalt	NA	ND	ND	5.4	6.8	6.3	4.7	7.4	NA
Copper	19	74.6	7.6	11.9	11.5	41.0	34.0	44.9	SED-1, SED-4, SED-5, SED-6
Iron	2.4 ^b	4,500	8,430	7,620	7,370	9,130	8,670	9,140	—
Lead	27	137 J	2.3 J	12.8 J	12.3 J	66.8	135	75.3	SED-1, SED-4, SED-5, SED-6
Magnesium	NA	3,880	11,500	10,700	10,200	10,600	6,660	6,670	NA
Manganese	428	161	242	328	353	299 J	334 J	318 J	—

Key at end of table.

Table 4-27

**PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SEDIMENTS
(mg/kg)**

Parameter	NYSDEC Sediment Criteria ^a	SED-1 12-7-92	SED-2 12-7-92	SED-3 12-7-92	SED-3D 12-7-92	SED-4 12-8-92	SED-5 12-8-92	SED-6 12-8-92	Samples Exceeding Criteria
Mercury	0.11	3.0	ND	ND	ND	0.82	0.25	ND	SED-1, SED-4, SED-5
Nickel	22	6.5	5.1	4.7	6.8	14.7	12.8	15.4	—
Potassium	NA	325	292	309	298	536	542	586	NA
Selenium	NA	ND	ND	ND	ND	0.44	ND	ND	NA
Silver	NA	1.1	ND	ND	ND	1.4	ND	1.3	NA
Sodium	NA	934	109	126	120	180	229	522	NA
Vanadium	NA	ND	10	7.2	6.5	ND	ND	ND	NA
Zinc	85	125	35.0	57.8	56.7	272 J	224 J	299 J	SED-1, SED-4, SED-5, SED-6

^a Division of Fish and Wildlife Sediment Criteria Guidance Document (December 1989).

^b Value in percent.

Key:

— = None exceeded criteria.

J = Reported value is estimated due to variance from QC limits.

NA = Not available.

ND = Not detected above sample quantitation limits.

Table 4-28

**PHASE I RI SUMMARY OF TOTAL ORGANIC CARBON RESULTS FOR SEDIMENTS
(mg/kg)**

Parameter	SED-1 12-7-92	SED-2 12-7-92	SED-3 12-7-92	SED-3D 12-7-92	SED-4 12-8-92	SED-5 12-8-92	SED-6 12-8-92
Total Organic Carbon	110,000	21,000	22,000	26,000	52,000	26,000	39,000

Table 4-29

PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SURFACE SOILS

Parameter	SS-1 12-1-92	SS-2 12-1-92	SS-3 12-1-92	SS-4 12-1-92	SS-5 12-1-92	SS-6 12-1-92	SS-7 12-1-92
Volatile Organics (µg/kg)							
2-Butanone	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	2 J	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND
Pesticides (µg/kg)							
Alpha chlordane	ND	ND	19 J	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	ND	ND
Gamma Chlordane	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND
PCBs (µg/kg)							
Aroclor 1254	ND	ND	ND	76	310	66	ND
Aroclor 1260	ND	ND	ND	72	550	55	ND
Semivolatiles (µg/kg)							
Carbazole	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	ND	ND	ND	ND	ND	ND	ND
Semivolatiles - PAHs (µg/kg)							
Acenaphthene	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Anthracene	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ND	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ND	81 J	94 J	51 J	65 J	87 J	ND
Benzo(g,h,i)Perylene	ND	ND	49 J	ND	ND	46 J	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	51 J	ND	48 J	ND	78 J	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	46 J	ND
Phenanthrene	ND	ND	ND	45 J	ND	50 J	ND
Pyrene	ND	63 J	57 J	59 J	ND	73 J	ND

Key at end of table.

Table 4-29

PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SURFACE SOILS

Parameter	SS-7D 12-1-92	SS-8 12-1-92	SS-9 12-1-92	SS-10 12-1-92	SS-11 12-1-92	SS-12 12-1-92	SS-13 12-1-92
Volatile Organics (µg/kg)							
2-Butanone	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND	2 J	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	ND	ND	ND	ND	1 J	ND	ND
Pesticides (µg/kg)							
Alpha Chlordane	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	ND	ND
Gamma Chlordane	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND
PCBs (µg/kg)							
Aroclor 1254	ND	31 J	180	86	ND	53	1,000
Aroclor 1260	ND	26 J	160	64	ND	68	690
Semivolatiles (µg/kg)							
Carbazole	NS	ND	ND	ND	ND	ND	ND
Diethylphthalate	NS	ND	ND	ND	ND	ND	ND
Semivolatiles - PAHs (µg/kg)							
Acenaphthene	NS	ND	ND	ND	ND	ND	ND
Benzo(a)Anthracene	NS	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	NS	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	NS	ND	60 J	ND	ND	120 J	ND
Benzo(g,h,i)Perylene	NS	ND	37 J	ND	ND	48 J	ND
Chrysene	NS	ND	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene	NS	ND	ND	ND	ND	ND	ND
Fluoranthene	NS	ND	54 J	ND	ND	65 J	22 J
Fluorene	NS	ND	ND	ND	ND	ND	24 J
Indeno(1,2,3-cd)pyrene	NS	ND	33 J	ND	ND	45 J	ND
Phenanthrene	NS	ND	ND	ND	ND	42 J	160 ^r J
Pyrene	NS	ND	45 J	ND	ND	79 J	67 ^r J

Key at end of table.

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Table 4-29

PHASE I RI SUMMARY OF ORGANIC RESULTS FOR SURFACE SOILS

Parameter	SS-13D 12-1-92	SS-14 12-1-92	SS-15 12-1-92	SS-16 12-1-92	SS-17 12-1-92	SS-18 12-1-92	SS-19 12-1-92	SS-20 12-1-92
Volatile Organics (µg/kg)								
2-Butanone	ND	ND	ND	4 J	ND	ND	ND	ND
Carbon Disulfide	ND	ND	2 J	3 J	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	2 J	ND
Toluene	ND	ND	1 J	ND	ND	ND	3 J	18
Trichloroethene	ND	ND	2 J	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	20
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	ND
Pesticides (µg/kg)								
Alpha Chlordane	ND	ND	ND	ND	ND	ND	ND	86 J
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	19
Dieldrin	ND	ND	ND	ND	ND	ND	ND	68
Gamma Chlordane	ND	ND	ND	ND	ND	ND	ND	37
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	34 J
PCBs (µg/kg)								
Aroclor 1254	2,100 J	110	76 J	ND	290	ND	67	ND
Aroclor 1260	1,200 J	120	91 J	ND	140 J	ND	ND	ND
Semivolatiles (µg/kg)								
Carbazole	NS	56 J	ND	ND	ND	ND	ND	ND
Diethylphthalate	NS	ND	ND	ND	63 J	ND	ND	ND
Semivolatiles - PAHs (µg/kg)								
Acenaphthene	NS	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Anthracene	NS	200 J	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	NS	280 J	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	NS	430	90 J	78 J	ND	57 J	ND	74 J
Benzo(g,h,i)Perylene	NS	210 J	ND	ND	ND	40 J	ND	ND
Chrysene	NS	260 J	ND	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene	NS	85 J	ND	ND	ND	ND	ND	ND
Fluoranthene	NS	390 J	59 J	67 J	ND	31 J	ND	61 J
Fluorene	NS	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	NS	240 J	ND	ND	ND	31 J	ND	34 J
Phenanthrene	NS	230 J	ND	ND	ND	ND	ND	ND
Pyrene	NS	370 J	67 J	77 J	ND	33 J	ND	65 J

Key at end of table.

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Table 4-29 (Cont.)

Key:

- = No analytical result.
- J = The associated numerical value is an estimated quantity.
- ND = Not detected above sample quantitation limit.
- NS = Not sampled.

Table 4-30

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SURFACE SOILS
(mg/kg)

Parameter	SS-1 12-1-92	SS-2 12-1-92	SS-3 12-1-92	SS-4 12-1-92	SS-5 12-1-92	SS-6 12-1-92	Common Range ^a
Aluminum	3,720	3,350	1,080	612	1,600	1,050	7,000 - >100,000
Antimony	ND R	ND R	ND R	ND R	ND R	ND R	<1 - 8.8
Arsenic	[2.7]	7.8	[2.2]	3.1	2.6	2.6	<0.1 - 73
Barium	[44.6]	[41.3]	[52.2]	[19.5]	80.3	[38.3]	10 - 1,500
Beryllium	[0.30]	[0.33]	ND	ND	ND	ND	<1 - 7
Cadmium	[0.61]	[0.94]	2.8	5.1	8.3	2.3	0.01 - 0.7 ^b
Calcium	2,430	3,310	19,200	3,210	7,700	1,290	10 - 280,000
Chromium	6.2 J	5.7 J	7.1 J	26.0 J	62.9 J	21.6 J	1 - 1,000
Cobalt	[2.8]	[2.9]	ND	[6.9]	40.4	[9.5]	<0.3 - 70
Copper	8.1 J	8.9 J	122 J	106 J	245 J	109 J	<1 - 700
Iron	7,620	5,950	5,570	18,900	41,700	27,400	10 - >100,000
Lead	23.2	23.1	164	206	75.7	41.9	<10 - 300
Magnesium	[696]	[917]	2,340	[304]	[396]	[209]	50 - 50,000
Manganese	139	218	127	578	598	507	<2 - 7,000
Mercury	ND	ND	ND	ND	0.13	ND	0.01 - 3.4
Nickel	[5.4]	[2.6]	[13.6]	52.2	90.1	55.2	<5 - 700
Potassium	[257]	[418]	[524]	[181]	[172]	[226]	50 - 3,700
Selenium	ND R	[0.33] J	[0.71] J	ND R	ND R	ND R	<0.1 - 3.9
Silver	[1.6]	[1.3]	[2.2]	[1.1]	[1.8]	[1.3]	NA
Sodium	ND	ND	ND	ND	[114]	ND	50 - 50,000
Vanadium	13.8	[10.2]	[11.2]	ND	13.3	[6.3]	<7 - 300
Zinc	31.8	37.7	409 J	201 J	167 J	97.5	<5 - 2,900
Cyanide	ND	ND	ND	ND	ND	ND	NA

Key at end of table.

Table 4-30

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SURFACE SOILS
(mg/kg)

Parameter	SS-7 12-1-92	SS-7D 12-1-92	SS-8 12-1-92	SS-9 12-1-92	SS-10 12-1-92	SS-11 12-1-92	Common Range ^a
Aluminum	5,870	2,310	1,590	903	573	1,120	7,000 - >100,000
Antimony	ND R	ND R	ND R	ND R	ND R	ND R	<1 - 8.8
Arsenic	2.6	2.9	[2.1]	[2.4]	[0.83]	2.5	<0.1 - 73
Barium	70.7	[36.8]	[27.6]	[22.5]	[16.3]	[24.7]	10 - 1,500
Beryllium	[0.39]	ND	ND	ND	ND	ND	<1 - 7
Cadmium	1.4	1.3	[0.87]	3.7	[0.48]	[0.81]	0.01 - 0.7 ^b
Calcium	58,700	37,000	36,600	4,000	[368]	130,000	10 - 280,000
Chromium	10.5 J	10.5 J	9.2 J	29.0 J	10.5 J	[2.2] J	1 - 1,000
Cobalt	[9.6]	[6.0]	[4.7]	[8.2]	16.6	[2.6]	<0.3 - 70
Copper	17.2 J	22.3 J	23.7 J	73.3 J	23.1 J	7.1 J	<1 - 700
Iron	14,500	9,270	9,240	21,600	8,390	4,630	10 - >100,000
Lead	7.4	36.7	11.8	43.9	34.8	40.1	<10 - 300
Magnesium	10,700	7,120	11,100	1,310	[204]	13,900	50 - 50,000
Manganese	484	326	327	424	277	609	<2 - 7,000
Mercury	ND	ND	ND	ND	ND	ND	0.01 - 3.4
Nickel	15.0	11.0	12.8	41.3	13.0	[2.0]	<5 - 700
Potassium	[1,070]	[396]	[317]	[105]	[120]	[271]	50 - 3,700
Selenium	ND R	ND R	ND R	ND R	[0.25] J	ND R	<0.1 - 3.9
Silver	[0.81]	ND	ND	[1.3]	[0.90]	[0.75]	NA
Sodium	[202]	ND	ND	ND	ND	ND	50 - 50,000
Vanadium	22.0	[10.7]	[6.9]	12.7	ND	[6.7]	<7 - 300
Zinc	38.4	55.6	30.9	87.8	16.2	14.3	<5 - 2,900
Cyanide	ND	ND	1.1 J	ND	ND	ND	NA

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Key at end of table.

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Table 4-30

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SURFACE SOILS
(mg/kg)

Parameter	SS-12 12-1-92	SS-13 12-1-92	SS-13D 12-1-92	SS-14 12-1-92	SS-15 12-1-92	SS-16 12-1-92	Common Range ^a
Aluminum	1,560	755	1,080	1,240	2,830	2,590	7,000 - > 100,000
Antimony	ND R	ND R	ND R	ND R	ND R	ND R	< 1 - 8.8
Arsenic	2.8	3.7	7.8	2.6	3.0	3.5	<0.1 - 73
Barium	[30.6]	[34.4]	[27.7]	[37.6]	80.5	[33.5]	10 - 1,500
Beryllium	ND	ND	ND	ND	ND	ND	<1 - 7
Cadmium	3.4	5.9	3.6	5.7	7.4	[1.3]	0.01 - 0.7 ^b
Calcium	[1,000]	[633]	[998]	[944]	4,520	2,210	10 - 280,000
Chromium	55.0 J	50.3 J	32.9 J	39.4 J	50.8 J	4.1 J	1 - 1,000
Cobalt	14.1	27.2	13.0	12.3	270	[3.3]	<0.3 - 70
Copper	113 J	171 J	218 J	237 J	1,540 J	15.9 J	<1 - 700
Iron	41,600	55,100	32,000	34,900	36,700	4,650	10 - > 100,000
Lead	42.4	45.0	32.6	48.7	421	52.4	<10 - 300
Magnesium	[505]	[69.0]	[131]	[269]	[603]	[466]	50 - 50,000
Manganese	664	588	542	601	663	109	<2 - 7,000
Mercury	ND	ND	ND	0.14	0.17	ND	0.01 - 3.4
Nickel	60.7	65.4	42.6	56.9	155	[4.1]	<5 - 700
Potassium	[168]	[132]	[121]	[131]	[564]	[286]	50 - 3,700
Selenium	ND R	[0.22] J	ND R	ND R	ND R	[0.38] J	<0.1 - 3.9
Silver	[1.6]	[1.2]	[1.2]	[1.2]	22.4	[2.5]	NA
Sodium	ND	ND	ND	ND	1,170	ND	50 - 50,000
Vanadium	16.1	[10.1]	11.2	[10.9]	14.3	[7.5]	<7 - 300
Zinc	105 J	78.5 J	71.7 J	235 J	858 J	29.2	<5 - 2,900
Cyanide	ND	ND	ND	0.66 J	ND	ND	NA

Key at end of table.

Table 4-30

PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SURFACE SOILS
(mg/kg)

Parameter	SS-17 12-1-92	SS-18 12-1-92	SS-19 12-1-92	SS-20 12-1-92	Common Range ^a	Samples Exceeding Common Range
Aluminum	887	728	609	2,540	7,000 - >100,000	—
Antimony	ND R	ND R	ND R	ND R	< 1 - 8.8	—
Arsenic	[1.5]	[1.3]	[1.6]	[1.7]	<0.1 - 73	—
Barium	1,550	[16.4]	[22.4]	[40.8]	10 - 1,500	SS-17
Beryllium	ND	ND	ND	[0.36]	<1 - 7	—
Cadmium	ND	[0.48]	8.8	[1.1]	0.01 - 0.7 ^b	SS-2, SS-3, SS-4, SS-5, SS-6, SS-7D, SS-8, SS-9, SS-11, SS-12, SS-13, SS-13D, SS-14, SS-15, SS-16, SS-19, SS-20
Calcium	1,910	[493]	[374]	11,600	10 - 280,000	—
Chromium	14.6 J	7.5 J	50.4 J	10.4 J	1 - 1,000	—
Cobalt	620	[3.1]	13.8	ND	<0.3 - 70	SS-15, SS-17
Copper	20.0 J	13.5 J	68.3 J	18.6 J	<1 - 700	SS-15
Iron	5,040	5,960	43,600	4,600	10 - >100,000	—
Lead	13.0	18.9	5.3	32.9	<10 - 300	SS-15
Magnesium	[192]	[196]	[307]	3,110	50 - 50,000	—
Manganese	263	938	562	217	<2 - 7,000	—
Mercury	ND	ND	ND	ND	0.01 - 3.4	—
Nickel	160	[6.4]	44.7	[2.9]	<5 - 700	—
Potassium	1,500	[148]	[53.6]	[489]	50 - 3,700	—
Selenium	ND R	ND R	ND R	ND R	<0.1 - 3.9	—
Silver	[1.8]	ND	ND	[1.5]	NA	—
Sodium	3,720	ND	ND	ND	50 - 50,000	—
Vanadium	ND	ND	ND	[5.8]	<7 - 300	—
Zinc	30.2	16.1	32.9	48.3	<5 - 2,900	—

Key at end of table.

Table 4-30 PHASE I RI SUMMARY OF INORGANIC RESULTS FOR SURFACE SOILS (mg/kg)						
Parameter	SS-17 12-1-92	SS-18 12-1-92	SS-19 12-1-92	SS-20 12-1-92	Common Range^a	Samples Exceeding Common Range
Cyanide	ND	ND	ND	ND	NA	—

^a Shacklette and Boerngen, 1984, for Soils of the Eastern United States.

^b According to Lindsey 1979.

Key:

[] = Estimated value because value is between instrument detection limit and contract-required detection limit.

— = No sample exceeded common range.

J = Reported value is estimated due to variance from QC limits.

NA = Not available.

ND = Not detected.

R = Reported value is unusable and rejected due to variance from quality control limits.

Table 4-31

PHASE I RI SUMMARY OF ASBESTOS FIBER RESULTS FOR SURFACE SOILS
(%)

Parameter	SS-1 12-1-92	SS-2 12-1-92	SS-3 12-1-92	SS-4 12-1-92	SS-5 12-1-92	SS-6 12-1-92	SS-7 12-1-92	SS-7D 12-1-92	SS-8 12-1-92	SS-9 12-1-92	SS-10 12-1-92
Chrysotile	ND	ND	ND	ND	1.0	ND	ND	ND	ND	ND	ND

Key at end of table.

Table 4-31

PHASE I RI SUMMARY OF ASBESTOS FIBER RESULTS FOR SURFACE SOILS
(%)

Parameter	SS-11 12-1-92	SS-12 12-1-92	SS-13 12-1-92	SS-13D 12-1-92	SS-14 12-1-92	SS-15 12-1-92	SS-16 12-1-92	SS-17 12-1-92	SS-18 12-1-92	SS-19 12-1-92	SS-20 12-1-92
Chrysotile	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key:

ND = Not detected.

Table 4-32

**PHASE I RI SUMMARY OF ORGANIC RESULTS
FOR MANHOLE WATERS
($\mu\text{g/L}$)**

Parameter	MH-01 12-7-92	MH-02 12-7-92	MH-03 4-7-93	MH-04 4-14-93	SW-TB-12-7 12-7-92	MW-TB-4-7 4-7-93	MW-TB-4-13 4-13-93
Volatile Organics							
Acetone	ND	ND	ND	ND	7	9	6
Benzene	ND	4 J	ND	17	ND	ND	ND
Bromodichloromethane	4 J	1 J	ND	1 J	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND	NR	NR	NR
Chloroform	48	3 J	2 J	2 J	8	ND	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	23
Ethylbenzene	ND	ND	ND	3 J	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	NR	NR	NR
Toluene	3 J	1 J	ND	4 J	ND	ND	ND
Xylene (total)	ND	2 J	ND	10	ND	ND	ND
Semivolatiles							
Bis(2-Ethylhexyl)Phthalate	3 J	4 J	ND	ND	NR	NR	NR
Butylbenzylphthalate	ND	ND	1 J	ND	NR	NR	NR
1,4-Dichlorobenzene	ND	6 J	6 J	3 J	NR	NR	NR
Diethylphthalate	20 J	ND	29	ND	NR	NR	NR

Key at end of table.

Table 4-32 PHASE I RI SUMMARY OF ORGANIC RESULTS FOR MANHOLE WATERS (µg/L)							
Parameter	MH-01 12-7-92	MH-02 12-7-92	MH-03 4-7-93	MH-04 4-14-93	SW-TB-12-7 12-7-92	MW-TB-4-7 4-7-93	MW-TB-4-13 4-13-93
Di-n-Butylphthalate	5 J	ND	ND	ND	NR	NR	NR
4-Methylphenol	7 J	ND	9 J	ND	NR	NR	NR
Phenol	ND	ND	3 J	ND	NR	NR	NR

Key:

J = The associated numerical value is an estimated quantity.
 ND = Not detected above sample quantitation limit.
 NR = Not requested.

Table 4-33

**PHASE I RI SUMMARY OF INORGANIC RESULTS
FOR MANHOLE WATERS
(mg/L)**

Parameter	MH-01 12-7-92	MH-02 12-7-92	MH-03 4-7-93	MH-04 4-14-93
Aluminum	334 J	558 J	ND	504 J
Arsenic	1.9	ND	ND	ND
Barium	40.2	81.3	51.0	90.9
Calcium	69,600	80,200	103,000	93,100
Chromium	8.3	ND	ND	ND
Copper	63.1	120	22.8	96.4
Iron	765	2,790	395	1,760
Lead	16.3	16.0	1.8	6.5
Magnesium	16,500	20,500	24,100	24,100
Manganese	55.9	141	76.5	190
Mercury	ND	3.4 J	ND	3.2
Nickel	57.1	9.3	ND	11.7
Potassium	10,800	12,600	4,770	10,500
Selenium	1.5 J	2.1 J	ND	ND
Silver	ND	24.9	ND	26.8
Sodium	269,000	48,800	118,000	76,100
Vanadium	ND	ND	ND	4.8
Zinc	163	214	40.5	129
Cyanide	10.0 J	ND	ND	ND

Key:

J = Reported value is estimated due to variance from QC limits.
 ND = Not detected above sample quantitation limit.

Table 4-34 PHASE I RI SUMMARY OF FIELD PARAMETERS FOR MANHOLE WATERS				
Parameter	MH-01 12-7-92	MH-02 12-7-92	MH-03 4-7-93	MH-04 4-14-93
pH (s.u.)	6.77	7.4	7.87	7.45
Temperature (°C)	12.3	6.3	11.1	9.5
Conductivity (μmhos)	1,330	1,275	1,384	1,052
Turbidity (NTUs)	NA	NA	18.7	98

Key:

NA = Not available.

Table 4-35			
PHASE I RI SUMMARY OF VOLATILE RESULTS FOR MONITORING WELL GAS SAMPLES			
Parameter	MW-4D	MW-8D	MW-10D
Petroleum hydrocarbons (C ₃ ,C ₈) (%)	99	99	99
Chlorinated organics (%)	ND	ND	ND
BETX compounds (%)	ND	ND	ND
Sulfide (mg/m ³)	NR	720	320

Key:

ND = Not detected above sample quantitation limit.

NR = Not requested.

Table 4-36				
PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR SOIL/SEDIMENT SAMPLES (pCi/g dry)				
Parameter	Relevant Standard	Test Pit Soil (depth)		
		TP-1A (8 feet) 11-5-92	TP-2A (3 feet) 11-5-92	TP-2C (6 feet) 11-5-92
Gross alpha	NA	8.8 ± 4.5 E+00	2.1 ± 0.6 E+01	< 4.0 E+00
Gross beta	NA	4.8 ± 1.5 E+00	3.5 ± 0.3 E+01	4.8 ± 1.5 E+00
Actinium-228	NA	4.38 ± 0.98 E-01	1.17 ± 0.12 E+00	3.27 ± 1.16 E-01
Barium-140	NA	< 5.0 E-02	< 3.0 E-02	< 5.0 E-02
Beryllium-7	NA	< 2.0 E-01	< 2.0 E-01	< 3.0 E-01
Bismuth-214	NA	3.11 ± 0.54 E-01	1.68 ± 0.17 E+00	1.59 ± 0.57 E-01
Cerium-141	NA	< 5.0 E-02	< 5.0 E-02	< 6.0 E-02
Cerium-144	NA	< 2.0 E-01	< 2.0 E-01	< 2.0 E-01
Cesium-134	NA	< 3.0 E-02	< 3.0 E-02	< 3.0 E-02
Cesium-137	NA	< 2.0 E-02	< 3.0 E-02	< 4.0 E-02
Cobalt-58	NA	< 2.0 E-02	< 2.0 E-02	< 3.0 E-02
Cobalt-60	NA	< 2.0 E-02	< 2.0 E-02	< 3.0 E-02
Iodine-131	NA	< 5.0 E-02	< 5.0 E-02	< 6.0 E-02
Iron-59	NA	< 4.0 E-02	< 5.0 E-02	< 6.0 E-02
Lead-212	NA	3.60 ± 0.38 E-01	9.27 ± 0.93 E-01	3.41 ± 0.47 E-01
Lead-214	NA	3.85 ± 0.55 E-01	1.92 ± 0.19 E+00	2.60 E ± 0.73 E-01
Manganese-54	NA	< 2.0 E-02	< 3.0 E-02	< 3.0 E-02
Potassium-40	NA	3.83 ± 1.95 E-01	9.43 ± 0.94 E+00	1.58 ± 0.38 E+00
Radium-226	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	< 6.0 E-01	3.58 ± 0.40	< 7.0 E-01
Radium-228	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	4.38 ± 0.98 E-01	1.17 ± 0.12 E+00	3.27 ± 1.16 E-01
Ruthenium-103	NA	< 3.0 E-02	< 3.0 E-02	< 3.0 E-02
Ruthenium-106	NA	< 2.0 E-01	< 2.0 E-01	< 3.0 E-01
Thallium-208	NA	3.89 ± 0.75 E-01	9.12 ± 0.91 E-01	3.26 ± 0.80 E-01
Thorium-228	NA	3.6 ± 0.37 E-01	8.93 ± 0.89 E-01	3.53 ± 0.46 E-01
Thorium-234	NA	NP	NP	NP
Zinc-65	NA	< 3.0 E-02	< 6.0 E-02	< 8.0 E-02
Zirconium-95	NA	< 3.0 E-02	< 3.0 E-02	< 3.0 E-02

Key at end of table.

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Table 4-36				
PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR SOIL/SEDIMENT SAMPLES (pCi/g dry)				
Parameter	Relevant Standard	Test Pit Soil (depth)		
		TP-3A (5 feet) 12-4-92	TP-4A (4 feet) 12-4-92	TP-5A (2 feet) 12-3-92
Gross alpha	NA	$6.6 \pm 4.4 \text{ E}+00$	$< 4.0 \text{ E}+00$	$2.8 \pm 0.8 \text{ E}+01$
Gross beta	NA	$6.7 \pm 2.2 \text{ E}+00$	$4.3 \pm 2.0 \text{ E}+00$	$4.0 \pm 0.4 \text{ E}+01$
Actinium-228	NA	$5.6 \pm 1.2 \text{ E}-01$	$3.7 \pm 1.0 \text{ E}-01$	$1.3 \pm 0.2 \text{ E}+00$
Barium-140	NA	NP	NP	NP
Beryllium-7	NA	NP	NP	NP
Bismuth-214	NA	$2.9 \pm 0.7 \text{ E}-01$	$2.1 \pm 0.5 \text{ E}-01$	$4.2 \pm 0.4 \text{ E}+00$
Cerium-141	NA	NP	NP	NP
Cerium-144	NA	NP	NP	NP
Cesium-134	NA	NP	NP	NP
Cesium-137	NA	$< 3.0 \text{ E}-02$	$< 3.0 \text{ E}-02$	$< 6.0 \text{ E}-02$
Cobalt-58	NA	NP	NP	NP
Cobalt-60	NA	NP	NP	NP
Iodine-131	NA	NP	NP	NP
Iron-59	NA	NP	NP	NP
Lead-212	NA	$4.4 \pm 0.4 \text{ E}-01$	$2.6 \pm 0.5 \text{ E}-01$	$1.1 \pm 0.1 \text{ E}+00$
Lead-214	NA	$3.0 \pm 0.6 \text{ E}-01$	$2.4 \pm 0.5 \text{ E}-01$	$4.7 \pm 0.5 \text{ E}+00$
Manganese-54	NA	NP	NP	NP
Potassium-40	NA	$5.8 \pm 2.2 \text{ E}-01$	$1.5 \pm 0.3 \text{ E}+00$	$1.9 \pm 0.5 \text{ E}+00$
Radium-226	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	$7.8 \pm 4.5 \text{ E}-01$	$< 6.0 \text{ E}-01$	$8.2 \pm 0.1 \text{ E}+00$
Radium-228	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	$5.6 \pm 1.2 \text{ E}-01$	$3.7 \pm 1.0 \text{ E}-01$	$1.3 \pm 0.2 \text{ E}+00$
Ruthenium-103	NA	NP	NP	NP
Ruthenium-106	NA	NP	NP	NP
Thallium-208	NA	$4.6 \pm 0.8 \text{ E}-01$	$3.2 \pm 0.8 \text{ E}-01$	$1.1 \pm 0.2 \text{ E}+00$
Thorium-228	NA	NP	NP	NP
Thorium-234	NA	$< 6.0 \text{ E}-01$	$< 6.0 \text{ E}-01$	$< 1.0 \text{ E}+00$
Zinc-65	NA	NP	NP	NP
Zirconium-95	NA	NP	NP	NP

Key at end of table.

Table 4-36				
PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR SOIL/SEDIMENT SAMPLES (pCi/g dry)				
Parameter	Relevant Standard	Test Pit Soil (depth)		Subsurface Soil (depth)
		TP-6B (6 feet) 12-3-92	TP-7B (13 feet) 12-4-92	MW-6D (10 - 12 feet) 3-2-93
Gross alpha	NA	$1.2 \pm 0.6 \text{ E}+01$	$8.8 \pm 4.9 \text{ E}+00$	$6.1 \pm 4.3 \text{ E}+00$
Gross beta	NA	$8.6 \pm 2.3 \text{ E}+00$	$1.7 \pm 0.3 \text{ E}+01$	$1.7 \pm 0.2 \text{ E}+01$
Actinium-228	NA	$4.5 \pm 0.9 \text{ E}-01$	$6.0 \pm 1.2 \text{ E}-01$	$5.73 \pm 1.91 \text{ E}-01$
Barium-140	NA	NP	NP	$< 5.0 \text{ E}-01$
Beryllium-7	NA	NP	NP	$< 4.0 \text{ E}-01$
Bismuth-214	NA	$2.3 \pm 0.4 \text{ E}-01$	$5.5 \pm 0.7 \text{ E}-01$	$5.33 \pm 0.53 \text{ E}-01$
Cerium-141	NA	NP	NP	$< 1.0 \text{ E}-01$
Cerium-144	NA	NP	NP	$< 2.0 \text{ E}-01$
Cesium-134	NA	NP	NP	$< 3.0 \text{ E}-02$
Cesium-137	NA	$< 3.0 \text{ E}-02$	$< 4.0 \text{ E}-02$	$< 3.0 \text{ E}-02$
Cobalt-58	NA	NP	NP	$< 4.0 \text{ E}-02$
Cobalt-60	NA	NP	NP	$< 3.0 \text{ E}-02$
Iodine-131	NA	NP	NP	$< 2.0 \text{ E}+00$
Iron-59	NA	NP	NP	$< 1.0 \text{ E}-01$
Lead-212	NA	$4.2 \pm 0.4 \text{ E}-01$	$5.8 \pm 0.6 \text{ E}-01$	$4.39 \pm 0.34 \text{ E}-01$
Lead-214	NA	$2.5 \pm 0.5 \text{ E}-01$	$5.9 \pm 0.7 \text{ E}-01$	$5.44 \pm 0.59 \text{ E}-01$
Manganese-54	NA	NP	NP	$< 3.0 \text{ E}-02$
Potassium-40	NA	$7.8 \pm 2.0 \text{ E}-01$	$5.1 \pm 0.5 \text{ E}+00$	$4.85 \pm 0.49 \text{ E}+00$
Radium-226	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	$< 5.0 \text{ E}-01$	$1.2 \pm 0.6 \text{ E}+00$	$1.07 \pm 0.39 \text{ E}+00$
Radium-228	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	$4.5 \pm 0.9 \text{ E}-01$	$6.0 \pm 1.2 \text{ E}-01$	$5.73 \pm 1.91 \text{ E}-01$
Ruthenium-103	NA	NP	NP	$< 6.0 \text{ E}-02$
Ruthenium-106	NA	NP	NP	$< 3.0 \text{ E}-01$
Thallium-208	NA	$3.9 \pm 0.7 \text{ E}-01$	$6.3 \pm 1.0 \text{ E}-01$	$4.97 \pm 0.74 \text{ E}-01$
Thorium-228	NA	NP	NP	$< 6.0 \text{ E}-02$
Thorium-234	NA	$< 5.0 \text{ E}-01$	$< 1.0 \text{ E}+00$	NP
Zinc-65	NA	NP	NP	$< 7.0 \text{ E}-02$
Zirconium-95	NA	NP	NP	$< 5.0 \text{ E}-02$

Key at end of table.

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Table 4-36				
PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR SOIL/SEDIMENT SAMPLES (pCi/g dry)				
Parameter	Relevant Standard	Subsurface Soil (depth)	Residential Subsurface Soil (depth)	Surface Soil
		MW-10D (16 - 18 feet) 1-19-93	BH-32V (0 - 2 feet) 1-7-93	SS-17 12-1-92
Gross alpha	NA	$6.1 \pm 4.3 \text{ E}+00$	$6.1 \pm 4.3 \text{ E}+00$	$3.6 \pm 0.9 \text{ E}+01$
Gross beta	NA	$1.4 \pm 0.2 \text{ E}+01$	$3.7 \pm 0.3 \text{ E}+01$	$1.2 \pm 0.1 \text{ E}+02$
Actinium-228	NA	$3.85 \pm 0.91 \text{ E}-01$	$6.03 \pm 1.35 \text{ E}-01$	$1.9 \pm 0.3 \text{ E}+00$
Barium-140	NA	$< 3.0 \text{ E}+00$	$< 7.0 \text{ E}+00$	NP
Beryllium-7	NA	$< 6.0 \text{ E}-01$	$< 9.0 \text{ E}-01$	NP
Bismuth-214	NA	$3.85 \pm 0.51 \text{ E}-01$	$4.38 \pm 0.63 \text{ E}-01$	$4.1 \pm 0.4 \text{ E}+00$
Cerium-141	NA	$< 2.0 \text{ E}-01$	$< 4.0 \text{ E}-01$	NP
Cerium-144	NA	$< 2.0 \text{ E}-01$	$< 2.0 \text{ E}-01$	NP
Cesium-134	NA	$< 3.0 \text{ E}-02$	$< 4.0 \text{ E}-02$	NP
Cesium-137	NA	$< 2.0 \text{ E}-02$	$1.38 \pm 0.33 \text{ E}-01$	$< 6.0 \text{ E}-02$
Cobalt-58	NA	$< 5.0 \text{ E}-02$	$< 7.0 \text{ E}-02$	NP
Cobalt-60	NA	$< 3.0 \text{ E}-02$	$< 3.0 \text{ E}-02$	NP
Iodine-131	NA	$< 5.0 \text{ E}+01$	$< 2.0 \text{ E}+02$	NP
Iron-59	NA	$< 2.0 \text{ E}-01$	$< 3.0 \text{ E}-01$	NP
Lead-212	NA	$4.08 \pm 0.34 \text{ E}-01$	$5.24 \pm 0.42 \text{ E}-01$	$1.7 \pm 0.2 \text{ E}+00$
Lead-214	NA	$4.43 \pm 0.55 \text{ E}-01$	$4.87 \pm 0.69 \text{ E}-01$	$4.5 \pm 0.5 \text{ E}+00$
Manganese-54	NA	$< 3.0 \text{ E}-02$	$< 4.0 \text{ E}-02$	NP
Potassium-40	NA	$8.61 \pm 0.86 \text{ E}+00$	$1.30 \pm 0.13 \text{ E}+01$	$2.9 \pm 0.6 \text{ E}+00$
Radium-226	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	$6.97 \pm 3.26 \text{ E}-01$	$< 6.0 \text{ E}-01$	$7.1 \pm 1.0 \text{ E}+00$
Radium-228	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	$3.85 \pm 0.91 \text{ E}-01$	$6.03 \pm 1.35 \text{ E}-01$	$1.9 \pm 0.3 \text{ E}+00$
Ruthenium-103	NA	$< 9.0 \text{ E}-02$	$< 2.0 \text{ E}-01$	NP
Ruthenium-106	NA	$< 2.0 \text{ E}-01$	$< 3.0 \text{ E}-01$	NP
Thallium-208	NA	$4.28 \pm 0.72 \text{ E}-01$	$5.88 \pm 0.89 \text{ E}-01$	$1.6 \pm 0.2 \text{ E}+00$
Thorium-228	NA	$< 7.0 \text{ E}-02$	$< 1.0 \text{ E}-01$	NP
Thorium-234	NA	$7.24 \pm 3.74 \text{ E}-01$	NP	$3.1 \pm 0.8 \text{ E}+00$
Zinc-65	NA	$< 8.0 \text{ E}-02$	$< 1.0 \text{ E}-01$	NP
Zirconium-95	NA	$< 6.0 \text{ E}-02$	$< 1.0 \text{ E}-01$	NP

Key at end of table.

