Preliminary Site Assessment Report

Kay Fries Offsite PSA

Stony Point, Rockland County

Site Number 344023
Work Assignment #D002925-18

Prepared for:

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Executive Summary

A Preliminary Site Assessment (PSA) was conducted to evaluate areas adjacent to the former Kay Fries, Inc. (Kay Fries) site in Stony Point, Rockland County, New York. The original PSA study area was 43 acres in size and was increased to include portions of the West Haverstraw Elementary School. The study area included a former sand borrow area located west of the facility, industrial properties south of Kay Fries Drive, the playground and athletic field of the West Haverstraw Elementary school, the former access road to the facility, and wetlands located to the northwest of the facility.

Remedial investigations conducted on the former Kay Fries property, listed in the New York State Registry of Inactive Hazardous Waste Disposal sites, have documented the presence of hazardous wastes. Interviews with former Kay Fries employees conducted during those remedial investigations indicated that wastes from the Kay Fries facility were disposed of east of the railroad tracks. The PSA was initiated based on the contamination found at the Kay Fries site and concerns raised by the local residents regarding historical activities west of the Kay Fries facility.

A review of the existing records and a site walk over did not identify evidence of environmental contamination in the study area. Consequently, the study used a step-wise approach to locate samples where they would provide the most information. The first step in the evaluation was to perform a review of historical aerial photographs. Photographs from the years 1940, 1953, 1962, 1969, 1974, 1977, 1980, 1984, and 1991 were obtained and reviewed to look for evidence of hazardous waste releases to the environment, or features that may have been associated with waste disposal. The evaluation identified a former pond on the West Haverstraw Elementary School property, areas where surface debris appeared present, and portions of a sand borrow area where excavation activities were concentrated or where depressions or soil piles existed.

A passive soil gas survey was then conducted to screen the site for evidence of volatile and semivolatile contamination. These contaminants were the focus of the Kay Fries site investigations and remediation, and were used as indicators of potential offsite contamination during the PSA. Soil gas sample locations were biased toward the areas of greatest historical activity or features that could be associated with a release, as identified by the evaluation of aerial photographs. The soil gas survey identified the presence of benzene, toluene, ethylbenzene, xylenes, and chlorinated solvents in the study area. The most significant result was the presence of relatively high levels of 1,1,1-trichloroethane and tetrachloroethene in one sample located between the industrial properties at 15 and 19 Kay Fries Drive.

The results of the soil gas survey were used to locate samples for the surface and subsurface investigations which would undergo laboratory analysis to test for the presence of environmental contamination. These investigations included surface and subsurface soil sampling, groundwater sampling, and surface water/sediment sampling. Surface soil samples were collected on the West Haverstraw Elementary School property, centered on the location of the former pond identified on aerial photographs. Three surface soil samples were also collected along the former access road to evaluate whether oils used for dust suppression were contaminated with PCBs. Six soil samples were collected to characterize local background levels, three on the Carpenter's Union Property at 11 Kay Fries Drive, and three at the nearby Thiells Elementary School.

Subsurface soil samples were collected where visual observations or field screening for total volatile organic compounds (VOCs) indicated a possible presence of contamination, or an abrupt change in soil type observed at Geoprobe® sampling locations that might indicate disposal. These samples were located throughout the study area based on the results of the aerial photographic review and the soil gas survey.

Surface and subsurface soil samples identified the presence of polycyclic aromatic hydrocarbons, pesticides, and metals at levels comparable to local background samples and within the published range of typical background soil concentrations. No further investigation for these parameters is recommended. Trace levels of the chlorinated solvents 1,1,1,-trichloroethane, trichloroethene, and 1,1-dichloroethene were found in subsurface soil samples at locations where these compounds were also identified in groundwater samples (WP17 and WP21).

Groundwater sampling identified the presence of chlorinated solvents, including 1,1,1-trichloroethane and trichloroethene, and metals in excess of New York State groundwater quality criteria. The chlorinated solvents were found at 350 ppb at one location, WP17, between 15 and 19 Kay Fries Drive. The distribution of samples in which lower levels of chlorinated solvents were detected indicates that a dissolved phase plume may be migrating downgradient from this location with the flow of groundwater. Groundwater in this area was determined to flow in a north-northwest direction. An investigation is underway to determine the source of the chlorinated solvent contamination in the groundwater.

Elevated concentrations of metals in the groundwater were also identified but appear to be a result of the turbidity of the groundwater samples collected in this investigation. Future groundwater sampling is planned to determine if the metal concentrations exceeding state groundwater quality criteria are associated with the high levels of suspended sediments in the groundwater samples from this investigation.

Phenol was detected in three groundwater samples from Geoprobe® prepacked wells installed for this investigation. The source of the phenol is most likely the prepacked well screens. A second round of sampling is planned to confirm whether these phenol levels truly persist at these three wells.

Polycyclic aromatic hydrocarbons (PAHs) and pesticides were detected in sediment samples collected in the streams and wetlands in the northern portion of the study area. The concentrations were comparable to the levels found in surface soils collected across the entire study area. The contaminants appear to be absorbed to the sediments and are not resulting in the contamination of associated surface water samples. Analytical results for surface water samples did not show detectable levels of environmental contamination. No further surface water or sediment sampling is recommended.

Findings

One area of groundwater contamination was identified during the offsite PSA. Chlorinated solvent contamination was found between properties at 15 and 19 Kay Fries Drive, in the Town of Stony Point. The DEC is continuing to investigate this area to determine the source of the contamination.

The offsite PSA found that there were no other areas of contamination resulting from the disposal of hazardous waste within the offsite PSA study area including:

- The location of the former pond area which is now part of the school playground.
- The former entrance road where PCBs were potentially released.
- The areas west of the plant where sand mining had taken place.
- The wetland north of the former plant road.

The PSA found that the direction of groundwater flow in the study area is to the north-northwest, a direction which is predominantly away from the school property. There is no known groundwater usage within one half mile of the center of the study area.

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Section 1
Introduction

The Kay Fries, Inc. facility was the site of chemical production from the 1930's through 1987. Several remedial investigations have been conducted to assess the properties associated with the production area, and the warehousing and office areas. The focus of this Preliminary Site Assessment (PSA) has been on offsite areas to the west and adjacent to the two operable units (see Figure 1-1).

Interviews with former Kay Fries employees have indicated that any disposal of chemicals that may have taken place occurred in areas associated with the manufacturing facility and surface impoundments to the east of the facility. Remedial investigations have identified soil and groundwater contamination at the facility consisting mainly of aromatic and chlorinated aliphatic solvents. Groundwater and surface seep samples collected in areas downgradient of the study area for this PSA have not indicated the presence of contamination to date.

Concerns have been raised by the neighboring community that Kay Fries may have disposed of wastes west of the production facility. These concerns included activities associated with a sand mining operation, ponded areas that were historically located west of the production facility, and that oils containing PCBs were used for dust suppression on a former access road.

Portions of the study area are active, including a grade school and several light industrial operations (see Figure 1-2). The area directly west of the facility is inactive, and overgrown with small trees and brush. Surface topography is relatively flat over most of the developed portion of the study area, exhibiting 10 to 15 feet of relief. The terrain in the former sand borrow area is irregular indicating that it was not regraded after the sand mining operations ceased. An escarpment drops steeply (>70 feet) to a wetland in the northern portion of the study area.

As part of a background review of the study area, CDM obtained stereo pairs of aerial photographs of the Stony Point/Haverstraw area for the years 1940, 1953, 1962, 1969, 1974, 1977, 1980, 1984, and 1991. The photographs were obtained from three sources; Robinson Aerial in New Jersey, Aerial Viewpoint in Houston, Texas, and National Aerial Resources in Troy, New York.

An initial review was conducted using stereo methods at the original scale of the photographs. The initial review was followed by a detailed review of years, where activities were greatest, using enlarged photos to yield a more detailed picture. Stereo methods use photos shot at different angles that when viewed through stereo glasses allows the viewer to see the area in three dimensions. The scale of the photos ranged from 1"=1000' to 1"=2000'. The initial review was conducted to identify features that might indicate activities which could be associated with disposal of wastes. These features would include evidence of excavation, grading, soil mounding, surface impoundments or ponded liquids, stained soils, drums, and pipelines. Features were noted and used to locate passive soil gas samples and Geoprobe® borings/groundwater samples for the subsurface investigation.

Based on the site history prepared for the Remedial Investigation of Operable Unit Two of the Kay Fries site, the offsite areas were initially used for agriculture purposes. This history is consistent with the aerial photographs reviewed during this study. During this period the ground surface was relatively flat from the present location of Hoke Drive across to the municipal boundary between

Scale 1" = 2000'

Source: USGS Haverstraw, N.Y. 7.5 Minute Quadrangle

CDM Camp Dresser & McKee

Figure 1-1
Site Location Map

CDM
environmental engineers, scientists, planners, & management consultants

Figure 1-2
Site Map

Stony Point and Haverstraw. The area west of the Kay Fries facility was used as a borrow area for sand for approximately 40 years. As sand continued to be removed, the area reached its current topographic relief.

April 6, 1940

In the 1940 aerial photograph, the majority of property west of the facility appears to be agricultural fields. Excavation of sand had already started from the area immediately west of the facility, including the area that the warehouse and offices are located on the west side of the rail line. The present day Kay Fries Drive, or Holt Drive, as it is referred to on published maps, appears to be only a dirt path. Access to the facility was through a dirt road further to the north, running adjacent to what is now Hoke Drive. Several other small dirt paths cross the borrow area. Coloration suggests that recent activity was located at the western end of the sand borrow area. There is a dark area near the junction of the access road to the Kay Fries facility and Route 9. There also appears to be a small building at this location. There is also a small group of buildings near the southwestern corner of the adjacent properties, just north of the Haverstraw-Stony Point municipal boundary. It is possible that this is the original farm house and outbuildings for the fields that cover most of the area. There is a pond located just south of the town line on what is now the West Haverstraw Elementary School property. The pond appears to be quite shallow or eutrified based on the coloration. Two dark areas appear at the western end of the borrow area. They appear to be shadows cast from the edge of the excavated area. A shadow from the rail bridge at the facility is cast in the same direction. There also is a wide depression in the ground surface adjacent to the railroad tracks where the facilities warehouse building is now situated.

April 15, 1953

There does not appear to have been much activity between 1940 and 1953 based on this photograph. Much of the offsite area appears to be plowed and still used for agricultural purposes. The size of the borrow area adjacent to the former facility has not expanded. Vegetation has grown in areas not actively in use as agricultural fields. The small building next to Route 9 where the dark area was noted in the 1940 photograph still shows evidence of activity but the dark area is not present. The pond at what is now the West Haverstaw Elementary School is present. Two areas of ponded water appear on this photograph directly adjacent to the original pond. The Kay Fries facility appears to have remained unchanged.

March 23, 1962

Between 1953 and 1962, the Kay Fries facility had expanded across the railroad tracks to the west into what is now Operable Unit 2 of the facility investigation. In addition to a parking area adjacent to the railroad tracks, vehicles appear to be parked at the western edge adjacent to the borrow area. The residential development along Hoke Drive also appears to have been completed. There is still evidence of activity at the junction of the access road to the Kay Fries facility and Route 9. The buildings thought to be the farmhouse and out buildings are no longer present, and the pond is approximately 40 percent of its original size. Only remnants of the other two ponds are present. Brush appears to have grown over most of the West Haverstraw Elementary School property, and unpaved extensions to the existing residential roads are evident. The borrow area appears to have increased in activity in a small area at the western end, however, its footprint has not expanded

significantly. This area appears to be accessed from the former access road to the facility. There are also bulldozer scrape marks in the southwest corner of the sand borrow area.

April 7, 1969

Between 1962 and 1969, the sand borrow area has expanded westward to the property boundary with what is now the shopping plaza and southward through the area that is now Gotham Ink and Stony Point Electronics. There is no vegetation in the borrow area, and evidence of soil erosion from channelized (from west to east) storm water flow and dirt bike activity can be seen. A pile of soil (most likely reserved top soil) is present at the eastern end of the area where Kay Fries Drive enters the facility. There appears to be several small bushes at its base, possibly for the purpose of stabilizating the soils. The building that is now the Stony Point Grand Union is present but the parking lot has not been constructed. Kay Fries Drive has been constructed and two buildings, marked as the boiler room and a storage shed on Operable Unit 2 maps, have been completed along the southern side of the road immediately west of the former Kay Fries property. The former access road still appears to be in use. Two additional buildings, associated parking areas, and a water tower appear to have been completed in the portion of the facility west of the railroad tracks. A paved parking lot is now present at the western edge of the facility adjacent to the borrow area. Vegetation at the West Haverstraw Elementary School property appears to have grown, small trees are now evident, and the pond is reduced in size to approximately 25 percent of its footprint in the 1962 photo. The residential area has expanded northward to the Haverstraw-Stony Point municipal border along the extensions to the roadways observed in the 1962 photo.

April 16, 1974

Major activity in the sand borrow area appears to have ceased, and low vegetation has begun to grow. Dirt pathways, probably enhanced by dirt bike activity, are evident. It appears that a portion of the pile thought to be top soil has been removed, but there is no evidence that it was redistributed over the borrow area. A pile of soil similar in color does appear in an area just south of the portion of the facility on the western side of the railroad tracks. The original access road to the facility appears to no longer be of use. The parking lot for the shopping plaza has been completed and it appears to be in use. The West Haverstraw Elementary School and its playgrounds have been completed and there is no evidence of the former pond. The Kay Fries facility itself does not appear to have changed significantly.

March 27, 1977

There were no significant changes from the 1974 photograph evident on this photograph.

April 21, 1980

There were no significant changes evident on this photograph. Vegetation is more evident compared to the 1977 photograph; however, this photograph was taken nearly a month later in the spring. Consequently, the increased vegetation could be a result of the photograph being taken further into the growing season.

April 9, 1984

There are no significant changes apparent in the facility and borrow area. Vegetation continues to fill in the borrow area, and pathways are less evident. The building that is the present site of the Carpenter's Union is now present.

February 23, 1991

Small trees are now evident in the borrow area, and pathways are less evident than in the 1984 photo. The buildings presently occupied by Stony Point Electronics and Gotham Ink have been constructed.

Summary of the Photographic Review

The aerial photographs were reviewed prior to field work. Based on this review, CDM recommended concentrating the soil vapor survey on the eastern edge of the sand borrow area and increasing the soil boring and groundwater sampling program to reflect more of a grid pattern across the former sand borrow area. Soil vapor, soil and groundwater samples on the school property were located to concentrate on the former pond.

There were no clear signs of a release to the ground surface, such as stained soils; or structures that may indicate a release, such as drums, pipes, or surface impoundments, found on the aerial photographs reviewed. The activity in the offsite areas owned by Kay Fries, that was visible on the aerial photographs, was largely associated with agriculture, the removal of sand from the borrow area west of the Kay Fries facility, and the expansion of the Kay Fries facility west of the railroad tracks. Properties adjacent to the areas owned by Kay Fries were either unused or used for agriculture purposes until they were developed for residential homes, commercial and light industrial use, or the West Haverstraw Elementary School.

[o:\cattafe\k-fries\intro]

Section 2
Investigation Methods

This section discusses the specific methods employed in the initial screening of the study area and the surface and subsurface investigations.

2.1 Passive Soil Gas Survey

A Gore-Sorber® Screening Survey was conducted to screen the study area prior to selecting specific sample locations for soil and groundwater samples. An initial screening program was proposed because of the large size of the study area, and the lack of definitive evidence of a release. A passive soil gas survey was selected over an active collection method for several reasons. Samples are collected over a longer period of time, typically one to two weeks and are collected onto adsorbent material. This results in less sensitivity to low permeability soil, soil moisture, and ambient changes in soil gas. The use of different adsorbent materials within the same collector results in a high sensitivity to both volatile and semi-volatile organic compounds. Because the collection method is passive, it does not disrupt the natural equilibrium of vapors in the subsurface.

The collectors are analyzed for a select group of volatile organic compounds by thermal desorption and gas chromatography and mass spectrography. The compounds selected for analysis were benzene, toluene, ethylbenzene, xylenes, 1,1-dichloroethane, 1,1,1-tricholoroethane, and tetrachloroethylene. These compounds were selected based on the major compounds reported in the April 1996 Final Remedial Investigation Report for Operable Unit Two of the Former Kay Fries Site which included the onsite areas west of the railroad tracks. The major compounds detected in the remedial investigation were used as indicators of possible releases in the offsite study area. Gore also agreed to notify CDM of any major hits of other volatile and semivolatile compounds that were indicated on the chromatogram.

A total of 68 collectors were deployed by CDM personnel on February 17 and 18, 1997 at the locations shown on Figure 2-1. The collectors were shipped to CDM in 4-ounce glass jars with Teflon lids and consisted of a 3-foot section of Teflon tubing with adsorbent sealed inside. Each collector has an aluminum tag attached with a unique number inscribed on it which corresponds to the same number affixed to the jar.

The collectors were inserted at a depth of 2 feet below the ground surface, at the recommendation of Gore, to minimize the background effects of exhaust or minor surface spills. The CDM field team used an electric hammer drill with a 1-inch bit to advance a hole to a depth of 2 feet below grade. The collector was inserted with a stainless steel rod provided by Gore, and the tubing was attached to a cork plug that was inserted into the top of the borehole to inhibit short circuiting to the atmosphere and aid in the retrieval of the collectors. The collectors were then covered with a few inches of soil to further seal the top of the hole.

The collectors were left in the ground for two weeks and retrieved by the field crew on March 4, 1997. The collectors were returned to the coded jars and shipped to Gore for analysis on

March 5, 1997 by overnight courier. Three of the collectors were not recovered due to either loss or animal activity. The field crew observed small chew marks on some of the cork plugs.

2.2 Surface Soil Sampling

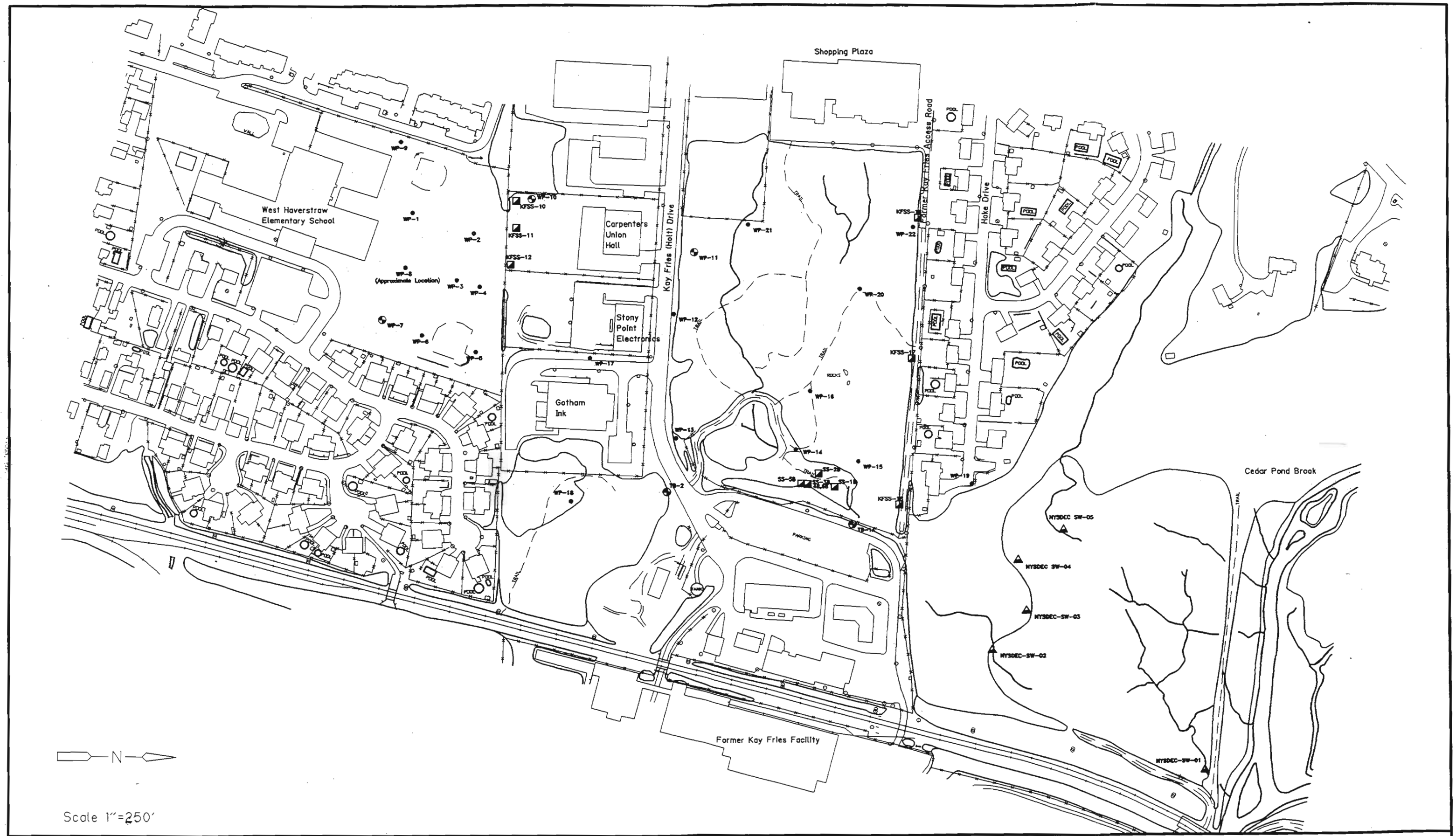
Surface soil samples were collected at selected locations to identify contamination due to direct point source releases to the ground surface, and non-point source releases. Samples were analyzed for USEPA Target Compound List (TCL) organic and Target Analyte List (TAL) inorganic parameters, including cyanides by ITS/Inchcape Laboratories, a New York State-approved laboratory. The analytical data were validated under a separate contract. Surface soil samples were collected to evaluate three distinct locations within the study area, the West Haverstraw Elementary School, the former access road to the Kay Fries facility, and a portion of the borrow area where empty steel drums were observed (see Figure 2-2). Note that surface soil samples at the school property were collected at the corresponding "WP" location.

The main concern at the school property was whether fine particulates or other contaminants had been transported through the air from either the facility process or the incinerator that was reportedly operated by Kay Fries. Soil samples were collected from nine locations (samples 1 through 9) throughout the ball field and play yard on April 24, 1997. The samples were collected at a depth of 0-to-2 inches below the root line to reduce the amount of vegetative material in the sample. This resulted in an average sample depth of 1-to-3 inches below grade.

Three samples (samples 16 through 18) were collected on April 25, 1997 from locations along the former access road to evaluate whether PCB-oils were used when oiling the unpaved road for dust suppression. These samples were re-collected on June 29, 1997 and analyzed when it was learned that the incorrect analysis had been inadvertently checked off on the chain-of-custody form sent to the laboratory. These samples were analyzed for the pesticide/ PCB fraction only. Samples from the former access road were collected 2-to-4 inches below grade.

In response to concerns raised by the community, background samples for the soil investigation, at the West Haverstraw Elementary School were collected at three locations from the Carpenter's Union property (samples SS10 through SS13) adjacent to the school, and at three locations from the Thiells Elementary School (samples 13 through 15), located off Rossman Road approximately 1.7 miles west of the West Haverstraw school (see Figures 2-2 and 2-3). Background samples are collected for comparison to samples collected within the study area to evaluate whether the analytical results show levels that are unusually high, or levels that can be expected from normal day to day activities. Samples on the Carpenter's Union property were collected to represent local soils where the least historical activity had occurred. Samples at the Thiells School were collected to characterize soils that had undergone a similar history with the exception of being adjacent to the Kay Fries facility. These samples were collected on April 25, 1997 in the same manner, and same depth interval, as those collected at the West Haverstraw Elementary School.

On May 7, 1997, a total of five environmental samples and one field duplicate sample (samples 1B through 6B) were collected from an area at the eastern edge of the borrow area where empty drums and a mixing vessel were discarded. Samples were collected from the 0-to-6-inch depth interval,



CDM
environmental engineers, scientists, planners, & management consultants

Figure 2-2
Sample Location Map

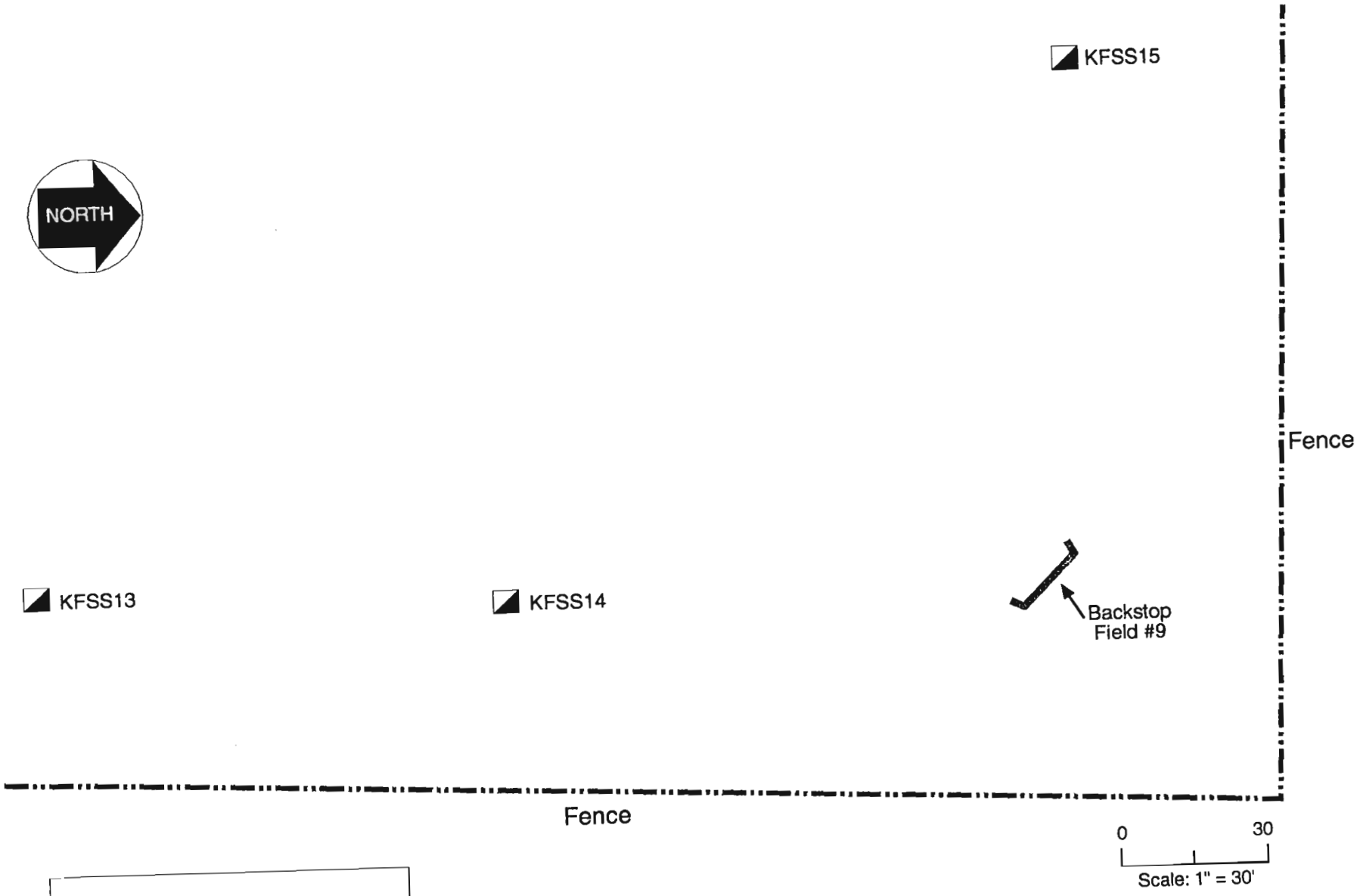


Figure 2-3
Background Surface Soil Sample Locations
Thiells Elementary School

with the exception of sample 4B which was collected at a depth of 6 inches based on a slight increase in total VOCs as measured by the OVM.

Samples were collected with dedicated stainless steel trowels and placed into dedicated stainless steel bowls. The trowels and bowls were decontaminated by the following procedure:

- alconox and water wash
- tap water rinse
- methanol rinse
- tap water rinse
- 10% nitric acid rinse
- tap water rinse
- distilled/deionized water rinse
- air dry

The sampling equipment was individually wrapped in aluminum foil that had been decontaminated by the same procedure for transport to the field.

The container for volatile organic analysis was collected first as a grab sample. Rocks and vegetative material were then removed and the remainder of the soil was homogenized. Jars for semivolatile, pesticide/PCB, metals, and cyanide analysis were then filled from the bowl. Sample jars were placed in coolers as soon as practical and preserved with ice. Field/rinseate and Trip Blanks specific to the surface soil sampling event were prepared and shipped to the laboratory with the environmental samples.

2.3 Subsurface Soil Sampling

Subsurface soils were collected continuously at each of the 22 Geoprobe® boring/groundwater sampling locations (see Figure 2-2). Samples were analyzed for TCL organic and TAL inorganic parameters, including cyanides by an New York State-approved laboratory. The analytical data were validated under a separate contract. Samples were collected using the 2-inch diameter by 4-foot long macrocore sampling device. Sample numbers used an alpha-numeric code to designate the location (boring number), and depth (letter). Depth designations were as follows:

Depth (ft.)	Letter Designation
0-4	A
4-8	B
8-12	C
12-16	D
16-20	E
20-24	F
24-28	G
28-32	H
32-36	I
36-40	J

The sampling device was lined with a dedicated acetate sleeve. The stainless steel core barrel was decontaminated between each use with an alconox and water wash, followed by a distilled water rinse. Sampling equipment was laid on plastic sheeting when not in use.

The acetate sleeves were extruded from the core sampler and cut open with a utility knife. The samples were screened with an OVM for total VOCs, and the soil type was described by sampling personnel. Characteristics that would indicate fill material or a release of contaminants, such as stains, odors, or the presence of man made material were noted. Six samples from borings at the West Haverstraw Elementary School were selected for laboratory analysis based on the presence of broken glass, soil moisture, indications from soil type that this may have been fill material, and the need to analyze a soil sample from the general area where the soil vapor point was lost on the school property. The remaining samples were collected from the borrow area. The jar for volatile organic analysis was filled first. The sample jars were filled using dedicated stainless steel trowels. The trowels were decontaminated as discussed in the previous section. Rocks gravel size and larger were removed and the sample was homogenized in the acetate sleeve. The remaining sample containers for semivolatile organic, pesticide/PCB, and metals analysis were filled. The samples were placed in a cooler with ice as soon as practical. Field/rinseate and trip blanks were prepared for this sampling event specifically. The field duplicate sample for the surface soil samples was used for subsurface soil samples as well.

2.4 Groundwater Sampling

Groundwater samples were collected at a total of 23 locations within the study area over a two-week period between the dates of April 21, 1997 and May 2, 1997 (see Figure 2-2). Samples were analyzed for TCL organic and TAL inorganic parameters, including cyanides. The analytical data were validated under a separate contract. Two of the locations were existing monitoring wells TB-1A and TB-2. These wells were installed for the onsite Operable Unit Two groundwater investigation and were selected to be sampled during this investigation because they were at the border between the offsite PSA and Operable Unit 2 study areas. The wells were constructed of 2-inch diameter PVC casing and wellscreen. Further details of well construction for these wells are not known because well construction diagrams were not available.

Three of the samples were collected from Geoprobe® prepacked wells installed for this investigation. These wells were constructed of ½-inch inner diameter PVC casing and prepacked PVC wellscreen. The wellscreen came prepacked with well gravel held by filter fabric. The screen was sealed in plastic by the manufacturer. The wells were installed within the 2-inch borehole after the rods and sampler had been retracted.

Twelve of the groundwater samples were collected through a slotted stainless steel probe provided with the Geoprobe® unit. The probe was decontaminated with an alconox/tap water wash and rinsed with distilled water. As a result of the low yield of the water bearing unit, a change was made in the field to temporarily install a 1-diameter PVC casing and wellscreen to collect the remaining eight groundwater samples. This change allowed the Geoprobe® unit to move to the next location and begin soil sampling while a second member of the field team sampled groundwater from the temporary well.

