# Five-Year Review Report

## For the

## Carroll and Dubies Sewage Disposal Superfund Site

## Town of Deerpark

## Orange County, New York

**PREPARED BY:**
**U.S. Environmental Protection Agency**
**Region 2**
**New York, New York**

**August 2010**

# Five-Year Review Summary Form

## SITE IDENTIFICATION

**Site name** *(from WasteLAN)*: Carroll and Dubies Sewage Disposal

**EPA ID** *(from WasteLAN)*: NYD 010968014

| **Region:** 2 | **State:** NY | **City/County:** Town of Deerpark/Orange |
|---|---|---|

## SITE STATUS

**NPL status:** ■ Final ☐ Deleted ☐ Other (specify)

**Remediation status** (choose all that apply): ☐ Under Construction ☐ Operating ■ Constructed

| **Multiple OUs?** ■ YES ☐ NO | **Construction completion date:** 03/20/2000 |
|---|---|

**Has site been put into reuse?** ☐ YES ■ NO ☐ N/A (site involves groundwater plume and not real property)

## REVIEW STATUS

**Lead agency:** ■ EPA State ☐ Tribe ☐ Other Federal Agency

**Author name:** Maria Jon

| **Author title:** Remedial Project Manager | **Author affiliation:** EPA |
|---|---|

**Review period:** 03/20/2005 to 04/30/2010

**Date(s) of site inspection:** 04/1/2010

**Type of review:**
■ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead
■ Policy ☐ Regional Discretion

**Review number:** ☐ 1 (first) ■ 2 (second) ☐ 3 (third) ☐ Other (specify)

**Triggering action:**
☐ Actual RA Onsite Construction at OU # ☐ Actual RA Start at OU#____
☐ Construction Completion ■ Previous Five-Year Review Report
☐ Other (specify)

**Triggering action date** *(from WasteLAN)*: 08/25/2005

**Due date** (*five years after triggering action date*): 08/25/2010

Does the report include recommendation(s) and follow-up action(s)? ■yes ☐no
Is human exposure under control? ■ yes ☐ no
Is contaminated groundwater under control? ■ yes ☐ no ☐ not yet determined
Is the remedy protective of the environment? ■ yes ☐ no ☐ not yet determined

## Five-Year Review Summary Form, cont'd.

### Recommendations and Follow-up Actions:

Re-institute sampling of monitoring well OW-24. This is the sentinel well for the chlorinated plume.

Replace the locking cover on monitoring well OW-19.

### Protectiveness Statement(s):

The implemented remedial actions at all OUs at the Carroll and Dubies Sewage Disposal Superfund Site are protective of human health and the environment. There are no exposure pathways that could result in unacceptable risks and none expected as long as the institutional controls, which are in place, and the natural attenuation remedy selected in the decision documents for the Site continue to be properly monitored and maintained.

# Five-Year Review Report

## Table of Contents


**I. Introduction** ..... 4

**II. Site Chronology** ..... 4

**III. Background** ..... 4
- Site Location and Physical Description ..... 4
- Site Geology and Hydrology ..... 5
- Land and Resource Use ..... 5
- History of Contamination ..... 6
- Initial Response ..... 6
- Basis for Taking Action ..... 6

**IV. Remedial Actions** ..... 7
- Remedy Selection ..... 7
- Remedial Action Implementation ..... 10
- Institutional Controls Implementation ..... 11
- Operations, Maintenance and Monitoring ..... 11

**V. Progress Since the Last Five-Year Review** ..... 12

**VI. Five-Year Review Process** ..... 12
- Administrative Components ..... 12
- Community Notification and Involvement ..... 12
- Data Review ..... 13
- Site Inspection ..... 15

**VII. Technical Assessment** ..... 15
- *Question A* ..... 15
- *Question B* ..... 16
- *Question C* ..... 17

**VIII. Issues, Recommendations and Follow-up Actions** ..... 17

**IX. Protectiveness Statement(s)** ..... 18

**X. Next Review** ..... 18

## I. Introduction

This five-year review was conducted in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of a five-year review is to assure that implemented remedies protect public health and the environment and that they function as intended by the decision documents. This report will become part of the Site file.

This is the second five-year review for the Carroll and Dubies Sewage Disposal Site. Upon completion of the remedial action for the former lagoons, contaminant levels on-site were reduced to levels that permit unlimited use and unrestricted exposure. However, since groundwater contamination continues to exceed groundwater standards after completion of the remedial action, this five-year review is being conducted as a matter of policy.

The Site is being addressed in two phases, or operable units (OUs). OU1, which involves excavation and off-site disposal of waste, contaminated soil and sediments in and around eight former lagoons, was completed in January 2000. OU2 addresses the contaminated groundwater. The OU2 remedy includes natural attenuation of organic contaminants in groundwater to below federal and state drinking water standards, implementation of institutional controls in the form of deed restrictions restricting the installation and use of groundwater wells on the Site, monitoring of the groundwater, and sampling of sediment and surface water in Gold Creek.

## II Site Chronology

Table 1 (attached) summarizes the site-related events from discovery through the most recent OU2 sampling event.

## III. Background

*Physical Characteristics*

The Carroll & Dubies Sewage Disposal Site is located in the Neversink Valley, approximately 3,000 feet northeast of the City of Port Jervis on Canal Street in the Town of Deerpark, Orange County, New York (Figure 1). The Site occupies approximately three acres, which includes parcels of land owned by the City of Port Jervis and Carroll and Dubies. The surrounding area is occupied by an active sand and gravel quarry, the inactive Port Jervis landfill, and remnants of the former Delaware and Hudson Canal and towpath. Orange County currently operates a solid waste transfer station on a portion of the Port Jervis landfill property.

Approximately 1,500 feet to the east of the Site is Gold Creek and its associated wetlands. The Neversink River is located approximately 2,000 feet beyond Gold Creek. Gold Creek and the Neversink River drain into the Delaware River.