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Table 4-36				
PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR SOIL/SEDIMENT SAMPLES (pCi/g dry)				
Parameter	Relevant Standard	Surface Soil	Sediment	Samples Exceeding Relevant Standard or Appropriate Background Value ^b
		SS-20 12-1-92	SED-1 12-7-92	
Gross alpha	NA	$3.9 \pm 3.7 \text{ E}+00$	$7.2 \pm 4.6 \text{ E}+00$	TP-2A, TP-5A, TP-6B, SS-17
Gross beta	NA	$4.2 \pm 0.4 \text{ E}+01$	$6.7 \pm 0.4 \text{ E}+01$	SS-17
Actinium-228	NA	$5.7 \pm 1.5 \text{ E}-01$	$8.9 \pm 1.9 \text{ E}-01$	SS-17
Barium-140	NA	NP	NP	—
Beryllium-7	NA	NP	NP	—
Bismuth-214	NA	$3.9 \pm 0.6 \text{ E}-01$	$5.6 \pm 1.0 \text{ E}-01$	TP-5A, SS-17
Cerium-141	NA	NP	NP	—
Cerium-144	NA	NP	NP	—
Cesium-134	NA	NP	NP	—
Cesium-137	NA	NP	$9.6 \pm 1.0 \text{ E}-01$	—
Cobalt-58	NA	NP	NP	—
Cobalt-60	NA	NP	NP	—
Iodine-131	NA	NP	NP	—
Iron-59	NA	NP	NP	—
Lead-212	NA	$5.0 \pm 0.5 \text{ E}-01$	$6.8 \pm 0.7 \text{ E}-01$	SS-17
Lead-214	NA	$4.1 \pm 0.7 \text{ E}-01$	$6.2 \pm 1.0 \text{ E}-01$	TP-5A, SS-17
Manganese-54	NA	NP	NP	—
Potassium-40	NA	$1.4 \pm 0.1 \text{ E}+01$	$1.2 \pm 0.1 \text{ E}+01$	—
Radium-226	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	$< 5.0 \text{ E}+00$	$< 9.0 \text{ E}-01$	SS-17
Radium-228	Background plus 5 pCi/g averaged over top 15 cm soil. Background plus 15 pCi/g averaged over 15-cm layers beneath the top 15 cm of soil. ^a	$5.7 \pm 1.5 \text{ E}-01$	$8.9 \pm 1.9 \text{ E}-01$	—
Ruthenium-103	NA	NP	NP	—
Ruthenium-106	NA	NP	NP	—
Thallium-208	NA	$6.0 \pm 1.0 \text{ E}-01$	$6.8 \pm 1.4 \text{ E}-01$	—
Thorium-228	NA	NP	NP	—
Thorium-234	NA	$< 8.0 \text{ E}-01$	$< 1.0 \text{ E}+00$	SS-17
Zinc-65	NA	NP	NP	—
Zirconium-95	NA	NP	NP	—

Key at end of table.

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Table 4-36 (Cont.)

- ^a From 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings. See text for a discussion of the use of these standards.
- ^b In the absence of applicable regulatory standards, analytical results were compared to the results from sample SS-20. Sample location SS-20 can be considered to be a background location for comparison and review of radioanalytical data from other project sample locations; see text. Results exceeding approximately three times the corresponding SS-20 value were noted.

Key:

- = No sample exceeded relevant standard or local background, or no standard or value is available for comparison.
- NA = Not available.
- NP = Analysis not performed.

Table 4-37

**PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR
GROUNDWATER FROM MONITORING WELLS (pCi/L)**

Parameter	Sample no.: Sampling date:	DR-1 4-28-93	DR-2 3-23-93	DR-3 3-26-93	MW-1D 2-18-93	NYSDEC Class GA Groundwater Standard or Relevant Standard ^a
Gross alpha ^c		<4.0 E+00	<1.0 E+01	<3.0 E+01 ^g	<3.0 E+01 ^g	15, excluding radon and uranium (Groundwater Standard)
Gross beta ^b		<4.0 E+00	1.2±0.5 E+01	4.4±1.5 E+01	5.3±1.6 E+01	1,000, excluding strontium-90 and alpha emitters (Groundwater Standard)
Radium-226 ^d		<1.0 E+00	<1.0 E+00	3.0±0.6 E+00	<5.0 E-01	3 (Groundwater Standard)
Radium-228 ^d		<1.0 E+00	<1.0 E+00	3.7±0.6 E+00	3.3±1.3 E+00	3.0 E+01
Radium-226 plus Radium-228 ^e		1.0±0.4 E+00	1.0±0.4 E+00	6.7±0.9 E+00	3.6±1.3 E+00	5 (Groundwater Standard)
Barium-140		<4.0 E+00	<2.0 E+01	<1.0 E+01	<1.0 E+02	2.0 E+04
Beryllium-7		<3.0 E+01	<4.0 E+01	<4.0 E+01	<6.0 E+01	2.0 E+06
Cerium-141		<5.0 E+00	<1.0 E+01	<9.0 E+00	<2.0 E+01	9.0 E+04
Cerium-144		<2.0 E+01	<3.0 E+01	<3.0 E+01	<2.0 E+01	1.0 E+04
Cesium-134		<3.0 E+00	<4.0 E+00	<4.0 E+00	<3.0 E+00	9.0 E+03
Cesium-137		<3.0 E+00	<4.0 E+00	<5.0 E+00	<3.0 E+00	2.0 E+04
Cobalt-58		<3.0 E+00	<4.0 E+00	<4.0 E+00	<5.0 E+00	9.0 E+04
Cobalt-60		<3.0 E+00	<3.0 E+00	<4.0 E+00	<3.0 E+00	3.0 E+04
Iodine-131		<5.0 E+00	<4.0 E+01	<3.0 E+01	<9.0 E+02 ^g	3.0 E+02
Iron-59		<6.0 E+00	<8.0 E+00	<9.0 E+00	<1.0 E+01	5.0 E+04
Manganese-54		<3.0 E+00	<4.0 E+00	<3.0 E+00	<3.0 E+00	1.0 E+05
Potassium-40		<9.0 E+01	<6.0 E+01	4.46±2.58 E+01	<5.0 E+01	NA
Radium-226 ^f		<6.0 E+01	<8.0 E+01	<7.0 E+01	<6.0 E+01	3 (Groundwater Standard)
Ruthenium-103		<3.0 E+00	<6.0 E+00	<5.0 E+00	<9.0 E+00	8.0 E+04
Ruthenium-106		<3.0 E+01	<3.0 E+01	<3.0 E+01	<3.0 E+01	1.0 E+04
Thorium-228		<5.0 E+00	<8.0 E+00	<7.0 E+00	7.27±3.06 E+00	7.0 E+03
Zinc-65		<7.0 E+00	<8.0 E+00	<7.0 E+00	<8.0 E+00	1.0 E+05
Zirconium-95		<3.0 E+00	<4.0 E+00	<4.0 E+00	<6.0 E+00	6.0 E+04

Key at end of table.

Table 4-37

**PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR
GROUNDWATER FROM MONITORING WELLS (pCi/L)**

Parameter	Sample no.: Sampling date:	MW-2D 2-8-93	MW-2D(N) 3-26-93	MW-3D(N) 3-26-93	MW-4D 2-5-93	NYSDEC Class GA Groundwater Standard or Relevant Standard ^a
Gross alpha ^c		<2.0 E+01 ^g	<5.0 E+01 ^g	<8.0 E+00	2.6±1.8 E+01	15, excluding radon and uranium (Groundwater Standard)
Gross beta ^b		8.0±1.6 E+01	8.9±2.9 E+01	2.3±0.5 E+01	7.3±1.0 E+01	1,000, excluding strontium-90 and alpha emitters (Groundwater Standard)
Radium-226 ^d		<1.0 E+00	2.6±0.2 E+00	<1.0 E+00	1.4±0.1 E+00	3 (Groundwater Standard)
Radium-228 ^d		<1.0 E+00	3.9±1.3 E+00	<1.0 E+00	2.6±1.2 E+00	3.0 E+01
Radium-226 plus Radium-228 ^e		1.0±0.4 E+00	6.5±1.3 E_00	1.0±0.4 E+00	4.0±1.2 E+00	5 (Groundwater Standard)
Barium-140		<2.0 E+02	<1.0 E+01	<1.0 E+01	<2.0 E+02	2.0 E+04
Beryllium-7		<7.0 E+01	<5.0 E+01	<4.0 E+01	<8.0 E+01	2.0 E+06
Cerium-141		<2.0 E+01	<1.0 E+01	<9.0 E+00	<2.0 E+01	9.0 E+04
Cerium-144		<2.0 E+01	<3.0 E+01	<3.0 E+01	<3.0 E+01	1.0 E+04
Cesium-134		<4.0 E+00	<5.0 E+00	<4.0 E+00	<5.0 E+00	9.0 E+03
Cesium-137		<4.0 E+00	<5.0 E+00	<4.0 E+00	<5.0 E+00	2.0 E+04
Cobalt-58		<7.0 E+00	<5.0 E+00	<4.0 E+00	<8.0 E+00	9.0 E+04
Cobalt-60		<4.0 E+00	<4.0 E+00	<4.0 E+00	<4.0 E+00	3.0 E+04
Iodine-131		<1.0 E+03 ^g	<4.0 E+01	<3.0 E+01	<2.0 E+03 ^g	3.0 E+02
Iron-59		<2.0 E+01	<1.0 E+01	<8.0 E+00	<2.0 E+01	5.0 E+04
Manganese-54		<4.0 E+00	<4.0 E+00	<3.0 E+00	<5.0 E+00	1.0 E+05
Potassium-40		<1.0 E+02	<1.0 E+02	<5.0 E+01	<1.0 E+02	NA
Radium-226 ^f		<8.0 E+01	<8.0 E+01	<7.0 E+01	<8.0 E+01	3 (Groundwater Standard)
Ruthenium-103		<1.0 E+01	<7.0 E+00	<5.0 E+00	<1.0 E+01	8.0 E+04
Ruthenium-106		<4.0 E+01	<4.0 E+01	<3.0 E+01	<4.0 E+01	1.0 E+04
Thorium-228		<7.0 E+00	<8.0 E+00	<6.0 E+00	<9.0 E+00	7.0 E+03
Zinc-65		<9.0 E+00	<1.0 E+01	<8.0 E+00	<1.0 E+01	1.0 E_05
Zirconium-95		<8.0 E+00	<5.0 E+00	<4.0 E+00	<9.0 E+00	6.0 E+04

Table 4-37

**PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR
GROUNDWATER FROM MONITORING WELLS (pCi/L)**

Parameter	Sample no. Sampling date:	MW-4S 2-17-93	MW-5D(N) 4-14-93	MW-5S 2-18-93	MW-6D 3-26-93	NYSDEC Class GA Groundwater Standard or Relevant Standard ^a
Gross alpha ^b		<2.0 E+01 ^g	<2.0 E+01 ^g	<2.0 E+01 ^g	<1.0 E+01	15, excluding radon and uranium (Groundwater Standard)
Gross beta ^c		<9.0 E+00	3.2±0.7 E+01	2.3±0.7 E+01	5.6±0.9 E+01	1,000 excluding strontium-90 and alpha emitters (Groundwater Standard)
Radium-226 ^d		5.2±1.2 E-01	2.3±0.8 E+00	9.0±4.6 E-01	<1.0 E+00	3 (Groundwater Standard)
Radium-228 ^d		<7.0 E-01	<1.0 E+00	<1.0 E+00	<1.0 E+00	3.0 E+01
Radium-226 plus Radium-228 ^e		8.7±2.3 E-01	2.8±0.9 E+00	1.4±0.6 E+00	1.0±0.4 E+00	5 (Groundwater Standard)
Barium-140		<1.0 E+02	<9.0 E+00	<1.0 E+02	<2.0 E+01	2.0 E+04
Beryllium-7		<6.0 E+01	<4.0 E+01	<5.0 E+01	<4.0 E+01	2.0 E+06
Cerium-141		<2.0 E+01	<1.0 E+01	<2.0 E+01	<1.0 E+01	9.0 E+04
Cerium-144		<2.0 E+01	<3.0 E+01	<2.0 E+01	<3.0 E+01	1.0 E+04
Cesium-134		<3.0 E+00	<4.0 E+00	<3.0 E+00	<4.0 E+00	9.0 E+03
Cesium-137		<3.0 E+00	<4.0 E+00	<3.0 E+00	<4.0 E+00	2.0 E+04
Cobalt-58		<5.0 E+00	<3.0 E+00	<5.0 E+00	<4.0 E+00	9.0 E+04
Cobalt-60		<3.0 E+00	<4.0 E+00	<3.0 E+00	<4.0 E+00	3.0 E+04
Iodine-131		<9.0 E+02 ^g	<1.0 E+01	<8.0 E+02 ^g	<4.0 E+01	3.0 E+02
Iron-59		<2.0 E+01	<8.0 E+00	<2.0 E+01	<9.0 E+00	5.0 E+04
Manganese-54		<3.0 E+00	<4.0 E+00	<3.0 E+00	<4.0 E+00	1.0 E+05
Potassium-40		<8.0 E+01	<7.0 E+01	1.08±0.24 E+02	<6.0 E+01	NA
Radium-226 ^f		<6.0 E+01	<1.0 E+02	<5.0 E+01	<9.0 E+01	3 (Groundwater Standard)
Ruthenium-103		<1.0 E+00	<5.0 E+00	<9.0 E+00	<6.0 E+00	8.0 E+04
Ruthenium-106		<3.0 E+01	<3.0 E+01	<3.0 E+01	<4.0 E+01	1.0 E+04
Thorium-228		1.70±0.42 E+01	<8.0 E+00	1.03±0.41 E+01	<7.0 E+00	7.0 E+03
Zinc-65		<7.0 E+00	<8.0 E+00	<7.0 E+00	<8.0 E+00	1.0 E_05
Zirconium-95		<6.0 E+00	<4.0 E+00	<5.0 E+00	<5.0 E+00	6.0 E+04

Key at end of table.

Table 4-37

**PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR
GROUNDWATER FROM MONITORING WELLS (pCi/L)**

Parameter	Sample no.: Sampling date:	MW-6S 3-24-93	MW-7S 2-17-93	MW-8D 2-17-93	MW-8SR 3-26-93	NYSDEC Class GA Groundwater Standard or Relevant Standard ^a
Gross alpha ^b		<2.0 E+01 ^g	<1.0 E+01	<2.0 E+02 ^g	<6.0 E+00	15, excluding radon and uranium (Groundwater Standard)
Gross beta ^c		3.0±0.8 E+01	1.4±0.6 E+01	2.6±0.8 E+02	1.0±0.4 E+01	1,000 excluding strontium-90 and alpha emitters (Groundwater Standard)
Radium-226 ^d		1.3±0.1 E+00	3.5±1.7 E-01	1.6±0.2 E+01	<1.0 E+00	3 (Groundwater Standard)
Radium-228 ^d		2.1±0.6 E+00	1.3±0.5 E+00	2.8±0.3 E+01	<1.0 E+00	3.0 E+01
Radium-226 plus Radium-228 ^e		3.4±0.6 E+00	1.7±0.5 E+00	4.4±0.4 E+01	1.0±0.4 E+00	5 (Groundwater Standard)
Barium-140		2.0 E+01	<1.0 E+02	<2.0 E+02	<2.0 E+01	2.0 E+04
Beryllium-7		<5.0 E+01	<6.0 E+01	<8.0 E+01	<4.0 E+01	2.0 E+06
Cerium-141		<1.0 E+01	<2.0 E+01	<2.0 E+01	<9.0 E+00	9.0 E+04
Cerium-144		<4.0 E+01	<3.0 E+01	<3.0 E+01	<2.0 E+01	1.0 E+04
Cesium-134		<4.0 E+00	<3.0 E+00	<5.0 E+00	<4.0 E+00	9.0 E+03
Cesium-137		<4.0 E+00	<3.0 E+00	<4.0 E+00	<4.0 E+00	2.0 E+04
Cobalt-58		<4.0 E+00	<5.0 E+00	<7.0 E+00	<4.0 E+00	9.0 E+04
Cobalt-60		<4.0 E+00	<4.0 E+00	<3.0 E+00	<4.0 E+00	3.0 E+04
Iodine-131		<4.0 E+01	<1.0 E+03 ^g	<2.0 E+03 ^g	<3.0 E+01	3.0 E+02
Iron-59		<1.0 E+01	<2.0 E+01	<2.0 E+01	<1.0 E+01	5.0 E+04
Manganese-54		<3.0 E+00	<3.0 E+00	<4.0 E+00	<4.0 E+00	1.0 E+05
Potassium-40		6.43±2.99 E+01	<5.0 E+01	<9.0 E+01	<1.0 E+02	NA
Radium-226 ^f		<1.0 E+02	<7.0 E+01	<7.0 E+01	<7.0 E+01	3 (Groundwater Standard)
Ruthenium-103		<6.0 E+00	<1.0 E+01	<1.0 E+01	<5.0 E+00	8.0 E+04
Ruthenium-106		<3.0 E+01	<3.0 E+01	<4.0 E+01	<3.0 E+01	1.0 E+04
Thorium-228		<9.0 E+00	<6.0 E+00	<8.0 E+00	<7.0 E+00	7.0 E+03
Zinc-65		<9.0 E+00	<8.0 E+00	<9.0 E+00	<7.0 E+00	1.0 E+05
Zirconium-95		<5.0 E+00	<6.0 E+00	<9.0 E+00	<4.0 E+00	6.0 E+04

Table 4-37

**PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR
GROUNDWATER FROM MONITORING WELLS (pCi/L)**

Parameter	Sample no.: Sampling date:	MW-9DR 3-19-93	MW-9S 2-17-93	MW-10DR 3-19-93	MW-10SR 3-23-93	NYSDEC Class GA Groundwater Standard or Relevant Standard ^a	Samples Exceeding Groundwater or Relevant Standard
Gross alpha ^b		<5.0 E+01 ^g	<1.0 E+01	<2.0 E+01 ^g	<8.0 E+00	15, excluding radon and uranium (Groundwater Standard)	MW-4D ^h
Gross beta ^b		8.3±2.9 E+01	1.3±0.6 E+01	4.5±1.4 E+01	8.0±4.3 E+00	1,000 excluding strontium-90 and alpha emitters (Groundwater Standard)	--
Radium-226 ^d		2.1±0.5 E+00	9.0±1.3 E-01	8.6±1.0 E-01	<1.0 E+00	3 (Groundwater Standard)	DR-3 ⁱ , MW- 5D(N) ⁱ , MW- 8D
Radium-228		2.7±1.2 E+00	1.4±1.1 E+00	<1.0 E+00	<1.0 E+00	3.0 E+01	MW-8D ⁱ
Radium-226 plus Radium- 228 ^c		4.8±1.3 E+00	2.3±1.1 E+00	1.4±0.3 E+00	1.0±0.4 E+00	5 (Groundwater Standard)	DR-3, MW- 2D(N), MW- 4D ⁱ , MW-8D, MW-9DR ⁱ
Barium-140		<3.0 E+01	<1.0 E+02	<2.0 E+01	<2.0 E+01	2.0 E+04	--
Beryllium-7		<5.0 E+01	<6.0 E+01	<3.0 E+01	<4.0 E+01	2.0 E+06	--
Cerium-141		<1.0 E+01	<2.0 E+01	<1.0 E+01	<9.0 E+00	9.0 E+04	--
Cerium-144		<3.0 E+01	<3.0 E+01	<2.0 E+01	<2.0 E+01	1.0 E+04	--
Cesium-134		<4.0 E+00	<3.0 E+00	<3.0 E+00	<5.0 E+00	9.0 E+03	--
Cesium-137		<4.0 E+00	<3.0 E+00	<3.0 E+00	<5.0 E+00	2.0 E+04	--
Cobalt-58		<5.0 E+00	<5.0 E+00	<3.0 E+00	<5.0 E+00	9.0 E+04	--
Cobalt-60		<4.0 E+00	<3.0 E+00	<3.0 E+00	<4.0 E+00	3.0 E+04	--
Iodine-131		<9.0 E+01	<9.0 E+02 ^g	<6.0 E+01	<4.0 E+01	3.0 E+02	--
Iron-59		<1.0 E+01	<2.0 E+01	<8.0 E+00	<1.0 E+01	5.0 E+04	--
Manganese-54		<4.0 E+00	<3.0 E+00	<3.0 E+00	<4.0 E+00	1.0 E+05	--
Potassium-40		<1.0 E+02	<5.0 E+01	4.32±2.07 E+01	<1.0 E+02	NA	--
Radium-226 ^f		<8.0 E+01	<7.0 E+01	<6.0 E+01	<8.0 E+01	3 (Groundwater Standard)	See Radium- 226 above
Ruthenium-103		<7.0 E+00	<9.0 E+00	<5.0 E+00	<6.0 E+00	8.0 E+04	--
Ruthenium-106		<4.0 E+01	<3.0 E+01	<2.0 E+01	<4.0 E+01	1.0 E+04	--
Thorium-228		<6.0 E+00	<7.0 E+00	1.90±0.43 E+01	<8.0 E+00	7.0 E+03	--
Zinc-65		<9.0 E+00	<7.0 E+00	<6.0 E+00	<9.0 E+00	1.0 E_05	--
Zirconium-95		<5.0 E+00	<6.0 E+00	<4.0 E+00	<5.0 E+00	6.0 E+04	--

Key at end of table.

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Table 4-37 (Cont.)

- ^a Applicable NYSDEC Class GA groundwater standards (from 6 NYCRR 703, Water Quality Standards, Surface Waters and Groundwater) are used for four radioanalytical parameters and indicated as such in the table. Because NYSDEC has no Class GA groundwater standard for the remaining radionuclides, the relevant standard used is the radionuclide concentration listed in 6 NYCRR 380.9, Prevention and Control of Environmental Pollution by Radioactive Materials, Table of Concentrations of Radioactive Material, Schedule 2. The Class GA Groundwater Standards are maximum allowable concentrations. The 380.9 standards apply to allowable concentrations in excess of natural background concentrations.
- ^b Gross alpha analysis excludes radon but includes uranium, if present.
- ^c Gross beta analysis includes strontium-90 and all alpha emitters that also emit beta radiation, if present.
- ^d Radium-226 and radium-228 were analyzed by separate radiochemical methods. The analytical laboratory analyzed all groundwater samples for radium-226 and radium-228 even though they were only required to perform these analyses if the gross alpha content exceeded 5 pCi/L.
- ^e Analytical results for Radium-226 and radium-228 were totaled to yield the radium-226 plus radium-228 result.
- ^f Radium-226 analyzed by gamma spectrometry, which is less sensitive than appropriate radiochemical methods.
- ^g Analytical laboratory detection limit not only exceeded the contract-required detection limit but also exceeded the standard.
- ^h It is difficult to determine conclusively if the gross alpha content of this sample exceeds the NYSDEC groundwater standard, since the gross alpha result includes uranium, if present, and the NYSDEC groundwater standard excludes uranium. See text.
- ⁱ Result exceeds standard if the positive analytical uncertainty is added to the base analytical value.

Key:

- = No sample exceeded standard or no standard is available for comparison.

NA = Not available.

Table 4-38

**PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR SURFACE WATERS
(pCi/L)**

Parameter	Relevant Standard ^a	SW-1 12-7-92	SW-2 12-7-92	SW-3 12-7-92	SW-3D 12-7-92	SW-4 12-8-92	Samples Exceeding Relevant Standard
Gross alpha	NA	< 5.0 E+00	< 5.0 E+00	< 5.0 E+00	< 5.0 E+00	< 4.0 E+00	—
Gross beta	NA	1.0 ± 0.5 E+01	1.2 ± 0.4 E+01	< 4.0 E+00	5.2 ± 3.0 E+00	< 4.0 E+00	—
Actinium-228	9.0 E+04	< 2.0 E+01	< 2.0 E+01	< 2.0 E+01	< 2.0 E+01	< 1.0 E+01	—
Bismuth-214	NA	< 9.0 E+00	< 1.0 E+01	< 9.0 E+00	< 8.0 E+00	< 8.0 E+00	—
Cesium-137	2.0 E+04	< 4.0 E+00	< 5.0 E+00	< 4.0 E+00	< 4.0 E+00	< 5.0 E+00	—
Lead-212	2.0 E+04	< 8.0 E+00	< 9.0 E+00	< 6.0 E+00	< 7.0 E+00	< 7.0 E+00	—
Lead-214	NA	< 2.0 E+01	< 2.0 E+01	< 1.0 E+01	< 2.0 E+01	< 1.0 E+01	—
Potassium-40	NA	< 5.0 E+01	< 4.9 ± 2.3 E+01	< 9.0 E+00	< 6.0 E+01	< 6.0 E+01	—
Radium-226 ^b	3.0 E+01	< 8.0 E+01	< 1.0 E+02	< 7.0 E+01	< 8.0 E+01	< 7.0 E+01	—
Thallium-208	NA	< 1.0 E+01	< 1.0 E+01	< 1.0 E+01	< 1.0 E+01	< 1.0 E+01	—
Thorium-234	2.0 E+04	< 1.0 E+02	< 1.0 E+02	< 8.0 E+01	< 9.0 E+01	< 8.0 E+01	—

Key at end of table.

Table 4-38 PHASE I RI SUMMARY OF RADIOANALYTICAL RESULTS FOR SURFACE WATERS (pCi/L)				
Parameter	Relevant Standard^a	SW-5 12-8-92	SW-6 12-8-92	Samples Exceeding Relevant Standard
Gross alpha	NA	< 4.0 E+00	< 4.0 E+00	—
Gross beta	NA	< 4.0 E+00	6.6 ± 2.8 E+00	—
Actinium-228	9.0 E+04	< 1.0 E+01	< 2.0 E+01	—
Bismuth-214	NA	< 8.0 E+00	< 9.0 E+00	—
Cesium-137	2.0 E+04	< 4.0 E+00	< 4.0 E+00	—
Lead-212	2.0 E+04	< 7.0 E+00	< 7.0 E+00	—
Lead-214	NA	< 1.0 E+01	< 1.0 E+01	—
Potassium-40	NA	< 5.0 E+01	< 9.0 E+01	—
Radium-226 ^b	3.0 E+01	< 7.0 E+01	< 7.0 E+01	— ^c
Thallium-208	NA	< 1.0 E+01	< 1.0 E+01	—
Thorium-234	2.0 E+04	< 9.0 E+01	< 6.0 E+01	—

^a NYSDEC has no water quality standards for radionuclides in surface water (see 6 NYCRR 703, Water Quality Standards, Surface Waters and Groundwater). For comparison, the relevant standard used is the radionuclide concentration listed in 6 NYCRR 380.9, Prevention and Control of Environmental Pollution by Radioactive Materials, Table of Concentrations of Radioactive Materials, Schedule 2. See text for discussion of the use of these standards.

^b Analyzed by gamma spectrometry, which yields higher detection limits than radiochemical methods. Radiochemistry for radium-226 and radium-228 was not performed because gross alpha results did not exceed 5 pCi/L.

^c Higher detection limits (see footnote b) preclude this determination; however, the gross alpha results indicate that radium-226 is not present in excess of the relevant standard.

Key:

— = No sample exceeded relevant standard or no standard is available for comparison.

NA = Not available.

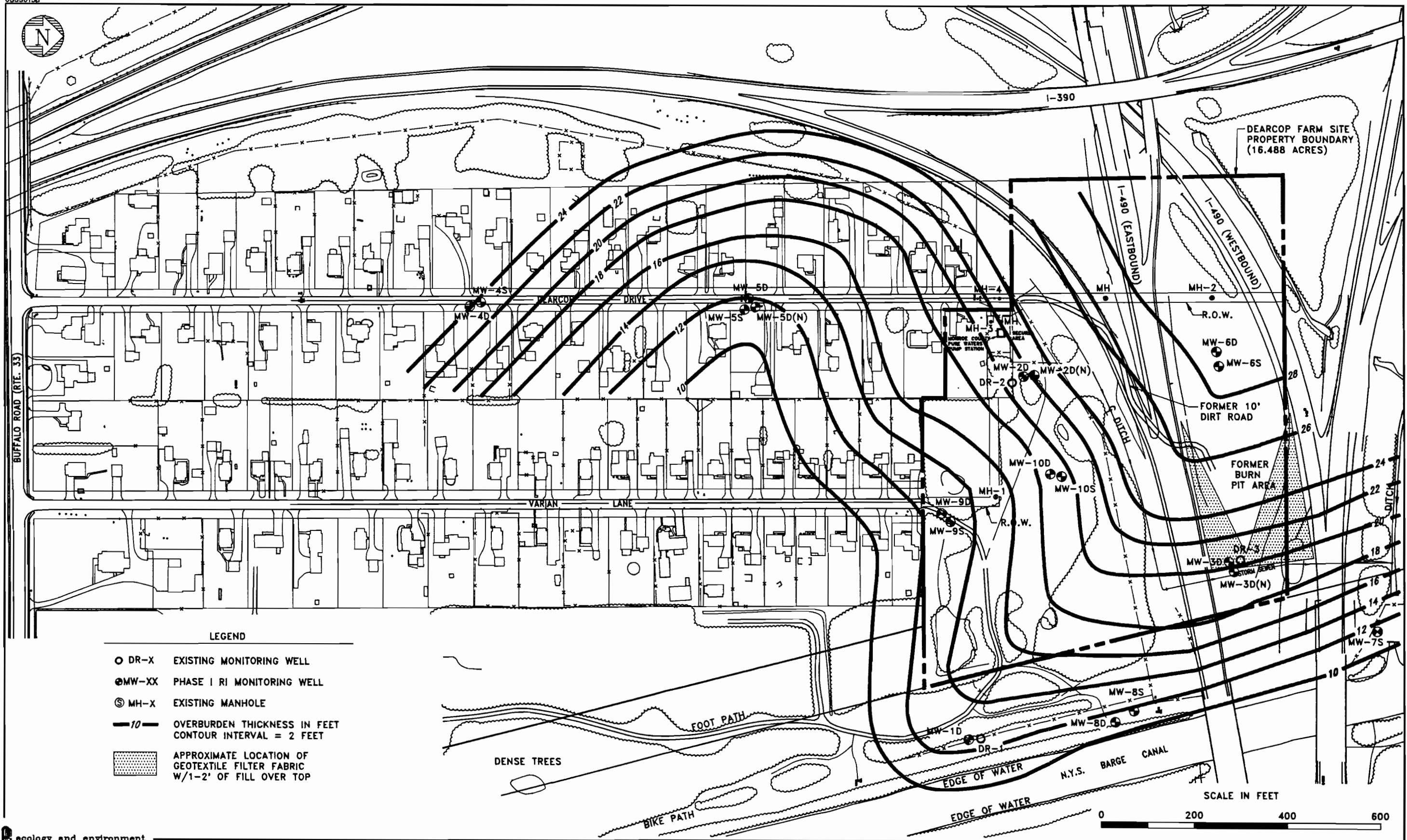


Figure 4-1 OVERBURDEN THICKNESS MAP
DEARCOP FARM SITE

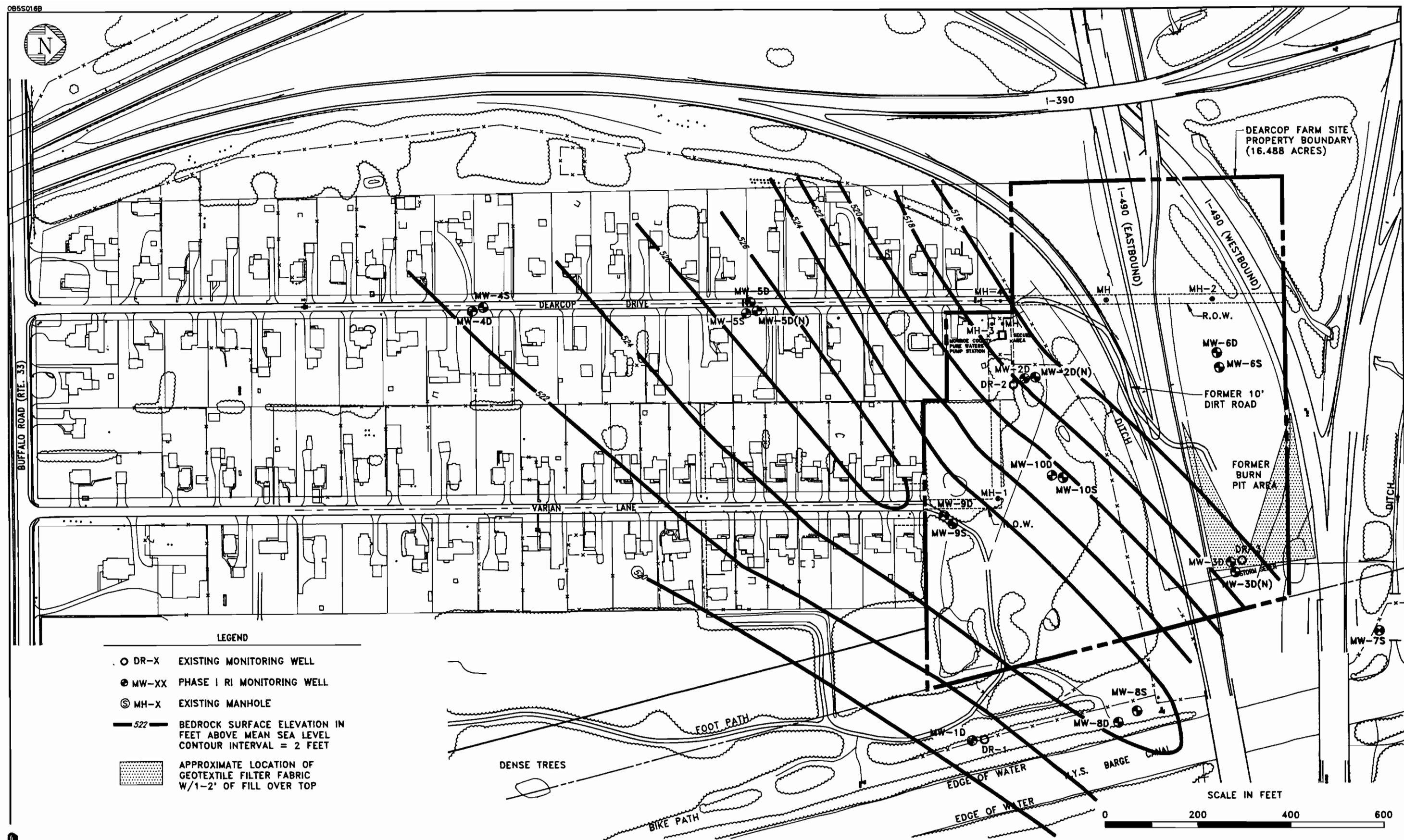
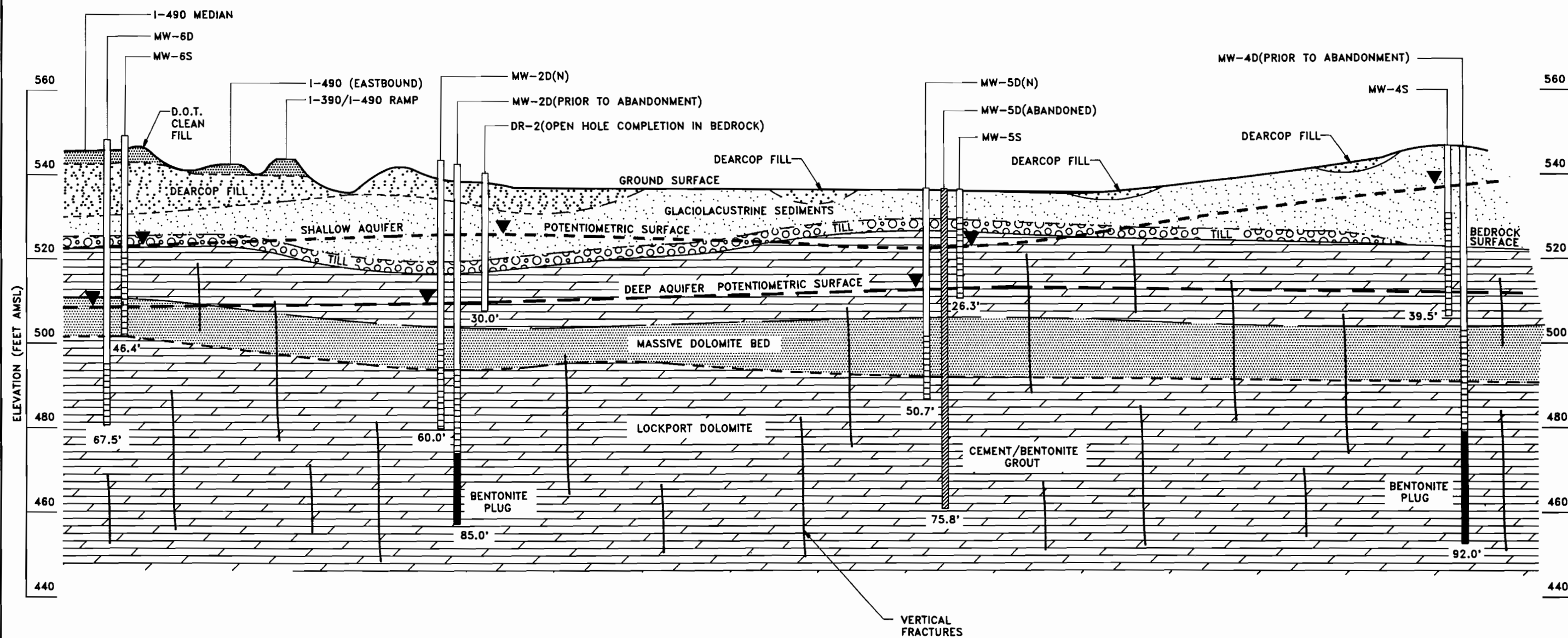


Figure 4-2 BEDROCK SURFACE ELEVATION MAP
DEARCOP FARM SITE

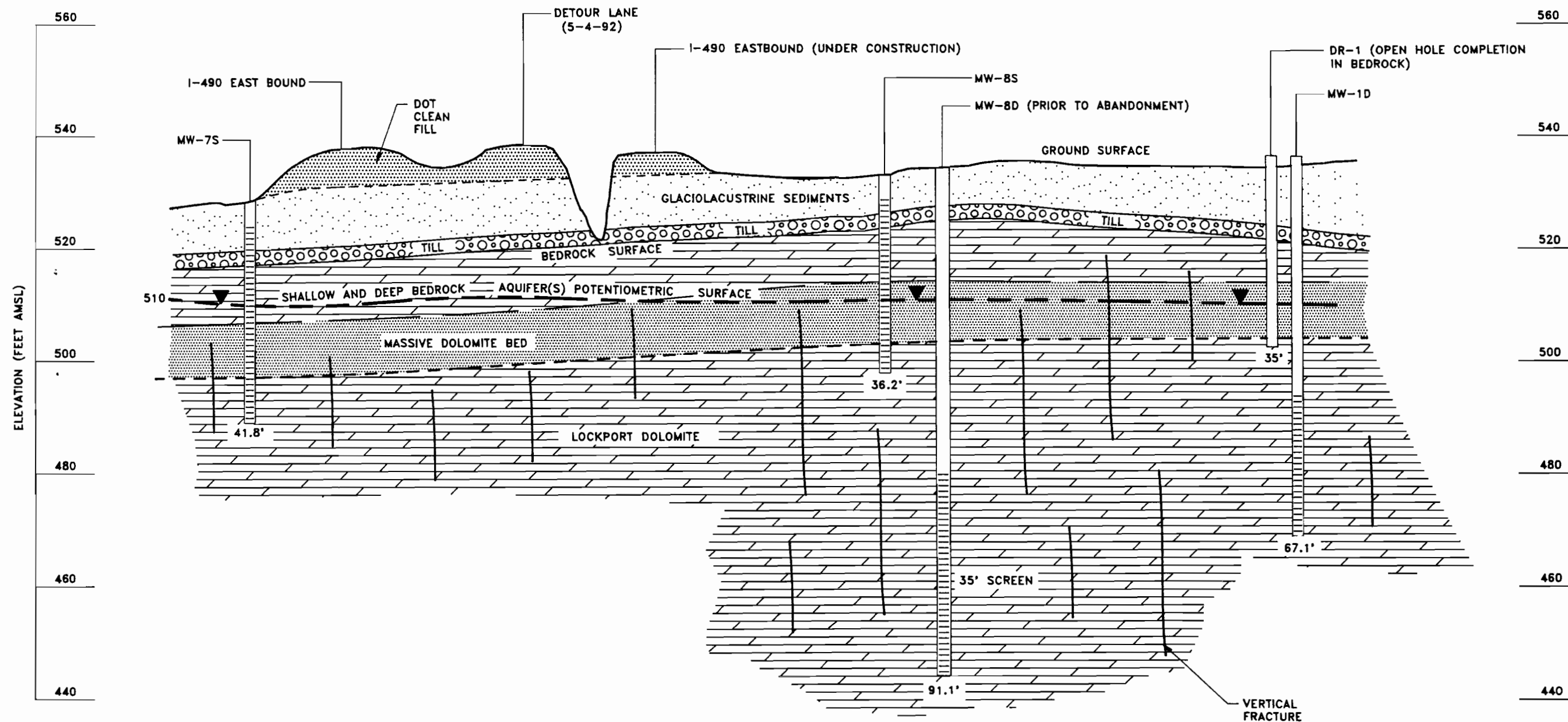
NORTH
ASOUTH
A'

NOTE: WATER TABLE ELEVATIONS
BASED ON 4-28-93
WATER LEVEL READINGS.