Groundwater samples were collected from the temporary well points using either a peristaltic pump or inertial pumping. The two existing wells were purged and sampled with a peristaultic pump. Dedicated polyethylene tubing was used in all cases. Three well volumes were purged prior to sample collection. Purge water was released to the ground next to the well and allowed to percolate back to the the water bearing unit. Measurements of temperature, pH, specific conductivity, dissolved oxygen, and turbidity were taken prior to sample collection at the existing monitoring wells and prepacked wells only. The flow rate of the pump was reduced to 100 to 250 milliliters per minute for sample collection.

At the Geoprobe® sampling locations, a peristaltic pump was used if the water level was within the limits of suction lift of the pump, approximately 25 feet. A hand operated inertial pump was used to sample groundwater where the depth to water was greater than 25 feet. Prior to sample collection, the temporary wells and the prepacked wells were developed by pumping until the turbidity reduced and visibly stabilized. Turbidity measurements were taken for the samples from the prepacked wells; however, the discharge from the temporary wells and the slotted probes never reduced to the range of the meter. All of the Geoprobe® groundwater samples collected were turbid to some degree.

Groundwater samples were collected at the Geoprobe® sampling locations immediately after the development activities had visually stabilized the turbidity. The samples were collected directly from the pump. The discharge rate was reduced to 100 to 250 milliliters per minute for sample collection. Field parameters were not measured for Geoprobe® groundwater samples. A field blank was not prepared for groundwater samples since the containers were being filled directly from the pump discharge. Field duplicate and trip blank samples were prepared and shipped with the samples.

Samples bottles for volatile organic analysis were collected first. Containers for volatile organic analysis were preserved with HC to a pH of 2 standard units (S.U.) or less. Preservatives were added to the sample containers by the analytical laboratory prior to shipment. Containers for semivolatile analysis, pesticide/PCB, metals, and cyanides were filled in that order. Containers for metals were preserved with nitric acid to a pH of 2 S.U. Metals samples were not filtered prior to preservation. Cyanide containers were preserved with sodium hydroxide to a pH of 12 S.U. or higher. The laboratory provided preservatives in the sample containers for both parameter groups. Sample containers were placed into coolers and preserved with ice as soon as practical.

2.5 Surface Water Sediment Sampling

Surface water and sediment samples were collected from five locations in the wetlands just north of the Kay Fries facility and west of the Conrail railroad tracks. Samples were analyzed for TCL organic and TAL inorganic parameters. The analytical data were validated under a separate contract. These samples were collected on December 18, 1996. One sample was collected from a stream entering the wetlands at the southwest corner. Three samples were collected from small streams or seeps along the escarpment that drops from the parking lot and the former facility through the end of Hoke Drive, approximately 70 feet in elevation to the wetlands, and one sample was collected from the tributary that carries surface water from this area into Cedar Pond Brook.

This sample was collected near the confluence of the creek and its tributary. Surface water and sediment sample locations are shown on Sample Location Map, Drawing 1.

Surface water samples were collected directly into unpreserved sample containers. Samples for volatile organic analysis were collected first, followed by semivolatile organics, pesticide/PCBs, and metals. Cyanides were not requested for surface water samples. Containers were preserved where appropriate, with preservatives provided by the laboratory. Sediment samples were collected directly into the sample containers where possible. Dedicated plastic disposable trowels were used where necessary to collect a sample and transfer it to the container. Field duplicate, field/rinseate, and trip blank samples were prepared and shipped to the laboratory with the environmental samples. Surface water and sediment samples were placed in coolers on ice as soon as practical after sample collection.

2.6 Groundwater Level Measurements

Groundwater levels were measured at a total of eleven locations with an electronic water level recorder. Two of the monitoring points were existing monitoring wells TB-1A and TB-2, and three were the Geoprobe® monitoring wells WP-7, WP-10, and WP-11. Measurements for these wells were taken from the top of the well casing. The well casings were surveyed to the 0.01 foot level of accuracy by a licensed surveyor. The remaining six measurements were taken at temporary wells WP-13, WP-14, WP-15, WP-16, WP-17, and WP-20. Depth to water measurements at the temporary wells were taken referenced from the ground surface. The elevation of the ground surface at each sampling point was taken from the site topographic map. Depth to groundwater measurements were taken from temporary wells on May 2, 1997 and May 7, 1997, and at the Geoprobe® and existing monitoring wells on May 7, 1997 and May 15, 1997.

2.7 Slug-Type Permeability Tests

Slug tests of TB1A and TB2 were conducted to evaluate the hydraulic conductivity of the aquifer in this part of the site. The hydraulic conductivity values are used to estimate the groundwater flow velocity. The hydraulic conductivity may also be used to estimate the transmissivity of the aquifer (transmissivity is the product of the hydraulic conductivity multiplied by the saturated aquifer thickness) to predict aquifer behavior under pumping conditions.

The slug test was conducted by quickly changing the water level in the wells, and measuring the rate at which the water level returns to its static equilibrium. A rising head test is conducted by lowering the water level and timing its subsequent rise to static equilibrium. A falling head test is conducted by raising the water level, and timing its subsequent fall to static equilibrium. The water level can be changed either by adding or removing water, or by inserting and removing a weighted cylinder.

The falling head test should only be conducted if the static water level in the well is below the screened portion of the well. If a falling head test is conducted in a well where the screen extends above the water level, then some of the water will percolate out of the screen into the vadose zone rather than entering the aquifer. This reduces the time required for the water level to recover, resulting in an overestimation of the hydraulic conductivity (Bouwer, 1989).

The equipment was decontaminated with a non-phosphate detergent/tap water wash, and a distilled water rinse prior to work at each well. The static water level and total well depths were first measured with an electric water level indicator. Rising head tests were then conducted at each well by removing water with a bailer.

At TB1A a pressure transducer and data logger were used to measure the rate of water level recovery. Before starting the test, the transducer was lowered into the well and connected to a data logger. The data logger was programmed to record the depth to water according to the following schedule:

Data Logger Schedule

Elapsed Time	Interval
0-20 seconds	0.2 seconds
20-60 seconds	1 second
1 to 10 minutes	12 seconds

The accuracy of the transducer was verified by moving it up and down the water column at measured increments. After verifying its accuracy, the transducer was secured in place and the cable was marked at the top of the well casing to assure its position remained stationary throughout the test. A bottom-filling bailer was then lowered into the well and allowed to fill with water in preparation of the rising head test. As the introduction of the equipment displaces water, the depth to water was rechecked with the electric water level indicator to assure that the water level was at static equilibrium prior to starting the test.

To start the test, the data logger was activated and the bailer was quickly removed from the well. Due to the tight fit of the equipment, the pressure transducer pulled up as the bailer was removed. The transducer was quickly returned to its original position, and the electric water level indicator was used to collect confirmatory measurements during the test. These measurements confirmed that the pressure transducer was accurate to within 0.02 feet. The test continued until at least 90 percent recovery was achieved.

Monitoring well TB2 could not accommodate both the bailer and the transducer cable; therefore, the transducer and data logger could not be used for the slug test. The procedure used in this well was generally similar to that for TB1A, except that all measurements were collected manually with the electric water level indicator and a stop watch. Upon removal of the bailer, the water level indicator was lowered into the well and measurements were recorded as frequently as possible (5 to 10 second intervals) until the water level had recovered to within 0.05 feet of the static level. The measurement interval then increased to about 60 seconds until the end of test.

[o:\cattafe\k-fries\rpt\sec2]

Section 3
Physical Characteristics of the Site

3.1 Topography

The study area encompasses a terrace, between 60 and 70 feet above the Hudson River to the east, and wetlands bordering Cedar Pond Brook to the north. The ground surface topography rises gently to the west at an approximate 3 percent slope and drops steeply at a 15 to 25 percent slope to wetlands surrounding the two surface water bodies at an elevation of 10 feet MSL. Ground surface topography is irregular and hummocky within the former sand borrow area in the central portion of the study area.

3.2 Climate

The study area receives an average of 47 inches of precipitation per year. In areas where deposits of sand and gravel are present, it is estimated that approximately 50 percent or 23 inches per year are recharged to the groundwater. The ground surface over most of the study area consists of a loose medium grain silty sand. Recharge will be less where fine grain deposits are present at the surface. Monthly precipitation averages between 3 and 5.8 inches, with the highest levels in July and August. The average annual temperature is 51 degrees. (Perlmutter, 1959)

3.2.1 Surface Water

Based on the orientation of drainage swales and surface topography, it appears that the majority of surface runoff is directed to wetlands bordering the Hudson River to the east. The portion of the study area north of the former access road to the former Kay Fries facility drains to Cedar Pond Brook to the north. Cedar Pond Brook is classified as a class D Stream.

Regional geology information indicates that the unconsolidated sediments in the study area consist of stratified drift deposits possibly overlying a basal layer of till. The unconsolidated material overlies bedrock of the Triassic Age Newark Group. The depth to bedrock is estimated to be on the order of 80 feet based on literature (Perlmutter, 1959). The study area is located at the edge of a deep trough that underlies the Hudson River. Unconsolidated sediments reportedly reach thicknesses of up to 600 feet beneath the river.

This study is primarily focused on the unconsolidated glacial deposits which comprise the uppermost water bearing unit in the study area. The lithologic log of the abandoned Kay Fries No. 2 test well indicates that there is a sequence of alternating silty sand, sandy clay, and gravel with occasional boulders between the elevation of 35 feet MSL, the ground surface elevation at the well location, and the bedrock surface at an elevation of approximately -17 feet MSL. The unsorted nature of these units suggests that they may be glacial till. Deposits of a basal layer of till have been observed below stratified drift throughout Rockland County. Site history indicates that sand or sand and gravel was excavated from the area between the elevations of 90 to 100 feet MSL, and 50 to 60 feet MSL. These elevations represent the original ground surface elevation and the present surface elevation in the borrow area west of the facility. Literature also indicates that there are kame delta deposits associated with Cedar Pond Brook.

Site specific data from the Geoprobe® borings installed for this investigation are consistent with the literature and the reported historical sand and gravel operation at the site. Boring logs are provided in Appendix A. The borings for this investigation were advanced to depths between 16 and 52 feet below the ground surface, which translates to elevations between 40 and 55 feet MSL based on ground surface elevation. The borings encountered primarily sand or sand and gravel deposits, with occasional thin lenses of clay or clay sand, silts, and beds of silt. The stratigraphic interval encountered by the Geoprobe® borings is above the basal till interval encountered in the abandoned Kay Fries test well. Based on literature, the layer of till probably thins to the west as the bedrock surface rises. The contact between the stratified drift and till appears to range between 25 and 40 feet MSL. This is the approximate range in elevation where seeps have been observed along the escarpment at the northern end of the facility near the former access road to the wetlands bordering Cedar Pond Brook.

The Geoprobe® borings mainly encountered deposits of fine to very fine sand, silty sand, and silt. The percentage of fine material varied with depth; however, there was no apparent correlation between borings. Cross bedding and coarsening upwards sequences, consistent with deltaic deposits, were observed in the northern part of the study area. Very fine sand and silts, consistent with lacustrine deposits, were observed in the southern part of the study area. Figure 3-1 shows cross sections of the major lithologic units observed in the study area. The lines of section are shown on Figure 3-2. Sand and gravel was observed at shallow depths in WP-17, at WP-22, and WP-19. This material was also reportedly observed at TB1A installed during the Operable Unit 2 investigation, and may represent remnants of the material excavated from the borrow area. A second deposit of sand and gravel was observed in borings that extended to elevation 40 feet MSL.

Fragments of broken glass were found at a depth of 11.5 feet in borings WP-2 and WP-4 located on the West Haverstraw School property suggesting that the upper 12 feet of material at these locations may be fill material. These borings are consistent with the location of the former pond that was observed on historical aerial photographs of the area. The material in this interval was otherwise similar in appearance to material observed throughout the school property, suggesting that local material may have been used to fill the pond.

3.2.2 Hydrogeology

The Geoprobe® borings were extended to the first saturated zone encountered at each location. Groundwater was encountered between the depths of 5.5 and 43 feet in the study area. Boring WP-22 was extended to a depth of 52 feet without encountering saturated soils. The boring was terminated at this depth due to refusal after several attempts to advance the boring using different samplers and probes. In general, groundwater was encountered between elevations of 35 and 60 feet MSL, which is consistent with the reported results of the Operable Unit 2 investigation. Groundwater elevations appear to be impacted by the permeability of the sediment unit that the well encountered. Temporary wells screened in the upper silty sand unit are in general, higher in elevation than groundwater levels in wells where water was encountered in lower unit of sand and gravel. The lower unit was encountered by the permanent monitoring wells TB-1A and TB-2, and boring WP-20. The contact between the lower sand and gravel and the upper silty sand appears to be between the elevations of 35 and 40 feet MSL (see Figure 3-1). The units are hydraulically

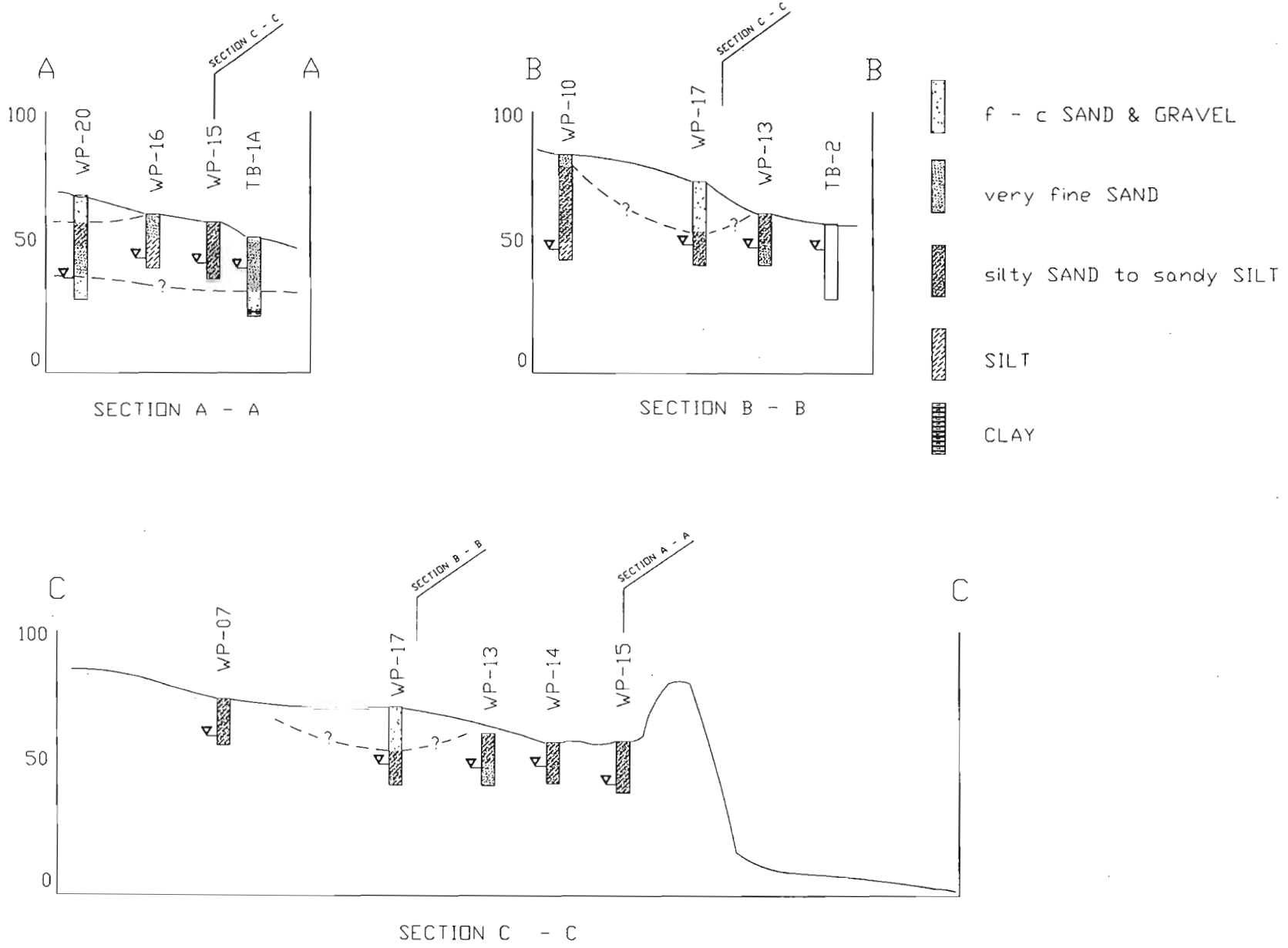


Figure 3-1
Geologic Cross Sections

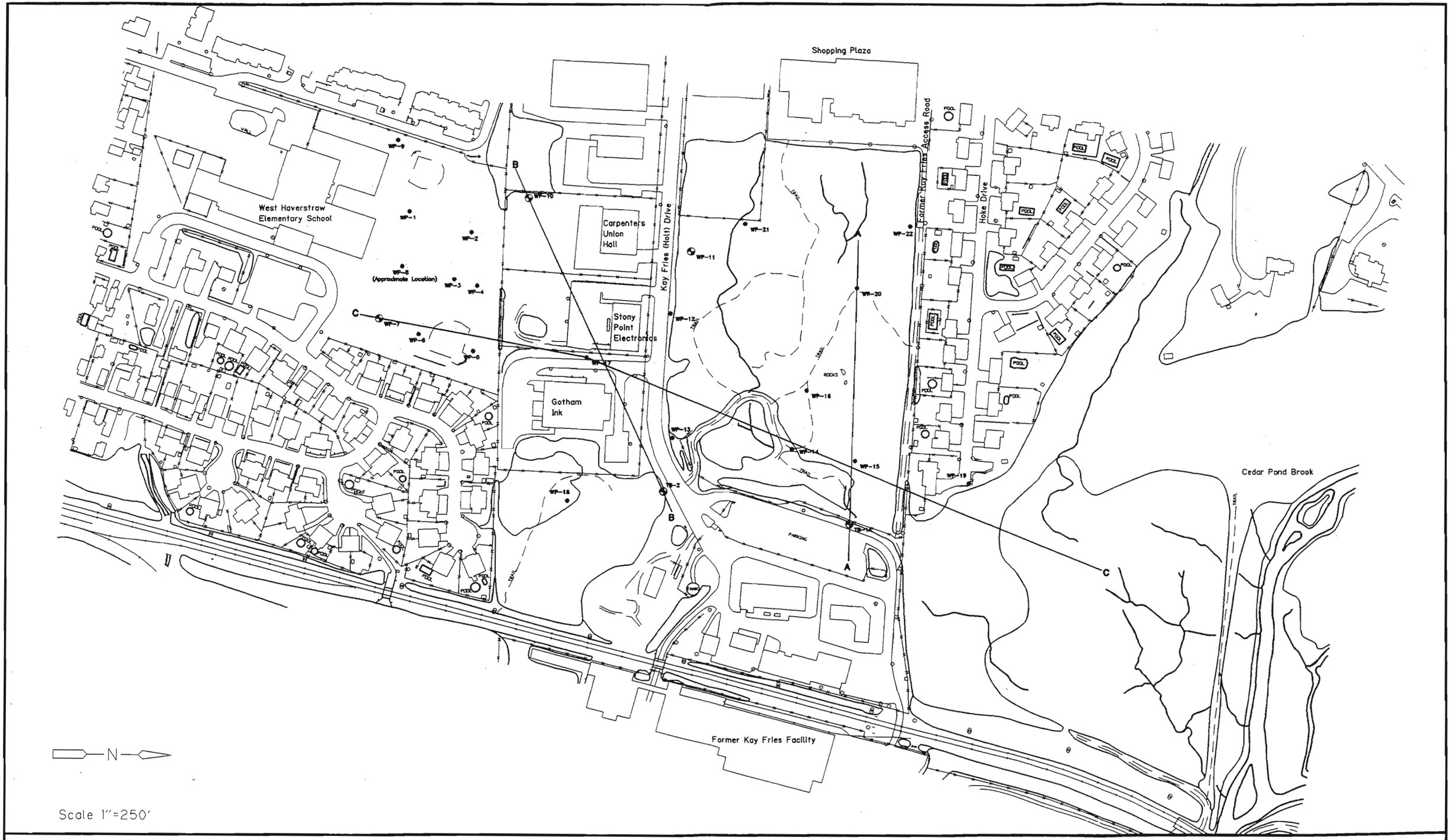


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Figure 3-2
Lines of Section for Geologic Cross Sections

connected; however, the water levels in the sand and gravel unit appear to be slightly lower in elevation compared to groundwater levels observed in the silty sand unit. Consequently, separate groundwater contour maps were generated for the two units (see Figures 3-3 and 3-4). The same general direction of groundwater flow, northwest, is indicated by both contour maps. The flow direction is consistent with the results of the Operable Unit 2 on-site investigation, however it is different from the direction that would be anticipated based on ground surface topography and the location of local surface water bodies. There are no known pumping wells in the immediate area of the site. New York State records indicate that the closest water supply wells are located over a half-mile to the northwest. It is possible that the direction of groundwater flow is being influenced by the local geology. A localized deposit of highly permeable material, for example coarse buried valley deposits, can act as a drain for surrounding lower permeability deposits. Buried valley deposits are found in glaciated areas such as this.

3.3 Slug Tests

The slug test data were entered into a computer spreadsheet program and printed out on semilogarithmic graphs, with the water level change on the logarithmic axis and elapsed time on the linear axis. The data were then analyzed by the slug test method for unconfined aquifers published by Bouwer and Rice (1976). The graphs and calculations are provided in Appendix B.

The calculation of hydraulic conductivity is dependent not only on the rate of water level rise, but also on the geometry of the well and the aquifer. CDM assumed that the drilled borehole diameters were 8-inches, that the wells are screened partially above the water table, and that the wells are fully penetrating. The latter is documented for well TB1A, which appears fully penetrating on a cross section produced by IT Corporation (Figure 6 - "Geologic Cross-Sections - OU2, For Kay Fries Site," dated September 29, 1994). The slug test data for each well were then analyzed for two possible screen conditions, as follows:

- Condition No. 1 - the screen is surrounded by a filter pack significantly more permeable than the surrounding formation. This condition results in hydraulic conductivities of 4.6 ft/day for well TB-1A, and 3.5 ft/day for TB-2.

- Condition No. 2 - the permeability of the filter pack is similar to that of the surrounding formation. This condition results in hydraulic conductivities of 25.3 ft/day for well TB-1A, and 19.0 ft/day for TB-2.

Note that if the filter pack is more permeable than the surrounding formation, the calculated hydraulic conductivity is greater than if the formation and filter pack are similar. Since the water level is assumed to be rising in the screen, a more permeable filter pack increases the effective radius of the well (Bouwer, 1989). Other things being equal, this results in an apparent increased hydraulic conductivity for a given set of test data.

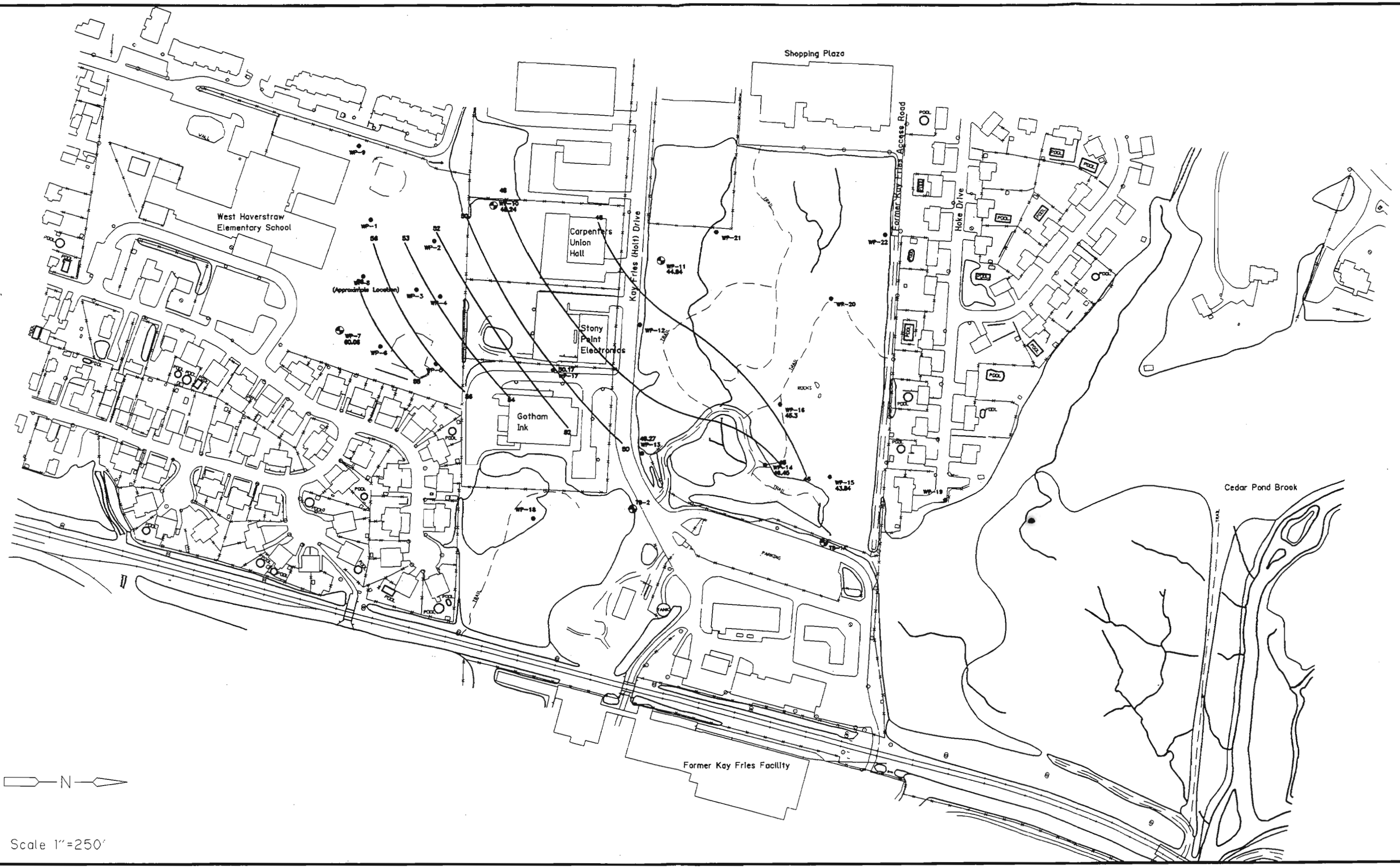

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Figure 3-3
Groundwater Level Contour Map
Silty Sand Unit

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Figure 3-4
Groundwater Level Contour Map
Sand and Gravel Unit

It is important to note that based on the stratigraphy shown on IT Corp.'s cross section, TB-1A penetrates a saturated fine sand layer and a saturated gravelly sand layer. If the screen penetrates both layers (as CDM assumed), then the calculated hydraulic conductivity is more representative of the gravelly sand, since most of the recovery probably flowed from this layer. The actual hydraulic conductivity of the fine sand is probably much less than the calculated values.

CDM has assumed that the stratigraphy and aquifer thickness are similar at TB-2 and TB-1A, since the wells are nearby one another and their depths are similar. However, it should be noted that there is a head difference of almost 4.5 feet between the two wells (IT Corp. - Final Remedial Investigation Report, Operable Unit Two, April 12, 1996).

[o:\cattafe\k-fries\rpt\sec3]

Section 4
Investigation Results

4.1 Soil Gas Survey

The soil gas survey identified the presence of benzene, toluene, ethylbenzene, xylenes, (BTEX), 1,1,1-trichloroethane, and tetrachloroethene within the study area. The results were reported in micrograms (ug), which indicates the total amount of the compound that was adsorbed onto the collectors during the two week period during which they were deployed. No major peaks indicating a significant presence of other volatile or semivolatile organic compounds were reported. The data are presented in Appendix C. Maps showing the location and magnitude of the selected chlorinated compounds and BTEX compounds are presented in Figures 4-1 and 4-2.

4.1.1 BTEX

Laboratory analysis detected toluene in most of the detectors; however, it was also detected in three of the five trip blank samples at levels ranging from 0.06 to 0.13 ug. This indicates that the collectors had come in contact with an outside source of toluene, not related to a source in the soil or groundwater in the study area. Many of the results were within or below this range. General QA/QC procedures will consider results within one-half to one order of magnitude of the levels measured in a trip blank to be suspect. The cut off for reliable data, based on a factor of 10 and the upper end of the range of levels found in trip blank samples, would be 1.3 ug. There were several samples where toluene was detected between 1.18 and 1.26 ug that were also considered as potential indicators of soil or groundwater contamination. Samples for laboratory analysis were located to evaluate whether the soil gas levels were associated with was significant levels of toluene present in the soils or groundwater in the subsurface investigations.

The positive results appeared to follow one of two general trends. When toluene was associated with one or more of the other BTEX compounds (e.g., locations B3.5, AA'2, C1, B2), the samples were generally near the former access road or within the former borrow area (see Figure 4-1). Both aerial photographs and field observations show evidence of recreational dirt bike activity throughout this area. It is possible that the presence of BTEX compounds were a result of the use of gasoline engines in the area.

Toluene was present by itself at low levels in several samples from the West Haverstraw Elementary School property, including B'8, B'7.5, and C'8.5, and B7 located just to the north of the school property boundary. Low levels of toluene and benzene were also found at locations A7 and A6 in back of the Carpenter's Union building. The samples on the school property were located in the general area of a former pond that was filled in when the school and athletic field were constructed. It is possible that the toluene is associated with the fill material. Groundwater appears to be flowing in a north-northwesterly direction based on measurements made in temporary wells in this area. This flow direction would make locations B7, A7, and A6 hydraulically downgradient of the samples on the school property. Another potential source of contaminants in the soil gas is the sewer line that runs east-west and roughly along the municipal boundary between Haverstraw and Stoney Point. This boundary is just south of the A7 to E7 line of soil gas samples.

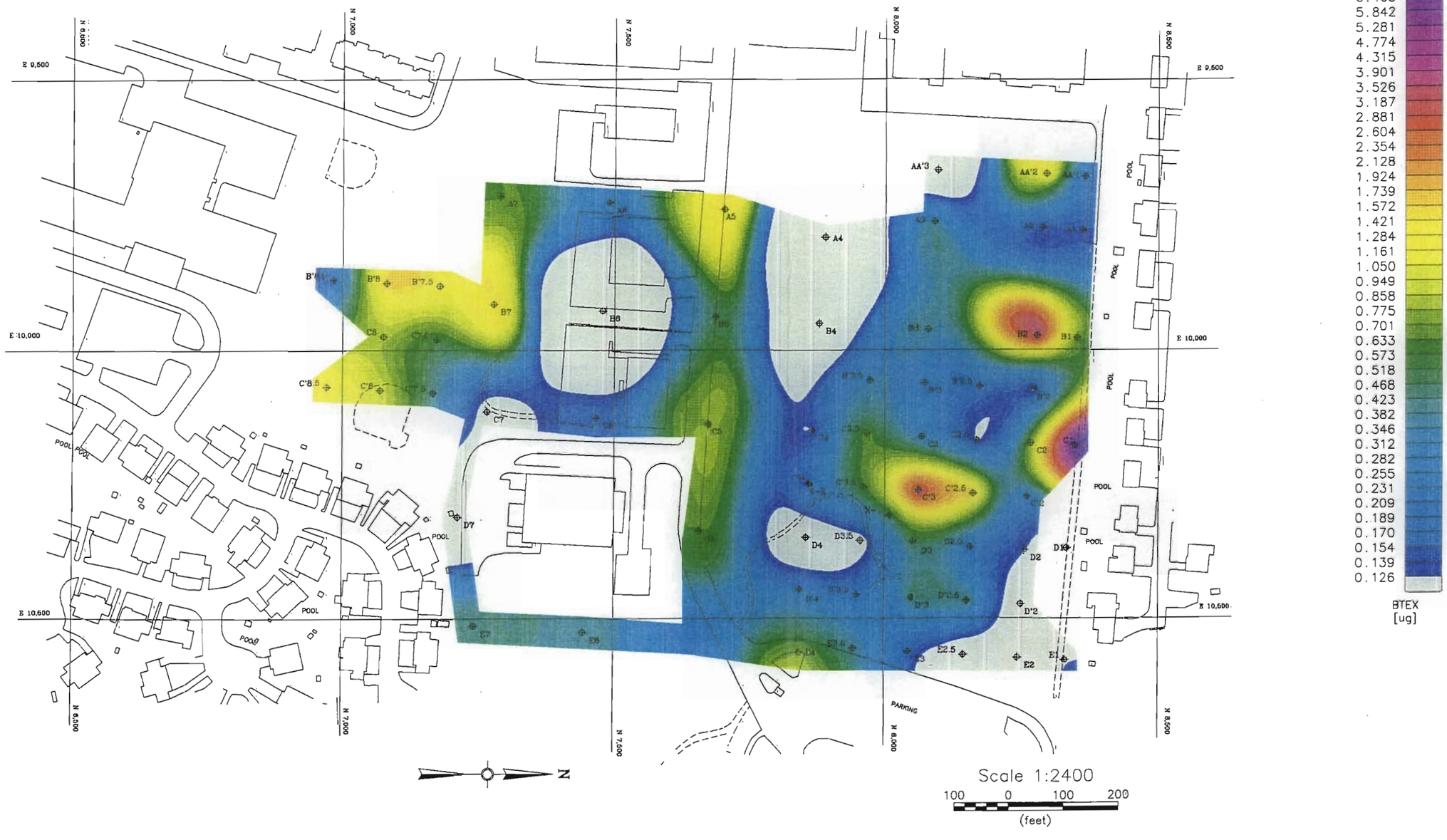

Figure 4-1
Summary of Total BTEX Levels in Soil Gas Samples
(Ref. Gore & Assoc. Inc.)

