Semiannual Monitoring Report

March 2001

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

Shield Environmental Associates, Inc.
4326 Northern Pike
Monroeville, Pennsylvania 15146

Project No. 698-0110

May 2001

Charles L Peter

Charles L. Peterman, P.G.
Senior Geologist

Kevin Jones

Kevin R. Jones
Managing Principal

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1.0 Introduction

This *Semiannual Monitoring Report* has been prepared for the Carroll and Dubies (C&D) Superfund Site, on behalf of the Carroll and Dubies Superfund Site Potentially Responsible Parties (PRP) Group, by Shield Environmental Associates, Inc. (Shield).

This report documents field activities and presents analytical data from field work completed between March 13 and March 16, 2001. The second semiannual report for 2001 will include a detailed analysis of data.

The documents used as guidance for the field activities were:

- *Field Sampling and Analysis Plan Addendum* (Shield, 1998)
- *Final Remedial Design Work Plan Addendum* (Shield, 1998a)
- *Quality Assurance Project Plan Addendum* (Shield, 1998b)
- *Remedial Action Work Plan, Appendix B, Health and Safety Plan* (Shield, 1998c)

Historical data from the *Addendum to Supplemental Hydrogeologic Remedial Investigation* (Remediation Technologies Inc. [RETEC], 1995) and *Preliminary Remedial Investigation Results* (Blasland, Bouck, & Lee, Inc. [BB&L], 1992) have been incorporated into this report as well as data collected during previous Shield sampling events.

The remedial activities for this site are separated into two operable units. Operable Unit 1 (OU-1) addressed source control through remediation of the lagoons, which was completed in 1999. This report covers the Operable Unit 2 (OU-2) activities only, which addresses groundwater impacts and remediation.

A Record of Decision (ROD) for OU-2 was signed by the U.S. Environmental Protection Agency (U.S. EPA) in September 1996. The major components of the selected remedy in the ROD included:

- Documenting monitored natural attenuation of organic contaminants in the groundwater

- Implementing institutional controls
- Monitoring of the groundwater to evaluate groundwater quality and ensure effectiveness of the remedy
- Sampling of water and sediment in Gold Creek

1.1 Site Location and History

The C&D Superfund Site is located in the Town of Deerpark in Orange County, New York (Figure 1). The three-acre site is approximately 3,000 feet northeast of the City of Port Jervis, New York. In 1970, the site began operating as a disposal facility. Liquid industrial wastes were received from approximately 1971 to 1979. The facility also accepted septic waste and municipal solid waste until 1989, which were the majority of wastes disposed of at the site. Figure 2 presents the details of the site. The wastes disposed at the site were removed during remediation activities conducted in 1999. Site restoration continued through the first week of January 2000. These activities are documented in the OU-1 *Remedial Action Report* (Shield, 2000).

The site is situated in 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 immediate surrounding area includes undeveloped woodlands to the north; undeveloped woodlands, a sand and gravel quarry pit, and the closed City of Port Jervis landfill to the east; the City of Port Jervis Police Department shooting range to the south; and a sparsely vegetated, shale bedrock, hillside to the west.

1.2 Site Hydrogeology

Subsurface investigations at the site (BB&L, 1992) have delineated three hydrostratigraphic units. The uppermost units have been identified as Pleistocene Age glacial outwash underlain by glacial till (RETEC, 1995). The underlying bedrock is the Middle Devonian age Mahantango Formation, the uppermost unit of the Hamilton Group. The outwash unit is generally described as medium brown, fine- to coarse-grained sand with inclusions of gravel and some cobbles. Color variations include reddish-brown and brownish gray. Very few borings indicate the presence of silt. Where silt is mentioned, it is usually as a trace amount. The till unit is generally described as dark gray, orangish brown, or dark brown silt and sand. Trace amounts of gravel and small sand lenses are reported. The bedrock is generally described as gray, dark gray, or black competent shale with horizontal fractures.

Groundwater flow across the site is to the southeast toward Gold Creek (Figure 3). Gold Greek serves as the base level for local groundwater flow.

1.3 Summary of Baseline Groundwater Quality

Groundwater at the site has been impacted by organic compounds at concentrations that exceed the Federal Maximum Contaminant Level (MCL) or New York State Department of Environmental Conservation (NYSDEC) water quality standards and guidance values (SGV) for groundwater, or both. Appendices A and B contain summaries of volatile and semivolatile organic analytes, respectively, that have been historically detected in groundwater. Based on the findings of the remedial investigation/feasibility study (RI/FS) and the selected remedy, inorganic constituents are not part of the ongoing monitoring program.

The groundwater sample results during the sampling periods before source removal (prior to January 2000) were used as the baseline for comparing groundwater sampling results subsequent to source removal activities. The concentrations of historically detected constituents are presented in Appendices A and B.

Historically, the groundwater downgradient of former Lagoons 1 and 2 has been impacted by volatile organic compounds (VOCs) at levels greater than MCLs or SGV. These VOCs include benzene, 1,2-dichloroethene (1,2-DCE), trichloroethene (TCE), and tetrachloroethene (PCE) in the outwash or outwash/till. With the exception of OW-13, the groundwater immediately downgradient of former Lagoons 3 and 4 has not been impacted above MCLs or SGVs. OW-13 has contained concentrations of benzene, ethylbenzene, vinyl chloride (VC), methylene chloride, toluene, phenol, and 1,2-DCE that exceed standards. The major area of impact to groundwater within the outwash/till interval lies downgradient of former Lagoons 6, 7, and 8. Contaminants that have exceeded standards in this area at least once include the VOCs acetone, benzene, chlorobenzene, chloroethane, chloroform, 1,2-DCE, ethylbenzene, methylene chloride, toluene, VC, and xylenes and the semivolatile organic compounds (SVOCs) bis(2-ethylhexyl) phthalate, isophorone, 4-methylphenol, naphthalene, and phenol.

Within the till and bedrock there were no organic compounds reported above the MCLs or SGVs.

1.4 Work Plan Variations

During this round of field activities, the minor variations from the work plans are listed below, followed by a brief explanation:

- <u>Ferrous iron was analyzed in the laboratory rather than in the field</u>. The laboratory method for analysis of ferrous iron uses the same reagent chemistry as the Hach® field kit, and the appropriate holding times were met.

- <u>Hydrochloric acid (HCl) was added to the volatile organic analysis (VOA) vials by the laboratory before shipment, rather than by the field team</u>. The use of pre-preserved VOA vials did not compromise the data as all samples were at a pH of ≤2 as tested at the laboratory upon arrival. Placement of acid in the VOA bottles by the laboratory before shipment to the field, rather than sample acidification in the field, is the more common practice today.

2.0 Semiannual Monitoring Activities

This section outlines the procedures used for field sampling and monitoring activities, including measurement of groundwater elevations, collection of groundwater samples, measurement of field parameters in groundwater, surface water sampling, and sediment sampling. The results and interpretation of the semiannual monitoring program are provided in Section 4.0.

2.1 Groundwater Elevations

Groundwater elevations were determined based on 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.

In addition to gauging groundwater levels, three surface water elevations were also measured. Three permanent gauge staffs were installed, two along Gold Creek and one adjacent to the quarry pond east of monitoring well OW-8 during the June 2000 sampling event. The elevations and locations of the gauge staffs were surveyed by a State of New York-registered surveyor. These locations are shown in Figure 3 and are identified as SW-1, SW-2, and quarry pond.

2.2 Monitoring Well Sample Collection

Dedicated low-flow purging and sampling pumps are utilized to sample the monitoring wells. After stabilization procedures were completed for each monitoring well, groundwater samples were taken directly from the Tygon® tubing dedicated to each respective well pump.

All monitoring wells maintained less than 0.3 foot of drawdown during purging and stabilization except for OW-15 (0.79 foot).