Figure 4-3 GEOLOGICAL CROSS-SECTION (A-A')
DEARCOP FARM SITE

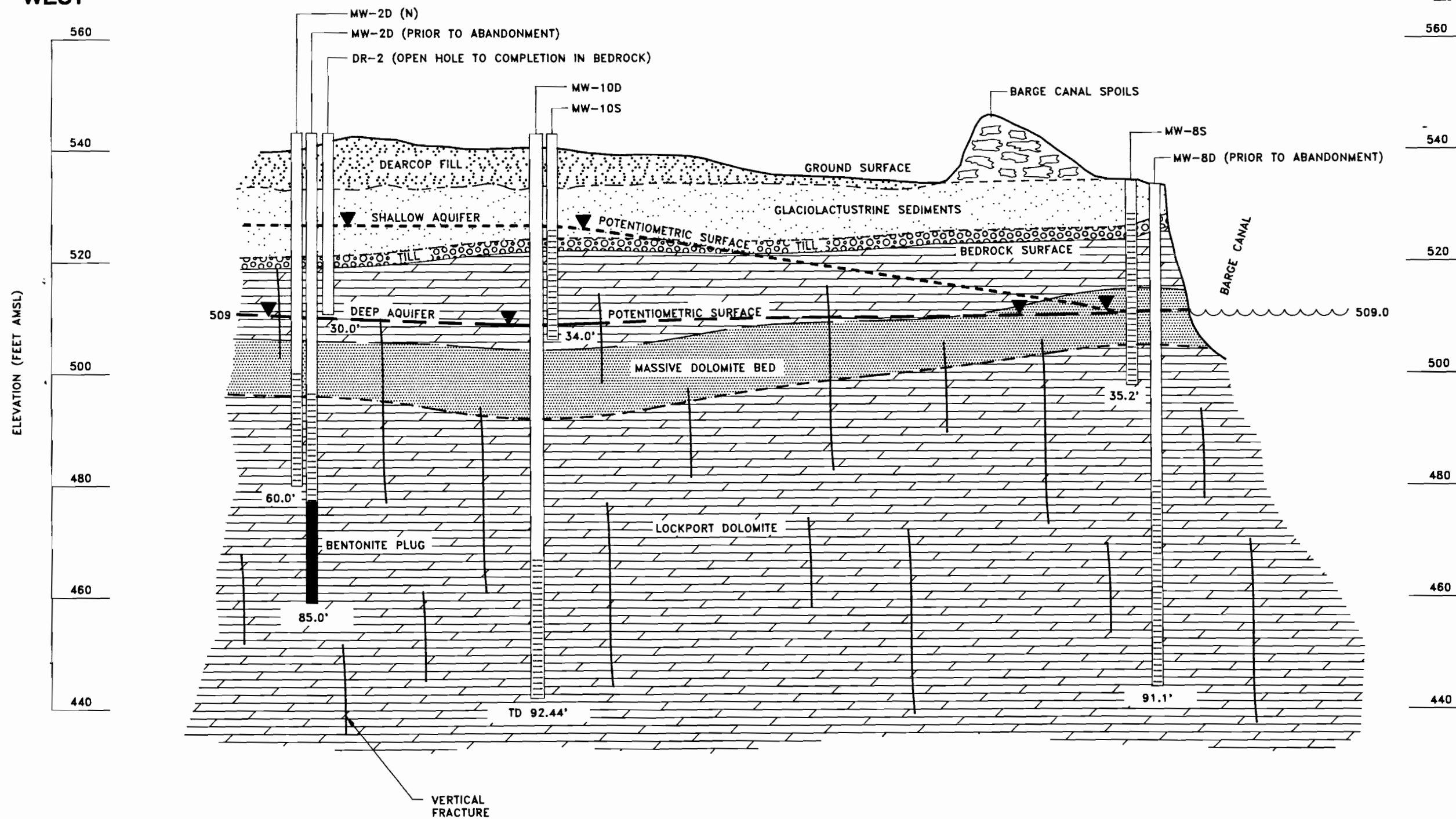
B
NORTH

B'
SOUTH



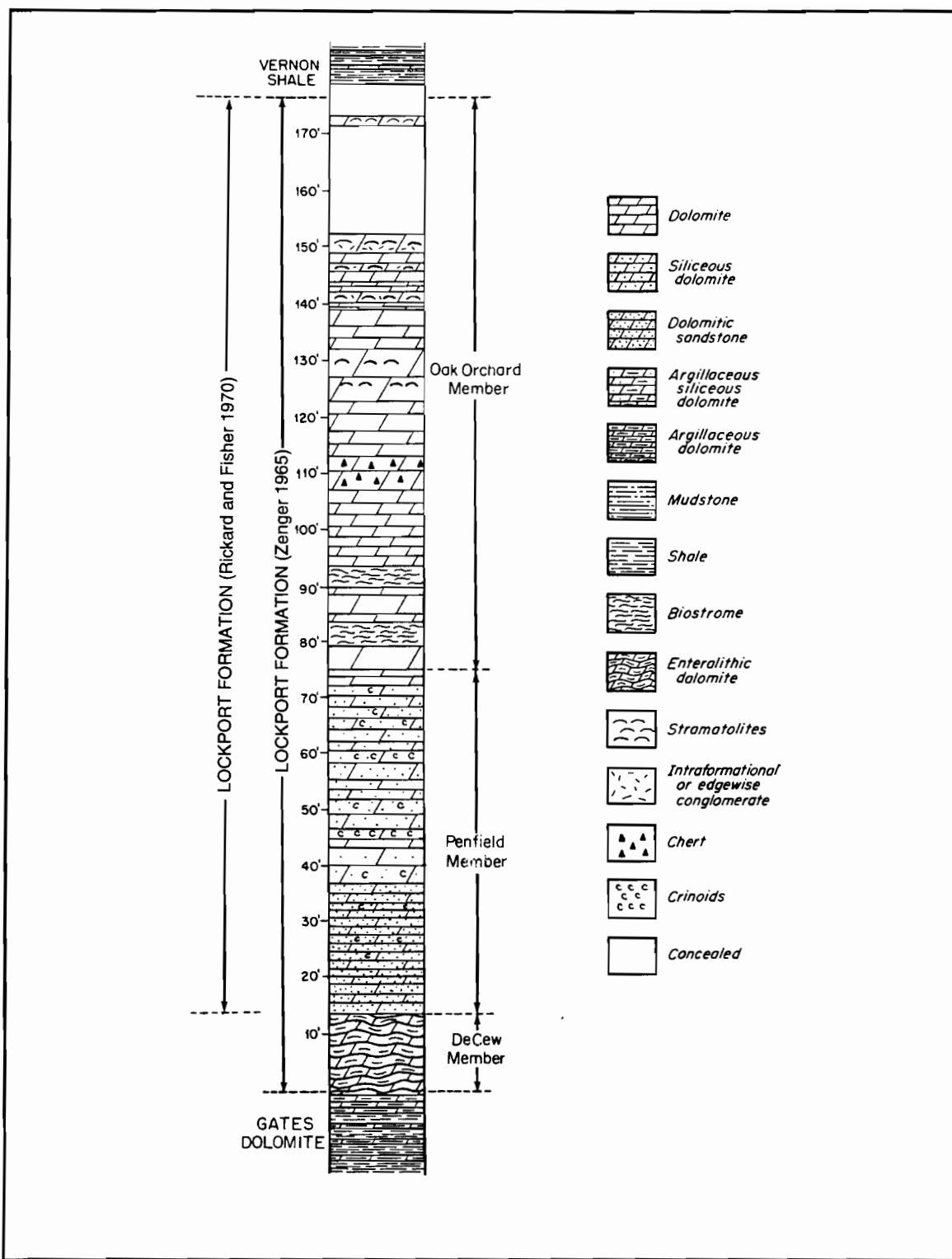
NOTE: WATER TABLE ELEVATIONS
BASED ON 4-28-93
WATER LEVEL READINGS.

Figure 4-4 GEOLOGIC CROSS SECTION (B-B')
DEARCOP FARM SITE

C
WESTC'
EAST

NOTE: WATER TABLE ELEVATIONS
BASED ON 4-28-93
WATER LEVEL READINGS.

Figure 4-5 GEOLOGIC CROSS SECTION (C-C')
DEARCOP FARM SITE



SOURCE: Zenger 1965.

Figure 4-6 COLUMNAR SECTION OF THE LOCKPORT FORMATION IN THE ROCHESTER - PENFIELD AREA

Figure 4-7 INTERFACE AQUIFER
POTENTIOMETRIC SURFACE MAP
APRIL 28, 1993
DEARCOP FARM SITE

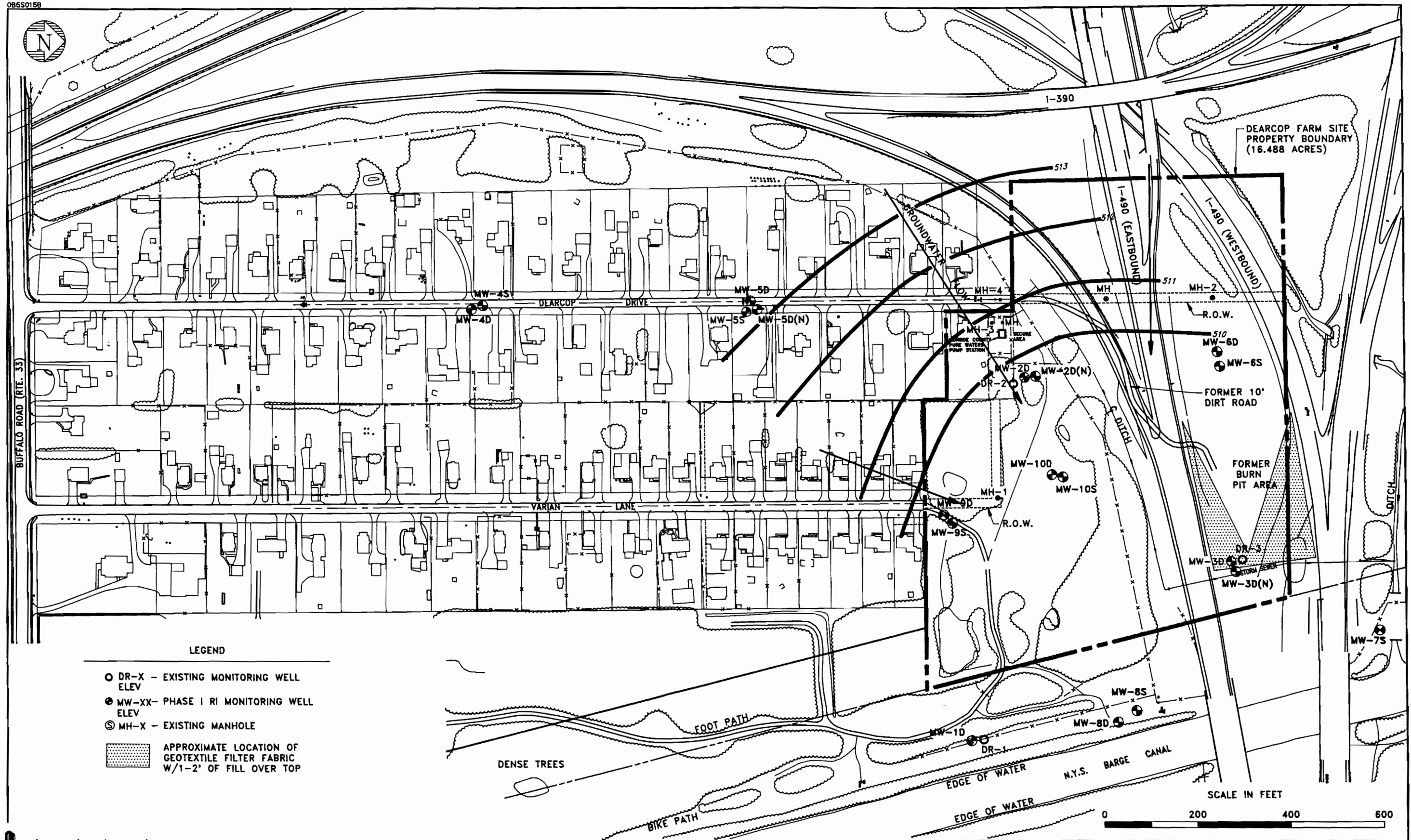


Figure 4-8 DEEP BEDROCK AQUIFER
POTENTIOMETRIC SURFACE
APRIL 28, 1993
DEARCOP FARM SITE

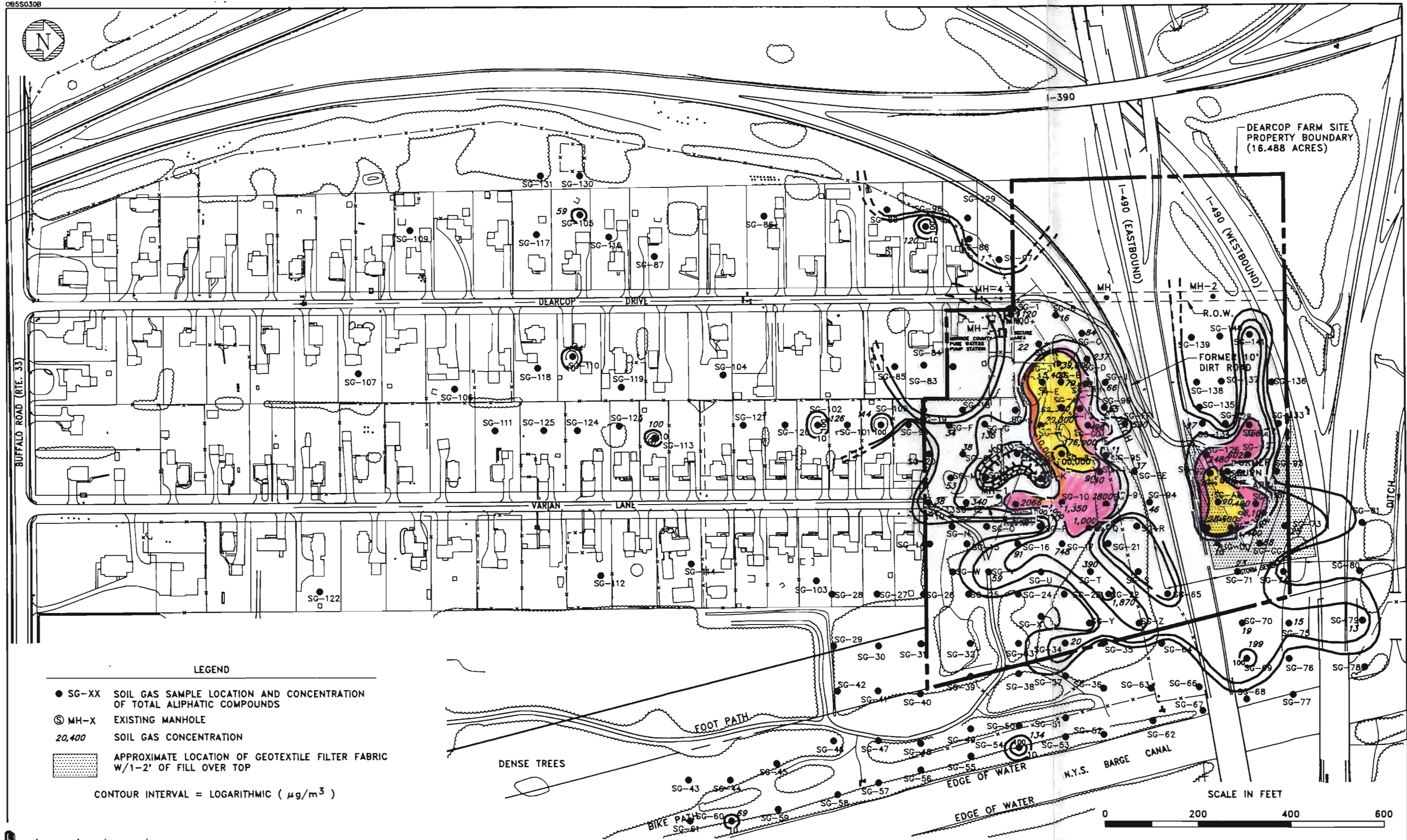


Figure 4-9 SOIL GAS TOTAL CHLORINATED ALIPHATIC PLUME BOUNDARY MAP DEARCOP FARM SITE

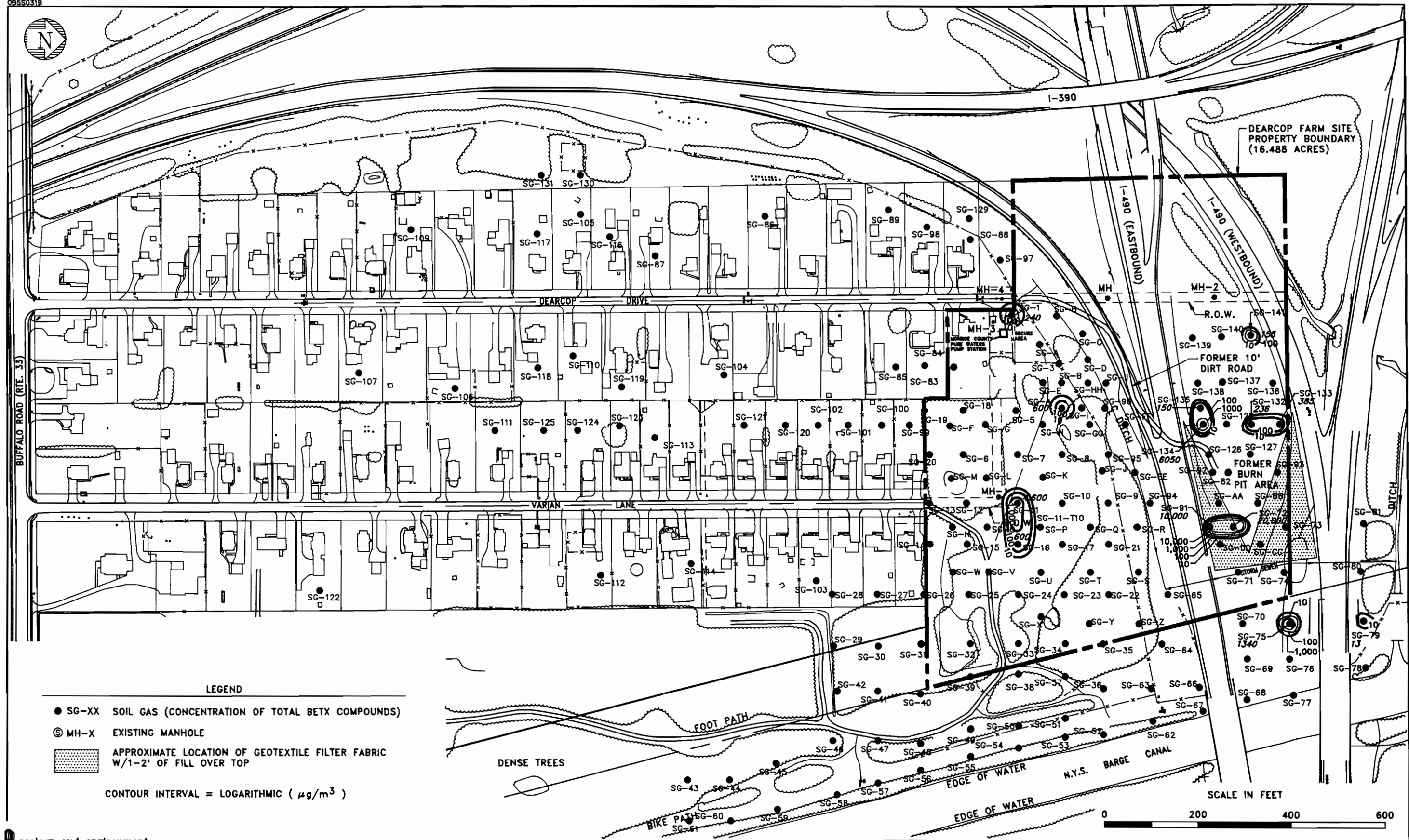


Figure 4-10 SOIL GAS TOTAL BETX
PLUME BOUNDARY MAP
DEARCOP FARM SITE

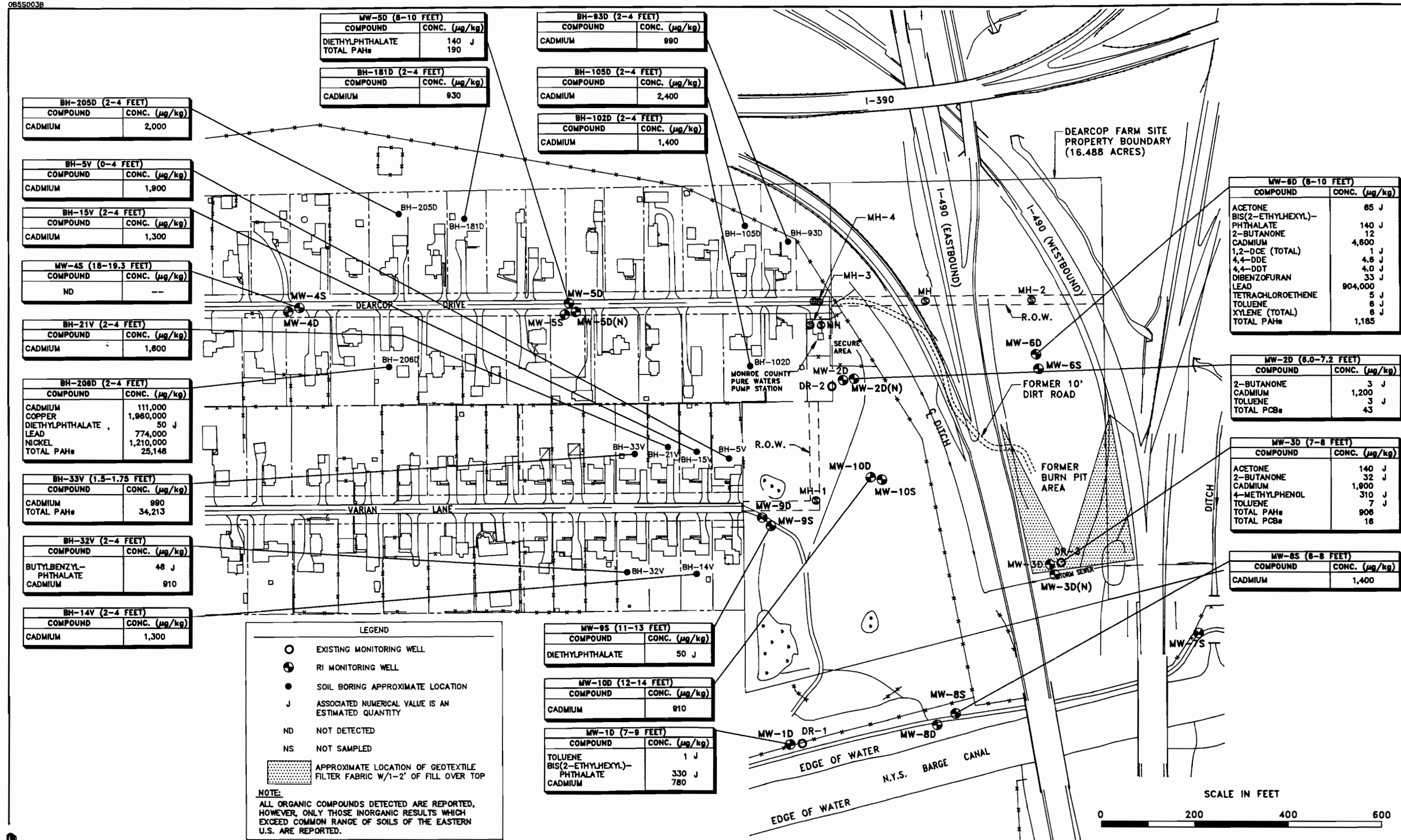


Figure 4-12 SUBSURFACE SOILS RESULTS
FROM MONITORING WELL AND
SOIL BORING LOCATIONS
DEARCOP FARM SITE

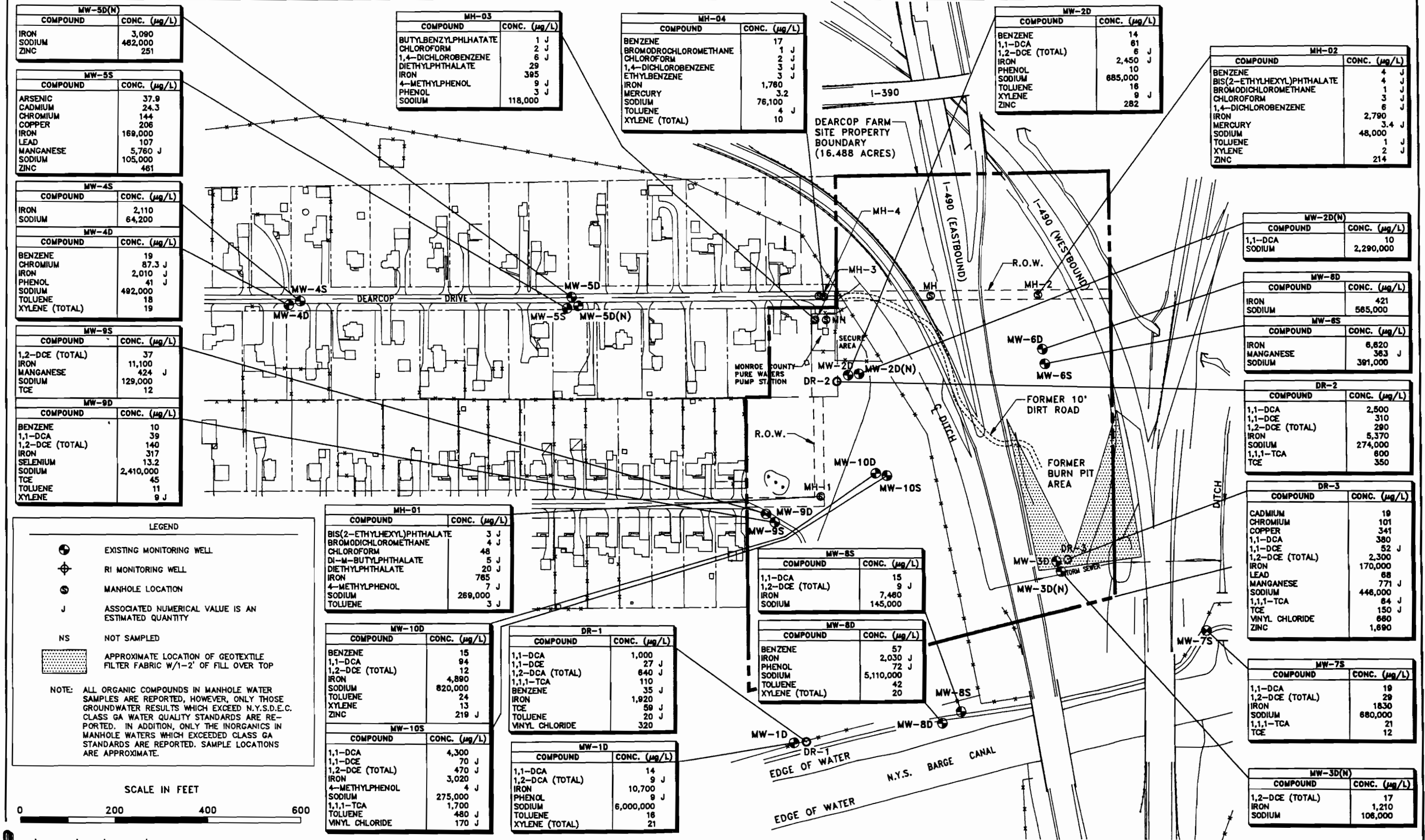


**Figure 4-13 GROUNDWATER AND MANHOLE WATER SAMPLE RESULTS
DEARCOP FARM SITE**

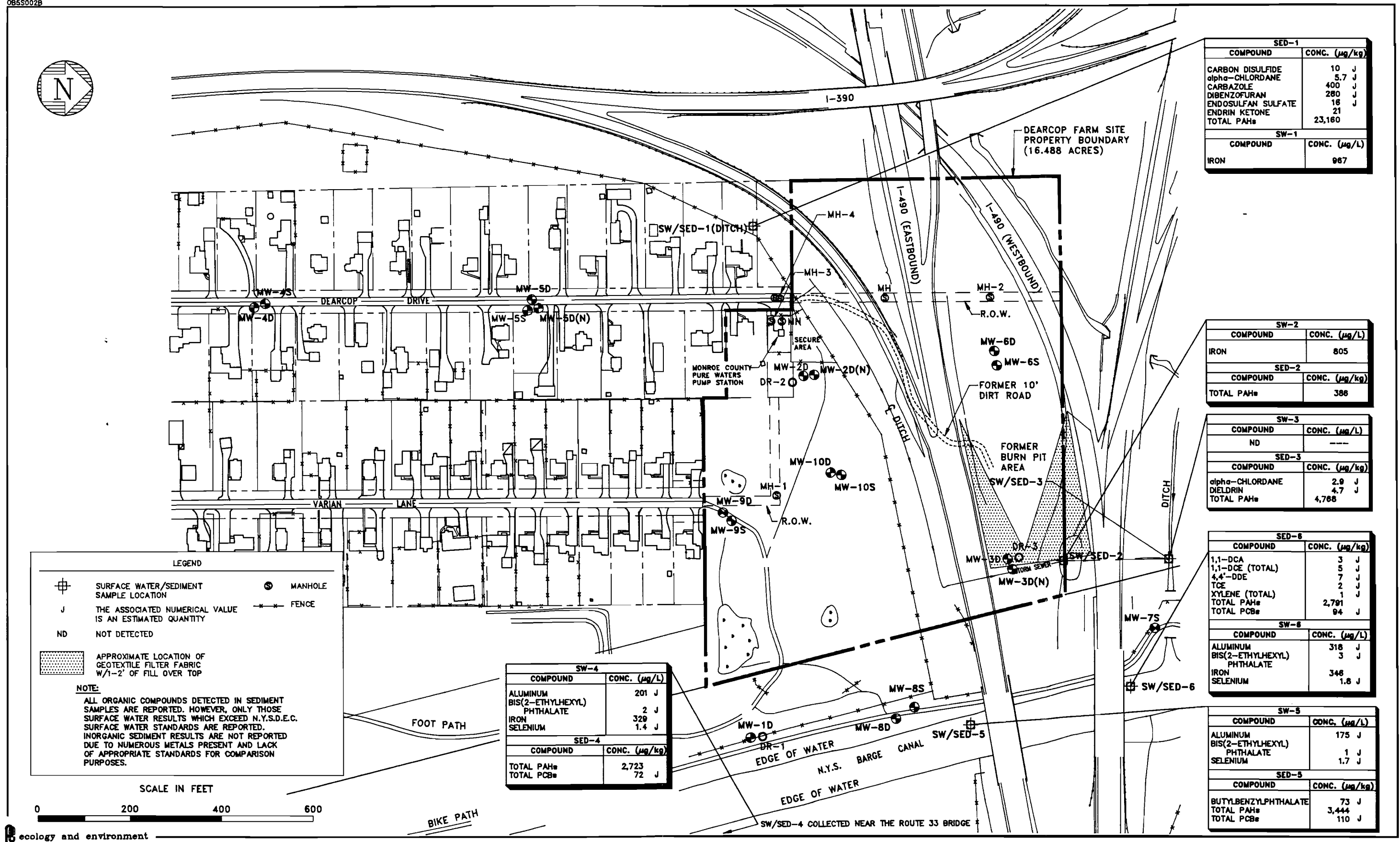


Figure 4-14 SURFACE WATER AND SEDIMENT SAMPLE RESULTS DEARCOP FARM SITE

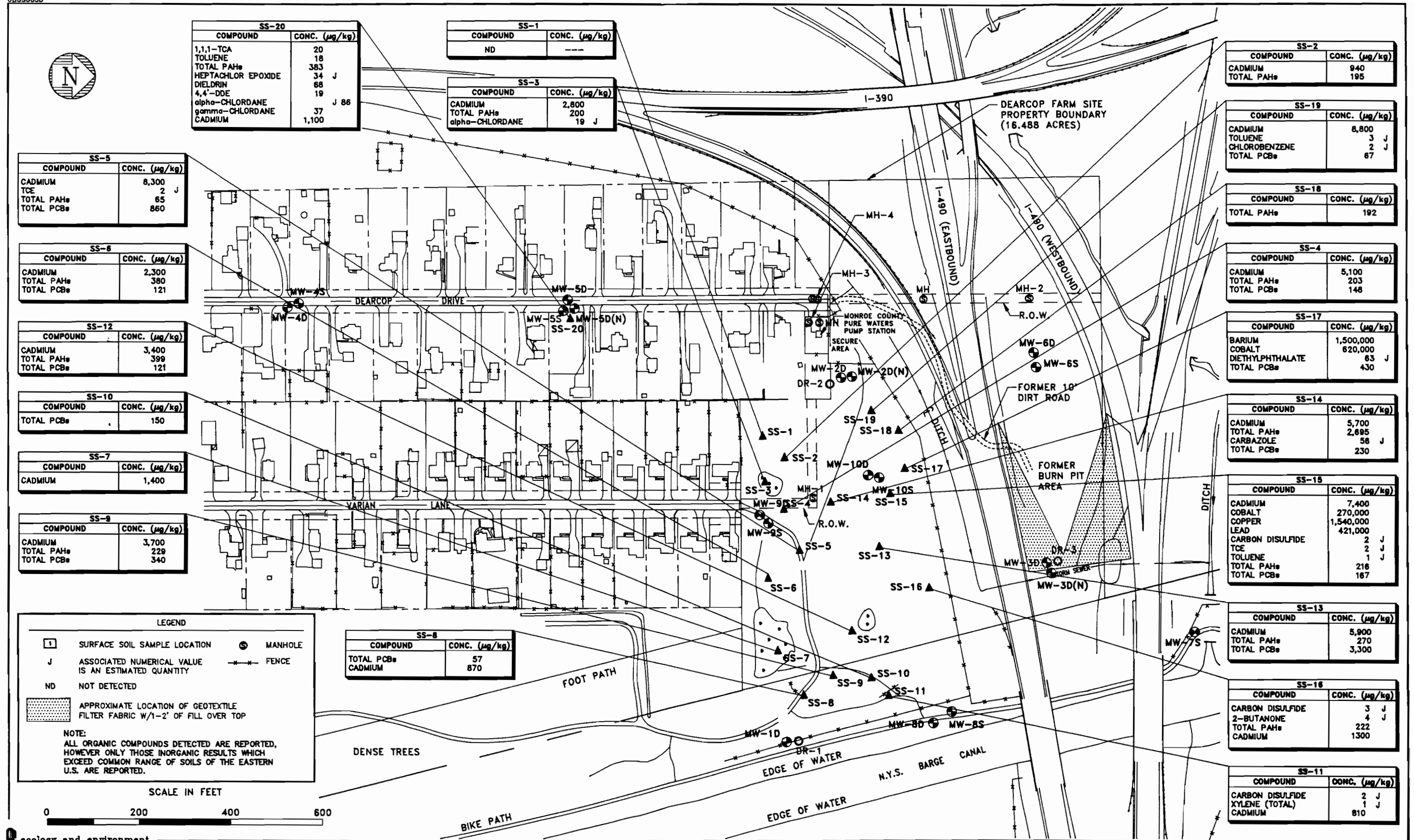


Figure 4-15 DEARCOP FARM SITE RI/FS
MONROE COUNTY, NEW YORK
SURFACE SOIL RESULTS

5. CONTAMINANT FATE AND TRANSPORT

5.1 INTRODUCTION

A wide variety of organic and inorganic chemicals was detected in the environmental media sampled at the Dearcop Farm site during the RI. The fate and transport of these chemicals in the environment is a function of the physical and chemical properties of each chemical and of the environmental conditions at the site. To facilitate the understanding of chemical fate and transport, organic chemicals can be classified into categories according to their similarity in chemical structure or physical/chemical properties (i.e., factors that would influence mobility in the environment). The chemicals of potential concern detected at the Dearcop Farm site can be classified into the following five categories: halogenated aliphatic hydrocarbons (mono-, di-, and tri-chloroethanes and ethenes), aromatic hydrocarbons (benzene, ethylbenzene, toluene, and xylene), PAHs, phenols, PCBs, and pesticides. This section is followed by more specific information on the environmental chemistry for each of the five organic chemical categories before concluding with a discussion on transport pathways. In addition to organic contaminants, elevated levels of inorganics (i.e., metals and asbestos fibers) were also detected at the site and are further discussed in the forthcoming sections.

