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February 2006 Sampling Report

Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

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1.0 Introduction

This report summarizes the methods and results of a field sampling program performed in February 2006 at the Carroll and Dubies Superfund Site (Site), Town of Deerpark, Orange County, New York. The work followed the August 2005 *Supplemental Sampling Work Plan* (work plan) approved by the United States Environmental Protection Agency (U.S. EPA). Field activities included abandonment and installation of monitoring wells; and groundwater, surface water, pore water, and sediment sampling. The field sampling program will continue on an approximately quarterly frequency through early 2007.

The work plan was developed to address issues raised by the U.S. EPA during the five-year review of remedial actions at the Site. The goals of the sampling program are to:

- Verify the southeastern extent of the volatile organic compound (VOC) plume in the vicinity of OW-2, OW-5, and OW-6, and
- Verify that the remedial actions continue to be protective of human health and ecological receptors.

1.1 Site Setting

The three-acre Site is located in the Town of Deerpark in Orange County, New York, which is approximately 3,000 feet northeast of the City of Port Jervis, New York (Figure 1). The Site is situated on the northwestern flank of the Neversink Valley. Gold Creek lies approximately 1,500 feet to the east, and the Neversink River is located approximately 2,000 feet beyond Gold Creek.

The Site is underlain by sand and gravel deposits of glacial and glaciofluvial origin. Groundwater monitoring wells on the Site have been completed in the outwash unit, found above a low-permeability till zone that functions as an aquitard. The outwash unit consists of fine to coarse sand with fine to coarse gravel. The direction of groundwater flow is generally toward the southeast.

1.2 Land and Resource Use

The immediate surrounding area includes undeveloped woodlands to the north; undeveloped woodlands and a sand and gravel quarry pit to the northeast; the closed City of Port Jervis landfill, the Orange County Transfer Station, and a concrete products

fabrication company to the south; and a sparsely vegetated, shale bedrock hillside to the west. Two Site monitoring wells, OW-21 and OW-22, were installed through the closed landfill, and four other wells, OW-17, OW-18, OW-19, and OW-23, are located at the downgradient edge of the landfill (Figure 2). In 2004, the City of Port Jervis began to operate a small sand and gravel operation on land owned by the City of Port Jervis, immediately to the southeast of the former lagoons, in the vicinity OW-5, OW-6, and OW-7. The outline of the cleared area associated with these operations is shown in Figure 2.

1.3 History of Waste Disposal and Contamination

In 1971, the three-acre Carroll and Dubies Site began operating as a disposal facility consisting of a series of lagoons. The majority of wastes disposed in the lagoons were septic waste, municipal sewage sludge, and solid waste. The Site also received liquid industrial wastes from approximately 1971 to 1979. The waste types in the lagoons were as follows:

- Lagoons 1, 2, and 4 received only municipal sewage sludge/septic wastes.
- Lagoon 6 received mainly solid waste and limited municipal sewage sludge/ septic wastes.
- Lagoons 3, 7, and 8 received industrial waste and solid waste.
- No industrial wastes were found in Lagoon 5, and it was eliminated as part of the source area.

Over time, waste constituents in the lagoons leached into groundwater and affected the outwash aquifer. VOCs were of particular concern because of their dispersion in the aquifer and relative risk. Benzene, vinyl chloride, and other VOCs were found through a series of investigations to exceed drinking water standards in Site wells.

1.4 Overview of Remedies

The remedies selected for the Site were defined by two operable units, the waste lagoons themselves, and the impacted groundwater. Remedies were selected and executed to remove wastes from the lagoons, restore the Site to a safe and stable condition, and promote and track improvements in groundwater quality.

1.4.1 OU1 Remedy

The goals of the OU1 remedy conducted in 1999 were to prevent further leaching of contaminants into groundwater, and to reduce the risks to potential future workers at the Site who could come in contact with lagoon wastes. The steps in this process were:

- Excavation of all wastes from Lagoons 1, 2, 3, 4, 6, 7, and 8, along with surrounding soils that exceeded specified levels for indicator chemicals.
- Appropriate management of all excavated wastes and soils. Depending on waste classification, wastes were disposed in either hazardous or nonhazardous waste landfills. Certain wastes required treatment through incineration before disposal.
- Placement of imported clean fill in the excavations, followed by grading for drainage control and vegetation.

1.4.2 OU2 Remedy

The goals of the ongoing OU2 remedy, which was initiated in 1999, have been to use natural attenuation to reduce or eliminate the risks associated with the ingestion of Site groundwater for future Site workers and to protect Gold Creek from Site-related impacts. The steps in the program are:

- Execution of a groundwater monitoring program in accordance with Work Plans and other documents prepared for the project and approved by the U.S. EPA.
- At the same time as groundwater samples are collected, sediment and surface water samples are collected from locations upstream and downstream of the Site.
- With each sampling round, a report is prepared for U.S. EPA that documents the progress made in achieving the remedial goals.

1.5 Overview of February 2006 Field Program

The activities performed during the February 2006 supplemental sampling program were:

- Abandonment of two monitoring wells, OW-7 and OW-13. These monitoring wells were affected by nearby gravel extraction operations. OW-7 was used for water-level measurements only, and was abandoned without replacement. OW-13 was part of the OU2 monitoring network and was replaced by OW-13R.
- Installation of three monitoring wells, OW-13R, OW-24, and OW-25. OW-24 and OW-25 were placed south and east of OW-2, OW-5, and OW-6.

- Collection of groundwater samples. Wells sampled were those in the established monitoring well network, the newly installed wells, and two monitoring wells that had not been sampled in several years, OW-17 and OW-23.
- Collection of surface water, sediment, and pore water samples from Gold Creek. Two of the surface water and sediment sample monitoring locations, SED-1/ SW-1 and SED-2/SW-2, have been part of the ongoing OU2 monitoring network. Two additional one-time sampling locations, PW-Upstream and PW-Downstream, which lie between SED/SW-1 and SED/SW-2, were sampled for pore water, sediment, and surface water.

A Community Air Monitoring Program, with real-time screening for airborne VOCs and dust was integrated with other field activities. New York State Department of Health (DOH) guidance was followed for the air monitoring program.

2.0 Monitoring Well Abandonment and Installation

This section describes the abandonment of monitoring wells OW-7 and OW-13, and installation of wells OW-13R, OW-24, and OW-25. The locations of the wells are shown in Figure 2, and the boring logs for the new monitoring well installation are provided in Appendix A.

2.1 Well Abandonment

On February 14 and 15, 2006, existing monitoring wells OW-7 and OW-13 were abandoned in a manner consistent with *Groundwater Monitoring Well Decommissioning Procedures,* New York State Department of Environmental Conservation (NYSDEC), October 1996, with overdrilling and grouting to the surface. The integrity of these wells was determined to be questionable (i.e., potentially damaged grout seals) during a well integrity assessment conducted in November 2004. Well logs indicated that the total depth of OW-7 was 34.5 feet below ground surface (bgs) and OW-13 was 34.8 feet bgs. The general procedures followed for well abandonment were:

- Casing and screened sections were tremie-grouted from the bottom of the well to the surface using cement-bentonite grout.
- Drill rods were placed inside the well as a guide, and hollow-stem augers were used to overdrill down to the depth of the well.
- Soil cuttings were contained in 55-gallon steel, open-top drums and transported to a designated staging area.
- The screen and riser was then pulled from inside the augers.
- The augers were loaded with cement-bentonite grout and removed from the boring, while maintaining the grout level at the surface.

2.2 Soil Borings and Well Installation

From February 14 through 16, 2006, three monitoring wells were installed. One of the wells was a replacement for OW-13 (OW-13R) and two new wells, OW-24 and OW-25, were added to the existing monitoring well network. Monitoring well OW-13R was installed approximately 25 feet north of the original OW-13 location. Monitoring well OW-25 was installed in a wooded area approximately 300 feet southeast and downgradient of existing well OW-6. Monitoring well OW-24 was installed along an

access road approximately 375 feet northeast of existing well OW-17. This location is also downgradient of OW-6 and OW-25 (Figure 2). A cross section showing OW-24 and OW-25 relative to upgradient OW-2 and OW-6 is provided as Figure 3.

Soil Borings

Boreholes for each monitoring well were advanced using 4.25-inch inside diameter (ID) hollow-stem augers. Soil cuttings were contained in 55-gallon steel, open-top drums and transported to the designated staging area. Soils for borings OW-24 and OW-25 were continuously sampled and logged throughout the entire section of the boreholes using 2-inch outer diameter (OD) by 2-foot long standard split spoon samplers. Soils for boring OW-13R were sampled and logged at 5-foot intervals.

Upon retrieval, soil samples were initially screened for VOCs with a photoionization detector (PID) and visually classified by the onsite geoscientist. PID readings and descriptions of soil density, color, grain size, composition, and moisture were recorded on Soil Boring Log forms (Appendix A). The depth at which groundwater was encountered was also recorded, as well as other relevant observations. After logging, a portion of each sample was placed in a plastic Ziploc® bag for analysis of headspace. The bags were set aside in the sunlight for approximately 10 minutes to allow for VOCs, if present, to collect in the headspace. After approximately 10 minutes, the bags were opened just enough to insert the tip of the PID and record the reading. VOCs were not detected in the headspace in any of the boring locations (Appendix A).

Monitoring Well Installation

Following completion of each borehole, monitoring wells were installed. The wells were installed at depths such that the screened section of each well is set within the saturated zone of the sand and gravel outwash unit.

The wells were constructed with 2-inch ID Schedule 40 polyvinyl chloride (PVC) risers with 10 feet of 0.010-inch factory-slotted PVC screen. The screen and riser assemblies were lowered into the boreholes and suspended just off the bottom to avoid curvature of the well during construction. A sand filter pack was installed around the screened section extending to a level approximately 2 feet above the top of the screen. The filter pack consisted of clean quartz sand sized to correspond to the screen slot size and formation material (i.e., Global #5 or equivalent). The filter packs were installed through the annular space between the well assembly and the auger string, as the augers were slowly pulled from the borehole.

A 2-foot thick bentonite chip seal was installed above the filter pack and hydrated. The bentonite chips were poured in from the top of the annulus between the well casing and the auger string at a slow rate to prevent bridging. The auger string was gradually pulled up as the bentonite pellets rose. Intermittent sounding of the top of solid annular materials, using a weighted tape measure, was frequently done to document well construction.

After allowing approximately a half-hour for the bentonite seal to swell, the borehole was backfilled with a cement-bentonite grout mix via tremie pipe to within approximately 2 feet bgs. The remainder of the borehole was filled with concrete up to ground. The wells were finished approximately 2 feet above the ground surface, and locking expandable well caps were installed at the top. A 4-inch diameter by 5-foot long steel protective cover with a locking lid was placed over the PVC riser (stickup). The steel protective covers were anchored in place with 18-inch diameter by 6-inch thick concrete pad. General well construction diagrams are shown on the Soil Boring Log forms (Appendix A).

For wells OW-13R and OW-24, a 5-foot by 5-foot buffer zone was maintained by installing bollards (2 per well) to a depth of 3 feet bgs that are anchored with poured concrete. The bollards stick up approximately 3 feet and are painted yellow for visibility.

2.3 Well Development

The newly constructed wells were developed after approximately 24 hours of installation using a surge-and-pump technique. Existing wells OW-17 and OW-23 were also redeveloped using this method. To ensure proper well development, the pump intake was initially set at the bottom of the well and then moved to the top of the well screen as development proceeded. The submersible pump was used as the surge block and was raised and lowered to loosen fine-grained sediments from the screen and filter pack material. The well was then purged, as often as possible between surging, to remove the loose sediments.

The adequacy of development was based primarily on the sediment content of the water removed from the well. Wells were developed until they yielded sediment-free water, to the extent practical. To assist in assessing the effectiveness of development, water removed from each well was periodically analyzed for pH, temperature, specific conductance, and turbidity. Stabilization of these parameters was determined by the achievement of turbidity readings less than 50 nephelometric turbidity units (NTU) and

variation of less than ±10 percent (%) for all other parameters during consecutive measurements.

The volume of water removed from the wells during development and the associated pH, specific conductance, turbidity, temperature data were recorded in the field logbook. Water removed from wells during development was stored in 55-gallon drums and transported to the designated staging area.

2.4 Decontamination of Drilling Equipment

Prior to beginning drilling activities at each well location, and also before final demobilization, the drilling rig and associated drilling equipment (samplers, rods, and augers) were taken to a designated location and pressure washed and steam cleaned. A temporary decontamination pad with splash guards capable of containing the drill rig and associated equipment was constructed for this effort and maintained in the designated staging area.

Pressure washing and steam cleaning are capable of removing most substances from metal surfaces, and do not introduce cleaning agents (e.g., organic solvents) to the sampling equipment, which could cause contamination of samples that is not related to site conditions. Water produced during decontamination was collected in 55-gallon drums.

Split-spoon samplers were also decontaminated through a multi-step washdown procedure prior to each sampling interval. First, the samplers were brushed to remove any residual soil material. Soil material brushed from the samplers was contained with the drill cuttings. The samplers were then washed using the following procedures:

- Wash with low phosphate detergent and tap water
- Rinse with tap water
- Rinse with deionized water
- Rinse with hexane
- Rinse with deionized water
- Air dry

Water from decontamination of the samplers was also contained in drums.

3.0 Groundwater Sample Collection

This section describes methods used to collect groundwater samples for analysis for newly installed and existing wells. The results of the groundwater sampling and analysis program are provided in Section 8.0.

3.1 Groundwater Elevations

Groundwater elevations were determined from measured depths to water from the reference point elevations before sampling began. The depth to groundwater was measured using a Solinst® electronic water-level meter and recorded in the field logbook to the 1/100th of a foot.

3.2 Equipment

Dedicated low-flow bladder pumps were used to purge and sample all monitoring wells except OW-13R, OW-17, OW-23, OW-24, and OW-25. These wells were sampled using a downhole bladder pump that was decontaminated initially and after sampling each well by:

- Washing with low phosphate detergent and tap water
- Rinsing with tap water
- Rinsing with deionized water
- Rinsing with hexane
- Final rinse with deionized water
- Air drying

Clean disposable tubing and a clean disposable bladder were used for each well sampled with the bladder pump.

3.3 Well Purging and Sampling

All wells were purged using low-flow (100 to 200 milliliters per minute [mL/min]) techniques. During purging of each monitoring well, temperature, dissolved oxygen (DO), redox potential, specific conductance, pH, and turbidity were monitored and recorded on field forms in average intervals of 5 minutes. Groundwater field parameters were measured with a YSI Model 556 MPS-10 multi-parameter unit equipped with a flow-through cell and a Lamotte Turbidity Meter Model 2020, which were calibrated prior to sampling activities. The wells were pumped for periods ranging from 55 to

155 minutes. The goal was to obtain three consecutive readings of the field parameters within the following ranges:

- ±1.0 degrees centigrade (°C) for temperature
- ±10% or ±0.3 milligrams per liter (mg/L) for DO (whichever is greater)
- ±10 millivolts (mV) for redox potential (redox)
- ±3% for specific conductance (conductivity)
- ±0.1 for pH
- ±10% or ±2 NTUs for turbidity (whichever is greater)

The final stabilized readings prior to sample collection for each of the monitoring wells are provided in Table 1. Groundwater purged from the monitoring wells was generally clear and contained little suspended sediment. All monitoring wells maintained 0.33 foot of drawdown or less during purging and stabilization. When purging was complete, groundwater samples were collected at a flow rate of between 100 and 200 mL/min directly from the pump tubing. Samples were placed immediately on ice for overnight shipment to Severn Trent Laboratories (STL), North Canton, Ohio.