*Geology/Hydrogeology*

The Site ranges from approximately 440 to 520 feet above mean sea level. The materials encountered underlying the Site consist of glacially derived unconsolidated materials underlain by consolidated bedrock. The thickness of the unconsolidated overburden materials ranges from zero feet at the exposed bedrock slope forming the northwestern Site boundary, to over 60 feet along the towpath. The glacially derived materials consist of two distinct units, including a glacial till unit overlain by glacial outwash deposits. The outwash deposit was observed to vary in thickness from 31 feet to 52 feet along the downgradient edge of the Site. The outwash deposits typically consist of medium dense to very dense brown sand with some clayey silt and gravel. The glacial till deposits are characterized as dense to very dense dark grey silt with sand and gravel. The glacial till is not continuous beneath the Site, and appears to pinch out toward the northwestern edge of the Site. The depth to groundwater from ground surface ranges from approximately 30 to 40 feet along the southeastern boundary of the Site. Groundwater movement is generally towards the southeast in the direction of Gold Creek, which is located approximately 1,500 ft southeast of the Carroll and Dubies property line.

The major aquifer system used for potable water supply in Orange County is comprised of the bedrock and the sand and gravel deposits in the valley. No residential wells have been found to exist between the Site and Gold Creek. However, approximately 90 residential wells exist between Gold Creek and the Neversink River. Gold Creek and its accompanying wetlands should provide an effective hydraulic barrier between the Site and these residential wells. The nearest residence and residential well is located approximately a quarter of a mile from the Site.

*Land and Resource Use*

The Site and land immediately adjacent to the Site are currently zoned exclusively for industrial land use. The immediate surrounding area includes a valley wall to the northwest, which consists of exposed bedrock with talus comprising the base; remnants of the former Delaware and Hudson Canal and towpath are to the southeast; undeveloped woodlands and an active sand and gravel quarry to the northeast. To the south, adjacent to the Site, are located a cement block manufacturing operation and the City of Port Jervis Landfill. The landfill is no longer active; however, Orange County currently operates a solid waste transfer station on a portion of the landfill property.

Land use at the Site has changed. 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, downgradient from the former lagoons and in the vicinity of some of the Site monitoring wells. Also, on the west side, upgradient from the former lagoons, the Port Jervis Police Department owns a firing range. Activities at the range do not conflict with the Protective Easement Restrictions, which were placed on the Site.

Access to the Site by vehicles is limited by a gate at the City of Port Jervis solid waste transfer station, which is locked in the evenings and on the weekends. The workers at the transfer station keep an eye on traffic in the area during business hours. However, many areas where sampling is conducted can be accessed on foot.

*History of Contamination*

From approximately 1970 to 1979, the Site was used for the disposal of septic and municipal sewage sludge, as well as industrial wastes, primarily from the cosmetic industry. The industrial wastes were deposited in one or more of the seven lagoons located at the Site (Lagoons 1 through 4 and 6 through 8 are depicted in Figure 2). Initially, it was believed that the industrial wastes were deposited only in Lagoons 1 through 4. In July 1992, however, the Site was expanded to include the investigation of areas believed to contain four additional filled-in lagoons (Lagoons 5, 6, 7 and 8). These lagoons were tentatively identified in historical aerial photographs. Trenching in the area of Lagoons 6, 7 and 8 confirmed the presence of sewage sludge and industrial waste; trenching in the area of Lagoon 5 revealed the presence of tires instead of industrial waste.

In 1978, Lagoon 3 was ignited by the Port Jervis Fire Department in order to practice suppression of chemical fires. After this incident, Lagoons 3 and 4 were filled in with soil and the area was revegetated. With the exception of Lagoons 1 and 2, all of the lagoons were covered with soil. Lagoons 1 and 2 were left uncovered and are surrounded by a wooden fence. In June 1979, the New York State Department of Environmental Conservation (NYSDEC) prohibited the disposal of industrial wastes at the Site. The Site continued to be used for the disposal of septic and municipal sewage wastes until 1989.

*Initial Response*

In February 1987, NYSDEC issued a Phase II Investigation Report which summarized past investigations and included a Hazard Ranking System (HRS) score for the Site. Based on the HRS score, the Site was proposed for inclusion on the National Priorities List (NPL) in June 1988 and was placed on the NPL in February 1990.

*Basis for Action*

The preliminary Remedial Investigation (RI) and supplemental RI were completed in October 1992 and December 1993, respectively. The Feasibility Study (FS) for the lagoons was completed in July 1994. A supplemental groundwater RI was completed in April 1995. The FS for the groundwater was completed in May 1996.

Through the site investigations, EPA determined that the contaminants of concern present in the former lagoons and surrounding soils included benzene, dichlorobenzene, tetrachloroethene, toluene, arsenic, lead and chromium. Some of the highest concentrations of volatile organic compounds (VOCs) and metals detected in the lagoons were benzene at 2,800 parts per million

(ppm), tetrachloroethene at 12,000 ppm, toluene at 13,000 ppm, chromium at 16,000 ppm, and lead at 609 ppm. Groundwater samples were collected downgradient of the lagoons and analyzed for organic and inorganic compounds. Some of the highest concentrations of organic contaminants in groundwater included benzene detected at 2,400 micrograms per liter (µg/L) or parts per billion (ppb), 1,2-dichloroethene (1,2-DCE) at 130 ppb, and tetrachloroethene (TCE) at 100 ppb. Based on the results of the remedial investigations, EPA conducted a baseline risk assessment to evaluate the potential risks to human health and the environment associated with the Site contaminants in the lagoons and groundwater under current and future conditions. EPA determined from the risk assessment that the contaminants in the lagoon materials and in the groundwater at the Site, if not addressed may present an imminent and substantial endangerment to the public health, welfare, or the environment. Therefore, EPA selected remedies to address the Lagoons and groundwater contamination in two Records of Decision (RODs) signed on March 31, 1995 and September 30, 1996, respectively.

## IV. Remedial Actions

*Remedy Selection*

In March 1995, EPA signed a Record of Decision for OU1. The remedial action objectives (RAOs) for this OU are:

- To prevent leaching of contaminants in the soils/sludges at levels which will contribute to the contravention of groundwater quality and drinking water standards in the groundwater in the vicinity of the Site; and

- To minimize potential risks to hypothetical excavation workers

The major components of the OU1 ROD include:

- Excavation of all contaminated materials from Lagoons 1, 2, 3, 4, 6, 7 and 8, as well as the contaminated soils in the vicinity of those lagoons.