Water solubility is a critical property affecting the environmental transport of a chemical: highly soluble chemicals can be rapidly leached from soils or waste and are generally mobile in groundwater. For inorganic contaminants, the solubility will depend on the valence state of the element and on the chemistry of the surrounding medium.

A compound's volatilization rate from water depends on its vapor pressure and water solubility. Highly water-soluble compounds generally have lower volatilization rates from water than compounds having a low water solubility. Vapor pressure, a measure of the

volatility of chemicals in their pure state, ranges from approximately 7×10^{-9} to 7.6×10^2 mm of mercury (Hg) for liquids (EPA 1986a). The Henry's Law constant, which is the ratio of a compound's vapor pressure (in atmospheres) to its solubility (in moles/m³), is a more accurate measure of volatilization behavior than is vapor pressure for estimating releases to air from water. Compounds with Henry's Law constants greater than approximately 10^{-3} can be expected to volatilize readily from water. Those with values ranging from 10^{-3} to 10^{-5} volatilize less readily, while compounds with values less than 10^{-5} volatilize slowly (Lyman *et al.* 1982).

The octanol-water partition coefficient (K_{ow}) is often used to estimate the extent to which an organic chemical will partition from water into lipophilic tissues of organisms, such as fish or animal fat. Log K_{ow} values generally range from -2.5 to 10.5. Chemicals with K_{ow} less than 3 are generally considered not to concentrate in animal tissues.

5.2 ENVIRONMENTAL CHEMISTRY OF THE ORGANIC CHEMICALS

The organic chemicals of potential concern detected in the environmental media at the Dearcop Farm site have been classified into five chemical categories as previously mentioned. The following sections are discussions of the environmental chemistry for each of these five organic chemical categories.

5.2.1 Halogenated Aliphatic Hydrocarbons

Trichloroethene (TCE); 1,1,-dichloroethane (1,1-DCA); 1,1-dichloroethene (1,1-DCE); 1,2-dichloroethene (1,2-DCE) (total), and 1,1,1,-trichloroethane (1,1,1-TCA), are among the most frequently detected halogenated aliphatic compounds detected at the Dearcop Farm site. These chemicals are volatile, moderately to poorly water-soluble compounds. The halogenated aliphatics of potential concern at the Dearcop Farm site are liquids at 20°C, with the exception of vinyl chloride, which is a gas at this temperature. These chemicals have densities greater than water; therefore, they may form a separate phase within an aquifer if present in sufficient volume. Halogenated aliphatic hydrocarbons tend to be poorly adsorbed to soils and to be persistent in groundwater.

Biotransformation reactions have been reported for many of the chemicals in this class. TCE in anaerobic soils has been shown to be slowly transformed via a series of biotic and abiotic reactions to 1,2-dichloroethene and vinyl chloride (Bouwer and McCarty 1983;

Vogel and McCarty 1985). Anaerobic biotransformation of 1,1,1-trichloroethane (TCA) to 1,1-dichloroethane has also been observed (Vogel *et al.* 1987). In general, the frequent observation of vinyl chloride accumulation in aquifers contaminated with TCE appears to indicate that conditions conducive to transformation of vinyl chloride to carbon dioxide are not prevalent in the environment. The rate and extent of transformation reactions are highly dependent on site-specific factors such as nutrient availability and microbial composition of the soil. The transformation reactions that have been identified by various investigators are shown in Figure 5-1.

The ultimate fate of halogenated aliphatic hydrocarbons in surface soils and surface water is generally volatilization to the atmosphere and subsequent photooxidation (EPA 1979). These compounds are not significantly bioaccumulated (Howard 1990).

5.2.2 Aromatic Hydrocarbons

The aromatic hydrocarbons of potential concern include benzene, ethylbenzene, toluene, and xylene. These chemicals have similar physico-chemical properties (see Table 5-1), and can be grouped together in a discussion of their fate and transport in the environment. Based on their high vapor pressures and relatively low water solubilities (Verschueren 1983), the primary fate of these aromatic hydrocarbons in surface soils or surface water is expected to be volatilization to the atmosphere (EPA 1979). Photooxidation in the troposphere is the dominant atmospheric fate of these compounds (EPA 1979).

Aromatic hydrocarbons may leach from soils into groundwater. The K_{oc} values range from 83 to 9,200, indicating that sorption to organic matter in soils or sediments may occur to a limited extent. Ethylbenzene has a liquid density less than water, and may form a separate phase above the water table if present in sufficient quantity (e.g., as part of a gasoline plume). Based on the available groundwater data for the site, two phase transport in groundwater does not appear to be occurring. Vapor-phase diffusion from groundwater may be a significant transport process in unsaturated soils.

Aromatic hydrocarbons can be biologically transformed in some soils/sediments (Barker *et al.*, 1987); the rate and extent of transformation is highly dependent on site-specific factors such as temperature, pH, and the microbial composition of the soil. Transformation by-products of alkyl aromatics are cresols and carbon dioxide (Barker *et al.* 1987; Gibson

et al., 1968). Aromatic hydrocarbons are not appreciably concentrated in plant or animal tissues (EPA 1979).

5.2.3 Polycyclic Aromatic Hydrocarbons

Most semivolatile organics detected at the Dearcop Farm site fall into the group of polycyclic aromatic hydrocarbons (PAHs).

PAHs are found wherever natural or synthetic chemicals are exposed to high temperature; they may also be synthesized by some plants and bacteria. Most common sources of PAHs are those which burn fossil fuels such as electrical power plants which burn coal, refuse burning, forest fires, automobiles, etc. PAHs are typically localized along highways and those emitted by jet engine exhaust and power plants may be spread over long distances. In surface waters, PAHs originate from fallout of particulate matter, adsorption of atmospheric gases, and polluted water.

Relevant physical and chemical properties of PAHs of potential concern are summarized in Table 5-1. Most priority pollutant PAHs can be characterized as having low vapor pressure, low water solubility, low Henry's Law constants, high octanol-water partition coefficients ($\log K_{ow}$), and high organic carbon partition coefficients (K_{oc} s). High K_{oc} s indicate that most PAHs are strongly sorbed to organic matter in the soils. Combined with low water solubilities, rates of transport of most PAHs from the unsaturated zone via infiltration to the saturated zone will be extremely low. Low vapor pressures, low Henry's Law constants, and low K_{oc} indicate that most PAHs will not readily volatilize from either surface water or surface soils.

The exception to this generalization are acenaphthene, fluorene, fluoranthene, and pyrene with solubilities greater than 100 $\mu\text{g/L}$. Although these compounds have relatively high K_{oc} s (10^3 or greater) relative to other PAHs, their high solubility indicates that they are relatively mobile and may be observed in groundwater.

Typically, although they are regarded as persistent in the environment, PAHs are degradable by soil micro-organisms. Degradation rates and degree of degradation are influenced by environmental factors, microbial flora, and physiochemical properties of the PAHs themselves. Important environmental factors include temperature, pH, oxygen status, nutrient availability populations present, and the relative proportions of bacteria, fungi, and

actinomycetes (Sims and Overcash 1983). Physico-chemical properties include chemical structure, concentration, and lipophilicity.

5.2.4 Phenols

Phenols as a group are characterized by high solubility (thousand of mg/L range), relatively low Henry's Law Constant (10^{-7} atm-m³/ range) and relatively low log octanol-water partition coefficients (approximately 2). Most phenols do not strongly sorb to sediments or bioaccumulate. With increasing chlorine substitution, the solubility tends to decrease and the octanol water portion coefficient tends to increase; therefore, more chlorinated phenols commonly exhibit increased sorption and bioaccumulation relative to less chlorinated phenols. Biodegradation and photolysis are the major fate mechanisms of phenols (Smith *et al.* 1988). Biodegradation of phenols in surface waters has been reported by Visser *et al.* (1977), USEPA (1979), and Banerjee *et al.* (1984).

5.2.5 Polychlorinated Biphenyls (PCBs)

Aroclor 1254 was the most frequently detected PCB at the Dearcop Farm site. The low water solubility and high octanol-water partition coefficients of PCBs indicate that they will be strongly sorbed to soils and other organic matter and will be relatively immobile in the subsurface. However, their low mobility would be markedly increased by the presence of non-aqueous phase liquids (NAPLs) or organic solvents in the groundwater which could act as cosolvents for the PCBs.

PCBs do not appear to undergo significant hydrolysis or oxidation in the aquatic environment (Mabey *et al.* 1981; EPA 1979). Photolysis may occur however, its relative rate and importance are unknown (Leifer *et al.* 1983). Studies of the biodegradability of PCBs indicate that susceptibility to these processes is very congener-specific; however, in general, isomers with one to three chlorine substituents appear to undergo oxidative biodegradation, while isomers with four or more chlorine substituents undergo anaerobic dehalogenation (EPA 1988; Brown *et al.* 1987). Biodegradation is probably the ultimate degradation process for PCBs in soils and sediments (ATSDR 1989).

At present, the major source of PCB exposure in the general environment appears to be the environmental cycling of PCBs previously introduced into the environment. The cycling process involves volatilization from ground and water surfaces into the atmosphere

with subsequent removal from the atmosphere by wet and dry deposition and then revolatilization (ATSDR 1989). The environmental persistence of PCBs generally increases with the degree of chlorination. Aroclors with higher levels of chlorination (1248, 1254, and 1260) are resistant to aerobic biodegradation and appear to degrade very slowly in the environment. Current releases of PCBs to the environment are from spills or releases from existing PCB-containing transformers, capacitors, and other PCB-containing equipment and wastes.

Atmospheric fallout and washout (dry and wet deposition) appear to be the major removal mechanisms for PCBs in the atmosphere and constitute a major non-point-source of PCB inputs to land surfaces and surface waters. The PCB concentrations in rain anywhere in the world typically range from 1 to 250 ng/L (Eisenreich *et al.* 1981), which provides an indication of the importance of wet deposition. Conversely, volatilization is a major removal mechanism for PCBs on land surfaces and a major source of PCB input to the atmosphere (Weant and McCormick 1984; Larsson 1985; and Swackhamer and Armstrong 1986). In water, adsorption to sediments and other organic matter is a major fate process for PCBs (EPA 1988; EPA 1979). However, resuspension of PCB-bearing sediments and redissolution of the PCBs themselves can provide continuing inputs of PCBs to the water column. Volatilization may also be a significant removal process for dissolved PCBs from surface waters (Lyman *et al.* 1982; Swackhamer and Armstrong 1986).

5.2.6 Pesticides

The pesticides most frequently detected above background levels were alpha-chlordane, dieldrin, and gamma-chlordane. Persistence in the environment was regarded as a desirable attribute of pesticides because it reduces the need for repeated applications. Therefore, it is not surprising that pesticides are among the most persistent of man-made chemicals. Biotransformation of pesticides is limited. Dieldrin has been reported to be a degradation product of aldrin (EPA 1979). Dieldrin is, however, resistant to further degradation.

Pesticides are generally applied to plants or soils. The chlorinated pesticides are nonpolar and relatively resistant to biological degradation. Both factors tend to result in sorption of organochlorine pesticides to site soils. Soils at or near the application of the pesticide serve as media to retain the chemicals. The organic matter level in soils appears to

be the most important factor influencing the concentration and retention of pesticides. This will allow site soils, especially soils with a high organic content, to have very high concentrations of pesticides; whereas water may have nondetectable concentrations. This is supported by the fact that pesticides were only detected in soil and sediment samples.

5.3 ENVIRONMENTAL CHEMISTRY OF INORGANICS

5.3.1 Metals

Cadmium, cobalt, chromium, copper, lead, and zinc were the most frequently detected inorganics of concern at the Dearcop Farm site. The fate of metals in the environment is largely determined by their low water solubility and tendency to bind to soil and sediments that contain minor to moderate amounts of clays. Levels of organics and metal oxides in soils and sediments can strongly affect migration rates. Specifically, relatively high levels of organics and of iron or manganese oxides can reduce migration.

Metals are generally persistent in the environment, but their chemical and physical forms can change depending on environmental conditions. Metals in soils and sediment may be in a metallic form, sorbed or chelated by organic matter or oxides, sorbed on the exchange sites of soil colloids, or dissolved in soil water. Most metals are immobile at usual soil pH ranges and become significantly leachable only if acidic solutions percolate through the soils. Other environmental factors that influence metal mobility include soil clay content, organic content, oxidation-reduction potential, carbonate content, and groundwater chemistry.

Speciation of metals is also an important factor in their mobility. If the metals are present as oxides or hydroxides, they will remain relatively immobile in soils and sediments. If they are present as soluble salts, the most likely reaction that may occur is the hydrolysis of metals to oxides or hydroxides, or precipitation of low solubility sulfates or carbonates.

Metal concentrations in the groundwater are influenced by the composition of the aquifer materials. Minerals in contact with groundwater may dissolve (i.e., all components of the mineral completely dissolve) or weather (i.e., a partial dissolution process in which certain elements leach, leaving other elements behind).

5.3.2 Asbestos

Asbestos fibers were found in surface and subsurface soils at and around the Dearcop Farm site. Asbestos is the name applied to a group of six different minerals that occur

naturally in the environment, the most common being chrysotile. Asbestos minerals are made up of long thin fibers which are very strong and resistant to heat and chemicals. Because of its properties, asbestos fibers have been used in many different products, primarily building materials, friction products and heat resistant fabrics. Due to their resistance to chemicals, they are very stable in the environment and they do not evaporate or dissolve in water and are not broken down over time. Prolonged exposure to airborne asbestos fibers has been linked to lung cancer. The use of asbestos in manufacturing and asbestos disposal has since been regulated.

5.4 CONTAMINANT TRANSPORT ROUTES

Contaminants were primarily introduced at the Dearcop Farm site through the apparently landfilling of industrial and domestic wastes from approximately 1919 to 1970. Fill material and its associated contaminants were found to not be limited to the fenced site property or even the highway median, but also were found off site on residential property.

The primary contaminant transport routes from the ongoing source of contamination (the soil) to the surrounding media include diffusion into the soil gas, overland flow to surface contamination to the drainage ditches, downward percolation through the unsaturated zone, and groundwater flow in the saturated zone. A discussion of each of these routes follows.

Diffusion Into Soil Gas

The soil gas investigation conducted at the Dearcop Farm site indicated the presence of numerous volatile organics, primarily halogenated aliphatic hydrocarbons (the most widespread class of contaminants identified in the sampled media at the site). Halogenated aliphatic hydrocarbons have generally high Henry's Law Constants (see Table 5-1). This will aid in diffusing the contaminants into the soil gas surrounding the source areas of contaminated soil, and into the soil gas above contaminated groundwater. The highest soil gas concentrations of aliphatic compounds were observed in the north-west portion of the vacant lot area. High soil gas concentrations were also observed on the I-490 median. Lower levels of contaminants were observed off site in the residential area immediately adjacent to the site, and discrete residential lots, some of which contained fill materials, allegedly taken from the site.

Overland Flow

The moderately-to well-drained soil types and the minimal vegetation present at the Dearcop Farm site causes overland flow (or surface water runoff) to be limited to periods of heavy storms or snow thaw. Thus, the physical characteristics of the site minimize the potential of surface soil contaminant migration via overland flow. When overland flow does occur on site, nearby drainage ditches receive the water and transport it along and under the I-490 and empty into the Barge Canal north of the site. Also during periods of high water table conditions, it is assumed that groundwater discharges, in part, to these same drainage ditches.

Surface water and sediment samples generally contained contaminants which were also detected in on-site soils and groundwater. The upgradient sediment sample location also had similar results which would indicate that the sample may not be far enough upgradient. This is believed to be the case since fill material was discovered during subsurface soil sampling in the backyard of 93 Dearcop Drive (BH-93D) which is close to the upgradient surface water and sediment sample (SW-1/SED-1). Most prevalent in the surface water and sediments were metals, PAHs, pesticides, and PCBs. Contamination was detected in all surface water and sediment samples including those from the Barge Canal. However, PCBs were only detected in the sediment samples collected from the Barge Canal. PAHs and PCBs tend to be more persistent in surface soils than purgeable hydrocarbons and aromatics since PAHs and PCBs are generally not volatile, only slightly soluble, and tend to be strongly sorbed to organic matter. Conversely, purgeable halocarbons and aromatics are volatile and tend to be poorly adsorbed to soils. Ultimately, these compounds would volatilize into the atmosphere.

Groundwater

The migration pathway for surface and subsurface releases in the unsaturated zone is downward percolation toward the water table. The migration rate through the unsaturated zone is dependent on numerous factors including: moisture content of the soil (as controlled by evaporation, transpiration, and precipitation), porosity and permeability of the soil, and density of the compound. A liquid compound will first move through the overburden soils as a non-aqueous phase liquid (NAPL) under the force of gravity until the adsorption onto soil grains and the capillary pressure between grains (as influenced by the moisture content of the

soil) inhibit continued gravitational flow. The compound will then begin to dissolve into the groundwater. The residual concentrations adhering to the soil particles will be washed into the water zone by infiltration and seasonal changes in the groundwater elevation.

Precipitation, therefore, becomes the driving force of flow through the overburden. Because the physical characteristics of the site cause surface runoff to be low, most of the annual precipitation plus soil moisture, must either infiltrate the soil or evaporate. The fall rains and spring snow melt mobilize residual organic contaminants in the unsaturated zone, carrying them to the groundwater. These seasonal, higher than average volumes of water essentially move water and organic contaminants vertically through the unsaturated zone in a pulse-like manner.

Once reaching the water table, dissolved compounds will flow vertically and horizontally with the groundwater at a rate dependent on the vertical and horizontal hydraulic conductivity of the matrix and on the compounds tendency to adsorb to the soil. The aliphatic compounds found in the groundwater at the Dearcop site will tend to sink through the water column because they are heavier than water. However, the overburden particles in this area are quite fine (i.e., fine sand and silt). Recent studies (Schwille 1988) have shown that TCE will tend to pool on top of the water table of a fine-grained aquifer until it has enough density to push through the intergranular surface tension. This phenomena could cause source plumes of TCE to migrate to deeper zones within the saturated overburden also in a pulse-like fashion, similar to the pulse-like migration through the unsaturated zone.

Volatile organics (both purgeable halocarbons and purgeable aromatics) are the primary contaminant group present in groundwater. The shallow bedrock aquifer contained much more contamination than did the deep bedrock aquifer. Water elevations indicate that these two aquifers are separated by a confining layer; but the presence of site contaminants in the deep aquifer indicates that this layer is discontinuous or at least breached by fractures thus making it semi-confining. Hydrogeologic maps indicate that both aquifers generally flow to the northeast and wells east and northeast of the site are more contaminated than those wells west and southwest of the site. Contaminants in the shallow aquifer discharge both downward into the deep aquifer and laterally to the east into the Barge Canal.

Deep aquifer contaminants presumably travel downward and downgradient to the discharge point which is east of the site and most likely the Genesee River which empties into Lake Ontario.

The seasonal raising and lowering of the Barge Canal by the New York State Thruway Authority also will effect hydrogeologic conditions on either side of the canal and therefore effect contaminant migration rates. Presumably a pulse-like effect could occur in the spring and summer when high canal levels will cause a more gentle gradient and slower migration rates. The lower canal level may create a steeper gradient and therefore could accelerate contaminant transport rates. Residents in the area of the site are not affected by the use of contaminated groundwater, since they obtain drinking water from a municipal source.

Review of the distribution of the chlorinated aliphatic compounds including the parent compounds (1,1,1-TCA and TCE) and the degradation products (1,2-DCE [total]), 1,1-DCA, 1,1-DCE, vinyl chloride, etc.) (see Figure 5-2) indicates that multiple source areas exist. In general, the parent compound 1,1,1-TCA is high in two potential source areas near DR-1 and MW-10S, and decreases in concentration further downgradient. TCE, another parent compound, is also higher in concentration at DR-2 and DR-3 and lower further downgradient. The degradation product of these two compounds, 1,2-DCE (total) is low in concentration at the potential source areas, and higher downgradient as to be expected. However, higher concentrations of degradation product 1,1-DCA as opposed to the parent compound 1,1,1-TCA were present at DR-2 and MW-10S. Vinyl chloride, which is further down the chain of degradation products, was also present at MW-10S, DR-3, and DR-1.

Contaminant migrates beneath the site in the shallow overburden/bedrock aquifer at least 800 feet from the western portion of the site to its discharge point to the east, the Barge Canal. Groundwater flow, in general, is expected to be accelerated along bedrock fractures as opposed to the primary porosity of the geomedium (i.e., overburden or unfractured bedrock).

Table 5-1
PHYSICAL-CHEMICAL PROPERTIES OF ORGANIC CONTAMINANTS OF POTENTIAL CONCERN
DEARCOP FARM SITE

Chemical Name	CAS Number	Mole Weight (g/mole)	Physical State at 20°C	Water Solubility (mg/L)	Source	Liquid Density (g/mL)	Source	Vapor Pressure (mm Hg)	Source	Henry's Law Constant (atm-m ³ /mol)	Source	K _{oc} (mL/g)	Source	Log K _{ow}	Source	BCF	Source
Halogenated Aliphatic Hydrocarbons																	
1,1-Dichloroethane	75-34-3	99.0	Liquid	5.50 E+03	E	1.17	G	1.82 E+02	K	4.31 E-03	C	30	P	1.79	L	—	—
1,1-Dichloroethene	75-35-4	97.0	Liquid	2.50 E+02	E	1.22	G	5.91 E+02	E	3.00 E-02	E	14	A	1.48	E	1.2	L
1,2-Dichloroethene (total)	540-59-0	97.0	Liquid	3.50 E+03	E	1.28	G	2.08 E+02	A	7.50 E-03	C	49	A	2.09	A	1.5	L
Tetrachloroethene	127-18-4	165.8	Liquid	1.50 E+03	E	1.63	G	1.85 E+0	E	1.49 E-02	E	277	P	3.40	E	66	L
1,1,1-Trichloroethane	71-55-6	133.4	Liquid	1.50 E+03	E	1.35	G	1.23 E+02	E	1.44 E-02	E	152	A	2.49	E	5.6	L
Trichloroethene	79-01-6	131.4	Liquid	1.10 E+03	E	1.47	G	6.90 E+01	E	1.20 E-03	C	126	A	2.42	L	13	L
Vinyl Chloride	75-01-4	62.5	Gas	2.76 E+03	E	0.91	F	2.66 E+03	E	6.90 E-01	C	57	E	1.38	E	0.8	L
Aromatic Hydrocarbons																	
Benzene	71-43-2	78.1	Liquid	1.79 E+03	E	0.88	G	9.52 E+01	E	5.43 E-03	C	83	D	2.13	E	6.5	L
Chlorobenzene	108-90-7	112.6	Liquid	4.72 E+02	A	1.11	K	1.19 E+01	A	3.46 E-03	C	3.30 E+02	A	2.84	K	1.00	+
Ethylbenzene	100-41-4	106.2	Liquid	1.61 E+02	E	0.86	F	9.53 E+00	E	8.44 E-03	E	1.10 E+03	E	3.15	E	3.75 E+01	L
Toluene	108-88-3	92.1	Liquid	5.35 E+02	E	0.87	G	2.81 E+01	E	5.94 E-03	E	300	A	2.73	E	26	L
Xylene (total)	1330-20-7	106.2	Liquid	1.60 E+02	E	0.86	G	1.00 E+01	E	6.82 E-03	E	240	A	3.20	E	70	L
Polynuclear Aromatic Hydrocarbons																	
Benzo(a)anthracene	56-55-3	228.29	Solid	9.00 E-03	H	1.27	H	2.20 E-08	+	1.00 E-06	H	2.0 E+05	H	5.60	A	1.17 E+04	+
Benzo(a)pyrene	50-32-8	252.3	Solid	3.80 E-03	H	1.35	H	5.60 E-09	H	4.90 E-07	H	5.50 E+0	H	6.06	H	—	—
Benzo(b)fluoranthene	205-99-2	252.3	Solid	1.48 E-02	H	—	—	5.00 E-07	+	1.22 E-05	H	5.50 E+05	H	6.04	H	—	—

Key at end of table.

Table 5-1

**PHYSICAL-CHEMICAL PROPERTIES OF ORGANIC CONTAMINANTS OF POTENTIAL CONCERN
DEARCOP FARM SITE**

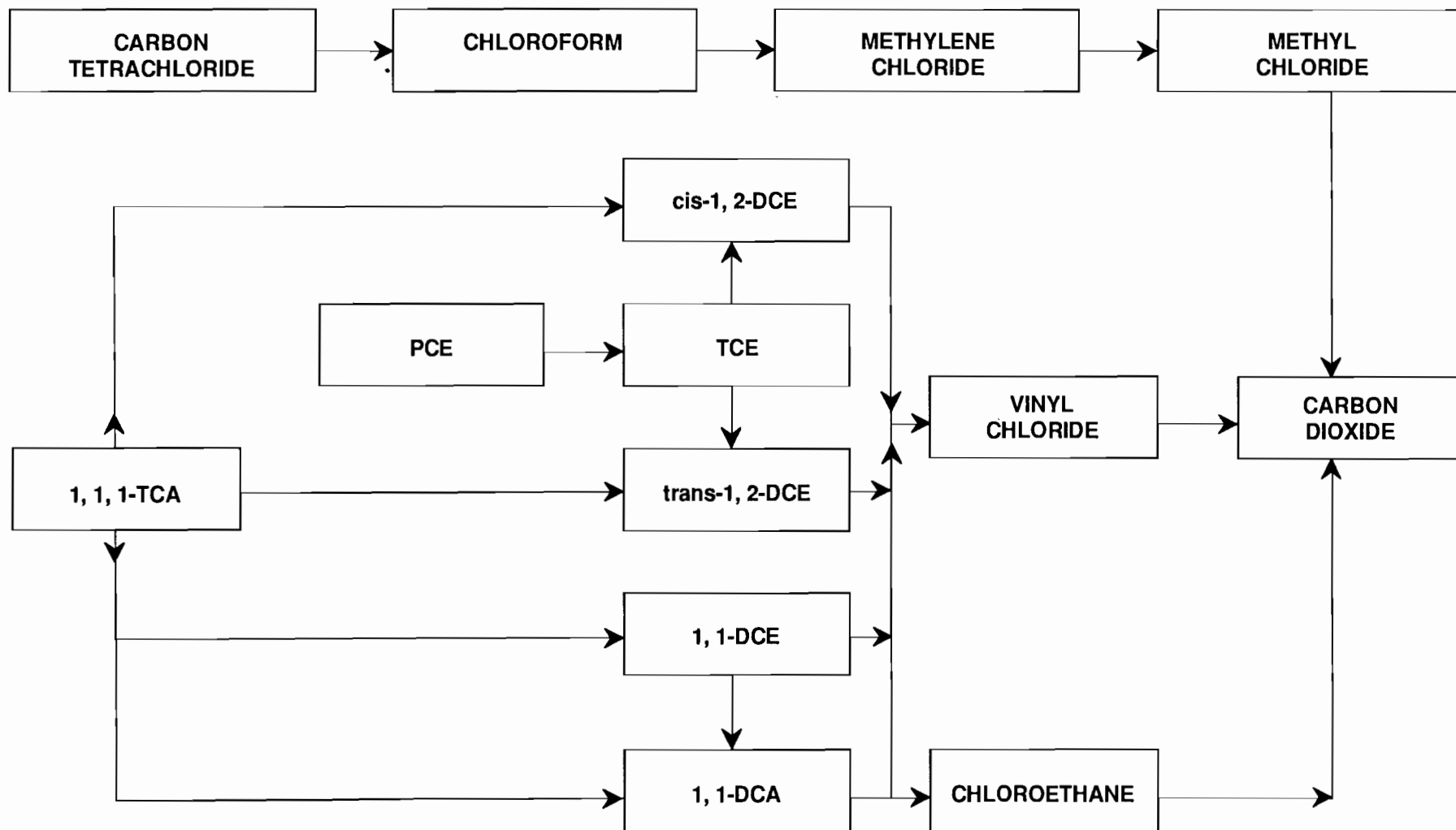
Chemical Name	CAS Number	Mole Weight (g/mole)	Physical State at 20°C	Water Solubility (mg/L)	Source	Liquid Density (g/mL)	Source	Vapor Pressure (mm Hg)	Source	Henry's Law Constant (atm-m ³ /mol)	Source	K _{oc} (mL/g)	Source	Log K _{ow}	Source	BCF	Source
Benzo(g,h,i)perylene	191-24-2	276.34	Solid	2.60 E-01	H	—	—	1.01 E-10	+	1.44 E-07	H	1.60 E+06	H	6.51	A	1.46 E+05	+
Benzo(k)fluoranthene	207-08-9	252.0	Solid	4.30 E-03	+	—	—	9.60 E-11	+	4.20 E-08	+	5.50 E+05	—	6.06	—	—	—
Chrysene	218-1-9	228.3	Solid	1.85 E-03	H	1.27	H	6.30 E-09	H	1.05 E-06	H	2.00 E+05	H	5.61	A	—	—
Dibenzo(a,h)anthracene	53-70-3	278.35	Solid	5.00 E-04	H	1.28	H	1.00 E-10	H	7.33 E-08	H	3.30 E+06	H	6.80	A	—	—
Indeno(1,2,3-cd)pyrene	193-39-5	276.3	Solid	5.30 E-04	+	—	—	1.00 E-10	+	6.95 E-08	H	1.60 E+06	H	6.58	A	—	—
Phenols																	
Phenol	108-94-2	94.1	Liquid	8.70 E+04	E	1.06	L	0.524	E	3.97 E-07	E	14	A	1.46	E	1.2	L
4-Methylphenol	106-44-5	108.1	Liquid	2.40 E+04	P	1.04	K	1.30 E-01	E	9.60 E-07	E	1.70 E+01	P	1.94	E	—	—
2-Methylphenol	95-48-7	108.1	Liquid	1.00 E+04	+	104	K	3.10 E-04	E	1.60 E-06	E	—	—	1.95	E	18	—
Pesticides																	
4,4-DDE	72-55-9	318.0	Solid	4.00 E-02	B	—	—	6.50 E-06	B	6.80 E-05	+	—	—	—	—	—	—
Dieldrin	60-57-1	380.9	Solid	1.95 E-01	B	—	—	1.80 E-07	B	4.50 E-07	+	1.70 E+03	+	6.20	+	1.20 E+03	B
Heptachlor epoxide	1024-57-3	389.0	Solid	3.5 E-01	+	—	—	3.00 E-04	+	4.39 E-04	+	2.20 E+02	+	2.70	A	1.44 E+04	+
PCBs																	
Aroclor 1248	12672-29-6	288	Liquid	2.0 E-01	Q	—	—	1.8 E-04	+	4.4 E-04	+	2.10 E+04	P	5.89	+	—	—
Aroclor 1254	11097-69-1	327.0	Solid	5.00 E-02	P	1.51	P	6.00 E-05	P	2.70 E-03	P	—	—	6.47	P	—	—
Aroclor 1260	11096-82-5	327.0	Resin	1.4 E-02	Q	—	—	1.1 E-05	Q	2.5 E-04	Q	—	—	6.91	+	—	—

Key at end of table.

Table 5-1 (Cont.)

Key:

- A = Mabey, W., *et. al.*, 1982, Aquatic Fate Process Data for Organic Priority Pollutants.
B = Smith, J., *et. al.*, 1988, Manmade Organic Compounds in the Surface Waters of the United States - A Review of Current Understanding.
C = Mackay, D. and W. Shiu, 1981, *J. Phys. Chem. Ref. Data*, 19:1175-1179.
D = Lyman, W., *et. al.*, 1983, *Handbook of Chemical Property Estimation Methods*, McGraw-Hill Book Company.
E = Howard, P., 1990, *Handbook of Environmental Fate and Exposure Data for Organic Chemicals*, Volume 1, Lewis Publishers, Inc.
F = Windholtz, M., *et. al.*, 1976, *The Merck Index*, 9th Edition, Merck and Company Inc.
G = Weast, R., ed., 1983, *Handbook of Chemistry and Physics*, 63rd Edition, CRC Press.
H = Clement Associates, Inc., 1989, Draft Toxicological Profile for Polycyclic Aromatic Hydrocarbons.
K = Verschueren, K., 1983, *Handbook of Environmental Data on Organic Chemicals*, VanNostrand Reinhold, New York.
L = Arthur D. Little, Inc. 1989, The Installation Program Toxicology Guide, Volumes 1 to 4.
N = EPA (1986) Superfund Public Health Evaluation Manual.
+ = Miscellaneous Physical Constant Handbooks.
P = Cohen, R., *et. al.* 1993, DNALP Site Evaluation, CRC Press.
Q = EPA (1989) Determining Soil Response Action Levels Based on Potential Contaminant Migration to Groundwater: A Compendium of Examples.



SOURCE: Ecology and Environment 1992; Adapted from Smith and Dragun, 1984.

Figure 5-1
TRANSFORMATION REACTIONS FOR VARIOUS CHLORINATED ORGANICS
IN SOIL-GROUNDWATER SYSTEMS

6. HUMAN HEALTH RISK EVALUATION

6.1 INTRODUCTION

6.1.1 Overview

The inactive Dearcop Farm site is located on approximately 16 acres in the town of Gates, New York. The site is the location of an inactive landfill. During its operations from 1919 until 1970, wastes from various companies were disposed of on the Dearcop Farm site.

These wastes include rubbish, office paper, wood, debris, scrap iron, foundry dirt, sand blasting debris, sand castings, and many materials that could potentially pose a threat to human health, such as waste acids, heavy metals, waste oil, oily sludges, and halogenated organics.

The objectives of this first phase of the human health risk evaluation are to:

- Review and summarize the analytical data for the site;
- Identify the chemicals of potential concern (COPCs);
- Develop a conceptual model for the site;
- Make a preliminary determination as to whether the site could potentially pose a threat to human health and, if so, identify for a detailed risk assessment, the human exposure pathways most likely to pose the greatest risk; and
- Identify data gaps that could impact the risk assessment.

6.1.2 Site Description and Setting

The northern 10 acres of the site are overlain by the interchange of Interstate Routes 390 and 490. A vacant lot covers the southern 6 acres. The eastern portion of these 6 acres is wooded and contains some low-lying, seasonally wet areas. The western and central

portions are open and show evidence of past grading activity. Although a chain-link fence has been installed in some areas to discourage site access, entry to the site is still possible. No streams cross the site; however, drainage ditches do run along the north and south sides of I-490. The southern drainage ditch flows eastward along the northern boundary of the vacant lot into an unnamed stream, which flows eastward into the Barge Canal, a New York State Class C surface water that can support fish propagation.

The site is located in a medium-density residential area, with a subdivision situated adjacent to its southern and southeastern sides. Soil and other materials from the Dearcop Farm site have reportedly been used as fill in some of the yards of this subdivision.

A bike path is located along the west side of the Barge Canal, to the east of the site. Other than the bike path, no schools, parks, or public facilities are known to exist in the immediate vicinity of the site. The demography of the nearby population is not expected to include exceptionally high percentages of potentially sensitive subpopulations such as young people or the elderly.

The ground surface is uneven, but the slope and drainage trend northward and eastward toward the Barge Canal. The underlying dolomitic bedrock slope and groundwater flow follow the same general direction. The groundwater is classified GA indicating that it is a potential source of drinking water, however, the area is served by a public water supply system. There are no known water supply wells located within a 2.5-mile radius of the site.

6.2 SITE INVESTIGATION SUMMARY

The site investigation focused on characterizing the nature and extent of contamination associated with the site and identifying potential migration and exposure pathways that could pose human health risks. Surface soil, subsurface soil, soil gas, and groundwater samples were collected from locations on site and in the residential area to the south. Sediment and surface water samples also were collected from site drainage ditches and the Barge Canal.

Substances detected in the various environmental media sampled are summarized in Tables 6-1 through 6-12. Metals concentrations detected in soils and sediments were compared to the 90th percentile values for eastern United States soils (Shacklette and Boerngen 1984) to determine which sample values, if any, were higher than naturally occurring levels. Metals with concentrations exceeding the 90th percentile of background

levels were considered to be potentially site-related contaminants. All organic chemicals detected were also regarded as site-related contaminants. Contaminant concentrations, were compared to regulatory and risk-based criteria values (also included in the summary tables) in order to help select COPCs. Several bases are used to determine NYSDEC soil cleanup criteria including estimated human health risks, protection of drinking water quality, and background concentrations. The EPA risk-based concentrations, which are calculated using standard default soil ingestion assumptions, are the concentrations above which the chemicals could begin to pose potential human health risks that could be of concern. If the maximum detected concentration of a contaminant exceeded its NYSDEC criterion or if it approached or exceeded its EPA risk-based concentration, the chemical was selected as a COPC.