4.0 Collection of Pore Water, Surface Water, and Sediment Samples

As part of the ongoing evaluation of conditions in Gold Creek, surface water, sediment, and pore water samples were collected from four locations along Gold Creek. At two locations, SED-1/SW-1 and SED-2/SW-2, which have been part of the ongoing OU2 monitoring network, sediment and surface water samples were collected. At two one-time monitoring locations, PW-Upstream and PW-Downstream, which lie between SED-1/SW-1 and SED-2/SW-2, pore water, sediment, and surface water were sampled. The results from the Gold Creek sampling program are provided in Section 9.0.

4.1 Pore Water Sampling

Two pore water samples were collected at locations PW-Upstream and PW-Downstream as indicated in Figure 2. To collect the samples, an engineer's hammer was used to drive a clean ¾-inch stainless steel drive point and piping to the desired depth, approximately 4 feet below the sediment surface. The sampling device was a single-use drive point attached to a slotted stainless steel filter screen, which was protected within a ¾-inch stainless steel shield body. The filter shield was used to reduce the potential for smearing and plugging of the filter during the drive-point installation. A connector, sealed with an O-ring, was placed at the top of the drive point on the inner wall of the stainless steel shield and to act as an annular seal to reduce the potential for water and sediment intrusion from areas higher in the borehole.

Half-inch ID tubing was attached at the barbed fitting and connected to a peristaltic pump on the ground surface. Three well volumes of accumulated water in the drive point were purged. The pore water samples were collected after purging and were placed into containers that were supplied by the laboratory for analysis of Target Compound List (TCL) VOCs. Even though the original intent was to collect the sample with a bailer, that approach was not technically practical with the sampling system used. The equipment supplier was contacted for advice, and recommended collecting the sample with the pump at a low flow rate.

4.2 Surface Water Sampling

Four surface water samples were collected. Two surface water samples were collected from Gold Creek at the established locations that have been sampled throughout the

OU2 monitoring period at SW-1, the downstream sample, and SW-2, the upstream sample (Figure 2). In addition, two one-time surface water samples were collected coinciding with the pore water sampling locations PW-Upstream and PW-Downstream (Figure 2), identified as SW-Upstream and SW-Downstream.

Samples were collected for VOCs in accordance with the *Field Sampling and Analysis Plan Addendum* (Shield Environmental Associates, Inc., 1998), using a disposable container provided by the laboratory to collect and transfer the sample water at each location to the VOC sample vials. The sample bottles were labeled appropriately, placed in a cooler with ice, and sent to a laboratory for analysis.

All sampling locations were surveyed or resurveyed (see Section 6.0). Surface water elevations were determined at the four locations sampled, and also at the quarry pond, which was not sampled.

4.3 Sediment Sampling

Four sediment samples were collected from Gold Creek. Two samples were collected from the established locations coinciding with SW-1 and SW-2 (Figure 2), and were designated SED-1 and SED-2. In addition, two one-time sediment samples were collected coinciding with sampling locations PW-Upstream and PW-Downstream identified as SED-Upstream and SED-Downstream and shown in Figure 2. The samples were collected at the sediment/water interface.

The sampling approach was designed to collect samples with relatively lower moisture content. First, a decontaminated 8-inch diameter PVC pipe, approximately 2 feet in length, was driven into the sediments to about 1 foot below the sediment surface. A decontaminated hand pump was then used to draw off water from the surface of the sediments, and the upper layer of muck and debris was scraped from the surface. The samples were collected using a stainless-steel scoop. The stainless-steel scoop, pump, and PVC pipe were decontaminated between sediment sampling locations.

This technique was effective in improving the solids content of the sediment samples, compared to previous sampling events. The average solids content was about 44% using this technique, compared to about 16% in 2003 and 41% in 2004. Higher solids concentrations improve the analytical reporting limits.

5.0 Air Monitoring

The following air monitoring procedures were conducted during drilling, well installation, and drive-point installation, in accordance with the *Community Air Monitoring Plan* (CAMP) contained in the approved *Supplemental Sampling Work Plan* (August 2005):

- The monitoring equipment was started up and checked daily in accordance with the manufacturer's instructions.
- The initial upwind and downwind directions for the prevailing wind were determined and recorded. Prevailing wind direction was monitored throughout the work period and the downwind monitoring location was adjusted, if necessary.
- Initial VOC and particulate measurements were taken and recorded at upwind, downwind, and crosswind locations. Instruments were set to display instantaneous readings while logging 15-minute running average concentrations.
- Frequent measurements were also made at upwind and crosswind locations.
- Every 15 minutes during the work period, the 15-minute running average values at the downwind location were checked, recorded, and compared against the action criteria detailed below.

Monitoring Program Response Activities

Condition	Response
VOC Monitoring	
Downwind perimeter 15-minute running average VOCs above 5 parts per million (ppm) over upwind perimeter but less than 25 ppm	• Halt activities • Identify and abate source • Continue monitoring • Resume work if VOCs 200 feet downwind of exclusion zone or ½ the distance to potential receptor[(1)] are below 5 ppm over background
Downwind perimeter 15-minute running average VOCs above 25 ppm	• Shut down activities
Particulate Monitoring	
Downwind perimeter 15-minute running average of particulate levels are 0.100 milligrams per cubic meter (mg/m^3) above upwind level or airborne dust is leaving work area	• Use dust suppression techniques • Resume work with dust suppression • Continue monitoring • Work can continue as long as downwind perimeter 15-minute running average remains below 0.150 mg/m^3
Downwind perimeter 15-minute running average of particulate levels are 0.150 mg/m^3 above upwind level	• Stop work • Re-evaluate activities

[(1)]Whichever is less, but in no case less than 20 feet.

Air monitoring data is provided in Tables 2 and 3. Table 2 shows the particulate and VOC monitoring data from February 14 to February 18, 2006, during monitoring well abandonment and installation activities and collection of pore water samples. Table 3 shows the results from the concurrent VOC monitoring during groundwater, surface water, and sediment sampling.

At no time did any of the air monitoring parameter values exceed the established action criteria. In fact, VOCs were never detected, and particulates were consistently well below the 0.100 mg/m^3 criterion.

6.0 Surveying

The newly installed groundwater monitoring wells, OW-24 and OW-25, and replacement well OW-13R, as well as PW-Upstream and PW-Downstream locations, were surveyed using a land surveyor licensed in the state of New York in accordance with procedures set forth in the original Field Sampling and Analysis Plan Addendum (Shield, 1998) for this site.

The surface water and sediment sampling locations SED-1/SW-1, SED-2/SW-2, and SW-3 (quarry pond) were also re-surveyed. Three permanent staff gauges were re-installed, two along Gold Creek and one adjacent to the quarry pond east of monitoring well OW-8, at SW-1, SW-2, and SW-3 (quarry pond). The original staff gauges had been lost. The surface water elevations were also surveyed at locations SW-Upstream and SW-Downstream, the one-time sampling locations for pore water, surface water, and sediment samples. All surveyed locations are shown in Figure 2.

The monitoring wells and PW/SED/SW sample locations were surveyed for location and elevations as described below:

- Horizontal location based on New York Geodetic Control Monuments PID # LY2611 (Laurel) and PID # AB3870 (Dianne). Adjusted to NAD 1983 within the New York State Plane Coordinate System. The survey is tied to an identified established permanent USGS monument or a previously established bench mark near the site.
- Elevation of ground surface (and top of riser stickup and protective steel cover for monitoring wells) and surface water based on N.G.V.D. 1988 Datum, Relative to the National Geodetic Vertical Datum of 1988, from a New York Geodetic Monument PID # LY2611, being a survey disk set in a large bridge abutment. Elevation = 465.26 ft MSL. Elevations are referenced to the identified established bench mark, and described as such on survey maps and data packages.

7.0 Management of Investigation-Derived Waste

Ten drums of nonhazardous investigation-derived waste were generated during the sampling program, and were managed through a commercial waste broker. The wastes were treated (water) or disposed (solids and soil) through Vexor Technology, Medina, Ohio. The wastes were:

- Five drums of water from well purging and equipment decontamination. Most of the water was generated during the development of OW-13R, OW-24, and OW-25, and the analytical results from these wells were used for waste profiling (Appendix B).
- Four drums of soil cuttings from well installation. OW-13R was the location most likely to be contaminated, and cuttings from this location were sampled for waste characterization (Appendix B). The only detected VOC was methylene chloride at 6 micrograms per kilogram (ug/kg).
- One drum of plastic sheeting, gloves, paper towels, tubing from groundwater sampling, and other types of sampling waste.

Waste pickup was on April 3, 2006, following review and acceptance of waste profiles with analytical results attached.

8.0 Groundwater Results

The results of the groundwater sampling program described in Section 3.0 are provided here. After a brief overview, specific areas of interest are discussed.

8.1 Groundwater Elevations

The groundwater elevations for this sampling round are presented in Table 4. Associated groundwater elevation contours and elevations of adjacent surface water bodies are shown in Figure 4. Measurements of surface water elevations were collected on the same day that the monitoring wells were gauged.

The groundwater flow direction on site is toward the southeast in the direction of Gold Creek. The groundwater gradient across the former lagoon site is approximately 0.080. This gradient transitions to a lower gradient, at about the location of the towpath. From the towpath to Gold Creek, the gradient is very shallow, approximately 0.007. The steeper gradient on the western side of the site is due to the depth to bedrock along the valley wall. As the depth to bedrock increases towards the valley floor, the thickness of the alluvial fill increases and the groundwater gradient flattens.

8.2 Overview of Groundwater Quality

Detected groundwater VOC analytes from the February sampling event are presented in Table 5. Historical data of detected organic compounds have been combined with the most recent data and are presented in Appendix C. Complete laboratory analytical reports, including marked Form Is from the data validation process, are included in Appendix B.

Eleven VOCs were detected in various wells during this sampling event, of which seven exceeded regulatory limits. The VOCs that exceeded regulatory limits are benzene, chlorobenzene, 1,2-dichloroethene (total), tetrachloroethene, trichloroethene, vinyl chloride, and xylenes (Table 6). The VOCs that most frequently exceeded regulatory limits were benzene and 1,2-dichloroethene. Regulatory exceedances are plotted in Figure 5.

VOC concentrations in monitoring wells in February 2006 are within the ranges seen in 2004, with somewhat lower concentrations in about half of the wells compared to 2004.

In the remainder of this section, specific groundwater trends and conditions are discussed in greater detail, including:

- VOC results for supplemental monitoring wells OW-17, OW-23, OW-24, and OW-25
- Concentration trends for benzene
- Concentration trends for chlorinated VOCs
- Achievement of regulatory limits in monitoring wells
- Monitored natural attenuation trends

8.3 Supplemental Wells OW-17 and OW-23

Two existing wells that have not been a part of the O2 monitoring network, OW-17 and OW-23, were sampled in February 2006. The results from OW-17 and OW-23 (Table 5) confirm the findings of the remedial investigation, and show why OW-18 and OW-19 were selected as part of the OU2 monitoring network instead of OW-17 and OW-23.

OW-17 was not selected to be part of the OU2 monitoring network because:

- It had nondetectable concentrations of VOCs during the RI sampling
- It was found to be outside of the maximum extent of impacted groundwater
- Upgradient OW-16 contained very low to nondetectable concentrations of VOCs

OW-17 was nondetectable for VOCs when sampled in February 2006, and upgradient OW-16 continues to show only low to nondetectable concentrations. With the installation of OW-24 and OW-25 (Section 8.4), it is evident that OW-17 is outside of the area of groundwater impact.

OW-23 was originally installed to test for vertical dispersion and hydraulic gradient. It was completed adjacent to OW-18, but about 20 feet deeper, down to bedrock. OW-18 was selected over OW-23 as a better sentinel well based on its completion depth and higher VOC concentrations. A comparison of results between OW-18 and OW-23 for February 2006 confirms that the wells have similar chemical signatures; however, OW-18 has substantially higher concentrations, and therefore is a more conservative indicator of groundwater impact:

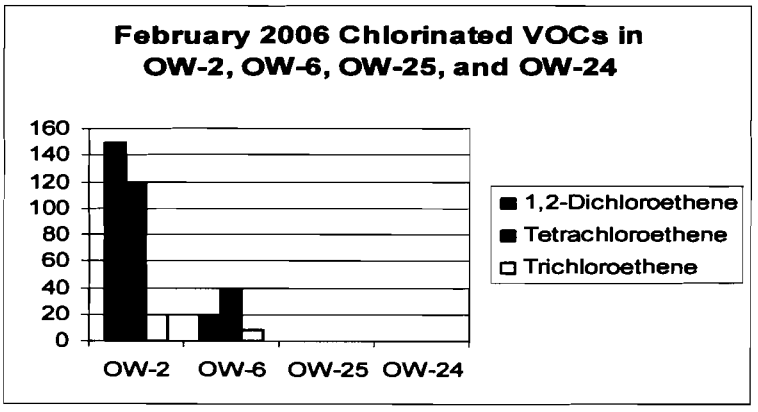
Detected VOCs in OW-18 and OW-23, February 2006

Compound	OW-18	OW-23
	02/17/06	02/17/06
Benzene	5.1	**0.38 J**
Chlorobenzene	10	1.0 U
Chloroethane	**3.2**	**0.31 J**
1,1-Dichloroethane	**1.6**	1.0 U
Toluene	**0.49 J**	1.0 U
Vinyl Chloride	2.0 U	**0.66 J**
Xylenes (total)	10	1.0 U

8.4 Newly Installed Monitoring Wells OW-24 and OW-25

Two new monitoring wells, OW-24 and OW-25, were installed and sampled in February 2006 to evaluate groundwater conditions east and south of OW-2 and OW-6 (Figure 2). OW-6 is approximately 100 feet to the southeast and downgradient of OW-2. While VOC concentrations in most monitoring wells in the OU2 monitoring network have declined over time, chlorinated VOC concentrations in OW-2 and OW-6 have been stable (Appendix C). Even though VOC concentrations were nondetectable in OW-8, directly east of OW-2 and OW-6, there was concern that the chlorinated VOCs detected in OW-2 and OW-6 could extend downgradient to the south and southeast.

The results (Table 5) show that impacts at OW-2 and OW-6 are localized and do not extend to OW-24 or OW-25. 1,2-Dichloroethene, trichloroethene, and tetrachloroethene, the three primary chlorinated VOCs in OW-2 and OW-6, were not detected in OW-25 or OW-24. The only detected constituent in OW-24 and OW-25 was toluene (not detected in either OW-2 or OW-6) at concentrations of 0.22 J and 0.17 J micrograms per liter (ug/L), respectively. The following graph illustrates the decline in chlorinated VOCs along the groundwater flow line from OW-2 to OW-24.



8.5 Benzene Concentration Trends

As was reviewed in detail in the *Supporting Documentation for Five-Year Review* (Cardinal Resources, 2005), different VOCs have predominated in different areas downgradient of the former lagoons. Benzene has predominated in several monitoring wells in the southwestern areas of the Site, with the highest concentrations observed in OW-10R, OW-13 (replaced in February 2006 with OW-13R), and OW-22, with relatively lower concentrations in MW-4, OW-18, OW-19, and OW-21. In MW-4, OW-10R, OW-19, and OW-21, benzene was below the Federal Maximum Contaminant Level (MCL) of 5 ug/L in February 2006, although not below the New York State Standard or Guidance Value (SGV) of 1 ug/L.