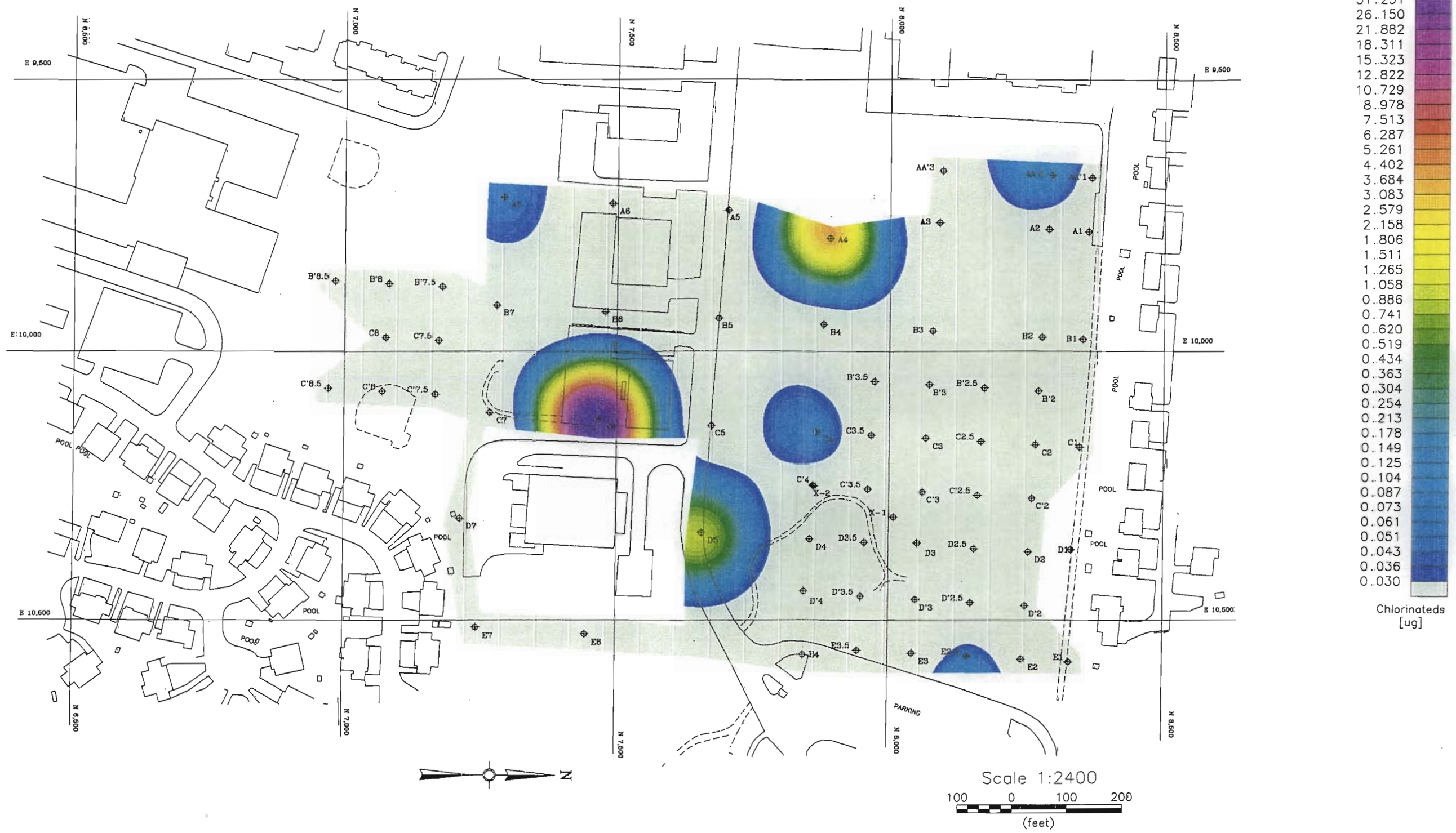

Figure 4-2
Summary of Select Chlorinated Compounds in Soil Gas Samples
(Ref. Gore & Assoc. Inc.)

4.1.2 Chlorinated Solvents

The survey identified the presence of two chlorinated solvents in the study area, tetrachloroethylene (PCE) and 1,1,1-trichloroethane (TCA). The highest levels of both compounds, indicating a potential source area, were found at location C6, located between the Stoney Point Electronics and Gotham Ink buildings (see Figure 4-2). Both compounds were also present at location D5 located north of Gotham Ink. It is possible that these results are related to the same source. TCA was not detected at any of the other locations. PCE was found in samples from locations C4, A4, and AA'2 which are located in a line running northwest from location C6. This is the general direction of the hydraulic gradient, and it may indicate that the PCE is migrating from the C6 location with the flow of groundwater. Relatively low levels of PCE were also detected at locations A7 and E2.5. Location A7 is behind the Carpenter's Union building, adjacent to the sewer. It is possible that the low level of PCE at this location is associated with the sewer. Location E2.5 is near the edge of the parking lot at the former Kay Fries facility. It is also within approximately 100 feet of TB1A, which has historically not showed detectable levels of PCE or other contaminants associated with the facility.

4.2 Surface Soil Sampling

Analytical results indicated that polycyclic aromatic hydrocarbons (PAH) and pesticides were present in most of the surface soil samples throughout the study area (see Tables 4-1 and 4-2). The concentrations were generally qualified as estimated values below the reportable quantitation limit. These compounds were also present at comparable levels in samples collected at the background locations. Bis(2-ethylhexyl)phthalate was found in one sample (SS09) at a concentration significantly above background levels; however, the concentration is well below New York State Soil Cleanup Guidlines. Several unknown aliphatic and aromatic compounds were tentatively identified in the library search. These levels were also comparable to background samples. Tentatively identified compounds (TICs) were also found in the laboratory method blanks. TICs found at levels less than 5 times those found in the method blank were rejected by the data validator. All other data were found to be usable.

PAHs are products of the combustion of fossil fuels and are common constituents of heavier hydrocarbons such as diesel and fuel oils. The pesticides were commonly used for insect control in the 1950s and 1960s. The volatile organic compounds, methylene chloride and acetone, were also detected at concentrations below the reportable quantitation limit; however, these compounds are common laboratory contaminants and acetone was also found in the laboratory method blank. The sampling equipment was decontaminated with methanol. Consequently, the equipment was not a source of acetone.

Samples SS-16, SS-17, and SS-18 were collected specifically to evaluate whether oils contaminated with PCBs had been used for dust suppression along the former access road to the Kay Fries facility. The analytical results showed no detectable concentrations of PCBs, however several pesticides were detected at concentrations comparable to other surface soil samples. The laboratory also noted that they experienced some interference from "oils" when conducting the analysis, suggesting that the samples were collected at appropriate locations and depths.

TABLE 4-1
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
ORGANIC COMPOUNDS
SURFACE SOILS

Parameters	KFSS01 (ug/kg) WHES	Q	KFSS02 (ug/kg) WHES	Q	KFSS03 (ug/kg) WHES	Q	KFSS04 (ug/kg) WHES	Q	KFSS05 (ug/kg) WHES	Q	KFSS06 (ug/kg) WHES	Q	KFSS07 (ug/kg) WHES	Q	KFSS08 (ug/kg) WHES	Q	KFSS09 (ug/kg) WHES	Q	KFSS10 (ug/kg) BKG	Q	KFSS11 (ug/kg) BKG	Q	KFSS12 (ug/kg) BKG	Q	Site BKG (ug/kg)
Volatile																									
Methylene Chloride	12	U	13	U	13	U	13	U	12	U	12	U	12	U	13	U	12	U	10	U	12	U	11	U	ND
Acetone	12	U	13	U	13	U	13	U	12	U	20	U	12	U	13	U	12	U	10	U	12	UJ	11	U	4JB-6JB
Semivolatile																									
Phenanthrene	140	J	160	J	130	J	91	J	85	J	88	J	140	J	160	J	85	J	350	U	60	J	380	U	45J-270J
Anthracene	390	U	420	U	430	U	420	U	380	U	380	U	380	U	420	U	380	U	350	U	390	U	380	U	ND-62J
Fluoranthene	280	J	300	J	250	J	160	J	160	J	170	J	260	J	310	J	170	J	350	U	140	J	380	U	85J-450
Pyrene	230	J	240	J	200	J	120	J	120	J	130	J	230	J	270	J	170	J	350	U	99	J	380	U	60J-280J
Benzo(a)anthracene	98	J	110	J	88	J	53	J	57	J	66	J	91	J	120	J	63	J	350	U	49	J	380	U	49J-160J
Chrysene	160	J	180	J	140	J	90	J	89	J	100	J	150	J	170	J	110	J	350	U	77	J	380	U	77J-190J
bis(2-Ethylhexyl)phthalate	120	J	120	J	55	J	89	J	210	J	58	J	59	J	100	J	2600		350	U	390	U	380	U	ND-55J
Benzo(b)fluoranthene	150	J	260	YJ	120	J	76	J	120	YJ	140	YJ	250	YJ	300	YJ	96	J	350	U	120	YJ	380	U	120YJ-300YJ
Benzo(k)fluoranthene	120	J	420	U	110	J	76	J	380	U	380	U	380	U	420	U	100	J	350	U	390	U	380	U	ND
Benzo(a)pyrene	130	J	130	J	120	J	70	J	64	J	80	J	120	J	140	J	90	J	350	U	48	J	380	U	48J-130J
Indeno(1,2,3-cd)pyrene	100	J	130	J	88	J	70	J	57	J	69	J	82	J	99	J	75	J	350	UJ	44	J	380	UJ	42J-92J
Dibenz(a,h)anthracene	47	J	49	J	51	J	420	UJ	380	UJ	380	UJ	380	U	420	U	380	J	350	UJ	390	U	380	UJ	ND-47J
Benzo(g,h,i)perylene	130	J	150	J	100	J	88	J	76	J	96	J	98	J	120	J	89	J	350	UJ	52	J	380	UJ	52J-110J
Pesticide/PCB																									
beta-BHC	2	U	2.2	U	2.2	U	2.2	U	2	U	1.9	U	2	U	2.2	U	2	U	1.8	U	2	U	2	U	ND
gamma-BHC (Lindane)	2	U	2.2	U	2.2	U	2.2	U	2	U	1.9	U	2	U	2.2	U	2	U	1.8	U	2	U	2	U	ND
Heptachlor epoxide	2	U	2.2	U	2.2	U	2.2	U	2	U	1.2	JN	1.1	JN	2.2	U	2	U	1.8	U	2	U	2	U	ND
Endosulfan I	2	U	2.2	U	2.2	U	2.2	U	2	U	1.9	U	2	U	2.2	U	2	U	1.8	U	2	U	2	U	ND
Dieldrin	3.9	U	4.3	U	4.3	U	4.2	U	3.9	U	3.8	U	3.8	U	4.3	U	3.8	U	3.5	U	3.9	U	3.8	U	ND
4,4'-DDE	3.3	J	3.4	J	3.6	J	4.2	U	8.4		4.9		5		3	J	5.6		3.5	U	45		3.8	U	3.7J-45
Endrin	3.9	U	4.3	U	4.3	U	4.2	U	3.9	U	3.8	U	3.8	U	4.3	U	3.8	U	3.5	U	3.9	U	3.8	U	ND
Endosulfan II	3.9	U	4.3	U	4.3	U	4.2	U	3.9	U	3.8	U	3.8	U	4.3	U	3.8	U	3.5	U	3.9	U	3.8	U	ND
4,4'-DDD	3.9	U	4.3	U	4.3	U	4.2	U	3.9	U	3.8	U	3.8	U	4.3	U	3.8	U	3.5	U	3.9	U	3.8	U	ND
Endosulfan sulfate	3.9	U	4.3	U	4.3	U	4.2	U	3.9	U	3.8	U	3.8	U	4.3	U	3.8	U	3.5	U	3.9	U	3.8	U	ND
p,p'-DDT	2.3	J	2.7	J	2	J	4.2	U	4.3		2.9	J	3.1	J	3.1	J	4.5		3.5	U	29		3.8	U	2.1J-29
p,p'-Methoxychlor	20	U	22	U	22	U	22	U	20	U	19	U	20	UJ	22	UJ	20	J	18	U	20	U	20	U	ND
Endrin ketone	3.9	U	4.3	U	4.3	U	4.3	U	3.9	U	3.8	U	3.8	U	4.3	U	3.8	U	3.5	U	3.9	U	3.8	U	ND
Endrin aldehyde	3.9	U	4.3	U	4.3	U	4.3	U	3.9	U	3.8	U	3.8	U	4.3	U	3.8	U	3.5	U	3.9	U	3.8	U	ND
alpha-Chlordane	2	U	2.2	U	2.2	U	2.2	U	1.7	J	2.2	J	2	J	2.2	U	1.5	J	1.8	U	2	U	2	U	1.3JP-1.8JP
gamma-Chlordane	2	U	2.2	U	2.2	U	2.2	U	2	U	1.9	U	2	U	2.2	U	2	U	1.8	U	2	U	2	U	ND

Notes:

WHES - West Haverstraw Elementary School sample
BKG - Background sample on Carpenters Union property
TES - Background sample on Thiells Elementary School property
See Table 4-17 for a description of the data qualifiers

TABLE 4-1
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
ORGANIC COMPOUNDS
SURFACE SOILS

Parameters	KFSS13 (ug/kg) TES	Q	KFSS14 (ug/kg) TES	Q	KFSS15 (ug/kg) TES	Q	KFSS16RDL (ug/kg)	Q	KFSS17RDL (ug/kg)	Q	KFSS18R (ug/kg)	Q	KFSSDUP (ug/kg)	Q	SSFB424 (ug/kg)	Q	SSTB424 (ug/l)	Q	Site BKG (ug/kg)
Volatile																			
Methylene Chloride	13	U	12	U	12	U	NA		NA		NA		14	U	10	U	10	U	ND
Acetone	13	U	12	U	12	U	NA		NA		NA		4	BJ	10	J	10	U	4JB-6JB
Semivolatile																			
Phenanthrene	420	U	45	J	270	J	NA		NA		NA		87	J	10	U	NS		45J-270J
Anthracene	420	U	400	U	62	J	NA		NA		NA		430	U	10	U	NS		ND-62J
Fluoranthene	85	J	140	J	450		NA		NA		NA		140	J	10	U	NS		85J-450
Pyrene	60	J	97	J	280	J	NA		NA		NA		140	J	10	U	NS		60J-280J
Benzo(a)anthracene	420	U	53	J	160	J	NA		NA		NA		56	J	10	U	NS		49J-160J
Chrysene	420	U	82	J	190	J	NA		NA		NA		81	J	10	U	NS		77J-190J
bis(2-Ethylhexyl)phthalate	420	U	400	U	55	J	NA		NA		NA		430	U	10	U	NS		ND-55J
Benzo(b)fluoranthene	420	U	140	YJ	300	YJ	NA		NA		NA		69	J	10	U	NS		120YJ-300YJ
Benzo(k)fluoranthene	420	U	400	U	380	U	NA		NA		NA		74	J	10	U	NS		ND
Benzo(a)pyrene	420	U	53	J	130	J	NA		NA		NA		73	J	10	U	NS		48J-130J
Indeno(1,2,3-cd)pyrene	420	U	42	J	92	J	NA		NA		NA		430	U	10	J	NS		42J-92J
Dibenz(a,h)anthracene	420	U	400	U	47	J	NA		NA		NA		430	U	10	J	NS		ND-47J
Benzo(g,h,i)perylene	420	U	52	J	110	J	NA		NA		NA		430	U	10	J	NS		52J-110J
Pesticide/PCB																			
beta-BHC	2.2	U	2.1	U	2	U	11.4	JND	18	U	1.1	JN	18	U	0.055	U			ND
gamma-BHC (Lindane)	2.2	U	2.1	U	2	U	19	U	18	U	1.8	U	18	U	0.055	U			ND
Heptachlor epoxide	2.2	U	2.1	U	2	U	19	U	18	U	1.2	JN	18	U	0.055	U	2.3	U	ND
Endosulfan I	2.2	U	2.1	U	2	U	9.9	JND	9.5	JND	1.2	JN	9.52	LTL	0.055	U			ND
Dieldrin	4.2	U	4	U	3.8	U	37	U	35	U	3.4	U	35	U	0.11	U	4.4	U	ND
4,4'-DDE	5.5		6.1		3.7	J	37	U	35	U	3.2	JN	35	U	0.11	U	3.2	JP	3.7J-45
Endrin	4.2	U	4	U	3.8	U	25	JND	22	JND	3.4	U	22.3	LTL	0.11	U			ND
Endosulfan II	4.2	U	4	U	3.8	U	37	U	35	U	3.4	U	35	U	0.11	U			ND
4,4'-DDD	4.2	U	4	U	3.8	U	37	U	35	U	2.1	JN	35	U	0.11	U			ND
Endosulfan sulfate	4.2	U	4	U	3.8	U	37	U	35	U	3.4	U	35	U	0.11	U			ND
p,p'-DDT	3.3	J	2.1	J	3.1	J	35	JND	18	JND	13	JN	18.4	LTL	0.11	U	4.4	U	2.1J-29
p,p'-Methoxychlor	22	U	21	U	20	U	150	JD	200	JND	13	JN	195	LTL	0.55	J			ND
Endrin ketone	4.2	U	4	U	3.8	U	37	U	26	JND	7.2	J	25.5	LTL	0.11	U			ND
Endrin aldehyde	4.2	U	4	U	3.8	U	25	JD	23	JND	3.4	U	23.4	LTL	0.11	U			ND
alpha-Chlordane	1.3	JN	1.8	J	2	U	19	U	18	U	1.8	U	18	U	0.055	U	2.3	U	1.3JP-1.8JP
gamma-Chlordane	2.2	U	2.1	U	2	U	19	U	18	U	1.8	U	18	U	0.055	U			ND

Notes:

WHES - West Haverstraw Elementary School sample
BKG - Background sample on Carpenters Union property
TES - Background sample on Thiells Elementary School property
See Table 4-17 for a description of the data qualifiers

TABLE 4-2
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS
FOR
ORGANIC COMPOUNDS
SURFACE SOIL SAMPLES
ADJACENT TO EMPTY DRUMS

Parameters	KFSS1B (ug/kg)	KFSS3B (ug/kg)	Q	KFSS4B (ug/kg)	Q	KFSS5B (ug/kg)	Q	KFSS6B (ug/kg)	Q	KFFB57 (ug/l)	Q	KFTB57 (ug/l)	Q	BKG Range (ug/kg)
Volatile														
Acetone	10	12	UJ	12	U	13	U	11	UJ	10	U	10	U	4JB-6JB
Semivolatile														
Diethylphthalate	350	410	U	410	U	420	U	370	U	10	U	NA		ND
Pentachlorophenol	840	1000	U	1000	U	1000	U	890	U	10	U	NA		ND
Phenanthrene	350	74	J	56	J	100	J	34	J	10	U	NA		45J-270J
Di-n-butylphthalate	350	410	U	410	U	420	U	370	U	10	U	NA		ND
Fluoranthene	20	140	J	130	J	250	J	96	J	10	U	NA		85J-450
Pyrene	19	160	J	100	J	230	J	79	J	10	U	NA		60J-280J
Benzo(a)anthracene	350	52	J	44	J	84	J	33	J	10	U	NA		49J-160J
Chrysene	350	79	J	68	J	120	J	47	J	10	U	NA		77J-190J
bis(2-Ethylhexyl)phthalate	350	36	J	32	J	59	J	19	J	0.6	J	NA		ND-55J
Benzo(b)fluoranthene	350	59	J	52	J	100	J	40	J	10	U	NA		120YJ-300YJ
Benzo(k)fluoranthene	350	65	J	63	J	110	J	46	J	10	U	NA		ND
Benzo(a)pyrene	350	66	J	55	J	100	J	41	J	10	U	NA		48J-130J
Indeno(1,2,3-cd)pyrene	350	51	J	40	J	74	J	27	J	10	U	NA		42J-92J
Dibenz(a,h)anthracene	350	21	J	410	U	27	J	370	U	10	U	NA		ND-47J
Benzo(g,h,i)perylene	350	64	J	50	J	94	J	34	J	10	U	NA		52J-110J
Pesticide/PCB														
beta-BHC	1.8	1.7	J	2.1	U	2.2	U	1.8	U	0.054	U	NA		ND
gamma-BHC (Lindane)	1.8	2.1	U	2.1	U	2.2	U	1.8	U	0.054	U	NA		ND
Heptachlor	1.8	2.1	U	2.1	U	2.2	U	1.8	U	0.054	U	NA		ND
Aldrin	1.8	2.1	U	2.1	U	2.2	U	1.8	U	0.054	U	NA		ND
Dieldrin	3.4	4.0	U	4.0	U	4.2	U	3.6	U	0.11	U	NA		ND
4,4'-DDE	3.4	5.8		6.3		3.3	J	3.6	U	0.11	U	NA		3.7J-45
Endrin	3.4	4.0	U	4.0	U	4.2	U	3.6	U	0.11	U	NA		ND
p,p'-DDT	3.4	4.6		4.7		4	J	3.6	U	0.11	U	NA		2.1J-29
alpha-Chlordane	1.8	2.1	U	2.1	U	1.7	J	1.8	U	0.054	U	NA		1.3JP-1.8JP

Notes:

1. ND - Not detected
2. NA - Not analysed
3. See Table 4-17 for a definition of data qualifiers

Inorganic substances were also found at concentrations that were comparable to background samples (see Tables 4-3 and 4-4). Metals such as aluminum, calcium, iron, magnesium, manganese, chromium, lead, mercury, nickel and zinc exceeded the site background levels. In most cases, the levels were just over the guideline or less than two times the value. These metals are present in minerals that make up soils, and are present in most soils at various concentrations. The presence of some of these metals, such as aluminum and magnesium, can be increased by the application of fertilizers. Lead is commonly present near roadways because of the widespread use of leaded automobile gasoline in the past. All of the soil concentrations were at the lower end of the published range of typical values found in soils. Cyanides were not found at detectable concentrations in any of the samples.

4.3 Subsurface Soil Sampling

The analytical results for subsurface soils samples showed detectable concentrations of volatile organic compounds and PAHs at isolated locations (see Table 4-5). Chlorinated solvents were detected in samples SB17H and SB21J. PAHs were detected in samples SB04C and SB14A (See Figure 4-2). Note that subsurface soil samples were collected at the locations identified with a "WP" prefix and corresponding numbers on the figures. The concentrations of volatile organics did not exceed soil clean-up guidelines, and the guideline for one PAH, dibenzo (a,h) anthracene, was exceeded in SB04C. Acetone was found in the laboratory blank for these samples, and low part per billion concentrations of acetone were found in all of the environmental samples. Tentatively identified compounds (TIC) were found at comparable levels to background samples. TICs were also identified in the laboratory method blanks. Levels that were five times those found in the method blanks were rejected by the data validator. All other data were found to be usable.

Diethylphthalate, 2-butanone, and the PAHs phenanthrene, fluoranthene, and pyrene were detected in sample SB04C. This sample was collected at the elementary school (see Figure 4-3) from an interval (8-to-12 feet below grade) in the area of the former pond. Broken glass fragments were observed in the sampler suggesting that the sample was collected where the pond had been filled and leveled. The PAH concentrations were comparable to background surface soil samples, and there was no distinct change in the visual characteristics of the soil suggesting that local soils were used to fill in the pond. Diethylphthalate and 2-butanone were not found in background soils but concentrations were below state soil cleanup guidelines.

A wide range of PAHs were found in SB14A, similar in type and concentration to surface soil samples. This samples was collected from the first Geoprobe® sampler at a depth interval from 0-to-4 feet below the ground surface. The boring was located in the borrow area at the fork in a trail. The trail was wide enough for vehicle passage, and appeared as though it may have been a former access road when the area was active.

Chlorinated solvents, 1,1-dichloroethene (DCE) and 1,1,1-trichloroethane (TCA), were detected in SB17H (20-to-24 feet below grade). This sample was collected from the interval just above the water table at depth of 26.5 feet below grade. It is possible that contaminated groundwater is the source of the soil contamination at this location. The soils could have been contaminated when they

TABLE 4-3
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS
INORGANIC SUBSTANCES AND CYANIDES
SURFACE SOIL SAMPLES

Parameters	KFSS01 (mg/kg) WHES	Q	KFSS02 (mg/kg) WHES	Q	KFSS03 (mg/kg) WHES	Q	KFSS04 (mg/kg) WHES	Q	KFSS05 (mg/kg) WHES	Q	KFSS06 (mg/kg) WHES	Q	KFSS07 (mg/kg) WHES	Q	KFSS08 (mg/kg) WHES	Q	KFSS09 (mg/kg) WHES	Q	KFSS10 (mg/kg) BKG	Q	KFSS11 (mg/kg) BKG	Q	Site BKG[5] (mg/kg)	Published BKG[6] (mg/kg)
ALUMINUM	13100		15300		15900		12000		14000		15300		15200		17000		10700		6620		14000		6620-15400	10000-300000
ANTIMONY	0.86	U	1.0	U	0.78	U	0.79	U	0.88	U	0.87	U	0.83	UJ	0.94	UJ	0.73	UJ	0.82	U	0.98	U	ND	0.2-150
ARSENIC	4.9		4.7		4.4		3.1		4.8		4.3		4.1		5.1		3.6		1.6	B	4.0		1.6B-4	0.1-194
BARIUM	61.2		66.5		74.3		52.9		65.7		59.2		65.3		75.2		56.9		27.9	B	64.4		27.9B-64.4	100-3000
BERYLLIUM	0.37	B	0.38	B	0.46	B	0.27	B	0.41	B	0.38	B	0.38	B	0.46	B	0.27	B	0.15	B	0.40	B	0.15B-0.42B	0.01-40
CADMIUM	0.31	B	0.32	B	0.30	B	0.23	B	0.25	B	0.26	B	0.20	B	0.50	B	0.63	B	0.15	B	0.26	B	0.15B-0.27B	0.01-7
CALCIUM	1890		2010		2010		1890		937	B	1110		1420		2050		5440		905	B	817	B	630B-1800	<150-500000
CHROMIUM TOTAL	13.3		15.4		15.4		13.9		15.3		16.0		14.6		16.4		10.4		6.8		12.3		6.8-14.2	5-3000
COBALT	7.3	J	7.4	J	7.7	J	6.4	J	7.8	J	8.1	J	7.4	B	8.2	B	5.4	B	4.4	J	6.0	J	4.4B-7.3B	0.05-65
COPPER	21.0		17.3		17.4		15.9		17.5		18.0		17.2		22.7		14.1		9.4		14.5		9.4-15.1	2-250
IRON	19500		20700		20700		17900		21200		20800		19900		23300		17700		11600		17900		11600-19900	100-550000
LEAD	22.5		25.1		24.6		18.8		24.1		20.9		22.1		26.8		21.4		4.6		28.1		4.6-16.9	<1-888
MAGNESIUM	3270		3290		3420		3060		2920		3470		3160		3830		4950		2120		2680		2120-3000	400-9000
MANGANESE	430		389		486		285		490		474		454	J	469	J	384	J	196		440		196-440	20-18300
MERCURY	0.094		0.13	U	0.11	U	0.099		0.11	U	0.10	U	0.078	U	0.096	U	0.086	U	0.10	U	0.12	U	ND	0.01-4.6
NICKEL	14.2		15.4		15.2		15.2		15.3		15.1		13.9		17.0		11.3		7.7		11.9		7.7-13.2	0.1-1530
POTASSIUM	1100		964	B	1010		1180		965	B	1160		1210		1280		1200		956		770	B	770B-1120	80-37000
SELENIUM	0.82	U	0.95	U	0.74	U	0.75	U	0.84	U	0.83	U	0.79	UJ	0.90	UJ	0.70	UJ	0.78	U	0.94	U	ND	0.1-38
SILVER	0.26	U	0.30	U	0.23	U	0.24	U	0.27	U	0.26	U	0.25	U	0.29	U	0.22	U	0.25	U	0.30	U	ND	0.01-8
SODIUM	85.0	U	98.5	U	76.3	U	77.6	U	86.6	U	86.0	U	81.5	U	92.7	U	72.1	U	80.6	U	96.6	U	ND	150-25000
THALLIUM	0.82	U	0.95	U	0.74	U	0.75	U	0.84	U	0.83	U	0.79	UJ	0.90	UJ	0.70	UJ	0.78	U	0.94	U	ND	0.1-0.8
VANADIUM	24.2		26.9		27.1		24.5		24.7		25.7		26.4		28.6		18.0		10.8		22.6		10.8-23.7	3-500
ZINC	51.8		58.1		56.7		47.5		60.4		54.8		54.7		60.8		111		26.5		48.3		26.5-48.4	1-2000
CYANIDE	0.63	U	0.73	U	0.77	U	0.72	U	0.62	U	0.60	U	0.64	U	0.76	U	0.62	U	0.56	U	0.66	U	ND	NR

Notes:

1. ND - Not detected
2. NA - Not analyzed
3. NR - Not reported
4. See Table 4-17 for a definition of data qualifiers
5. Site background represents the range of values found in samples SS-10, SS-11, SS-12, SS-13, SS-14, and SS-15.
6. Published background represents a range of typical values found in soils. The references for these values are provided in Section 6.0.