- Treatment of excavated soil/sludges which contain organic constituents above the treatment levels specified in the ROD via on-site ex-situ vapor extraction.

- Additional treatment of Lagoon 7 soils/sludges via on-site ex-situ bioslurry (treatment targeted primarily for semi-volatile contaminants).

- Stabilization/solidification of soils/sludges which fail the Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP) levels for inorganic constituents, as specified in 40 C.F.R. §262.24.

- Placement of treated and untreated soil/sludge in a lined and capped cell consistent with the modified requirements of New York Code of Rules and Regulations Part 360. The base of the cell was to have consisted of a high density polyethylene (HDPE) liner and a sand drainage layer. The cell was to be sloped to a leachate collection system. The cap was to have consisted of a low-permeability clay layer, an HDPE membrane, a sand drainage layer, and a topsoil cover layer.

- Recommendations that deed and well restrictions be imposed to protect the integrity of the cap.

The OU1 ROD also stated that although the use of the bioslurry process to treat Lagoon 7 materials appeared to be a promising means of treating the semi-volatiles contaminants, further treatability studies would be necessary to demonstrate that this process can reduce the complex mix of constituents in Lagoon 7 to remediation goals. Because of the uncertainty, a contingency remedy would be implemented if treatability study results indicated that bioslurry would not be effective in reducing contaminants to remediation goals. The major components of the contingency remedy would be identical to those of the selected remedy with the exception that the materials in Lagoon 7 would be excavated and transported off-site for treatment at a RCRA Subtitle C permitted treatment facility.

As a result of studies performed during the remedial design of the OU1 remedy, on August 28, 1998, EPA issued an Explanation of Significant Differences (ESD), modifying the remedy selected in the OU1 ROD. The modified remedy required all of the subject waste and soil to be treated to below health-based levels or disposed of off-site, eliminating the need for on-site containment of waste. The RAOs for this OU remain unchanged.

The modified remedy included the following components:

- Excavation of all waste materials from Lagoons 1, 2, 3, 4, 6, 7 and 8, as well as the contaminated soils near those lagoons that equal or exceed the excavation levels specified in the ROD. For subsurface soil impacted by volatile organic compounds, in-situ soil vapor extraction (SVE) treatment will be utilized to treat these soils to below levels requiring excavation unless it is more practicable to excavate and dispose these soils off-site. The excavation depth will not exceed the depth to groundwater.

- On-site treatment of selected excavated soil and interbedded wastes that exceed the RCRA TCLP levels for organic constituents by ex-situ soil vapor extraction prior to off-site disposal.

- Off-site treatment of industrial wastes that exceed the RCRA Land Disposal Restrictions, as specified in 40 C.F.R. Part 268, at the receiving hazardous waste management facility prior to off-site disposal.

- Off-site treatment of soil and sludges that fail the RCRA TCLP levels for inorganic constituents at the receiving hazardous waste management facility prior to off-site disposal.

- Off-site disposal of excavated wastes and soils in either a permitted non-hazardous waste management facility (municipal sewage sludge/septage wastes and impacted soils) or a permitted hazardous waste management facility (industrial wastes, interbedded wastes and municipal sewage sludge/septage wastes and soils impacted by industrial wastes) following any required treatment.

- Development of an air-monitoring system and installation of air pollution control equipment to ensure compliance with air pollution control regulations.

- Backfilling and regrading of excavated areas with clean soil.

The excavation levels identified in the OU1 ROD for indicator constituents of concern were:

| **Constituents of Concern** | **Excavation Limit (mg/kg)** |
|---|---|
| Benzene | 0.06 |
| Trichloroethene | 1.0 |
| Tetrachloroethylene | 1.4 |
| Toluene | 1.5 |
| 1,2 Dichlorobenzene | 7.9 |
| 1,4 Dichlorobenzene | 6.0 |
| Di-n-butyl phthalate | 8.1 |
| Naphthalene | 13.0 |
| Chromium | 61.9 |
| Nickel | 36.7 |

In September 1996, EPA signed a ROD for OU2. The RAOs for this OU are:

- To reduce or eliminate potential health risks associated with ingestion of Site contaminated groundwater by potential future industrial workers; and

- To reduce the concentration of contaminants in the groundwater to drinking water standards.

The OU2 ROD remedy included the following components:

- Natural attenuation of organic contaminants in groundwater to below federal and state drinking water standards

- Monitoring of the groundwater to evaluate improvement in groundwater quality and ensure the effectiveness of the remedy

- Conduct sediment and surface water sampling in Gold Creek to ensure contaminants do not impact the creek, and

- Implementation of institutional controls in the form of deed restrictions, restricting the installation and use of groundwater wells on the Site.

Groundwater modeling performed during the remedial investigation indicated that the cleanup levels would be achieved within five years of completion of OU1 source control remedy. The groundwater model also predicted that the cleanup levels would be achieved in the same time frame whether by natural attenuation processes or by active treatment.

*Remedy Implementation*

The PRPs' contractor, Shield Environmental Associates, Inc. (Shield), prepared remedial design plans and specifications, which EPA approved on September 29, 1998. Following on-site mobilization on April 19, 1999, clearing and grubbing, perimeter fence installation, and surveying were conducted. Subsequently, Shield initiated the excavation and off-site treatment and disposal component of the remedy. OU1 construction activities, including backfill work, were completed by January 11, 2000.

A total of 368 post-excavation confirmatory soil samples were collected from the foundation soils, sidewalls, ditches and perimeters of the lagoons at the designated grid points. Sample locations with analytical results above the indicator contaminants of concern (COCs) were excavated again as specified in the approved remedial design documents. Then, additional samples were collected from beneath the excavation. This sampling procedure was followed until the analytical results were below the excavation levels for the indicator COCs.