Benzene continues to exhibit an overall downward trend in individual wells, for example, OW-10R, OW-13/OW-13R, and OW-22, as illustrated in Figure 6. This figure plots the benzene concentrations over time in the three wells. There has also been a flattening and mass decline of the benzene plume along the groundwater flow path, as illustrated in Figure 7. This depiction shows how the benzene concentration has declined 2 to 3 orders of magnitude since 1999 in OW-10R and OW-13/OW-13R, closest to the source area. The benzene concentration has also declined in OW-18, which is located approximately 850 feet downgradient of the former lagoons, but the relatively lower initial concentrations have not declined as much. In February 2006, the benzene concentration in OW-10R was essentially the same as in OW-18.

8.6 Trends for Chlorinated VOCs

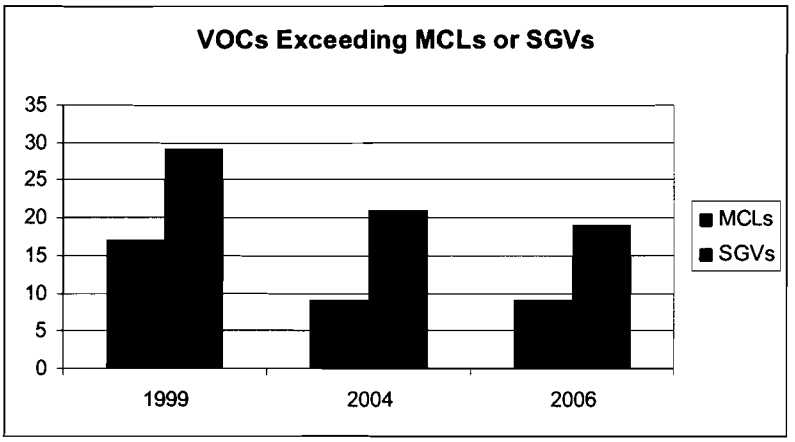
Chlorinated VOCs are the predominant constituents on the eastern side of the site, particularly in OW-2, OW-5, and OW-6, but are detectable in other locations, including OW-13/OW-13R.

In OW-2 and OW-6, chlorinated VOC concentrations are stagnant. Geochemical conditions that include low total organic carbon (TOC), nondetectable methane, high DO, and relatively high redox (Table 7) in the area of these wells are not conducive to reductive dechlorination. However, as discussed in Section 8.4, the impacts appear to be localized and have not migrated significantly to the south or east.

In OW-5 and OW-12/OW-13R, where groundwater is generally higher in methane and TOC and more reduced, conditions are more amendable to reductive dechlorination. In these locations, chlorinated VOCs in general are trending downward (Figure 8).

8.7 Achievement of MCLs and SGVs

The *Supporting Documentation for Five-Year Review* (Cardinal Resources, 2005) described how in the five years between completion of OU1 remediation in 1999 and 2004, some, but not all, of the Federal Maximum Contaminant Levels (MCLs) and state groundwater standards and guidance values (SGVs) had been met in groundwater wells downgradient of the former lagoons. Table 6 summarizes these findings through the current sampling round, and shows that in February 2006 there were 19 SGV exceedances, producing a net decline of two SGV exceedances as compared to the 2004 total of 21. The net number of MCL exceedances of 9 did not change, although the constituents exceeded changed somewhat. These findings illustrate that there has been improvement in groundwater quality relative to MCLs and SGVs:



8.8 Monitored Natural Attenuation Trends

A variety of monitored natural attenuation (MNA) field and laboratory parameters have been analyzed over time in groundwater (Table 7). These parameters are general indicators of geochemical conditions conducive to degradation of chlorinated and other VOCs. Patterns of MNA indicators by area were discussed in detail in the *Supporting Documentation for Five-Year Review*, along with an evaluation of how those patterns may relate to contaminant distribution within the groundwater plume. The patterns seen in February 2006 are consistent with the observations presented previously:

- Methane concentrations greater than 50 mg/L are observed in monitoring wells to the south and west, coincident with wells in the area where benzene predominates.
- Relatively high TOC, 2 mg/L or greater, is typically found in the same area as elevated methane concentrations.

- Relatively lower DO and higher reduction/oxidation potential (redox) indicating reduced conditions are found within the same area.

OW-2 and OW-6 are to the north and east, outside of the area with elevated methane, TOC, and reduced conditions, which explains the lack of significant chlorinated VOC degradation in these wells. Reduced conditions and a source of carbon other than chlorinated ethenes are needed to drive reductive dechlorination, and methane promotes degradation of chlorinated ethenes through cometabolic pathways. In OW-5, further to the west and south, geochemical conditions are more favorable and reduction of chlorinated VOCs has been observed (Figure 8).

9.0 Gold Creek Sampling Results

Refer to Section 4.0 for a description of the methods for surface water, sediment, and pore water sample collection along the creek. Table 8 provides the detected results for pore water, sediment, and surface water samples collected in four locations along Gold Creek (Figure 2). Refer to Appendix C for historical surface water and sediment data.

The results are arranged in the table from the furthest downstream (SED-1/SW-1) to the furthest upstream (SED-2/SW-2). SED-1/SW-1 and SED-2/SW-2 are the established sampling locations that have been used throughout the OU2 monitoring program; sediment and surface water samples were collected. The two other locations, PW-Downstream and PW-Upstream, are one-time sampling locations that fall in between SED-1/SW-1 and SED-2/SW-2. Sediment, surface water, and pore water samples were collected at these locations.

9.1 Pore Water Results

The purpose of the pore water sampling program was to evaluate whether upgradient impacted groundwater was upwelling into pore water and then into Gold Creek. The PW-Downstream pore water samples were collected in duplicate, and the sample and its duplicate were nondetectable for VOCs. The PW-Upstream sample contained three constituents, bromomethane, chloromethane, and 4-methyl-2-pentanone, all reported in concentrations less than 1 ug/L, and all at estimated (J) concentrations below the reporting limit (Table 8). Chloromethane has on occasion been reported in groundwater monitoring wells in concentrations below the reporting limit; bromomethane and 4-methyl-2-pentaone have not been previously reported (Appendix C). These chemicals are nonspecific to the wastes in the former lagoons, and are found in a variety of products, including fumigants and herbicides (bromomethane, chloromethane), and paint solvents and hydraulic fluids (4-methyl-2-pentanone).

Based on the findings, there is no evidence of impact to pore water from upgradient groundwater. The detected constituents in the upstream pore water sample do not correlate with the primary groundwater contaminant types, benzene and chlorinated ethenes, and no VOCs were detected in the downstream duplicate samples.

9.2 Surface Water Results

Low, estimated levels of chloroethane and vinyl chloride were detected in SW-Downstream and SW-1 (vinyl chloride only in the duplicate); there were no detected VOCs in SW-Upstream or SW-1 (Table 8). The surface water results are similar to historic SW-1 and SW-2 (Appendix C), with occasional detections of low, estimated concentrations of VOCs below New York state surface water standards (Table 9).

9.3 Sediment Results

One or two VOCs were detected in each of the four sediment samples collected, with the results in all cases estimated values below reporting limits (Table 8). The detected VOCs were toluene, trichloroethene, and carbon disulfide, a common laboratory artifact. The findings are comparable to what was observed previously in SED-1 and SED-2 (Appendix C), with occasional detections of site-related constituents.

9.4 Discussion

The results for the four sampling locations along Gold Creek are consistent with past observations for SED-1/SW-1 and SED-2/SW-2. That is, there are occasional low detections of VOCs in surface water and sediment. Detections have occurred in locations upstream and downstream of the former lagoons. The results also show that there is no apparent relationship between upgradient groundwater conditions and pore water conditions, and therefore no evidence of upwelling of groundwater that could affect the quality of Gold Creek.

The regulatory literature was reviewed for guidance criteria for VOCs in sediments and surface water related to ecological effects (Tables 9 and 10). The available ecological criteria for VOCs in these media are limited. None of the criteria identified were exceeded by the detected VOCs. Based on the low detections of VOCs in upstream and downstream samples that do not exceed conservative ecological criteria, there is no evidence that ecological conditions in Gold Creek are being adversely affected by the Site.

10.0 Data Quality Review

Data quality review, also called data validation, was performed on the two analytical data packages to assure that they met quality and usability requirements.

10.1 Introduction

A Tier II data quality review of sample data packages was completed using U.S. EPA guidelines. The Tier II data evaluation consisted of a review of data package completeness and a quality control (QC) review, as summarized in the QC forms provided by the laboratory. The completeness review covered:

- Signed transmittal page
- Data package narrative
- Sample transmittal documentation
- Standard QC forms for:
  - Surrogate recovery
  - Matrix spike/matrix spike duplicate (MS/MSD) recovery
  - Laboratory check samples
  - Method blank summary
  - Instrument performance check
  - Internal standard summary and retention time (RT) summary
  - Initial calibration data
  - Continuing calibration data
- Form Is and raw data for field samples, blanks, laboratory control samples, MS/MSDs
- Copies of logbook pages documenting sample preparation, moisture determination, extract transfer, instruments, and sample tracking

The QC review covered the same items as in the completeness review, and:

- Holding times
- Form Is and raw data for field and QC samples
- Other data quality considerations, including field procedures and sediment handling, moisture content of sediment samples, field duplicates and field, trip, and decontamination blanks

10.2 Results of Data Review

Refer to Appendix D for Tier II data review summary tables (volatile organic analysis [VOA]), dissolved gases, and general chemistry) for two sample delivery groups (SDGs), 6B16126 and 6B21162. The hand-marked, qualified Form Is are provided in Appendix B with the laboratory reports. Results in data Tables 5 and 8 reflect the qualified data. The two data qualifiers used as a result of the data review are:

- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

For both SDGs, the data packages were complete and appropriately organized, and all relevant supporting information was provided.

10.2.1 Holding Times

Holding times were met, with the exception of four nitrate analyses (24-hour holding time), for OW-16, OW-18, OW-19, and OW-23. A winter storm delayed express delivery of one sample cooler to the laboratory. The affected samples were qualified as estimated, with a J flag for detected concentrations, and a UJ flag for nondetects.

10.2.2 Field QC Samples

The field QC samples for VOC analyses were duplicates; MS/MSDs; decontamination blanks for the pump used for OW-17, OW-23, OW-24, and OW-25 (pump rinsate): a decontamination blank used for the scoop to collect sediment samples (scoop rinsate); field blanks for VOCs, and trip blanks. A field duplicate was collected for each sample matrix, groundwater (OW-13R), surface water (SW-1); sediment (SED-1), and pore water (PW-Downstream). These same sample locations were used for MS/MSDs. A field blank was collected for each sampling day, and a trip blank was included with each sample cooler.

10.2.3 Data Qualifications

Data qualifications were minor for both SDGs. Results that required qualification through the data validation process were qualified either as J for estimated, or UJ for not detected but estimated; no results were rejected. In summary, the qualifications were for:

Detections in Blanks - Low concentrations of the common laboratory contaminants as acetone, methylene chloride, and 2-butanone, and a few other VOCs, were detected in laboratory blanks, trip blanks, field blanks, and rinsate blanks (water for field and final rinsing of equipment blanks was provided by the laboratory). These detects were below the reporting limits in the blanks. Using U.S. EPA data validation methods, detections of these compounds in the associated field samples were qualified as appropriate. Detects below the blank 5x (common laboratory contaminants) or 10x (other VOCs) action levels in the associated samples were qualified as U at the reporting level if the result was less than the reporting level. If the result concentration was greater than the reporting level, it was qualified as U at the reported concentration.

VOC MS/MSDs - All MS/MSD spike recoveries and relative percent differences (RPDs) were within QC limits except for chlorobenzene in sample SED-1, which was attributed to matrix interference. The nondetectable result was qualified as UJ.

Dissolved Gases MS/MSD - Methane was out of QC limits (high) for the MS/MSD pair in one SDG. Detected concentration only required qualification as J, for samples MW-1, MW-4, OW-5, OW-8, OW-10R, OW-15, OW-16, OW-18, OW-19, OW-21, OW-22, and OW-23.

VOC Internal Standard Performance - Low internal standard recoveries in sediments attributed to matrix interferences resulted in placement of J (detected constituents) and UJ (nondetected constituents) for SED-2 and SED-Downstream samples for those compounds associated with one of the internal standards.

VOC Qualification for High Moisture in SED-Downstream - Even though steps were taken to minimize moisture in sediment samples using special procedures, one sediment sample, SED-Downstream, exceeded the moisture criterion. Detected constituents were qualified as J, nondetects as UJ.

Holding Time Exceedance for Nitrate - As described above under Holding Time, one cooler of samples was delayed in transit because of weather and nitrate analyses could not be performed within 24 hours of sample collection, therefore the affected results (OW-16, OW-18, OW-19, and OW-23) are qualified as J or UJ.

10.3 Data Quality and Usability

The data review process indicates that the analytical results are of acceptable quality, and no results have been rejected. Acceptable field techniques are indicated by the comparable field duplicate results generally acceptable solids concentrations in the sediment samples.

11.0 Summary and Conclusions

The *Supplemental Sampling Work Plan* (Cardinal Resources, 2005) that was the basis for this sampling program outlined two goals to be accomplished over four quarterly sampling rounds:

- Verify the southeastern extent of the VOC plume in the vicinity of OW-2, OW-5, and OW-6
- Verify that remedial actions continue to be protective of human health and ecological receptors

The first round of field activities in February 2006 show that the VOC plume in the area of OW-2, OW-5, and OW-6 does not extend to the southeast, and that the overall OU1 and OU2 remedies continue to be protective of human health and the environment. The evidence is:

- Chlorinated VOCs were not detected in OW-8, OW-17, OW-24, and OW-25, east and southeast of OW-2, OW-5, and OW-6.
- Benzene and chlorinated VOC concentrations in groundwater in other areas are stable or declining.
- The lack of site-related VOCs in one-time sampling of pore water shows that there is not a complete pathway between VOCs in groundwater, Gold Creek, and potential human receptors.
- Detected VOCs in upgradient and downgradient sediment and surface water samples did not exceed regulatory limits or guidelines developed to protect human health and ecological receptors.

The next round of sampling (groundwater only) is scheduled for May 2006. In accordance with the approved plan, the May 2006 sampling round will be limited to seven monitoring wells: OW-2, OW-5, OW-6, OW-17, OW-23, OW-24, and OW-25.

12.0 References

Cardinal Resources, Inc., August 2005, *Supplemental Sampling Work Plan, Carroll and Dubies Superfund Site,* Prepared for Kolmar Laboratories, Inc. and Wickhen Products, Inc.

Cardinal Resources, Inc., August 2005, *Community Air Monitoring Plan,* Section 5.1 of *Supplemental Sampling Work Plan,* Prepared for Kolmar Laboratories, Inc. and Wickhen Products, Inc.

Cardinal Resources, Inc., March 2005, *Supporting Documentation for Five-Year Review, Carroll and Dubies Superfund Site,* Prepared for Kolmar Laboratories, Inc. and Wickhen Products, Inc.

New York State Department of Environmental Conservation, October 1996, *Groundwater Monitoring Well Decommissioning Procedures.*

New York State Technical Guidance for Screening Contaminated Sediments, 1999 update, Division of Fish and Wildlife and Division of Marine Resources.

Shield Environmental Associates, Inc., August 18, 1998, *Field Sampling and Analysis Plan Addendum.*

United States Environmental Protection Agency, Region 6, 1999, Screening Level Risk Assessment Protocol, Appendix E, Toxicity Reference Values, Produced by the Center for Combustion Science and Engineering, http://epa.gov/earth1r6/6pd/rcra_c/protocol/appe-all.pdf.

United States Geological Survey, 1998, Transport, Fate, and Behavior of Organic Compounds in Streams, Tables 30 and 31, U.S.G.S. Professional Paper 1589, http://sd.water.usgs.gov/nawqua/pubs/other/pp1589.pdf.