TABLE 4-3
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS
FOR
INORGANIC SUBSTANCES AND CYANIDES
SURFACE SOIL SAMPLES

Parameters	KFSS12 (mg/kg) BKG	Q	KFSS13 (mg/kg) TES	Q	KFSS14 (mg/kg) TES	Q	KFSS15 (mg/kg) TES	Q	KFSS16 (mg/kg)	Q	KFSS17 (mg/kg)	Q	KFSS18 (mg/kg)	Q	KFSSDUP (mg/kg)	Q	SSFB424 (ug/l)	Q	Site BKG[5] (mg/kg)	Published BKG[6] (mg/kg)
ALUMINUM	15400		9660		12900		13100		13900		9970		6610		14200		9.7	U	6620-15400	10000-300000
ANTIMONY	0.99	U	0.80	U	0.77	U	0.72	U	0.87	U	0.76	U	0.92	U	1.0	U	4.3	U	ND	0.2-150
ARSENIC	3.8		2.8		3.7		2.7		4.4		2.6		5.8		4.3		3.1	U	1.6B-4	0.1-194
BARIUM	57.7		49.7		48.6		53.4		52.2		39.9		27.6	B	65.4		3.1	U	27.9B-64.4	100-3000
BERYLLIUM	0.42	B	0.20	B	0.25	B	0.27	B	0.27	B	0.11	B	0.26	B	0.40	B	0.14	B	0.15B-0.42B	0.01-40
CADMIUM	0.26	B	0.28	B	0.27	B	0.27	B	0.37	B	0.26	B	0.16	B	0.27	B	0.4	U	0.15B-0.27B	0.01-7
CALCIUM	630	B	1800		1090		1230		11100		1280		1380		1910		80.7	B	630B-1800	<150-500000
CHROMIUM TOTAL	14.2		14.1		13.6		13.0		14.2		13.6		9.0		14.2		0.8	U	6.8-14.2	5-3000
COBALT	7.3	J	5.2	J	5.9	J	5.8	J	7.9	J	6.5	J	4.5	J	7.5	B	1.2	U	4.4B-7.3B	0.05-65
COPPER	14.5		12.9		15.1		12.8		25.3		17.1		17.5		17.2		1.2	U	9.4-15.1	2-250
IRON	19600		16200		19900		18700		20200		18800		13100		20500		27.2	U	11600-19900	100-550000
LEAD	17.5		14.0		15.9		16.9		33.4		16.3		8.7		23.8		3	U	4.6-16.9	<1-888
MAGNESIUM	3000		2440		2630		2390		8590		3870		3020		3250		85.9	U	2120-3000	400-9000
MANGANESE	411		278		260		249		379		412		201		433		1.1	B	196-440	20-18300
MERCURY	0.10	U	0.13	U	0.11	U	0.09	U	0.10	U	0.10	U	0.07	U	0.16		0.2	U	ND	0.01-4.6
NICKEL	13.2		10.3		11.2		10.4		13.6		13.0		14.0		14.8		2.3	U	7.7-13.2	0.1-1530
POTASSIUM	980	B	1120		869	B	968		1260		1640		1030	B	916	B	125	U	770B-1120	80-37000
SELENIUM	0.94	U	0.77	U	0.74	U	0.68	U	0.82	U	0.73	U	0.88	U	0.97	U	4.1	U	ND	0.1-38
SILVER	0.30	U	0.24	U	0.23	U	0.22	U	0.26	U	0.23	U	0.28	U	0.31	U	2	B	ND	0.01-8
SODIUM	96.9	U	79.2	U	76.2	U	70.6	U	85.1	U	74.9	U	90.3	U	99.7	U	423	U	ND	150-25000
THALLIUM	0.94	U	0.77	U	0.74	U	0.68	U	0.82	U	0.73	U	0.88	U	0.97	U	4.1	U	ND	0.1-0.8
VANADIUM	22.8		20.1		23.4		23.7		31.0		22.1		21.2		25.0		1.5	U	10.8-23.7	3-500
ZINC	48.4		39.0		43.5		43.9		56.4		43.9		29.4		55.5		1.1	B	26.5-48.4	1-2000
CYANIDE	0.64	U	0.66	U	0.68	U	0.65	U	NA		NA		NA		0.76	U	5	U	ND	NR

Notes:

1. ND - Not detected
2. NA - Not analyzed
3. NR - Not reported
4. See Table 4-17 for a definition of data qualifiers
5. Site background represents the range of values found in samples SS-10, SS-11, SS-12, SS-13, SS-14, and SS-15.
6. Published background represents a range of typical values found in soils. The references for these values are provided in Section 6.0.

TABLE 4-4
KAY FRIES OFFSITE PSA
ANALYTICAL RESULT FOR
INORGANIC SUBSTANCES AND CYANIDES
SURFACE SOIL SAMPLES
ADJACENT TO EMPTY DRUMS

Parameters	KFSS1B (mg/kg)	Q	KFSS2B (mg/kg)	Q	KFSS3B (mg/kg)	Q	KFSS4B (mg/kg)	Q	KFSS5B (mg/kg)	Q	KFSS6B (mg/kg)	Q	KFFB57 (ug/l)	Q	Site BKG[5] (mg/kg)	Published BKG[6] (mg/kg)
ALUMINUM	4910		6520		9560		8980		6010		5640		9.7	U	6620-15400	10000-300000
ANTIMONY	0.82	UJ	0.76	UJ	0.83	UJ	0.80	UJ	0.60	UJ	0.49	UJ	4.3	U	ND	0.2-150
ARSENIC	1.5	B	2.1		3.0		2.7		1.7		1.7		3.1	U	1.6B-4	0.1-194
BARIUM	22.8	B	34.2	B	43.0		42.5		27.9		26.7		3.1	U	27.9B-64.4	100-3000
BERYLLIUM	0.078	B	0.12	B	0.22	B	0.23	B	0.15	B	0.11	B	0.1	U	0.15B-0.42B	0.01-40
CADMIUM	0.12	B	0.16	B	0.24	B	0.22	B	0.20	B	0.14	B	0.4	U	0.15B-0.27B	0.01-7
CALCIUM	1100		1160		1880		1750		1080		1510		72.9	U	630B-1800	<150-500000
CHROMIUM TOTAL	7.3	J	7.8	J	10.4	J	9.8	J	6.1	J	7.3	J	0.80	U	6.8-14.2	5-3000
COBALT	4.1	B	4.7	B	5.3	B	5.3	B	3.6	B	3.9	B	1.2	U	4.4B-7.3B	0.05-65
COPPER	10.9	J	11.8	J	13.4	J	13.5	J	8.3	J	10.5	J	1.2	U	9.4-15.1	2-250
IRON	11600		13100		14900		15000		9310		11200		27.2	U	11600-19900	100-550000
LEAD	6.1	J	11.5	J	15.1	J	15.6	J	12.2	J	9.3	J	3.1	U	4.6-16.9	<1-888
MAGNESIUM	2230		2410		2680		2540		1560		2420		85.9	U	2120-3000	400-9000
MANGANESE	200		314	J	310	J	296	J	196	J	213	J	0.80	U	196-440	20-18300
MERCURY	0.1	UJ	0.092	UJ	0.11	UJ	0.1	UJ	0.11	UJ	0.11	UJ	0.20	U	ND	0.01-4.6
NICKEL	8.6		10.5		11.0		10.8		7.3		8.5		2.3	U	7.7-13.2	0.1-1530
POTASSIUM	866	B	928		1090		1010		711		784		125	U	770B-1120	80-37000
SELENIUM	0.78	R	0.73	R	0.79	R	0.76	R	0.57	R	0.47	R	4.1	U	ND	0.1-38
SILVER	0.25	U	0.23	U	0.25	U	0.24	U	0.18	U	0.15	U	1.3	U	ND	0.01-8
SODIUM	80.7	U	75.2	U	81.8	U	78.4	U	59.0	U	48.2	U	423	U	ND	150-25000
THALLIUM	0.78	U	0.73	U	0.79	U	0.76	U	0.57	U	0.47	U	4.1	U	ND	0.1-0.8
VANADIUM	11.5		12.9		17.5		17.2		11.6		12.1		1.5	U	10.8-23.7	3-500
ZINC	26.5		30.4		43.4		43.2		25.8		27.4		0.71	B	26.5-48.4	1-2000
CYANIDE	0.52	U	0.55	U	0.71	U	0.70	U	0.76	U	0.62	U	5	U	ND	NR

Notes:

1. ND - Not detected
2. NA - Not analyzed
3. NR - Not reported
. See Table 4-17 for a description of data qualifiers
5. Site background represents the range of values found in samples SS-10, SS-11, SS-12, SS-13, SS-14, and SS-15.
6. Published background represents a range of typical values found in soils. The references for these values are provided in Section 6.0.

TABLE 4-5
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
ORGANIC COMPOUNDS
SUBSURFACE SOIL SAMPLES

Parameters	SB02D (ug/kg) Q	SB02E (ug/kg) Q	SB04C (ug/kg) Q	KFSB08A (ug/kg) Q	SB13A (ug/kg) Q	SB14A (ug/kg) Q	SB17H (ug/kg) Q	SB21J (ug/kg) Q	SB2252 (ug/kg) Q	FBSB423 (ug/l) Q	Site BKG (ug/kg)
Volatile											
Methylene Chloride	11 U	12 U	12 U	12 U	1 J	11 U	12 U	12 U	11 U	10 U	ND
Acetone	11 U	12 U	110 U	12 U	11 U	11 U	12 U	12 U	11 U	2 J	ND
1,1-Dichloroethene	11 U	12 U	12 U	12 U	11 U	11 U	1 J	12 U	11 U	10 U	ND
2-Butanone	11 U	12 U	21	12 U	11 U	11 U	12 U	12 U	11 U	10 U	ND
1,1,1-Trichloroethane	11 U	12 U	12 U	12 U	11 U	11 U	5 J	12 U	11 U	10 U	ND
Trichloroethene	11 U	12 U	12 U	12 U	11 U	11 U	12 U	5 J	11 U	10 U	ND
Semivolatile											
Diethylphthalate	390 U	390 U	410 U	390 U	400	350 U	430 U	360 U	NA	10 U	ND
Phenanthrene	390 U	390 U	56 J	390 U	350 U	32 J	430 U	360 U	NA	10 U	45J-270J
Di-n-butylphthalate	390 U	390 U	410 U	390 U	350 U	350 U	430 U	360 U	NA	10 U	ND
Fluoranthene	390 U	390 U	100 J	390 U	350 U	110 J	430 U	360 U	NA	10 U	85J-450
Pyrene	390 U	390 U	72 J	390 U	350 U	130 J	430 U	360 U	NA	10 U	60J-280J
Benzo(a)anthracene	390 U	390 U	410 U	390 U	350 U	56 J	430 U	360 U	NA	10 U	49J-160J
Chrysene	390 U	390 U	410 U	390 U	350 U	70 J	430 U	360 U	NA	10 U	77J-190J
Benzo(b)fluoranthene	390 U	390 UJ	410 U	390 U	350 U	100 J	430 U	360 U	NA	10 UJ	120YJ-300YJ
Benzo(k)fluoranthene	390 U	390 U	410 U	390 U	350 U	350 U	430 U	360 U	NA	10 U	ND
Benzo(a)pyrene	390 U	390 U	410 U	390 U	350 U	44 J	430 U	360 U	NA	10 U	48J-130J
Indeno(1,2,3-cd)pyrene	390 U	390 U	410 U	390 U	350 U	35 J	430 U	360 U	NA	10 UJ	42J-92J
Dibenz(a,h)anthracene	390 U	390 U	410 U	390 U	350 U	20 J	430 U	360 U	NA	10 UJ	ND-47J
Benzo(g,h,i)perylene	390 U	390 U	410 U	390 U	350 U	51 J	430 U	360 U	NA	10 UJ	52J-110J
3 - Nitroanoline	950 U	950 U	1000 UJ	940 U	860 U	850 UJ	1000 U	870 U	NA	10 U	ND
4 - Nitroanoline	950 U	950 U	1000 UJ	940 U	860 U	850 UJ	1000 U	870 U	NA	10 U	ND
Carbazole	390 U	390 U	410 U	390 U	350 U	350 UJ	430 U	360 UJ	NA	10 U	ND
Hexachlorocyclopentadiene	390 UJ	390 UJ	410 U	390 U	350 U	350 U	430 UJ	360 U	NA	10 UJ	ND
Pesticide/PCB	NO COMPOUNDS DETECTED										

Notes:

1. ND - Not detected
2. NA - Not analyzed
3. See Table 4-17 for a definition of data qualifiers

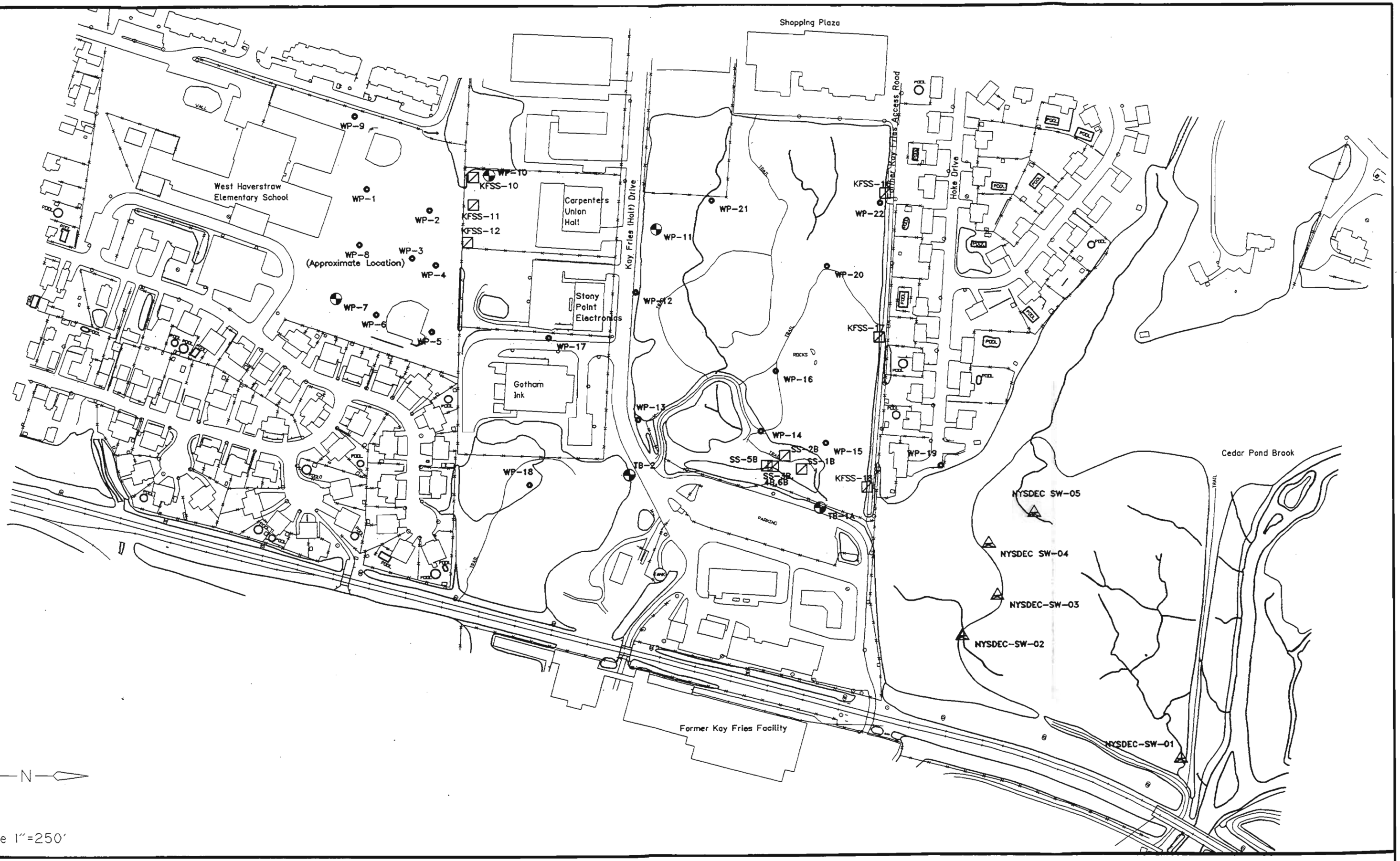

Figure 4-3
Soil Sample Locations

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encountered groundwater during seasonal fluctuations or locally heavy rain events. This boring was located where the soil gas survey had detected the elevated levels of TCA and tetrachloroethene (PCE). Trichloroethene (TCE) was detected in SB21J (28 to 32 feet below grade). Saturated soils were encountered at an approximate depth of 37 feet at this location. At this distance from the water table, it is possible that there is a local source in the unsaturated soils. However, screening for total volatile organic compounds with a PID did not indicate the presence of VOCs in the unsaturated soils at this location indicating that a significant source was not present at the boring location. It is possible that there is a nearby source, or that the water table has a greater fluctuation at this location. TCE is commonly associated with PCE which was detected in the general area of SB21J.

In general, analytical results for inorganic parameters showed levels comparable to or lower than levels detected in the surface soil samples (see Table 4-6). Lead significantly exceeded site background levels in sample SB04C; however, the concentration was well within the published range of typical values found in soils. Cyanides were not detected in any of the subsurface soil samples.

4.4 Groundwater Sampling

Laboratory analysis of groundwater samples from the West Haverstraw Elementary School detected low levels of bis(2-ethylhexyl)phthalate and phenol (see Table 4-7). Acetone was also detected, but at comparable levels to those found in the field blank. Phenol was the only compound that exceeded its New York State Groundwater Quality Criteria. Phenol was found in three groundwater samples, WP07, WP10, and WP11, at concentrations ranging from 2 to 19 ug/l (see Figure 4-3). All three of these samples were collected from Geoprobe® pre-packed wells. The wells are spread out across the site, and the only characteristic common to them is the well construction. Since phenol was not found in soils or any of the other groundwater samples, it appears that the compound is related to the well material.

CDM contacted our drilling subcontractor ADT, who in turn spoke to a representative of Geoprobe®. It appears that Geoprobe® purchases the pre-packed screens from a manufacturer and provides them as they receive them. The manufacturer cleans the PVC with a solvent, and under their QA/QC procedures sample for a selected list of parameters to confirm that the materials are free of the solvent. This list does not include phenol. It is their conclusion that the phenol is probably a residue of this solvent. However, this cannot be confirmed because the manufacturer does not use this solvent any more and there are no more prepacked screens from that lot.

The analytical results for groundwater samples collected across the rest of the study area identified the presence of chlorinated solvents at locations WP11, WP13, WP17, WP18, WP21, and TB2 (see Table 4-8). Concentrations exceeded groundwater quality criteria at WP11, WP17, and WP21. The highest levels were found at location WP17 where 350 ug/l of TCA and 23 ug/l of 1,1-DCE were detected (see Figure 4-4). This is the same location where the soil gas survey found high levels of TCA and PCE. PCE, however, was not found in groundwater or soil samples at this location,

TABLE 4-6
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
INORGANIC SUBSTANCES AND CYANIDES
SUBSURFACE SOIL SAMPLES

Parameters	SB02D (mg/kg)	Q	SB02E (mg/kg)	Q	SB04C (mg/kg)	Q	KFSB08A (mg/kg)	Q	SB13A (mg/kg)	Q	SB14A (mg/kg)	Q	SB17H (mg/kg)	Q	SB21J (mg/kg)	Q	FBSB423 (ug/kg)	Q	Site BKG (mg/kg)	Published BKG (mg/kg)
ALUMINUM	6430		6580		15800		8430		6470	J	6830	J	5290	J	5860	J	11.2	B	6620-15400	10000-300000
ANTIMONY	0.60	UJ	0.61	UJ	0.76	UJ	0.66	U	0.85	UJ	0.88	UJ	1	UJ	0.92	UJ	4.3	U	ND	.2-150
ARSENIC	2.2		2.1		7.3		2.5		2.0	J	2.4	J	1.5	J	2.1	J	3.1	U	1.6B-4	.1-194
BARIUM	32.1		34.7		74.4		42.8		28.2	J	28.7	J	27.7	J	32.5	J	3.1	U	27.9B-64.4	100-3000
BERYLLIUM	0.15	B	0.12	B	0.38	B	0.11	B	0.12	J	0.16	J	0.08	J	0.15	J	0.11	B	.15B-.42B	.01-40
CADMIUM	0.32	B	0.28	B	0.81	B	0.2	B	0.1	J	0.08	J	0.09	UJ	0.09	UJ	0.40	U	.15B-.27B	.01-7
CALCIUM	1650		1930		1570		1560		1030		1260		1460	J	1720		125	B	630B-1800	<150-500000
CHROMIUM TOTAL	9.4		9.8		23.5		14.4		12.3	J	9.4	J	12.7	J	8.8	J	0.80	U	6.8-14.2	5-3000
COBALT	5.7	B	5.6	B	9.3		8.4	J	5.7	J	4.7	J	5.0	J	5.2	J	1.2	U	4.4B-7.3B	.05-65
COPPER	13.2		13.3		37.0		18.1		14.5	J	12.1	J	11.7	J	13.8	J	1.2	U	9.4-15.1	2-250
IRON	14900		15800		35800		19300		14500	J	13900	J	12900	J	14700	J	27.2	U	11600-19900	100-550000
LEAD	5.0		4.3		123		6.6		5.5	J	7.7	J	2.9	J	4.1	J	3.0	U	4.6-16.9	<1-888
MAGNESIUM	2470		2580		4560		3370		2750		2710		2670		2940		85.9	U	2120-3000	400-9000
MANGANESE	283	J	288	J	366	J	289		313	J	240	J	182	J	255	J	3.2	B	196-440	20-18300
MERCURY	0.096	U	0.09	U	0.11	U	0.12	U	0.1	U	0.10	U	0.10	U	0.11	U	0.20	U	ND	.01-4.6
NICKEL	9.8		10.5		20.4		14.3		13.5	J	10.8	J	11.2	J	11.0	J	2.3	U	7.7-13.2	.1-1530
POTASSIUM	1030		1290		1890		1420		1070		1130		1150	B	1290		125	U	770B-1120	80-37000
SELENIUM	0.57	UJ	0.58	UJ	0.72	UJ	0.63	U	0.81	UJ	0.84	UJ	0.97	UJ	0.88	UJ	4.1	U	ND	.1-38
SILVER	0.18	U	0.18	U	0.23	U	0.2	U	0.26	UJ	0.27	UJ	0.31	UJ	0.28	UJ	1.3	U	ND	.01-8
SODIUM	58.7	U	59.5	U	74.5	U	65.2	U	83.8	U	86.9	U	100	U	90.5	U	423	U	ND	150-25000
THALLIUM	0.57	UJ	0.58	UJ	0.72	UJ	0.63	U	0.81	UJ	0.84	UJ	0.97	UJ	0.88	UJ	4.1	U	ND	.1-.8
VANADIUM	14.0		15.8		31.1		20.5		14	J	13.3	J	13.6	J	11.6	J	1.5	U	10.8-23.7	3-500
ZINC	31.0		30.5		96.7		39.9		29.8	J	28.3	J	33.3	J	32.4		0.76	B	26.5-48.4	1-2000
CYANIDE	0.69	U	0.65	U	0.63	U	0.63	U	0.54	U	0.59	U	0.67	U	0.62	U	5.0	U	ND	N/A

Notes:

1. ND - Not detected
2. See Table 4-17 for a definition of data qualifiers

TABLE 4-7
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
ORGANIC COMPOUNDS
HAVERSTRAW ELEMENTARY SCHOOL GROUNDWATER SAMPLES

Parameters	KFWP01 (ug/l)	Q	KFWP02 (ug/l)	Q	KFWP03 (ug/l)	Q	KFWP04 (ug/l)	Q	KFWP05 (ug/l)	Q	KFWP06 (ug/l)	Q	KFWP07 (ug/l)	Q	KFWP08 (ug/l)	Q	KFWP09 (ug/l)	Q	NYS GQC (ug/l)
Volatile																			
Acetone	10	U	10	U	10	U	4	J	10	U	10	UJ	10	UJ	3	BJ	10	U	50
Semivolatile																			
Phenol	10	U	10	U	10	U	10	U	10	U	11	U	19		10	U	10	U	1
bis(2-Ethylhexyl)phthalate	1	BJ	2	BJ	1	BJ	10	U	10	U	11	U	11	U	2	J	10	U	50
Pesticide/PCB																			
NO COMPOUNDS DETECTED																			

Notes:

1. NA - Not analyzed
2. See Table 4-17 for a definition of data qualifiers

TABLE 4-7
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
ORGANIC COMPOUNDS
HAVERSTRAW ELEMENTARY SCHOOL GROUNDWATER SAMPLES

Parameters	FBWP422 (ug/l)	Q	TB421 (ug/l)	Q	TBA (ug/l)	Q	TBB (ug/l)	Q	TBC (ug/l)	Q	TBE (ug/l)	Q	TBF (ug/l)	Q	NYS GQC (ug/l)
Volatile															
Acetone	3	J	10	J	10	U	10	U	10	U	2	BJ	2	BJ	50
Semivolatile															
Phenol	10	U	NA		NA		NA		NA		NA		NA		1
bis(2-Ethylhexyl)phthalate	10	U	NA		NA		NA		NA		NA		NA		50
Pesticide/PCB															
NO COMPOUNDS DETECTED															

Notes:

1. NA - Not analyzed
2. See Table 4-17 for a definition of data qualifiers

TABLE 4-8
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
ORGANIC COMPOUNDS
FORMER KAY FRIES PROPERTY GROUNDWATER SAMPLES

Parameters	KFWP10 (ug/l)	Q	KFWP11 (ug/l)	Q	KFWP12 (ug/l)	Q	KFWP13 (ug/l)	Q	KFWP14 (ug/l)	Q	KFWP15 (ug/l)	Q	KFWP16 (ug/l)	Q	KFWP17 (ug/l)	Q	KFWP18 (ug/l)	Q	KFWP19 (ug/l)	Q	KFWP20 (ug/l)	Q	KFWP21 (ug/l)	Q	NYS GQC (ug/l)
Volatile																									
Acetone	9.0	J	10	U	10	U	8.0	J	10	U	10	UJ	7.0	J	33	UJ	6.0	J	5.0	J	10	U	9.0	J	50
1,1-Dichloroethene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	23	J	10	U	10	U	10	U	10	U	5
1,2-Dichloroethene (total)	10	U	1.0	J	10	U	10	U	10	U	10	U	10	U	33	U	10	U	10	U	10	U	10	U	5
1,1,1-Trichloroethane	10	U	7.0	J	10	U	2.0	J	10	U	10	U	10	U	350		3.0	J	10	U	10	U	8.0	J	5
Trichloroethene	10	U	9.0	J	10	U	4.0	J	10	U	10	U	10	U	33	U	10	U	10	U	10	U	12		5
Semivolatile																									
Phenol	5.0	J	2.0	J	10	U	10	U	10	U	10	U	12	U	11	U	13	U	10	U	10	U	10	U	1
bis(2-Ethylhexyl)phthalate	17.0	U	10	U	10	U	10	U	10	U	10	U	20	U	11	U	13	U	10	U	10	U	10	U	50
Pesticide/PCB																									
NO COMPOUND DETECTED																									

Notes:

1. ND - Not detected
2. See Table 4-17 for a definition of data qualifiers

TABLE 4-8
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
ORGANIC COMPOUNDS
FORMER KAY FRIES PROPERTY GROUNDWATER SAMPLES

Parameters	KFWP22 (ug/l)	Q	KFWP2 (ug/l)	Q	MW1A (ug/l)	Q	MW02 (ug/l)	Q	DUP (MW02) (ug/l)	Q	FBWP422 (ug/l)	Q	TB424 (ug/l)	Q	TB430 (ug/l)	Q	NYS GQC (ug/l)
Volatile																	
Acetone	NS		10	U	10	U	10	U	10	U	3	J	10	UJ	10	UJ	50
1,1-Dichloroethene	NS		10	U	10	U	10	U	10	U	10	U	10	U	10	U	5
1,2-Dichloroethene (total)	NS		10	U	10	U	10	U	10	U	10	U	10	U	10	U	5
1,1,1-Trichloroethane	NS		10	U	10	U	10	U	10	U	10	U	10	U	10	U	5
Trichloroethene	NS		10	U	10	U	1.0	J	0.90	J	10	U	10	U	10	U	5
Semivolatile																	
Phenol	NS		10	U	10	U	11	U	11	U	10	U	NA		NA		1
bis(2-Ethylhexyl)phthalate	NS		0.6	J	10	U	11	U	11	U	10	U	NA		NA		50
Pesticide/PCB																	
NO COMPOUND DETECTED																	

Notes:

1. ND - Not detected
2. See Table 4-17 for a definition of data qualifiers

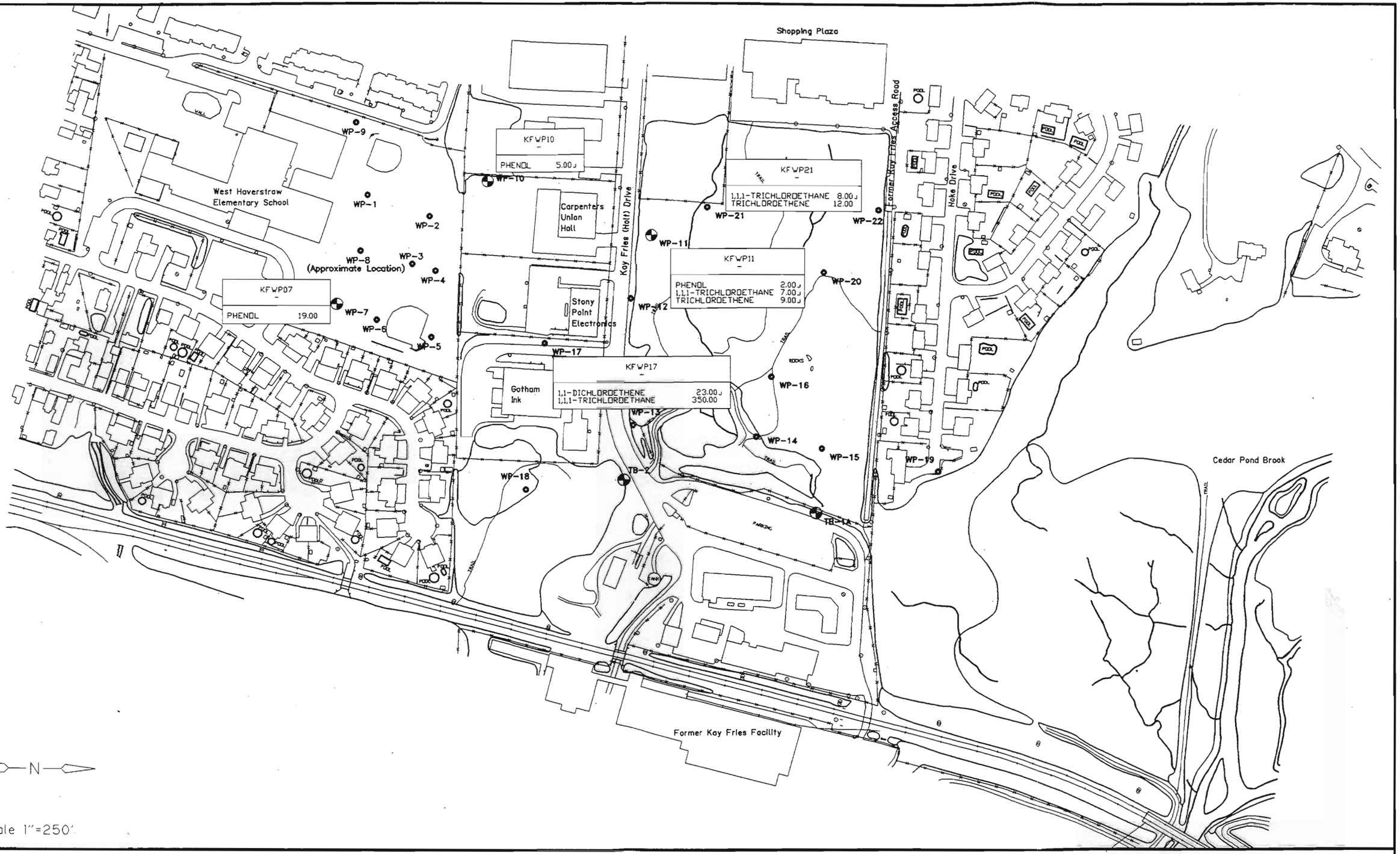

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Figure 4-4
Results of Groundwater Samples Exceeding New York State Groundwater Quality Criteria

suggesting that the source is in the vicinity of the boring but not at the actual location. TCA and DCE were also found in the subsurface soil sample collected at this location. TCA and/or trichloroethylene (TCE) were found in lower concentrations at locations WP18, TB2, WP13, WP11, and WP21. WP11 and WP21 are at locations hydraulically downgradient of WP17. WP12 is also at a downgradient location and did not detect the chlorinated solvents. There is no apparent explanation for why this sample did not detect the contaminants. The remaining groundwater samples, in which TCA and TCE were found, were located east and north of WP17. Due to their proximity to WP17 it is likely that they are related to this source area. Tentatively identified compounds (TICs) were found in the library search, generally at low ug/l concentrations. Some of the TICs were also found in the laboratory method blank. Concentrations less than five times the levels in the method blank were rejected by the data validator. All other data were found to be usable.