Cover soils from Lagoons 3, 4, 6, 7, and 8 were removed and stockpiled into 150-cubic yard stockpiles at the Site. Each stockpile was sampled and analyzed for the indicator COCs. The analytical results for the cover soil samples were compared to the excavation levels for the indicator COCs. The stockpiles that did not exceed the excavation levels for the indicator COCs met the performance standards and were used for fill during the final grading of the lagoons. In addition, off-site borrow material was needed to complete the final grading and to fulfill the design requirements. Approximately 11,000 cubic yards of off-site borrow material from a single source were delivered to the Site. The source of the borrow material was from a New York State Department of Transportation approved supplier of construction materials. Samples were collected from every 500 cubic yards of borrow material and analyzed for target compound list (TCL) VOCs, TCL semivolatile compounds, metals and cyanide, herbicides, pesticides, and polychlorinated biphenyls to verify that the material met the performance standards.

The total amount of contaminated waste material remediated was 22,885 cubic yards. The categories of waste types and total volumes disposed are summarized as follows:

- Nonhazardous waste to RCRA Subtitle D Landfill.....22,417 tons

- Hazardous waste to Incinerator..... 3,417 tons

- Hazardous waste to RCRA Subtitle C Landfill..... 838 tons

The analytical results from post-excavation soil samples collected from the excavated areas indicated that the remediation of all waste materials from Lagoons 1, 2, 3, 4, 6, 7 and 8, as well as the contaminated soils near the lagoons, has reduced contamination of Site soils in the unsaturated zone to below excavation levels specified in the ROD.

*Institutional Controls Implementation*

As required in the ROD for the OU2 remedy, on August 11, 2004, two (2) Environmental Protection Easements and Declarations of Restrictive Covenants ("Easements") were filed with the Orange County Clerk's office covering Site property owned by the City of Port Jervis and a separate parcel of Site property owned by Joseph Carroll and Gustave Dubies. The City of Port Jervis's Easement was granted to Kolmar Laboratories, Inc., and Wickhen Products, Inc., two of the PRPs at the Site, with EPA identified as a Third-Party Beneficiary. The Joseph Carroll and Gustave Dubies Easement was granted to Kolmar and Wickhen as well as the City of Port Jervis. This Easement also identifies EPA as a Third-Party Beneficiary. Both Easements restrict the extraction, consumption, exposure or utilization of groundwater (except as specifically approved by EPA); prohibit the installation of groundwater wells (except as specifically approved by EPA); and prohibit the disturbance of the surface or subsurface of the land in any manner (except as specifically approved by EPA). Note that with respect to the City of Port Jervis's property, the above-noted restrictions relate to the Site property. With respect to property owned by Joseph Carroll and Gustave Dubies, the restrictions are limited to the Carroll and Dubies property within 200 feet of Lagoon 2.

*System Operations/Operation and Maintenance*

No long-term operational systems were required for the lagoons remediation or OU1; therefore, no system operation and maintenance (O&M) activities occur at the Site. OU2 activities include monitoring of the groundwater, and sampling of sediment and surface water in Gold Creek. The inspection, maintenance, sampling, monitoring, data evaluation and reporting costs are approximately $36,700 on an annual basis. These costs are itemized in Table 2.

## V. Progress since Last Five-Year Review

The previous five-year review found that the implemented remedy protected public health and the environment. However, the monitoring network did not allow for a determination of the edge of the chlorinated plume and any impacts to Gold Creek. While surface water and sediment sampling in Gold Creek did not indicate a Site impact on this water body, a more thorough sampling program and additional well installation were recommended. A workplan for additional field work was reviewed and approved in September 2005. This supplemental investigation was completed in November 2006. Two monitoring wells, OW-24 and OW-25, were installed to determine the southeast edge of the groundwater plume. Groundwater data collected from the new monitoring wells, OW-24 and OW-25, did not detect any chlorinated compounds. Data collected indicates that the extent of the benzene and chlorinated compounds plumes have been established and that benzene concentrations appear to decline with distance away from the lagoons. No additional work is recommended at this time, other than continued monitoring.

## VI. Five Year Review Process

*Administrative Components*

The five-year review team consisted of
Maria Jon, EPA Region 2 Remedial Project Manager (RPM)
Julie McPherson, EPA Region 2 Human Health Risk Assessor
Grant Anderson, EPA Region 2 Hydrologist
Michael Clemetson, EPA, Region 2
Robin Hackett, NYSDEC
Barbara H. Jones, Principal, Cardinal Resources, Consultant to the PRPs
Kevin R. Jones, President, Cardinal Resources, Consultant to the PRPs

*Community Involvement*

The EPA Community Involvement Coordinator (CIC) for the Carroll and Dubies Sewage Disposal Site, Natalie Loney, published a notice in the Poughkeepsie Journal on March 25, 2010, notifying the community of the initiation of the five-year review process. The notice indicated that EPA would be conducting a five-year review of the remedy for the Site to ensure that the implemented remedy remains protective of public health and is functioning as designed. It was also indicated that once the five-year review is completed, the results will be made available in the local site repositories. In addition, the notice included the RPM's and the CIC's addresses and telephone numbers for questions related to the five-year review process for the Carroll and Dubies Sewage Disposal Site.

*Data Review*

VOCs, such as benzene, 1,2 dichloroethene and tetrachloroethylene, are the primary contaminants of concern. Long-term monitoring of contaminants in the groundwater and sampling of sediment and surface water in Gold Creek are currently conducted on an annual basis. For the annual monitoring program, 13 monitoring wells are sampled for analysis of VOCs and natural attenuation parameters; and surface water and sediment samples are collected and analyzed for VOCs.

*Groundwater*

There are two distinct plumes at the Site; a plume with benzene as the primary contaminant emanating from former Lagoons 6, 7 and 8 and a separate plume emanating from former Lagoon 2, which contains the chlorinated compounds, such as 1,2 dichloroethene (1,2-DCE) and tetrachloroethylene (PCE).