During purging of each monitoring well, temperature, dissolved oxygen (DO), redox potential, specific conductance, pH, and turbidity were monitored and recorded on field forms (Appendix C) in average intervals of 5 minutes. The wells were pumped for periods ranging from 40 to 65 minutes. The goal was for three consecutive readings of field parameters within the following ranges:

- ±1.0 for temperature
- ±0.1 for pH
- ±3% for specific conductance (conductivity)
- ±10 millivolts (mV) for redox potential (redox)
- ±10% or ±0.2 mg/L for DO (whichever is greater)
- ±10% or ±2 nephelometric turbidity units (NTUs) for turbidity (whichever is greater)

Groundwater purged from the majority of monitoring wells in preparation for sampling was relatively clear and contained little to no detectable sediment or suspended particles. All groundwater samples were collected at a flow rate of between 150 and 350 milliliters per minute (mL/min). The low-flow sampling pumps allowed all samples to be collected with minimal turbulence.

2.3 Groundwater Field Parameters

Groundwater field parameters were measured with a Horiba Model 22 flow-through cell that was calibrated daily prior to sampling activities. Field parameters measured and recorded included:

- Temperature (°Centigrade)
- DO (milligrams per liter [mg/L])
- Redox potential (mV)
- pH (standard units)
- Specific conductance (micromhos per centimeter [umhos/cm])
- Turbidity (NTUs)

The final stabilized field parameter values are presented in Tables 1 and 2.

Temperature

Although a range for temperature fluctuations was not established in the *Field Sampling and Analysis Plan Addendum* (Shield, 1998), fluctuations were 0.1 degree Centigrade (°C) or less for a minimum of three consecutive readings prior to sampling all of the monitoring wells. Groundwater temperatures ranged from 7.80° to 10.70°C.

Dissolved Oxygen

DO concentrations stabilized for a minimum of three consecutive measurements within the recommended ±10% or 0.2 mg/L range in all but one monitoring well (OW-16). DO is an important parameter in the interpretation of natural attenuation trends. DO readings across the site ranged from 0.00 to 13.32 mg/L.

Redox

Redox stabilized within the recommended ±10 mV range for three consecutive measurements in all monitoring wells except OW-5. Redox is also an important parameter in the interpretation of natural attenuation trends. A wide range of redox readings were found in the wells, varying from –100.00 to 242.00 mV.

pH

A minimum of three consecutive readings for pH within the recommended ±0.1 range was achieved for all monitoring wells prior to sampling. Groundwater samples were within the pH range of 5.54 to 6.55.

Specific Conductance

A minimum of three consecutive readings for specific conductance was achieved within the recommended ±3% range for all monitoring wells prior to sampling. Specific conductance varied from 140 to 1,100 umhos/cm across the site.

Turbidity

A minimum of three consecutive readings for turbidity were achieved within the recommended ±10% or ±2 NTUs range for monitoring wells prior to sampling except for two wells, MW-15 and MW-18. Turbidity readings varied from 2.4 to 33.4 NTUs across the site.

2.4 Surface Water Sampling

Two surface water samples were collected from Gold Creek and are identified as SW-1, the downstream sample, and SW-2, the upstream sample. These locations were permanently monumented with staff gauges by the licensed surveyor. The locations were also marked with a yellow-painted fence post visible from the road during this monitoring period.

Samples were collected in accordance with the *Field Sampling and Analysis Plan* for VOCs and SVOCs. The SVOCs container was used to collect the samples at each location. Water was then transferred to the VOC sample vial from the SVOC container. The SVOC bottle was placed back into the water, and the bottle was refilled. The sample bottles were labeled appropriately and placed in a cooler with ice.

2.5 Sediment Sampling

Two sediment samples were collected from Gold Creek. These samples, identified as Sed 1 and Sed 2, are identified in Figure 2. They coincide with surface water sample locations SW-1 and SW-2. The samples were collected at the sediment/water interface.

The sediment samples were collected directly into the sample jars. At the shore line, an area was cleared of surface debris and roots to expose the sediment under approximately two inches of water. The sediment in the area was then mixed to homogenize the sample. The sample jar was then placed through the water and, using like a scoop, filled with sediment. Both VOC and SVOC samples were collected from the same location. This collection method was used instead of using a bowl and spoon as previously done to determine if historical acetone detections were a result of decontamination residuals or actually present in the sediments.

3.0 Sampling Results

3.1 Groundwater Elevations

The groundwater elevations for this sampling round are presented in Table 3, and Figure 3 shows the groundwater elevation contours.

The elevations of adjacent surface water bodies have been included in the groundwater contours map shown in Figure 3. Measurements of surface water elevations were collected on the same day as 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 site is approximately 0.12. The gradient transitions to a lesser slope at about the location of the towpath. From the towpath to Gold Creek, the gradient is very shallow, approximately 0.006. The steeper gradient on the western side of the site is due to the depth to bedrock along the valley wall. It is known from previous borings that the bedrock elevation in the vicinity of OW-15 is higher than across the rest of the site (RETEC, 1995). The bedrock elevation at OW-15 is approximately 433 feet, which is at or above the groundwater elevation of most of the wells. As the depth to bedrock increases towards the valley floor, the alluvial fill increases and the groundwater gradient flattens.

3.2 Groundwater Quality

Summaries of detected VOC and SVOC analytes from the March 2001 sampling event are presented in Tables 4 and 5, respectively, and in Figures 4 and 5. Historical data of detected organic compounds have been combined with the most recent data and are presented in Appendices A (VOCs) and B (SVOCs). Appendix D contains the analytical reporting pages from the data packages. The validated concentrations are used throughout this report. The complete laboratory analytical reports for this sampling episode have been submitted separately as electronic files on disk, along with the data validation report.

VOCs are the primary contaminants of concern in groundwater at this site. The concentrations of VOCs in site monitoring wells for this semiannual monitoring event have been reviewed in comparison to results from previous sampling events.

SVOCs are of lesser concern in groundwater than VOCs due to lower concentrations and limited areal extent. The SVOC concentrations in samples collected in March 2001 declined in concentrations and constituents, compared to SVOC sample results collected during previous sampling episodes (Appendix B).

3.2.1 Volatile Organic Compounds

Ten VOCs were detected in various wells during this sampling event, of which six exceeded regulatory limits (Table 4). The VOCs that exceeded regulatory limits are benzene, chlorobenzene, 1,2-DCE, PCE, TCE, and VC. The detected compounds and concentrations are shown by well in Figure 4. Monitoring well MW-1 contained VOCs but at concentrations not greater than MCLs or SGVs. Monitoring wells OW-8 and OW-16 did not contain detectable VOCs. The other 11 wells within the network had concentrations that exceeded MCLs or SGVs for one or more VOCs. The principal nonchlorinated VOC was benzene, and the principal chlorinated VOCs were 1,2-DCE and PCE, consistent with previous sampling episodes.

Concentration changes occurred in several wells. Benzene concentrations in OW-10R and OW-13 were at their lowest since 1995, dropping 95 and 70 micrograms per liter (ug/L), respectively. PCE concentrations were relatively consistent in MW-4, OW-5, and OW-6 being within historical values. The general trend for TCE in these four wells was the same as for PCE. In OW-2, the PCE concentration reached 160 ug/L, which is higher than previously reported, and the TCE in OW-2 reached 32 ug/L, which is higher than previously reported. The concentration of 1,2-DCE, a degradation compound, in OW-2 went up from 211 to 310 ug/L.

Although the concentrations increased, the percentage of degradation compounds continued to increase while the percentage of primary compounds continued to decrease (Figure 6).

3.2.2 Semivolatile Organic Compounds

Only one SVOC (bis [2-ethylhexyl] phthalate) was detected in four monitoring wells: OW-2, OW-6, OW-8, and OW-10R, in concentrations below the SGV (Table 5). The detected compounds and concentrations are shown by well in Figure 5. In comparison, in June 2000, seven SVOC constituents were reported in five wells, OW-2, OW-10R, OW-13, OW-18, and OW-22, and in three wells in January 2000, OW-10R, OW-13, and OW-18.

3.2.3 Monitored Natural Attenuation Parameters

Field measurements and laboratory analyses were performed on groundwater samples collected during this semiannual monitoring program. This information was collected to monitor evidence that natural attenuation processes, through biodegradation and other physical and chemical processes, are occurring and reducing contaminant concentrations in groundwater over time at the site.