Tables

Table 1
Groundwater Field Stabilization Parameters
February 2006
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Well ID	Date	Temperature (°C)	Dissolved Oxygen (mg/L)	Redox (mV)	Specific Conductance (uS/cm)	pH (standard units)	Turbidity (NTUs)
MW-1	02/15/06	9.83	0.61	174.7	228	6.29	2.7
MW-4	02/15/06	12.59	0.62	-158.3	766	6.63	2.8
OW-2	02/15/06	11.88	3.89	47.7	133	5.60	2.4
OW-5	02/16/06	12.00	0.67	44.3	295	6.16	3.1
OW-6	02/16/06	10.83	5.65	139.0	117	5.71	2.1
OW-8	02/16/05	11.61	0.97	-72.8	133	6.53	4.0
OW-10R	02/15/06	11.45	0.89	-120.8	355	6.46	3.3
OW-13R	02/20/06	11.24	1.32	-126.9	640	6.81	4.4
OW-15	02/15/06	10.62	0.51	-139.1	280	6.32	3.1
OW-16	02/17/06	11.06	0.69	77.0	171	5.64	2.7
OW-17	02/20/06	10.10	1.83	90.2	335	6.56	0.0
OW-18	02/17/06	10.68	0.84	-93.4	845	6.35	3.0
OW-19	02/17/06	10.23	1.73	-117.2	654	6.38	5.2
OW-21	02/16/06	12.45	0.82	-115.3	523	6.37	4.0
OW-22	02/16/06	12.43	0.57	-157.9	667	6.39	3.1
OW-23	02/17/06	10.57	0.64	-126.9	491	7.01	19.0
OW-24	02/20/06	8.70	4.45	60.7	219	7.46	2.3
OW-25	02/20/06	9.38	8.49	37.9	102	6.43	20.0

Notes:
mg/L = milligrams per liter
mV = milliVolts
uS/cm = microsiemens per centimeter
NTU = nephelometric turbidity units

Table 2
February 2006 Air Monitoring Results
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Time	Prevailing Wind Direction	Upwind Readings		Downwind Readings		Crosswind Readings		Notes
		PID (ppm)	MIE DataRAM (mg/m^3)	PID (ppm)	MIE DataRAM (mg/m^3)	PID (ppm)	MIE DataRAM (mg/m^3)	
February 14, 2006								
0900	W/SW to E/NE	0	0.006	0	0.006	0	0.006	Begin OW-13R drilling
0945	W/SW to E/NE	0		0	0.011	0		
1000	W/SW to E/NE	0		0	0.012	0		
1015	W/SW to E/NE	0		0	0.009	0		
1030	W/SW to E/NE	0		0	0.010	0		
1045	W/SW to E/NE	0		0	0.008	0		
1100	W/SW to E/NE	0		0	0.010	0		
1115	W/SW to E/NE	0		0	0.011	0		
1130	W/SW to E/NE	0	0.007	0	0.012	0	0.006	Begin OW-13R well installation
1145	W/SW to E/NE	0		0	0.013	0		
1200	W/SW to E/NE	0		0	0.014	0		
1215	W/SW to E/NE	0		0	0.011	0		
1230	W/SW to E/NE	0		0	0.017	0		Begin OW-7 well abandonment (over-drilling)
1245	W/SW to E/NE	0		0	0.015	0		
1300	W/SW to E/NE	0	0.021	0	0.019	0	0.019	
1315	W/SW to E/NE	0		0	0.015	0		
1330	W/SW to E/NE	0		0	0.014	0		
1345	W/SW to E/NE	0		0	0.011	0		
1400	W/SW to E/NE	0		0	0.009	0		
1415	W/SW to E/NE	0		0	0.012	0		
1430	W/SW to E/NE	0		0	0.011	0		
1445	W/SW to E/NE	0		0	0.015	0		
1500	W/SW to E/NE	0	0.008	0	0.010	0	0.011	Begin grouting for OW-7 well abandonment
1515	W/SW to E/NE	0		0	0.015	0		
1530	W/SW to E/NE	0		0	0.021	0		
1545	W/SW to E/NE	0		0	0.026	0		Begin OW-13 well abandonment (over-drilling)
1600	W/SW to E/NE	0		0	0.022	0		
1615	W/SW to E/NE	0		0	0.028	0		
1630	W/SW to E/NE	0		0	0.031	0		
1645	W/SW to E/NE	0		0	0.027	0		
1700	W/SW to E/NE	0		0	0.030	0		End of intrusive activities for the day

Table 2
February 2006 Air Monitoring Results
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Time	Prevailing Wind Direction	Upwind Readings		Downwind Readings		Crosswind Readings		Notes
		PID (ppm)	MIE DataRAM (mg/m^3)	PID (ppm)	MIE DataRAM (mg/m^3)	PID (ppm)	MIE DataRAM (mg/m^3)	
February 15, 2006								
1415	W/SW to E/NE	0	0.014	0	0.016	0	0.013	
1430	W/SW to E/NE	0		0	0.018	0		Resume overdrilling for OW-13 abandonment
1445	W/SW to E/NE	0		0	0.019	0		
1500	W/SW to E/NE	0		0	0.017	0		
1515	W/SW to E/NE	0		0	0.015	0		
1530	W/SW to E/NE	0		0	0.019	0		
1545	W/SW to E/NE	0		0	0.020	0		
1600	W/SW to E/NE	0	0.016	0	0.017	0	0.014	
1615	W/SW to E/NE	0		0	0.022	0		
1630	W/SW to E/NE	0		0	0.020	0		
1645	W/SW to E/NE	0		0	0.019	0		
1700	W/SW to E/NE	0		0	0.017	0		End of intrusive activities for the day

Table 2
February 2006 Air Monitoring Results
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Time	Prevailing Wind Direction	Upwind Readings		Downwind Readings		Crosswind Readings		Notes
		PID (ppm)	MIE DataRAM (mg/m^3)	PID (ppm)	MIE DataRAM (mg/m^3)	PID (ppm)	MIE DataRAM (mg/m^3)	
February 16, 2006								
0830	W/SW to E/NE	0	0.035	0	0.034	0	0.035	Begin drilling for OW-24 monitoring well
0845	W/SW to E/NE	0		0	0.039	0		
0900	W/SW to E/NE	0		0	0.035	0		
0915	W/SW to E/NE	0		0	0.029	0		
0930	W/SW to E/NE	0		0	0.031	0		
0945	W/SW to E/NE	0		0	0.038	0		Begin OW-24 well installation
1000	W/SW to E/NE	0		0	0.037	0		
1015	W/SW to E/NE	0		0	0.035	0		
1030	W/SW to E/NE	0	0.033	0	0.033	0	0.034	
1045	W/SW to E/NE	0		0	0.034	0		
1100	W/SW to E/NE	0		0	0.039	0		
1115	W/SW to E/NE	0		0	0.038	0		
1130	W/SW to E/NE	0		0	0.035	0		End OW-24 well construction
1345	W/SW to E/NE	0	0.016	0	0.020	0	0.018	Begin drilling for OW-25 monitoring well
1400	W/SW to E/NE	0		0	0.016	0		
1415	W/SW to E/NE	0		0	0.021	0		
1430	W/SW to E/NE	0		0	0.024	0		
1445	W/SW to E/NE	0		0	0.028	0		
1500	W/SW to E/NE	0		0	0.030	0		
1515	W/SW to E/NE	0		0	0.029	0		
1530	W/SW to E/NE	0	0.023	0	0.023	0	0.020	
1545	W/SW to E/NE	0		0	0.028	0		
1600	W/SW to E/NE	0		0	0.035	0		Begin OW-25 well installation
1615	W/SW to E/NE	0		0	0.031	0		
1630	W/SW to E/NE	0		0	0.036	0		
1645	W/SW to E/NE	0		0	0.037	0		
1700	W/SW to E/NE	0	0.033	0	0.043	0	0.037	End of intrusive activities for the day

Table 2
February 2006 Air Monitoring Results
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Time	Prevailing Wind Direction	Upwind Readings		Downwind Readings		Crosswind Readings		Notes
		PID (ppm)	MIE DataRAM (mg/m^3)	PID (ppm)	MIE DataRAM (mg/m^3)	PID (ppm)	MIE DataRAM (mg/m^3)	
February 18, 2006								
1100	N/NW to S/SE	0	0.014	0	0.015	0	0.014	
1115	N/NW to S/SE	0		0	0.017	0		Collect PW-Downstream (and QC) samples
1130	N/NW to S/SE	0		0	0.021	0		
1145	N/NW to S/SE	0		0	0.019	0		
1200	N/NW to S/SE	0	0.025	0	0.025	0	0.027	
1215	N/NW to S/SE	0		0	0.027	0		
1230	N/NW to S/SE	0		0	0.022	0		
1245	N/NW to S/SE	0		0	0.034	0		
1300	N/NW to S/SE	0	0.036	0	0.031	0	0.034	
1315	N/NW to S/SE	0		0	0.037	0		Collect PW-Upstream (and QC) samples
1330	N/NW to S/SE	0		0	0.023	0		
1345	N/NW to S/SE	0	0.028	0	0.030	0	0.029	End pore water sampling activities

Table 3
Monitoring Well Sampling PID Readings
February 2006
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Well ID	Date	Time	PID Reading
MW-1	02/15/06	14:00	0.0
		15:05	0.0
		15:15	0.0
OW-2	02/15/06	12:35	0.0
		14:00	0.0
		14:10	0.0
MW-4	02/15/06	11:15	0.0
		12:25	0.0
		12:35	0.0
OW-5	02/16/06	07:35	0.0
		09:15	0.0
		09:25	0.0
OW-6	02/16/06	09:25	0.0
		10:50	0.0
		11:00	0.0
OW-8	02/16/06	11:00	0.0
		12:15	0.0
		12:25	0.0
OW-10R	02/15/06	09:35	0.0
		11:05	0.0
		11:15	0.0
OW-13R	02/20/06	13:35	0.0
		14:45	0.0
		14:55	0.0
OW-15	02/15/06	08:15	0.0
		09:15	0.0
		09:25	0.0
OW-16	02/17/06	07:50	0.0
		09:15	0.0
		09:25	0.0
OW-17	02/20/06	10:15	0.0
		11:35	0.0
		11:45	0.0
OW-18	02/17/06	11:20	0.0
		12:55	0.0
		13:05	0.0
OW-19	02/17/06	09:25	0.0
		11:05	0.0
		11:15	0.0
OW-21	02/16/06	12:35	0.0
		13:35	0.0
		13:45	0.0
OW-22	02/16/06	13:50	0.0
		14:20	0.0
		14:30	0.0

Table 3
Monitoring Well Sampling PID Readings
February 2006
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Well ID	Date	Time	PID Reading
OW-23	02/17/06	13:05	0.0
		14:20	0.0
		14:30	0.0
OW-24	02/20/06	08:35	0.0
		09:55	0.0
		10:05	0.0
OW-25	02/20/06	11:55	0.0
		13:15	0.0
		13:25	0.0
SW-1 / SED-1	02/18/06	09:20	0.0
		09:40	0.0
		09:50	0.0
SW/PW/SED Downstream	02/18/06	10:00	0.0
		11:20	0.0
		12:30	0.0
SW/PW/SED Upstream	02/18/06	12:40	0.0
		13:25	0.0
		13:40	0.0
SW-2/SED-2	02/18/06	14:55	0.0
		15:00	0.0
		15:25	0.0

Table 4
Groundwater and Surface Water Elevation Data[1]
February 14, 2006
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Well No.	Top of Casing Elevation or Staff Gauge[2]	Screened Interval	Depth to Groundwater or Surface Water	Groundwater or Surface Water Elevation
MW-1	469.39	28.5 - 43.5	31.81	437.58
MW-4	470.13	35.3 - 50.3	37.72	432.41
OW-2	472.33	30.0 - 47.0	39.99	432.34
OW-3	472.70	30.0 - 46.5	40.70	432.00
OW-4	473.33	26.5 - 27.5	34.72	438.61
OW-5	459.85	25.5 - 45.5	27.66	432.19
OW-6	464.40	31.4 - 51.4	32.41	431.99
OW-8	464.63	34.6 - 54.6	32.51	432.12
OW-9	472.91	25.3 - 35.3	29.24	443.67
OW-10R	469.27	29.0 - 39.0	28.41	440.86
OW-13R	457.69	25.0 - 35.0	26.15	431.54
OW-15	472.05	22.0 - 32.0	11.83	460.22
OW-16	453.90	18.0 - 28.0	22.20	431.70
OW-17	447.18	11.0 - 21.0	15.64	431.54
OW-18	444.57	11.0 - 21.0	13.35	431.22
OW-19	438.69	5.0 - 15.0	7.90	430.79
OW-21	467.46	37.1 - 47.1	37.12	430.34
OW-22	467.10	38.0 - 48.0	35.40	431.70
OW-23	444.73	29.0 - 39.0	13.31	431.42
OW-24	446.77	14.4 - 24.4	15.83	430.94
OW-25	452.47	20.0 - 30.0	21.01	431.46
SW-1[3]	432.06	-	-	429.05
SW-2[3]	432.03	-	-	431.40
SW-3[3]	440.10	-	-	430.31

Notes:

[1]Data reported in feet; elevations relative - mean sea level; 1988 National Geodetic Vertical Datum.

[2]Top of casing and gauge staff elevations surveyed by Maser Consulting P.A.

[3]Water elevation measured using surveying transit.

Table 5
Summary of Detected TCL Volatile Organic Compounds in Groundwater (ug/L)
February 2006
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Solubility Limit

Compound	NYSDEC SGV	U.S. EPA MCL	MW-1 02/15/06	MW-4 02/15/06	OW-2 02/15/06	OW-5 02/16/06	OW-6 02/16/06	OW-8 02/16/06	OW-10R 02/15/06	OW-13R 02/20/06	OW-13R DUP 02/20/06	OW-15 02/15/06
Benzene	1 (S)	5	1.0 U	3.8	4.0 U	1.0 U	1.7 U	1.0 U	3.2	15	14	**0.88 J**
2-Butanone	5 (S)*	NE	10 U	10 U	40 U	10 U	17 U	10 U	10 U	0.79 J	**0.64 J**	10 U
Chlorobenzene	5 (S)*	100	1.0 U	1.0 U	4.0 U	1.0 U	1.7 U	1.0 U	**1.4**	1.0 U	1.0 U	**0.53 J**
Chloroethane	5 (S)*	NE	2.0 U	2.0 U	8.0 U	2.0 U	3.3 U	2.0 U	**0.52 J**	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane	5 (S)*	NE	1.0 U	1.0 U	4.0 U	1.0 U	1.7 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.24 J**
1,2-Dichloroethene (total)	5 (S)*	70	1.0 U	**0.53 J**	150	6.2	19	1.0 U	1.0 U	**0.60 J**	**0.60 J**	1.0 U
Tetrachloroethene	5 (S)*	5	1.0 U	**0.33 J**	120	**4.3**	39	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	5 (S)*	1,000	1.0 U	1.0 U	4.0 U	1.0 U	1.7 U	1.0 U	1.0 U	**0.29 J**	**0.35 J**	1.0 U
Trichloroethene	5 (S)*	5	1.0 U	1.0 U	20	**2.0**	7.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2 (S)	2	2.0 U	2.0 U	8.0 U	2.0 U	3.3 U	2.0 U	**0.47 J**	**1.1 J**	**1.1 J**	**0.73 J**
Xylenes (total)	5 (S)*	10,000	1.0 U	1.0 U	4.0 U	1.0 U	1.7 U	1.0 U	1.3 U	1.0 U	1.0 U	1.3 U

Compound	NYSDEC SGV	U.S. EPA MCL	OW-16 02/17/06	OW-17 02/20/06	OW-18 02/17/06	OW-19 02/17/06	OW-21 02/16/06	OW-22 02/16/06	OW-23 02/17/06	OW-24 02/20/06	OW-25 02/20/06
Benzene	1 (S)	5	1.0 U	1.0 U	5.1	3.4	3.0	7.5	**0.38 J**	1.0 U	1.0 U
2-Butanone	5 (S)*	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5 (S)*	100	1.0 U	1.0 U	10	5.6	1.0 U	11	1.0 U	1.0 U	1.0 U
Chloroethane	5 (S)*	NE	2.0 U	2.0 U	**3.2**	**1.9 J**	2.0 U	**0.31 J**	**0.31 J**	2.0 U	2.0 U
1,1-Dichloroethane	5 (S)*	NE	1.0 U	1.0 U	**1.6**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethene (total)	5 (S)*	70	**0.37 J**	1.0 U	1.0 U	**1.3**	1.0 U	**0.59 J**	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5 (S)*	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	5 (S)*	1,000	1.0 U	1.0 U	**0.49 J**	1.0 U	1.0 U	**0.26 J**	1.0 U	**0.22 J**	**0.17 J**
Trichloroethene	5 (S)*	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2 (S)	2	2.0 U	2.0 U	2.0 U	2.9	**0.52 J**	**0.29 J**	**0.66 J**	2.0 U	2.0 U
Xylenes (total)	5 (S)*	10,000	1.0 U	1.0 U	10	1.0 U	1.0 U	**1.0**	1.0 U	1.0 U	1.0 U

Notes:
TCL = Target Compound List
NYSDEC SGV = New York State Department of Environmental Conservation Standards (S) and Guidance (G) Values for groundwater
U.S. EPA MCL = United States Environmental Protection Agency Maximum Contaminant Level for drinking/groundwater
NE = Not established; no criteria specified
U = The analyte was analyzed for, but was not detected above the reported quantitation limit.
J = Estimated result; result is less than reporting limit
* = The principal organic contaminant (POC) standard for groundwater of 5 ug/L applies to this substance.
Red = Concentrations detected at or above regulatory limit
Blue = Analyte detected at less than regulatory limit, or analyte detected but no regulatory criteria specified.
Acetone and chloromethane were reported by the laboratory in some samples; however, the results were qualified during the data validation process as not detected (U) at or above the reported levels due to the presence of those compounds in an associated method, field, trip, or rinsate blank.