A supplemental groundwater sampling program was initiated in February 2006, to confirm the conclusions presented in the first five-year review and to verify the southeastern extent of the VOC plume in the vicinity of monitoring wells OW-2, OW-5, and OW-6. These three wells are located within the chlorinated compounds plume. As part of this program, two new monitoring wells (OW-24 and OW-25) were installed and two existing monitoring wells that had been excluded from the ongoing groundwater monitoring program were redeveloped and sampled. Quarterly sampling was conducted in 2006 to evaluate trends through an entire hydrologic cycle. This sampling program included 18 monitoring wells. This supplemental sampling program also included the collection of surface water, sediment, and pore water samples from Gold Creek.

Quarterly sampling was conducted in 2006. Groundwater monitoring data during this five-year review period exceeded the New York State Department of Environmental Conservation Groundwater criteria and/or the federal Maximum Contaminant Level (MCLs) for a number of contaminants in on-site groundwater monitoring wells. Based on the review of the groundwater data for the last five years, there has been a decrease in concentrations of benzene at most of the monitoring wells since the lagoon remediation activities were completed in 1999. In the monitoring wells immediately downgradient from the lagoon area (monitoring wells OW-10R and OW-13), the benzene level is consistently declining (13 ppb of benzene in OW-13 in July 2009, as compared to the highest level of 620 ppb detected in January 2000). Benzene exceeded the MCL of 5 ppb and the State groundwater standard of 0.7 ppb set forth in the OU2 ROD in only two monitoring wells in July 2009, OW-13R (13 ug/L) and OW-22 (5.1 ug/L).

Chlorinated VOCs are 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-19. The concentrations of 1,2-DCE and PCE have fluctuated in the past five years, and the levels suggest a decrease of these contaminants, in particular in monitoring well OW-2. 1,2-DCE was detected at

280 ug/L in November 2006, and 53 ug/L in July 2009. PCE was detected at 140 ug/L in November 2006, and 62 ug/L in July 2009. The decline has been slower in monitoring wells OW-05 and OW-6. OW-05 detected 1,2-DCE at levels ranging from 8.7 to 34 ug/L, and PCE was detected at levels ranging from 3.7 to 7.1 ug/L. Monitoring data over the last three years detected cholorobenzene in monitoring well OW-18 ranging from 6.5 to 10 ug/L and monitoring well OW-22 ranging from 4.6 to 7.8 ug/L. In all four sampling rounds conducted in 2006, PCE and TCE and their degradation products (chloroethane, 1,2-dichloroethene and vinyl chloride) were not detected in OW-24 and OW-25 (Figure 2). In June 2007, the annual groundwater monitoring program resumed with a monitoring network of 13 wells, and continued in 2008 and 2009. The difference between this list of wells and the monitoring network that was sampled in February and August 2006 is five wells (OW-15, OW-16, OW-17, OW-23 and OW-24). Monitoring well OW-24, which is the closest well to Gold Creek monitoring the chlorinated plume, was removed from the sampling program. Monitoring well OW-25, which is located upgradient from OW-24 is being monitored annually. Although both these wells did not detect any chlorinated compounds, monitoring of well OW-24 should be re-instituted. Well OW-24 is the sentinel well for the chlorinated plume.

The main component of the OU2 remedy is monitored natural attenuation (MNA) of organic contaminants, with the goal of achieving drinking water standards. MNA parameters have been monitored in all the monitoring wells beginning in 1999. Based on the results of the MNA program and the concentrations of VOC contaminants in the groundwater plumes having decreased in the past five years, MNA is occurring at the Site.

*Gold Creek*

The OU2 ROD requires surface water and sediment sampling in Gold Creek to ensure no impacts to the creek. The O&M plan requires annual sampling. During the 2006 supplemental sampling program, two pore water samples were collected, one upstream and one downstream. 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. In addition, four surface water samples were collected from Gold Creek, two samples were collected at the established locations that have been sampled throughout the OU2 monitoring period, and two one-time samples collected at locations coinciding with the pore water sampling locations. Four sediment samples were collected from Gold Creek, at locations coinciding with the surface water sample collection.

The results of the sampling program, including the 2006 investigation and the annual sediment and surface water sampling, in Gold Creek detected no VOCs in surface water samples, and occasional low detections of VOCs in sediment. However, the concentrations of VOCs in the sediments did not exceed sediment guidance values. 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.

*Document Review*

The documents, data, and information which were reviewed in completing the five-year review are summarized in the attached Table 3.

*Site Inspection*

A site inspection was conducted on April 1, 2010. The following parties were in attendance:

Maria Jon, EPA Region 2 RPM
Julie McPherson, EPA, Region 2 Human Health Risk Assessor
Grant Anderson, EPA, Region 2 Hydrologist
Michael Clemetson, EPA, Region 2
Robin Hackett, NYSDEC
Barbara Jones, Cardinal Resources (Consultant to the PRPs)
Kevin Jones, Cardinal Resources (Consultant to the PRPs)

## VII. Technical Assessment

*Question A: Is the remedy functioning as intended by the decision documents?*

EPA designated the lagoon effort as OU1 and the groundwater work as OU2. The major elements of the remedy for the soil and sediments in and around the lagoons set forth in EPA's March 1995 OU1 ROD as modified by EPA's August 1998 Explanation of Significant Difference was excavation and off-site disposal of waste materials and impacted soils. All excavated areas were backfilled and regraded with clean soil. This work was completed in January 2000. The elements of the groundwater remedy set forth in EPA's September 1996 OU2 ROD are (1) natural attenuation of organic contaminants in groundwater to below federal and state drinking water standards, (2) monitoring of the groundwater to evaluate improvement in groundwater quality and ensure effectiveness of the remedy, (3) performance of sediment and surface water sampling in Gold Creek to ensure contaminants do not impact the creek, and (4) implementation of institutional controls in the form of deed restrictions, restricting the installation and use of groundwater wells on the Site. Currently, the land use downgradient of the Site is primarily industrial (between the Site and Gold Creek). Groundwater modeling performed during the remedial investigation indicated that the cleanup levels would be achieved within five years of completion of the OU1 source control remedy. The groundwater model also predicted that the cleanup levels would be achieved in the same time frame whether by natural attenuation processes or by active treatment. The groundwater remedy (monitored natural attenuation) has not yet resulted in restoration of groundwater to meet federal MCLs and/or state groundwater standards.