The chemical and physical parameters measured as part of this monitoring program show that natural attenuation is occurring at the site. Since wastes and contaminated soils that acted as source material have been removed, concentrations of organic constituents in groundwater will continue to decrease over time due to natural attenuation.

Table 2 summarizes the natural attenuation parameter results, including:

- DO
- Alkalinity
- Chloride
- Ferrous iron
- Nitrate
- Sulfate
- Sulfide
- Total organic carbon (TOC)
- Ethane/ethene
- Methane
- Redox

The field parameters (Appendix C; Appendix E) were measured during monitoring well sample collection using a multi-parameter instrument. Natural attenuation analytical parameters for samples collected since February 1999 are provided in Appendix F.

General Observations

U.S. EPA has provided final guidance on tracking and interpreting natural attenuation trends in groundwater (U.S. EPA, 1999). Table 6 is an adaptation of a table presented at a U.S. EPA symposium (Weidermeier, 1996) that is useful in data interpretation. The contaminant plume at the C&D site is relatively complex, in that it shows impacts from chlorinated VOCs, nonchlorinated VOCs, and organic carbon as lagoon leachate. The general observations regarding natural attenuation data are:

- Several parameters indicate that reductive dechlorination of chlorinated VOCs may be occurring (presence of chlorinated daughter products, presence of ethane/ethene and methane within the plume, elevated chloride concentrations downgradient of the lagoons, redox readings less than 50 mV within the plume). Reductive dechlorination occurs under anaerobic conditions.

- Indicators of reductive dechlorination are most consistently found in association with the former Lagoon 8 portion of the contaminant plume, which contains both benzene and chlorinated VOCs. The former Lagoons 1 and 2 portion of the plume contains mainly chlorinated VOCs.

- All monitoring wells, except for OW-10R, OW-13, OW-21, and OW-22 were found to have DO readings less than 1 mg/L. DO concentrations in most wells were less than 0.5 mg/L, which is indicative of anaerobic conditions, under which reductive dechlorination will occur.

Dissolved Oxygen

DO readings were less than 0.5 mg/L in most wells, indicative of low oxygen conditions that would favor anaerobic degradation pathways, except for OW-10R, OW-13, OW-21, and OW-22.

Redox

Redox readings below approximately +750 mV indicate that anaerobic processes can occur. A reductive dechlorination pathway is possible when redox readings are +50 mV or less. Redox values for most of the wells located near and downgradient of the former lagoons exhibited redox readings less than +50 mV, indicative of conditions conducive to dechlorination. Background well MW-1 and downgradient wells OW-2, OW-5, OW-6, and OW-16, located further from the source areas, indicated redox values of greater than +50 mV.

Alkalinity

Alkalinity greater than two times the background concentration may be indicative of the ultimate oxidation of chlorinated VOCs to carbon dioxide (CO_2). Alkalinity greater than or equal to 280 mg/L was found in OW-10R, OW-13, and OW-22. The presence of elevated alkalinity concentrations indicates that more highly chlorinated VOCs are being degraded to VC and, ultimately, to CO_2.

Chloride

Elevated chloride concentrations (equal to or greater than two times the background concentration of 5.8 mg/L in MW-1) are indicative of reductive dechlorination. Chloride concentrations greater than or equal to 11.6 mg/L were found in MW-4, OW-5, OW-21, and OW-22, wells where chlorinated VOCs and degradation products have been detected.

Ferrous Iron

Ferrous iron is generated when ferric iron is used as an electron acceptor under anaerobic conditions. Ferrous iron concentrations greater than 1 mg/L may be indicative of reductive dechlorination. Ferrous iron concentrations greater than 1 mg/L were measured in all monitoring wells except MW-1, OW-2, OW-5, OW-6, and OW-16. The elevated ferrous iron concentrations were generally found downgradient of former Lagoons 6, 7, and 8.

Nitrate

Low nitrate concentrations (less than 1 mg/L) potentially indicate the occurrence of anaerobic degradation processes and reductive dechlorination in groundwater. Nitrate concentrations of 1 mg/L or less were found in all wells except MW-1, the background well, OW-2, OW-5, and MW-4 downgradient of the Lagoons 1 and 2 contaminant plume, and OW-16, a downgradient well that has not had detectable levels of constituents. The relatively high nitrate concentrations in OW-2 (6.2 mg/L) and OW-5 (7.1 mg/L) are probably a result of sewage and septage wastes from former Lagoons 1 and 2.

Sulfate/Sulfide

Sulfate is an electron acceptor under anaerobic, strongly reducing conditions. Sulfide is produced under these conditions. Relatively low sulfate (less than 20 mg/L), combined with detectable sulfide (greater than 1 mg/L) may be indicative of this reductive dechlorination pathway. Although sulfate concentrations less than 20 mg/L were measured in several wells, sulfide was not detected in any of the wells, indicating that sulfate is probably not being used as an electron acceptor at this site.

TOC

Organic carbon, as measured by TOC, provides a carbon and energy source for biodegradation, and can drive dechlorination. Although TOC was not measured in any well at the "rule of thumb" concentration of 20 mg/L or greater, concentrations greater than the background concentration of 1 mg/L (MW-1) were found in all wells with the exception of OW-2 and OW-16 (1 mg/L) and OW-8 and OW-6 (no detection of TOC).

Ethane/Ethene

These compounds are end degradation products of chlorinated VOCs. Detectable concentrations of both ethane and ethene were found in OW-10R, OW-13, OW-19, and OW-21. In addition, wells with detectable levels of ethane only include OW-15 and OW-22.

Methane

Methane is an ultimate reductive dechlorination daughter product, and concentrations greater than 0.1 mg/L may indicate this process. However, the presence of methane at this site in relatively high concentrations, greater than 1 mg/L, is more likely an indicator of impacts from septic waste disposal. Methane was measured at concentrations greater than 1 mg/L (1,000 ug/L) in OW-10R, OW-15, OW-18, and OW-22.

3.3 Surface Water Quality

Two surface water samples were collected during this sampling event. No detectable VOCs or SVOCs were reported in the upstream sample SW-2. The downstream sample, SW-1, however, had low detections below the reporting limit and SGV of VC, chloroethane, 1,2-DCE (total), and 1,2-dichloroethane (1,2-DCA). Historically detected VOCs in surface water are shown in Table 7.

3.4 Sediment Quality

Two sediment samples were collected during this sampling event. Analytical results for detected constituents are provided in Table 8. Acetone was detected in the downstream sample, Sed 1 and in the upstream sample, Sed 2. The detections were J-qualified, indicating the analyte was detected below the method reporting limit. Historically, acetone has been detected in both the upstream and downstream sediment samples.

There were no SVOCs detected in either sediment sample during this sampling event.

4.0 Summary and Conclusions

The 14 monitoring network wells were sampled between March 13 and 16, 2001 for analysis of VOCs, SVOCs, and natural attenuation parameters. Two surface water samples and two sediment samples were collected and analyzed for VOCs and SVOCs. All laboratory analytical samples were analyzed by Severn Trent Laboratories, Inc., North Canton, Ohio.

Generally, the concentrations of VOCs in groundwater collected from the three post-source removal sampling episodes either declined or were similar to the concentrations from the pre-source removal sampling episodes (Appendix A). In OW-2, where 1,2-DCE, PCE, and TCE increased, the relative percentage of 1,2-DCE compared to TCE plus TCE, continues to increase. The concentrations of SVOCs have decreased overall since the OU-1 removal action was completed. This is the first time that the detected SVOCs were all below SGVs or MCLs.

The groundwater chemical analyses and other parameters provide evidence that natural attenuation is occurring within the groundwater plume.

The evidence of ongoing natural attenuation processes, includes:

- The general reduction of VOC concentrations and the number of SVOC constituents and concentrations.
- The presence of 1,2-DCE, chloroethane, and VC, which are degradation products of PCE and TCE.
- The presence of ethene/ethane and methane, which are the ultimate degradation products of chlorinated VOCs.
- Elevated chloride concentrations in and downgradient of impacted zones, evidence of the release of chloride associated with the degradation of chlorinated VOCs.
- DO and redox values that indicate reductive dechlorination can occur.