Table 6
MCL and SGV Exceedances, 1999, 2004, and February 2006
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Well	Compound	MCL ug/L	SGV ug/L	1999 Exceedance		2004 Exceedance		2006 Exceedance	
				MCL	SGV	MCL	SGV	MCL	SGV
MW-4	Benzene	5	1	X	X		X		X
	1,2-Dichloroethene (1,2-DCE)	70	5		X				
OW-2	Benzene	5	1				X		
	Tetrachloroethene (PCE)	5	5	X	X	X	X	X	X
	Trichloroethene (TCE)	5	5	X	X	X	X	X	X
	1,2-Dichloroethene (1,2-DCE)	70	5	X	X	X	X	X	X
OW-5	Tetrachloroethene (PCE)	5	5	X	X	X	X		
	Trichloroethene (TCE)	5	5	X	X				
	1,2-Dichloroethene (1,2-DCE)	70	5		X		X		X
OW-6	Tetrachloroethene (PCE)	5	5	X	X	X	X	X	X
	Trichloroethene (TCE)	5	5			X	X	X	X
	1,2-Dichloroethene (1,2-DCE)	70	5		X		X		X
OW-10(R)*	Benzene	5	1	X	X	X	X		X
	Chlorobenzene	100	5		X				
	Methylene chloride	5	5	X	X				
	Toluene	1,000	5		X				
OW-13 - OW-13R**	Benzene	5	1	X	X	X	X	X	X
	1,2-Dichloroethene (1,2-DCE)	70	5		X				
	Methylene chloride	5	5	X	X				
	Toluene	1,000	5		X				
	Vinyl chloride	2	2	X	X	X	X		
OW-15	Benzene	5	1		X		X		
OW-18	Benzene	5	1		X		X	X	X
	Chlorobenzene	100	5				X		X
	Xylenes (total)	10,000	5						X
OW-19	Benzene	5	1	X	X		X		X
	Chlorobenzene	100	5		X		X		X
	Chloroethane	NA	5		X				
	Vinyl chloride	2	2	X	X			X	X
OW-21	Benzene	5	1	X	X		X		X
OW-22	Benzene	5	1	X	X		X	X	X
	Chlorobenzene	100	5		X		X		X
	Vinyl chloride	2	2	X	X				

Notes:

*OW-10 was replaced with OW-10R in 2000. OW-10 was abandoned because it was within the OU1 construction area.

**OW-13R was installed in February 2006 to replace OW-13.

Table 7
Natural Attenuation Parameters
February 2006
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Well ID	Date	Alkalinity (mg/L)	Chloride (mg/L)	Dissolved Oxygen (mg/L)	Ethane (ug/L)	Ethene (ug/L)	Ferrous Iron (mg/L)*	Methane (ug/L)	Laboratory Nitrate (mg/L)	Redox (mV)	Sulfate (mg/L)	Sulfide (mg/L)	TOC (mg/L)
MW-1	02/15/06	120	3.5	0.61	0.50 U	0.50 U	0.0	29 J	1.3	174.7	21.3	1.0 U	1 U
MW-4	02/15/06	220	105	0.62	0.50 U	0.50 U	3.4	1,000 J	0.10 U	-158.3	81.6	1.0 U	2
OW-2	02/15/06	42	3.0	3.89	0.50 U	0.50 U	0.0	0.50 U	1.4	47.7	38.1	1.0 U	1 U
OW-5	02/16/06	110	7.6	0.67	0.50 U	0.50 U	0.0	0.18 J	0.68	44.3	66.8	1.0 U	1
OW-6	02/16/06	38	1.6	5.65	0.50 U	0.50 U	0.0	0.50 U	0.47	139.0	42.2	1.0 U	1
OW-8	02/16/06	50	2.5	0.97	0.50 U	0.50 U	3.4	2.3 J	0.10 U	-72.8	1.0 U	1.0 U	1 U
OW-10R	02/15/06	170	2.1	0.89	0.50 U	0.43 J	3.4	1,200 J	0.10 U	-120.8	39.1	1.0 U	1
OW-13R	02/20/06	400	6.7	1.32	0.65	0.41 J	6.8	830	0.10 U	-126.9	23.2	1.0 U	4
OW-15	02/15/06	120	2.7	0.51	0.26 J	0.50 U	3.4	800 J	0.10 U	-139.1	20.0	1.0 U	4
OW-16	02/17/06	76	3.9	0.69	0.50 U	0.50 U	0.0	5.1 J	1.1 J	77.0	40.5	1.0 U	1 U
OW-17	02/20/06	170	6.7	1.83	0.50 U	0.50 U	0.0	160	0.10 U	90.2	34.7	1.0 U	2
OW-18	02/17/06	430	15.3	0.84	0.50 U	0.50 U	0.0	1,100 J	0.10 UJ	-93.4	3.2	1.5	11
OW-19	02/17/06	310	16.1	1.73	1.0 U	0.43 J	3.4	960 J	0.10 UJ	-117.2	29.8	1.0 U	7
OW-21	02/16/06	270	5.1	0.82	0.50 U	0.50 U	3.4	260 J	0.10 U	-115.3	55.0	1.0 U	3
OW-22	02/16/06	340	14.8	0.57	1.0 U	1.0 U	3.4	1,200 J	0.10 U	-157.9	7.6	1.0 U	7
OW-23	02/17/06	280	10.5	0.64	0.38 J	0.25 J	0.0	350 J	0.10 UJ	-126.9	29.7	1.0	2
OW-24	02/20/06	120	2.2	4.5	0.50 U	0.50 U	0.0	0.50 U	0.20	60.7	12.7	1.0 U	1 U
OW-25	02/20/06	55	1.2	8.49	0.50 U	0.50 U	0.0	0.83	0.25	37.9	11.9	1.0 U	1 U

Notes:

mg/L = milligrams per liter

ug/L = micrograms per liter

mV = milliVolts

TOC = total organic carbon

U = Analyte not detected at method reporting limit.

J = Estimated result; result is less than the reporting limit.

UJ = Analyte not detected above the reporting limit; however, the reporting limit is approximate.

*Ferrous iron was measured in the field (Hach kit).

Table 8
February 2006
Detected Volatile Organic Compounds in Surface Water, Pore Water, and Sediment Sampling Locations in Gold Creek
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Location	SED-1 / SW-1 (Downstream)				PW-DOWNSTREAM				PW-UPSTREAM			SED-2 / SW-2 (Upstream)	
Sample	SED-1	SED-1 DUP	SW-1	SW-1 DUP	PW-DOWN-STREAM	PW-DOWN-STREAM DUP	SED-DOWN-STREAM	SW-DOWN-STREAM	PW-UP-STREAM	SED-UP-STREAM	SW-UP-STREAM	SED-2	SW-2
Constituent	ug/kg	ug/kg	ug/L	ug/L	ug/L	ug/L	ug/kg	ug/L	ug/L	ug/kg	ug/L	ug/kg	ug/L
Bromomethane	23 U	18 U	2.0 U	2.0 U	2.0 U	2.0 U	43 UJ	2.0 U	**0.40 J**	15 U	2.0 U	32 U	2.0 U
Carbon Disulfide	11 U	9.1 U	1.0 U	1.0 U	1.0 U	1.0 U	21 UJ	1.0 U	1.0 U	7.3 U	1.0 U	**1.8 J**	1.0 U
Chloroethane	23 U	18 U	**0.37 J**	2.0 U	2.0 U	2.0 U	43 UJ	**0.28 J**	2.0 U	15 U	2.0 U	32 U	2.0 U
Chloromethane	23 U	18 U	2.0 U	2.0 U	2.0 U	2.0 U	43 UJ	2.0 U	**0.16 J**	15 U	2.0 U	32 U	2.0 U
4-Methyl-2-pentanone	45 U	36 U	5.0 U	5.0 U	5.0 U	5.0 U	85 UJ	5.0U	**0.38 J**	29 U	5.0 U	65 UJ	5.0 U
Toluene	**1.2 J**	**0.95 J**	1.0 U	1.0 U	1.0 U	1.0 U	**51 J**	1.0 U	1.0 U	7.3 U	1.0 U	**2.1 J**	1.0 U
Trichloroethene	**1.9 J**	9.1 U	1.0 U	1.0 U	1.0 U	1.0 U	21 UJ	1.0 U	1.0 U	**0.99 J**	1.0 U	16 U	1.0 U
Vinyl Chloride	23 U	18 U	**0.34 J**	**0.29 J**	2.0 U	2.0 U	43 UJ	**0.53 J**	2.0 U	15 U	2.0 U	32 U	2.0 U

Notes:
J = Estimated result; less than the reporting limit.
U = The analyte was analyzed for but not detected above the quantitation limit.
Blue = Detected constituents
Acetone, 2-butanone, and methylene chloride were reported by the laboratory in some samples; however, the results were qualified during the data validation process as not detected (U) at or above the reported levels due to the presence of those compounds in an associated method, field, trip, or rinsate blank.

Table 9
Comparison of February 2006 Detected Volatile Organic Compounds
in Surface and Pore Water to Guidance Criteria
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Constituent	Maximum Detected Concentration, ug/L	New York State Surface Water Limits[1]	Human Health Bioaccumulation Criterion, ug/L[2]	EC50, ug/L[3]	LC50, ug/L[4]	FreshwaterToxicity Reference Value, ug/L[5]
Bromomethane	0.40 J	5	-	Medaka (fish): 5.0×10^{2} Guppy (fish): 6.0×10^{-1} Water flea (insect): $1.7\text{-}2.0 \times 10^{3}$ Green algae (plant): $2.1\text{-}6.7 \times 10^{3}$	Carp (fish): 1.4×10^{4} Guppy (fish): 8.0×10^{-1} Water flea (insect): 2.2×10^{3}	-
Chloroethane	0.37 J	5	-	-	-	-
Chloromethane	0.16 J	5	-		Bluegill (fish): 5.5×10^{5}	
4-Methyl-2-pentanone	0.38 J	5	-	-	-	
Vinyl Chloride	0.53 J	2	18.0[1]	-		3.88×10^{3}

Notes:

[1]6 NYCRR Part 703

[2]New York State Technical Guidance for Screening Contaminated Sediments, 1999 update.

[3]U.S. Geological Survey, 1998. Transport, Fate, and Behavior of Organic Compounds in Streams, Table 31. U.S.G.S. Professional Paper 1589. EC50 is minimum concentration resulting in 50% functional effects on test organisms.

[4]U.S. Geological Survey, 1998. Transport, Fate, and Behavior of Organic Compounds in Streams, Table 30. U.S.G.S. Professional Paper 1589. LC50 is minimum concentration resulting in 50% mortality of test organisms.

[5]U.S. EPA Region 6, 1999, Screening Level Risk Assessment Protocol, Appendix E, Toxicity Reference Values. Produced by the Center for Combustion Science and Engineering, Multimedia Planning and Permitting Division.

Table 10
Comparison of February 2006 Detected Volatile Organic Compounds in Sediment to Guidance Criteria[1]
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Constituent	Maximum Detected Concentration, ug/kg	Human Health Bioaccumulation Criterion, ug/kg[2]	Benthic Aquatic Life Acute Toxicity Criterion, ug/kg[2]	Benthic Aquatic Life Chronic Toxicity, ug/kg[2]
Carbon Disulfide	1.8 J	-	-	-
Trichloroethene	1.9 J	60	-	-
Toluene	51 J	-	7,050	1,470

Notes:

[1]New York State Technical Guidance for Screening Contaminated Sediments, 1999 update.

[2]Using organic carbon normalized criteria in guidance document and an assumed carbon content for sediment of 3%, which is a conservative default value. Organic carbon in sediment is typically reported to be in the range of 3% to 10%.

Figures

2,000' 0 2,000'

SCALE IN FEET

LEGEND:

— — — — APPROXIMATE SITE BOUNDARY

SOURCE:
USGS TOPOGRAPHIC QUADRANGLE MAP
PORT JERVIS NORTH, NEW YORK, DATED 1991.

