REMEDIAL INVESTIGATION REPORT

Scobell Chemical Site

Town of Brighton, New York
Monroe County
Site No. 8-28-076

February 1999 (Operable Unit #1)
Revised February 2002 (Operable Unit #2)

Prepared by
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION

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Section 1 - INTRODUCTION

1.1 Site Location

The Scobell Chemical site is located at One Rockwood Place, immediately adjacent to the northwest corner of the I-490/I-590 interchange, in the Town of Brighton (on the boundary with the City of Rochester), Monroe County, New York (see Figure 1). The site is bordered to the south and east by the highway interchange, to the west by a commercial building, and to the north by railroad tracks and a Rochester Gas and Electric (RG&E) substation.

1.2 Site Description

The site is the location of a former chemical operation that conducted chemical storage, warehousing, transferring and sales of hazardous materials. Originally, the site was approximately 2.6 acres in size. In 1988, as a part of the New York State Department of Transportation's (NYSDOT) "can of worms" reconstruction project, an Interim Remedial Measure (IRM) was conducted by NYSDOT. The IRM included demolition of all of the on-site buildings as well as excavation and off-site disposal of contaminated soil and bedrock from over half of the site. The present site is about one (1) acre in size, is capped with approximately twelve (12) inches of clay, and is fenced. The site is located in a highly urbanized area in the Town of Brighton, at the eastern boundary of the City of Rochester. Industrial and commercial properties are located directly to the west of the site. A major Conrail railroad line is directly north, and to the east and south is the I-490 and I-590 highway interchange. The site is presently owned by the New York State Department of Transportation (NYSDOT).

For reasons described later in this Report, this site has been divided into two operable units: the on-site operable unit (Operable Unit #1, or OU#1) and the off-site operable unit (Operable Unit #2, or OU#2).

1.3 Site History

The Scobell Chemical Site is the location of a former chemical repackaging company. The former site was operated from the 1920s until 1986. Assorted chemicals were purchased by the company in bulk and repackaged into smaller containers for resale. The site had one main building, two smaller structures and four above ground storage tanks. The amount of and type of the materials handled is unclear but significant subsurface soil contamination has been identified.

In 1986, the NYSDOT condemned the property to construct the "Can of Worms" highway intersection (the intersection of I-590 and I-490). In early 1988, the NYSDOT discovered extensive contamination at the Scobell site including abandoned drums, contaminated structures, and soil and bedrock contamination. Drums and containers containing halogenated volatile organic compounds (VOCs), pesticides/herbicides (including 2,4,5-T) and toluene were found in the warehouse. The site was reported to contain deteriorated containers, discolored soils, and stained asphalt.

In 1988, the NYSDOT conducted an IRM removal action. The IRM included decontamination and demolition of the structures, removal of containers, drums and above ground storage tanks, and excavation and disposal of contaminated soil and bedrock. Over half of the former footprint of the site was remediated by the IRM and is now a part of the highway interchange. For the remaining portion of the site, only the structures and above ground tanks were removed; no soil remediation was reported other than capping the area with 9-12 inches of clay. A fence was placed around the site. Significant subsurface soil contamination remains under the cap including toluene, trichloroethene, tetrachloroethene, 1,2-dichloroethene, chromium and pesticides (see Section 2).

A seep prevention system was installed by NYSDOT in November 1988, near the end of the IRM. The seep prevention system was installed at the base of the slope, adjacent to the highway ramp, to prevent water from running onto the highway. The seep prevention system consisted of approximately 300 feet of six inch diameter underdrain pipe that ran from the southwest to the northeast at the base of the slope between the site and the highway. When the system was in operation water drained to a 16 cubic foot collection sump (a manhole), located at the base of the slope below the northeast corner of the Scobell site. From the collection sump the water was pumped to a 2000 gallon holding tank, located at the top of the slope in the northeast corner of the site. When the seep prevention system was temporarily shut down in 1994, no water was seeping from the bedrock face. Since the purpose of the seep prevention system (prevent water from running onto the highway) was being accomplished on its own, the system was no longer needed to accomplish its intended goal and its use was discontinued in 1995.

During the demolition of the on-site structures 62 drums of soil/dust, containing site related contamination including low levels of 2,4,5-T (silvex), were generated. At the time the waste was generated it was difficult to find a facility to accept the waste for disposal. As a result, the drums were stored in an on-site storage trailer until they were disposed of at an off-site facility in 1996.

Section 2 - RESULTS FROM PREVIOUS SAMPLING AT/ NEAR THE SITE

Previous sampling events at and near the site are discussed below. A summary of the analytical results from these sampling events can be found in Table 2.1.

2.1 1988 NYSDOT Soil Sampling

Contractors for NYSDOT conducted soil/dust sampling in March, May, and June-August of 1988. Samples were collected from the entire footprint of the site at that time; since that time, over half of the site was removed as a part of the IRM summarized in Section 1.3, above. The results discussed in this section only include results from the current site area (what remained after the 1988 IRM).

Samples were analyzed for one or more of the following: volatile organics, total metals, EP Toxicity metals, dioxin scan, pesticides, and herbicides. Soil samples were collected at various depths ranging from the surface down to bedrock (generally less than ten feet below the surface).