Inorganic analyses of samples collected at the elementary school detected levels of iron, manganese, magnesium, and sodium (in one sample) in excess of the groundwater quality criteria (see Table 4-9). It is likely that these elevated levels were a result of the highly turbid samples that were collected through the Geoprobe. The samples were not filtered, and were preserved immediately upon collection to a pH of 2, which resulted in digestion of metals present in the sediments into the aqueous portion of the sample.

Analytical results for inorganic parameters in samples collected in other parts of the study area detected comparable levels of the same metals (see Table 4-10). Cyanides were not detected in any of the groundwater samples. Concentrations of lead, chromium, and arsenic were also found to exceed the groundwater quality criteria in samples WP10, WP12, WP18, WP19, WP20, and WP21. These samples are spread out across the study area with no apparent common characteristics. It is possible that the concentrations of these three substances are also related to digestion of metals from sediments in the groundwater samples. The analytical results for samples collected from the two permanent wells sampled during this event, TB1A and TB2, showed significantly lower concentrations for most of the inorganic parameters. Physical/chemical parameters measured in the field at the permenant monitoring wells and prepacked wells are presented in Table 4-11.

4.5 Surface Water and Sediment Sampling

Analytical results for surface water samples detected low concentrations of two phthalate compounds, di-n-butylphthalate and bis(2-ethylhexyl)phthalate (see Table 4-12). The phthalates were also detected in the field blank at comparable levels and are considered to be a result of sampling equipment. Chloroform was also found in the field blank at an estimated concentration of 2 ug/l, and PCE was detected in the trip blank at 1 ug/l; however, these compounds were not found in the environmental samples. Analytical results for inorganic substances showed that iron was the only metal to exceed New York State Surface Water Quality Criteria (see Table 4-13). All data were found to be usable by the data validator. The concentrations do not correlate with turbidity measurements, suggesting that the iron was present in the dissolved state when the samples were collected (see Table 4-14).

A wide range of PAHs and pesticides were found in sediment samples (see Table 4-15). Acetone and chloroform were also detected in sediment samples; however, these compounds were also

TABLE 4-9
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
INORGANIC SUBSTANCES AND CYANIDES
HAVERSTRAW ELEMENTARY SCHOOL GROUNDWATER SAMPLES

Parameters	KFWP01 (ug/l)	Q	KFWP02 (ug/l)	Q	KFWP03 (ug/l)	Q	KFWP04 (ug/l)	Q	KFWP05 (ug/l)	Q	KFWP06 (ug/l)	Q	KFWP07 (ug/l)	Q	KFWP08 (ug/l)	Q	KFWP09 (ug/l)	Q	FBWP422 (ug/l)	Q	NYS GWQC (ug/l)
ALUMINUM	2810		12200		16000		1020		94.4	B	34.9	U	1960		159	J	7820		14.4	B	-
ANTIMONY	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	3
ARSENIC	3.1	U	3.9	B	17.9		3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	25
BARIUM	43.9	B	195	B	648		78.2	B	17.1	B	10.8	B	52.8	B	22.7	B	75.4	B	3.1	U	1,000
BERYLLIUM	0.25	U	0.91	B	0.91	B	0.12	U	0.14	U	0.14	U	0.21	U	0.10	U	0.37	U	0.11	B	3
CADMIUM	0.65	B	0.86	B	1.9	B	0.40	U	0.40	U	0.61	B	0.46	B	0.40	U	0.40	U	0.40	U	10
CALCIUM	28200		54200		418000		179000		35500		12800		65000		43000		31600		72.9	U	-
CHROMIUM TOTAL	5.2	B	17.2		20.5		2.2	B	0.80	U	0.80	U	3.8	B	1.5	B	8.0	B	0.80	U	50
COBALT	8.1	B	24.9	B	35.2	B	6.4	B	1.2	U	1.7	B	8.4	B	1.8	B	4.2	B	1.2	U	-
COPPER	6.9	B	26.1		42.3		5.6	B	1.2	U	2.3	B	5.0	B	2.5	B	15.8	B	1.2	U	200
IRON	5500	J	18000	J	71100	J	2500	J	346	J	469	J	3580	J	402	J	10900	J	27.2	U	300
LEAD	3.0	U	9.2		16.8		3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	7.7		3.0	U	25
MAGNESIUM	7600		20600		77500		53500		10100		3820	B	20100		14600		7760		85.9	U	35,000
MANGANESE	639		2440		4620		7470		67.9		144		1220		99.0		520		0.80	U	300
MERCURY	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	2
NICKEL	7.1	B	35.6	B	43.8		6.2	B	2.3	U	2.3	U	17.1	B	2.3	U	10.6	B	2.3	U	-
POTASSIUM	3180	B	4110	B	8780		5520		1380	B	1240	B	3590	B	1490	J	3130	B	125	U	-
SELENIUM	4.1	U	4.1	J	4.1	U	4.1	U	4.1	U	6.3	J	4.1	U	4.1	U	5.2	J	4.1	U	10
SILVER	1.6	B	1.3	U	1.3	U	1.3	U	1.3	U	2.5	B	1.3	U	1.3	U	1.3	U	1.3	U	50
SODIUM	5660	J	13800	J	7670	J	7180	J	4800	J	3510	B	4450	B	3720	J	24400	J	423	U	20,000
THALLIUM	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4
VANADIUM	6.6	B	15.8	B	35.8	B	2.9	B	1.5	U	1.5	U	3.2	B	1.5	U	14.5	B	1.5	U	-
ZINC	16.2	J	75.2	J	103	J	38.5	J	1.7	B	1.8	B	11.1	B	4.4	B	66.1	J	0.70	U	300
CYANIDE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	

Notes:

1. ND - Not detected
2. See Table 4-17 for a definition of data qualifiers

TABLE 4-10
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
INORGANIC SUBSTANCES
FORMER KAY FRIES PROPERTY GROUNDWATER SAMPLES

Parameters	KFWP10 (ug/l)	Q	KFWP11 (ug/l)	Q	KFWP12 (ug/l)	Q	KFWP13 (ug/l)	Q	KFWP14 (ug/l)	Q	KFWP15 (ug/l)	Q	KFWP16 (ug/l)	Q	KFWP17 (ug/l)	Q	KFWP18 (ug/l)	Q	KFWP19 (ug/l)	Q	NYS GQC (ug/l)
ALUMINUM	82100		20000		2940		244		518		619		3170		7120		58200		31700		-
ANTIMONY	7.8	B	4.3	U	4.3	U	5.5	B	5.3	B	4.4	B	5.2	B	4.3	U	4.3	U	4.3	U	3
ARSENIC	40.6		6.1	B	3.1	U	3.1	U	3.1	U	3.1	U	7.1	B	4.2	B	36.8		13.5		25
BARIUM	603		302		112	B	14.2	B	12.1	B	14.9	B	43.4	B	64.0	B	810		894		1,000
BERYLLIUM	3.9	B	1.7	B	0.17	B	0.16	B	0.11	B	0.20	B	0.32	B	0.29	B	5.2		2.4	B	3
CADMIUM	1.7	B	0.98	B	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U	2.2	B	1.1	B	10
CALCIUM	228000		104000		119000		25400		23400		31700		53400		24900		396000		351000		-
CHROMIUM TOTAL	233		31.9		158		1.2	B	1.7	B	1.7	B	6.4	B	18.4		62.9		63.4		50
COBALT	83.1		17.7	B	4.5	B	1.2	U	1.8	B	1.2	U	3.9	B	9.9	B	100		81.9		-
COPPER	262		36.8		12.7	B	1.2	U	1.2	U	1.2	U	36.5		23.2	B	173		112		200
IRON	163000		22700		11700		600		1140		1360		6990		16900		100000		57200		300
LEAD	88.5	J	10.2	J	3.0	UJ	3.0	UJ	3.0	UJ	3.0	UJ	3.0	UJ	5.6	J	68.6	J	21.4	J	25
MAGNESIUM	63000		22800		28800		8840		3380	B	8210		14000		11900		49400		62200		35,000
MANGANESE	5100		2110		206		48.0		144		60.3		158		704		9210		5920		300
MERCURY	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	2
NICKEL	201		54.6		82.4		2.3	U	2.3	U	2.3	U	3.1	B	20.5	B	128		105		-
POTASSIUM	16200		6910		3420	B	1650	B	1220	B	1520	B	2420	B	3250	B	9000		11000		-
SELENIUM	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	10
SILVER	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	50
SODIUM	6490	J	23900		17600	J	50700		1490	J	3010	J	1880	J	4760	J	2920	J	25900		20,000
THALLIUM	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	4.6	B	4.1	U	4.1	U	4.1	U	4
VANADIUM	134		25.7	B	8.9	B	1.5	U	1.7	B	2.5	B	8.8	B	16.8	B	72.3		58.8		-
ZINC	484		102		36.8		1.6	B	3.5	B	11.1	B	49.1		39.8		402		232		300
CYANIDE	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	

Notes:

1. See Table 4-17 for a definition of data qualifiers

TABLE 4-10
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS FOR
INORGANIC SUBSTANCES
FORMER KAY FRIES PROPERTY GROUNDWATER SAMPLES

Parameters	KFWP20 (ug/l)	Q	KFWP21 (ug/l)	Q	KFWP22 (ug/l)	KFWP23 (ug/l)	Q	MW1A (ug/l)	Q	MW02 (ug/l)	Q	DUP (MW02) (ug/l)	Q	KFFB57 (ug/l)	Q	NYS GQC (ug/l)
ALUMINUM	52900		56400		NS	37.6	B	10.7	B	28.4	B	9.8	U	9.70	U	-
ANTIMONY	4.3	U	4.3	U	NS	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	3
ARSENIC	27.0		30.0		NS	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	25
BARIUM	717		1100		NS	9.7	B	7.6	B	16.5	B	15.6	B	3.1	U	1,000
BERYLLIUM	3.2	J	4.9	B	NS	0.10	U	0.10	B	0.12	B	0.15	B	0.10	U	3
CADMIUM	1.8	B	1.3	B	NS	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U	10
CALCIUM	95900		106000		NS	15800		21400		26200		24800		72.9	U	-
CHROMIUM TOTAL	89.6		87.8		NS	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	50
COBALT	61.8		154		NS	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	-
COPPER	126		125		NS	30.3		1.2	U	1.2	U	1.2	U	1.2	U	200
IRON	95700		71800		NS	54.7	J	42.4	J	78.7	J	45.8	J	27.2	U	300
LEAD	43.8		34.7	J	NS	3.1	U	3.0	UJ	3.0	UJ	3.0	UJ	3.1	U	25
MAGNESIUM	46700		36800		NS	1900	B	6530		8660		8210		86	U	35,000
MANGANESE	4710		7740		NS	2.1	B	0.80	U	2.3	B	0.80	U	0.80	U	300
MERCURY	0.20	U	0.43		NS	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	2
NICKEL	108		92.4		NS	2.3	U	2.3	U	2.3	U	2.3	U	2.30	U	-
POTASSIUM	16600		12600		NS	872	B	749	B	1090	B	1060	B	125	U	-
SELENIUM	4.1	U	4.1	U	NS	4.1	U	4.1	U	4.1	U	4.1	U	4.1	U	10
SILVER	1.3	U	1.3	U	NS	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	50
SODIUM	41000		89800		NS	9570	J	5450	J	64500		63400		423	U	20,000
THALLIUM	4.1	U	4.1	U	NS	4.1	U	4.8	B	4.5	B	4.1	U	4.1	U	4
VANADIUM	110		80.9		NS	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	-
ZINC	257		343		NS	14.4	B	13.5	B	3.3	B	3.2	B	0.71	B	300
CYANIDE	5.0	U	5.0	UJ	NS	5.0	U	5.0	UJ	5.0	UJ	5.0	UJ	5.0	U	

Notes:

1. See Table 4-17 for a definition of data qualifiers

TABLE 4-11
KAY FRIES OFFSITE PSA
PHYSICAL/CHEMICAL PARAMETERS
GROUNDWATER SAMPLING

Sample No.	Temperature (° C)	pH (S.U.)	Specific Conductivity (uS/cm.)	Turbidity (NTU)	Dissolved Oxygen (mg/l)
KFWP07	11.5	6.41	0.560	>999	5.0
KFWP10	13.9	7.61	0.549	-	4.6
KFWP11	-	7.28	0.517	89	5.4
KFMW1A	9.4	7.60	0.952	1.2	6.9
KFMW2	9.6	7.17	0.575	6.9	6.4

TABLE 4-12
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS
ORGANIC COMPOUNDS
SURFACE WATER SAMPLES

Parameters	SW01 (ug/l)	Q	SW02 (ug/l)	Q	SW03 (ug/l)	Q	SW04 (ug/l)	Q	SW05 (ug/l)	Q	SWDUP (ug/l)	Q	FB121896 (ug/l)	Q	TB121696 (ug/l)	Q	NYS SWQG (ug/l)
Volatile																	
Chloroform	10	U	10	U	10	U	10	U	10	U	10	U	2	J	10	U	-
Semivolatile																	
Di-n-butylphthalate	0.50	J	0.60	J	0.50	J	14	U	10	U	10	U	0.60	J	NA		-
bis(2-Ethylhexyl)phthalate	1.0	J	2.0	J	2.0	J	1.0	J	2.0	J	0.50	J	1.0	J	NA		0.6
Pesticide/PCB																	
NO COMPOUNDS DETECTED																	

Notes:

1. NA - Not analyzed
2. See Table 4-17 for a definition of data qualifiers

TABLE 4-13
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS
FOR
INORGANIC SUBSTANCES
SURFACE WATER SAMPLES

Parameters	SW01 (ug/l)	Q	SW02 (ug/l)	Q	SW03 (ug/l)	Q	SW04 (ug/l)	Q	SW05 (ug/l)	Q	SWDUP (ug/l)	Q	B121896 (ug/l)	Q	NYS SWQG (ug/l)
ALUMINUM	212		33.8	B	32.4	B	209		97.6	B	193	B	25.0	B	100.00
ANTIMONY	5.1	U	5.1	U	5.1	U	5.1	U	5.1	U	5.1	U	5.1	U	-
ARSENIC	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	190.00
BARIUM	44.9	B	32.4	B	18.0	B	53.6	B	63.2	B	44.5	B	2.3	U	-
BERYLLIUM	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	1100
CADMIUM	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	1.41
CALCIUM	66800		65200		50300		85500		82700		68400		92.8	U	-
CHROMIUM TOTAL	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	259
COBALT	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	5.00
COPPER	2.1	B	1.0	U	1.0	U	2.2	B	1.5	B	1.5	B	1.0	U	15
IRON	2220		75.1	B	826		943		186		1980		24.4	B	300.00
LEAD	2.2	U	2.2	U	2.2	U	3.0	B	2.2	U	2.2	U	2.2	U	3.7
MAGNESIUM	16400		15600		11900		21600		18500		16700		68.7	U	-
MANGANESE	245		16.6		136		62.6		21.4		242		0.30	U	-
MERCURY	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.20
NICKEL	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	118
POTASSIUM	1550	B	1640	B	976	B	1770	B	1740	B	1560	B	99.7	U	-
SELENIUM	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	1.00
SILVER	4.6	U	4.6	U	7.6	B	6.3	B	7.3	B	4.6	U	4.6	U	0.10
SODIUM	34400		27300		13500		36400		38600		35300		282	U	-
THALLIUM	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	8.00
VANADIUM	1.6	U	1.6	U	1.6	U	2.7	B	1.6	U	1.6	U	1.6	U	14.00
ZINC	7.8	B	1.8	U	3.0	B	7.0	B	4.4	B	5.6	B	1.8	U	30.00

Notes:

1. See Table 4-17 for a definition of data qualifiers

TABLE 4-14
KAY FRIES OFFSITE PSA
PHYSICAL/CHEMICAL PARAMETERS
SURFACE WATER

Sample No.	Temperature (° C)	pH (S.U.)	Specific Conductivity (uS/cm.)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Salinity (mV)
KFSW01	9.6	6.03	0.492	7	8.25	0.02
KFSW02	10.7	6.36	0.427	12	7.22	0.02
KFSW03	8.9	6.58	0.316	0	3.25	0.01
KFSW04	10.1	6.59	0.596	116	8.26	0.02
KFSW05	10.7	7.09	0.571	82	8.44	0.02

TABLE 4-15
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS
FOR
ORGANIC COMPOUNDS
SEDIMENT SAMPLES

Parameters	SED01 (ug/kg)	Q	SED02 (ug/kg)	Q	SED02RE (ug/kg)	Q	SED03 (ug/kg)	Q	SED03RE (ug/kg)	Q	SED04 (ug/kg)	Q	SED04RE (ug/kg)	Q	SED05 (ug/kg)	Q	FB121896 (ug/l)	Q	TB121896 (ug/l)	Q	Site BKG (ug/kg)
Volatile																					
Acetone	170	B	26		29	B	30	B	NA		28	B	NA		37	B	10	U	10	U	4JB-6JB
Chloroform	16	U	23	U	12	J	28	U	NA		17	U	NA		33	U	2	J	10	U	ND
Semivolatile																					
Acenaphthylene	79	J	650	U	NA		470	U	470	U	690	U	690	U	29	J	10	0	NA		ND
Acenaphthene	100	J	650	U	NA		47	J	45	J	690	U	690	U	72	J	10	U	NA		ND
Dibenzofuran	53	J	650	U	NA		22	J	23	J	690	U	690	U	38	J	10	U	NA		ND
Diethylphthalate	150	BJ	130	J	NA		110	JB	43	BJ	160	BJ	89	BJ	120	JB	10	U	NA		ND
Fluorene	130	J	650	U	NA		470	U	470	U	690	U	690	U	100	J	10	U	NA		ND
Phenanthrene	1500		260	J	NA		710		710		560	J	530	J	1400		10	U	NA		45J-270J
Anthracene	210	J	47	J	NA		88	J	90	J	51	J	49	J	250	J	10	U	NA		ND-62J
Carbazole	220	J	36	J	NA		120	J	120	J	88	J	85	J	200	J	10	U	NA		ND
Di-n-butylphthalate	1000	U	650	U	NA		470	U	470	U	690	U	690	U	62	J	0.60	J	NA		ND
Fluoranthene	4000		640	J	NA		1400		1500		1300		1200		3500		10	U	NA		85J-450
Pyrene	2400		350	J	NA		800		800		730		670	J	2500		10	U	NA		60J-280J
Butylbenzylphthalate	52	J	650	U	NA		470	U	470	U	690	U	690	U	490	U	10	U	NA		ND
Benzo(a)anthracene	1200		180	J	NA		400	J	410	J	320	J	300	J	1200		10	U	NA		49J-160J
Chrysene	1700		230	J	NA		600		600		550	J	500	J	1500		10	U	NA		77J-190J
bis(2-Ethylhexyl)phthalate	520	J	250	J	NA		150	J	150	J	160	J	150	J	1200		1.0	J	NA		ND-55J
Di-n-octylphthalate	1000	U	650	U	NA		470	U	470	U	690	U	690	U	210	J	10	U	NA		ND
Benzo(b)fluoranthene	2200		260	J	NA		710		810		560	J	570	J	1800		10	U	NA		120YJ-300YJ
Benzo(k)fluoranthene	1700		220	J	NA		750		610		710		600	J	1800		10	U	NA		ND
Benzo(a)pyrene	1700		220	J	NA		540		550		460	J	430	J	1400		10	U	NA		48J-130J
Indeno(1,2,3-cd)pyrene	430	J	67	J	NA		140	J	150	J	110	J	130	J	320	J	10	U	NA		42J-92J
Dibenz(a,h)anthracene	160	J	650	U	NA		53	J	60	J	690	U	690	U	120	J	10	U	NA		ND-47J
Benzo(g,h,i)perylene	430	J	65	J	NA		140	J	160	J	120	J	140	J	340	J	10	U	NA		52J-110J
Pesticide/PCB																					
Endosulfan I	9.13		3.3	U	NA		13.9		NA		6.24	P	NA		12.4		0.11	U	NA		ND
4,4'-DDE	10	U	5.80	J	NA		4.7	U	NA		6.9	U	NA		2.37	J	0.11	U	NA		3.7J-45
Endrin	10	U	6.5	U	NA		2.79	J	NA		6.9	U	NA		4.9	U	0.11	U	NA		ND
Endosulfan II	10	U	6.5	U	NA		2.57	J	NA		6.9	U	NA		4.9	U	0.11	U	NA		ND
Endosulfan sulfate	10	U	6.5	U	NA		2.71	J	NA		6.9	U	NA		2.78	J	0.11	U	NA		ND
4,4'-DDT	10	U	6.5	U	NA		4.7	U	NA		6.9	U	NA		3.23	J	0.11	U	NA		2.1J-29
Endrin ketone	10	U	6.5	U	NA		2.86	J	NA		6.9	U	NA		3.99	J	0.11	U	NA		ND
Endrin aldehyde	10	U	6.5	U	NA		7.06	P	NA		6.9	U	NA		11.8	P	0.11	U	NA		ND
alpha-Chlordane	5.3	U	3.3	U	NA		2.11	J	NA		2.69	J	NA		10.2	P	0.11	U	NA		1.3JP-1.8JP

Notes:

1. NA - Not analyzed
2. ND - Not detected
3. See Table 4-17 for a definition of data qualifiers

found in either the laboratory method blank or the field blank. Di-n-butylphthalate and bis(2-ethylhexyl)phthalate were also found in the field blank. The highest levels were found in a sample collected from the stream entering the wetland at its southwest corner and at the confluence between the stream draining the wetland and Cedar Pond Brook (see figure 4-5). These points appear to represent the inlet and outlet for the wetlands. The concentrations in these samples were comparable, suggesting that there was not a significant impact from the former Kay Fries facility on the wetlands. This also suggests that the PAHs were a result of the same sources that contributed to the levels in background samples. The absence of these compounds in surface water samples indicates that they are strongly adsorbed to sediments, and will only migrate through the physical transport of the sediments. The analytical results for inorganic substances indicate that levels are comparable to those found in background soils (see Table 4-16).

[o:\cattafe\k-fries\rpt\sec4]

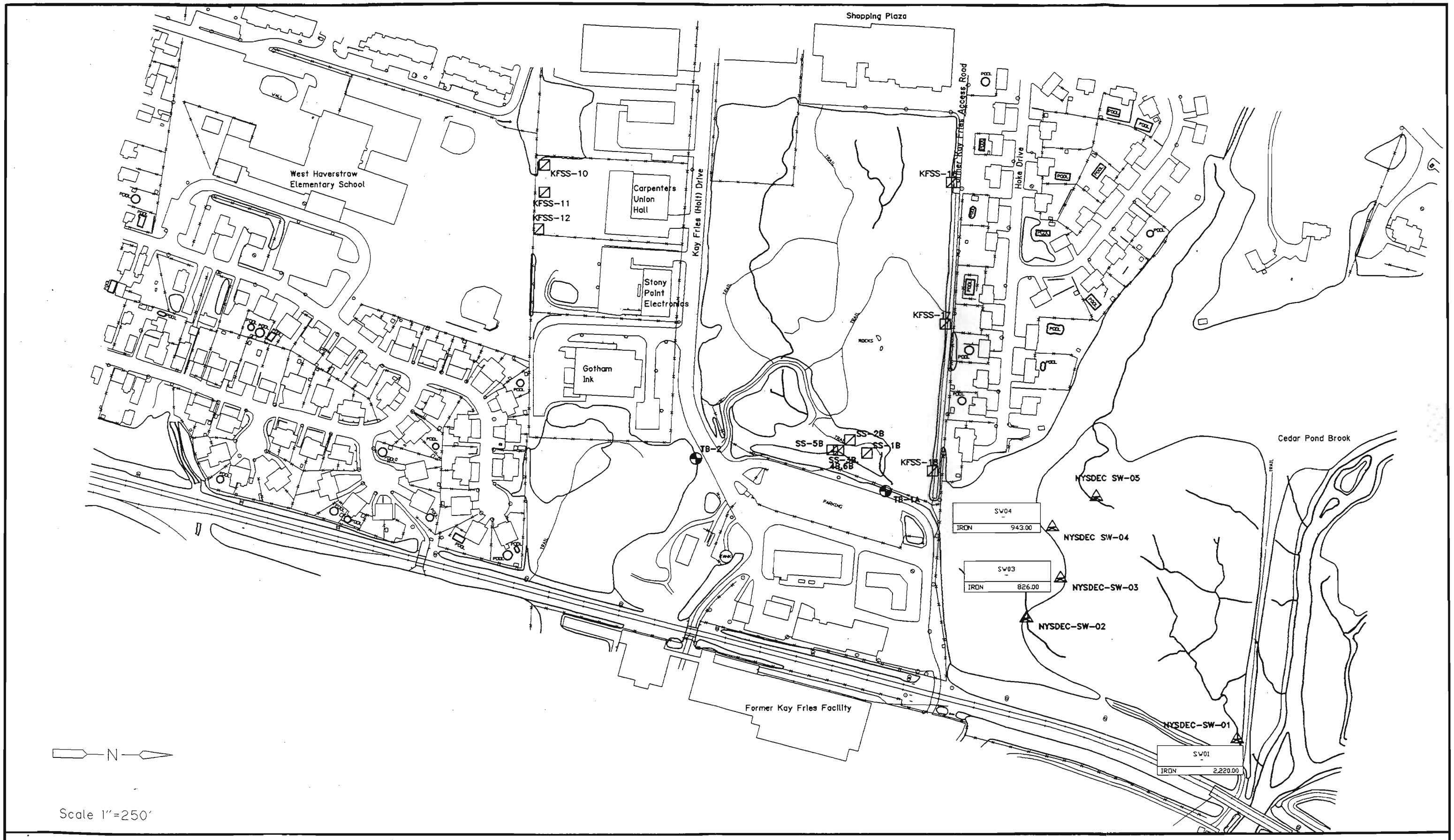

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Figure 4-5
Results of Surface Water Samples Exceeding New York State Quality Criteria

TABLE 4-16
KAY FRIES OFFSITE PSA
ANALYTICAL RESULTS
FOR
INORGANIC SUBSTANCES
SEDIMENT SAMPLES

Parameters	SED01 (mg/kg)	Q	SED02 (mg/kg)	Q	SED03 (mg/kg)	Q	SED04 (mg/kg)	Q	SED05 (mg/kg)	Q	B121896 (ug/l)	Q	Site BKG[3] (mg/kg)	Published BKG[4] (mg/kg)
ALUMINUM	9040		4630		2260		14900		3980		25.0	B	6620-15400	10000-300000
ANTIMONY	3.0	U	1.5	U	0.66	U	1.4	U	0.80	U	5.1	U	ND	0.2-150
ARSENIC	3.9	B	1.8	B	0.81	B	3.6		1.1	B	4.2	U	1.6B-4	0.1-194
BARIUM	60.8	B	31.1	B	15.5	B	67.0		25.7	B	2.3	U	27.9B-64.4	100-3000
BERYLLIUM	0.23	B	0.11	B	0.064	B	0.34	B	0.080	B	0.20	U	0.15B-0.42B	0.01-40
CADMIUM	0.93	B	0.50	B	0.20	B	1.1	B	0.27	B	0.30	U	0.15B-0.27B	0.01-7
CALCIUM	3350		1700		1760		8120		2560		92.8	U	630B-1800	<150-500000
CHROMIUM TOTAL	18		9.1		4.9		25.4		6.6		1.0	U	6.8-14.2	5-3000
COBALT	7	B	3.4	B	2.2	B	13.2	B	3.3	B	1.0	U	4.4B-7.3B	0.05-65
COPPER	29.9		15.0		6.3		58.5		9.8		1.0	U	9.4-15.1	2-250
IRON	27400		14000		4450		35800		8210		24.4	B	11600-19900	100-550000
LEAD	41.5		21.0		11.6		57.1		12.9		2.2	U	4.6-16.9	<1-888
MAGNESIUM	3360		1710		1150		7830		1670		68.7	U	2120-3000	400-9000
MANGANESE	329		167		34		382		128		0.30	U	196-440	20-18300
MERCURY	0.30		0.10	B	0.065	U	0.11	B	0.055	U	0.10	U	ND	0.01-4.6
NICKEL	14.5	B	7.4	B	5.0	B	27.0		7.2		2.1	U	7.7-13.2	0.1-1530
POTASSIUM	1420	B	724	B	429	B	2270		749	B	99.7	U	770B-1120	80-37000
SELENIUM	2.1	B	0.92	B	0.35	U	0.77	B	0.65	B	2.7	U	ND	0.1-38
SILVER	2.7	U	1.4	U	0.60	U	1.3	U	0.80	B	4.6	U	ND	0.01-8
SODIUM	246	B	148	B	36.5	U	360	B	44.5	U	282	U	ND	150-25000
THALLIUM	2.1	U	1.1	U	0.48	U	1.0	U	0.58	U	3.7	U	ND	0.1-0.8
VANADIUM	23.1	B	11.8	B	10.3		40.1		11.6		1.6	U	10.8-23.7	3-500
ZINC	97.5		49.7		23.4		380		47.0		1.8	U	26.5-48.4	1-2000

Notes:

1. ND - Not detected
2. See Table 4-17 for a definition of data qualifiers
3. Site background represents the range of values found in samples SS-10, SS-11, SS-12, SS-13, SS-14, and SS-15.
4. Published background represents a range of typical values found in soils. The references for these values are provided in Section 6.0.

Section 5
Conclusions and Recommendations

The Preliminary Site Assessment (PSA) of areas adjacent to the former Kay Fries site identified the presence of the chlorinated solvents, 1,1,1-trichloroethane (TCA), trichloroethene (TCE), and tetrachloroethene (PCE), in subsurface soils and groundwater, primarily located between 15 and 19 Kay Fries Drive. The solvents appear to be associated with a local source unrelated to the Kay Fries site. An investigation to determine the source, extent, and impact of the environmental contamination is underway.

In addition to the solvents, low levels of polycyclic aromatic hydrocarbons (PAHs) and pesticides were present in the soils at levels comparable to background, and inorganic substances were detected at levels slightly above background but well within the published range of typical background values found in soils. No further investigation of these substances is recommended.

5.1 Soil

The presence of chlorinated solvents was identified in subsurface soil samples collected at locations WP17 and WP21. Chlorinated solvents were also identified in soil gas and groundwater samples at these locations. The main source of the solvents appears to be near sample location WP17. Sample WP21 was located down gradient of WP17.

Low levels of PAHs, pesticides, and inorganic substances were identified in surface and subsurface soil samples at concentrations comparable to local background samples. PAHs are produced by burning fossil fuels. Potential sources of PAHs near the study area are the power generating plants, and exhaust from diesel trains and automobiles. It is also possible that the Kay Fries facility contributed to these levels if hydrocarbon base materials were burned in their incinerator, or if they burned fossil fuels to run boilers or heat buildings.

The pesticides detected were commonly used to control insects for agriculture and in residential areas in the 1950s and 1960s. The metals and other inorganic substances are common constituents of minerals present in soils, fertilizers, and salts used for de-icing roadways. Lead was found to be slightly above local background in one subsurface soil sample; however, the concentration was well within the published range of typical background concentrations in soils. No further characterization of PAHs, pesticides, or organic substances in soil is recommended.

5.2 Groundwater

Groundwater sampling identified the presence of chlorinated solvents and metals in excess of the state groundwater quality criteria. TCA was found at a concentration of 350 ug/1 at location WP17, significantly above the groundwater quality criterium of 5 ug/1. Lower levels of TCA and TCE were also found at locations hydraulically downgradient of this location, suggesting that a dissolved phase plume could be migrating from the WP17 area.

The elevated levels of inorganic substances are most likely a result of high levels of turbidity in groundwater samples collected for this investigation. Groundwater samples were collected through Geoprobe® slotted probes or temporary wells, which are not designed to limit the amount of fine grained formation material. The formation at the top of the saturated zone consisted of silt and silty sand. Metals are leached from the fine grained material when the groundwater sample is preserved with nitric acid. It is standard industry practice to collect unfiltered samples in the initial or screening phase of a groundwater investigation to show worst case conditions. It is planned that the fully developed conventional wells, installed to further evaluate the chlorinated solvents, be sampled for inorganic analysis to confirm that the elevated metals are related to suspended sediments. If suspended sediment levels are still high (greater than 50 NTU), both filtered and unfiltered samples should be collected for inorganic analysis.