Low concentrations of the VOCs chloroethane, VC, 1,2-DCE, and 1,2-DCA were detected in the downstream surface water sample, SW-1 collected from Gold

Creek. These concentrations are qualified “J,” as an estimated concentration below the reporting limit.

A low concentration of acetone was detected in the downstream sediment sample from Gold Creek. Acetone is a common laboratory contaminant and has been previously detected in the system equipment blank. Previous one-time detections of toluene and methylene chloride were not observed during this round of sampling. Previous SVOC detections of bis(2-ethylhexyl) phthalate and 4-methylphenol were not detected in the sediment samples from this sampling event. The concentrations are “J”-qualified, designating an estimated concentration below the method reporting limit.

5.0 Recommendations

It is recommended that the groundwater, surface water, and sediment sampling program continue on a semiannual basis, as outlined in the approved work plan. The next sampling event is scheduled for September 2001.

Evaluation of analytical data will continue to determine the effect of source removal on groundwater and document the effectiveness of natural attenuation.

6.0 References

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Tables

Table 1
Groundwater Field Parameters
March 2001
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Well ID	**Date**	**Temperature** (°C)	**pH** (standard units)	**Specific Conductance** (uS/cm)	**Turbidity** (nephelometric turbidity units)
MW-1	03/15/01	7.80	6.37	380	4.7
MW-4	03/14/01	9.50	6.21	1,400	2.4
OW-2	03/15/01	10.60	5.65	320	2.6
OW-5	03/14/01	10.40	5.93	1,100	4.7
OW-6	03/15/01	10.70	5.73	140	6.7
OW-8	03/15/01	10.10	6.54	220	12.9
OW-10R	03/14/01	10.70	6.37	730	33.4
OW-13	03/14/01	10.20	6.24	780	5.3
OW-15	03/14/01	9.00	6.14	480	24.0
OW-16	03/14/01	9.50	5.54	250	2.9
OW-18	03/16/01	9.80	6.55	670	24.0
OW-19	03/16/01	9.60	6.44	540	3.3
OW-21	03/13/01	10.30	6.27	690	6.9
OW-22	03/13/01	10.70	6.20	950	5.7

Table 2
Natural Attenuation Parameters
March 2001
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)	Ferrous Iron (mg/L)	Nitrate (mg/L)	Redox (mV)	Sulfate (mg/L)	Sulfide (mg/L)	TOC (mg/L)	Ethane (ug/L)	Ethene (ug/L)	Methane (ug/L)
MW-1	03/15/01	140	5.8	0.00	0.079	2.9	96.0	15	<1.0	1	<1.0	<1.0	86 D,B
MW-4	03/14/01	160	235	0.00	1.5	2.3	19.0	89	<1.0	5	<0.50	<0.50	460 D,B
OW-2	03/15/01	59	11.2	0.00	<0.050	6.2	242.0	33	<1.0	1	<0.50	<0.50	0.35 J,B
OW-5	03/14/01	110	131	0.00	0.42	7.1	129.0	220	<1.0	2	<0.50	<0.50	3.8 B
OW-6	03/15/01	44	2.2	0.00	<0.050	0.2	192.0	17	<1.0	<1	<0.50	<0.50	1.3 B
OW-8	03/14/01	78	3.1	0.00	4.7	<0.1	-74.0	17	<1.0	<1	<0.50	<0.50	5.3 B
OW-10R	03/14/01	300	7.3	1.81	12.3	<0.1	-64.0	35	<1.0	4	0.62	1.6	3,700 D,B
OW-13	03/14/01	360	9.4	7.43	11.6	<0.1	-44.0	21	<1.0	5	0.95	4.1	570 D,B
OW-15	03/14/01	170	5.7	0.00	18.3	<0.1	-64.0	17	<1.0	5	1.1	<0.50	3,700 D,B
OW-16	03/14/01	62	4.7	0.31	<0.050	5.3	242.0	14	<1.0	1	<0.50	<0.50	0.32 J,B
OW-18	03/16/01	250	7.3	0.00	17.2	0.1	-100.0	14	<1.0	9	<0.50	<0.50	1,300 D,B
OW-19	03/16/01	190	7.2	0.00	32.4	<0.1	-78.0	19	<1.0	6	0.22 J	0.39 J	890 D,B
OW-21	03/13/01	240	26	3.61	15.5	<0.1	-57.0	51	<1.0	3	0.44 J	0.23 J	260 D,B
OW-22	03/13/01	370	28.2	13.32	34.9	<0.1	-94.0	14	<1.0	10	1.2	<0.50	2,500 D,B

Notes:
D = Result was obtained from the analysis of a dilution
TOC = Total organic carbon
< = Analyte not detected at method reporting limit
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result; result is less than the reporting limit

Table 3
Groundwater and Surface Water Elevation Data - March 13, 2001
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Well No.	Top of Casing Elevation or Gauge Staff	Screened Interval	Depth to Groundwater or Surface Water	Groundwater or Surface Water Elevation
MW-1	469.39	28.5 - 43.5	31.85	437.54
MW-4	470.13	35.3 - 50.3	41.86	428.27
OW-2	472.33	30.0 - 47.0	40.52	431.81
OW-3	472.70	30.0 - 46.5	41.24	431.46
OW-4	473.33	26.5 - 27.5	34.95	438.38
OW-5	459.85	25.5 - 45.5	28.13	431.72
0W-6	464.40	31.4 - 51.4	32.67	431.73
OW-7	459.31	24.5 - 34.5	27.71	431.60
OW-8	464.63	34.6 - 54.6	32.79	431.84
OW-9	472.91	25.3 - 35.3	28.73	444.18
OW-10R	469.27	29.0 - 39.0	27.87	441.40
OW-13	458.00	24.8 - 34.8	26.33	431.67
OW-15	472.05	22.0 - 32.0	11.49	460.56
OW-16	453.90	18.0 - 28.0	22.52	431.38
OW-17	447.18	11.0 - 21.0	15.89	431.29
OW-18	444.57	11.0 - 21.0	13.37	431.20
OW-19	438.69	5.0 - 15.0	7.73	430.96
OW-21	467.46	37.1 - 47.1	36.12	431.34
OW-22	467.10	38.0 - 48.0	35.77	431.33
OW-23	444.73	29.0 - 39.0	13.55	431.18
SW-1	432.06	-	2.22	429.84
SW-2	432.03	-	1.57	430.46
SW-3	440.10	-	3.45	436.65

Notes:

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

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

Table 4

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

Compound	NYSDEC SGV (ug/L)	U.S. EPA MCL (ug/L)	MW-1 03/15/01	MW-4 03/14/01	OW-2 03/15/01	OW-5 03/14/01	OW-6 03/15/01	OW-8 03/15/01	OW-10R 03/14/01	OW-10RD 03/14/01	OW-13 03/14/01	OW-15 03/14/01	OW-16 03/14/01	OW-18 03/16/01	OW-19 03/16/01	OW-21 03/13/01	OW-22 03/13/01
Benzene	1 (S)	5	0.40 J	3.6	<10	0.46 J	<1.0	<1.0	35	32	130	1.2	<1.0	3.1	1.7	4.5	12
Chlorobenzene	5 (S)*	100	0.38 J	<1.0	<10	<1.0	<1.0	<1.0	3.6	3.3	<5.0	0.67 J	<1.0	3.0	3.8	<1.0	8.2
Chloroethane	5 (S)*	NA	<2.0	<2.0	<20	<2.0	<2.0	<2.0	0.80 J	<2.9	<10	<2.0	<2.0	<2.0	1.4 J	<2.0	<2.0
1,2-Dichloroethene (total)	5 (S)*	70	<1.0	3.2	310	14	6.9	<1.0	1.0	0.75 J	15	0.37 J	<1.0	0.38 J	0.96 J	<1.0	0.70 J
Ethylbenzene	5 (S)*	700	<1.0	<1.0	<10	<1.0	<1.0	<1.0	0.89 J	0.78 J	4.0 J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride	5 (S)*	5	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.43	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	5 (S)*	5	<1.0	0.66 J	160	6.2	19	<1.0	<1.0	<1.4	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	5 (S)*	1,000	<1.0	<1.0	<10	<1.0	<1.0	<1.0	0.44 J	<1.4	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.56 J
Trichloroethene	5 (S)*	5	<1.0	0.42 J	32	3.7	3.9	<1.0	<1.0	<1.4	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride	2 (S)	2	<2.0	<2.0	<20	<2.0	<2.0	<2.0	2.4	2.0 J	12	1.1 J	<2.0	<2.0	1.3 J	0.70 J	0.76 J
Xylenes (Total)	5 (S)*	10,000	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.4	<5.0	<1.0	<1.0	1.4	<1.0	<1.0	1.9

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 Concentration Limit for drinking/groundwater
NA = Not applicable; no criteria specified
< = Analyte not detected at reporting 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.