Due to the restrictions placed on installing potable supply wells in this area, no one is currently utilizing the groundwater as drinking water source in this area (located between the Site and Gold Creek); therefore, the exposure pathway has been interrupted. Groundwater use is not expected to

change in this area within the next five years, the period of time considered in this review. Currently, the residential properties located to the east/southeast of Gold Creek use the groundwater as drinking water source. There are nearly a thousand feet of wetlands between the Site and the residential wells. Gold Creek and its accompanying wetlands should provide an effective hydraulic barrier between the Site and these residential wells. This represents an effective "recharge boundary." Although the residential wells downgradient of the Site are not part of the monitoring program, it is not expected that the residential wells would be impacted by site- related contaminants. The data indicate that several constituents have been detected in the sediments of Gold Creek below their respective state criteria. The constituents have not been detected in the surface water samples since 2006. The remedy is functioning as intended by the decision documents.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?*

The residential adult, residential child and recreational receptor were not evaluated in the original risk assessment as potential future receptors (1996). Since no one is currently using the groundwater as a potable water supply in the known affected area (between the Site and Gold Creek), it is not anticipated that some chemical-specific toxicity value changes would affect the remedy.

Some chemical-specific toxicity values have changed since the Site was originally assessed. In order to account for changes in toxicity values since the baseline human health risk assessment was performed, the maximum detected concentrations of the contaminants of concern (COCs) identified during the sampling period from 2006-2010 were compared to their respective Risk Screening Levels (RSLs), federal MCLs and their respective New York State Department of Environmental Conservation (NYSDEC) Groundwater criteria. The MCL is the highest level of contaminant that is allowed in drinking water. MCLs are promulgated standards that apply to public water systems and are intended to protect human health by limiting the levels of contaminants in drinking water. RSLs are a human health risk-based value that is equivalent to a cancer risk of $1 \times 10^{-6}$ or a hazard index of 0.1. This analysis indicates that maximum detected concentrations of benzene, chlorobenzene, 1,2-DCE, TCE, PCE, vinyl chloride, and xylene continue to exceed their respective MCLs or NYSDEC groundwater criteria within the past five years. The RAOs have not been met at the Site as of yet; however, the groundwater will continue to be monitored to ensure that the remedy continues to be protective of human health and the environment.

The soil remedy was also revisited to address the protectiveness of the remedy presented in the Record of Decision (1995). The soil cleanup levels in 1995 were established for the contaminants of concern. The current NYSDEC TAGM soil cleanup objectives for these COCs are still valid with the exception of TCE. The cleanup goal for TCE has changed slightly from 1 mg/kg to 0.7 mg/kg; however, it is not anticipated that this change would affect the remedy. The remedy is considered to be currently protective.

Soil vapor intrusion was previously evaluated in the first five-year review as a potential future exposure pathway based on the conservative (health protective) assumption that buildings are located above the maximum detected concentration of the contaminants of concern in the groundwater. The review determined that concentrations of several constituents exceeded the groundwater screening criteria. However, the vapor intrusion pathway is currently incomplete since buildings are not located over the groundwater plume. If a building were to be erected over the plume, further evaluation would be necessary, including site-specific considerations such as the type of building, the location of the building relative to the maximum detected concentrations, and the subsurface characteristics of the Site. This information could be used to assess whether vapor intrusion would be a problem and if necessary, a vapor mitigation system could be integrated into the building design.

The 1996 Record of Decision stated that there are no impacts to ecological receptors in Gold Creek, since contaminants in groundwater have not migrated to Gold Creek and are not anticipated to migrate there in the future. Based upon the data provided, downgradient groundwater monitoring wells OW-19 and OW-18 were found to have site-related contaminants and are near (upgradient) sediment sample location SED-1 in the creek. The monitoring well (OW-24) near sediment sample location SED-2 was not sampled. Both of the sediment sampling locations were found to have detections of volatile organic compounds. However, the concentrations of the contaminants did not exceeded sediment guidance values. The assumptions, data, levels, and objectives appear to be still valid.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No other information has come to light that could call into question the protectiveness of the remedy.

## VIII. Recommendations and Follow-Up Actions

Re-institute sampling of monitoring well OW-24. This is the sentinel well for the chlorinated plume.

Replace the locking cover on monitoring well OW-19.

Table 5 summarizes the recommendations and follow-up actions stemming from this five-year review.

## IX. Protectiveness Statement

Because the implemented remedial actions at all OUs at the Carroll and Dubies Sewage Disposal Superfund Site are protective, the Site is protective of human health and the environment. There are no exposure pathways that could result in unacceptable risks and none expected as long as the institutional controls, which are in place, and natural attenuation remedy selected in the decision documents for the Site continue to be properly monitored and maintained.

## X. Next Review

The next five-year review for the Carroll and Dubies Sewage Disposal Site should be completed within five years of the signature date below.

Approved: _____ Date: 8/19/2010

Walter E. Mugdan, Director
Emergency and Remedial Response Division

| Acronyms Used in this Document | |
|---|---|
| ARAR | Applicable or Relevant and Appropriate Requirement |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| EPA | United States Environmental Protection Agency |
| CIC | Community Involvement Coordinator |
| MCL | Maximum Contaminant Level |
| NPL | National Priorities List |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| RA | Remedial Action |
| RD | Remedial Design |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RPM | Remedial Project Manager |
| TCE | Trichloroethene |
| VOCs | Volatile Organic Compounds |

| Table 1 : Chronology of Site Events | |
|---|---|
| **Event** | **Date** |
| C&D began operations as a municipal sewage sludge/septage waste facility | 1971 – 1979 |
| EPA conducted a site inspection and limited sampling | 1981 |
| Site is placed on the NPL | 1990 |
| Record of Decision signed for Operable Unit 1 (OU1) | 1995 |
| Record of Decision for OU2 | 1996 |
| Unilateral Administrative Order | 1997 |
| Remedial Design for OU1 | 1998 |
| Explanation of Significant Differences for OU1 | 1998 |
| Remedial Action for OU1 completed | 2000 |
| Preliminary Close-Out Report | 2000 |
| Initiation of monitoring activities for OU2 | 2000 |
| First Five-Year Review | 2005 |
| Most recent sampling event for OU2 | 2009 |

| **Table 2: Estimated Average Annual Cost of the OU 2 Remedy** (Based on 2009 year) | |
|---|---|
| Item | |
| Sampling equipment, supplies, shipping | $ 3,200 |
| Analytical services | $ 9,000 |
| Reporting | $ 7,000 |
| Data validation and QA/QC | $ 7,000 |
| Document production/drafting | $ 1,500 |
| Sampling labor | $ 9,000 |
| Total Annual Cost | $36,700 |