CARDINAL RESOURCES

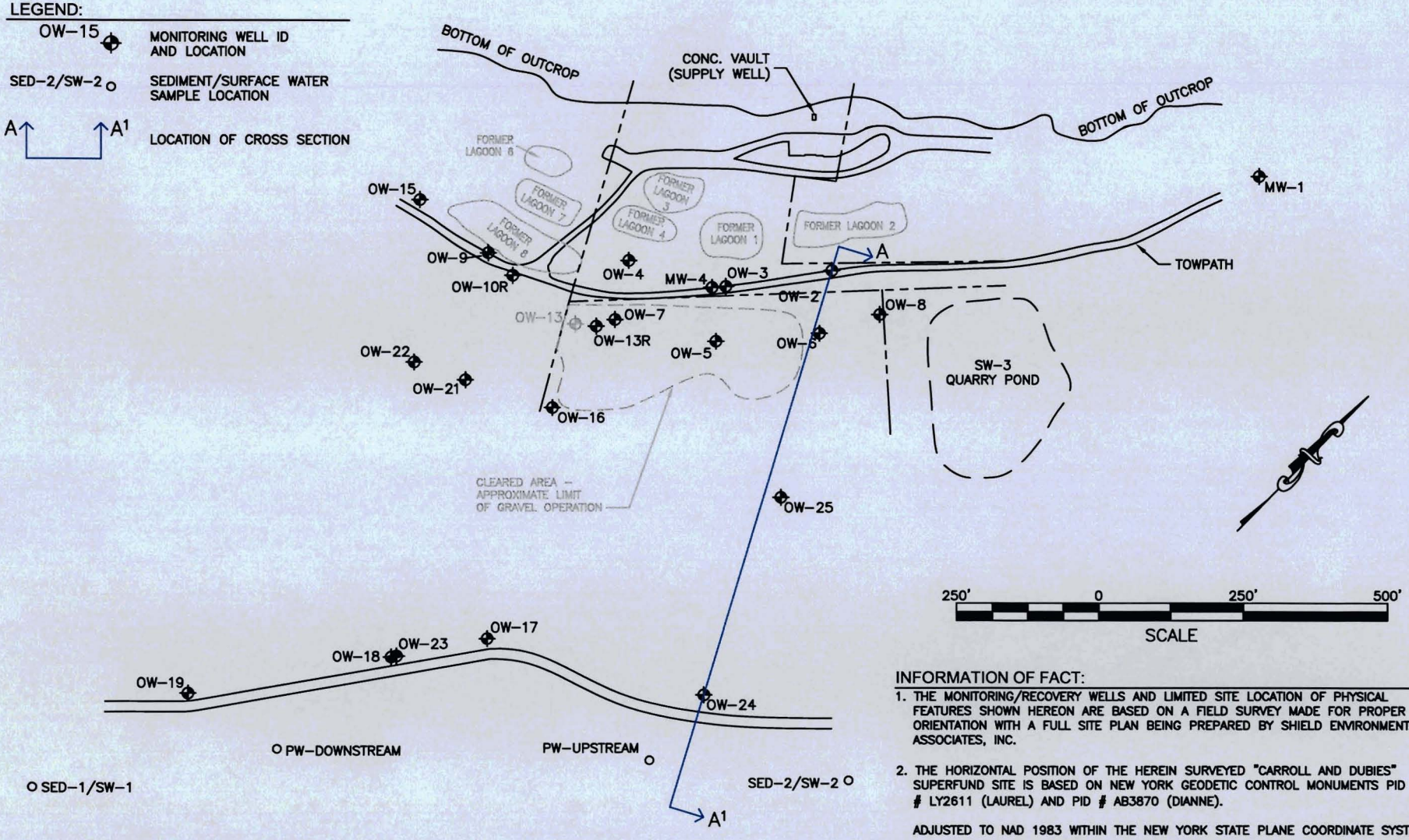
CARROLL AND DUBIES SUPERFUND SITE
TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK

104-0012

NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
1							
0	ECM						

FIGURE 1
SITE LOCATION MAP
FEBRUARY, 2006

CADD FILE	9005	SCALE	AS NOTED	CURRENT DATE:	03/08/06
DRAWING NO.	104-0012			REVISION	0



INFORMATION OF FACT:

1. THE MONITORING/RECOVERY WELLS AND LIMITED SITE LOCATION OF PHYSICAL FEATURES SHOWN HEREON ARE BASED ON A FIELD SURVEY MADE FOR PROPER ORIENTATION WITH A FULL SITE PLAN BEING PREPARED BY SHIELD ENVIRONMENTAL ASSOCIATES, INC.

2. THE HORIZONTAL POSITION OF THE HEREIN SURVEYED "CARROLL AND DUBIES" SUPERFUND SITE IS BASED ON NEW YORK GEODETIC CONTROL MONUMENTS PID # LY2611 (LAUREL) AND PID # AB3870 (DIANNE).

ADJUSTED TO NAD 1983 WITHIN THE NEW YORK STATE PLANE COORDINATE SYSTEM.

NOTE: THE OUTLINES OF THE FORMER LAGOONS ARE BASED ON THE ACTUAL EXCAVATION.

SOURCE: MASER CONSULTING P.A. MONITORING WELL LOCATION PLAN. INDEXN). SUOOQ9, MARCH 3, 1999.

CARDINAL RESOURCES

CARROLL AND DUBIES SUPERFUND SITE
TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK
104-0012

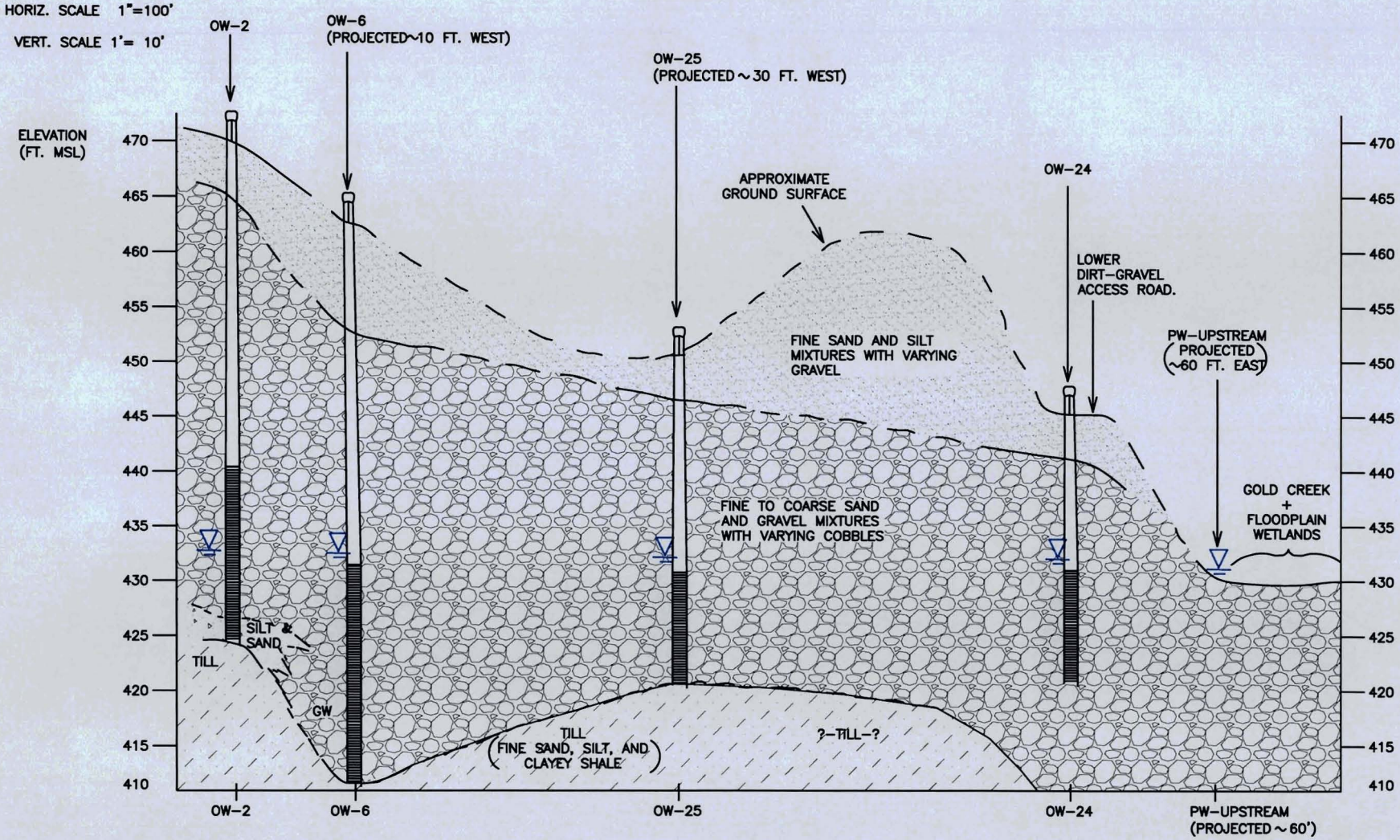
NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
1							
0	ECM						

FIGURE 2
MONITORING WELL, SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS
FEBRUARY, 2006

CADD FILE	9005	SCALE	AS NOTED	CURRENT DATE:	03/08/06
DRAWING NO.	104-0012			REVISION	0

CROSS SECTION A–A¹

(LOOKING NORTHEAST)



HORIZONTAL SCALE 1"=100'

CARDINAL RESOURCES

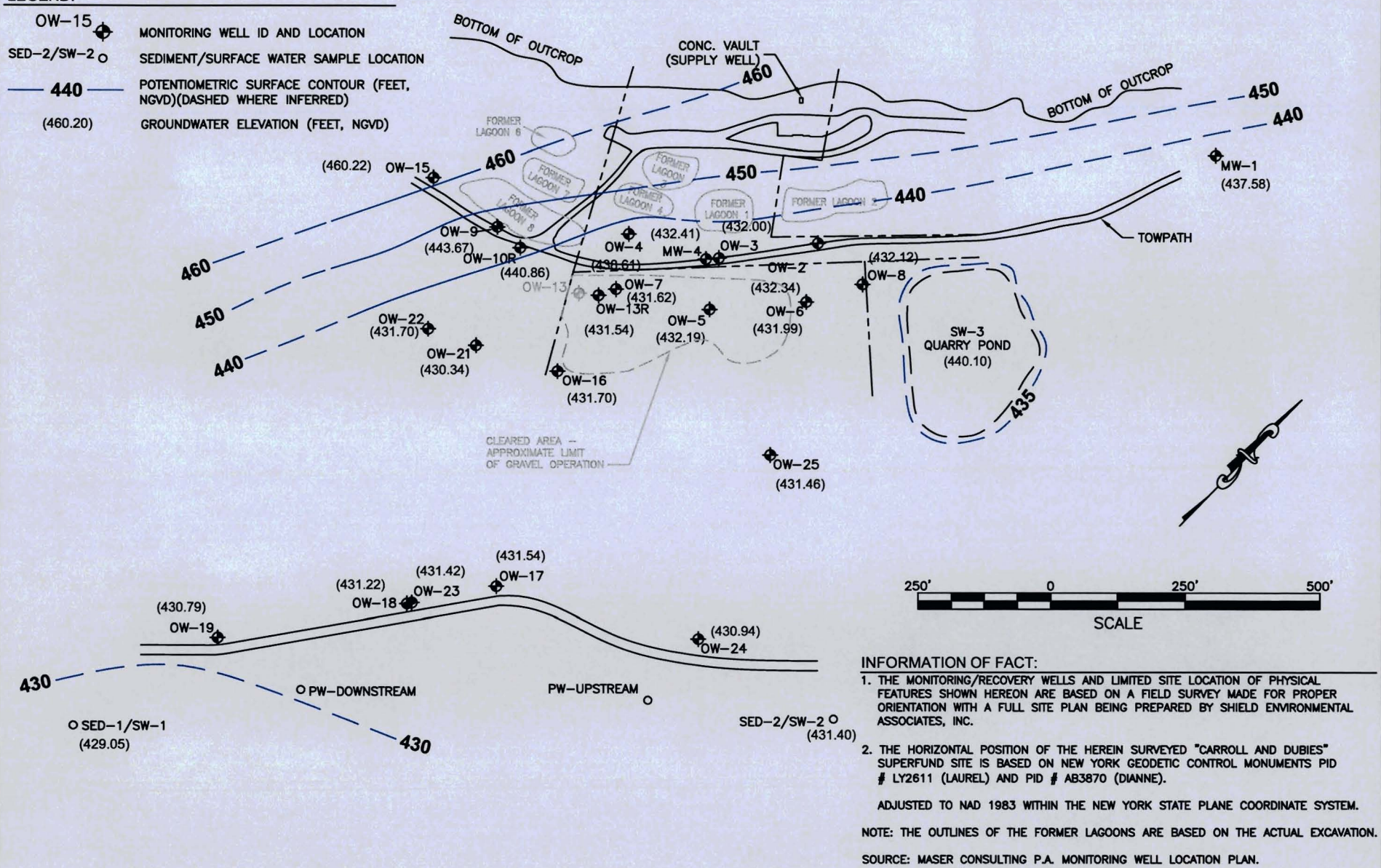
CARROLL AND DUBIES SUPERFUND SITE
TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK
104-0012

NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
1							
0	ECM						

FIGURE 3
CROSS SECTION

FEBRUARY, 2006

CADD FILE	9112	SCALE	AS NOTED	CURRENT DATE:	03/08/06
DRAWING NO.	104-0012-0300-02			REVISION	0



INFORMATION OF FACT:

1. THE MONITORING/RECOVERY WELLS AND LIMITED SITE LOCATION OF PHYSICAL FEATURES SHOWN HEREON ARE BASED ON A FIELD SURVEY MADE FOR PROPER ORIENTATION WITH A FULL SITE PLAN BEING PREPARED BY SHIELD ENVIRONMENTAL ASSOCIATES, INC.
2. THE HORIZONTAL POSITION OF THE HEREIN SURVEYED "CARROLL AND DUBIES" SUPERFUND SITE IS BASED ON NEW YORK GEODETIC CONTROL MONUMENTS PID # LY2611 (LAUREL) AND PID # AB3870 (DIANNE).

   ADJUSTED TO NAD 1983 WITHIN THE NEW YORK STATE PLANE COORDINATE SYSTEM.

NOTE: THE OUTLINES OF THE FORMER LAGOONS ARE BASED ON THE ACTUAL EXCAVATION.

SOURCE: MASER CONSULTING P.A. MONITORING WELL LOCATION PLAN. INDEXN). SUOOQ9, MARCH 3, 1999.

CARDINAL RESOURCES

CARROLL AND DUBIES SUPERFUND SITE
TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK
104-0012

NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
1							
0	ECM						

FIGURE 4
GROUNDWATER CONTOUR MAP

FEBRUARY 2006

CADD FILE	9112	SCALE	AS NOTED	CURRENT DATE:	03/08/06
DRAWING NO.	104-0012-0300-01			REVISION	0

LEGEND:

OW–15 ◆ MONITORING WELL ID AND LOCATION

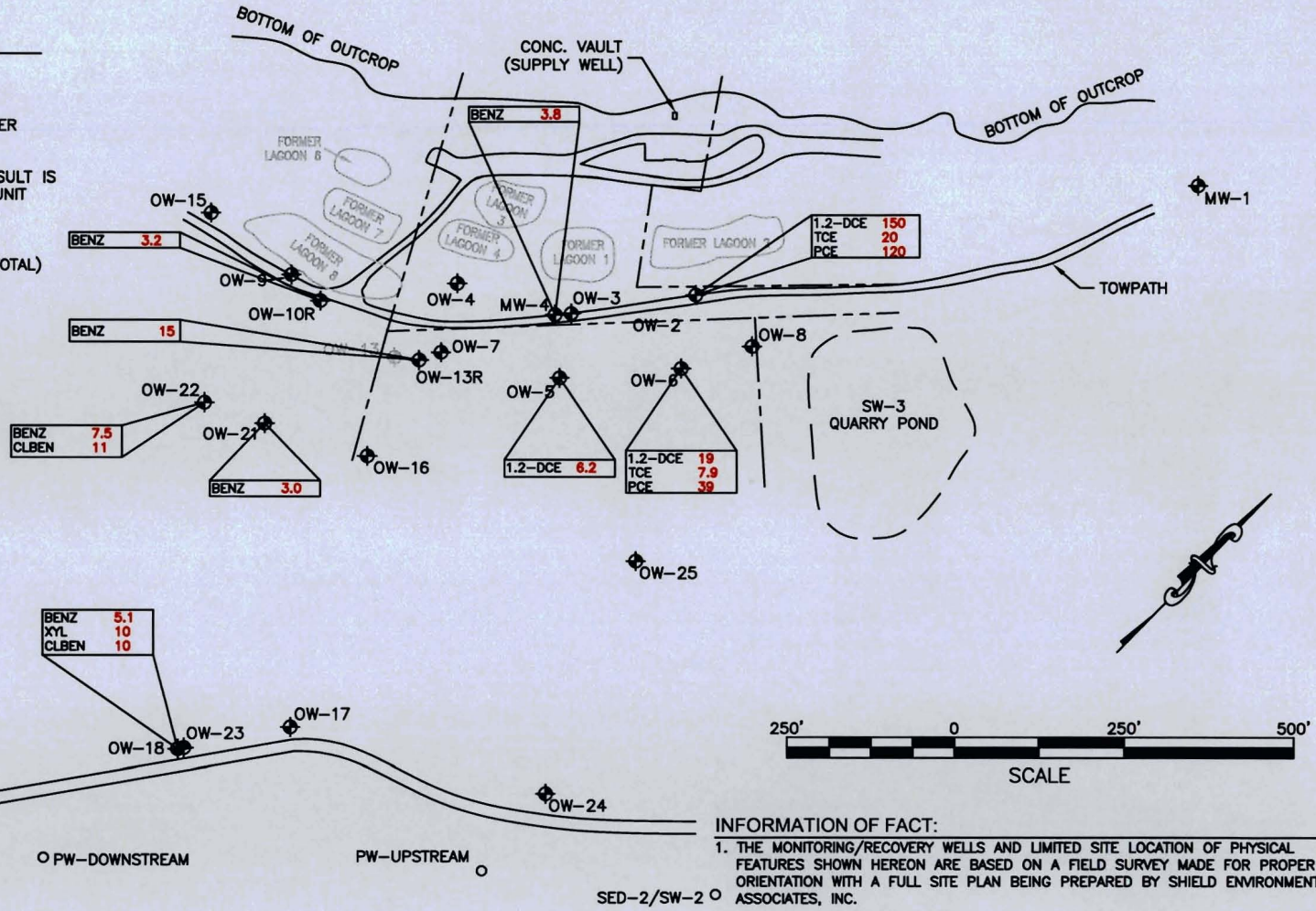
SED–2/SW–2 ○ SEDIMENT/SURFACE WATER SAMPLE LOCATION

J – ESTIMATED RESULT. RESULT IS LESS THAN REPORTING UNIT

BENZ – BENZENE
CLBEN – CHLOROBENZENE
1.2–DCE – 1.2–DICHLOROETHANE (TOTAL)
PCE – TETRACHLOROETHENE
TCE – TRICHLOROETHENE
VC – VINYL CHLORIDE
XYL – XYLENES (TOTAL)

ALL CONCENTRATIONS IN ug/L.