Table 5
Summary of Detected TCL Semivolatile Organic Compounds in Groundwater
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Compound		bis(2-Ethylhexyl)phthalate
NYSDEC SGV (ug/L)		5 (S)
U.S. EPA MCL (ug/L)		NA
Well ID	Sample Date	Compound Concentrations in ug/L
MW-1	03/15/01	<10
MW-4	03/14/01	<10
OW-2	03/15/01	3.9 J,B
OW-5	03/14/01	<10
OW-6	03/15/01	3.4 J,B
OW-8	03/15/01	3.8 J,B
OW-10R	03/04/01	3.9 J,B
OW-10RD	03/14/01	<10
OW-13	03/14/01	<10
OW-15	03/14/01	<10
OW-16	03/14/01	<10
OW-18	03/16/01	<10
OW-19	03/16/01	<10
OW-21	03/13/01	<10
OW-22	03/13/01	<10

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 Concentration Limit for drinking/groundwater
S (a) = Sum of dichlorobenzenes 5 ug/L
NA = Not applicable; no criteria specified
< = Analyte not detected at method reporting limit
J = Analyte detected at less than the method reporting limit
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
Blue = Concentration detected below regulatory limit or analyte detected but no regulatory criteria specified

Table 6
Parameters for Preliminary Monitored Natural Attenuation Screening

Analyte	Concentration in Most Contaminated Zone	Interpretation
Oxygen	<0.5 mg/L	Tolerated; suppresses reductive dechlorination at higher concentrations
Oxygen	>1 mg/L	Vinyl chloride may be oxidized aerobically, but reductive dechlorination will not occur
Nitrate	<1 mg/L	May compete with reductive pathway at higher concentrations
Iron (II)	>1 mg/L	Reductive pathway possible
Sulfate	<20 mg/L	May compete with reductive pathway at higher concentrations
Sulfide	>1 mg/L	Reductive pathway possible
Methane	>0.1 mg/L	Ultimate reductive daughter product
	>1 mg/L	Vinyl chloride accumulates
	<1 mg/L	Vinyl chloride oxidizes
Oxidation reduction potential	<50 mV against Ag/AgCl	Reductive pathway possible
pH	5 < pH <9	Tolerated range for reductive pathway
DOC	>20 mg/L	Carbon and energy source; drives dechlorination; can be natural or anthropogenic
Temperature	>20 degrees C	At T >20 degrees C, biochemical process is accelerated
Carbon dioxide	>2x background	Ultimate oxidative daughter product
Alkalinity	>2x background	Results from interaction of carbon dioxide with aquifer minerals
Chloride	>2x background	Daughter product of organic chlorine; compare chloride in plume to background conditions
Hydrogen	>1 nM	Reductive pathway possible; vinyl chloride may accumulate
Hydrogen	<1 nM	Vinyl chloride oxidized
Volatile fatty acids	>0.1 mg/L	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source
BTEX	>0.1 mg/L	Carbon and energy source; drives dechlorination
Perchloroethene		Material released
Trichloroethene		Material released or daughter product of perchloroethene
Dichloroethene		Material released or daughter product of trichloroethene; if amount of cis-1,2-dichloroethene is greater than 80% of total dichloroethene, it is likely a daughter product of trichloroethene
Vinyl chloride		Material released or daughter product of dichloroethenes
Ethene/Ethane	<0.1 mg/L	Daughter product of vinyl chloride/ethene
Chloroethane		Daughter product of vinyl chloride under reducing conditions
1,1,1-trichloroethane		Material released
1,1-dichloroethene		Degradation product of 1,1,1-trichloroethane

Source: Weidermeier, et al., 1996

Table 7
Detected TCL Volatile Organic Compounds in Surface Water (ug/L)
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Analyte		Benzene	Chloroethane	[illegible] 1,2-Dichloroethane	1,2-Dichloroethene (total)	Methylene Chloride	Vinyl Chloride
NYSDEC SGV		**1 (S)**	**5 (S)**	**0.8 (S)**	**5 (S)**	**5 (S)**	**2 (S)**
U.S. EPA MCL		**5**	**NA**	**5**	**70**	**NA**	**2**
Sample ID	**Date**						
SW-1	02/18/99	<1.0	<2.0	ND	ND	<1.0	<2.0
	01/04/00	0.19 J,B	0.85 J	ND	ND	0.15 J,B	0.99 J
	06/08/00	<1.0	<2.0	ND	ND	<1.0	<2.0
	03/15/01	<1.0	0.97 J	0.61J	0.39 J	<1.0	0.52 J
SW-2	02/18/99	<1.0	<2.0	ND	ND	<1.0	<2.0
	01/04/00	<1.0	<2.0	ND	ND	<1.0	<2.0
	06/08/00	<1.0	<2.0	ND	ND	<1.0	<2.0
	03/15/01	<1.0	<2.0	<1.0	<1.0	<1.0	<2.0

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 Concentration Limit for drinking/groundwater
NA = Not applicable; no criteria specified
< = Analyte not detected at reporting limit
ND = Not detected prior to first reported value
J = Estimated result; result is less than reporting limit
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
Blue = Analyte detected at less than regulatory limit, or analyte detected but no regulatory criteria specified.

Table 8
Detected TCL Volatile and Semivolatile Organic Compounds in Sediment
Carroll and Dubies Superfund Site
Town of Deerpark, Orange County, New York

Compound (Concentrations in ug/kg)	SED 1 09/27/94	SED 1 02/18/99	SED 1 01/04/00	SED 1 06/08/00	SED 1 03/15/01	SED 2 09/27/97	SED 2 02/18/99	SED 2 01/04/00	SED 2/2 DUP 06/08/00	SED 2/2 DUP 03/15/01
Volatile Compounds										
2-Butanone	<20	<28	82 J	17 J	<62	<23	50 J	<220	49 J/<160	70 UJ/69 UJ
Acetone	58	<28	370	60 J,B	55 J	76	140 J	180 J	150 J/<160	36 UJ/69 UJ
Vinyl Chloride	<20	<14	6.9 J	<27	<31	<23	<88	<110	<91/<81	35 UJ/35 UJ
Toluene	ND(1)	ND(1)	ND(1)	<13	<16	ND(1)	ND(1)	ND(1)	13 J/<41	17 UJ/17 UJ
Semivolatile Compounds										
Di-n-butyl phthalate	190 J,B	77 J	<2,000	<880	<1,000	220 J,B	370 J	<3,600	<3,000/<2,700	<1,200/<1,100
bis(2-Ethylhexyl)phthalate	ND(1)	ND(1)	ND(1)	590 J	<1,000	ND(1)	ND(1)	ND(1)	2,900 J/1,500 J	<1,200/<1,100
4-Methylphenol	ND(1)	ND(1)	ND(1)	<880	<1,000	ND(1)	ND(1)	ND(1)	480 J,#/<2,700	<1,200/<1,100

Notes:

TCL = Target Compound List

< = Not detected at the method detection limit.