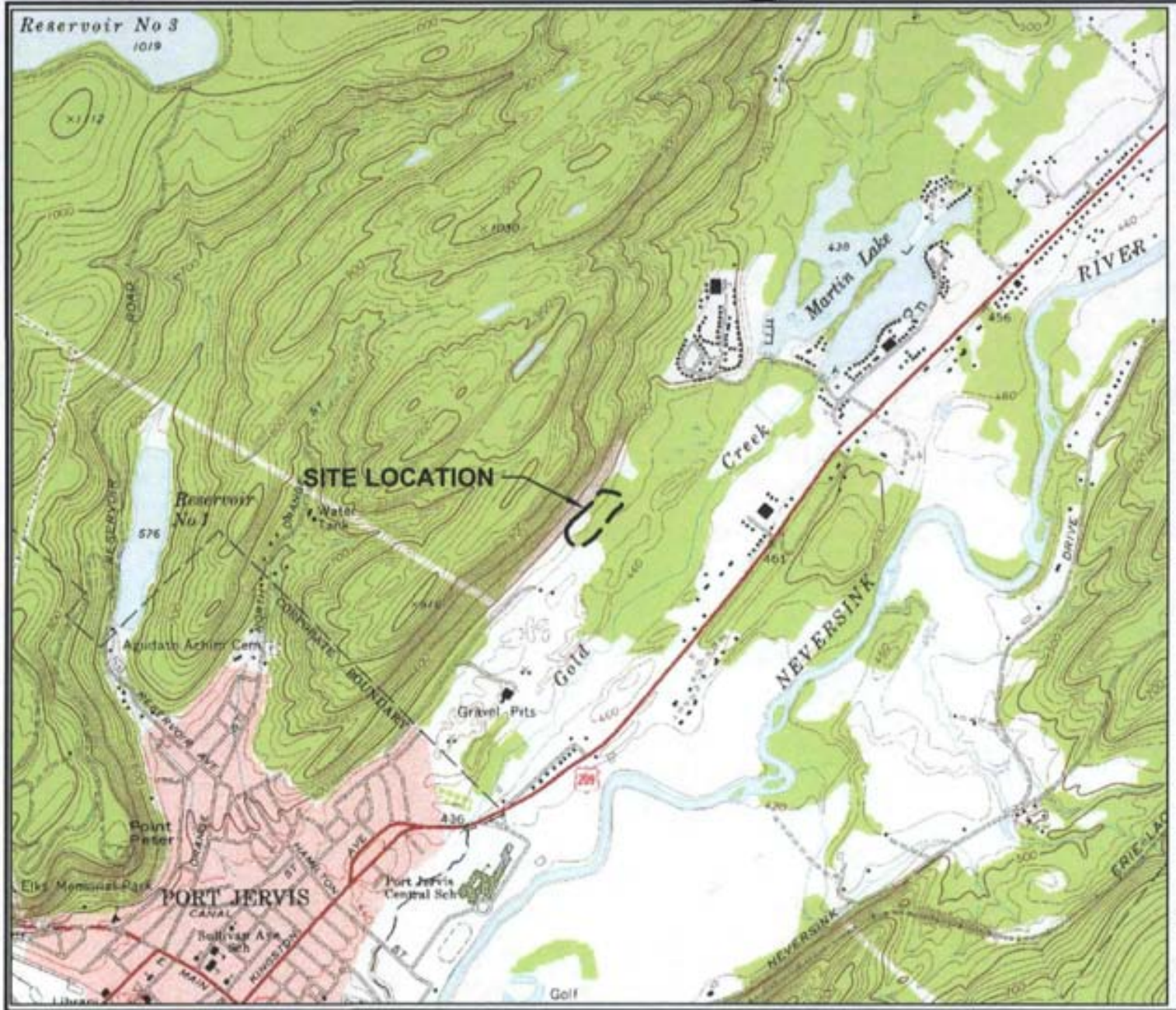
**Table 3 : Documents Reviewed**

| Author | Date | Title/Description |
|---|---|---|
| US EPA | May 1995 | Record of Decision, Carroll and Dubies Sewage Disposal, Operable Unit 1 |
| US EPA | September 1996 | Record of Decision, Carroll and Dubies Sewage Disposal, Operable Unit 2 |
| Remediation Technologies, Inc. | September 1995 | Supplemental Hydrogeologic Remedial Investigation, Carroll and Dubies Sewage Disposal |
| Remediation Technologies, Inc. | April 1996 | Baseline Risk Assessment, Carroll and Dubies Sewage Disposal |
| Shield Environmental Associates, Inc. | February 2000 | Remedial Action Report, Carroll and Dubies Sewage Disposal |
| Shield Environmental Associates, Inc. | April 2003 | Annual Monitoring Report, Carroll and Dubies Sewage Disposal |
| Cardinal Resources | April 2004 | Annual Monitoring Report, Carroll and Dubies Sewage Disposal |
| Cardinal Resources | February, May, August and November 2006 | Annual Monitoring Report, Carroll and Dubies Sewage Disposal |
| Cardinal Resources | June 2007 | Annual Monitoring Report, Carroll and Dubies Sewage Disposal |
| Cardinal Resources | September 2008 | Annual Monitoring Report, Carroll and Dubies Sewage Disposal |
| Cardinal Resources | September 2009 | Annual Monitoring Report, Carroll and Dubies Sewage Disposal |