RED VALUES EXCEED SGV OR MCL



INFORMATION OF FACT:

1. THE MONITORING/RECOVERY WELLS AND LIMITED SITE LOCATION OF PHYSICAL FEATURES SHOWN HEREON ARE BASED ON A FIELD SURVEY MADE FOR PROPER ORIENTATION WITH A FULL SITE PLAN BEING PREPARED BY SHIELD ENVIRONMENTAL ASSOCIATES, INC.

2. THE HORIZONTAL POSITION OF THE HEREIN SURVEYED "CARROLL AND DUBIES" SUPERFUND SITE IS BASED ON NEW YORK GEODETIC CONTROL MONUMENTS PID # LY2611 (LAUREL) AND PID # AB3870 (DIANNE).

   ADJUSTED TO NAD 1983 WITHIN THE NEW YORK STATE PLANE COORDINATE SYSTEM.

NOTE: THE OUTLINES OF THE FORMER LAGOONS ARE BASED ON THE ACTUAL EXCAVATION.

SOURCE: MASER CONSULTING P.A. MONITORING WELL LOCATION PLAN. INDEXN). SU0009, MARCH 3, 1999.

CARDINAL RESOURCES

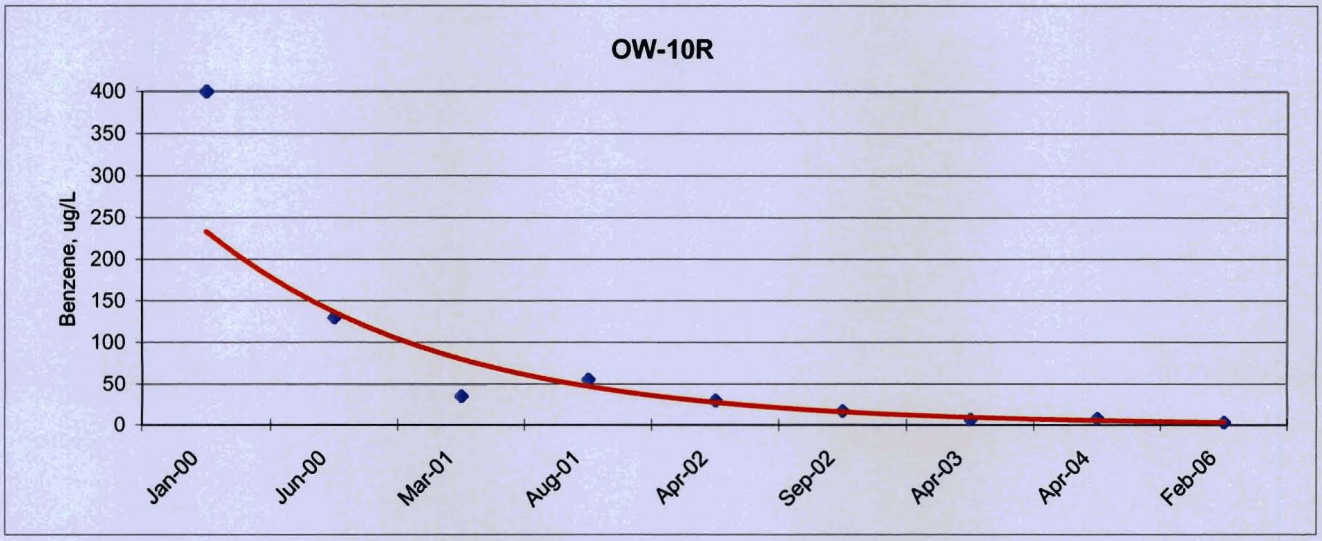
CARROLL AND DUBIES SUPERFUND SITE
TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK
104-0012

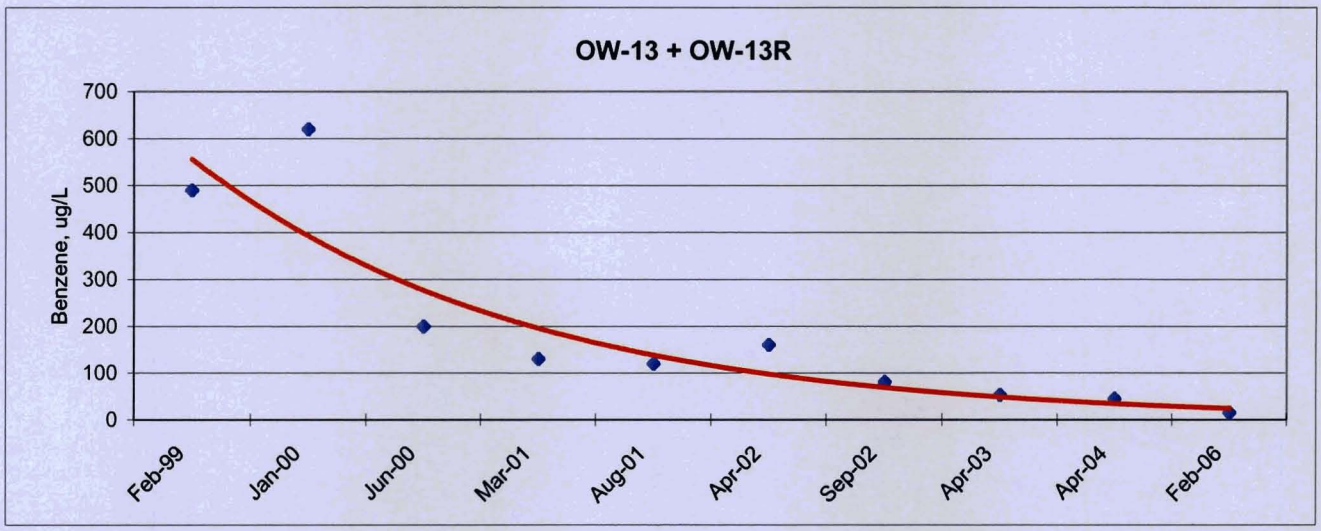
NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
1							
0	ECM						

FIGURE 5
VOLATILE ORGANIC COMPOUND EXCEEDANCES IN GROUNDWATER FEBRUARY, 2006

CADD FILE	9112	SCALE	AS NOTED	CURRENT DATE:	03/08/06
DRAWING NO.	104-0012-0300-02			REVISION	0

Figure 6
Benzene Concentration Trends
Pre-Excavation to April 2004





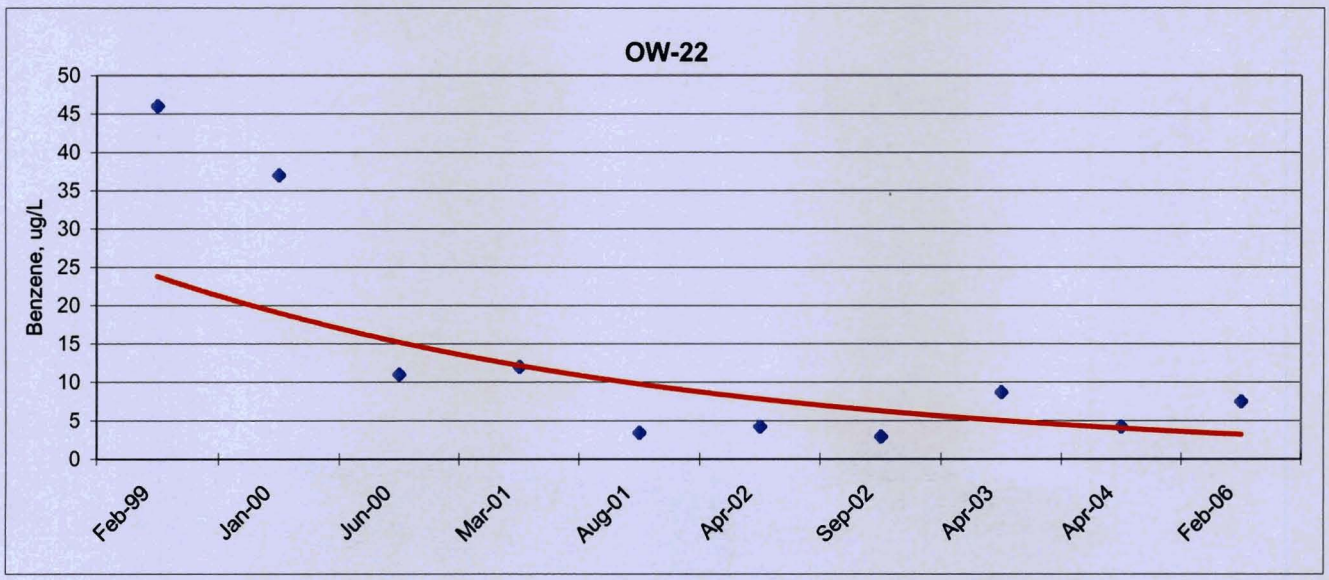


Figure 7
Benzene Concentration in Groundwater Over Duration of the Monitoring Period
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