J = Estimated result; result is less than method reporting limit

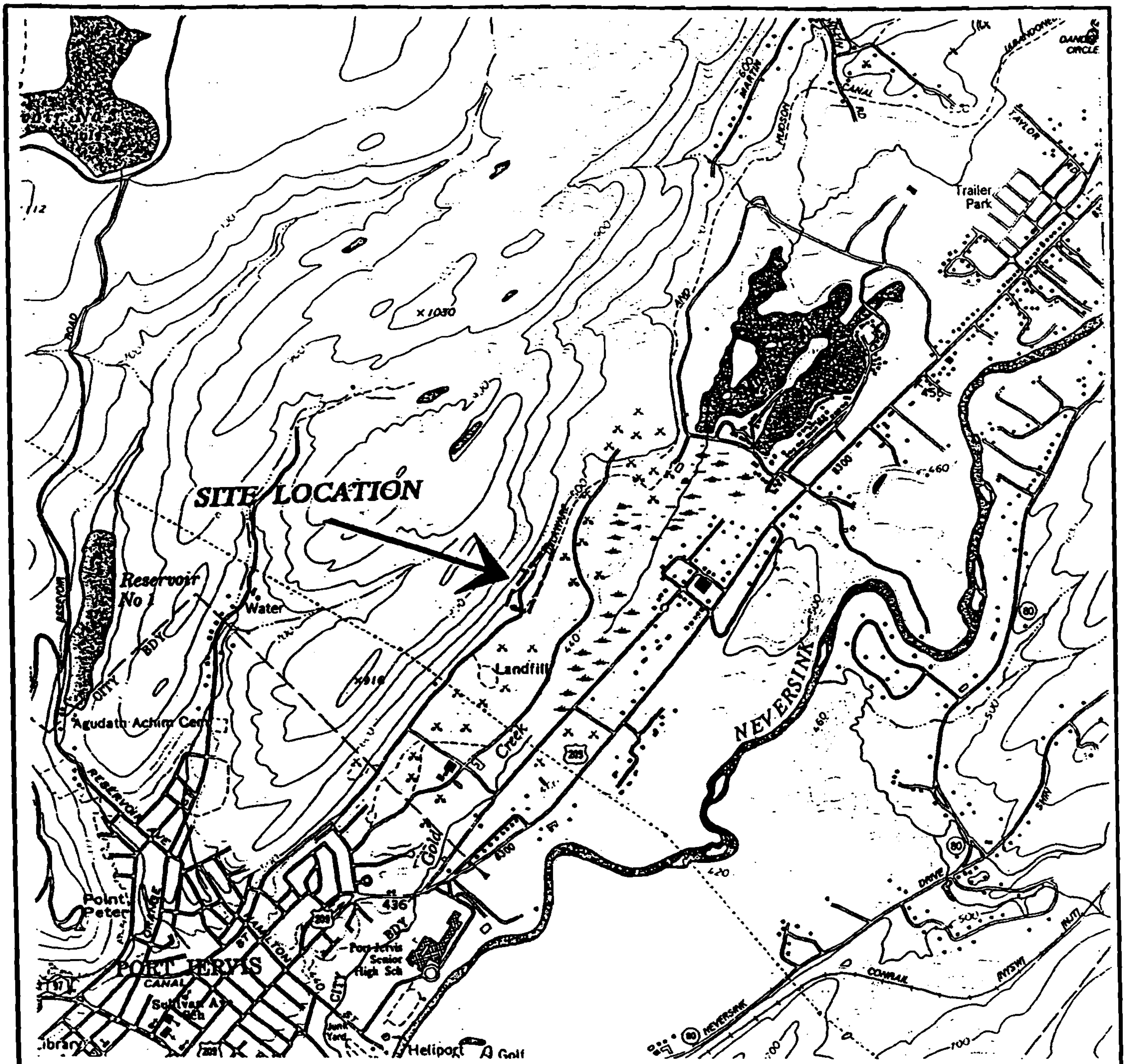
B = Method blank contamination. The associated method blank contains the analyte at a reportable level.

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

ND(1) = Not detected prior to 06/08/00.

= This value represents a probable combination of 3-methylphenol (m-cresol) and 6-methylphenol (p-cresol).

Figures



---- Approxmate Site Boundary

SOURCE: USGS Topographic Quadrangle Map
Port Jervis North Quadrangle - 1991

N

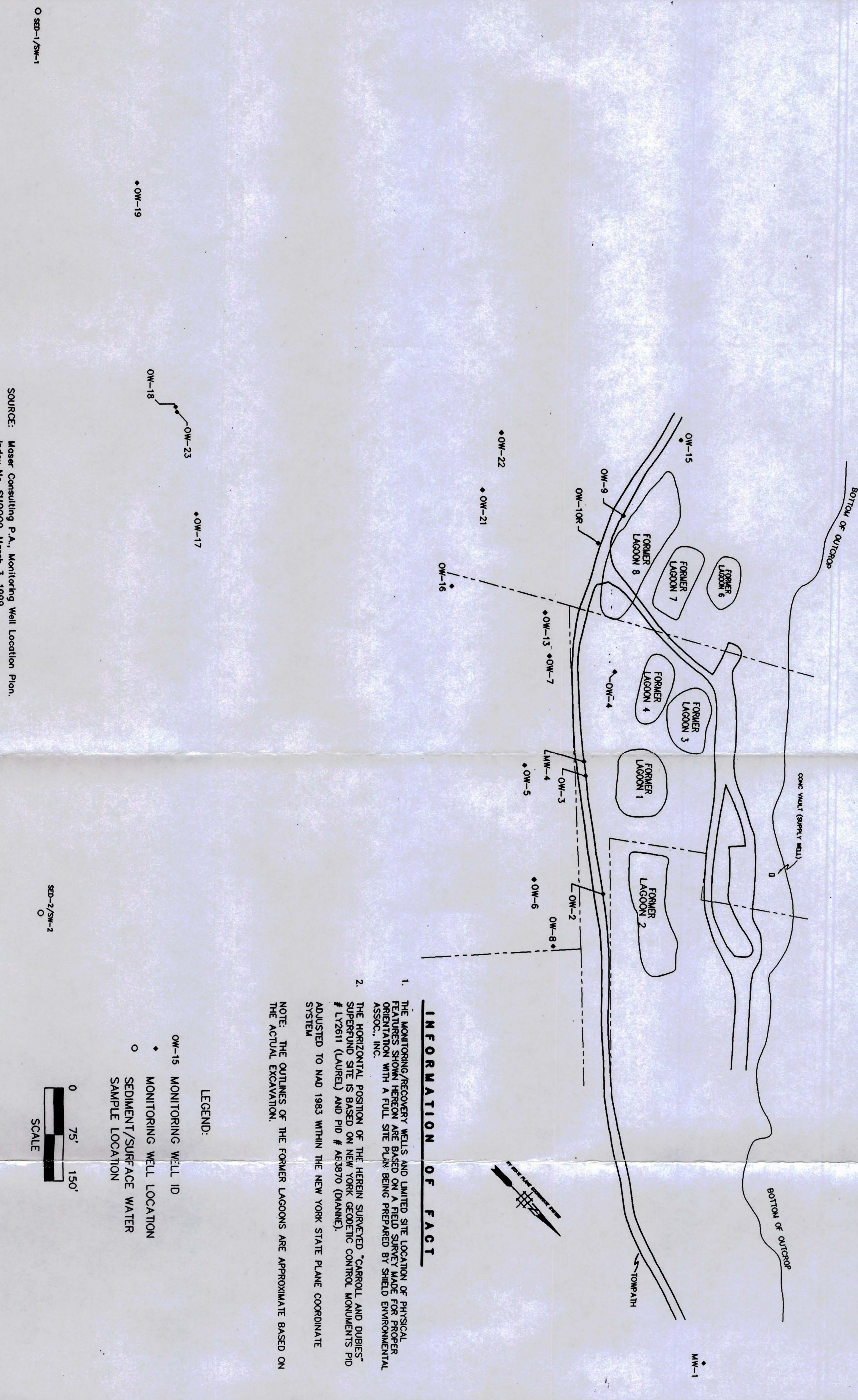
0 1,000' 2,000'
SCALE

DATE: 3/25/99
DRAWN BY: P.D.H.
APPROVED BY: C.L.P.
CLIENT NO.: 698–0110

FIGURE 1

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

SHIELD
ENVIRONMENTAL ASSOCIATES, INC.
PITTSBURGH, PENNSYLVANIA



SOURCE: Maser Consulting P.A. Monitoring Well Location Plan.
Index No. SU0009, March 3, 1999.