**Table 4: Recommendations and Follow-up Actions from the 2005 Five-Year Review**

| Issue | Recommendations and Follow-up Actions | Status |
|---|---|---|
| Groundwater. The current monitoring network does not allow for a determination of the edge of the plume and any impacts to Gold Creek. Surface water and sediment samples in Gold Creek do not indicate the Site is having an impact on this water body. However, more thorough sampling and additional well installation are recommended to verify this conclusion. | Installation of two monitoring wells to the east of monitoring well OW-17 and down gradient of OW-6. | Completed |
| | Sampling of monitoring wells OW-23 and OW-17. | Completed |
| | Sampling of sediment and surface water at two additional locations between locations SED-1 and SED-2 in Gold Creek. | Completed |
| | Sampling of pore water in the sediments at 4 feet below Gold Creek. | Completed |

| Table 5: Recommendations and Follow-up Actions from this Five-Year Review | | | | | |
|---|---|---|---|---|---|
| Issue | Party Responsible | Oversight Agency | Date | Affects Protectiveness (Y/N) | |
| | | | | Current | Future |
| Re-institute sampling of monitoring well OW-24. This is the sentinel well for the chlorinated plume.<br><br>Replace the locking cover on monitoring well OW-19. | PRP | EPA | Next sampling event | N | N |
| | | | | | |




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

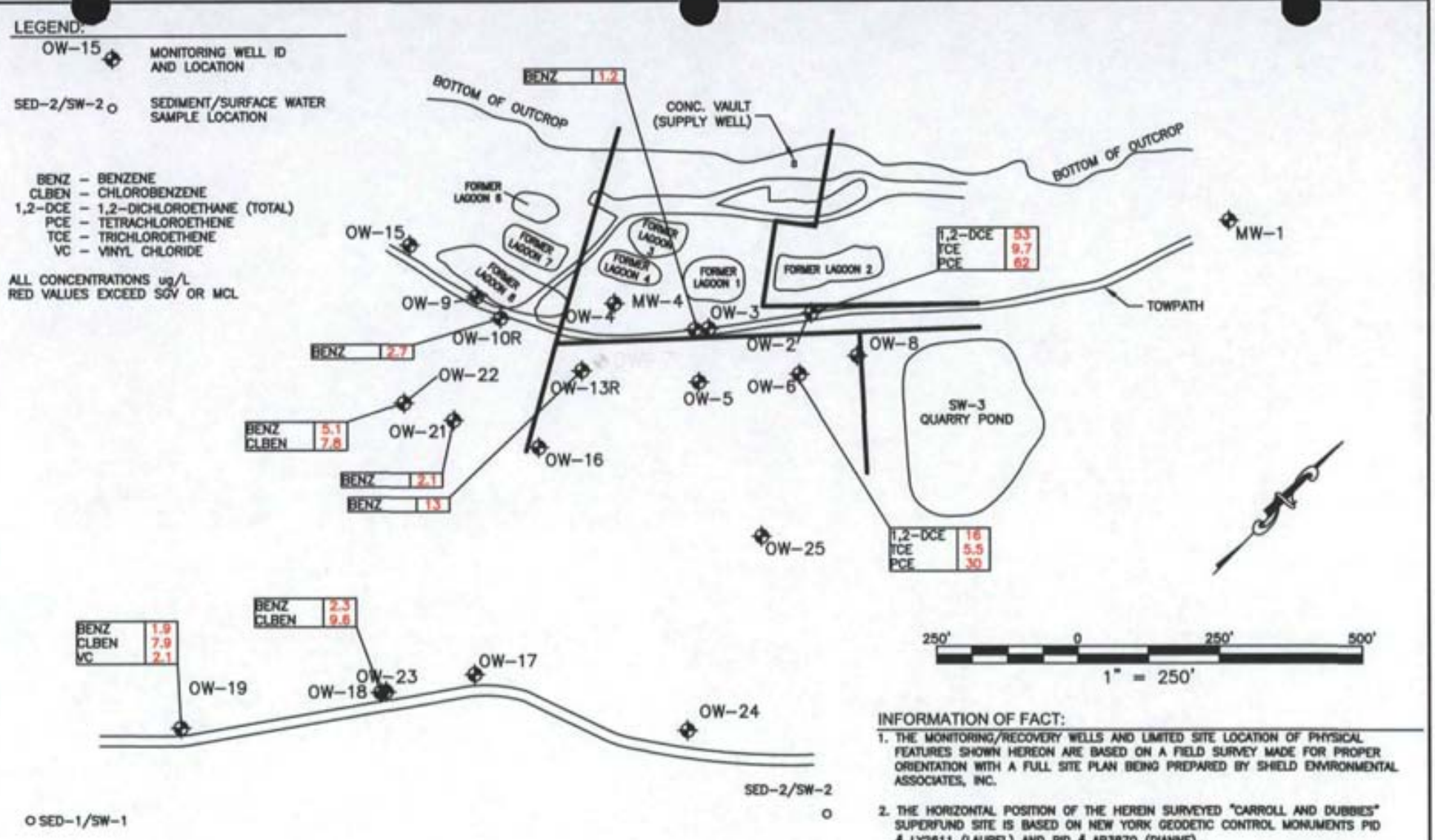
105-0035

| NO | DRWN | DATE | REVISION | CHKD | DATE | APPVD | DATE |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 0 | ECM | | | | | | |

FIGURE 1

SITE LOCATION MAP

| CADD FILE | 9005 | SCALE | AS NOTED | CURRENT DATE: | 03-07-2005 |
|---|---|---|---|---|---|
| DRAWING NO. | 105-0035-0300-01 | | | 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 DUBBIES" 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. INDEX(). 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 | | | | | | | |

FIGURE 2
VOLATILE ORGANIC COMPOUND EXCEEDANCES IN GROUNDWATER
JULY 2009

| CADD FILE | | SCALE | 1"=250' | CURRENT DATE: | 08-27-2009 |
|---|---|---|---|---|---|
| DRAWING NO. | 104-0012-0300-03 July09 | | | REVISION | 0 |