Phenol was found in three groundwater samples. However, because the phenol was found only where Geoprobe® prepacked wells were installed, it is likely that the compound is associated with the well material and it is planned that these wells be resampled to confirm this observation.

5.3 Surface Water and Sediment Sampling

PAHs and pesticides were detected in sediment samples collected in the streams and wetlands in the northern portion of the study area. The concentrations were comparable to the levels found in surface soils, indicating that the levels resulted from the same or similar sources not necessarily related to the former Kay Fries site. The contaminants appear to be absorbed to the sediments and are not resulting in the contamination of associated surface water samples. Analytical results for surface water samples did not show detectable levels of environmental contamination. No further sampling is recommended for the wetlands.

[o:\cattafe\k-fries\drpt\sec5b.wpd]

Section 6
References

Bouwer, H. 1989. The Bouwer and Rice Slug Test - An Update. Ground Water. V. 27 no. 3. pp. 304-309.

Bouwer, H. and R.C. Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. Water Resources Research. v. 12, pp. 423-428.

Bowen, H.J. M., 1975. Environmental Chemistry of the Elements. Academic Press, New York.

IT Corporation, 1996. Final Remedial Investigation Report, Operable Unit Two at the Former Kay Fries Site. Volume 1.

Lechler, T.J., et. al., 1980. Major and Trace Metal Analysis of 12 Reference Soils by Inductively Coupled Plasma-Atomic Emission Spectrometry. Soil Science 130 238-241.

Lisk, D.J., 1972. Trace Metals in Soils, Plants, and Animals. Adv. Agron. 24 267-311.

Parr, James F., Marsh, Paul B., Kla, Joanne M., 1983. Land Treatments of Hazardous Wastes, Agricultural Environmental Quality Institute, Agricultural Research Service, USDA, Beltsville, Maryland, Noyes Data Corporation, Park Ridge, New Jersey.

Perlmutter, N.M., 1959. Geology and Ground-Water Resources of Rockland County, New York. NYS Department of Conservation Water Power and Control Commission. Bul. GW-42, 133 pp.

Ragaini, R.C., et. al., 1977. Environmental Trace Contamination in Kellog Idaho Near Lead Smelting Complex. "Envir. SI. and Technol. 11 773-780.

Sharklette, H.T., et. al., 1971. Elemental Composition of Surficial Material in the Conterminous United States, USGS Professional Paper 574-70.

Ure, A.M., et. al., 1983. Elemental Constituents of Soils, Environmental Chemistry, Vol 2. P 94-204 ad H.J. M. Bowen, Royal Society of Chemistry, Burlinghouse, London, U.K.

USGS, 1975. Geochemistry of Some Rocks, Soil, Plant and Vegetables, in the Conterminous United States, Geological Survey Professional Paper 574 F.

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Appendix A

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BORING NUMBER: WP-1

Page 1 of 1

Log of Boring

Project KAY FRIES Location _____ Job. No _____

Date Drilled 4/21/97 Drilling Co. _____

Total Depth 20' Method Used GEOPROBE

Inspector T. HORN Organic Vapor Instruments Used _____ Water Table Depth 13'

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
4	A		0-4'		0.0	tan, f-vf SAND		
8	B		4'-8'		0.0	Brown SILT & CLAY Brown m SAND Brown CLAYEY SILT Brown m-c SAND		DAMP
12	C		8'-12'		0.0			
16	D		12'-16'		0.0	tan vf SAND		WET
20	E		16'-20'		0.0			
						END OF BORING		

NY-1

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BORING NUMBER: WP-2
Page 1 of 1

Log of Boring

WP 2

Project KAY FRIES Location _____ Job. No _____

Date Drilled 4/22/97 Drilling Co. _____

Total Depth 20' Method Used GEOPROBE

Inspector T. HORN Organic Vapor Instruments Used _____ Water Table Depth 15'

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
4	A		0-4'		0.0	tan SILT, some CLAY, tr GRAVEL		DAMP
8	B		4'-8'		0.0	tan f SAND & SILT tr GRAVEL tan-green		SOFT, MOIST STIFF, DRY
12	C		8'-12'		0.0	tan SILT, tr GRAVEL tan-green f SAND & SILT tr CLAY, tr GRAVEL		SOFT, MOIST GLASS FRAGMENTS @ 11.5'
16	D		12'-16'		0.0	tan-green VF SAND		WATER @ 15'
20	E		16'-20'		0.0	END OF BORING		

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BORING NUMBER: WP-3
Page 1 of 1

Log of Boring

Project KAY FRIES Location WP 3 Job. No

Date Drilled 4/22/97 Drilling Co.

Total Depth Method Used GEOPROBE

Inspector T. HORN Organic Vapor Instruments Used Water Table Depth

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						Brown m SAND, GRAVEL		DRY
4	A		0-4'		0.0	SAND, SILTY, tr CLAY		MOIST
						Brown SILTY SAND tr(?) GRAVEL, ROUNDED		DAMP
8	B		4'-8'		0.0			
						tan V.f. SAND, MICACEOUS,		WET
12	C		8'-12'		0.0	SILTY, ROCK FRAGS, SOME CLAY		
						Gray Brown - Gray green vf SAND, SILTY,		
16	D		12'-16'		0.0	SOME CLAY, tr GRAVEL		
						REFUSAL AT 18.4'		
20	E		16'-18.4'		0.0			WP SCREEN PUSHED TO 22'

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BORING NUMBER: WP-4
Page 1 of 1

Log of Boring

Project KAY FRIES Location WP-4 Job. No

Date Drilled 4/22/97 Drilling Co.

Total Depth 24 Method Used GEOPROBE

Inspector T. HORN Organic Vapor Instruments Used Water Table Depth

Depth (feet)	Samp No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						Brown SILTY SAND		DRY
4	A		0-4'		0.0			MOIST
8	B		4'-8'		0.0			
						Gray SILT, some SAND		SOFT, MOIST
12	C		8'-12'		0.0			BROKEN GLASS @ 11.5'
						tan-gray SILT, tr CLAY		SOFT, WET
16	D		12'-16'		0.0	tan-green m. SAND		tr. organic material
						gray SILT		DAMP SOFT, WET
20	E		16'-20'		0.0	tan-green vf SAND		WET
						tan		
24	F		20'-24'		0.0			
						END OF BORING		

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BORING NUMBER: WP 05
Page 1 of 1

Log of Boring

Project KAY FRIES Location _____ Job. No _____

Date Drilled 4/23/97 Drilling Co. ADT

Total Depth _____ Method Used GEOPROBE

Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth _____

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						Brn-tan SAND, some SILT, tr GRAVEL		DRY
								DAMP
4	A		0-4		0.0	gray-brn SILT		DAMP
						tan SILT		DRY
8	B		4-8		0.0	tan SAND, SILTY tr GRAVEL (ANGULAR)		
						tan-brn f. SAND & SILT, some CLAY - (LAMINATED f SAND & CLAYEY SILT)		
12	C		8-12		0.0			
						GRAY to tan SILT & f SAND - (PLASTIC)		WET
16	D		12-16		0.0			
						tan m. SAND		WET
	E		16-20		0.0			
20						light gray CLAYEY SILT		
						END OF BORING @ 20'		
						SCREEN @ 17'-19'		

NY-1

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BORING NUMBER: WP-6

Log of Boring

Project KAY FRIES Location W. HAVERSTRAW ELEMENTARY Job. No

Date Drilled Drilling Co. ADT

Total Depth 16 FEET Method Used GEOPROBE

Inspector D. EATON Organic Vapor Instruments Used OVM Water Table Depth 10-12'

Depth (feet)	Samp No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A	NA	0-4'	NA	BKG	0-8" TOP SOIL 8"-28" SAND, FINE, BROWN TO DARK BROWN + TAN, SOME SILT TRACE FINE GRAVEL 28"-48" SAND CMF, LITTLE SILT GRADING TO SOME SILT @ 48", TRACE FINE GRAVEL, BROWN		MOIST
4	B	NA	4-8'	NA	BKG	48"-72" D.O. GRADING TO TRACE +/LITTLE - SILT 72" D.O. W/MED TO FINE GRAVEL 80" LENSE of SAND + SILT 84" SAND, MEDIUM TO FINE BROWN 90"-96" LENSE OF FINE SAND AND SILT		
8	C	NA	8-12'	NA	BKG	96"-106" SAND, FINE, TRACE SILT BROWN 106"-132" SAND, FINE AND SILT WITH BANDS/LENSES OF MED-FINE SAND) LIGHT BROWN		WET COLLECTED SOIL SAMPLE KFSB-6C GROUNDWATER SAMPLE COLLECTED FROM 10-12'
12	D	NA	12-16'	NA	BKG	144"-168" SAND, FINE AND SILT, VARVED W/1-2" LENSES OF CMF SAND) LT. BROWN		

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BORING NUMBER: WP-6

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
						168"-186" SILT, AND FINE SAND, VARVED W/ THIN LAMINAE OF FINE SAND, GREY		
						186"-192" SAND, CMF, TRACE SILT, BROWN		
16								TOTAL DEPTH OF BORING

WP-2

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BORING NUMBER: WP-07

Page 1 of 1

Log of Boring

Project KAY FRIES Location _____ Job. No _____

Date Drilled 4/24/97 Drilling Co. ADT

Total Depth 20' Method Used GEO PROBE

Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth _____

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						dark brown SILT & SAND-		DAMP
4	A		0-4		0.0	tan, m. SAND, tr SILT		
						tan m. SAND, tr cms GRAVEL		DAMP
8	B		4-8		0.0			
						LAMINATED (1') tan SILT & tan m. SAND		DAMP
12	C		8-12		0.0			
						do		
16	D		12-16		0.0			
						END OF BORING @ 20'		
						SCREEN SET 13'-16'		
20								

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BORING NUMBER: WP-8 - 1st Attempt
Page 1 of 1

Log of Boring

Project Kay Fries Location _____ Job. No _____
Date Drilled 4/24/97 Drilling Co. Aquifer Drilling and Testing
Total Depth 21' Method Used Geoprobe
Inspector T. Horn Organic Vapor Instruments Used OVM Water Table Depth 15'

Depth (feet)	Samp. No.	Blows per 6" N/A lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A		0'-4'	48"/48"	0	Silty organic sand, some gravel. Roots. Dry	2'	
4						Tan Micaceous SILT Moist.		
	B		4'-8'		0	N.O.	5'	
						Tan fine SAND. Moist	8'	
8	C		8-11.5		0	Tan SILT trace Clay Moist	9'	
						Very fine to medium SAND wet.	11'	Refusal at 11.5'. Move borehole
	D		11-13			Tan SILT, tr. fine sand moist.		
12								
	E		14-16		0	Tan fine SAND, trace silt. wet		
16								
						Screen to 21, No water		
20								
24								

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BORING NUMBER: WM-8 2nd Attempt

Log of Boring

Project Kay Fries Location _____ Job. No _____

Date Drilled 4/25/97 Drilling Co. Aquifer Drilling and Testing

Total Depth 24' Method Used Geoprobe

Inspector T. Horn Organic Vapor Instruments Used OVM Water Table Depth 16'

Depth (feet)	Samp. No.	Blows per 6" N/A lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A	-	0-4'	48"/12"	0	2" Organic soil, roots 2-12" Brown Sandy SILT trace pebbles, dry		
4	B		4'-8'	43"/43"	0	12" Tan Silty SAND moist 36" Tan SILT, some very fine Sand. moist.		
8	C		8'-12'	48"/48"	0	20" Tan very fine to fine SAND, moist 24" Tan micaceous SILT Moist		
12	D		12-16'	48"/0"	NA	No Recovery		
16	E		16'-20'		0	Red-brown micaceous SILT (1" very fine sand at 18") wet.		
20	F		20-24'	48"/48"	0	24" Red SILT wet 24" Brown-Tan micaceous SILT and fine sand wet		
24						Screen 18-20'		

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BORING NUMBER: WP-9

Page 1 of 1

Log of Boring

Project KAY FRIES Location _____ Job. No _____

Date Drilled _____ Drilling Co. _____

Total Depth _____ Method Used _____

Inspector _____ Organic Vapor Instruments Used _____ Water Table Depth 11'

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						tan, f-m SAND, sm. GRAVEL		DRY
4	A		0-4'		0.0	c. SAND & SILT tr GRAVEL (rounded)		DRY
								MOIST
8	B		4'-8'		0.0			
						orange GRAVEL, angular		WET
12	C		8'-12'		0.0	tan f SAND & SILT		WATER @ 11' WET -
						tan f-m SAND, tr SILT		
16	D		12'-16'		0.0			WET
20	E		16'-20'		0.0			
						END OF BORING @ 20'		
						SCREEN SET 18'-20'		

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BORING NUMBER: WP-10

Log of Boring

Project KAY FRIES Location _____ Job. No _____

Date Drilled 4/25/97 Drilling Co. ADT

Total Depth 40' Method Used GEOPROBE

Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth _____

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
4	A		0-4		0.0	tan m-c SAND, tr SILT subangular pebbles		dry
8	B		4-8		0.0	tan vf-f SAND, SILTY		
12	C		8-12		0.0	tan vf-f SAND & SILT		DAMP
								CAVE IN
15	D		12-15		0.0	tan SILT, some vf SAND		DAMP
16	E		15-16		0.0	do		CAVE IN
19	F		16-19		0.0	do		CAVE IN
23	G		19-23		0.0	tan vf-f SAND, some SILT		DAMP
								CAVE IN
26	H		23-26		0.0	tan vf-m SAND, tr SILT		DAMP

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BORING NUMBER: WP-10

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
26								
						tan - reddish tan VF - F SAND,		
	I		26-28		0.0	some SILT		DAMP
28								
	J		28-32		0.0	do		
32						do		
	K		32-36		0.0	gray SILT, some VF SAND tr SUB angular Pebbles, tr CLAY		DAMP
36								
	L		36-39		0.0	gray SILT & SAND		
39	M		39-40		0.0	gray SILT & SAND, tr ang. pebbles		WET
40						END OF BORING AT 40'		
						SCREEN SET 36'-39'		

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BORING NUMBER: WP-11

Log of Boring

Project KAY FRIES Location _____ Job. No _____

Date Drilled 4/29/97 Drilling Co. ADT

Total Depth 40' Method Used GEOPROBE

Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth 34'

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
4	A		0-4		0.0	dk Brn micaceous SILT & VF-f SAND, organic matter, sub-ang pebbles tan f-C SAND, with SILT, tr GRAVEL		DRY
						tan SILT		MOIST
8	B		4-8		0.0	tan, m-c SAND, tr Rounded Pebbles tan SILT tan f SAND, some SILT tr sub-rounded pebbles		DAMP moist WET
12	C		8-12		0.0	tan SILT, & VF SAND		
16	D		12-16		0.0	tan VF-m SAND, tr SILT		DAMP
20	E		16-20		0.0	tan VF-f SAND, tr SILT tr GRAVEL - (sub angular)		DAMP
23	F		20-23		0.0	tan f-C SAND, & SILT		DAMP
27	G		23-27		0.0	do, tr GRAVEL		

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BORING NUMBER: WP-11

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
						light brown f-m SAND,		
32	H		27-32		0.0	& SILT, tr ROCK FRAGS (SS)		DAMP
						do		WATER @ 34'
						tan f-c SAND		WET
36	I		32-36		0.0	tan SILT		
						light brown SAND, SILTY		WET
40	J		36-40		0.0			
						END OF BORING @ 40'		
						SCREEN SET 33'-39'		

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BORING NUMBER: WP-12
Page 1 of 2

Log of Boring

Project KAY FRIES Location _____ Job. No _____
Date Drilled 4/29/97 Drilling Co. ADT
Total Depth 42' Method Used GEOPROBE
Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth _____

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						DK brn SILTY SAND, organics		DRY
						tan SILT		DAMP
4	A		0-4		0-0			
						tan vf - f SAND, tr SILT, tr pebbles (sub-r)		DAMP
8	B		4-8		0.0			
						do		
						lt brn m-c SAND		
						tan f SAND, some SILT		DAMP
12	C		8-12		0.0			
	D		12-16		0.0	dk gray c SAND & SILT tr GRAVEL (sub-ang)		DAMP
16								
						tan f SAND, some SILT		
	E		16-20		0.0	tan C. SAND, tr SILT		DAMP
20								
	F		20-22		0.0	tan m-c SAND, SILTY & pebbles, (rounded)		DAMP
22								
	G		22-26		0.0	tan c. SAND, some Sm pebbles, rounded		DRY
26								
27	H		26-27		0.0	do		CAVE DAMP

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BORING NUMBER: WP - 12

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
28						tan C. SAND, sm pebbles		CAVG IN DAMP
						tan SAND, SLTY, with sm pebbles, rounded		DAMP
32	I		28-32		0.0	tan SAND, l SILT		WET
36	J		32-36		0.0	tan m-c SAND, l. SILT, tr sm pebbles		WET
						reddish-tan, m-c SAND, tr SILT, tr pebbles		MOIST
40								
42						do		
						END OF BORING @ 42'		

WP-2

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BORING NUMBER: WP-13
Page 1 of 1

Log of Boring

Project KAY FRIES Location _____ Job. No _____
Date Drilled 4/30/97 Drilling Co. ANT
Total Depth 20' Method Used GEOPROBE
Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth _____

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						dk brn SILTY SAND, organics		
						tan f-m SAND,		
	A		0-4'		0.0	l. micaceous SILT		DRY
4								
						tan vf-f SAND, SILTY		
						tan SANDY SILT, tr CLAY		
	B		4-8'		0.0	tan vf-m SAND, SILTY		
8								
	C		8-12'		0.0	m-c SAND, tr SILT		
12								
						tan f-m SAND, tr SILT		WET
	D		12-16'		0.0	m-c SAND		
16								
						f-m SAND, tr SILT		WET
	E		16-20		0.0	m-c SAND, tr SILT		
20						SILT, tr CLAY		
						END OF BORING AT 20'		
						SCREEN SET 15-20'		

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BORING NUMBER: WP-14
Page 1 of 1

Log of Boring

Project KAY FRIES Location _____ Job. No _____

Date Drilled 4/30/97 Drilling Co. APT

Total Depth 16' Method Used GEO PROBE

Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth _____

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
4	A		0-4		19.5	tan f-c SAND, tr SILT tan f-c SAND, SILTY - tan-brown, f-m SAND, SILTY gray SILT, soft, moist, tr CLAY		AT 1.5', 1" BAND BLACK SEMI-PLASTIC MATERIAL PETRO ODOR, OVM 19.5 DAMP
8	B		4-8		0.0	tan SILT, tr GRAVEL, angular, tan f-m SAND, w/tr SILT		STIFF, DRY DAMP
12	C		8-12		0.0	tan vf SAND & SILT		WET
16	D		12-16		0.0	tan SILT tr vf SAND		WET
						END OF BORING @ 16' SCREEN SET 10.5-14.5		

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BORING NUMBER: WP-15
Page 1 of 1

Log of Boring

Project KAY FRIES Location _____ Job. No _____
Date Drilled 4/30/97 Drilling Co. ADT
Total Depth 20' Method Used GEOPROBE
Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth 11.5

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						tan SILT, l. VF SAND		DAMP
4	A		0-4		0.0			
						do		MOIST
8	B		4-8		0.0			
						do		WATER @ 11.5
12	C		8-12		0.0			
								WET
						do		
16	D		12-16		0.0			
						do		
20	E		16-20		0.0			
						END OF BORING @ 20'		
						SCREEN SET 15-20'		

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BORING NUMBER: WP - 16
Page 1 of 1

Log of Boring

Project KAY FRIES Location _____ Job. No _____
Date Drilled 4/30/97 Drilling Co. ADT
Total Depth 20' Method Used GEOPROBE
Inspector T. HORN Organic Vapor Instruments Used OVM Water Table Depth 10'

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
						tan vf-f SAND, tr SILT		DAMP
4	A		0-4		0.0			
						do		
8	B		4-8'		0-0	tan SILT		MOIST
						tan vf SAND & SILT		WATER @ 10'
12	C		8-12		0.0			
						do		DAMP
15	D		12-15		0.0			
16						do		WET
20	E		15-20					
						END OF BORING @ 20'		
						SCREEN SET 15'-20'		

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BORING NUMBER: WP-17
Page 1 of 2

Log of Boring

Project Kay Fries Location _____ Job. No _____
Date Drilled 5/1/97 Drilling Co. Aquifer Drilling and Testing
Total Depth 29.5' Method Used Geoprobe
Inspector T. Horn Organic Vapor Instruments Used OVM Water Table Depth 26.5'

Depth (feet)	Samp. No.	Blows per 6" N/A lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A		0-4'	48"/48"	0	Brown Organic Silty SAND		
						Tan Coarse SAND, trace silt, gravel. Moist		
4	B		4-8'		0	Tan medium to coarse SAND, trace gravel. Moist.		
8	C		8-12'		0	Tan Coarse SAND, trace silt, gravel. Moist.		
12	D		12-16'		0	Tan fine to medium SAND, trace gravel. Moist.		
16	E		16-19'		0	Tan very fine Sand and silt. Moist	16	
19	F		19-23'			Tan very fine SAND. Moist		
23	G		23-27'			Tan very fine to fine SAND and silt. WET at 26.5'		

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BORING NUMBER: WA-17

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" NA lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
27	H		27-29.5'		0	D.O.		
29.5							29.5	
						Screen 24.5->9.5		

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BORING NUMBER: MP-18
Page 1 of 1

Log of Boring

Project Kay Fries Location _____ Job. No _____
Date Drilled 5/1/97 Drilling Co. Aquifer Drilling and Testing
Total Depth 8' Method Used Geoprobe
Inspector T. Horn Organic Vapor Instruments Used OVM Water Table Depth 5.5'

Depth (feet)	Samp No.	Blows per 6" N/A lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A		0'-4'	48"/48"	0	Brown organic silty sand Tan coarse SAND some gravel Moist	0.5'	
4								
	B		4'-8'		0	D.O. Tan SILT, trace Clay, stiff, moist Gray SILT, stff, wet	5.0' 5.5'	
8							8'	
						Screen 3'-8'		

NY-1

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BORING NUMBER: WP 19
Page 1 of 2

Log of Boring

Project Kay Fries Location _____ Job. No _____
Date Drilled 5/1/97 Drilling Co. Aquifer Drilling and Testing
Total Depth 49' Method Used Geoprobe
Inspector T. Horn Organic Vapor Instruments Used OVM Water Table Depth 43'

Depth (feet)	Samp. No.	Blows per 6" N/A lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A		0'-4'	48"/48"	0	3" Asphalt 6" Asphalt and crushed stone Tan-brown SILT, some gravel (angular). Moist.		
4								
	B		4'-8'		0	N.O.	6'	
						Tan fine to coarse SAND. Moist.		
8	C		8'-12'		0	N.O.		
12							12'	
	D		12'-16'		0	Tan medium to coarse SAND, little silt, trace gravel. Moist.		
16	E		16'-20'		0	Tan medium SAND, little silt, trace gravel. Moist.		
20	F		20-24'		0	N.O.		
24	G		24'-28'		NR	No Recovery		

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BORING NUMBER: WA-19

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" (140 lbs.)	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
29	H		28'-29'		0	Tan medium SAND, little Silt, trace gravel. Moist.		
	I		30'-33'			D.O.		
33	J		33'-36'		0	D.O.		
36	K		36-39'		0	Tan fine SAND, moist.		
39	L		37-43'			D.O.		
					0	Tan SILT, wet	41	
						Tan fine SAND, moist	41.5	
43						Tan SILT, wet	42.5	
						Tan fine SAND, damp	43	
	M		43-46.5'		0	Sandy SILT, wet.	44	
46	N		46.5-49'		0	fine SAND and silt, moist	46	
						D.O.		
49							49	
						Screen 44-49		

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BORING NUMBER: WP-20
Page 1 of 2

Log of Boring

Project Kay Fries Location _____ Job. No _____
Date Drilled 5/1/97 - 5/2/97 Drilling Co. Aquifer Drilling and Testing
Total Depth 40' Method Used Geoprobe
Inspector T. Horn / J. Cattafe Organic Vapor Instruments Used OVM Water Table Depth 37'

Depth (feet)	Samp. No.	Blows per 6" N/A lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A		0-4'		0	Brown organic mod. - coarse SAND, tr. silt	1'	
						Tan fine to coarse SAND, trace silt.		
4								
	B		4'-8'		0	N.O. (1" wet SILT at 5')		
						Tan medium to coarse SAND trace silt. (5-6')		
						Very fine to medium SAND, trace silt. (6-9')		
8								
	C		4'-12'		0	N.O.	9'	
						Tan SILT, wet	10'	
						Tan medium SAND and silt.		
12								
	D		12'-16'		0	Very fine to fine SAND and silt.		
16								
	E		16'-20'		0	N.O.		
20								
	F		20'-24'	48"/27"	0	21" Brown fine SAND, trace very fine; trace silt		
						0.5" Green-brown CLAY		
						2" RED very fine SAND and SILT, brown mottled. Dry.		
						3.5" Brown fine SAND, tr. V.F. Silty at bottom		
24								
	G		24'-28'	48"/46"	0	22" Fine SAND, trace very fine		
						4" Very fine SAND and SILT. Reddish.		
						20" Fine SAND, trace very fine.		

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BORING NUMBER: WP-20

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
	H		28'-32'	48"/35"		23" SAND and Gravel. Iron stained. Trace+ clay at bottom inch 12" Fine SAND, trace very fine, trace silt. Moist. Trace+ clay at top 2 inches		
32	I		32'-36'	48"/21"	0	6" fine SAND, little- red clay trace m, coarse sand 12" Coarse SAND, some medium trace- gravel 3" Fine SAND, little coarse		
36	J		36'-40'	48"/45"	0	12" Red-brown med. SAND, trace coarse, gravel. Damp 20" Sand and gravel. Sand matrix grades from coarse at top to medium at bottom Wet. 7" Fine sand and silt. Wet. 6" Fine sand and gravel, little silt. Little coarse sand. Moist.		wet at top.
40								

WP-2

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BORING NUMBER: WP-21
Page 1 of 2

Log of Boring

Project Kay Fries Location _____ Job. No _____
Date Drilled 5/2/97 Drilling Co. Aquifer Drilling and Testing
Total Depth 44' Method Used Geoprobe
Inspector J. Cattafe Organic Vapor Instruments Used OVM Water Table Depth ±37'

Depth (feet)	Samp. No.	Blows per 6" N/A lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A		0-4'		0	Organic silt and very fine Sand (Loam)		
4	B		4'-8'	48"/46"	0	46" N.O. 2" Fine SAND		
8	C		8'-12'	48"/46"	0	12" Fine SAND, trace silt. 34" Fine SAND and silt. Dry Slither and moister at 12-16" and 30-36"		
12	D		12'-16'	48"/40"		10" Very Fine SAND trace silt 30" Very Fine SAND grading to fine Sand. Dry.		
16	E		16'-20'	48"/30"	0	20" Fine SAND, little clay, silt, gravel. 4" Very fine SAND some silt, little clay 6" Fine SAND trace silt.		
20	F		20'-24'	48"/16"		Brown, black, red medium SAND, trace Coarse		
24	G		24'-28'	48"/24"	0	16" medium SAND, trace Coarse. 4" medium and Coarse SAND - cross bedded. 20-24" Gravel. - Dry.		

NT-1

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BORING NUMBER: WA 21

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
	H		28'-32'	48"/28"	0	Coarse SANS and gravel Red clayey zones. Trace Silt. Dry.		
32	I		32'-36'	48"/25"	0	11" Medium SANS, some gravel 6" Red SILT grading to very fine SANS 8" Fine SANS Grading to SILT.		
36	J		36'-40'	48"/12"	0	Medium SANS, some coarse Wet in Tip		
40	K		40'-44'	48"/40"		Fine SANS trace + gravel Saturated at tip and 30-40"		

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BORING NUMBER: WP-22
Page 1 of 2

Log of Boring

Project Kay Fries Location _____ Job. No _____
Date Drilled 5/2/97 Drilling Co. Aquifer Drilling and Testing
Total Depth 58.5' Method Used Geoprobe
Inspector J. Cattafe Organic Vapor Instruments Used OVM Water Table Depth 51'

Depth (feet)	Samp. No.	Blows per 6" /A lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
	A		0-4'	48"/36"	0	SILT and very fine Sand Some clay.		
4	B		4-8'	48"/30"	0	Medium and Fine SANS, trace coarse. Dry.		
8	C		8-12'	48"/30"	0	Medium SANS, some fine, Some gravel. Dry.		
12	D		12-16'	48"/36"		4" medium and coarse SANS Some gravel 8" Medium SANS grading to: 13" Fine SANS and silt tr+ clay Some gravel 2" Fine SANS and silt trace clay, gravel 9" Medium and fine SANS some silt		
16	E		16-20'	48"/21"	0	Medium SANS, some coarse, gravel (broken cobble) grading up to SANS and Gravel, to fine Sand		
20	F		20-24'	48"/23"		Medium SANS, Some gravel		
24	G		24-28'	48"/10"		D.O.		