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 ASSOC., 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 # AE3870 (DIANNE).

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

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

LEGEND:

OW-15 MONITORING WELL ID
◆ MONITORING WELL LOCATION
○ SEDIMENT/SURFACE WATER SAMPLE LOCATION

DATE: 04/05/00	FIGURE 2 SITE PLAN/MONITORING WELL LOCATIONS CARROLL AND DUBIES SUPERFUND SITE TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK	SHIELD ENVIRONMENTAL ASSOCIATES, INC. PITTSBURGH, PENNSYLVANIA
DRAWN BY: P.D.H.		
APPROVED BY: C.L.P.		
CLIENT NO.: 698-0110		

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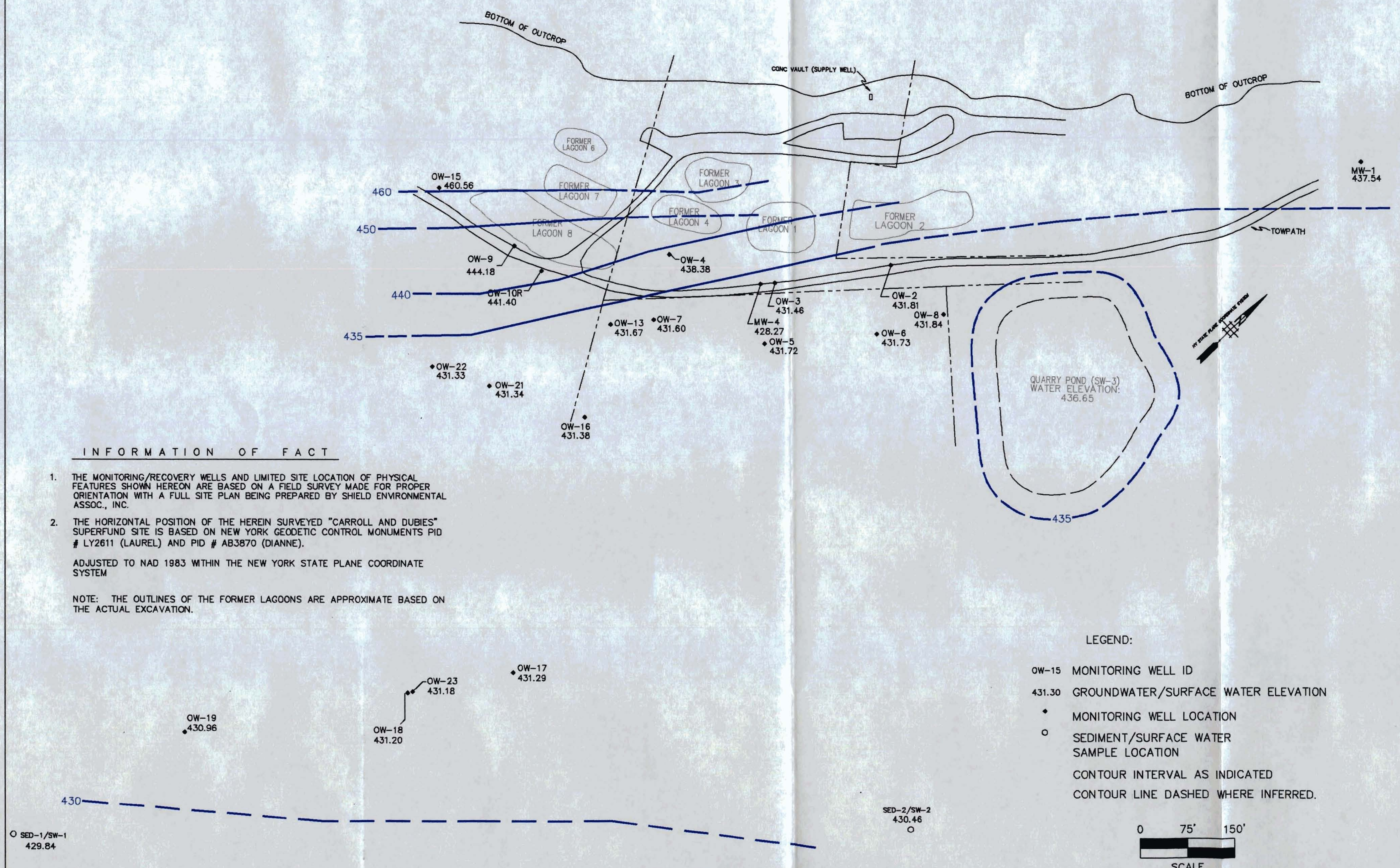


INFORMATION OF FACT

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 ASSOC., 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 APPROXIMATE BASED ON THE ACTUAL EXCAVATION.

LEGEND:

OW-15	MONITORING WELL ID
431.30	GROUNDWATER/SURFACE WATER ELEVATION
◆	MONITORING WELL LOCATION
○	SEDIMENT/SURFACE WATER SAMPLE LOCATION

CONTOUR INTERVAL AS INDICATED

CONTOUR LINE DASHED WHERE INFERRED.

0 75' 150'

SCALE

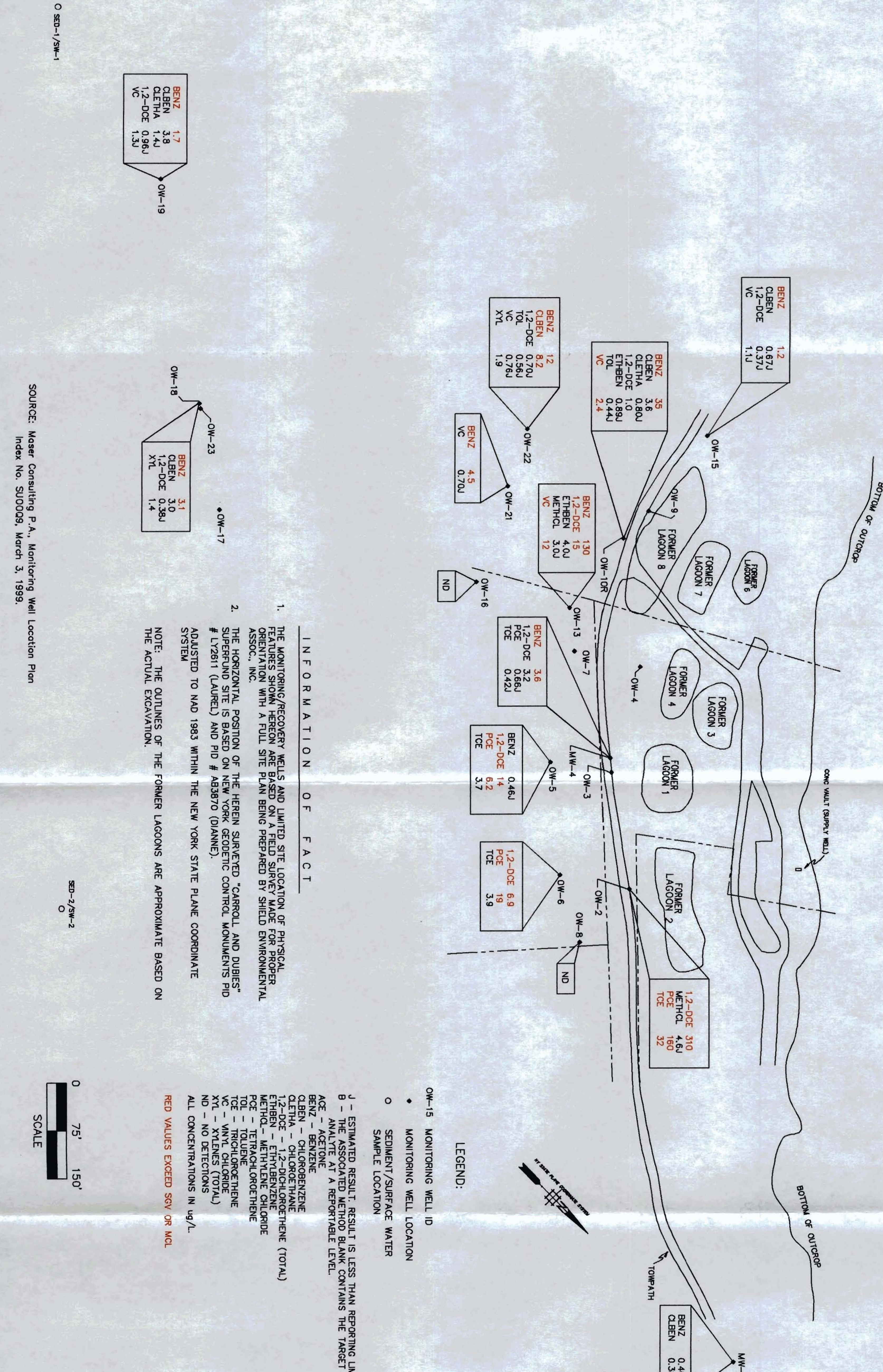
SOURCE: Maser Consulting P.A., Monitoring Well Location Plan. Index No. SU0009, March 3, 1999.