Table 6-2 summarizes the chemicals detected in subsurface soils. The greatest number of contaminants and generally the highest contaminant concentrations were found in on-site subsurface soils at the northern edge of the vacant lot and at the I-490 eastbound/westbound median. Site-related contamination was also found in a few soil borings collected from residential yards south of the site, where materials from the site have been used as fill. COPCs include volatile organics (mostly chlorinated hydrocarbons), semivolatile organics (PAHs, phenols, and N-nitrosodiphenylamine), pesticides, PCBs, and metals.

Although PAHs and metals were detected at elevated concentrations in subsurface soil samples collected from residential areas, given the depths at which the samples were taken, human contact with these contaminants is unlikely. In addition, excavation of back yards in the area is not likely, therefore, the presence of these contaminants in the subsurface soil samples does not present a substantial risk to human health.

Similar, but fewer, contaminants were detected in site surface soils and drainage ditch sediments. COPCs in surface soils include PAHs, PCBs, metals, radionuclides, and possibly asbestos (see Table 6-1). Because human exposures to drainage ditch sediments would occur by the same pathways as exposure to soils, these sediments were compared to soil background and criteria values (see Table 6-5). PAHs and metals were selected as COPCs in the drainage ditch sediments.

Surface water data for three samples from the site drainage ditches and one sample from a quarry located approximately ½ mile southwest of the site are summarized in Table 6-4. No chemicals detected in drainage ditch surface water that might adversely affect human

health exceeded NYSDEC Class D surface water criteria, which applies to water where only minimal contact is expected and ingestion is unlikely.

The concentrations of chemicals detected in groundwater (see Table 6-3) were compared with three sets of regulatory criteria: federal maximum contaminant levels (MCLs) for drinking water, NYSDEC Class GA Groundwater Standards (for groundwater usable as drinking water), and EPA risk-based concentrations for drinking water calculated using standard default assumptions. Federal MCLs were used instead of New York State MCLs because fewer state MCLs are available. In any case, those chemicals with state MCLs have the same MCLs as the Federal MCLs or match the New York State Class GA groundwater standards. Chemicals detected at a concentration exceeding any of the three criteria were selected as COPCs. COPCs in groundwater include VOCs (mostly chlorinated hydrocarbons), semivolatile organics (bis[2-ethylhexyl]phthalate and phenols), and metals. Generally, the highest levels of groundwater contamination were found where subsurface soil was also highly contaminated (DR-2, MW-10S, DR-3) and downgradient of these areas along the Barge Canal (DR-1). High concentrations of metals were detected in MW-5S which is located in the residential area south of the site; however, these concentrations may be due to the high suspended sediment content of the sample. BTEX compounds (benzene, toluene, ethylbenzene, and xylene) were detected in most of the deep wells at the site but in only a few of the shallow wells. As explained in Section 4.5.3, BTEX compounds in the deep wells are thought to be due to the natural gas deposits encountered during drilling operations at the site rather than site-related contamination.

Many of the VOCs detected in subsurface soils and groundwater were also detected in soil gas. Volatile contaminants can migrate via the soil gas and can infiltrate through building foundations to indoor air or be released at the soil surface to outdoor air. However, because of the mechanisms that limit the rate of contaminant migration in soil gas and the dilution that occurs upon release to indoor or outdoor air, the resultant concentrations in breathing zone air are much lower than in the soil gas. For this reason, soil gas contaminant concentrations presented in Table 6-8 were evaluated by comparing estimated indoor air concentrations (maximum observed soil gas concentration times a dilution factor of 5×10^{-4}) and estimated outdoor air concentrations (maximum observed soil gas concentration times a dilution factor of 1×10^{-6}) to New York State Annual Air Guideline Concentrations (NYSDEC 1991b) and

EPA Region 3 risk-based concentrations for air, which are based on residential inhalation exposure.

The attenuation factor for outdoor air, 1×10^{-6} , was derived using the Millington-Quirck model for estimating the steady-state volatilization flux from a subsurface contamination source combined with the near-field box model for estimating the downwind air concentration from the total flux. The equations used and the variable values assumed are described in Appendix I. The estimated outdoor air concentrations, which are also presented in Table 6-8, were obtained by multiplying the maximum observed concentrations in soil gas by the 1×10^{-6} attenuation factor. The estimated outdoor air concentrations for all contaminants detected in soil gas were at least one order of magnitude lower than either of their criteria values.

The attenuation factor used to estimate indoor air screening concentrations, 5×10^{-4} was derived from a model developed by Johnson and Ettinger (1991) for vapor infiltration through cracks in basement floors and walls from an infinite source. The model and the assumptions used are described in Appendix I. Based on the maximum observed soil gas concentrations, all of which were detected within the landfill, times the 5×10^{-4} attenuation factor, the estimated indoor air concentrations of benzene, 1,1-DCE, methylene chloride, TCE, and vinyl chloride exceed both of their risk-based criteria (see Table 6-8). The highest concentrations were detected in the vacant lot south of I-490 and the I-490 east-bound/westbound median. This indicates that if there were a residence in these on-site areas, inhalation of benzene, 1,1-DCE, methylene chloride, TCE, and vinyl chloride in indoor air could potentially pose human health risks. However, there are currently no residences on the landfill site and it is highly unlikely that homes would be constructed there in the future.

Contaminant concentrations measured in soil gas in the residential area to the south of the site and along the southern edge of the site were much lower than the concentrations found in the landfill, suggesting that volatiles are not migrating far beyond the landfill area. Indoor air concentrations estimated for the residential areas are presented in Table 6-9, which summarizes soil gas concentrations within 100 feet of the residential areas where indoor exposures might occur under existing conditions, or could occur in the future. None of the indoor air concentrations, which are based on the maximum observed soil gas concentrations in these areas, exceeded health-based criteria. The concentration of only one contaminant (TCE) even approached its criteria level. The maximum TCE concentration detected in soil

gas outside of the landfill areas during the Phase I RI investigation, $200 \mu\text{g}/\text{m}^3$, was found in the back yard at 206 Dearcop Drive; the corresponding indoor air concentration was estimated to be $0.1 \mu\text{g}/\text{m}^3$, which is approximately one quarter of the NYS Annual Guideline.

Preliminary results from Phase II sampling showed a TCE concentration of $580 \mu\text{g}/\text{m}^3$ in a soil gas sample taken in the back yard at 206 Dearcop Drive near the original sample; the corresponding indoor air estimate would be approximately half the criteria level. Because TCE was not detected in other samples from the same yard, the TCE levels at 206 Dearcop Drive were assumed to be the result of localized soil contamination, rather than contaminant migration in groundwater from the landfill. This localized soil contamination may have been caused by the use of landfill material as fill in the yard or by a past spill. The potential indoor air concentrations, which were conservatively estimated from these soil gas results for the purpose of screening, may overestimate the potential indoor air concentrations in the residence because the source appears to be limited (not infinite) and is located several meters from the house.

Both groundwater and surface water from the site discharge to the Barge Canal. In the surface water (see Table 6-6), selenium and bis(2-ethylhexyl)phthalate exceeded NYSDEC Class C surface water criteria. A number of chemicals that may be site related were detected in Barge Canal sediments including VOCs, PAHs, PCBs, and metals (see Table 6-7). Although natural metal concentrations in sediment may differ somewhat from natural soil concentrations, comparison with soil background levels can help identify elevated metal concentrations in sediment. Lead, mercury, and zinc were detected in sediments at concentrations exceeding the 90th percentile values for eastern United States soils. Some of the contamination found in the Barge Canal may not be site related, but could be derived from another site or even from urban runoff; for example, the concentrations of lead and PAHs detected in the sediment are comparable to concentrations typically found in urban soils. Direct human contact with these sediments is unlikely, and consequently poses little risk to human health. However, because the Barge Canal is used for fishing, two sediment contaminants that tend to bioaccumulate in fish (Aroclor 1254 and mercury) were selected as COPCs.

Data for four water samples from sewer manholes near the pumphouse on the vacant lot are summarized in Table 6-10. These data were collected to evaluate whether contaminants from the site were leaching into the sewer lines located beneath the site. As

discussed in Section 4.5.6, utility trenches (structural bedding for sewers, watermain, etc.) are not expected to be potential migration pathways since the sewer lines running beneath the site are encased in concrete or concrete cradle. In addition, because site-related contaminants were not detected or were detected at low concentrations adjacent to these trenches, it is highly unlikely that the utility trenches are potential migration pathways.

Some soil, sediment, groundwater, and surface water samples were collected for radionuclide analysis, in addition to chemical analysis. The only measure of radioactivity detected in surface water was gross beta activity ranging from 5.2 to 12 pCi/L, and probably reflect typical background values. There are no regulatory or risk-based criteria for gross beta emissions in surface water.

Radionuclide data for soils and sediments are summarized in Table 6-11 along with EPA preliminary remediation goals (PRGs), which are risk-based concentrations calculated using standard default assumptions for residential exposures. Currently, there are limited regulatory criteria for radionuclides in soil. Radionuclides with maximum detected concentrations greater than the 10^{-6} risk level PRG were selected as COPCs; however, as explained in Section 4.5.9, the detected radionuclides selected as COPCs were either present in background concentrations (actinium-228, potassium-40, radium-228, and thallium-208) or were associated with discrete areas of low-level NORM (bismuth-214, lead-212, lead-214, and radium-226).

Radionuclide results for groundwater are summarized in Table 6-12. For comparison, two regulatory criteria are included in the table: federal MCLs for drinking water and NYSDEC Class GA Groundwater Standards (or other relevant standards; see footnote). PRG concentrations corresponding to a cancer risk of 10^{-6} are also presented. Radionuclides detected at concentrations exceeding any of these criteria were selected as COPCs in groundwater; however, as explained in Section 4.5.9, the detected radionuclides selected as COPCs are either present in background concentrations (barium-140, potassium-40, and thorium-232) or are believed to be due to the NORM typical of the bedrock, and not due to the NORM found in the landfill.

Contaminants selected as COPCs are marked in Tables 6-1 through 6-12 and are summarized in Table 6-13.

6.3 CONTAMINANT MIGRATION AND EXPOSURE PATHWAYS

Figure 6-1, the conceptual site model, summarizes the potential migration and exposure pathways for contaminants originating from the Dearcop Farm site. As a result of past waste disposal activities, chemicals were released to surface soils and subsurface soils on the site. Contaminated soils from the site were apparently used as fill on some of the residential properties south of the site. Only trace concentrations of VOCs were detected in surface soils, indicating that if VOCs were originally present near the surface, most have evaporated. Contaminants were also transported by infiltrating precipitation to groundwater and by surface runoff to site drainage ditches. Both shallow groundwater and the drainage ditches discharge to the Barge Canal. VOCs in subsurface soils and groundwater can also migrate via the soil gas to the basements of nearby residences or to the soil surface where they are released to ambient air.

Under current site conditions, trespassers who enter the site could be exposed to contaminants in surface soils and drainage ditch sediments through direct contact, both dermal contact and incidental ingestion of soil via hand-to-mouth contact. Inhalation of airborne contaminants (volatile contaminant vapors emitted at the soil surface and soil particles eroded by the wind from bare soil areas) is another potential exposure route for site trespassers as well as for nearby off-site residents. Off-site residents also could potentially be exposed to volatile contaminants that may diffuse to the air in their homes. However, as discussed previously, preliminary screening of soil gas data indicates that inhalation of vapors in indoor and outdoor air is not likely to be a significant route of exposure to site contaminants. Residences in the area are served by the municipal water supply system; therefore, direct contact with groundwater contamination is unlikely. If contaminated groundwater does discharge to the Barge Canal, fishermen and swimmers could potentially be exposed to site-related chemicals through dermal contact with the surface water and eating fish caught from the canal. Fish and other aquatic organisms can absorb contaminants from sediment as well as the water columns. Therefore, individuals consuming fish caught from the canal could be indirectly exposed to contaminants in the sediment by this pathway. However, because site-related chemicals were not detected in the Phase I RI Barge Canal water samples, exposure to site-related contaminants through dermal contact with surface water is not expected to be an exposure pathway of concern for fishermen and swimmers. Although no site-related chemicals were detected during the Phase I RI, the Barge Canal water will again be sampled

during the Phase II RI. If Phase II RI samples indicate the presence of site-related contaminants in the Barge Canal water, these additional exposure pathways will be evaluated.

If land usage in the site area changes in the future, the most likely change would be the construction of additional homes near the landfill. It is unlikely that homes would be constructed directly on the landfill, and homes already exist adjacent to landfill. Thus, while the nearby population may increase, it is unlikely that future land uses would result in substantially greater exposures to nearby residents than those occurring under existing conditions. Another alternate future land use might involve conversion of the vacant lot portion of the site to a more formal recreational use, such as a playground or ball field. Although the frequency of recreational exposures would probably increase if this occurred, the pathways of exposure would remain the same as under current site conditions. Therefore, no changes would need to be made in the conceptual site model specifically to take potential future land uses into account.

6.4 CONCLUSIONS

The results of the Phase I RI investigation of the Dearcop Farm site indicate that the site contamination could pose a potential threat to human health. COPCs were detected in soils, sediments, groundwater, and surface water on and near the site. Of the potential exposure pathways, presented in Figure 6-1, the pathways most likely to pose the greatest risks are:

- Direct contact (dermal contact and incidental ingestion) with PAHs, PCBs, metals, and radionuclides in site surface soils by site trespassers.
- Inhalation of resuspended soil particles by site trespassers and possibly by off-site residents.

Concern about the potential threat to human health posed by radionuclides in soil should be tempered by the evidence that the radionuclides identified as COPCs are present at essentially background concentrations, believed to be due to local NORM, or are associated with discrete areas of low-level, on-site NORM (areas of blue sandy material suspected to be glass fines). In addition, it should be recognized that the on-site NORM does not belong to an acknowledged NORM waste sector (e.g., phosphate waste, metal mining waste) and most typical NORM exposure scenarios (e.g., downwind exposure to resuspended particulates;

on-site exposure to indoor radon, etc.) do not apply to an unoccupied site such as Dearcop Farm, where the NORM is present in very low concentrations in small, localized areas (EPA 1991).

Fishermen could potentially be exposed to site-related contaminants in the Barge Canal through fish consumption and direct contact with surface water; however, these exposures are probably minor compared to the pathways listed above. Additionally, there are other potential sources, such as urban soil and road dust, for some of the chemicals like lead, zinc, and PAHs found at elevated levels in the canal sediments. Therefore, it is not clear that the sediment COPCs are actually site related.

6.5 DATA GAPS

An important data gap that could affect the risk assessment is the lack of local background soil samples. Background soil data is particularly important because metals occur naturally in soils and because most of the NYSDEC criteria for soils are based on local background concentrations. Radionuclides also are naturally present in soil and comparisons with background data are needed to separate background levels from those potentially due to site contamination. Background surface soil samples should be collected from nearby areas that are not affected by the site.

Additional sediment sampling and analysis is also recommended to determine if the site is a likely source of the Aroclor 1254 and mercury contamination detected in the Barge Canal. This additional sediment data would be used to determine if fish consumption is a potential exposure pathway for site-derived chemicals that is likely to pose a risk to human health.

Another data gap is the lack of off-site surface soil data from yards where site materials were used as fill. These data are needed to evaluate potential direct exposures of residents to soil contaminants in their yards.

These data gaps will be addressed in the Phase II RI. Potential risks to future on-site construction/utility workers who might disturb soil or fill on site from direct contact with the soil or inhalation of vapors, and the potential risks to residents from direct contact with (or ingestion of) contaminated groundwater also will be discussed in the Phase II RI.

In addition, if Phase II RI analytical results for the Barge Canal water samples indicate the presence of COPCs, additional exposure pathways such as dermal contact with surface water by fishermen and swimmers will be evaluated and discussed.

Table 6-1
SUMMARY OF CONTAMINANTS DETECTED IN SURFACE SOIL

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^c	Frequency of Detection Above EPA RBC for Residential Soil
Volatiles (µg/kg)									
2-Butanone	1/20	—	4.0	NA	—	300	0	3,900,000	0
Carbon Disulfide	3/20	2.0	3.0	NA	—	2,700	0	7,800,000	0
Chlorobenzene	1/20	—	2.0	NA	—	1,700	0	1,600,000	0
Toluene	3/20	1.0	18.0	NA	—	1,500	0	16,000,000	0
Trichloroethene	2/20	2.0	2.0	NA	—	700	0	110,000	0
Xylene (total)	1/20	—	1.0	NA	—	1,200	0	160,000,000	0
Semivolatiles (µg/kg)									
Acenaphthene	1/20	—	21.0	NA	—	50,000	0	4,700,000	0
Benzo(a)anthracene ^f	1/20	—	200	NA	—	330	0	1,100	0
Benzo(a)pyrene ^f	1/20	—	280	NA	—	330	0	160	1
Benzo(b)fluoranthene ^f	12/20	51.0	430	NA	—	1,100	0	1,300	0
Benzo(g,h,i)perylene	6/20	37.0	210	NA	—	50,000	0	7,700	0
Carbazole	1/20	—	56.0	NA	—	NA	—	60,000	0
Chrysene ^f	1/20	—	260	NA	—	400	0	NA	—
Dibenz(a,h)anthracene ^f	1/20	—	85.0	NA	—	330	0	150	0
Diethylphthalate	1/20	—	63.0	NA	—	7,100	0	63,000,000	0

Key at end of table.

Table 6-1									
SUMMARY OF CONTAMINANTS DETECTED IN SURFACE SOIL									
Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^c	Frequency of Detection Above EPA RBC for Residential Soil
Fluoranthene	11/20	22.0	390	NA	—	50,000	0	3,100,000	0
Fluorene	1/20	—	24.0	NA	—	50,000	0	3,100,000	0
Indeno(1,2,3-cd)pyrene ^f	6/20	31.0	240	NA	—	3,200	0	590	0
Phenanthrene	5/20	42.0	230	NA	—	50,000	0	NA	—
Pyrene	12/20	33.0	370	NA	—	50,000	0	2,300,000	0
Pesticides (µg/kg)									
Alpha chlordane	2/20	19.0	86.0	NA	—	NA	—	920	0
PCBs (µg/kg)									
Aroclor 1254 ^f	12/20	31.0	1,550	NA	—	100	5	160	4
Aroclor 1260 ^f	11/20	26.0	945	NA	—	100	5	160	2
Inorganics (mg/kg)									
Aluminum	20/20	573	4,090	128,000	0	30 ^e	20	230,000	0
Arsenic	20/20	0.83	7.8	16.0	0	7.5 ^e	1	23	0
Barium	20/20	16.3	1,550	867	1	300 ^e	1	5,500	0
Beryllium	4/20	0.30	0.39	1.81	0	0.14 ^e	3	0.28	4
Cadmium	19/20	0.48	8.8	NA	—	1 ^e	12	39	0
Calcium	20/20	368	130,000	14,400	4	NA ^e	—	NA	—

Key at end of table.

Table 6-1

SUMMARY OF CONTAMINANTS DETECTED IN SURFACE SOIL

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^c	Frequency of Detection Above EPA RBC for Residential Soil
Chromium	20/20	2.2	62.9	112	0	10 ^c	12	7,800	0
Cobalt ^f	18/20	2.6	620	19.8	4	30.0 ^c	3	NA	—
Copper ^f	20/20	7.1	1,540	48.7	10	25.0 ^c	10	2,900	0
Iron	20/20	4,600	43,600	54,100	0	2,000 ^c	20	NA	—
Lead ^f	20/20	5.3	421	33.0	12	30 ^c	12	NA	—
Magnesium	20/20	100	13,900	10,700	2	NA ^c	—	NA	—
Manganese	20/20	109	938	1,450	0	NA ^c	—	390	12
Mercury	3/20	0.13	0.17	0.265	0	0.1	3	23	0
Nickel ^f	20/20	2.0	160	38.2	10	13.0 ^c	11	1,600	0
Potassium	20/20	53.6	1,500	23,500	0	4,000 ^c	0	NA	—
Selenium	5/5 ^d	0.22	0.71	0.941	0	2.0 ^c	0	390	0
Silver	17/20	0.75	22.4	NA	—	200	0	390	0
Sodium	4/20	114	3,720	17,400	0	3,000 ^c	1	NA	—
Vanadium	15/20	5.8	16.4	140	0	150 ^c	0	550	0
Zinc ^f	20/20	14.3	858	104	6	20 ^c	17	23,000	0
Cyanide	2/20	0.66	1.1	NA	—	NA	—	1,600	0

Key at end of table.

Table 6-1									
SUMMARY OF CONTAMINANTS DETECTED IN SURFACE SOIL									
Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^c	Frequency of Detection Above EPA RBC for Residential Soil
Asbestos and Other Fibers (%)									
Chrysotile ^f	1/19	—	1.0	NA	—	NA	—	NA	—
Cellulose	13/19	1.0	10.0	NA	—	NA	—	NA	—

^a Shacklette and Boerger 1984.

^b NYSDEC 1992.

^c USEPA 1993. Risk-based concentrations for residential soil.

^d Although 19 samples were analyzed for selenium, only 5 of 19 values were not rejected through the quality assurance program.

^e Value reported or site background.

^f Selected as a COPC.

Key:

ND = Not detected.

NA = Not available.

R = Value rejected through quality assurance program.

Table 6-2 SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL									
Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC- Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^d	Frequency of Detection Above EPA RBC for Residential Soil
Volatiles (µg/kg)									
Acetone ^c	4/37	85	260,000	NA	—	200	2	7,800,000	0
Benzene	1/37	—	2	NA	—	60	0	41,000	0
2-Butanone	10/37	2	44	NA	—	300	0	3,900,000	0
Carbon Disulfide	1/37	—	2	NA	—	2,700	0	7,800,000	0
Chlorobenzene	1/37	—	3	NA	—	1,700	0	1,600,000	0
1,1-Dichloroethane ^c	7/37	4	3,700	NA	—	200	1	7,800,000	0
1,2-Dichloroethane ^c	4/37	2	320,000	NA	—	100	3	13,000	1
Total 1,2-Dichloroethene	8/37	1	1,100	NA	—	NA	NA	780,000	0
Ethylbenzene ^c	2/37	3	110,000	NA	—	5,500	1	7,800,000	0
4-Methyl-2-pentanone	1/37	—	310	NA	—	1,000	0	3,900,000	0
Methylene chloride ^c	1/37	—	70,000	NA	—	100	1	160,000	0
Tetrachloroethene	2/37	4	162	NA	—	1,400	0	23,000	0
Toluene ^c	15/37	1	3,400,000	NA	—	1,500	2	16,000,000	0
Trichloroethene ^c	9/37	4	23,000	NA	—	700	1	110,000	0
1,1,1-Trichloroethane ^c	7/37	2	880,000	NA	—	800	2	7,000,000	0
Xylene (total) ^c	8/37	1	580,000	NA	—	1,200	2	160,000,000	0

Key at end of table.

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Table 6-2
SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^d	Frequency of Detection Above EPA RBC for Residential Soil
Semivolatiles (µg/kg)									
Bis(2-ethylhexyl)phthalate	3/37	28	247	NA	—	50,000	0	85,000	0
Butylbenzylphthalate	1/37	—	48	NA	—	50,000	0	16,000,000	0
Dibenzofuran	4/37	29	58	NA	—	6,200	0	NA	NA
Diethylphthalate	3/37	—	50	NA	—	7,100	0	63,000,000	0
Di-n-butylphthalate	5/37	27	500	NA	—	8,100	0	7,800,000	0
2-Methylphenol ^e	1/37	—	3,900	NA	—	330	1	3,900,000	0
4-Methylphenol ^e	2/37	310	4,000	NA	—	900	1	390,000	0
N-nitrosodiphenylamine ^c	1/37	—	140,000	NA	—	NA	NA	240,000	0
Phenol ^e	2/37	200	540,000	NA	—	330	1	47,000,000	0
Acenaphthene	3/37	30	83	NA	—	50,000	0	4,700,000	0
Anthracene	6/37	22	98	NA	—	50,000	0	23,000,000	0
Benzo(a)anthracene ^c	9/37	50	2,200	NA	—	330	3	1,100	2
Benzo(a)pyrene ^c	8/37	41.5	3,100	NA	—	330	2	160	4
Benzo(b)fluoranthene ^c	10/37	40	8,300	NA	—	1,100	2	1,300	2
Benzo(g,h,i)perylene ^c	10/37	29	5,000	NA	—	50,000	0	7,700	0
Benzo(k)fluoranthene ^c	8/37	59	2,400	NA	—	1,100	1	3,100	0

Key at end of table.

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Table 6-2

SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^d	Frequency of Detection Above EPA RBC for Residential Soil
Chrysene ^c	11/37	24	3,700	NA	—	400	3	NA	—
Dibenzo(a,h)anthracene ^c	5/37	19	2,000	NA	—	330	2	150	2
Fluoranthene	9/37	32	4,700	NA	—	50,000	0	3,100,000	0
Fluorene	3/37	40	58.5	NA	—	50,000	0	3,100,000	0
Indeno(1,2,3-cd)pyrene ^c	9/37	27	4,900	NA	—	3,200	1	590	1
2-Methylnaphthalene	6/37	28	84	NA	—	36,400	0	NA	—
Naphthalene	7/37	20	89.5	NA	—	13,000	0	3,100,000	0
Phenanthrene	10/37	31	640	NA	—	50,000	0	NA	—
Pyrene	10/37	18	5,000	NA	—	50,000	0	2,300,000	0
Pesticides (µg/kg)									
Alpha chlordane	1/37	—	48.5	NA	NA	NA	NA	920	0
Alpha-BHC	1/37	—	55	NA	NA	110	0	270	0
Beta-BHC	1/37	—	180	NA	NA	200	0	660	0
4,4'-DDD	1/37	—	41	NA	NA	2,900	0	5,000	0
4,4'-DDE	1/37	—	4.6	NA	NA	2,100	0	3,500	0
4,4'-DDT	2/37	4.0	20	NA	NA	2,100	0	3,500	0
Dieldrin	1/37	—	29	NA	—	44	0	75	0

Key at end of table.

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Table 6-2
SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^d	Frequency of Detection Above EPA RBC for Residential Soil
Endosulfan I	1/37	—	123.5	NA	—	900	0	3,900	0
Endosulfan sulfate	1/37	—	10	NA	—	1,000	0	NA	NA
Endrin ^c	2/37	24.8	200	NA	—	100	1	2,300	—
Gamma Chlordane	2/37	68.5	170	NA	—	540	0	920	0
Heptachlor ^c	3/37	22	180	NA	—	100	1	270	0
Heptachlor epoxide ^c	2/37	—	870	NA	—	20	1	130	1
Lindane ^c	3/37	4.7	280	NA	—	60	1	920	0
Methoxychlor	1/37	—	1,400	NA	—	10,000	0	390,000	0
PCBs (µg/kg)									
Aroclor 1248 ^c	4/36	43	200,000	NA	—	10,000	1	160	3
Aroclor 1254 ^c	9/36	16	3,300	NA	—	10,000	0	160	4
Aroclor 1260 ^c	4/36	35	4,200	NA	—	10,000	0	160	2
Inorganics (mg/kg)									
Aluminum	37/37	372	11,300	128,000	0	30 ^e	37	230,000	0
Arsenic	37/37	0.50	7.0	16.0	0	7.5 ^e	0	23	0
Barium ^c	37/37	14.0	1,150	867	1	300 ^f	7	5,500	0
Beryllium	15/37	0.25	0.71	1.81	0	0.14 ^g	15	0.28	10

Key at end of table.

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Table 6-2 SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL									
Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^d	Frequency of Detection Above EPA RBC for Residential Soil
Cadmium ^c	37/37	0.75	111	NA	—	1 ^c	26	39	1
Calcium	37/37	342	87,500	14,400	16	NA ^c	NA	NA	—
Chromium ^c	37/37	2.7	15,300	112	3	10 ^c	20	78,000	0
Cobalt ^c	36/37	1.8	989	19.8	7	30 ^c	4	NA	—
Copper ^c	37/37	6.5	1,960	48.7	13	25 ^c	14	2,900	0
Iron	37/37	3,410	66,200	54,100	2	2,000 ^c	37	NA	—
Lead ^c	37/37	2.0	1,900	33.0	11	30 ^b	11	NA	—
Magnesium	37/37	264	23,500	10,700	12	NA ^c	NA	NA	—
Manganese ^c	37/37	91.7	3,320	1,450	2	NA ^c	NA	390	14
Mercury ^c	8/37	0.13	0.59	0.265	4	0.1	8	23	0
Nickel ^c	36/37	4.7	3,620	38.2	13	13 ^c	21	1,600	1
Potassium	34/37	51.3	1,785	23,500	0	4,000 ^c	0	NA	—
Selenium	14/37	0.22	0.90	0.941	0	2 ^c	0	390	0
Silver	13/37	0.23	51.9	NA	—	200	0	390	0
Sodium	33/37	72.3	5,070	17,400	0	3,000 ^c	1	NA	—
Thallium	5/37	0.24	0.26	13.8	0	20 ^c	0	NA	—
Vanadium	27/37	1.9	26.9	140	0	150 ^c	0	550	0

Key at end of table.

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Table 6-2

SUMMARY OF CONTAMINANTS DETECTED IN SUBSURFACE SOIL

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^d	Frequency of Detection Above EPA RBC for Residential Soil
Zinc	31/37	9.1	1,740	104	12	20 ^c	29	23,000	0
Cyanide	3/37	0.66	8.2	NA	NA	NA	NA	1,600	0
Asbestos and Other Fibers (%)									
Amosite	1/25	—	< 1.0						
Cellulose	15/27	1.0	25.0						
Chrysotile	6/27	TR	6.5						
Other fibers	1/27	—	1.0						

^a Shacklette and Boerngen 1984.^b NYSDEC 1992.^c Value reported or site background.^d USEPA 1993. Risk-based concentrations for residential soil.^e Selected as a COPC.

Key:

ND = Not detected.

NA = Not available.

TR = Trace.

Table 6-3

SUMMARY OF CONTAMINANTS DETECTED IN GROUNDWATER

Chemical	Frequency of Detection	Minimum	Maximum	Federal Maximum Contaminant Level ^a	Frequency of Detection Above Federal Maximum Contaminant Level	NYSDEC Class GA Groundwater Standard ^b	Frequency of Detection Above NYSDEC Class GA Groundwater Standard	EPA RBC for Drinking Water ^c	Frequency of Detection Above EPA RBC for Drinking Water
Volatiles (µg/kg)									
Benzene ⁱ	6/23	10.0	57.0	5.0	6	0.7	6	0.35	6
2-Butanone	1/20	—	14	NA	—	NA	—	1,800	0
Chlorobenzene ⁱ	1/23	—	11.0	100	0	5.0	1	39	0
Chloroform ⁱ	1/23	—	3.0	100	0	7.0	0	0.2	1
1,1-Dichloroethane ⁱ	15/23	5.0	4,300	NA	—	5.0	14	810	4
1,1-Dichloroethene ⁱ	9/23	1.0	310	7.0	6	5.0	6	0.054	9
Total 1,2-Dichloroethene ⁱ	14/23	6.0	2,300	70 ^d	7	5.0	14	55	7
Ethylbenzene	5/23	1.0	5.0	700	0	5.0	0	1,300	0
Tetrachloroethene ⁱ	1/20	—	2.0	5.0	0	5.0	0	1.3	1
Toluene ⁱ	12/23	1.0	480	1,000	0	5.0	7	750	0
1,1,1-Trichloroethane ⁱ	10/23	1.0	1,700	200	2	5.0	7	1,300	1
Trichloroethene ^j	13/23	1.0	350	5.0	9	5.0	9	1.9	12
Vinyl chloride ^j	4/23	170	660	2.0	4	2.0	4	0.023	4
Total xylenes ⁱ	10/23	1.0	21.0	10,000	0	5.0	6	12,000	0

Key at end of table.

Table 6-3

SUMMARY OF CONTAMINANTS DETECTED IN GROUNDWATER

Chemical	Frequency of Detection	Minimum	Maximum	Federal Maximum Contaminant Level ^a	Frequency of Detection Above Federal Maximum Contaminant Level	NYSDEC Class GA Groundwater Standard ^b	Frequency of Detection Above NYSDEC Class GA Groundwater Standard	EPA RBC for Drinking Water ^c	Frequency of Detection Above EPA RBC for Drinking Water
Semivolatiles (µg/L)									
Bis(2-ethylhexyl)phthalate	5/20	1.0	20.0	6	2	50	0	5.7	2
Diethylphthalate	1/20	—	1.0	NA	—	NA	—	29,000	0
Di-n-octylphthalate	2/20	1.0	1.0	NA	—	NA	—	730	0
2-Methylphenol	1/20	—	1.0	NA	—	1.0 (total phenols cpds)	0	1,800	0
4-Methylphenol ⁱ	1/20	—	4.0	NA	—	1.0 (total phenols cpds)	1	180	0
Naphthalene	1/20	—	1.0	NA	—	NA	—	1,500	0
Phenol ⁱ	4/20	9.0	72.0	NA	—	1.0 (total phenols cpds)	4	22,000	0
Inorganics (µg/L)									
Aluminum	20/20	158	90,300	200 ^e	14	NA	—	110,000	0
Arsenic ⁱ	13/20	1.1	37.9	50	0	25	1	11	1
Barium	17/20	22.0	612	2,000	0	1,000	0	2,600	0
Beryllium ⁱ	1/20	—	4.5	4	1	3	1	19	0
Cadmium ⁱ	4/20	2.2	24.3	5.0	1	10	1	18	1

Key at end of table.

Table 6-3

SUMMARY OF CONTAMINANTS DETECTED IN GROUNDWATER

Chemical	Frequency of Detection	Minimum	Maximum	Federal Maximum Contaminant Level ^a	Frequency of Detection Above Federal Maximum Contaminant Level	NYSDEC Class GA Groundwater Standard ^b	Frequency of Detection Above NYSDEC Class GA Groundwater Standard	EPA RBC for Drinking Water ^c	Frequency of Detection Above EPA RBC for Drinking Water
Calcium	20/50	37,900	1,400,000	NA	—	NA	—	NA	—
Chromium ⁱ	11/20	6.5	144	100	1	50	3	37,000	0
Cobalt	5/20	5.4	91.3	NA	—	NA	—	NA	—
Copper ⁱ	12/20	3.6	341	1,300 ^f	0	200	2	1,400	0
Iron	20/20	170	170,000	300 ^e	15	300 ^g	15	NA	—
Lead ⁱ	14/20	1.3	107	15 ^f	1	25	1	NA	—
Magnesium	20/20	10,200	363	NA	—	NA	—	NA	—
Manganese ^j	15/20	17.5	5,760	50 ^e	9	300 ^g	3	180	5
Nickel ⁱ	9/20	7.3	144	100	2	NA	—	730	0
Potassium	20/20	1,700	80,500	NA	—	NA	—	NA	—
Selenium ⁱ	3/20	1.1	13.2	50	0	10	1	180	0
Sodium	16/20	20,000	6,000,000	NA	—	20,000	19	NA	—
Thallium ⁱ	1/20	—	2.4	2.0	1	NA	—	2.5	0
Vanadium	6/20	4.7	205	NA	—	NA	—	260	0
Zinc ⁱ	12/20	36.7	1,690	5,000 ^e	0	300	2	11,000	0
Cyanide	2/20	24.0	42.0	200	0	100	0	730	0

Key at end of table.

Table 6-3 (Cont.)

- a** USEPA May 1993, Drinking Water Regulations and Health Advisories.
- b** NYSDEC September 1, 1991, Water Quality Regulations for Surface Waters and Groundwater. Class GA groundwater is best suited as a potable water supply.
- c** USEPA 1993, Risk-Based Concentrations for Tap Water.
- d** MCL for Total-1,2-Dichloroethene is based upon the MCL for the cis-isomer.
- e** Secondary MCL.
- f** Action level.
- g** Total for iron and manganese should not exceed 500 µg/L.
- h** The elevated concentrations of aluminum and iron suggest that some of the groundwater samples may have contained suspended sediment. Some of the other elevated metals concentrations identified as being of potential may be associated with these suspended sediments.
- i** Selected as a COPC.

Key:

ND = Not detected.
NA = Not available.

Table 6-4					
SUMMARY OF CONTAMINANTS DETECTED IN DRAINAGE DITCH AND QUARRY SURFACE WATER					
Chemical	Frequency of Detection	Range of Detected Concentrations		NYSDEC Class D Surface Water Criteria ^a	Frequency of Detection Above NYSDEC Class D Surface Water Criteria
		Minimum	Maximum		
Volatiles (µg/L)					
Total 1,2-Dichloroethene	1/4	-	1.5	NA	-
Toluene	1/4	-	1.0	NA	-
Semivolatiles (µg/L)					
Bis(2-ethylhexyl)phthalate	3/4	1.0	4.0	NA	-
Diethylphthalate	1/4	-	3.0	NA	-
Inorganics (µg/L)					
Aluminum	2/4	158	1,230	NA	-
Arsenic	1/4	-	1.6	360	0
Barium	4/4	51.1	89.7	NA	-
Calcium	4/4	80,600	128,000	NA	-
Copper	2/4	9.0	11.3	45.2 - 65.4 ^b	0
Iron	3/4	235	967	300	2
Lead	3/4	1.9	11.8	290 - 478 ^b	0
Magnesium	4/4	19,100	30,000	NA	-

Key at end of table.

Table 6-4
**SUMMARY OF CONTAMINANTS DETECTED IN DRAINAGE DITCH
 AND QUARRY SURFACE WATER**

Chemical	Frequency of Detection	Range of Detected Concentrations		NYSDEC Class D Surface Water Criteria ^a	Frequency of Detection Above NYSDEC Class D Surface Water Criteria
		Minimum	Maximum		
Manganese	4/4	9.4	600	NA	-
Mercury	1/4	-	0.33	NA	-
Potassium	4/4	2,490	3,790	NA	-
Selenium	1/4	-	1.6	NA	-
Sodium	4/4	56,600	533,000	NA	-
Zinc	2/4	52.2	260	733 - 1,020 ^b	0

^a NYSDEC September 1, 1991, Water Quality Regulations for Surface Waters and Groundwaters. Class D surface water is best suited for secondary contact. (Minimal contact expected, ingestion is unlikely.)