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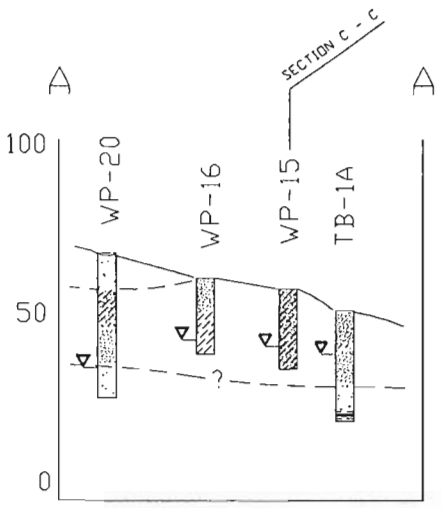
BORING NUMBER: WP-22

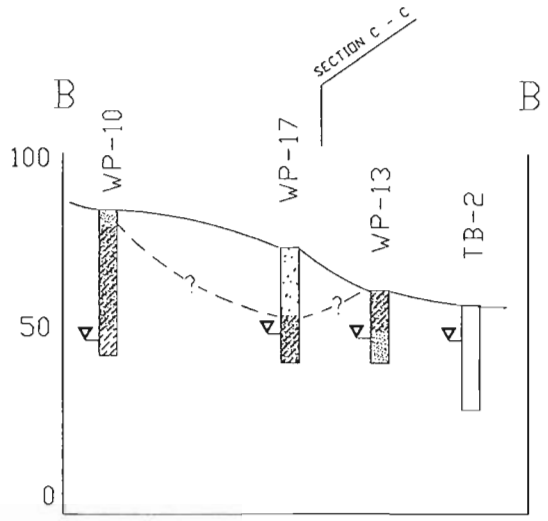
Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
	H		28'-32'	48"/25"	0	13" Medium and fine SAND, some coarse		
						12" Medium SAND and gravel. 2" cobble at top.		
32	I		32'-35'	36"/27"	0	Medium SAND and gravel		
								Borehole Caving - Advance to 51' for water Sample
36								
40								
44								
48								
	J		50'-52'					VOA Sample
52								

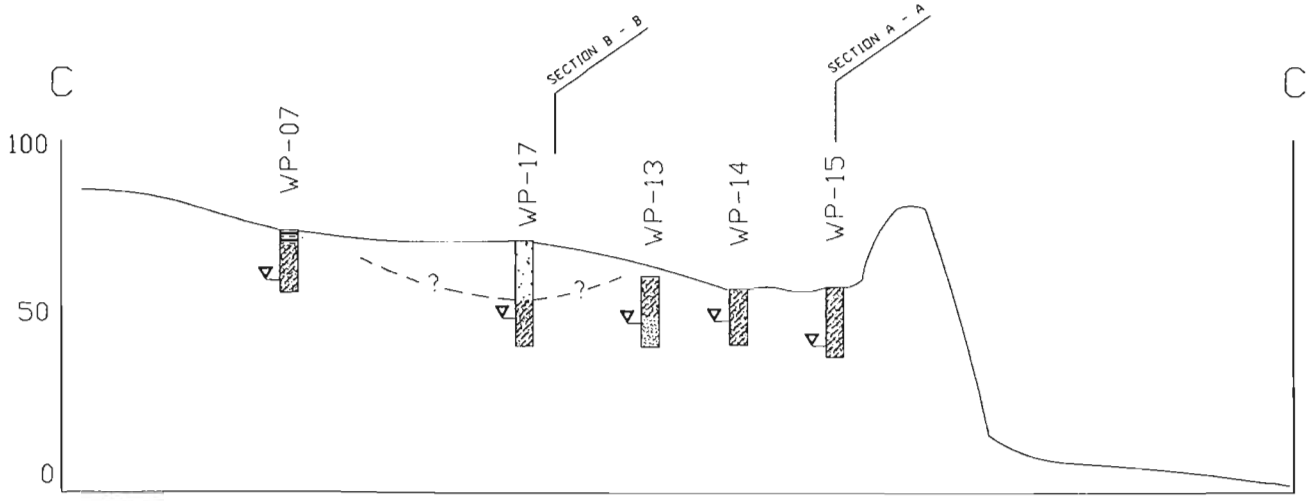
Y-2



SECTION A - A



SECTION B - B



SECTION C - C

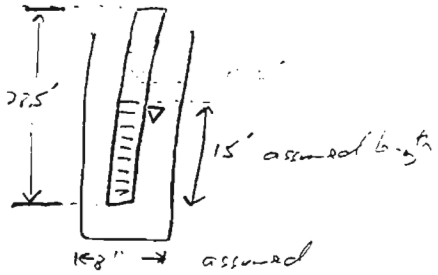
KAY FRIES CROSS SECTIONS

Appendix B

CAMP DRESSER & McKEE

CLIENT NYSDEC | JOB NO. | COMPUTED BY KS
PROJECT Ka. Fm. | DATE CHECKED | DATE 6/16/97
DETAIL MW-1a Slug Test (Test 2 on logger) | CHECKED BY | PAGE NO. 1 of 3

Total well depth = 28.5'
Static SWL = 14.50'
PVC Ø = 2" = .0833'
Assume Screen is 15' long - Top of screen is @ 13.5'
Assume 8" dia hole r = .333'
Assume gravel pack is 30% porosity



Bouwer & Rice

$r_w = 0.333'$
$r_c = 0.0833'$
* $L_e = 15' - 2.5$ (Crossection) $= 12.5'$ (Bottom of screen in clay)
$H_e = 12.5$ - Static to bottom of screen (use effective saturation)
$D = 12.5$ Saturated thickness
* Top of screen 1.0 above water
Bottom of screen 1.5' into clay

(1) $y_0 = 2.0'$ at $t = 56$ sec, $y = 0.1'$

$$\frac{1}{t} \ln \frac{y_0}{y_t} = \frac{1}{56\,\text{sec}} \ln \frac{2.0}{0.1} = 0.03483\ \text{sec}^{-1}$$

(2) $\frac{L}{r_w} = \frac{12.5}{.333} = 37.5 \qquad C = 2.2$

(3) $$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln(H/r_w)} + \frac{C}{L/r_w}\right]^{-1} = \left[\frac{1.1}{\ln(37.5)} + \frac{2.2}{37.5}\right]^{-1} = 2.76$$

(4) $$K = \frac{2 r_c^2 \left(\ln \frac{R_e}{r_w}\right)\left(\frac{1}{t} \ln \frac{y_0}{y_t}\right)}{2L} = \frac{2\,(.0833^2\,ft^2)\,(2.76)\,(.03483\,sec^{-1})}{25\,ft}$$

$= 5.336 \times 10^{-5}$ ft/sec $= 4.6105$ ft/day

$r_c' = [(1-n) r_c^2]^{1/2}$

$K = 4.6$ ft/day

Accounting for 30% sand pack

$r_c' = [(1-0.3)\cdot .0833^2 + .3(.333^2)]^{1/2} = 0.195'$

then $K = \frac{2(.195^2)(2.76)(.03483)}{25} = 2.93 \times 10^{-4}$ ft/sec

$= 25.3$ ft/day

CAMP DRESSER & McKEE

CLIENT: ME DEC
PROJECT: Kay Fries
DETAIL: Monitoring Slug test (test 1 on loss)

JOB NO.
DATE CHECKED
CHECKED BY

COMPUTED BY: RC
DATE: 5/1/97

Bouwer + Rice

$y_0 = 2.3$

at 92 sec $y = 0.09$

$$\frac{1}{t} \ln \frac{y_0}{y_t} = \frac{1}{92} \ln \frac{2.0}{0.09} = 0.0337 \text{ sec}^{-1}$$

Based on parameters on Sheet 1

$$K = \frac{r_c^2 \left(\ln \frac{R_e}{r_w}\right)\left(\frac{1}{t} \ln \frac{y_0}{y_t}\right)}{2L} = \frac{2(.0833)^2(2.76)(.0337)}{25} = 5.16 \times 10^{-5}$$

$= 4.46$ ft/day

or if water rises in 30% porosity sand

$$K = \frac{2(.195)^2(2.76)(.0337)}{25} = 2.82 \times 10^{-4} \text{ ft/sec}$$

$= 24.4$ ft/day

CAMP DRESSER & McKEE

CLIENT NYSDEC
PROJECT K, Fcis
DETAIL Hvorslev Slug test (Taken on logger)

JOB NO.
DATE CHECKED
CHECKED BY

COMPUTED BY
DATE 6/10/97
PAGE NO. 33

$y_0 = 2.0$

at 95 sec $y = 0.1$

$$\frac{1}{t} \ln \frac{y_0}{y_t} = \frac{1}{95} \ln \frac{2.0}{0.1} = 0.0315$$

Based on parameters on Sheet 1

$$K = \frac{r_c^2 \left(\ln \frac{R_e}{r_w}\right)\left(\frac{1}{t} \ln \frac{y_0}{y_t}\right)}{2L}$$

$$= \frac{2(0.0333^2)(2.75)(0.0315)}{25} = 4.826 \times 10^{-5} \text{ ft/sec}$$

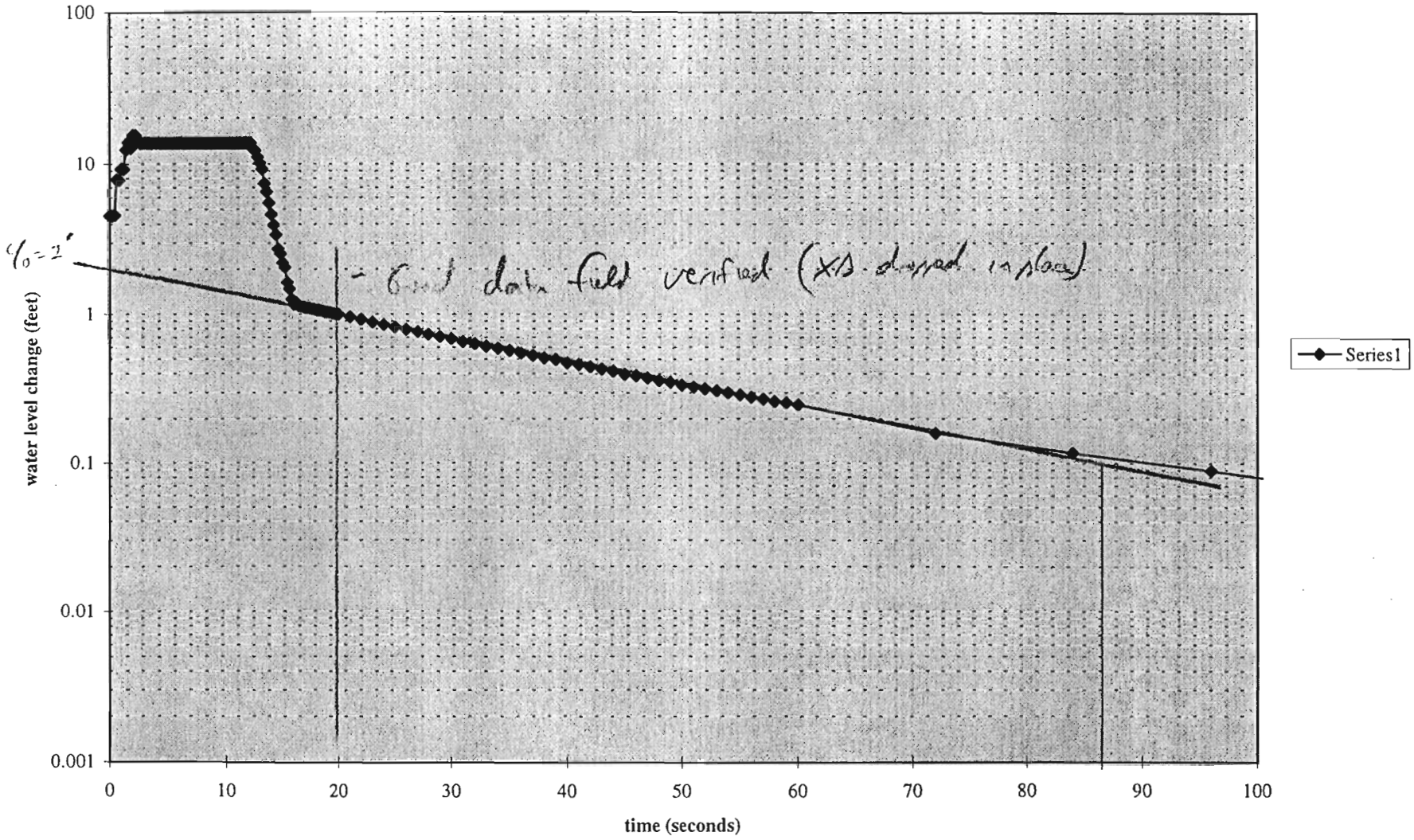
$$= 4.17 \text{ ft/day}$$

Or if water level rises in 2" ... well ...

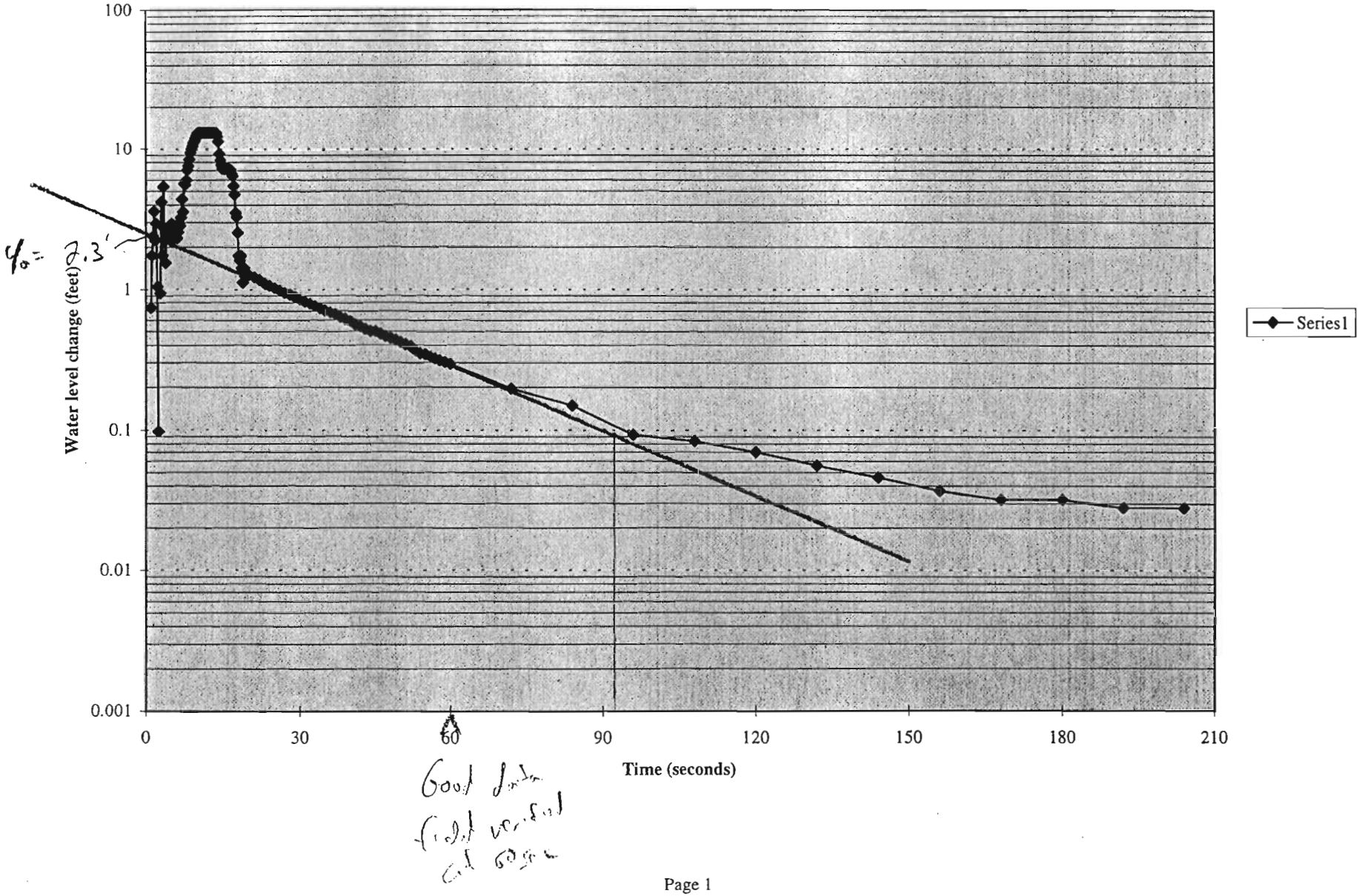
$$K = \frac{2(.1042^2)(2.76)(0.0315)}{25} = 2.645 \times 10^{-4} \text{ ft/sec}$$

$$= 22.85 \text{ ft/day}$$

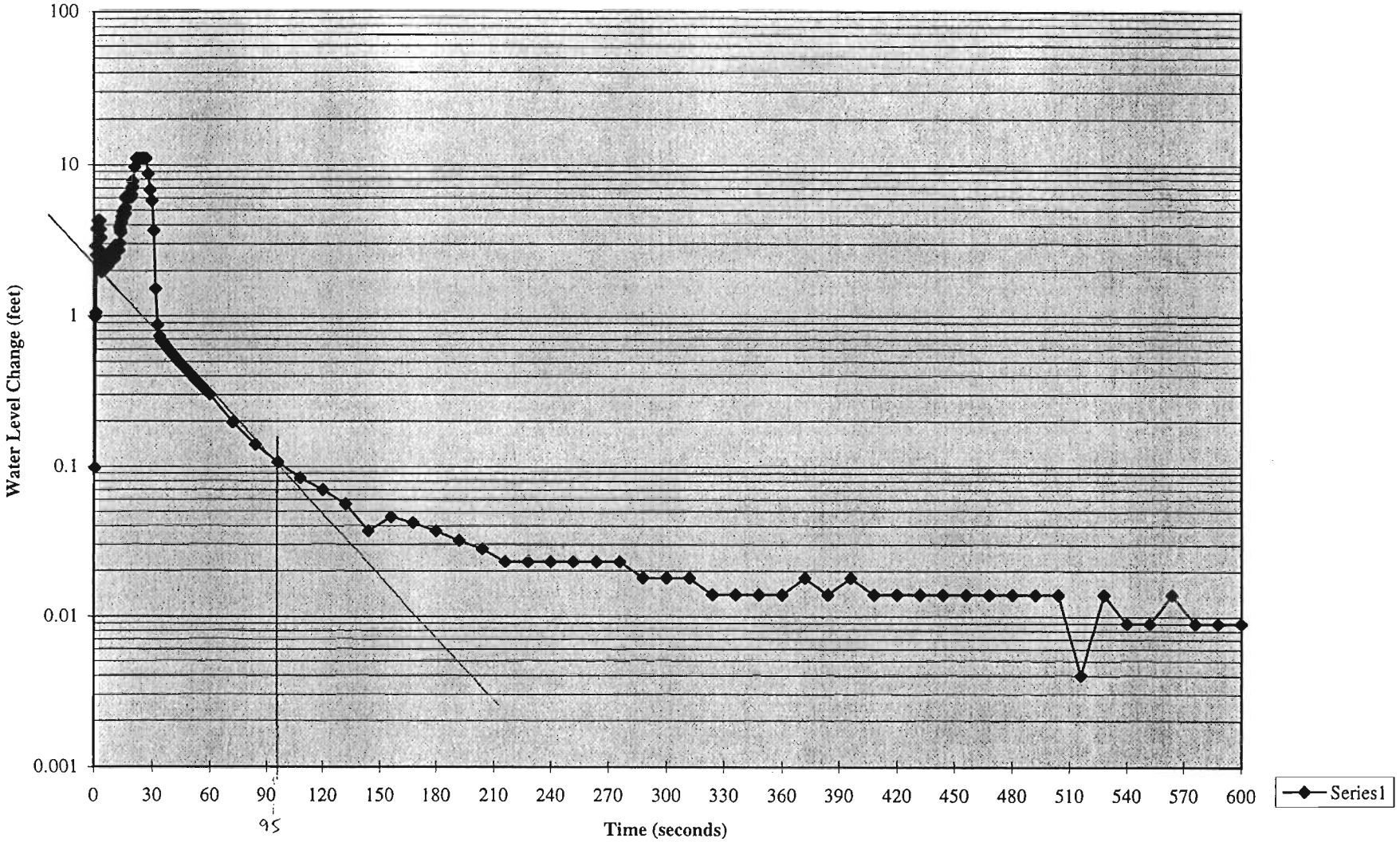
Slug Test MW-1a



Slug Test MW-1a



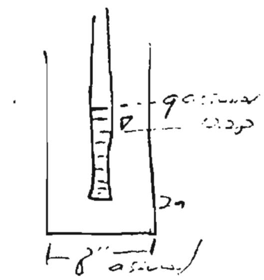
Slug Test MW-1a



CAMP DRESSER & McKEE

CLIENT: NYSDEC
PROJECT: King Electric
DETAIL: MW-2 Slug test (3.0 below...)
JOB NO.:
DATE CHECKED:
CHECKED BY:
COMPUTED BY: RC
DATE: 6/10/97
PAGE NO.: 1 of 1

Total well depth = 29.0'
Static DTW = 10.28'
PVC ϕ = 2" = .0833'
Assume Screen = 20' long – Top of screen is 9'
Assume 8" ϕ hole a r_w = 0.333'
Assume gravel pack = 30% porosity



r_w = 0.333'
r_c = 0.0833
L = 18.72' (top screen is out of water)
H = 18.72' (static to bottom of screen)
D = 18.72' (assume screen is bottom of aquifer)

① $\frac{1}{t} \ln \frac{y_0}{y_t} = \frac{1}{50} \ln \frac{0.4}{0.07} = 0.03486 \text{ sec}^{-1}$

② $\frac{L}{r_w} = \frac{18.72}{.333} = 56.16$ $C = 2.8$

③ $\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln(H/r_w)} + \frac{C}{L/r_w}\right]^{-1} = \left[\frac{1.1}{\ln 56.16} + \frac{2.8}{56.16}\right]^{-1} = 3.10$

④ $K = \frac{2 r_c^2 \left(\ln \frac{R_e}{r_w}\right)\left(\frac{1}{t} \ln \frac{y_0}{y_t}\right)}{2L} = \frac{2(0.0833^2)(3.10)(0.03486)}{37.44} =$

4.01×10^{-5} ft/sec = 3.46 ft/day

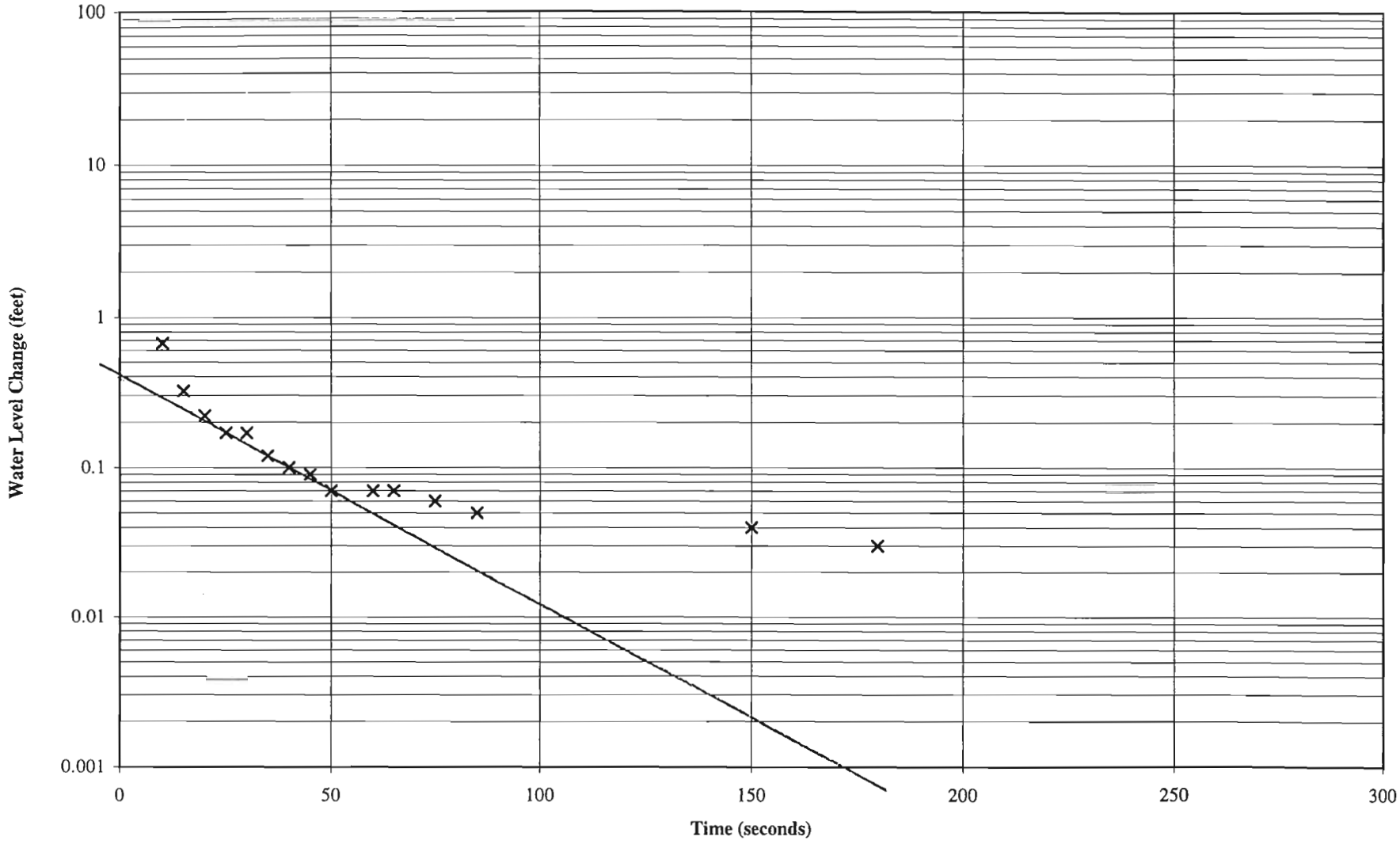
or

If water rises in 30% ϕ gravel pack

$r_c = \left[(1-0.3)(.0833^2) + 0.3(.333^2)\right]^{1/2} = 0.195'$

$K = \frac{2(0.195^2)(3.10)(0.03486)}{37.44} = 2.20 \times 10^{-4}$ ft/s = 19.0 ft/day

Slug Test MW-2



Appendix C

W. L. GORE & ASSOCIATES, INC.

101 LEWISVILLE ROAD • P.O. BOX 1100 • ELKTON, MARYLAND 21922-1100 PHONE: 410/392-3300
FAX: 410/996-3325 • TELEX 467637 GORE FB ELKT

ENVIRONMENTAL PRODUCTS GROUP

GORE-SORBER[SM] Screening Survey
Final Report

Kay Fries
Rockland County, NY

April 15, 1997

Prepared For:
Camp Dresser & McKee
Raritan Plaza 1
Raritan Center
Edison, NJ 08818

W.L. Gore & Associates, Inc.
Written/Submitted by

Ray Fenstermacher, P.G.
Associate

W.L. Gore & Associates, Inc.
Reviewed/Approved by

Jay W. Hodny, M.S.
Associate

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GORE-SORBER[sm] Screening Survey
Final Report

REPORT DATE: April 15, 1997 **AUTHOR:** RFF

SITE INFORMATION

Site Reference: Kay Fries, Rockland County, NY
Customer Purchase Order Number: 0897-20472
Gore Production Order Number: 071969 **Gore Site Code:** YH

FIELD PROCEDURES

 # Modules shipped: 76
Installation Date(s): February 17-18, 1997 **# Modules Installed:** 68
Field work performed by: Camp Dresser & McKee

Retrieval date(s): March 4, 1997 **Exposure Time:** 13-14 **[days]**
 # Modules Retrieved: 65 **# Trip Blanks Returned:** 5 *
 # Modules Lost in Field: 3 **# Unused Modules Returned:** 3

Date/Time Received by Gore: March 6, 1997 @ 12:30 pm **By:** CJF
Recorded Cooler/Water Temperature Control Blank temperature: 2.0 **[°C]**
Chain of Custody Form attached: √
Chain of Custody discrepancies: None
Comments: None

* Only one module (133081) was noted as being a trip blank, however four of the "unused" modules that were returned with this survey were also analyzed as trip blanks.

GORE-SORBER[sm] Screening Survey
Final Report

ANALYTICAL PROCEDURES

W.L. Gore & Associates' Screening Module Laboratory operates under the guidelines of its Quality Assurance Manual, Operating Procedures and Methods. The quality assurance program is consistent with Good Laboratory Practices (GLP) and ISO Guide 25, "General Requirements for the Competence of Calibration and Testing Laboratories", third edition, 1990. The Laboratory is audited regularly by a quality system design, development and auditing company.

Instrumentation consists of Hewlett-Packard 5890 gas chromatographs and 5971 mass selective detectors, as well as Perkin-Elmer ATD 400 automated thermal desorption units. Sample preparation simply involves cutting the tip off the bottom of the sample module and transferring one or more exposed sorbent containers (sorbers, each containing 40mg of a suitable granular adsorbent) to a thermal desorption tube for analysis. Sorbers remain clean and protected from dirt, soil, and ground water by the insertion/retrieval cord, and require no further sample preparation.

Screening Method Quality Assurance:

Before each run sequence, two instrument blanks, a sorber containing 5µg BFB (Bromofluorobenzene), and a method blank are analyzed. The BFB mass spectra must meet the criteria set forth in our methods before samples can be analyzed. A sorber containing BFB is also analyzed after every 30 samples and/or trip blanks, as is a method blank. Standards containing the selected target compounds at three calibration levels of 5, 20, and 50µg are analyzed at the beginning of each run. The criterion for each target compound is less than 35% RSD (relative standard deviation). If this criterion is not met for any target compound, the analyst has the option of generating second- or third-order standard curves, as appropriate. A second-source reference standard, at a level of 20µg per target compound, is analyzed after every ten samples and/or trip blanks, and at the end of the run sequence. Positive identification of target compounds is determined by the presence of the target ion and at least two secondary ions, retention time versus reference standard, and the analyst's judgment.

NOTE: All data have been archived. Any replicate sorbers not used in the initial analysis will be discarded fifteen (15) days from the date of analysis.

Laboratory analysis: thermal desorption, gas chromatography, mass selective detection
Quality Assurance Level: 2 (ANA-4/A1)
Instrument ID: # 3 **Chemist:** WW **Data Subdirectory:** 071969
Compounds/mixtures requested: Custom Target Compound List (A7)
Deviations from Standard Method: None
Comments: Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 5).

GORE-SORBER[sm] Screening Survey
Final Report

DATA TABULATION

 # CONTOUR MAPS ENCLOSED: Three (3) B-sized color contour maps
LIST OF MAPS ENCLOSED:

- Benzene, Toluene, Ethyl benzene, and total Xylenes (BTEX)
- Toluene
- Select Chlorinated Compounds: PCE, TCA and 1,1-DCA (Chlorinateds)

Compound Name	Method Detection Limit [µg]	Low Map (gray) Limit [µg]	Highest Detect Level [µg]	Upper Map (purple) Limit [µg]
BTEX	0.02	0.13	8.74	8.74
Toluene	0.14	0.13	3.73	3.73
Chlorinateds	0.03	0.03	53.36	53.36

NOTE: All data values presented in Appendix A represent masses of compound(s) desorbed from the GORE-SORBER Screening Modules received and analyzed by W.L. Gore, as identified in the Chain of Custody (Appendix A). The measurement traceability and instrument performance are reproducible and accurate for the measurement process documented. Semi-quantitation of the compound mass is based on either a single-level (QA Level 1) or three-level (QA Level 2) standard calibration.

Comments:

- The minimum (gray) contour level, for each mapped analyte or group of analytes, was set at the maximum blank level observed or the MDL, whichever was greater. The maximum contour level was set at the maximum value observed.
- The sampling interval for this survey was quite large; and if the intent of this survey was to identify potential source areas for target compounds, then Gore would recommend additional investigative work around those areas that exhibited the greatest mass.
- The distribution of chlorinated compounds from the target list are highest at grid location C6, with a lesser magnitude detection at grid locations A4 and D5. While the detection at A4 may be isolated from C6, the detection at D5 could very well be associated with the same source area as that of C6. The distance between D5 and C6 (>250 feet) make any interpretations between these two data points speculative.
- The low to moderate levels of BTEX constituents (which for this survey was comprised mainly of toluene) appear to be disseminated across the survey area with a few areas exhibiting the greatest mass. These areas include grid locations B2, C'3, C'2.5, and C1.

GORE-SORBER[sm] Screening Survey
Final Report

KEY TO DATA TABLE
Kay Fries, Rockland County, NY

UNITS

µg	micrograms (per sorber), reported for compounds for which we run external standards.
MDL	method detection limit

ANALYTES

Select Chlorinated Compounds	combined masses of tetrachloroethene, 1,1,1-trichloroethane, and 1,1-dichloroethane
BTEX	combined masses of benzene, toluene, ethylbenzene and total xylenes (Gasoline Range Aromatics)
11DCA	1,1-dichloroethane
111TCA	1,1,1-trichloroethane
BENZ	benzene
TOL	toluene
PCE	tetrachloroethene
EtBENZ	ethylbenzene
mpXYL	m-, p-xylene
oXYL	o-xylene

BLANKS

TBn	unexposed trip blanks, which traveled with the exposed modules

APPENDIX A:

1. CHAIN OF CUSTODY
2. DATA TABLE
3. COLOR CONTOUR MAPS

GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only
Production Order # 71969

W. L. Gore & Associates, Inc., Environmental Products Group
101 Lewisville Road • Elkton, Maryland 21921 • Tel: (410) 392-3300 • Fax (410) 996-3325

Instructions: Customer must complete ALL shaded cells

Customer Name: CAMP DRESSER & MCKEE INC	Site Name:
Address: RARITAN PLAZA I	Site Address:
RARITAN CENTER	KATTAFIES NY
EDISON NJ 08818	Project Manager: JOE CATTAFE
Phone: 908 225 7000	Customer Project No.:
FAX: 908 225 7851	Customer P.O. #: 0897-2472 Quote #: 7357

Serial # of Modules Shipped			# of Modules for Installation 69 # of Trip Blanks 7
# 133019	through	# 133074	Total Modules Shipped: 76 Pieces
# 133078	through	# 133097	Total Modules Received: 76 Pieces
#	through	#	Total Modules Installed: 68 Pieces
#	through	#	Serial # of Trip Blanks (*Client Decides*) #
#	through	#	# 133081 # #
#	through	#	# # #
#	through	#	# # #

Installation Performed By:	Installation Method(s) (*circle those that apply*):
Name (*please print*): VINCE EUGENE / TOM HORN	(Slide Hammer) (Hammer Drill) Auger
Company/Affiliation: CDM / TECHNICAL STAFF	Other:
Installation Start Date and Time: 02/17/97 10:35	(AM) PM
Installation Complete Date and Time: 02/18/97 15:35	AM (PM)
Retrieval Performed By:	Total Modules Retrieved: 65 Pieces
Name (*please print*): VINCE EUGENE / TOM HORN	Total Modules Lost in Field: 3 Pieces
Company/Affiliation: CDM / TECHNICAL STAFF	Total Unused Modules Returned: 5 Pieces ALL TRIP BLANKS
Retrieval Start Date and Time: 03/04/97 10:13	(AM) PM
Retrieval Complete Date and Time: 03/04/97 14:12	AM (PM)

Target Analytes to be Mapped (*Check Options or List as appropriate*):	To Be Determined Pending Completion of Lab Analysis [ ] or write "None", if applicable.	
Analyte #1:	Analyte #2:	Analyte #3:

Other Instructions, if any: CONTACT JOE CATTAFE AT 908 225-7000 FOR MW / ANALYTE INFO.