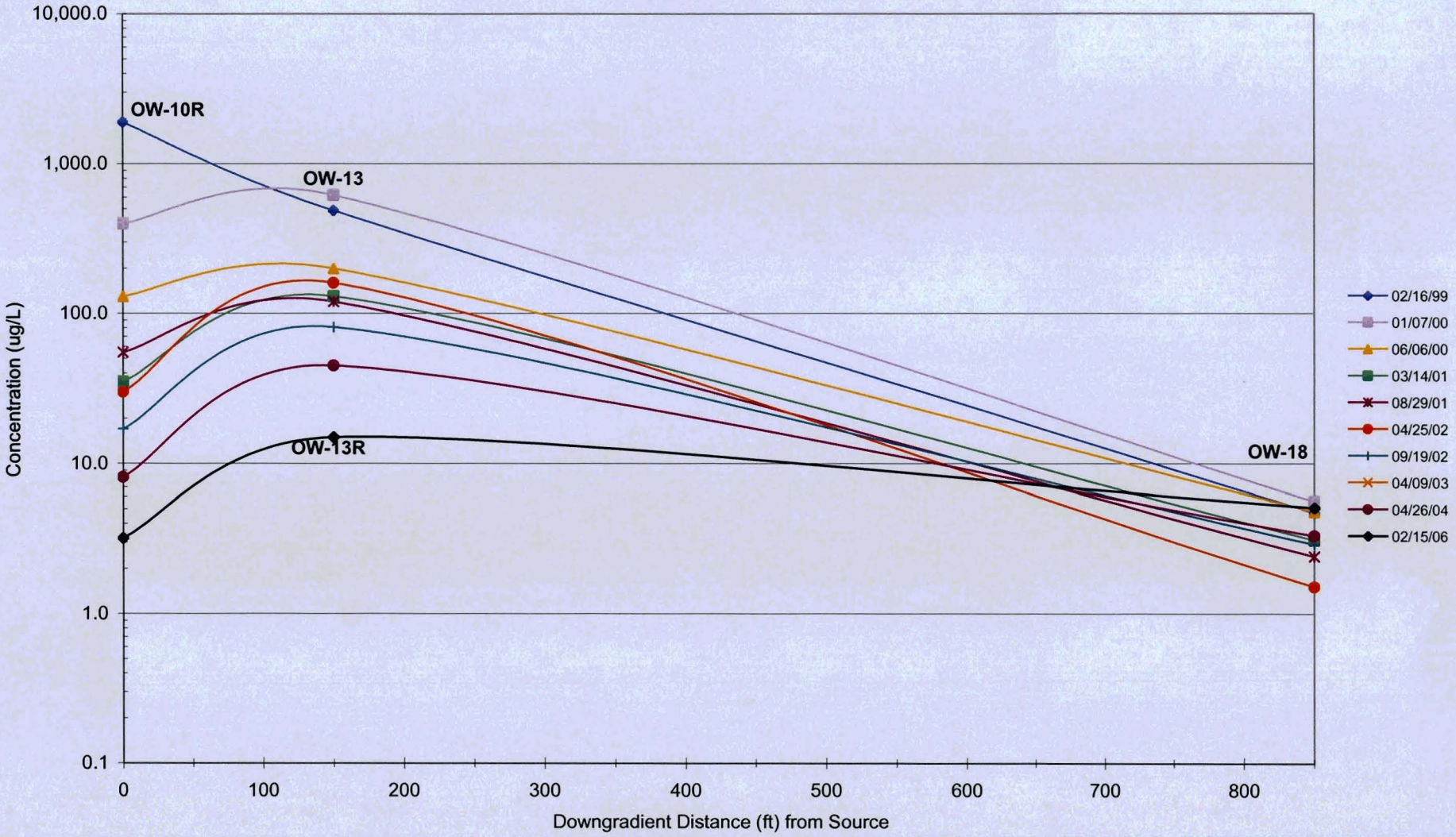
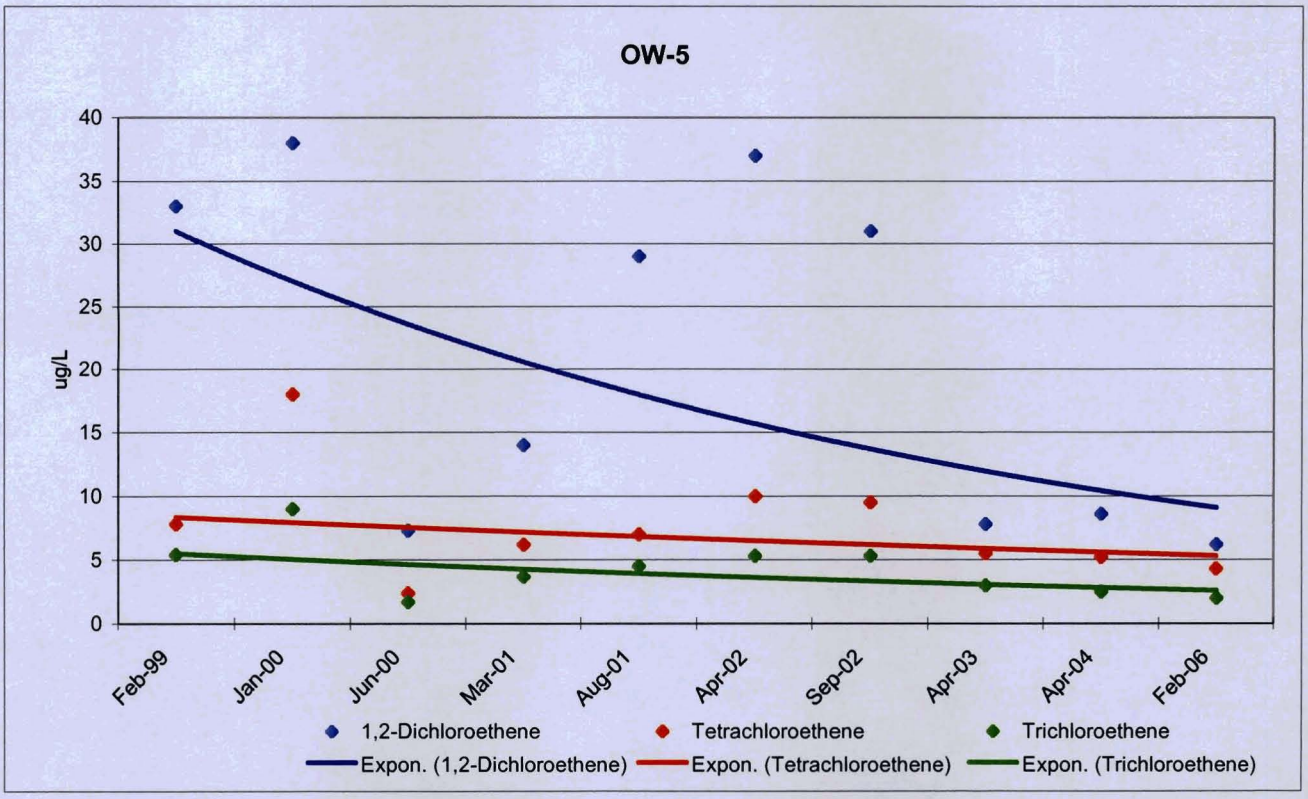
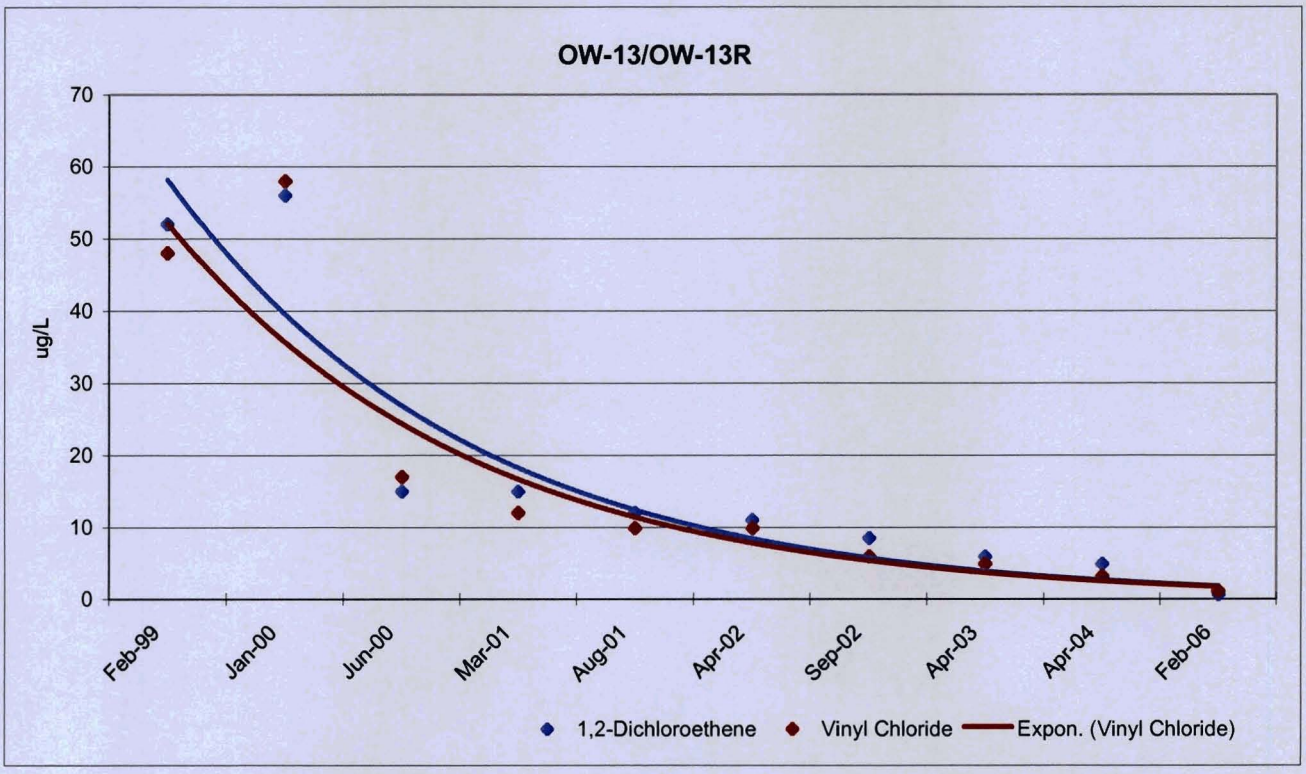


Figure 8
Chlorinated VOC Concentration Trends
Pre-Excavation to April 2004





Appendix A
Boring Logs for Wells Installed in February 2006

CARDINAL

Soil Boring Log: OW-13R

CARDINAL RESOURCES, INC. **4326 Northern Pike, Suite 200** **Monroeville, PA 15146** Telephone: 412-374-0989 Facsimile: 412-374-0959		Project Name	**Carroll & Dubies Superfund Site**
		Project #:	104-0012
		Boring ID	OW-13R
		Depth to GW	~24.5 ft bgs
		Elevation	
Contractor/Operator	Parratt & Wolff / Glen Lansing	Total Depth	35.0 feet bgs
Drilling Method	4.25-in Hollow-Stem Augers	Date Started	02/14/06
Borehole Logger	John Vogeding	Date Completed	02/14/06
Additional Personnel		Page	1 of 2

Depth (ft.)	Sample ID	Blow Counts	Recovery (in.)	PID Data (ppm)	Lithologic Description	USCS Symbol	Soil Graphic	Well Construction
2	S1	3 6 6 4	10	0	Loose, dark brown, very fine to fine, SAND and SILTY SAND, trace gravel and rock fragments, moist.	SM		
4						SW		
6	S2	12 27 20 21	6	0	Dense, dark to medium brown, fine to medium, SAND and SILTY SAND, trace gravel, moist.			
8								
10	S3	6 6 5 4	12	0	Loose, dark to medium brown, fine to coarse, SAND, with trace to moderate gravel, moist.			
12								
14						SW		
16	S4	6 42 50/2" -	9	0	Very dense, dark to medium brown, fine to coarse, SAND, moderate gravel and rock fragments, very moist.	GW		
18								
20	S5	21 25 29 16	18	0	Dense, dark grey to brown, fine to coarse, SAND, with moderate gravel, very moist.			
22								
24								

Remarks:

slotted screen | solid riser | grout | Riser stick-up = 2.5 feet

sandpack | bentonite | concrete

CARDINAL

Soil Boring Log: OW-13R

CARDINAL RESOURCES, INC.
4326 Northern Pike, Suite 200
Monroeville, PA 15146
Telephone: 412-374-0989
Facsimile: 412-374-0959

Project Name	Carroll & Dubies Superfund Site
Project #:	104-0012
Boring ID	OW-13R
Depth to GW	~24.5 ft bgs
Elevation	
Contractor/Operator	Parratt & Wolff / Glen Lansing
Drilling Method	4.25-in Hollow-Stem Augers
Borehole Logger	John Vogeding
Additional Personnel	
Total Depth	35.0 feet bgs
Date Started	02/14/06
Date Completed	02/14/06
Page	2 of 2

Depth (ft.)	Sample ID	Blow Counts	Recovery (in.)	PID Data (ppm)	Lithologic Description	USCS Symbol	Soil Graphic	Well Construction
26	S6	22 16 13 13	17	0	Medium dense, dark grey to black, medium to coarse, SAND, with moderate gravel, few rock fragments, wet at ~25.5 feet.	SW GW		
28								
30	S7	22 20 15 12	12	0	Medium dense, dark to olive grey, medium to coarse, SAND, with moderate gravel, wet.			
32								
34								
36					Bottom of Boring at 35.0 feet bgs.			
38								
40								
42								
44								
46								
48								

Remarks:

slotted screen | solid riser | grout | Riser stick-up = 2.5 feet

sandpack | bentonite | concrete

CARDINAL

Soil Boring Log: OW-24

CARDINAL RESOURCES, INC. 326 Northern Pike, Suite 200 Monroeville, PA 15146 Telephone: 412-374-0989 Facsimile: 412-374-0959		Project Name	Carroll & Dubies Superfund Site
		Project #:	104-0012
		Boring ID	OW-24
		Depth to GW	~14.0 feet bgs
		Elevation	
Contractor/Operator	Parratt & Wolff / Glen Lansing	Total Depth	24.4 feet bgs
Drilling Method	4.25-in Hollow-Stem Augers	Date Started	02/16/06
Borehole Logger	John Vogeding	Date Completed	02/16/06
Additional Personnel		Page	1 of 1

Depth (ft.)	Sample ID	Blow Counts	Recovery (in.)	PID Data (ppm)	Lithologic Description	USCS Symbol	Soil Graphic	Well Construction
		2			~4-in. silty TOPSOIL & fine SAND, with little HUMUS, moist.	PT		
	S1	6 6 6	19	0	Medium dense, medium to reddish brown, medium SAND and SILTY SAND w/moderate gravel, moist.	SM		
2	S2	9 10 11 11	6	0	Same as above (rock fragment stuck/blocking sampler).			
4	S3	7 7 6 5	12	0	Medium dense, light to medium brown, fine to medium SAND, trace gravel, moist.			
6	S4	9 10 12 12	17	0	Medium dense, reddish to greyish brown, medium to coarse SAND, with trace gravel, moist.			
8	S5	9 8 9 10	15	0	Medium dense, greyish brown, medium to coarse SAND, with NO gravel, moist.			
10	S6	7 6 5 5	14	0	Same as above.			
12	S7	6 6 7 7	18	0	Same as above.	SW		
14	S8	2 3 4 4	16	0	Loose, greyish to reddish brown, medium to coarse SAND, with trace to moderate gravel, wet at ~ 14 feet.			
16	S9	4 4 5 5	20	0	Same as above, with NO gravel, wet.			
18	S10	4 6 6 7	19	0	Same as above, medium dense with trace gravel, wet.			
20	S11	5 10 14 12	20	0	Same as above, with cobble fragment, wet.			
22	S12	14 12 8 8	22	0	Same as above, with trace to moderate gravel, wet.			
24					BOTTOM OF BORING AT 24.4 FEET.			

Remarks:

slotted screen | solid riser | grout | sandpack | bentonite | concrete

Riser stick-up = 2.4 feet

CARDINAL

Soil Boring Log: OW-25

CARDINAL RESOURCES, INC.
326 Northern Pike, Suite 200
Monroeville, PA 15146
Telephone: 412-374-0989
Facsimile: 412-374-0969

Project Name	Carroll & Dubies Superfund Site		
Project #:	104-0012		
Boring ID	OW-25		
Depth to GW	~20 ft bgs		
Elevation			
Contractor/Operator	Parratt & Wolff / Glen Lansing	Total Depth	30.0 feet bgs
Drilling Method	4.25-in Hollow-Stem Augers	Date Started	02/16/06
Borehole Logger	John Vogeding	Date Completed	02/16/06
Additional Personnel		Page	1 of 2

Depth (ft.)	Sample ID	Blow Counts	Recovery (in.)	PID Data (ppm)	Lithologic Description	USCS Symbol	Soil Graphic	Well Construction
		2			~4-in. silty TOPSOIL & silty SAND, with little HUMUS, moist.	PT		
	S1	2 3 8	12	0	Medium dense, medium brown, very fine to fine SAND and SILTY SAND with trace gravel, moist.	SM		
2	S2	9 9 9 14	15	0	Medium dense, medium to reddish brown, fine to medium SAND and SILTY SAND, with trace to moderate gravel, moist with some perched water.	SM SW		
4	S3	8 50/4" - -	0	0	NO RECOVERY (sampler refusal). COBBLES observed in cuttings from 4 - 6 feet.			
6	S4	9 50/4" - -	4	0	COBBLE and rock fragments.	GW		
8	S5	50/2" - - -	0	0	NO RECOVERY (sampler refusal). Augers grinding through COBBLES			
10	S6	1 2 5 9	8	0	Medium dense, medium to greyish brown, medium to coarse SAND, with moderate Gravel, moist.	SW		
12	S7	10 9 8 8	14	0	Same as above, with trace gravel, moist.			
14	S8	10 17 39 16	15	0	Very dense, medium to greyish brown, medium to coarse, SAND, with moderate GRAVEL, COBBLES (fragments), moist.			
16	S9	38 50/4" - -	8	0	Same as above, very moist.			
18	S10	- - - -	NA	0	Augers grinding through COBBLES from 18 - 20 feet.	GW		
20	S11	5 11 34 26	12	0	Very dense, dark greyish to reddish brown, medium to coarse, SAND and GRAVEL, COBBLES (fragments), wet at ~ 20 feet..			
22	S12	29 19 14 11	19	0	Same as above, wet. (beginning to experience heaving sands.)			
24								

Remarks:

slotted screen | solid riser | grout | Riser stick-up = 2.0 feet

sandpack | bentonite | concrete

CARDINAL

Soil Boring Log: OW-25

CARDINAL RESOURCES, INC. **326 Northern Pike, Suite 200** **Monroeville, PA 15146** Telephone: 412-374-0989 Facsimile: 412-374-0959		Project Name	**Carroll & Dubies Superfund Site**
		Project #:	104-0012
		Boring ID	OW-25
		Depth to GW	~20 ft bgs
		Elevation	
Contractor/Operator	Parratt & Wolff / Glen Lansing	Total Depth	30.0 feet bgs
Drilling Method	4.25-in Hollow-Stem Augers	Date Started	02/16/06
Borehole Logger	John Vogeding	Date Completed	02/16/06
Additional Personnel		Page	2 of 2

Depth (ft.)	Sample ID	Blow Counts	Recovery (in.)	PID Data (ppm)	Lithologic Description	USCS Symbol	Soil Graphic	Well Construction
26	S13	3 6 9 7	20	0	Same as above, wet. (experiencing heaving sands.)	GW		
28	S14	6 11 13 16	24	0	*increasing gravel and cobble\fragments with depth.			
30	S15	13 16 11 10	24	0	trace amount of dark grey to black, clayey shale near 30 feet.			
32					Bottom of Boring at 30.0 feet bgs.			
34								
36								
38								
40								
42								
44								
46								
48								

Remarks:

slotted screen | solid riser | grout | sandpack | bentonite | concrete

Riser stick-up = 2.0 feet