^b Criterion is hardness dependent, per sample.

Key:

NA = Not available.

Table 6-5
SUMMARY OF CONTAMINANTS DETECTED IN DRAINAGE DITCH SEDIMENT

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^c	Frequency of Detection Above EPA RBC for Residential Soil
Volatiles (µg/kg)									
Carbon Disulfide	1/3	—	10.0	NA	—	2,700	0	7,800,000	0
Semivolatiles (µg/kg)									
Acenaphthene	1/3	—	490	NA	—	50,000	0	4,700,000	0
Anthracene	2/3	86.0	790	NA	—	50,000	0	23,000,000	0
Benzo(a)anthracene ^d	2/3	186	1,900	NA	—	330	1	1,100	1
Benzo(a)pyrene ^d	2/3	185	1,500	NA	—	330	1	160	2
Benzo(b)fluoranthene ^d	3/3	61.0	2,300	NA	—	1,100	1	1,300	1
Benzo(g,h,i)perylene	2/3	143	1,000	NA	—	50,000	0	7,700	0
Benzo(k)fluoranthene	1/3	—	308	NA	—	1,100	0	3,100	0
Carbazole	1/3	—	400	NA	—	—	—	60,000	0
Chrysene ^d	3/3	53.0	2,000	NA	—	400	1	—	—
Dibenzo(a,h)anthracene ^d	2/3	100	540	NA	—	330	1	150	1
Dibenzofuran	1/3	—	280	NA	—	6,200	0	—	—
Fluoranthene	3/3	110	3,900	NA	—	50,000	0	3,100,000	0
Fluorene	2/3	92.0	450	NA	—	50,000	0	3,100,000	0

Key at end of table.

Table 6-5
SUMMARY OF CONTAMINANTS DETECTED IN DRAINAGE DITCH SEDIMENT

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^c	Frequency of Detection Above EPA RBC for Residential Soil
Indeno(1,2,3-cd)pyrene ^d	2/3	200	1,400	NA	—	3,200	0	590	1
2-Methylnaphthalene	1/3	—	130	NA	—	36,400	0	—	—
Naphthalene	1/3	—	260	NA	—	13,000	0	3,100,000	0
Phenanthrene	3/3	68.0	3,100	NA	—	50,000	0	—	—
Pyrene	3/3	94.0	3,400	NA	—	50,000	0	2,300,000	0
Pesticides (µg/kg)									
alpha-Chlordane	2/3	2.9	5.7	NA	—	—	—	920	0
Dieldrin	1/3	—	3.2	NA	—	44.0	0	75.0	0
Endosulfan sulfate	1/3	—	16.0	NA	—	1,000	0	—	—
Endrin ketone	1/3	—	21.0	NA	—	—	—	—	—
Inorganics (mg/kg)									
Aluminum	3/3	2,090	2,320	128,000	0	30	3	23,000	0
Arsenic	3/3	0.79	2.3	16.0	0	7.5	0	23	0
Barium	3/3	15.8	55.7	867	0	300	0	5,500	0
Cadmium ^d	3/3	1.5	2.4	—	—	1.0	3	39	0
Calcium	3/3	21,200	38,500	14,400	3	—	—	—	—

Key at end of table.

Table 6-5
SUMMARY OF CONTAMINANTS DETECTED IN DRAINAGE DITCH SEDIMENT

Chemical	Frequency of Detection	Minimum	Maximum	USGS 90th Percentile Concentration for Eastern U.S. Soils ^a	Frequency of Detection Above USGS 90th Percentile Concentration for Eastern U.S. Soils	NYSDEC-Recommended Soil Cleanup Goal ^b	Frequency of Detection Above NYSDEC-Recommended Soil Cleanup Goal	EPA RBC for Residential Soil ^c	Frequency of Detection Above EPA RBC for Residential Soil
Chromium	3/3	5.0	8.2	112	0	10	0	7,800	0
Cobalt	1/3	—	6.1	19.8	0	30	0	—	—
Copper ^d	3/3	7.6	74.6	48.7	1	25	1	2,900	0
Iron	3/3	4,500	8,430	54,100	0	2,000	3	—	—
Lead ^d	3/3	2.3	137	33.0	1	30	1	—	—
Magnesium	3/3	3,880	11,500	10,700	1	—	—	—	—
Manganese	3/3	161	341	1,450	0	—	—	390	0
Mercury ^d	1/3	—	3.0	0.265	1	0.1	1	23	0
Nickel	3/3	5.1	6.5	38.2	0	13	0	1,600	0
Potassium	3/3	292	325	23,500	0	4,000	0	—	—
Silver	1/3	—	1.1	—	—	200	0	390	0
Sodium	3/3	109	934	17,400	0	3,000	0	—	—
Vanadium	2/3	6.9	10.0	140	0	150	0	550	0
Zinc ^d	3/3	35.0	125	104	1	20	3	23,000	0

Key at end of table.

Table 6-5 (Cont.)

^a Shacklette and Boerngen 1984.

^b NYSDEC 1992.

^c USEPA 1993. Risk-based concentrations for residential soil.

^d Selected as a COPC.

Key:

ND =Not detected.

NA =Not available.

Table 6-6

**SUMMARY OF CONTAMINANTS DETECTED IN
BARGE CANAL SURFACE WATER**

Chemical	Frequency of Detection	Range of Detected Concentrations		NYSDEC Class C Surface Water Criteria ^a	Frequency of Detection Above NYSDEC Class C Surface Water Criteria	EPA AWQC for Protection of Human Health ^b	Frequency of Detection Above EPA AWQC for Protection of Human Health
		Minimum	Maximum				
Volatiles (µg/L)							
Carbon disulfide	1/3	—	130	NA	—	NA	—
Total 1,2-Dichloroethene	2/3	1.0	2.0	NA	—	140,000	0
Semivolatiles (µg/L)							
Bis(2-Ethylhexyl)phthalate ^d	3/3	1.0	3.0	0.6	3	NA	—
2-Chloropyridine	3/3	2.0	3.0	NA	—	NA	—
Inorganics (µg/L)							
Aluminum	3/3	175	318	100	3	NA ^c	NA ^c
Barium	3/3	41.8	43.4	NA	—	NA	—
Calcium	3/3	81,200	83,700	NA	—	NA	—
Iron	3/3	275	346	300	2	NA	—
Lead	1/3	—	11.1	10.8 - 11.3 ^b	0	NA	—
Magnesium	3/3	18,700	19,300	NA	—	NA	—
Manganese	3/3	45.3	46.1	NA	—	NA	—

Key at end of table.

Table 6-6

**SUMMARY OF CONTAMINANTS DETECTED IN
BARGE CANAL SURFACE WATER**

Chemical	Frequency of Detection	Range of Detected Concentrations		NYSDEC Class C Surface Water Criteria ^a	Frequency of Detection Above NYSDEC Class C Surface Water Criteria	EPA AWQC for Protection of Human Health ^b	Frequency of Detection Above EPA AWQC for Protection of Human Health
		Minimum	Maximum				
Potassium	3/3	2,810	2,890	NA	—	NA	—
Selenium	3/3	1.4	1.8	1.0	3	104	0
Sodium	3/3	46,900	52,100	NA	—	NA	—

^a NYSDEC September 1, 1991, Water Quality Regulations for Surface Waters and Groundwaters. Class C surface water is suitable for fish propagation, and primary and secondary contact recreation.

^b Ambient Water Quality Criteria (USEPA 1991), Human Health Criteria recalculated values for organisms only.

^c pH dependent.

^d Selected as a COPC.

Key:

NA = Not available.

Table 6-7			
SUMMARY OF CONTAMINANTS DETECTED IN BARGE CANAL SEDIMENTS			
Chemical	Frequency of Detection	Minimum	Maximum
Volatiles (µg/kg)			
1,1-Dichloroethane	1/3	—	3.0
Total 1,2-Dichloroethene	1/3	—	5.0
Trichloroethene	1/3	—	2.0
Xylene (Total)	1/3	—	1.0
Semivolatiles (µg/kg)			
Anthracene	2/3	42.0	56.0
Benzo(a)anthracene	3/3	170	230
Benzo(a)pyrene	1/3	—	190
Benzo(b)fluoranthene	3/3	380	510
Benzo(g,h,i)perylene	3/3	170	270
Butylbenzylphthalate	1/3	—	73.0
Chrysene	3/3	260	310
Dibenzo(a,h)anthracene	3/3	91.0	110
Fluoranthene	3/3	520	580
Fluorene	2/3	53.0	590.0
Indeno(1,2,3-cd)Pyrene	3/3	230	290
Naphthalene	2/3	45.0	69.0
Phenanthrene	3/3	230	420
Pyrene	3/3	420	540
Pesticides (µg/kg)			
4,4'-DDE ^a	1/3	—	7.0
PCBs (µg/kg)			
Aroclor 1254 ^a	3/3	72.0	110
Inorganics (mg/kg)			
Aluminum	3/3	2,470	2,920
Arsenic	3/3	3.2	3.7
Barium	3/3	4.32	57.9

Table 6-7 SUMMARY OF CONTAMINANTS DETECTED IN BARGE CANAL SEDIMENTS			
Chemical	Frequency of Detection	Minimum	Maximum
Beryllium	2/3	0.38	0.43
Cadmium	3/3	1.6	2.3
Calcium	3/3	27,900	56,900
Chromium	3/3	23.4	27.1
Cobalt	3/3	4.7	7.4
Copper	3/3	34.0	44.9
Iron	3/3	8,670	9,140
Lead	3/3	66.8	135
Magnesium	3/3	6,660	10,600
Manganese	3/3	299	334
Mercury ^a	2/3	0.25	0.82
Nickel	3/3	12.8	15.4
Potassium	3/3	536	586
Selenium	1/3	—	0.44
Silver	2/3	1.3	1.4
Sodium	3/3	180	522
Zinc	3/3	224	299

^a Selected as COPC.

Table 6-8						
SUMMARY OF CONTAMINANTS DETECTED IN SOIL GAS						
Chemical	Frequency of Detection	Range of Detected Contaminants		NYS Annual Guideline Concentration ^b	EPA RBC for Air	Indoor Air Dilution Factor ^a
		Minimum	Maximum			
Volatiles (µg/m ³)						
Benzene	8/191	11.0	5,000	0.12	0.21	5.0 x 10 ⁻⁴
1,1-Dichloroethane	28/191	10.0	70,000	500	520	5.0 x 10 ⁻⁴
1,2-Dichloroethane	2/191	53.0	63.0	0.039	0.088	5.0 x 10 ⁻⁴
1,1-Dichloroethene	3/191	14.0	400	NA	0.046	5.0 x 10 ⁻⁴
cis-1,2-Dichloroethene	18/191	15.0	5,000	1,900	37	5.0 x 10 ⁻⁴
trans-1,2-Dichloroethene	19/191	13.0	15,000	360	73	5.0 x 10 ⁻⁴
Ethylbenzene	8/191	33.0	5,000	1,000	1,000	5.0 x 10 ⁻⁴
Methylene chloride	18/191	6.0	40,000	27	4.8	5.0 x 10 ⁻⁴
Toluene	9/191	52.0	5,000	2,000	420	5.0 x 10 ⁻⁴
1,1,1-Trichloroethane	30/191	1.0	5,000	1,000	1,000	5.0 x 10 ⁻⁴
Trichloroethene	53/191	9.9	51,000	0.45	1.3	5.0 x 10 ⁻⁴
Vinyl chloride	9/190	19.0	5,000	0.02	0.027	5.0 x 10 ⁻⁴
Xylenes (total)	3/191	2,300	5,000	300	7,300	5.0 x 10 ⁻⁴

Table 6-8							
SUMMARY OF CONTAMINANTS DETECTED IN SOIL GAS							
Chemical	Maximum Estimated Indoor Air Concen- tration	Frequency Above NYS Annual Guideline Concen- tration	Frequency Above EPA RBC for Air	Outdoor Air Dilution Factor	Estimated Maximum Outdoor Air Concen- tration	Frequency Above NYS Annual Guideline Concen- tration	Frequency Above EPA RBC for Air
Volatiles ($\mu\text{g}/\text{m}^3$)							
Benzene	2.5	3	2	1×10^{-6}	5×10^{-3}	0	0
1,1-Dichloroethane	35.0	0	0	1×10^{-6}	7×10^{-2}	0	0
1,2-Dichloroethane	0.032	0	0	1×10^{-6}	6.3×10^{-5}	0	0
1,1-Dichloroethene	0.20	—	2	1×10^{-6}	4×10^{-4}	0	0
cis-1,2-Dichloroethene	2.5	0	0	1×10^{-6}	5×10^{-3}	0	0
trans-1,2-Dichloroethene	7.5	0	0	1×10^{-6}	1.5×10^{-2}	0	0
Ethylbenzene	2.5	0	0	1×10^{-6}	5×10^{-3}	0	0
Methylene chloride	20.0	0	3	1×10^{-6}	4×10^{-2}	0	0
Toluene	2.5	0	0	1×10^{-6}	5×10^{-3}	0	0
1,1,1-Trichloroethane	2.5	0	0	1×10^{-6}	5×10^{-3}	0	0
Trichloroethene	25.5	17	10	1×10^{-6}	5.1×10^{-2}	0	0
Vinyl chloride	2.5	9	5	1×10^{-6}	5×10^{-3}	0	0
Xylenes (total)	2.5	300	0	1×10^{-6}	5×10^{-3}	0	0

^a USEPA 1992, Assessing potential indoor air impacts for Superfund sites.

^b NYSDEC 1991b.

^c USEPA 1993, Risk-Based Concentrations for Ambient Air.

Key:

NA = Not available.

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Table 6-9									
SUMMARY OF CONTAMINANTS DETECTED IN SOIL GAS SAMPLES FROM THE CURRENT RESIDENTIAL AREA AND BORDERING LOCATIONS									
Chemical	Frequency of Detection	Range of Detected Contaminants		NYS Annual Guideline Concentration ^b	EPA RBC for Air	Indoor Air Dilution Factor ^a	Maximum Estimated Indoor Air Concentrations	Frequency Above NYS Annual Guideline Concentration	Frequency Above EPA RBC for Air
		Minimum	Maximum						
Volatiles (µg/m ³)									
1,1-Dichloroethane	2/55	10	140	500	520	5 x 10 ⁻⁴	0.07	0	0
Trans-1-2-dichloroethene	2/55	38	58	360	73	5 x 10 ⁻⁴	0.029	0	0
Ethylbenzene	1/55	—	240	1,000	1,000	5 x 10 ⁻⁴	0.12	0	0
Methylene chloride	1/55	—	70	27	4.8	5 x 10 ⁻⁴	0.035	0	0
1,1,1-trichloroethane	2/55	16	30	1,000	1,000	5 x 10 ⁻⁴	0.015	0	0
Trichloroethene	8/55	13	200	0.45	1.3	5 x 10 ⁻⁴	0.10	0	0

^a USEPA 1992: Assessing potential indoor air impacts for Superfund sites.^b NYSDEC 1991b.

Table 6-10			
SUMMARY OF CONTAMINANTS DETECTED IN MANHOLE WATERS			
Chemical	Frequency of Detection	Minimum	Maximum
Volatiles ($\mu\text{g/L}$)			
Benzene	2/4	4	17
Bromodichloromethane	3/4	1	4
Chloroform	4/4	2	48
Ethylbenzene	11/4	—	3
Toluene	3/4	1	4
Xylene	2/4	2	10
Semivolatiles ($\mu\text{g/L}$)			
Bis(2-ethylhexyl)phthalate	2/4	3	4
Butylbenzylphthalate	1/4	—	1
1,4-Dichlorobenzene	3/4	3	6
Diethylphthalate	2/4	20	29
Di-n-butylphthalate	1/4	—	5
4-Methylphenol	2/4	7	9
Phenol	1/4	—	3
Inorganics ($\mu\text{g/L}$)			
Aluminum	3/4	334	558
Arsenic	1/4	—	1.9
Barium	4/4	40.2	90.9
Calcium	4/4	69,600	103,000
Chromium	1/4	—	8.3
Copper	4/4	22.8	120
Iron	4/4	395	2,790
Lead	4/4	1.8	16.3
Magnesium	4/4	16,500	24,100
Manganese	4/4	55.9	190
Mercury	2/4	3.2	3.4
Nickel	3/4	9.3	57.1

Table 6-10 SUMMARY OF CONTAMINANTS DETECTED IN MANHOLE WATERS			
Chemical	Frequency of Detection	Minimum	Maximum
Potassium	4/4	4,770	12,600
Selenium	2/4	1.5	2.1
Silver	2/4	24.9	26.8
Sodium	4/4	48,800	269,000
Vanadium	1/4	—	4.8
Zinc	4/4	40.5	214
Cyanide	1/4	—	10.0

Table 6-11 SUMMARY OF RADIONUCLIDES DETECTED IN SOIL/SEDIMENT SAMPLES (pCi/g dry)					
	Frequency of Detection	Minimum ^a	Maximum ^a	Residential Soil PRG at 10 ⁻⁶ Cancer Risk	Frequency Above 10 ⁻⁶ Cancer Risk Soil PRG
Gross alpha	12/14	3.9	36	NA	—
Gross beta	14/14	4.3	120	NA	—
Actinium-228	14/14	0.327	1.9	0.014	14
Bismuth-214	14/14	0.159	4.2	0.0079	14
Cesium-137	2/12	0.138	0.96	28	0
Lead-212	14/14	0.26	1.7	0.15	14
Lead-214	14/14	0.24	4.7	0.065	14
Potassium-40	10/10	0.383	14	0.077	10
Radium-226	7/14	0.697	8.2	2.3	3
Radium-228	14/14	0.327	1.9	7.9	0
Thallium-208	14/14	0.32	1.6	0.0032	14
Thorium-228	3/6	0.353	0.893	37	0
Thorium-234	2/10	0.724	3.1	11	0

^a Value shown does not include reported analytical uncertainty.

Key:

ND = Not detected.

NA = Not available.

PRG = Preliminary remediation goals for soil under residential land use.

Table 6-12

SUMMARY OF RADIONUCLIDES DETECTED IN GROUNDWATER (pCi/L)

	Frequency of Detection	Minimum ^b	Maximum ^b	Federal Maximum Contaminant Level	Frequency Above Federal MCL	NYSDEC Class GA Groundwater Standard or Relevant Standard ^a	Frequency Above NYSDEC Standard	Drinking Water PRG at 10 ⁻⁶ Cancer Risk	Frequency Above 10 ⁻⁶ Cancer Risk Drinking Water PRG
Gross alpha	1/20	—	26	15	1	15	—	NA	—
Gross beta	18/20	8.0	260	4 mrem	— ^c	1,000	0	NA	—
Radium-226 ^d	12/20	0.52	16	NA	0	3	1	0.0042	12
Radium-228 ^d	9/20	1.3	28	NA	1	3.0	3	0.018	9
Radium-226 plus Radium-228 ^d	20/20	0.87	44	5	—	5	4	0.022	20
Barium-140 ^d	1/20	—	20	NA	—	2	1	47	1
Potassium-40 ^d	4/20	43.2	108	NA	—	NA	—	1.2	4
Thorium-228 ^d	1/20	—	10.3	NA	—	7,000	0	0.0074	1

^a Applicable NYSDEC Class GA groundwater standards (from 6 NYCRR 703, Water Quality Standards, Surface Waters and Groundwater) are used for four radioanalytical parameters and indicated as such in table. Because NYSDEC has no Class GA groundwater standard for the remaining radionuclides, the relevant standard used is the radionuclide concentration listed in 6 NYCRR 380.9, Prevention and Control of Environmental Pollution by Radioactive Materials, Table of Concentrations of Radioactive Material, Schedule 2. The Class GA Groundwater Standards are maximum allowable concentrations. The 380.9 standards apply to allowable concentrations in excess of natural background concentrations.

^b Value shown does not include reported analytical uncertainty.

^c Dose equivalent for gross beta results were not calculated because the results did not exceed NYSDEC Class GA standard.

^d Selected as a COPC.

Key:

PRG = Preliminary remediation goal for residential drinking water.

Table 6-13						
CONTAMINANTS OF POTENTIAL CONCERN						
Chemical	Drainage Ditch Sediment	Surface Soil	Subsurface Soil	Groundwater	Barge Canal Water	Barge Canal Sediment
Volatiles						
Acetone			X			
Benzene				X		
Chlorobenzene				X		
Chloroform				X		
1,1-Dichloroethane			X	X		
1,2-Dichloroethane			X			
1,1-Dichloroethene				X		
1,2-Dichloroethene				X		
Ethylbenzene			X			
Methylene chloride			X			
Tetrachloroethene				X		
Toluene			X	X		
Trichloroethene			X	X		
1,1,1-Trichloroethane			X	X		
Vinyl chloride				X		
Xylenes			X	X		
Semivolatiles						
Bis(2-ethylhexyl) phthalate				X	X	
Benzo(a)anthracene	X	X	X			
Benzo(a)pyrene	X	X	X			
Benzo(b)fluoranthene	X		X			
Benzo(g,h,i)perylene			X			
Benzo(k)fluoranthene			X			
Chrysene	X	X	X			
Dibenzo(a,h)anthracene	X	X	X			
Indeno(1,2,3-cd)pyrene	X	X	X			
2-Methyl phenol			X			
4-Methyl phenol			X	X		
Phenol			X	X		

Table 6-13						
CONTAMINANTS OF POTENTIAL CONCERN						
Chemical	Drainage Ditch Sediment	Surface Soil	Subsurface Soil	Groundwater	Barge Canal Water	Barge Canal Sediment
N-Nitrosodiphenylamine			X			
Pesticides						
Endrin			X			
Heptachlor			X			
Heptachlor epoxide			X			
Lindane			X			
PCBs						
Aroclor 1248			X			
Aroclor 1254		X	X			X
Aroclor 1260		X	X			
Metals						
Arsenic				X		
Barium		X	X			
Cadmium	X	X	X	X		
Chromium			X	X		
Cobalt		X	X			
Copper	X	X	X	X		
Lead	X	X	X	X		
Manganese			X	X		
Mercury	X		X			X
Nickel		X	X	X		
Selenium				X	X	
Thallium				X		
Zinc	X	X	X	X		
Chrysotile		X				

Table 6-13						
CONTAMINANTS OF POTENTIAL CONCERN						
Chemical	Drainage Ditch Sediment	Surface Soil	Subsurface Soil	Groundwater	Barge Canal Water	Barge Canal Sediment
Radionuclides						
Actinium-228	X	X	X			
Barium-140				X		
Bismuth-214	X	X	X			
Lead-212	X	X	X			
Lead-214	X	X	X			
Potassium-40	X	X	X	X		
Radium-226				X		
Radium-228				X		
Thallium-208	X	X	X			

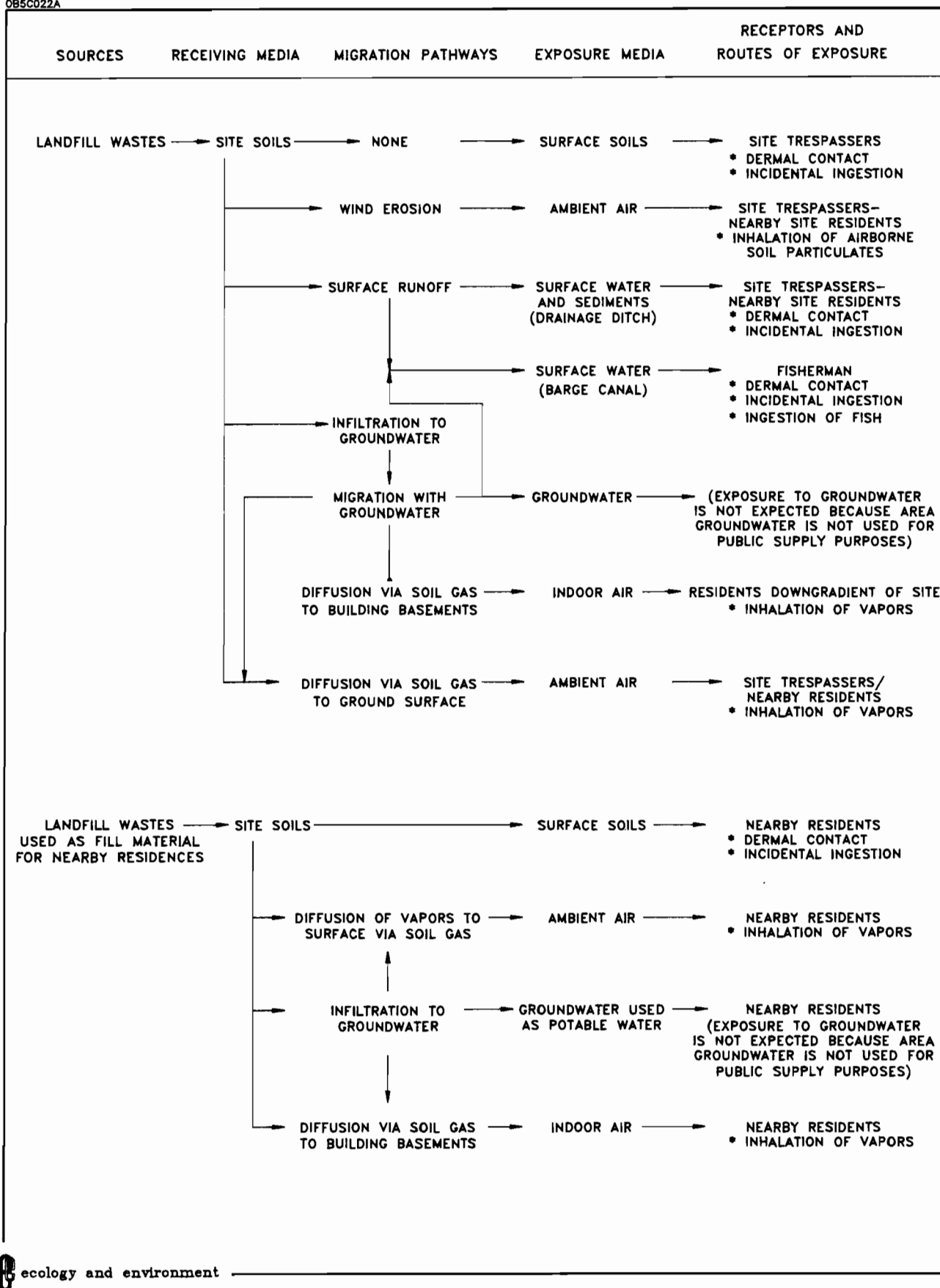


Figure 6-1 CONCEPTUAL SITE MODEL FOR DEARCOP FARM SITE

7. HABITAT-BASED ASSESSMENT

7.1 INTRODUCTION

This section assesses the potential impact of site-related contaminants on the ecological resources associated with the Dearcop Farm site. The ecological assessment (EA) followed New York State guidance for characterizing threats to fish and wildlife at hazardous waste sites (*Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites*, June 18, 1991 - NYSDEC Division of Fish and Wildlife). In addition, methods of investigation and analysis were generally consistent with EPA guidance for environmental evaluation of hazardous waste sites (EPA 1989, 1992).

The purpose of the EA is to determine if there are actual or potential threats to fish and wildlife at the site posed by of site-related contamination. The EA report consists of four main sections:

- A description and characterization of ecological resources present at the site;
- An evaluation of the potential pathways for exposure of fish and wildlife to site-related contaminants of concern;
- A comparison of concentrations of contaminants of concern to regulatory criteria for the protection of fish and wildlife; and
- An evaluation of the toxicological effects of site-related contaminants of concern.

From this analysis, preliminary conclusions were drawn regarding the exposures and risks to fish and wildlife associated with contaminants at the site.

7.2 ECOLOGICAL CHARACTERIZATION

This ecological characterization describes the ecological environment of the site and the surrounding areas. Included is a detailed characterization of the terrestrial and aquatic ecosystems present within a 0.5-mile radius of the site, and a description of important fish and wildlife resources present within a 2.0-mile radius of the site.

7.2.1 Methodology

Prior to the initiation of field surveys, federal and state natural resource agencies were contacted regarding endangered, threatened, and special-concern plants and animals; significant fish and wildlife resources; and state-designated freshwater wetlands present within 2 miles of the site. In addition, a copy of the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) map for the Rochester, West, New York quadrangle was obtained in order to identify NWI wetlands within 2 miles of the site.

The initial field survey for this ecological characterization was made by two E & E biologists on May 17, 1993. During the field surveys, the entire 0.5-mile radius detailed study area was examined to describe the distinct vegetation cover types present. All natural plant community cover types were identified during the field survey so that detailed cover type descriptions could be made.

Wherever possible, plant cover types were classified according to *Ecological Communities of New York State* (Reschke 1990). Cover types were distinguished in terms of plant species composition, vegetation structure, edaphic conditions, and land use.

Wildlife use of each cover type was noted during the field surveys. Wildlife sightings included direct observations as well as identifications based on vocalizations, tracks, burrows, browse, and scat. General wildlife values (e.g., food and cover availability) were also noted.

Aquatic resources present within the detailed study area were examined during the field survey. Streams were inspected for size, flow rate, and ability to support aquatic invertebrates. The pond located near the northern edge of the detailed study area was sampled for physical and chemical properties. No biological sampling was conducted.

No field surveys were conducted outside of the detailed study area. Ecological resources within the 2.0-mile radius general study area were identified from agency contacts, U.S. Geological Survey (USGS) topographic quadrangle maps, and USFWS NWI maps.

Terrestrial and aquatic ecosystems were delineated and characterized within the detailed study area. Fish and wildlife observed during the field surveys were also described along with species expected to occur in the study area, based on geographic range and habitat requirements. The value of each habitat to fish and wildlife of particular features present within the detailed study area were reviewed, and observations of physiological stress to plants or animals within the detailed study area were described.

7.2.2 Terrestrial Resources

Fish and wildlife resources in the site study area are typical for the Great Plains ecozone (Reschke 1990). Amphibians, reptiles, birds, and mammals observed or expected to occur within the detailed study area are listed in Tables 7-1 through 7-4. No endangered, threatened, or special concern species are known to occur within the detailed study area (Buffington 1993) and none were observed during the field survey.

Ten distinct terrestrial cover types plus paved areas were identified within the detailed study area. The location of each cover type is depicted on Figure 7-1. The plant species composition, vegetation structure, edaphic conditions, and land use for each cover type are described below.

Cover Type 1: Successional Old Field

Cover type 1 consists of a highly disturbed field that is sparsely vegetated. The dominate vegetation includes goldenrods (*Solidago sp.*), ragweed (*Ambrosia artemisiifolia*), Queen Annes Lace (*Daucus carota*), and grasses with scattered seedling and sapling staghorn sumac (*Rhus typhina*). Slag and metal debris was located on the surface throughout this cover type. Also, areas of blue glass debris were observed. These areas were devoid of vegetation with radioactivity detected slightly above background.

This field provides food and edge for wildlife. The grasses and forbes produce seeds which are eaten by songbirds such as the song sparrow (*Melospiza melodia*), field sparrow (*Spizella pusilla*) and rufous-sided towhee (*Pipilo erythrophthalmus*). The sumacs are not the preferred food for wildlife; however, they are an important food for upland gamebirds such as ruffed grouse (*Bonasa umbellus*). Also, songbirds such as the cardinal (*Cardinalis cardinalis*) and robin (*Turdus migratorius*) also utilize sumac fruit, and white-tailed deer (*Odocoileus*

virginianus) feed on twigs and fruit (Martin et. al. 1961). The scattered shrubs also provide cover for these wildlife species utilizing the field.

Cover Type 2: Mowed Roadside

Cover type 2 consists of narrow strips of mowed vegetation along the interchange for Interstate Routes 390 and 490. These strips are dominated by grasses, sedges, and rushes. Several of these areas had a roadside drainage ditch which contained cattails (*Typha latifolia*) and rushes. One roadside drainage located south of Interstate 490, is culverted under the interstate and eventually flows to an intermittent stream associated with cover type 11.

Characteristic birds of mowed areas include robin, killdeer (*Charadrius vociferus*) and starling (*Sturnus vulgaris*). Otherwise, this area is a low-quality wildlife habitat.

Cover Type 3: Disturbed Floodplain Forest

Cover type 3 is a disturbed wetland associated with an intermittent drainage area. This drainage area empties into a depressional ponded area (see cover type 5). This cover type was dominated by a hydrophytic vegetative community. Large (up to 20-inch diameter) black willow (*Salix nigra*) trees grow along the edge of the drainage. The remainder of the wetland consists of pole-sized and larger cottonwood (*Populus deltoides*) and green ash (*Fraxinus pennsylvanica*). The remainder of the wetland consists of a thick shrub layer comprised of tartarian honeysuckle (*Lonicera tatarica*), green ash saplings and panicled dogwood (*Cornus racemosa*). Jewel weed (*Impatiens*) is the dominant herb.

The U.S. Army Corp. of Engineers (USACE) established three criteria that must be met; hydrology, soils and vegetation, before an area can be classified as a wetland (USACE 1987). This manual also provides guidance for problem areas where one of the criteria has been eliminated either by human natural activities.

Hydrological indicators during the time of the survey were, 2 to 4 inches of standing water and the saturated soils. The soil survey of Monroe County describes this area as a dump with soils that are disturbed and consist of fill. Even though the soils are disturbed, it appears that this cover type meets the criteria necessary to be considered a jurisdictional wetland.

The cottonwoods provide an excellent feeding area for wildlife. White-tailed deer and the eastern cottontail (*Sylvilagus floridanus*) eat the foliage, twigs, and bark. Ruffed grouse feed heavily on buds and catkins during winter and early spring months.

This area also provides excellent habitat for many wildlife species because of the seasonal presence of water. This water is used directly for drinking by animals in the area. In addition, pooled water is essential for breeding populations of various amphibians such as wood frog (*Rana sylvatica*), spring peeper (*Hyla crucifer*), and red-spotted newt (*Notophthalmus vividescens*). The size of this wetland is a factor limiting the size population that it may support.

Cover Type 4: Successional Shrubland

Cover type 4 is a dense stand of red osier dogwood (*Cornus stolonifera*), stag horn sumac, green ash saplings and tartarian honeysuckle. A few large trees, sour cherry (*Prunus cerasus*), and cottonwood, are scattered throughout this shrubland. The ground cover is sparse and consists of grasses, wild strawberry (*Fragaria virginiana*), and goldenrods.

The dense shrub area provides both food and cover for species utilizing the field. Dogwoods and cherries are important wildlife foods. The berries are consumed by a variety of songbirds including robins, starlings, flickers (*Colaptes auratus*) and great crested flycatchers (*Myiarchus crinitus*). White-tailed deer and rabbits feed on twigs, foliage, and bark (Martin *et al.* 1961). The size of this area is the limiting factor in the size population that it may support.

Cover Type 5: Shrub Swamp/Open Water Wetland

Cover type 5 is shrub/scrub wetland located in a depressional area. This wetland is hydrologically connected to the intermittent drainage/forested floodplain wetland described in cover type 3. Although a depth was not probed, at the time of the survey, there was approximately two to three feet of ponded water. Surrounding the ponded water is a thick shrub layer consisting of sapling black willow, hoary willow (*Salix candida*), sampling cottonwoods and panicked dogwood.

The soils consisted of 1 to 2 inches of muck and gravelly fill. The Soil Survey of Monroe County describes this area as a dump. As described in cover type 3, this area meets the criteria necessary to be considered a jurisdictional wetland even though the soils are disturbed.

The wetland is a continuation of cover type 3. Therefore, the value of this community to wildlife is expected to be basically similar to that of cover type 3. The only difference is the composition of the shrub layer. This portion of the wetland complex is dominated by willow shrubs. The twigs and buds of willows are staple foods for ruffed grouse, white-tailed deer and eastern cottontails (Martin *et al.* 1961).

Cover Type 6: Successional Cottonwood Islands

Three areas within the detailed study area are described as cover type 6, successional cottonwood islands. These areas consist of an almost pure stand of pole-size and larger cottonwood trees.

These islands are excellent wildlife feeding areas. White-tailed deer and eastern cottontails feed on the foliage, twigs, and bark. Ruffed grouse feed heavily on buds and catkins during winter and early spring months (Martin *et al.* 1961).

Cover Type 7: Late Successional Shrubland

Cover type 7 is a late successional shrub area associated with the berm adjacent to the Barge Canal. It was dominated by sapling to pole-size cottonwood and box elder (*Acer negundo*). Also present was sour cherry, tartarian honeysuckle, and red osier dogwood. The shrub layer was dense with little ground cover. The ground cover consisted of grasses and ragweed.

The berm provides protective cover for many birds and mammals utilizing the successional field and Barge Canal. This area is also an important feeding area. The trees produce seeds and catkins, and the shrubs produce berries which are consumed by a variety of wildlife. The twigs, birds, foliage, and bark are also browsed upon by white-tailed deer and easter cottontails (Martin *et al.* 1961).

Cover Type 8: Successional Northern Hardwoods

Cover type 8 is an early successional woodlot dominated by mature red oak (*Quercus rubra*) and cottonwood trees. The moderately dense understory is comprised of sapling black cherry (*Prunus serotina*) and ironwood (*Carpinus caroliniana*). Also present in the understory is tartarian honeysuckle, grape (*Vitis sp.*) and service berry (*Amelanchier sp.*) Golden rod is the dominant herbaceous plant.

The abundance of red oaks and cottonwood results in a high-quality wildlife area. Oak acorns are valuable fall and winter wildlife foods. Upland game birds such as ruffed grouse feed heavily upon acorns and catkins in season. A few songbirds, including the blue jay (*Cyanocitta cristata*) and flicker feed on acorns. Acorns are also important food items in the diets of small mammals, including the northern flying squirrel (*Glaucomys sabrinus*), eastern gray squirrel (*Sciurus carolinensis*), and eastern chipmunk (*Tamias striatus*). White-tailed deer feed on the twigs, bark, and foliage of the cottonwoods as well as the acorns (Martin *et al.* 1961).