Relinquished By CA Jordan	Date 2/13/97	Time 1500	Received By:	Date 2/19/97	Time 1600
Affiliation: W.L. Gore & Associates, Inc.			Affiliation: (2/19/97) CDM		
Relinquished By	Date 3/5/97	Time 0830	Received By:	Date	Time
Affiliation: CDM			Affiliation:		
Relinquished By	Date	Time	Received By: CA Jordan	Date 3/6/97	Time 12:30
Affiliation			Affiliation: W.L. Gore & Associates, Inc.		
			Temperature of Samples When Received By Gore	2-0	°C

GORE-SORBER® Screening Survey Installation and Retrieval Log

Page 1 of 2

SITE NAME & LOCATION
KAUFRIES'

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate) LPH	ODOR	NONE	MODULE IN WATER (check one) ✓ = 3/4/96 YES	NO	COMMENTS ALL AT 2' DEPTH
1. C8	133037	2/17 @ 1035	3/4/97 @ 1035			✓		✓	PROBE TIP WET/MUD
C'8.5 2. ~~A6~~	133031	2/17 @ 1045	3/4/97 @ 1110			✓		✓	MOIST / DRILL
C 8.5 3. ~~A5~~	133025	2/17 @ 1055	missing			✓		✓	MOIST / DRILL
B'8.5 4. ~~A4~~	133019	2/17 @ 1110	3/4/97 @ 1053			✓		✓	MOIST / DRILL
5. B'8	133020	2/17 @ 1135	3/4/97 @ 1055			✓		✓	"
6. B'7.5	133026	2/17 @ 1145	3/4 @ 1037			✓		✓	WET / DRILL
7. C7.5	133032	2/17 @ 1155	3/4 1032			✓		✓	"
8. C'8	133021	2/17 @ 1210	3/4 @ 1013			✓		✓	"
9. C'7.5	133038	2/17 @ 1200	3/4 @ 1019			✓		✓	"
10. E4	133027	2/17 @ 1335	3/4 @ 1229			✓		✓	DRY, 15' E (OFF PAVEMENT)
11. E5	133033	2/17 @ 1350	3/4 @ 1232			✓		✓	MOIST / DRILL
12. D5	133039	2/17 @ 1405	3/4 @ 1413			✓		✓	"
13. C5	133022	2/17 @ 1415	3/4 @ 1415			✓		✓	MOIST. 6'N OFF PAVEMENT
14. B5	133028	2/17 @ 1420	3/4 @ 1417			✓		✓	MOIST, 6.5'N OFF PAVEMENT
15. A5	133034	2/17 @ 1430	3/4 @ 1419			✓		✓	MOIST, 11'N OFF PAVEMENT
16. D4	133040	2/17 @ 1440	3/4 @ 1237			✓		✓	MOIST / DRILL
17. C4	133023	2/17 @ 1450	3/4 @ 1241			✓		✓	MOIST, DRILL
18. D3	133029	2/17 @ 1515	3/4 @ 1317			✓		✓	6' SW OF STAKE MOIST DRILL TO 20"
19. C'3	133035	2/17 @ 1530	3/4 @ 1331			✓		✓	BELOW RED FLAGGING ON BRUSH
20. C3	133024	2/17 @ 1535	3/4 @ 1335	(OUT	SQUIRREL?)	✓		✓	6" NNW STATION
21. B'3	133041	2/17 @ 1540	3/4 @ 1351			✓		✓	1'NE OF FLAGGED TREE
22. B3	133030	2/17 @ 1555	3/4 @ 1354			✓		✓	DAMP / DRILL
23. B'2.5	133036	2/17 @ 1605	3/4 @ 1349	Out of	hole	✓		✓	"
24. B'3.5	133061	2/17 @ 1615	3/4 @ 1358	OUT of	the hole	✓		✓	DAMP BESIDE DCE SCAN
25. C2.5	133049	2/17 @ 1625	3/4 @ 1337			✓		✓	DAMP / DRILL
26. C3.5	133055	2/17 @ 1635	3/4 @ 1333			✓		✓	"
27. C'2.5	133042	2/17 @ 1640	3/4 @ 1328			✓		✓	"
28. D2.5	133043	2/17 @ 1650	3/4 @ 1319			✓		✓	"
29. D-2	133062	2/17 @ 1652	3/4 @ 1323			✓		✓	Drill ~~Auger~~ SANDY (DRY)
30. D'2	133056	2/17 @ 1700	3/4 @ 1312			✓		✓	"
31. B2.5	133050	2/17 @ 1710	3/4 @ 1314			✓		✓	"
32. D'3	133044	2/18 @ 0900	3/4 @ 258			✓		✓	DAMP / DRILL
33. E2.5	133045	2/18 @ 0910	3/4 @ 1306			✓		✓	" BELOW BRUSH FLAG
34. E2	133057	2/18 @ 0920	3/4 @ 1305			—		—	" (1'E OF STAKE)
35. D'3.5	133063	2/18 @ 0930	3/4 @ 1248			—	✓	—	DAMP / DRILL
36. C'3.5	133046	2/18 @ 0940	3/4 @ 1245			✓		—	" BELOW BRUSH FLAG
37. X-1	133051	2/18 @ 0950	3/4 @ 1296			✓		✓	"
38. E-3.5	133058	2/18 @ 0959	3/4 @ 1304			✓		✓	SANDY 8" SE of Stake
39. D3.5	133052	2/18 @ 1005	3/4 @ 1255			✓		✓	MOIST SAND BELOW BRUSH
40. C'4	133059	2/18 @ 1010	3/4 @ 1240			✓		✓	1' SW SATURATED SAND
41. X-2	133065	2/18 @ 1015	3/4 @ 1242			✓		✓	1' NE SAT. SAND DRILL
42. D'4	133053	2/18 @ 1025	3/4 @ 1235			✓		✓	6' SSW OF SHRUB FLAG

133087 ... 94-97 UNUSED

GORE-SORBER® Screening Survey Installation and Retrieval Log

Page 2 of 2

SITE NAME & LOCATION

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
43 E7	133047	2/18/97 @ 1100	3/4 @ 13:29			✓		✓	AT STAKE, WET
44 E6	133048	2/18/97 @ 1110	3/4 @ 1325			✓		✓	1' NE OF STAKE
45 D7	133054	2/18/97 @ 1115	3/4 @ 13:16			✓		✓	42' S OF STA.
46 C7	133066	2/18/97 @ 1128	3/4 @ 13:09			✓		✓	1' W OF STAKE WET
47 C6	133060	2/18/97 @ 1135	3/4 @ 13:05			✓		✓	55' N 1' FROM FENCE
48 B7	133064	2/18/97 @ 1145	3/4 @ 12:43			✓		✓	AT STAKE, WET
49 A7	133041	2/18/97 @ 1150	3/4 @ 12:40			✓		✓	8' NW OF STAKE WET
50 A6	133085	2/18/97 @ 1155	3/4 @ 12:35			✓		✓	6" East of STAKE WET
51 B6	133090	2/18/97 @ 1200	3/4 @ 13:00			✓		✓	AT STAKE
52 E1	133082	2/18/97 @ 1240	3/4 @ 1310			✓		✓	1' E OF STAKE
53 D1	133067 NH	2/18/97 @ 1255	3/4 @ MISSING			✓		✓	13' SW OF STA.
54 C2	133088	2/18/97 @ 1310	3/4 @ 1327	(OUT OF HOLE - SQUIRREL)		✓		✓	1' E OF SHRUB FLAG
55 C2	133068 NH	2/18/97 @ 1315	MISSING			✓		✓	"
56 C1	133074	2/18/97 @ 1325	3/4 @ 13:50			✓		✓	6' S OF STA
57 B'2	133073	2/18/97 @ 1330	3/4 @ 13:45			✓		✓	AT STA
58 B1	133089	2/18/97 @ 1340	3/4 @ 1428			✓		✓	125' S OF STA. DRY
59 B2	133083	2/18/97 @ 1345	3/4 @ 1404			✓		✓	DRY AT STA.
60 A1	133078	2/18/97 @ 1355	3/4 @ 1431			✓		✓	14.5' S OF STA
61 A2	133069	2/18/97 @ 1400	3/4 @ 1433			✓		✓	AT STA. DAMP
62 AA'1	133084	2/18/97 @ 1410	3/4 @ 1437			✓		✓	15' S of LINE 1
63 A3	133079	2/18/97 @ 1415	3/4 @ 1440			✓		✓	AT STA. DAMP
64 AA'2	133070	2/18/97 @ 14:30	3/4 @ 1435	(½ OUT - SQUIRREL)		✓		✓	AT STA. DAMP
65 AA'3	133092	2/18/97 @ 14:40	3/4 1442			✓		✓	4.5' E of Brush flag
66 A4	133080	2/18/97 @ 1430	3/4 @ 1412			✓		✓	40' E of A4 STA.
67 B4	133086	2/18/97 @ 1455	3/4 @ 1415			✓		✓	1' E of STA.
68 E3	133071	2/18/97 @ 1535	3/4 @ 1302			✓		✓	AT STA
69.									
70.									
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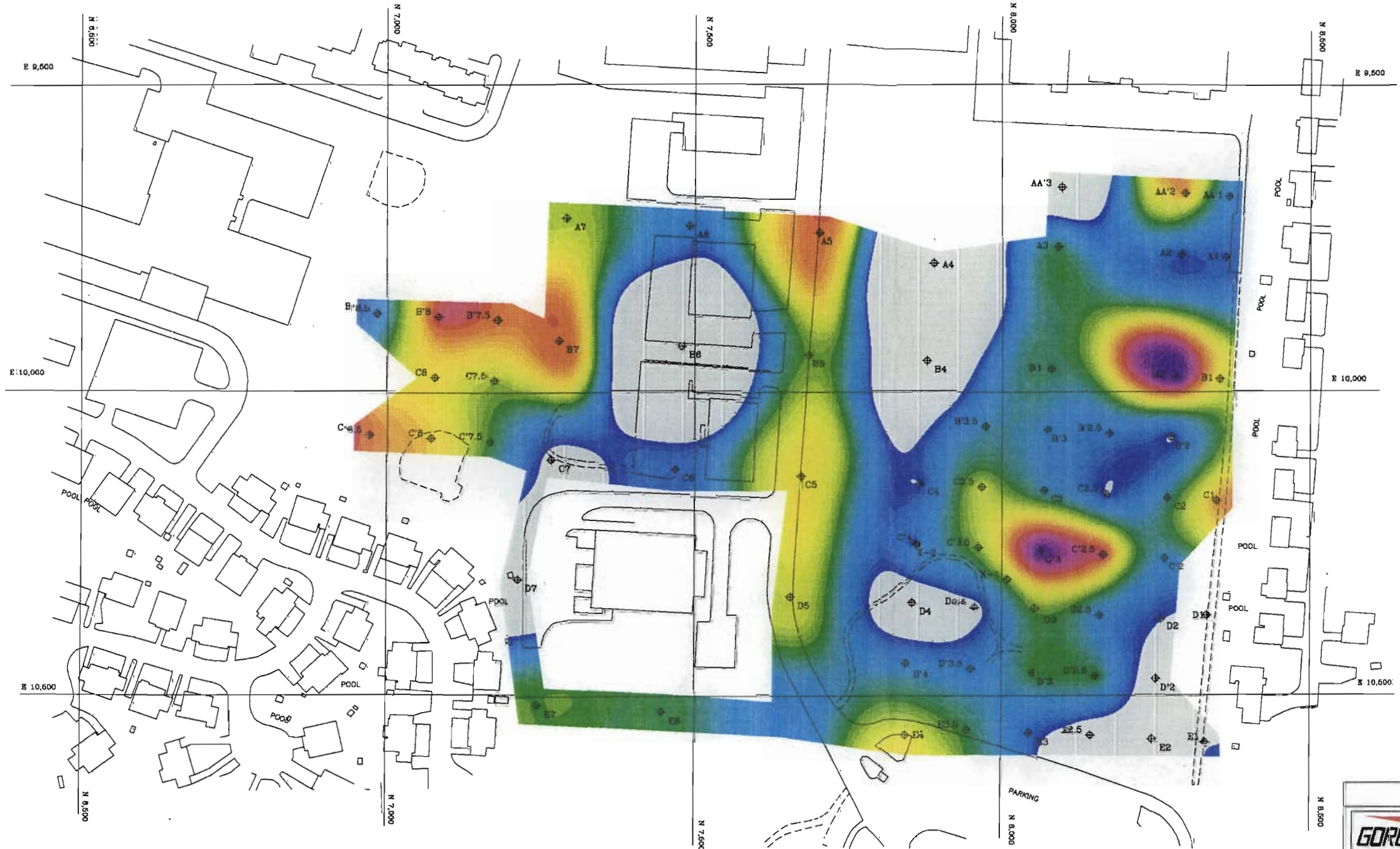
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
CAMP DRESSER MCKEE, INC., EDISON, NJ
GORE CUSTOM TARGET COMPOUND LIST (A7)
KAYFRIES, NY
SITE YH - PRODUCTION ORDER #071969

GRID LOCATION	MODULE NUMBER	DATE ANALYZED	Select Chlorinated Compounds, ug	BTEX, ug	11DCA, ug	111TCA, ug	BENZ, ug	TOL, ug	PCE, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug
		MDL =	0.03	0.02	0.05	0.08	0.02	0.14	0.03	0.02	0.03	0.02
E2	133057	03/07/97	0.00	0.07	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
E3.5	133058	03/07/97	0.00	0.42	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00
C'4	133059	03/07/97	0.00	0.10	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
C6	133060	03/07/97	53.36	0.16	0.00	37.97	0.00	0.16	15.40	0.00	0.00	0.00
B'3.5	133061	03/07/97	0.00	0.38	0.00	0.00	0.00	0.31	0.00	0.00	0.07	0.00
D2	133062	03/07/97	0.00	0.13	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00
D'3.5	133063	03/07/97	0.00	0.21	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00
B7	133064	03/07/97	0.00	1.31	0.00	0.00	0.00	1.31	0.00	0.00	0.00	0.00
X2	133065	03/07/97	0.00	0.35	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00
C7	133066	03/07/97	0.00	0.10	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
A2	133069	03/07/97	0.00	0.13	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00
AA'2	133070	03/07/97	0.19	1.47	0.00	0.00	0.08	1.26	0.19	0.03	0.08	0.03
E3	133071	03/07/97	0.00	0.17	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00
B'2	133073	03/07/97	0.00	0.11	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
C1	133074	03/07/97	0.00	8.74	0.00	0.00	0.25	1.18	0.00	0.77	4.02	2.52
A1	133078	03/07/97	0.00	0.15	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00
A3	133079	03/07/97	0.00	0.40	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00
A4	133080	03/07/97	4.08	0.00	0.00	0.00	0.00	0.00	4.08	0.00	0.00	0.00
E1	133082	03/07/97	0.00	0.12	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00
B2	133083	03/07/97	0.00	3.77	0.00	0.00	0.00	3.73	0.00	0.00	0.03	0.00
AA'1	133084	03/07/97	0.00	0.21	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00
A6	133085	03/07/97	0.00	0.27	0.00	0.00	0.06	0.21	0.00	0.00	0.00	0.00
B4	133086	03/07/97	0.00	0.05	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
C'2	133088	03/07/97	0.00	0.25	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
B1	133089	03/07/97	0.00	0.64	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00
B6	133090	03/07/97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A7	133091	03/07/97	0.05	0.62	0.00	0.00	0.07	0.55	0.05	0.00	0.00	0.00
AA'3	133092	03/07/97	0.00	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
	Max. Detected		53.36	8.74	0.05	37.97	0.25	3.73	15.40	0.77	4.02	2.52
	TB1 - 133081	03/06/97	0.00	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
	TB2 - 133072	03/07/97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TB3 - 133087	03/07/97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TB4 - 133093	03/07/97	0.00	0.13	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00
	TB5 - 133094	03/07/97	0.00	0.09	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
CAMP DRESSER MCKEE, INC., EDISON, NJ
GORE CUSTOM TARGET COMPOUND LIST (A7)
KAYFRIES, NY
SITE YH - PRODUCTION ORDER #071969

GRID LOCATION	MODULE NUMBER	DATE ANALYZED	Select Chlorinated Compounds, ug	BTEX, ug	11DCA, ug	111TCA, ug	BENZ, ug	TOL, ug	PCE, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug
		MDL =	0.03	0.02	0.05	0.08	0.02	0.14	0.03	0.02	0.03	0.02
B'8.5	133019	03/06/97	0.00	0.20	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00
B'8	133020	03/06/97	0.00	1.76	0.00	0.00	0.00	1.76	0.00	0.00	0.00	0.00
C'8	133021	03/06/97	0.00	0.92	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.00
C5	133022	03/06/97	0.00	0.77	0.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00
C4	133023	03/06/97	0.11	0.12	0.00	0.00	0.00	0.12	0.11	0.00	0.00	0.00
C3	133024	03/07/97	0.00	0.28	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00
B'7.5	133026	03/06/97	0.00	1.26	0.00	0.00	0.00	1.26	0.00	0.00	0.00	0.00
E4	133027	03/06/97	0.00	0.81	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.00
B5	133028	03/06/97	0.00	0.47	0.00	0.00	0.00	0.47	0.00	0.00	0.00	0.00
D3	133029	03/07/97	0.00	0.49	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00
B3	133030	03/07/97	0.00	0.39	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.00
C'8.5	133031	03/06/97	0.00	1.24	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.00
C7.5	133032	03/06/97	0.00	0.52	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00
E5	133033	03/06/97	0.00	0.22	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00
A5	133034	03/06/97	0.00	1.21	0.00	0.00	0.00	1.21	0.00	0.00	0.00	0.00
C'3	133035	03/07/97	0.00	3.67	0.00	0.00	0.00	3.67	0.00	0.00	0.00	0.00
B'2.5	133036	03/07/97	0.00	0.21	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00
C8	133037	03/06/97	0.00	0.80	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
C'7.5	133038	03/06/97	0.00	0.44	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00
D5	133039	03/06/97	1.09	0.62	0.00	0.90	0.00	0.62	0.19	0.00	0.00	0.00
D4	133040	03/06/97	0.00	0.07	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
B'3	133041	03/07/97	0.00	0.26	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00
C'2.5	133042	03/07/97	0.00	1.92	0.00	0.00	0.00	1.92	0.00	0.00	0.00	0.00
D2.5	133043	03/07/97	0.00	0.22	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00
D'3	133044	03/07/97	0.00	0.45	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00
E2.5	133045	03/07/97	0.07	0.06	0.00	0.00	0.00	0.06	0.07	0.00	0.00	0.00
C'3.5	133046	03/07/97	0.00	0.61	0.00	0.00	0.08	0.53	0.00	0.00	0.00	0.00
E7	133047	03/07/97	0.00	0.45	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00
E6	133048	03/07/97	0.00	0.41	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00
C2.5	133049	03/07/97	0.00	0.12	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00
D'2.5	133050	03/07/97	0.00	0.48	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00
X1	133051	03/07/97	0.00	0.51	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00
D3.5	133052	03/07/97	0.00	0.10	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
D'4	133053	03/07/97	0.00	0.24	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00
D7	133054	03/07/97	0.00	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
C3.5	133055	03/07/97	0.00	0.70	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.00
D'2	133056	03/07/97	0.00	0.08	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00



Toluene [ug]
3.176
2.930
2.703
2.493
2.300
2.122
1.957
1.805
1.665
1.536
1.417
1.307
1.206
1.112
1.026
0.947
0.873
0.806
0.743
0.685
0.632
0.583
0.538
0.496
0.458
0.422
0.390
0.359
0.332
0.306
0.282
0.260
0.240
0.221
0.204
0.188
0.174
0.160
0.148
0.136
0.126

Scale 1:2400

100 0 100 200

(feet)

NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.

ORIG. CAD:	KAYFRIES.DWG

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GORE-SORBER SCREENING MODULE IS A TRADEMARK OF W.L. GORE & ASSOCIATES.

GORE-SORBER SCREENING SURVEY

GORE
Creative Technologies Worldwide
W.L. GORE & ASSOCIATES, INC.
P.O. BOX 1100
101 LEWISVILLE ROAD
ELKTON, MD 21922-1100
(410) 392-3300

KAY FRIES SITE, ROCKLAND COUNTY, NY

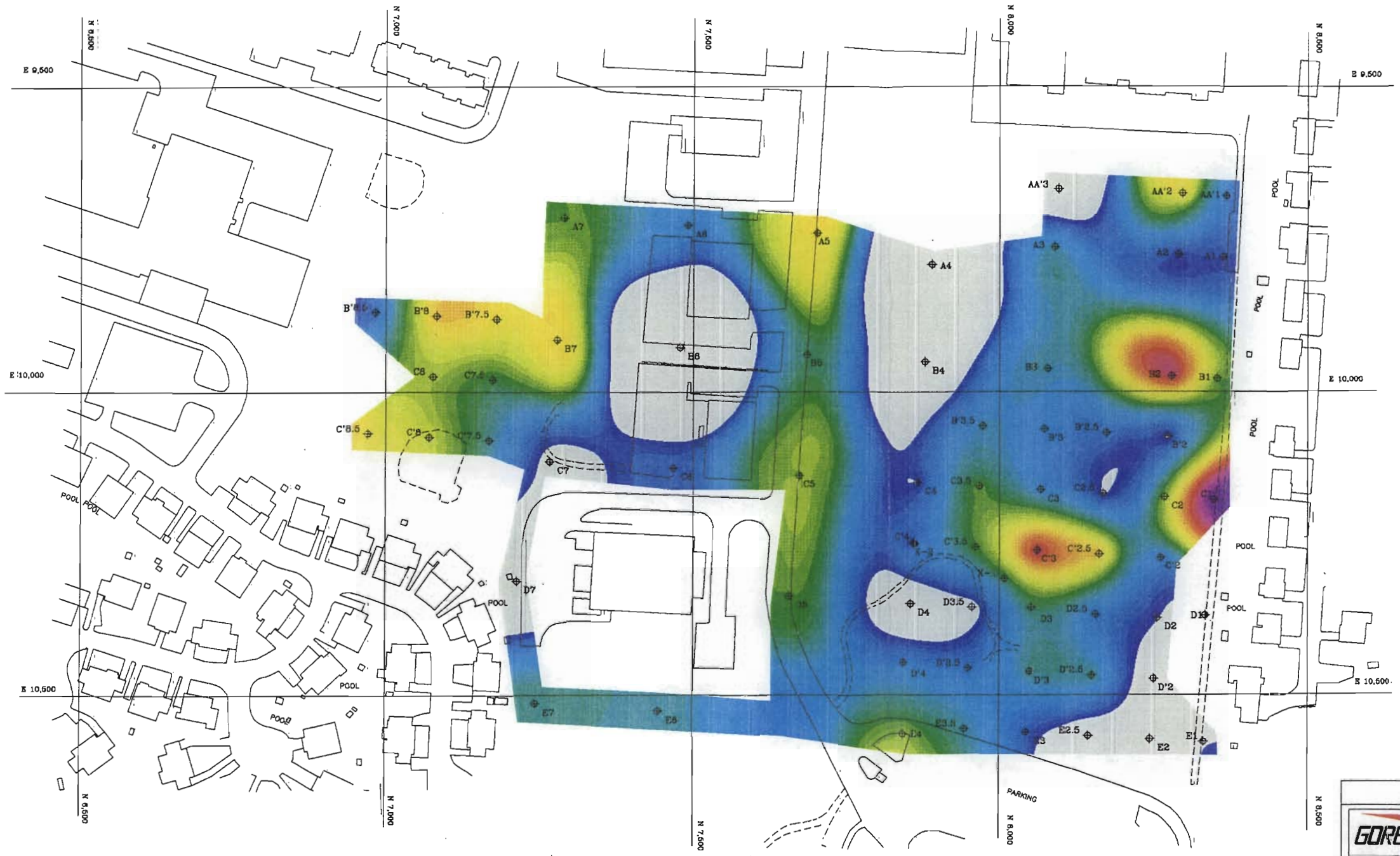
TOLUENE

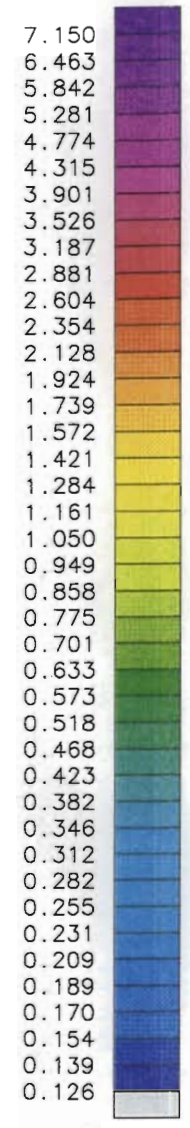
CAMP DRESSER & MCKEE, EDISON, NJ

REV. #: 1

REV. DATE: 4/21/97

DATE DRAWN:	April 14, 1997	GRID FILE:	TOXY.GRD
DRAWN BY:	RF/JH	PLOT FILE:	TOC.PLT
DATE CHECKED:	April 14, 1997	PROJECT NUMBER:	971369
CHECKED BY:	RF/JH	SITE CODE:	YH





Scale 1:2400

100 0 100 200

(feet)

NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.

ORIG. CAD: KAYFRIES.DWG

GORE-SORBER SCREENING SURVEY

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(410) 392-3300

KAY FRIES SITE, ROCKLAND COUNTY, NY

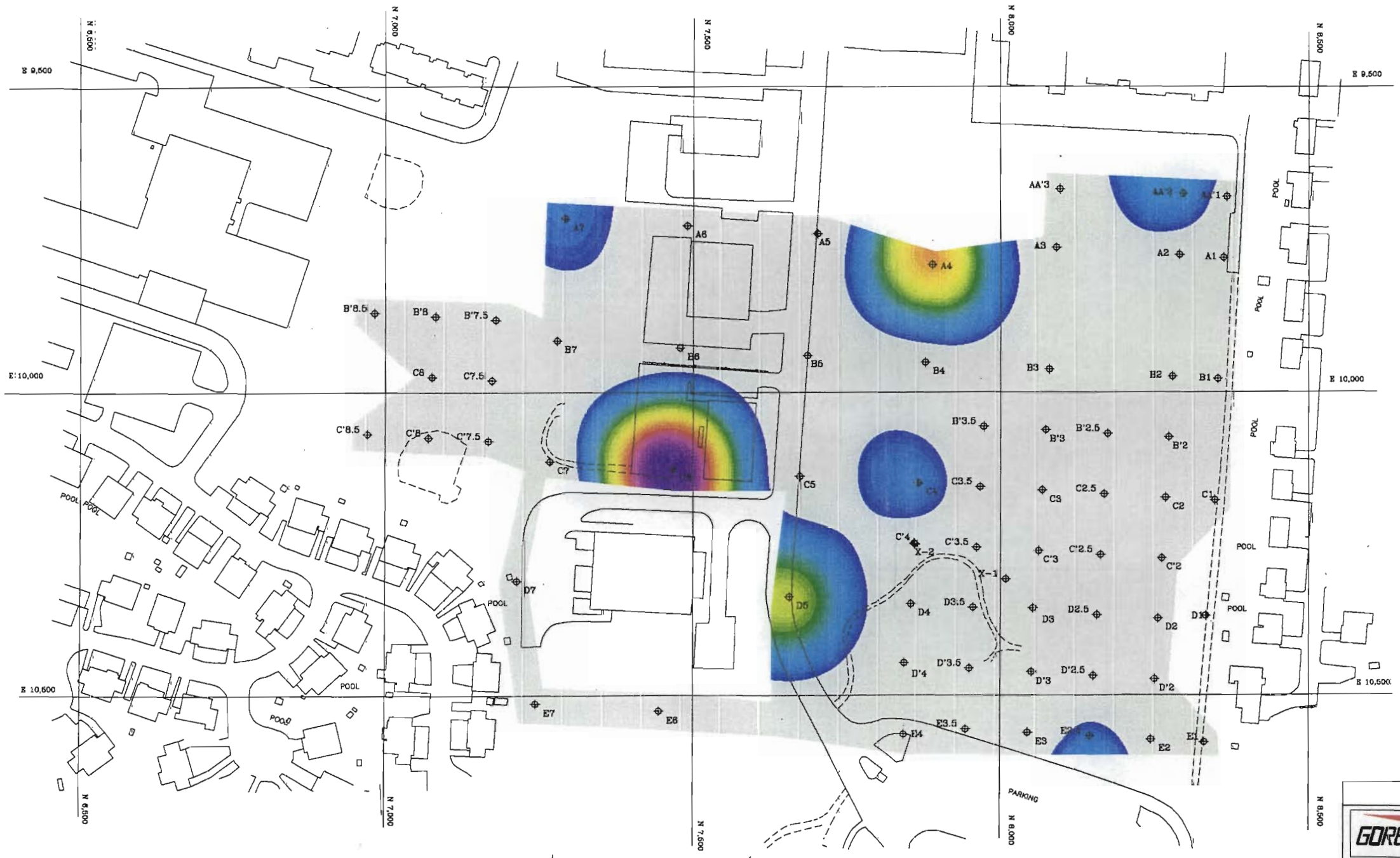
BTEX

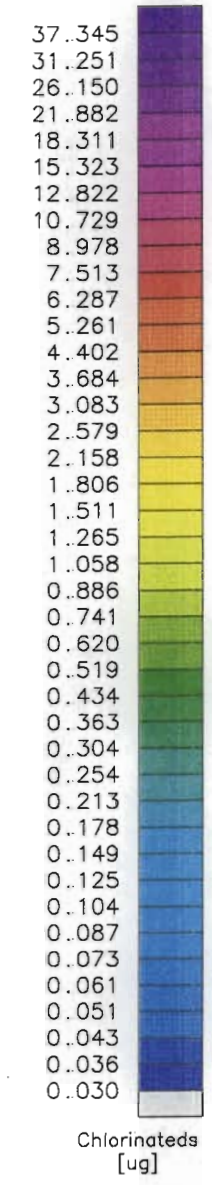
CAMP DRESSER & MCKEE, EDISON, NJ

REV. #: 1

REV. DATE: 4/21/97

DATE DRAWN:	April 14, 1997	GRID FILE:	BTO1.GRD
DRAWN BY:	RF/JH	PLOT FILE:	BTC.PLT
DATE GRIDDED:	April 14, 1997	PROJECT NUMBER:	071969
GRIDDED BY:	RF/JH	SITE CODE:	YH





NOTE: CONTOUR PLOT REPRESENTS MASS OF COMPOUND DESORBED FROM GORE-SORBER SCREENING MODULES, IDENTIFIED AND QUANTIFIED BY GAS CHROMATOGRAPH MASS SELECTIVE DETECTION.

ORIG. CAD: KAYFRIES.DWG

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KAY FRIES SITE, ROCKLAND COUNTY, NY

SELECT CHLORINATED COMPOUNDS

CAMP DRESSER & MCKEE, EDISON, NJ

REV. #: 1
REV. DATE: 4/21/97

DATE DRAWN:	April 14, 1997	GRID FILE:	B101.GRD
DRAWN BY:	RF/JH	PLOT FILE:	BIC.PIT
DATE GRIDDED:	April 14, 1997	PROJECT NUMBER:	071969
GRIDDED BY:	RF/JH	SITE CODE:	YH