SHIELD
ENVIRONMENTAL ASSOCIATES, INC.
PITTSBURGH, PENNSYLVANIA

FIGURE 3
GROUNDWATER CONTOUR MAP – MARCH 13, 2001

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

DATE: 04/19/01
DRAWN BY: P.D.H.
APPROVED BY: C.L.P.
CLIENT NO.: 698-0110



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 ASSOC., 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 APPROXIMATE BASED ON THE ACTUAL EXCAVATION.

SOURCE: Maser Consulting P.A., Monitoring Well Location Plan Index No. SU00Q9, March 3, 1999.

LEGEND:

OW-15 MONITORING WELL ID
◆ MONITORING WELL LOCATION
○ SEDIMENT/SURFACE WATER SAMPLE LOCATION

J – ESTIMATED RESULT. RESULT IS LESS THAN REPORTING LIMIT.
B – THE ASSOCIATED METHOD BLANK CONTAINS THE TARGET ANALYTE AT A REPORTABLE LEVEL.
ACE – ACETONE
BENZ – BENZENE
CLBEN – CHLOROBENZENE
CLETHA – CHLOROETHANE
1,2-DCE – 1,2-DICHLOROETHENE (TOTAL)
ETHBEN – ETHYLBENZENE
METHCL– METHYLENE CHLORIDE
PCE – TETRACHLOROETHENE
TOL – TOLUENE
TCE – TRICHLOROETHENE
VC – VINYL CHLORIDE
XYL – XYLENES (TOTAL)
ND – NO DETECTIONS
ALL CONCENTRATIONS IN ug/L.

RED VALUES EXCEED SGV OR MCL

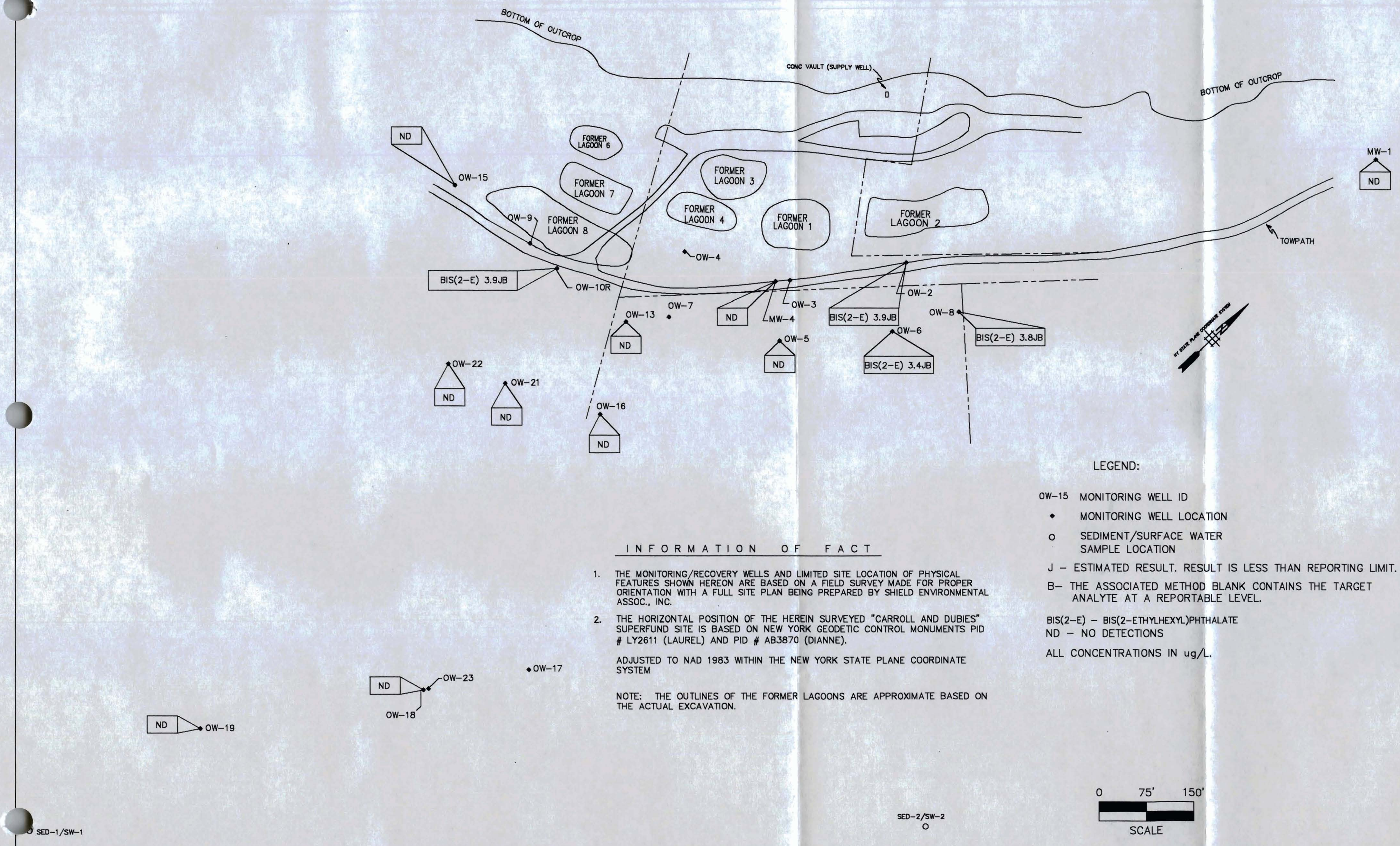
DATE: 04/19/01
DRAWN BY: P.D.H.
APPROVED BY: C.P.
CLIENT NO.: 698–0110

FIGURE 4

DETECTED VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
MARCH 2001

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

SHIELD
ENVIRONMENTAL ASSOCIATES, INC.
PITTSBURGH, PENNSYLVANIA



LEGEND:

OW-15 MONITORING WELL ID

◆ MONITORING WELL LOCATION

○ SEDIMENT/SURFACE WATER SAMPLE LOCATION

J – ESTIMATED RESULT. RESULT IS LESS THAN REPORTING LIMIT.

B– THE ASSOCIATED METHOD BLANK CONTAINS THE TARGET ANALYTE AT A REPORTABLE LEVEL.

BIS(2-E) – BIS(2-ETHYLHEXYL)PHTHALATE

ND – NO DETECTIONS

ALL CONCENTRATIONS IN ug/L.

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 ASSOC., 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 APPROXIMATE BASED ON THE ACTUAL EXCAVATION.

0 75' 150'
SCALE

SOURCE: Maser Consulting P.A., Monitoring Well Location Plan.
Index No. SU00Q9, March 3, 1999.

SHIELD
ENVIRONMENTAL ASSOCIATES, INC.
PITTSBURGH, PENNSYLVANIA

FIGURE 5
DETECTED SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
MARCH 2001
CARROLL AND DUBIES SUPERFUND SITE
TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK

DATE: 04/19/01
DRAWN BY: P.D.H.
APPROVED BY: C.P.
CLIENT NO.: 698-0110