Cover Type 9: Mowed Lawn with Trees

Cover type 9 consists of maintained lawns associated with several residences located within the detailed study area. These lawns are mowed grass with scattered trees, typically saw timber-sized silver maples, (*Acer saccharinum*) and cottonwoods.

Wildlife species utilizing this cover type are more tolerant of human activities. Characteristic birds include robin and starlings with occasional chipping sparrows (*Spizella passerina*) and house finch (*Carpodacus mexicanus*). This area is a low-quality wildlife habitat.

Cover Type 10: Paved Road/Path

Cover type 10 consists of all the paved roadways in the detailed study area. This area also includes a construction work area for road work currently being conducted on the Interstate routes 490 and 390.

This cover type provides no wildlife habitat.

Cover Type 11: Floodplain Forest

Cover type 11 is a palustrine forested wetland associated with an intermittent stream that was identified on the NWI map. The stream contained 2 to 3 inches of water at the time of the survey. The wetland was dominated by large black willow and red maple trees. The understory consisted of serviceberry, hawthorn (*Crataegus spp.*), red-osier dogwood, and gray dogwood. Numerous snag trees were present. This wetland has been altered by road construction and the development of the surrounding area.

Soils were saturated in this area at the time of the field survey. The Soil Survey of Monroe County describes these soils as Canandaigua silt loam, which is classified as a hydric soil by New York State (USDA 1988).

This forest wetlands provide excellent habitat for many animals because of the seasonal presence of water. This water is used directly for drinking by animals. In addition, pooled water is essential for breeding populations of frogs and salamanders.

Wildlife species such as white-tailed deer, gray squirrel, eastern chipmunk and ruffed grouse include seeds and berries in their diets. In addition, the trees provide nesting and roosting areas for songbirds.

The snag trees provide nesting cavities for wildlife species such as the barred owl (*Strix varia*) and downy woodpecker (*Picoides pubescens*). These snags, as well as the sapling and shrubs for deer browse and late summer fruit, contribute to habitat quality.

7.2.3 Aquatic Ecosystems

Relatively few aquatic ecosystems are present within the 0.5-mile radius detailed study area. The Barge Canal is located adjacent to the eastern edge of the site. In addition, one intermittent stream with its associated road drainage, and a drainage area flowing to a ponded water wetland drain the study area. The locations of these resources are depicted on Figure 7-1 (see covertype 3, 5, and 8).

The Barge Canal is hydrologically connected to the site. It receives both surface runoff and discharges from the intermittent stream (see Figure 7-1). The Barge Canal is a man-made structure that is approximately 100 feet across. The water level fluctuates seasonally by being artificially lowered during the winter months. The steep man-made banks are devoid of vegetation. Adjacent to the western edge of the Barge Canal is an upland cottonwood-dominated scrub area (cover type 7).

The Barge Canal is a Class B stream, which indicates the water is suitable for primary and secondary contact recreation and is suitable for fish propagation and survival (NYSCR 1991). Water quality data collected by E & E from the Barge Canal on December 8, 1992 are summarized in Table 7-5.

The Barge Canal supports a warm water fishery. Principal species that occur in the canal include largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), rock bass (*Ambloplites rupestris*), yellow perch (*Perca flavescens*) and black crappie (*Pomoxis*

nigromaculatus) (Sanders 1992). No direct evidence of fishing in the canal was observed. However, access is easily obtained from a bike path that parallels the canal.

The intermittent stream located 250 feet north of the site is a tributary to the Barge Canal. The drainage pattern of this stream is depicted in Figure 7-1. It is noteworthy that water draining from the site flows into a roadside drainage that parallels the ramp from I-390 to I-490 and I-490 itself. Approximately 200 feet west of the canal, the drainage ditch is culverted under the interstates and eventually discharges into the intermittent stream.

The intermittent stream is approximately 10 feet wide. The stream depth ranges from 2 to 12 inches. The substrate was silty with scattered rocks. Water quality data collected from the intermittent stream on December 7, 1992 are summarized in Table 7-5. No fish were observed in this stream during the field survey, and few are expected to occur due to the stream's intermittent nature.

A relatively large forested wetland (cover type 11) is associated with this stream. Smaller forested wetland communities are located along other portions of this stream. Interstate 490 also borders the majority of this stream.

The intermittent drainage in the southeast portion of the Dearcop Farm Site does not flow into the Barge Canal, due to obstruction from a small man-made embankment of soil and rock from canal construction. The drainage ditch is approximately 40 feet long, 1 to 2 feet wide, and flows into a depressional area. At the time of the survey, this area was flooded with approximately 2 to 3 feet of water. A wetland complex (cover types 3 and 5) is associated with this drainage system. No fish were observed within this drainage, and none are expected to occur due to the intermittent nature of this closed system.

An important fish and wildlife resource located approximately 2.5 miles from the site is Genessee River. This river is a Class B stream, which is suitable for fishing and fish propagation (NYSCR 1991). The lower Genessee River is stocked with Chinook salmon (*Oncorhynchus tshawytscha*), Coho salmon (*Oncorhynchus kisutch*), and rainbow trout (*Oncorhynchus mykiss*) (Sanders 1992). This river also supports a recreational fishery for large and small mouth bass, yellow perch, and black crappie.

7.2.4 Freshwater Wetlands

Three New York State freshwater wetlands (see Figure 7-2) are located within the 2.0 mile radius general study area. The characteristics of these freshwater wetlands are

summarized in Table 7-6. All three of these wetlands are located upgradient of the site and are of moderately high quality (DEC Class II). Each is comprised primarily of forested swamp (Sanderson 1993).

The USFWS NWI map for the Rochester West, New York quadrangle was reviewed for NWI wetlands present within the general study area. Wetlands located within the 2.0 mile radius general study area are summarized in Table 7-7, and shown in Figure 7-3.

7.2.5 Value of Fish and Wildlife Resources

The cover types described for the detailed study area provide the food and cover requirements for a variety of species. However, the diversity of species and the number of individuals within a given population may be limited. The vegetation associated with the site is surrounded by residential and industrial development, thus limiting the size of available habitat. Species more tolerant of human disturbances will utilize this area more than species less tolerant.

The Barge Canal supports a recreational fishery. According to NYSDEC, the Barge Canal is an underutilized fishery resource, and receives low to moderate fishing pressure (Sanderson 1993).

7.2.6 Applicable Fish and Wildlife Regulatory Criteria

Site-specific criteria that are applicable to the remediation of the fish and wildlife resources associated with the Dearcop Farm site are:

- The Freshwater Wetlands Act (Article 24 ECL, 6 NYCRR, Parts 663 and 664);
- Regulations pertaining to streams and navigable water bodies (Article 15 ECL, 6 NYCRR, Part 608);
- Water quality standards and guidance values 6 NYCRR Part 701 and TOGS 1.1.1, and sediment criteria for the protection of fish and wildlife (Sediment Criteria - December 1989); and
- Significant habitats and species of the Natural Heritage Program.

7.3 EXPOSURE ASSESSMENT

This subsection identifies contaminants of potential ecological concern (CPEC) as well as the source of contamination, potential ecological receptors, and potential pathways of contaminant migration.

7.3.1 Contaminants of Ecological Concern

Selection of inorganic CPECs for ecological receptors was based on the comparison of chemical concentrations with media-specific screening criteria. If the concentration exceeded the criteria, the potential exists for biota to be impacted. All organics detected above the detection limit were considered CPECs. Table 7-8 lists that CPECs for the Dearcop Farm site by media.

7.3.2 Contaminant Release, Migration, and Fate

The Dearcop Farm site is a potential source of contamination to the intermittent stream and the Erie Barge Canal. An additional source of PAH contamination may be I-490 and I-390 which bisect the site. Emissions from automotive vehicles are a known source of PAHs in the environment (Eisler 1987). Three potential contaminant migration pathways are viable at the site: wind, stormwater runoff, and groundwater. CPEC migration via wind erosion where possible is not likely due to the dense vegetation surrounding the site.

Contaminants migrating via surface water runoff may be found in the water and sediment of the intermittent stream, the associated wetland area, and the Erie Barge Canal. A roadside drainage that is adjacent to the site receives runoff from the site. It is culverted under the interstates into the intermittent stream. The intermittent stream water and suspended sediment/soil particles empties into the Barge Canal which is the ultimate fate of contaminants being transported by the stream.

7.3.3 Fish and Wildlife Receptors

As indicated in the field survey (Section 7.2), fish and wildlife resources in the Dearcop Farm Study Area are typical for the Great Lakes Plain ecozone. The field survey found that fish and wildlife resources were moderately diverse and abundant in the study area.

The site itself contains a typical old field habitat with islands of successional northern hardwoods (Covertypes 1 and 6). The site is partially surrounded by successional forest and

forested floodplain wetlands. The remainder is developed. The value of habitats identified for populations of fish and wildlife is high due to the lack of similar habitat in the surrounding area.

The entire detailed study area is influenced by human habitation and activities. These activities influence the number and types of species that will utilize the habitat types. Species more tolerant of human activities such as deer, gray squirrel, and songbirds will utilize the habitat types.

Plants growing on or adjacent to the site may uptake site-related contaminants. However, no evidence of physiological stress to plants or animals was observed during the field surveys. The detailed study area was observed carefully, and no dead or dying vegetation was observed. Some areas of blue glass debris were observed in the northwest portion of the vacant lot. This portion of the site was devoid of vegetation and contained subsurface soils, groundwater, and soil gas (see Section 4). Therefore, potential impacts to terrestrial plants and wildlife inhabiting the site itself are moderate to high.

The Barge Canal is an important recreational fishery. Aquatic and benthic organisms residing in the canal and intermittent stream could potentially be exposed to site related chemicals. Also, semi-aquatic and terrestrial wildlife that depend on the aquatic environment for a fraction of their food could also be exposed to site-related chemicals. The sampling results indicate the presence of CPECs in the sediment and surface water collected from the roadside drainage, the intermittent stream, and the Barge Canal. Therefore, the potential impacts to the species inhabiting these areas is moderate.

The site survey identified no critical habitat or endangered or threatened species in the 0.5 mile radius detailed study area.

7.3.4 Potential Exposure Pathways

Three major exposure pathways exist at the Dearcop Farm site. First, benthic and aquatic invertebrates would be expected to have direct contact with contaminated sediment particles and surface water through direct contact and absorption, direct ingestion, and feeding on contaminated food. Also, uptake of contaminants from sediments (via interstitial water) by aquatic plants could occur.

Secondly, bioconcentration of contaminants from water and sediment by aquatic species and subsequent bioaccumulation in the food chain could expose some wildlife to

CPECs. Semi-aquatic wildlife and some terrestrial species could be exposed via the food chain. Some of these receptors could also be exposed through contact, absorption, and incidental ingestion of contaminated sediment and surface water.

Thirdly, plants growing on the site or adjacent to the waterbodies could be exposed through uptake by the roots. Upland terrestrial wildlife could be exposed through contact with contaminated soil, accidental ingestion, or exposure through the terrestrial food chain.

These potential exposure pathways and ecological receptors were evaluated for the existence of possible risk on the basis of affected media and CPEC. Potential risk exists for aquatic and benthic organisms due to their potential exposure to elevated levels of PAHs, PCBs, and metals in the sediments. Potential risks exist for semi-aquatic wildlife such as frogs and salamanders due to potential exposure to both contaminated sediments and surface soils. On the site itself, potential risk exists to secondary consumers especially small mammals using the site soils.

Low levels of PAHs were detected in the surface soil. PAHs are ubiquitous in nature and the levels detected on the Dearcop Farm site are indicative of background. Therefore, minimal risk from PAHs to secondary consumers is expected from site soils. Also, the maximum concentration of PCBs detected in surface soils was 2.1 ppm. This level of PCBs poses minimal risk to animals residing on the site. In addition, no evidence of physiological stress to animals was observed during the field surveys. Therefore, the potential impacts to terrestrial wildlife from organics occurring at site itself are not considered significant. But, there is a potential risk to wildlife from elevated metals from direct contact and incidental ingestion of contaminated soil.

Plants growing on top of and adjacent to the site were excluded due to the lack of observed stress during the field surveys. Also, upland tertiary consumers and top carnivores were excluded from risk evaluation due to the size of the site relative to the necessary home range of these species. For example, a red-tailed hawk was observed during the field visit. The territory size for a red-tailed hawk is 80 to 200 acres. Therefore, the potential for exposure of these birds to CPECs is minimal.

7.4 CRITERIA-SPECIFIC TOXICITY ASSESSMENT

Potential contaminants of concern are the chemicals detected in surface water and sediment samples from the Dearcop Farm site. The chemicals and levels of contamination are

summarized in Section 4. They include organic chemicals (volatiles, semivolatiles, PAHs, and PCBs) and inorganic chemicals.

7.4.1 Surface Water

The NYSDEC Ambient Water Quality Standards and Guidance Values (AWQS/GVs) for the protection of freshwater aquatic life were used to evaluate the contaminant levels. Values used are for Class B waters (secondary contact recreation and fish propagation) because the Barge Canal is classified as a Class B stream. These values are generally based on acute toxicity endpoints from laboratory studies of aquatic species, or on endpoints related to bioaccumulation. Bioaccumulation criteria (also known as fish flesh or wildlife residue criteria) have been developed to protect piscivorous wildlife, and are based on laboratory data from mammalian species or birds (NYSDEC 1990). All surface water criteria were obtained from TOGS 1.1.1 (NYSDEC September 25, 1990).

Concentrations were also compared to the EPA Ambient Water Quality Criteria (AWQC) (EPA 1992). Values used are the freshwater chronic criteria, which are intended to protect aquatic life (and organisms that depend of aquatic life) from adverse effects of long-term exposure to toxins. The NYSDEC AWQS/GVs are in some cases the same as or derived from the EPA criteria.

Results are provided in Table 7-9. Criteria are generally unavailable for organics detected at the site. Surface water was collected from six sampling locations. Only bis(2-ethylhexyl)phthalate had a criteria value and none of the surface water samples exceeded it.

Surface water samples exceeded NYSDEC criteria for aluminum in all three waterbodies sampled: roadside ditch, intermittent stream, and the Barge Canal. Concentrations of iron exceeded NYSDEC criteria in four surface water samples collected from the roadside drainage and Barge Canal. Concentrations of mercury and zinc exceeded NYSDEC and EPA criteria samples collected from in the roadside drainage. Selenium concentrations exceeded NYSDEC criteria in the Barge Canal. Concentrations of arsenic, copper, and lead did not exceed NYSDEC or USEPA criteria.

Due to the exceedances of NYSDEC AWQS/GVs at several locations and the few available criteria for evaluating surface water contamination at the site, potential surface water hazards to fish and wildlife at the site are further evaluated in the Toxicity/Hazard Assessment (see Section 7.5).

7.4.2 Sediments

The NYSDEC sediment criteria for the protection of freshwater aquatic life were used to evaluate the contaminant levels. Evaluation criteria for organic substances have been derived using the equilibrium partitioning approach and are normalized for organic carbon content of sediments (see Table 7-10) (NYSDEC 1989). In addition, EPA Interim Sediment Criteria values for nonpolar hydrophobic organic contaminants are presented in Table 7-10 for comparison. Metals criteria are based on empirical data from laboratory and field studies (see Table 7-11). In addition, Ontario Ministry of the Environment (OME) sediment of quality criteria for inorganics are presented in Table 7-11 for comparison. The EPA and OME guidelines are generally less conservative than NYSDEC criteria, and exceedances of these guidelines could indicate highly polluted sediments.

Few sediment criteria are available for the evaluation of organic chemicals detected at the site. Sediment was collected from three locations, the drainage ditch, the intermittent stream and the Barge Canal. Concentrations of the PAHs phenanthrene (normalized for sediment organic carbon content) exceeding the sediment criteria in one sample collected from the drainage ditch. Concentrations of PCBs (Aroclor 1254) (normalized for sediment organic carbon content) exceeded the NYSDEC wildlife residue-based criterion in the Barge Canal. PCBs were found at concentrations exceeding the wildlife residue-based criterion by greater than 10 times, indicating PCB contamination is potentially significant in the canal.

Levels of inorganic substances were also found exceeding sediment criteria (Table 7-11). Chromium, copper, lead, and zinc were found at concentrations exceeding the NYSDEC criteria at one or more locations. Moreover, copper, lead and zinc levels exceeded OME guidelines at sample locations in the drainage ditch and the Barge Canal.

Due to the exceedances of sediment criteria and guidelines and the few available criteria for evaluating sediment contamination at the site, potential sediment hazards to fish and wildlife at the site are further evaluated in Section 7.5.

7.4.3 Soils

Risks posed by organics in site soils were considered insignificant. Therefore, no criteria specific toxicity assessment was conducted. The levels of PAHs detected in surface soil are indicative of background concentrations for urban soils (Eisler 1987). Also, the levels of PCBs detected on site pose minimal risks to wildlife residing on site.

NYSDEC does not have criteria for inorganics in soil with regard to the protection of wildlife. Instead, the soils were compared to Shacklette and Boerngen (1984) background element concentrations in soils from the eastern United States. The upper 95% confidence level was used. This indicates 95% of all naturally occurring metals are below the reported concentrations. Exceedances could indicate contaminated soil. Shacklette and Boerngen does not evaluate cadmium instead Lindsey (1977) was used to compare levels of cadmium. Results are provided in Table 7-12.

Levels of inorganic substances were found exceeding the background levels. Cadmium, cobalt, copper, lead, nickel, and zinc were found at concentrations exceeding background at one or more sampling locations.

Due to the exceedances of soil inorganics over background, potential soil hazards to wildlife at the site are further evaluated in Section 7.5.

7.5 TOXICITY/HAZARD ASSESSMENT

Potential contaminants of concern at the Dearcop Farm site were evaluated relative to Toxicity Benchmark Criteria (TBC). Best available data were used to derive TBC; in most cases, sources were acute lowest observed effect levels (LOELs) published in the EPA "Gold Book" (EPA 1986). TBC were multiplied by an uncertainty factor (UF) to provide a margin of safety for the protection of aquatic life from adverse effects of site-related contaminants. The product of the TBC multiplied by the UF is the environmental concern level (ECL) for that chemical. Exceedances of ECLs would generally indicate a potential for adverse effects on aquatic life.

7.5.1 Surface Water

ECLs for organics and inorganics detected at the site are derived in Table 7-13. As a conservative approach for determining risk, the maximum concentration detected in surface water was used to determine the exposure point concentration (EPC). The ratio of EPC/ECL is referred to as the toxicity quotient (TQ); a TQ greater than 1 indicates that contaminant concentrations are above the level at which adverse effects are expected. The comparisons provided in Table 7-13 indicate a TQ greater than 1 for only iron and zinc; for all other surface water contaminants, TQ is less than 1.

The ECLs in Table 7-13 are generally based on acute toxicity endpoints. The results of the hazard assessment indicate that, other than bioaccumulatory toxins, impacts on fish and wildlife due to surface water contamination from organic substances are likely to be minimal.

The form of iron normally found in stagnant ditchwater is unlikely to affect adversely wetlands or aquatic life downgradient from the site, despite a TQ greater than 1 for iron at SW-1 which was collected from the roadside ditch.

In summary, surface water contamination at the site appears to pose a minimal risk of impacts to fish and wildlife.

7.5.2 Sediments

Following the NYSDEC guidance (NYSDEC 1989), site-specific sediment criteria were derived for non-polar organics using the equilibrium partitioning approach. Sediment criteria were derived as follows:

$$\text{Sediment Criterion} = \text{ECL } (\mu\text{g/L}) \times K_{ow} \times 1 \text{ kg/1,000 gOC}$$

where:

ECL = Environmental Concern Level

K_{ow} = octanol/water partitioning coefficient

1 kg/1,000 grams of organic carbon is a conversion factor

The sediment criteria are provided in Table 7-14. Comparisons of concentrations of sediment contaminants to the sediment criteria are presented in Table 7-15. The highest sediment concentration of a given contaminant (normalized for sediment organic carbon content) is used as the EPC in Table 7-15.

In general, levels of non-polar organic contaminants are below site-specific sediment criteria at the site (TQ less than 1). However, levels of benzo(a)pyrene, phenanthrene, PCBs (Aroclor-1248) are above criteria/concern levels based on bioaccumulation (fish flesh or wildlife residue criteria). Levels of PCBs are greater than 70 times the wildlife residue basis/site-specific sediment criterion. These results suggest that migration of non-polar organics off site into downgradient streams and wetlands could pose a risk of adverse effects due to bioaccumulation in the food chain.

According to the NYSDEC Sediment Criteria guidance document, exceedance of sediment criteria based on bioaccumulation by a factor of 100 or more would likely result in acute toxicity to aquatic organisms. Since the highest TQ in Table 7-15 is 1,153 benzo(a)pyrene, acute toxicity of sediments due to non-polar organics is likely at the site. Since bioaccumulating contaminants are likely to be diluted downgradient from the site, risks of acute toxicity to wildlife are likely to be minimal from exposure to contaminants in streams and wetlands downgradient of the site. However, potential impacts of chronic toxicity from migration of benzo(a)pyrene, phenanthrene, and PCBs to downgradient streams and wetlands cannot be completely ruled out from the available evidence.

Following the NYSDEC guidance, the magnitude of metals contamination of sediments was evaluated by comparison to "limits of tolerance," which are concentrations likely to be detrimental to most species. None of the metals concentrations in samples was greater than the limits of tolerance (see Table 7-16) except mercury. Mercury levels in sample SED-1 collected from the roadside ditch exceed the limit of tolerance levels. Therefore, potential risk to wildlife from mercury in the sediments cannot be ruled out. Further characterization and/or calculations involving indicator species are necessary to fully analyze the risk to wildlife from mercury. This is beyond the scope of this phase of the RI. Significant impacts from the other inorganic contaminants of sediments are unlikely on the site.

7.5.3 Soils

An assessment of soils cannot be complete without calculating dose estimates in indicator species. This is beyond the scope of work for this phase of the RI/FS. A potential risk from elevated levels of cadmium, cobalt, lead, nickel and zinc cannot be ruled out.

7.6 CONCLUSIONS

Limited sampling of surface water and sediments from a drainage ditch at the Dearcop Farm site indicates contamination above levels of concern for some bioaccumulating toxins: benzo(a)pyrene, phenanthrene, and PCBs. The concentrations of these contaminants pose a moderate to high risk of impacts to fish and wildlife populations, due to the following:

- Significant aquatic/wetland resources could be identified downgradient in proximity to the site;

- The toxin concentrations are exceptionally high, especially for benzo(a)pyrene (1,000 times greater than the TBC). Concentrations are likely to be reduced from dilution but not enough to eliminate risk; and
- Acute toxicity thresholds for the protection of Class B waters are not exceeded by site-related contaminants.

Potential impacts of bioaccumulating toxins on fish and wildlife reproduction or survival are expected to be minimal on and in the vicinity of the site; however, further investigation would be required to evaluate risks of exposure and chronic toxicity to organisms in downgradient streams and wetlands. Also, further investigation would be required to evaluate exposure and chronic toxicity to wildlife residing on-site to elevated levels of metals in the soils, as well as to wildlife exposed to elevated levels of mercury in sediments.

However, based on current data, it is not evident that the Dearcop site is the source of the sediment contamination detected. Therefore, additional sediment sampling is recommended prior to completing (if needed) the additional ecological investigations described above.

Table 7-1 AMPHIBIANS LIKELY TO OCCUR WITHIN THE DETAILED STUDY AREA	
Red-spotted newt	<i>Notophthalmus viridescens</i>
Northern dusky salamander	<i>Desmognathus fuscus</i>
Red-backed salamander	<i>Plethodon cinereus</i>
American toad	<i>Bufo americanus</i>
Spring peeper	<i>Hyla crucifer</i>
Gray treefrog	<i>Hyla versicolor</i>
Green frog ^a	<i>Rana clamitans</i>
Bullfrog	<i>Rana catesbeiana</i>
Northern leopard frog	<i>Rana pipiens</i>
Pickerel frog	<i>Rana palustris</i>
Wood frog	<i>Rana sylvatica</i>
Spotted Salamander	<i>Ambystoma maculatum</i>

^a Species observed during the field survey.

Source: Conant 1975.

Table 7-2 REPTILES LIKELY TO OCCUR WITHIN THE DETAILED STUDY AREA	
Wood turtle	<i>Clemmys insculpta</i>
Midland painted turtle	<i>Chrysemys picta</i>
Eastern garter snake	<i>Thamnophis sirtalis</i>
Northern ribbon snake	<i>Thamnophis sauritus</i>
Northern red-bellied snake	<i>Storeria occipitomaculata</i>
Northern brown snake	<i>Storeria dekayi</i>
Northern ringneck snake	<i>Diadophis punctatus</i>
Eastern smooth green snake	<i>Opheodrys vernalis</i>
Northern black racer	<i>Coluber constrictor</i>
Black rat snake	<i>Elaphe obsoleta</i>
Eastern milk snake	<i>Lampropeltis triangulum</i>
Eastern box turtle	<i>Terrapene carolina</i>
Northern water snake	<i>Nerodia sipedon</i>

Source: Conant, 1975.

Table 7-3	
BIRDS LIKELY TO BREED WITHIN THE DETAILED STUDY AREA	
Red-tailed hawk ^a	<i>Buteo jamaicensis</i>
American kestrel	<i>Falco sparverius</i>
Turkey vulture	<i>Cathartes aura</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Ruffed grouse	<i>Bonasa umbrellus</i>
Killdeer ^a	<i>Charadrius vociferus</i>
American woodcock	<i>Scolopax minor</i>
Rock dove ^a	<i>Columba livia</i>
Mourning dove ^a	<i>Zenaida macroura</i>
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Eastern screech owl	<i>Otus asio</i>
Great horned owl	<i>Bubo virginianus</i>
Barn owl	<i>Tyto alba</i>
Chimney swift	<i>Chaetura pelagica</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
Downy woodpecker	<i>Picoides pubescens</i>
Hairy woodpecker	<i>Picoides villosus</i>
Northern flicker ^a	<i>Colaptes auratus</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Eastern wood-pewee	<i>Contopus virens</i>
Willow flycatcher	<i>Empidonax traillii</i>
Least flycatcher	<i>Empidonax minimus</i>
Eastern phoebe ^a	<i>Sayornis phoebe</i>
Great crested flycatcher	<i>Myiarchus crinitus</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Horned lark	<i>Eremophila alpestris</i>

Table 7-3	
BIRDS LIKELY TO BREED WITHIN THE DETAILED STUDY AREA	
Purple martin	<i>Progne subis</i>
Belted kingfisher	<i>Megaceryle alcyon</i>
Tree swallow	<i>Tachycineta bicolor</i>
Barn swallow	<i>Hirundo rustica</i>
Rough-winged swallow	<i>Stelgidopteryx ruficollis</i>
Blue jay	<i>Cyanocitta cristata</i>
American crow ^a	<i>Corvus brachyrhynchos</i>
Black-capped chickadee	<i>Parus atricapillus</i>
Tufted tit mouse	<i>Parus bicolor</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
Brown creeper	<i>Certhis americana</i>
House wren ^a	<i>Troglodytes aedon</i>
Blue-gray gnatcatcher	<i>Poliopitila caerulea</i>
Wood thrush	<i>Hylocichla mustelina</i>
American robin ^a	<i>Turdus migratorius</i>
Gray catbird ^a	<i>Dumetella carolinensis</i>
Brown thrasher	<i>Toxostoma rufum</i>
Cedar waxwing	<i>Bombycilla cedrorum</i>
European starling	<i>Sturnus vulgaris</i>
Warbling vireo	<i>Vireo gilvus</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Black and white warbler	<i>Mniotilta varia</i>
Blue-winged warbler	<i>Vermivora pinus</i>
Yellow warbler ^a	<i>Dendroica petechia</i>
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>
American redstart	<i>Setophaga ruticilla</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Scarlet tanager	<i>Piranga olivacea</i>
Black-throated green warbler ^a	<i>Dendroica virens</i>

Table 7-3 BIRDS LIKELY TO BREED WITHIN THE DETAILED STUDY AREA	
Northern cardinal	<i>Cardinalis cardinalis</i>
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Indigo bunting	<i>Passerina cyanea</i>
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>
Chipping sparrow	<i>Spizella passerina</i>
Field sparrow	<i>Spizella pusilla</i>
Song sparrow	<i>Melospiza melodia</i>
Red-winged blackbird ^a	<i>Agelaius phoeniceus</i>
Eastern meadowlark	<i>Sturnella magna</i>
Common grackle	<i>Quiscalus quiscula</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Northern oriole	<i>Icterus galbula</i>
House finch	<i>Carpodacus mexicanus</i>
American goldfinch ^a	<i>Carduelis tristis</i>
House sparrow	<i>Passer domesticus</i>
Northern junco	<i>Junco hyemalis</i>
Purple finch	<i>Carpodacus purpureus</i>

^a Species observed during the field survey.

Source: Anderle, R.F. and J.R. Carroll 1988.

Table 7-4 MAMMALS LIKELY TO OCCUR WITHIN THE DETAILED STUDY AREA	
Opossum	<i>Didelphis virginiana</i>
Masked shrew	<i>Sorex cinereus</i>
Pygmy shrew	<i>Microsorex hoyi</i>
Least shrew	<i>Cryptotis parva</i>
Short-tailed shrew	<i>Blarina brevicauda</i>
Hairytail mole	<i>Parascalops breweri</i>
Keen myotis	<i>Myotis keeni</i>
Little brown myotis	<i>Myotis lucifugus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Eastern pipistrel	<i>Pipistrellus subflavus</i>
Red bat	<i>Lasiurus borealis</i>
Hoary bat	<i>Lasiurus cinereus</i>
Big brown bat	<i>Eptesicus fuscus</i>
Raccoon	<i>Procyon lotor</i>
Short-tail weasel	<i>Mustela erminea</i>
Long-tail weasel	<i>Mustela frenata</i>
Striped skunk	<i>Mephitis mephitis</i>
Coyote	<i>Canis latrans</i>
Red fox	<i>Vulpes vulpes</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Woodchuck ^a	<i>Marmota monax</i>
Eastern chipmunk	<i>Tamias striatus</i>
Eastern gray squirrel ^a	<i>Sciurus carolinensis</i>
Red squirrel	<i>Tamiasciurus hudsonicus</i>
Northern flying squirrel	<i>Glaucomys sabrinus</i>
Southern flying squirrel	<i>Glaucomys volans</i>
White-footed mouse	<i>Peromyscus leucopus</i>
Deer mouse	<i>Peromyscus maniculatus</i>
Southern bog lemming	<i>Synaptomys cooperi</i>
Southern redback vole	<i>Clethrionomys gapperi</i>
Meadow vole	<i>Microtus pennsylvanicus</i>

Table 7-4 MAMMALS LIKELY TO OCCUR WITHIN THE DETAILED STUDY AREA	
Pine vole	<i>Microtus pinetorum</i>
Meadow jumping mouse	<i>Zapus hudsonius</i>
Eastern cottontail ^a	<i>Sylvilagus floridanus</i>
Whitetail deer ^a	<i>Odocoileus virginianus</i>

^a Species observed during the field survey.

Source: Burt, W.H. and R.P. Grossenheider 1976.

Table 7-5 WATER QUALITY DATA FOR THE STUDY AREA			
	Barge Canal	Intermittent Stream with Culverted Drainage	Drainage and Open Water Wetland
Date Sampled	12/8/92	12/7/92	NS
Temperature (°C)	2.4	2.3	NS
pH (standard units)	6.69	7.64	NS
Alkalinity (mg/L)	177	412	NS
Conductance (µmho/cm)	943	1,168	NS
Hardness (mg/L)	263	357	NS
Total suspended solids (mg/L)	ND	1,362	NS
Dissolved Oxygen (mg/L)	8.54	7.78	NS

Note: Values are the average of three samples.

Key:

ND = Not detected.

NS = Not sampled.

Table 7-6 STATE-DESIGNATED FRESHWATER WETLANDS LOCATED WITHIN THE GENERAL STUDY AREA			
NYSDEC Code	Vegetation Type	NYSDEC Classification	Location
GT-3	PFO, PSS, PEM	II	Upgradient
GT-8	PFO, PSS	II	Upgradient

Key:

PEM = Palustrine emergent wetland.
PFO = Palustrine forested wetland.
PSS = Palustrine shrub/scrub wetland.

Source: Sanderson 1993.

Table 7-7
FEDERALLY-DESIGNATED FRESHWATER WETLANDS LOCATED
WITHIN THE GENERAL STUDY AREA

Direction from Site	Vegetation Type	Distance from Site (miles)
North	PFO1E	Adjacent
North	PFO1E	0.91
North	PFO1E	1.00
Northeast	PFO1E/P- <u>SS</u> _{5E} EM	1.11
South	PFO1E	0.60
Southwest	PFO1E	0.95
Southwest	PFO1E/P- <u>FO</u> _{SS} -1E/PEM5Bd/PEM5E	1.20
Northeast	PFO1Ad	0.25
Northeast	PFO1E	0.31
Northeast	PFO1Ad	0.37
Northeast	POWz	1.30
Northeast	PSS1E	1.35
Northeast	PFO1E/P- <u>FO</u> _{SS} -1E	1.38
Northeast	PFO1A	1.50
Northeast	PEM5A	2.00
Northeast	PFO1E	2.00
Barge Canal	R2OWHx	Adjacent

Key:

- PFO1E = Palustrine, forested, broad-leaved deciduous, seasonal saturation.
P-SS_{5E} = Palustrine, scrub-shrub/narrow-leaved persistent emergent, seasonal saturation.
EM
P-FO_{SS}-1E = Palustrine, forested/scrub-shrub/broad-leaved deciduous, seasonal saturation.
SS
PEM5Bd = Palustrine, emergent, narrow-leaved persistent, saturated partially drained/ditched.
PEM5E = Palustrine, emergent, narrow-leaved persistent, seasonal saturation.
PFO1Ad = Palustrine, forested, broad-leaved deciduous, temporary, partially drained/ditched.
PFO1A = Palustrine, forested, broad-leaved deciduous, temporary.
POWz = Palustrine, open water, intermittently exposed/permanent.
PEM5A = Palustrine, emergent, narrow-leaved persistent, temporary.
PSS1E = Palustrine, scrub-shrub, broad-leaved deciduous, seasonal saturation.
R2OWHx = Riverine, lower perennial, open water, permanent, excavated.

Table 7-8 CONTAMINANTS OF ECOLOGICAL CONCERN AT DEARCOP FARM SITE			
Chemical	Media		
	Soil	Sediment	Surface Water
Volatile Organics			
2-Butanone	X		
Carbon disulfide	X	X	X
Chlorobenzene	X		
Toluene	X		X
Trichloroethene	X	X	
1,1,1-trichloroethane	X		
Xylene (total)	X	X	
1,1-Dichloroethane		X	
Total-1,2-Dichloroethene		X	X
Semivolatiles			
Carbazole	X	X	
Diethylphthalate	X		X
Bis(2-ethylhexylphthalate)			X
2-Chloropyridine			X
Butylbenzylphthalate		X	
Dibenzofuran		X	
Semivolatiles (PAHs)			
Acenaphthene	X	X	
Anthracene		X	
Benzo(a)anthracene	X	X	
Benzo(a)pyrene	X	X	
Benzo(b)fluoranthene	X	X	
Benzo(g,h,i)perylene	X	X	
Benzo(k)fluoranthene		X	
Chrysene	X	X	

Table 7-8 CONTAMINANTS OF ECOLOGICAL CONCERN AT DEARCOP FARM SITE			
Chemical	Media		
	Soil	Sediment	Surface Water
Dibenz(a,h)anthracene	X	X	
Fluoranthene	X	X	
Fluorene	X	X	
Indeno(1,2,3-cd)pyrene	X	X	
2-methylnaphthalene		X	
Naphthalene		X	
Phenanthrene	X	X	
Pyrene	X	X	
Pesticides			
Alpha chlordane	X	X	
4,4'-DDE	X	X	
Dieldrin	X	X	
Gamma chlordane	X		
Heptachlor epoxide	X		
Endosulfan sulfate		X	
Endrin ketone		X	
PCBs			
Aroclor 1254	X	X	
Aroclor 1260	X		
Inorganics			
Cadmium	X	X	
Chromium		X	
Lead	X	X	
Mercury		X	X
Silver	X		
Zinc	X	X	X
Barium	X		
Cobalt	X		

Table 7-8 CONTAMINANTS OF ECOLOGICAL CONCERN AT DEARCOP FARM SITE			
Chemical	Media		
	Soil	Sediment	Surface Water
Nickel	X		

Table 7-9 SURFACE WATER CRITERIA FOR PROTECTION OF FISH AND WILDLIFE			
Chemical	NYSDEC AWQS/GV^a (µg/L)	USEPA AWQC^b (µg/L)	Sampling Locations With Concentrations Above Criterion
Organics			
Carbon disulfide	--	--	--
Total-1,2-dichloroethene	--	--	--
Toluene	--	--	--
Diethylphthalate	--	--	--
Bis(2-ethylhexyl)phthalate	0.6	360	None
2-chloropyridine	--	--	--
Inorganics			
Aluminum	100	--	SW-1, SW-3, SW-4, SW-5, SW-6
Arsenic	190	190	None
Barium	--	--	--
Copper	31.3 ^d	31.3 ^d	None
Iron	300	1,000	SW-1, SW-2, SW-4, SW-6
Lead	13.6 ^d	13.6 ^d	None
Manganese	--	--	--
Mercury	0.2	0.012	SW-1
Selenium	1.0	5.0	SW-4, SW-5, SW-6
Zinc	30	110	SW-1, SW-2

^a Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Ambient Water Quality Standards and Guidance Values; unless otherwise noted, values are standards for protection of freshwater aquatic life (fish survival) in class B waters (NYSDEC 1990).

^b Ambient Water Quality Criteria (EPA 1992), freshwater chronic criteria unless otherwise noted.

^c Bioaccumulation guidance value for Class B waters (NYSDEC 1990).

^d Hardness dependent criteria (312 ppm used).

^e Value presented to LOEL

Key:

-- = No criterion exists.

Table 7-10 SEDIMENT CRITERIA FOR PROTECTION OF FISH AND WILDLIFE ORGANIC CHEMICALS			
Chemical	NYSDEC* (µg/kg)^c	EPA Interim^d Guidance (µg/kg)	Sampling Locations With Concentrations Above Criterion
Volatiles			
1,1-Dichloroethane	—	—	—
Total-1,2-dichloroethene	—	—	—
Xylene (total)	—	—	—
Trichloroethene	—	—	—
BNAs			
Butylbenzylphthalate	—	—	—
Carbozole	—	—	—
Dibenzofuran	—	—	—
PAHs			
Acenaphthene	7,300	7,330	None
Anthracene	—	—	—
Benzo(a)anthracene	—	13,200	None
Benzo(b)fluoranthene	—	—	—
Benzo(k)fluoranthene	—	—	—
Benzo(a)pyrene	—	10,630	None
Benzo(g,h,i)perylene	—	—	—
Chrysene	—	—	—
Dibenzo(a,h)anthracene	—	—	—
Fluoranthene	—	—	—
Fluorene	—	—	—
2-methylnaphthalene	—	—	—
Indeno(cd 1,2,3)pyrene	—	—	—
Naphthalene	—	—	—
Phenanthrene	1,390	1,390	SED-1
Pyrene	—	13,100	None

Table 7-10 SEDIMENT CRITERIA FOR PROTECTION OF FISH AND WILDLIFE ORGANIC CHEMICALS			
Chemical	NYSDEC^a ($\mu\text{g/kg}$)^c	EPA Interim^d Guidance ($\mu\text{g/kg}$)	Sampling Locations With Concentrations Above Criterion
PCBs			
Aroclor-1254	1.4 ^b	196	SED-4, SED-5, SED-6
Pesticides			
Alpha-chlordane	0.006	—	—
4,4'-DDE	0.828 ^b	—	—
Dieldrin	19.5	—	—
Endosulfan sulfate	—	—	—
Endrin ketone	—	—	—

^a Division of Fish and Wildlife Sediment Criteria guidance document (NYSDEC December 1989); unless otherwise noted, values are aquatic toxicity based sediment criteria.

^b Wildlife residue based sediment criterion (NYSDEC December 1989).

^c Concentrations normalized for estimated sediment organic carbon content (1% used).

^d Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants.

Key:

— = No criterion exists.

Table 7-11 SEDIMENT CRITERIA FOR PROTECTION OF FISH AND WILDLIFE INORGANIC CHEMICALS			
Chemical	NYSDEC^a	Ontario Ministry of Environment (LOEL)^b	Sampling Locations With Concentrations Above Criterion
Inorganics			
Aluminum	—	—	—
Arsenic	5	5.5	None
Barium	—	60	None
Beryllium	—	—	—
Cadmium	0.8	1.0	
Chromium	26	31	SED-6
Cobalt	—	—	—
Copper	19	25	SED-1, SED-4, SED-5, SED-6
Iron (%)	2.4	3	None
Lead	27	31	SED-1, SED-4, SED-5, SED-6
Manganese	428	457	None
Mercury	0.11	0.12	SED-1
Nickel	22	31	None
Selenium	—	—	
Silver	—	—	
Vanadium	—	—	—
Zinc	85	110	SED-1, SED-4, SED-5, SED-6

^a Division of Fish and Wildlife Sediment Criteria guidance document (NYSDEC December 1989).

^b Environment Sediment Quality Criteria (Persuad 1991).

Key:

— = No criterion exists.

Table 7-12 COMPARISON OF SITE INORGANICS TO REPORTED BACKGROUND CONCENTRATION		
Chemical	95% Concentration (mg/kg)^a	Sampling Location with Concentration Above Background
Aluminum	187,000	None
Arsenic	22.5	None
Barium	1,183	None
Beryllium	2.53	None
Cadmium	0.7 ^b	SS-2, SS-4, SS-5, SS-6, SS-9, SS-12, SS-13, SS-14, SS-15, SS-19
Calcium	21,600	None
Chromium	159	None
Cobalt	27.9	SS-5, SS-15, SS-17
Copper	70.7	SS-3, SS-4, SS-5, SS-6, SS-9, SS-12, SS-13, SS-14, SS-15
Iron	79,300	None
Lead	42	SS-3, SS-4, S-5, SS-9, SS-12, SS-13, SS-14, SS-15, SS-16
Magnesium	16,900	None
Manganese	2,360	None
Mercury	0.371	None
Nickel	54.3	SS-5, SS-6, SS-12, SS-13, SS-14, SS-15, SS-17
Potassium	26,800	None
Selenium	1.30	None
Sodium	30,200	None
Vanadium	195	None
Zinc	137	SS-3, SS-4, SS-5, SS-14, SS-15

^a Schacklette and Boerngen 1989, for Soils of the Eastern United States.

^b According to Lindsey 1979.

Table 7-13						
TOXICITY QUOTIENTS - SURFACE WATER						
Chemical	TBC ^a (µg/L)	Endpoint /Source ^b	UF ^c	ECL ^d (µg/L)	EPC ^e (µg/L)	TQ ^f
Organics						
Carbon disulfide	—	—	—	—	3	—
Total-1,2-Dichloroethene	11,600	(1)	.1	1,160	2	<0.01
Toluene	17,500	(2)	.1	1,750	1	<0.01
Bis(2-ethylhexyl)phthalate	—	—	—	—	4	—
2-chloropyridene	—	—	—	—	3	—
Inorganics						
Aluminum	—	—	—	—	1,230	—
Barium	50,000	(1)	.1	5,000	89.7	0.02
Copper	31.3	(2)	1.0	31.3	11.3	0.36
Iron	300	(5)	1.0	300	967	3.22
Lead	13.6	(2)	1.0	13.6	11.8	0.86
Manganese	—	—	—	—	600	—
Selenium	—	—	—	—	1.7	—
Zinc	30	(2)	1.0	30	260	8.66

^a TBC = Toxicity Benchmark Criterion.

^b Endpoints/Sources:

(1) Acute LOEL for chemical or chemical class, EPA 1986.

(2) Hardness dependent acute criteria (312 ppm used), EPA 1986, NYSDEC 1990.

^c UF = Uncertainty Factor: 0.1 used to estimate NOEL from LOEL; 0.1 used to estimate NOEL for structurally-related compounds (EPA 1984).

^d ECL = Environmental Concern Level = TBC x UF.

^e EPC = Exposure Point Concentration = concentrations measured at sampling location SW-2.

^f TQ = Toxicity Quotient - EPC/ECL ratio.

Key:

— = Insufficient data to derive a criterion.

Table 7-14						
SITE-SPECIFIC SEDIMENT CRITERIA FOR NON-POLAR ORGANICS						
Chemical	TBC ^a (µg/L)	Endpoint /Source ^b	UF ^c	ECL ^d (µg/L)	log K _{ow}	Sediment Criteria ^e (µg/kg)
Volatiles						
1,1-Dichloroethane	118,000	(1)	.01	1,180	1.79	1,180
Total-1,2-Dichloroethene	11,600	(2)	.1	1,160	2.06 (trans)	1,160
Trichloroethene	45,000	(2)	.1	4,500	2.29	877
	11	(5)	1.0	11	2.29	2.1
Xylenes (total)	--	--	--	--	--	--
BNAs						
Butylbenzylphthalate	--	--	--	--	--	--
Carbazole	--	--	--	--	--	--
Dibenzofuran	--	--	--	--	--	--
PAHs						
Acenaphthene	--	--	--	--	--	730 ^f
Anthracene	--	--	--	--	--	--
Benzo(a)anthracene	--	--	--	--	--	--
Benzo(b)fluoranthene	--	--	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--
Benzo(a)pyrene	.0012	(5)	1.0	.0012	6.04	1.3
Benzo(g,h,i)perylene	--	--	--	--	--	--
Chrysene	--	--	--	--	--	--
Dibenzo(a,h)anthracene	--	--	--	--	--	--
Fluoranthene	3,980	(2)	.1	398	4.90	31,614
Fluorene	--	--	--	--	--	--
Indenopyrene	--	--	--	--	--	--
Naphthalene	--	--	--	--	--	--
2-methyl-naphthalene	--	--	--	--	--	--
Phenanthrene	--	--	--	--	--	139 ^f
Pyrene	--	--	--	--	--	--

Table 7-14						
SITE-SPECIFIC SEDIMENT CRITERIA FOR NON-POLAR ORGANICS						
Chemical	TBC ^a (μg/L)	Endpoint /Source ^b	UF ^c	ECL ^d (μg/L)	log K _{ow}	Sediment Criteria ^e (μg/kg)
PCBs						
Aroclor-1254	— .001	— (5)	— 1.0	— .001	— 6.14	196 ^g 1.4
Pesticides						
Alpha-chlordane	—	—	—	—	—	0.006 ^f
4,4'-DDE	—	—	—	—	—	0.828 ^f
Dieldrin	—	—	—	—	—	195 ^f
Endosulfon	—	—	—	—	—	—
Sulfate	—	—	—	—	—	—
Endrin ketone	—	—	—	—	—	—

^aTBC = Toxicity Benchmark Criteria.

^bEndpoints/Sources:

- (1) Acute LOEL for 1,2-Dichloroethane, EPA 1986.
- (2) Acute LOEL for chemical or chemical class, EPA 1986.
- (3) Chronic LOEL for chemical or chemical class, EPA 1986.
- (4) Hardness dependent acute criteria (not applicable to non-polar organics).
- (5) NYSDEC surface water criterion for protection of aquatic life (fish survival or bioaccumulation), NYSDEC 1990.

^cUF = Uncertainty Factor: 0.1 used to estimate NOEL from LOEL; 0.1 used to estimate NOEL for structurally related compounds (EPA 1984).

^dECL = Environmental Concern Level = TBC x UF.

^eSediment criteria normalized for estimated sediment organic carbon content (2% used) - see text for calculation.

^fNYSDEC sediment criterion, NYSDEC 1989.

^gEPA Interim guidance.

Key:

— = Insufficient data to derive a criterion.

Table 7-15 SITE-SPECIFIC SEDIMENT TOXICITY QUOTIENTS FOR NON-POLAR ORGANICS			
Chemical	Sediment Criteria^a (µg/kg)	EPC^b (µg/kg)	TQ^c
Volatiles			
Carbon disulfide	—	10	—
1,1-Dichloroethane	1,180	3	<0.01
Total-1,2-Dichloroethene	1,160	5	<0.01
Trichloroethene	877	2	<0.01
	2.1	2	0.87
Xylenes (total)	—	1	—
BNAs			
Butylbenzophthalate	—	73	—
Carbazole	—	400	—
Dibenzofuran	—	280	—
PAHs			
Acenaphthene	730	490	0.67
Anthracene	—	790	—
Benzo(a)anthracene	—	1,900	—
Benzo(b)fluoranthene	—	2,300	—
Benzo(k)fluoranthene	—	450	—
Benzo(a)pyrene	1.3	1,500	1,153.8
Benzo(g,h,i)perylene	—	1,000	—
Chrysene	—	2,000	—
Dibenzo(a,h)anthracene	—	540	—
Fluoranthene	31,614	3,900	0.12
Fluorene	—	450	—
Indenopyrene	—	1,400	—
Naphthalene	—	260	—
2-methylnaphthalene	—	130	—
Phenanthrene	139	3,100	22.3
Pyrene	—	3,400	—

Table 7-15 SITE-SPECIFIC SEDIMENT TOXICITY QUOTIENTS FOR NON-POLAR ORGANICS			
Chemical	Sediment Criteria^a (µg/kg)	EPC^b (µg/kg)	TQ^c
PCBs			
Aroclor-1254	196	110	0.56
	1.4	110	78.6
Pesticides			
Alpha-chlordane	0.006	5.7	950
4,4-DDE	0.828	7.0	8.4
Dieldrin	195	4.7	0.02
Endosulfon sulfate	—	16	—
Endrin ketone	—	21	—

Key:

^a Sediment criteria from Table 7-11.

^b EPC = Estimated Point Concentration = highest concentration measured at SED-1, SED-2, SED-3, SED-4, or SED-5.

^c TQ = Toxicity Quotient = EPC/Sediment Criterion.

Table 7-16 SITE-SPECIFIC SEDIMENT TOXICITY QUOTIENTS FOR INORGANICS			
Chemical	Sediment Criteria^a (mg/kg)	EPC^b (mg/kg)	TQ^c
Aluminum	—	2,920	—
Arsenic	33	3.7	0.74
Barium	—	57.9	—
Beryllium	—	0.43	—
Cadmium	10	2.4	0.24
Chromium	111	27.1	
Cobalt	—	6.8	—
Copper	114	74.6	0.64
Iron	4	0.91	0.22
Lead	250	137	0.54
Manganese	1,100	353	0.32
Mercury	2	3.0	1.5
Nickel	90	15.4	0.17
Selenium	—	0.44	—
Silver	—	1.3	—
Vanadium	—	10	—
Zinc	800	299	0.37

Key:^a Sediment criteria Limit of Tolerance (NYSDEC 1989).^b EPC = Estimated Point Concentration = highest concentration measured at sediment sampling location.^c TQ = Toxicity Quotient = EPC/Sediment Criterion.

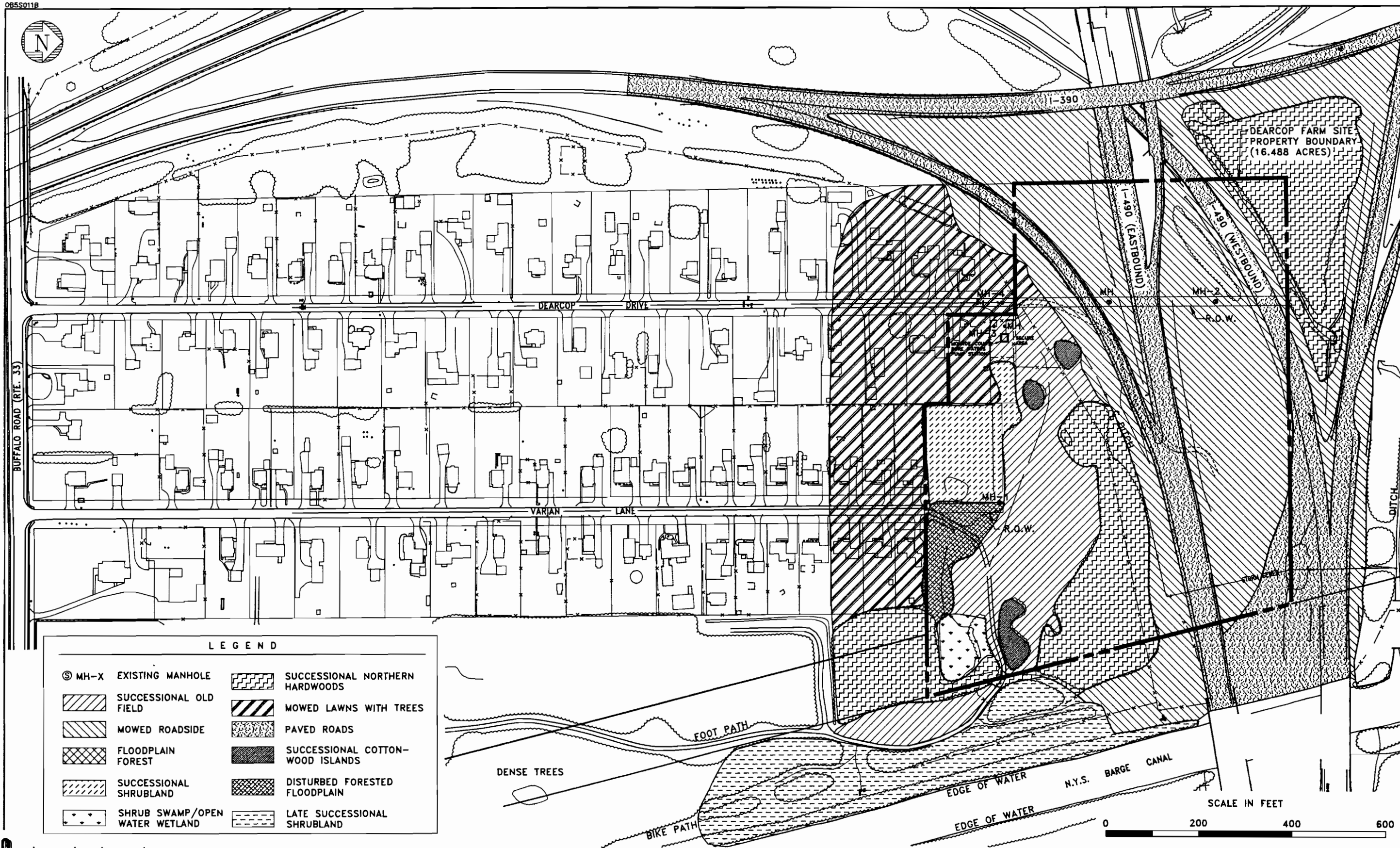
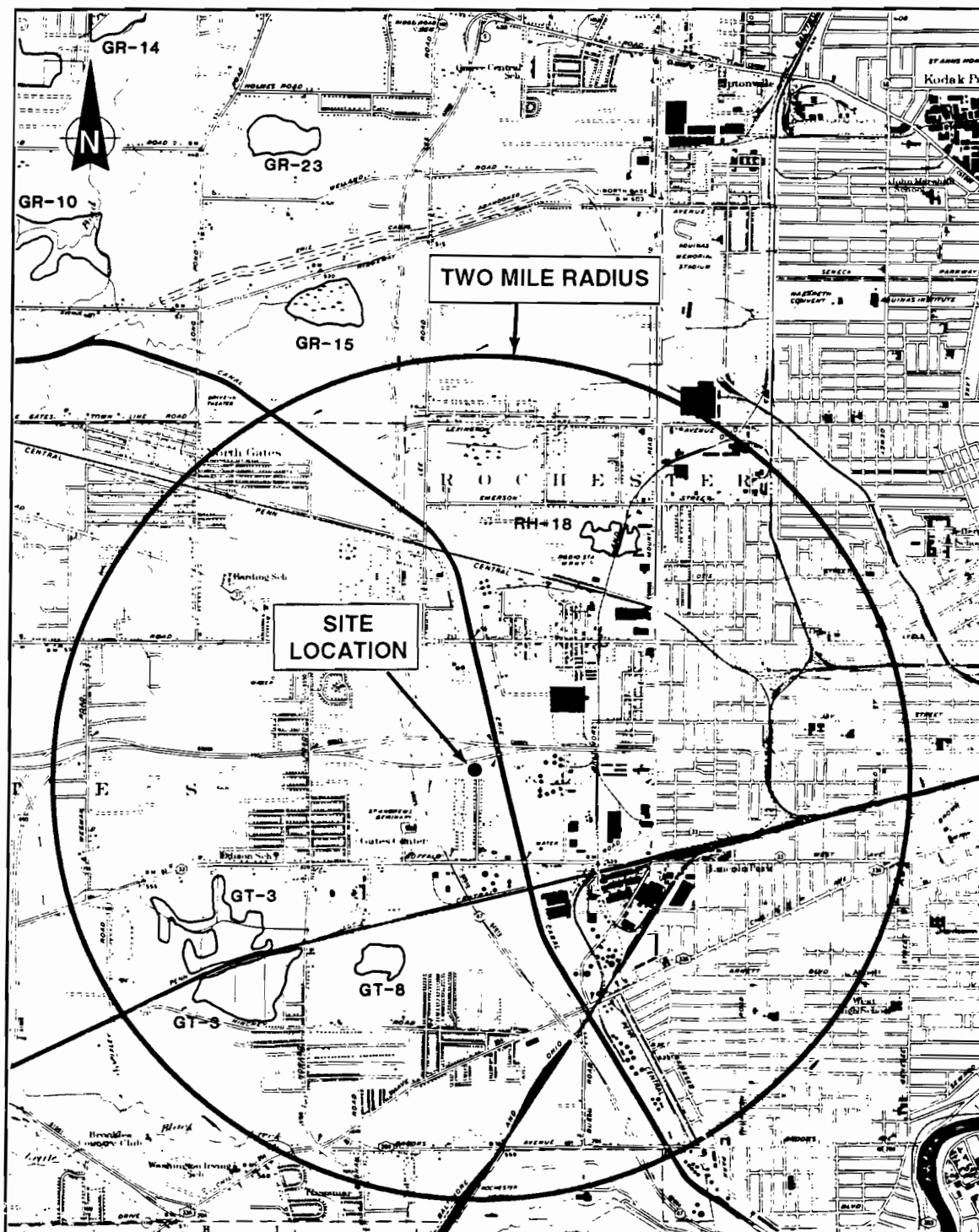


Figure 7-1 COVER TYPE MAP FOR
MAY 1993
DEARCOP FARM SITE



SOURCE: NYSDOT 1968.

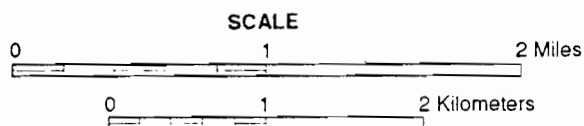


Figure 7-2
STATE REGULATED WETLANDS
WITHIN A 2-MILE RADIUS OF THE DEARCOP FARM SITE

8. SUMMARY AND CONCLUSIONS

8.1 SUMMARY

8.1.1 Nature and Extent of Contamination

Soil Gas

The soil gas survey at the Dearcop Farm site indicated the presence of purgeable halocarbon and purgeable aromatic compounds. Purgeable halocarbons were found to be divided by the I-490 into two major plumes (see Appendix E). The first and largest plume is approximately 300 feet east/west by 150 feet north/south in the northwestern portion of the vacant lot area south of the I-490 eastbound lanes. The second plume is approximately 200 feet east/west by 100 foot north/south and is located on the I-490 median between the east and westbound lanes. This plume appears to extend beneath the I-490 eastbound lanes toward the site. Three other potential source areas of lesser magnitude were also identified in the vacant lot area, and several samples in the residential area south of the site also had low levels of contaminants. Purgeable aromatics were mainly detected on the I-490 median; however, localized areas of high concentrations were also found in the vacant lot area. Positive soil gas readings were detected on the northernmost residential lots on both Dearcop Drive and Varian Lane, and two residences (205 and 206 Dearcop Drive) approximately 1,000 feet south of the site. Some of these residences contained fill material below the topsoil that is believed to be from the site.

Soil

The magnetic and electromagnetic geophysical survey identified areas of highly conductive fill materials which apparently mimic fill boundaries, based upon visual

observations of topography, subsurface excavations, and drill log data. Highly conductive fill materials are present throughout the vacant lot area and the interstate median. The geophysical data was used in placement of test pit locations.

Subsurface soil samples were collected from on-site test pits, and both on and off-site monitoring well boreholes, and soil boring locations from selected residential lots. Test pit excavations identified the presence of fill materials consisting of metal and glass slag and other industrial and municipal debris at all locations. Rusted drums (some with oily substances) were found in TP-5 and TP-6 in the northwestern portion of the vacant lot area and blue-stained material in TP-2. Elevated radiation readings up to three times background were detected from the blue-stained materials. The highest concentrations of VOCs were detected in TP-6 and TP-2. The highest concentration of PCBs were detected in TP-5. In addition to chemical contaminants, asbestos fibers were detected in some of the samples at variable percentages ranging up to 2% in TP-5 (2 feet BGS).

Subsurface soils from residential lots indicated the presence of man-made fill materials at three of the 12 locations tested (93 and 206 Dearcop Drive, and 33 Varian Lane). Sample analyses from these samples indicated a low concentration of toluene (2 mg/kg) in BH-33V, bis(2-ethylhexyl)phthalate in BH-93D (39 $\mu\text{g/kg}$) and BH-205D (50 $\mu\text{g/kg}$), several PAHs in BH-206D (27,500 $\mu\text{g/kg}$), and BH-33V (34,200 $\mu\text{g/kg}$) and several metals exceeding the common range for metals in soils of the eastern United States. These metals include: cadmium in BH-93D, BH-102D, BH-105D, BH-205D, BH-206D, BH-212, BH-332, and BH-5V, and copper, lead, and nickel in BH-206. Asbestos fibers (6.5%) were also detected in subsurface soils from one of the residential lots containing man-made fill (BH-93D). Subsurface soils from monitoring well boreholes were also collected. Sample results indicated relatively low levels of contaminants in all of the samples tested, with the exception of cadmium above the common range in MW-2D (6 to 7.2 feet), MW-3D (7 to 8 feet), MW-8S (6 to 8 feet), an MW-10D (12 to 14 feet).

Groundwater

Groundwater beneath the site is found in two aquifer systems. Groundwater in the shallow aquifer flows to the east/northeast and discharges to the Barge Canal. Groundwater in the deep aquifer flows north/northeast and discharges to the Barge Canal and ultimately to the Genesee River basin and Lake Ontario. The raising and lowering of the water in the

Barge Canal for flood control purposes (Martin 1993) has a direct effect on both the shallow and deep aquifer. Vertical hydraulic gradients in most of the shallow and deep wells are separated by a semi-confining massive dolomite layer. The presence of contaminants in deep wells indicates that the massive dolomite layer is fractured and leaky. All of the shallow wells do not appear to penetrate this layer (based upon rock cores and rock quality designation). However, the Barge Canal intersects this layer, therefore connecting the two aquifers. The vertical gradient between the shallow and deep wells along the Barge Canal is non-existent.

Groundwater contained VOCs in excess of NYSDEC drinking water standards in all downgradient wells. Upgradient wells (MW-4S/4D, MW-5S/5D, and MW-6S/6D) were free of contaminants except for MW-4D which contained BTX compounds that are believed to be naturally occurring. The primary groundwater contaminants beneath the site and downgradient consist of several chlorinated aliphatics (1,1-DCA, 1,1-DCE, 1,2-DCE (total), 1,1,1-TCA, TCE, and VC). Semivolatile compounds including phthalates, phenols, and naphthalene were also detected in the groundwater. The phthalates are believed to be field or laboratory artifacts from the use of disposable gloves. Phenols are common contaminants associated with landfills, however, only 4-methylphenol was detected in a shallow on-site well. Although 2-chloropyridine, which is indicative of contaminants originating from the Olin Chemical site, was detected in the three surface water samples from the Barge Canal, no pyridines were detected in the groundwater samples beneath or adjacent to the site.

Several metals were also detected above groundwater standards; however, due to high turbidity in some samples, the high levels of several of these metals may be attributable to interference from particulates in the groundwater or natural leaching from the bedrock. However, there were a few samples which contained elevated metals concentrations of questionable origin. Those metals include zinc in MW-2D, MW-5D(N), and MW-ND; chromium in MW-4D; and selenium in MW-9D. Since these metals are only present in elevated concentrations in deep wells, the source is unknown and not believed to be from the site. The source of the elevated levels of aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, and sodium are inconclusive based upon the above statements. The distribution of the above-mentioned contaminants indicates a multiple contaminant source on site. These areas include the vicinity of DR-2/MW-2D(N), MW-10S/MW-10D, DR-3/MW-3D(N), and possibly DR-1/MW-1D. These areas correspond with soil gas results.

Fracture flow and possibly gravity flow of the denser chlorinated aliphatic has resulted in variable distribution of contaminants downgradient wells.

Surface Water and Sediments

Surface water collected from the drainage ditch passing through the site did not contain significant levels of contaminants other than iron which exceeded surface water standards. Iron is a commonly occurring metal that often exceeds standards. Low levels of 2-chloropyridine were detected in the samples from the barge canal, the indicating contamination from the Olin site. Therefore, there appears to be no significant contribution from the landfill to the surface water. Sediments collected from the drainage ditch contained elevated levels of semivolatiles and low levels of pesticides. PCBs and low levels of VOCs were only detected only in sediment samples collected from the barge canal. Cadmium, copper, lead, and mercury exceeded criteria in samples from both the drainage ditch and barge canal.

Surface Soils

Only very low levels of VOCs and semi-volatiles were detected in the surface soils; the highest concentrations of VOCs were detected from a sample collected on a residential lot (SS-20). Low levels of pesticides were only detected in two samples, one of which was on the residential lot (SS-20). Low levels of two PCBs (Aroclor 1254 and 1260) were detected in all but seven of the 20 surface soil samples with the highest total PCBs of 3.3 ppm in SS-13. Metals that exceeded the common range for Eastern U.S. soils include cadmium, cobalt, copper, and lead in SS-15, and barium and cobalt in SS-7, and cadmium in SS-5 and SS-19.

Water from manhole samples contained low levels of VOCs, semi-volatiles, and metals which do not appear to be from the site.

Water seeping into the quarry located 0.5 miles southwest of the site was free from site contaminants. The quarry was determined to be upgradient and not affecting groundwater gradients in the vicinity of the site.

Finally, gas produced from monitoring wells was determined to be 99% petroleum hydrocarbons with trace amounts of chlorinated organics. Two wells tested, MW-8D and MW-10D produced elevated levels of hydrogen sulfide.

In general, the nature and extent of contamination at the Dearcop Farm site has been reasonably defined by the data collected during the Phase I RI. High soil gas readings in the northwest corner of the vacant lot and I-490 median were confirmed by contaminated subsurface soils collected from test pits 2, 5, 6, and groundwater samples from DR-2, MW-10S, and DR-3. Contamination in this area might be the cause of lack of vegetation noted in the northwest portion of the vacant lot area. Although other localized areas of contamination were detected on site, the above-mentioned areas are clearly the most contaminated portions of the site. Specific sources are not well defined; however, drums found in test pits 5 and 6 may be a contributing source. Contamination in the median may be due to the alleged burning of solvents. Since soil gas and geophysical results did not indicate any suspect areas of contamination in the vicinity of DR-1, the source of the high levels of VOCs are presently unknown and may be due to localized dumping or contaminant migration along a major rock fracture. Contamination in the groundwater is migrating via fractures in the upper bedrock, to the east/northeast and discharging to the Barge Canal. Some vertical migration is also taking place to the deeper bedrock aquifer which in turn is migrating to the northeast into and beneath the Barge Canal.

The nature and extent of contamination in the residential area has not been fully defined. The presence of contaminants noted in soil gas samples and subsurface soil samples collected to verify soil gas results from residential lots did indicate that fill materials from the site have been transferred in the past to the residential lots, probably to fill low-lying areas. The extent and distribution of these materials is still undetermined. The purpose of this study was to determine if the landfill was impacting the residential area. However, the transfer of fill material to lots up to 1,000 feet or more from the site was not fully anticipated. Therefore, additional reconnaissance work is needed to assess potential risks to human health (see Sections 8.1.3 and 8.2.1).

8.1.2 Fate and Transport

The following is a summary of contaminant fate and transport:

- The fill material and its associated waste is the primary source of chemical contamination at the site and where present, off site (i.e., residential lots);

- Surface and subsurface soils are contaminated by the leaching of wastes from the fill material;
- Soil gases contain organic contamination on site and in some areas, off site. The contaminants are assumed to be venting off into the atmosphere at low levels;
- Surface water and sediment is minimally affected by site-related contaminants because runoff is minimal relative to downward infiltration and, due to site topography overland, flow from the site to the Barge Canal is limited to the drainage ditches;
- Both the shallow and deep aquifers contain site contaminants and flow toward the east/northeast. The shallow groundwater discharges into the Barge Canal, whereas, the deeper bedrock aquifer discharges into and under the Barge Canal;
- Groundwater flow is predominantly through rock fractures and joints; and
- Seasonal fluctuations in the canal water level would effect rates of groundwater contaminant migration, most likely causing a seasonal pulse-like effect. The Barge Canal to the east of the site functions as a hydrologic barrier for the shallow aquifer. Contamination from the site has migrated approximately 800 feet laterally to the canal.

8.1.3 Risk Assessment

The results of the Phase I RI investigation of the Dearcop Farm site indicate that the site contamination could pose a potential threat to human health. COPCs were detected in soils, sediments, groundwater, and surface water on and near the site. Of the potential exposure pathways, presented in Figure 6-1, the pathways most likely to pose the greatest risks are:

- Direct contact (dermal contact and incidental ingestion) with PAHs, PCBs, metals, and radionuclides in site surface soils by site trespassers.
- Inhalation of resuspended soil particles by site trespassers and possibly off-site residents.

An important data gap that could affect the risk assessment is the lack of local background soil samples. Background soil data is particularly important because metals are naturally occurring in soils and because most of the NYSDEC criteria for soils are based on

local background concentrations. Radionuclides are also naturally present in soil and comparisons with background data are needed to separate background levels from these potentially due to site contamination. Background surface soil samples should be collected from nearby areas that are not affected by the site.

Additional sediment sampling and analysis is also recommended to determine if the source of the Aroclor 1254 and mercury contamination detected in the Barge Canal is the site. This additional sediment chemical data would be used to determine if fish consumption is a potential exposure pathway for site-derived chemicals that is likely to pose a risk to human health.

Another data gap is the lack of off-site surface soil data from yards where site materials were used as fill. This data is needed to evaluate potential, direct exposures of residents to soil contaminants in their yards.

These data gaps will be addressed in the Phase II RI.

8.1.4 Habitat-Based Assessment

The sampling of the sediments from the drainage ditch, intermittent stream, and the Barge Canal indicates contamination above levels of concern for benzo(a)pyrene, phenanthrene, and PCBs. Further investigation is needed to determine if the source of contamination is the Dearcop Farm site or from other sources (e.g., industries and Interstates 390 and 490).

If the source of sediment contamination is determined to be the Dearcop site then, additional site-specific information such as identification of benthic communities, toxicity tests, and tissue analysis would be necessary to further characterize the potential risk posed by site-related contaminants. Additionally, due to the lack of criteria-specific standards and guidance values for soils, a detailed toxicological effects analysis using indicator species would also be recommended. This analysis would fully characterize the potential risks posed by elevated levels of metals detected on the Dearcop Farm site.

8.2 CONCLUSIONS

8.2.1 Data Limitations and Recommendations for Future Work

Results of Phase I RI activities and analytical data indicate the presence of groundwater and soil contamination throughout most of the site (i.e., the vacant lot area and I-490 median), and parts of the residential area to the south of the site.

Specific on-site source areas have not been defined; however, based on soil gas, test pit, and groundwater analyses, the northwest portion of the vacant lot area exhibits the highest degree of contamination. High levels of contaminants were also detected in groundwater collected from the I-490 median (DR-3) and along the Barge Canal (DR-1).

Because the site is an inactive landfill, and multiple source areas are expected, further delineation of the source areas through additional monitoring wells is not recommended. Upgradient and downgradient boundaries of groundwater contamination have been reasonably identified through the installation and sampling of monitoring wells installed during the Phase I RI. However, verification of the contaminant plume should be performed through quarterly groundwater sampling for at least a period of one year. During this time, verification of groundwater gradient should be performed in order to determine the effects of raising and lowering of the Barge Canal, and measured dewatering in the nearby quarry. A second round of groundwater sampling should be performed during a limited Phase II RI.

Although 55-gallon drums were observed on site both at and below ground surface (i.e., in Test Pits 5 and 6), additional geophysics and test pits are not recommended due to the high metallic content of the landfill materials (i.e., metallic slag). Since magnetic and electromagnetic surveys were conducted on a majority of the site, and numerous anomalies were detected, it is impossible to identify and separate buried drum anomalies from anomalies caused by slag or other metal objects. In addition, only two of the seven test pits excavated at prominent geophysical anomalies contained 55-gallon drums. These test pits were close to one another. Analysis of the soils surrounding these drums revealed the presence of PCB compounds, which are relatively immobile.

Based upon the above-mentioned conclusions, additional investigation (other than quarterly groundwater sampling) work is not recommended within the site boundaries. Remedial alternatives for the site will be discussed in the feasibility study.

Contamination in the residential area, however, needs to be further characterized. Background information (i.e., NYSDEC questionnaires from local residents) and Phase I RI soil gas and soil boring results revealed the presence of landfill materials on and beneath several residential lots along Dearcop Drive and Varian Lane. The origin of these materials is believed to be the Dearcop Farm landfill.

E & E recommends the following activities to more fully characterize contamination in the residential area and to facilitate the human health risk evaluations:

- Collection of one composite surface soil sample (0 to 6 inches) from each residential lot believed to contain debris based on field observations and/or previous residential questionnaires. (Approximately 12 locations are proposed.) These composite samples would be collected with a bias toward potential human exposure (i.e., gardens, play areas, etc.). These composite samples will be analyzed for the contaminants detected at elevated concentrations in the subsurface soil samples collected from the residential lots (i.e., metals, PAHs, and asbestos);
- Collection of a separate grab surface soil sample from areas with fill materials found during the collection of the aforementioned composite surface soil samples. The grab surface soil sample will be analyzed for full TCL parameters and asbestos;
- Collection of five background surface soil samples from areas that have been relatively undisturbed by development and landfilling (i.e., the wooded area north of I-490, adjacent residential/commercial area west of Dearcop Drive, and I-390 and east of Varian Lane between the residential lots and the Barge Canal). The purpose of these samples is to establish a more reliable background data base in order to properly evaluate the chemical data (i.e., separate background levels from those potentially due to site contamination). The background samples will be analyzed for full TCL metals, PCBs/pesticides, PAHs, and radionuclides;
- Subsurface soil from 331 Dearcop Drive to characterize the thickness and chemical content of fill materials known to be present on this lot. This sample will be analyzed for full TCL parameters, radionuclides, and asbestos;
- Soil gas for TCL VOCs at 206 and 331 Dearcop where fill materials from the site are known to be present; and
- Vegetable samples from residential lots known to contain fill materials from the site. These samples will be analyzed for TCL metals.

Additional sediment samples are also recommended to determine if the contamination detected in the sediment samples is site related. Sediment samples would be collected from the drainage ditch as well as the Barge Canal. A total of five samples are recommended: one farther upgradient of SW-1/SED-1 from the drainage ditch; one at the same location as SW-1/SED-1 to verify previous sample results; one from the drainage ditch between the fenced area of the site and I-490 eastbound; and two from the Barge Canal farther away from

the site to the north and south. These samples will be analyzed for TCL metals, PAHs, and PCBs/pesticides.

Results obtained from the samples proposed above will be evaluated and discussed in the Phase II RI Report.

9. REFERENCES

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