Volatile organics were detected at nearly every sample location at varying concentrations. The volatile organics which were most prevalent include: trichlororethene (TCE), tetrachloroethene (PCE), 1,2-dichlororethene (1,2-DCE), and toluene. The following is a brief summary (also see Figure 2.1/Table 2.1 for a summary of the 1988 NYSDOT sampling) of the contaminants found in the portion of the site that remained after NYSDOT's IRM (the current footprint of the site):

Trichloroethene

The results indicated concentrations of TCE in the soil ranging from non-detect to 116 parts per million (ppm). The highest concentration was detected at the south-central portion of the site (sample # 88-61) at a depth of 84"-107". The area near the west-central portion of the site also indicated the presence of relatively high TCE concentrations (22.4 ppm at sample #88-85 at a depth of 0-18").

Tetrachloroethene

The results indicated concentrations of PCE in the soil ranging from non-detect to 73.6 ppm. The area where the highest concentrations of PCE were observed was the west-central portion of the site at and near sample # 88-89.

1,2-Dichloroethene

The results indicated concentrations of 1,2-DCE in the soil ranging from non-detect to 76.1 ppm. The highest concentrations were detected at the south-central portion of the site (sample # 88-60, -61, -62, and -29).

Toluene

Elevated concentrations of toluene in the soil were detected in many of the samples across the current footprint of the site. The highest contamination was detected in an area running from the west-central portion of the site to the east-central portion of the site, as well as in the north central portion of the site (near the former above ground storage tanks). The highest concentration was detected at sample # 88-98 (989 ppm at a depth of 36"-72") with elevated concentrations also found at sample # 88-89, -85, -97, -60, -61, -29, -91, -92, -93, -95, and -96.

EP Toxicity Metals - Chromium

There was an occasional "hit" for EP Tox chromium at levels above the regulated level (the level which classifies the soil as hazardous waste; 5 mg/L for chromium). Five samples, located along the western portion of the site (sample # 88-71, -72, -73, -75, and -76) indicated concentrations above the regulated level; four of these samples had levels between 8.3 and 15.3 mg/L with one of the sample results indicating a concentration of 758 mg/L.

EP Toxicity Metals - Lead

There were two samples that indicated EP Tox lead at levels above the regulated level (5 mg/L for lead). These samples were located along the western portion of the site (sample # 88-71 and -73) and the EP Tox lead concentrations were 12.2 and 5.6 mg/L, respectively.

Pesticides/Herbicides

There were some low level detections of certain pesticides/herbicides at the site. However, the only concentration that exceeded any of the cleanup objectives, presented in the Division of Environmental Remediation's Technical and Guidance Memorandum 4046, was the 12.6 ppm of MCPP (2-(22-methyl-4-chlorophenoxy)-propionic acid) detected in sample 88-30, located near the northeast corner of the site.

2.2 Leachate Collection System

As indicated in Section 1.3, a seep prevention system was installed, by NYSDOT in November 1988, near the end of their IRM. The seep prevention system was installed at the base of the slope, adjacent to the highway ramp, to prevent water from running onto the highway. The seep prevention system consisted of approximately 300 feet of six inch diameter underdrain pipe that ran from the southwest to the northeast at the base of the slope between the site and the highway. When the system was in operation water drained to a 16 cubic foot collection sump (a manhole); water that collected in the sump was then pumped to a 2000 gallon holding tank, located at the top of the slope in the northeast corner of the site.

Two sets of data are available for water samples taken from the 2000 gallon leachate holding tank. These samples were collected on April 10, 1989 and July 6, 1992 and the results are summarized below:

April 10, 1989

Analysis of this sample indicated the presence of 1,2-DCE (1360 parts per billion or ppb), PCE (302 ppb), TCE (224 ppb), toluene (150 ppb), 1,2-dichloroethane (122 ppb), and 1,1,1-trichloroethane (31 ppb).

July 6, 1992

The results of this sampling event indicated elevated concentrations of TCE (435 ppb), PCE (114 ppb), 1,1,1-trichloroethane (93 ppb), 1,2-dichloroethane (21 ppb), and 1,2-DCE (9 ppb).

2.3 Sediment and Surface Water Samples - Grass Creek Drainage System

On May 5, 1992 representatives of the Monroe County Health Department and the New York State Department of Health collected surface water/sediment samples from four locations in the Grass Creek drainage system. The samples were collected from (with the upstream samples listed first): north of site on RG&E property (sample location #3); just northwest of the I-590/I-490 interchange from the south end of the detention pond adjacent to the highway (sample location #4); northeast corner of Route 590 North on-ramp at Blossom Road (sample location #2); and north side of Edgevale Road at Clover Street (sample location #1).

The two sample locations located furthest from the site (#1 & #2) did not indicate the presence of elevated concentrations of site related contaminants. The two sample locations closest to the site indicated elevated concentrations of the following VOCs in the surface water samples: cis-1,2-DCE (up to 310 ppb), TCE (up to 140 ppb), and vinyl chloride (up to 6 ppb).

2.4 Blossom Village Apartments Foundation Excavation

The Blossom Village Apartments are located approximately one half mile north-northeast of the site, on the south side of Blossom Road just west of I-590. During the construction of the building the excavation for the foundation was advanced to approximately 7 feet below the surface, in one area, in order to remove concrete foundations and scrap metal (reportedly the remains of a small structure that had previously existed at the site). The elevation of the groundwater surface was reported to be just above the bottom of the excavation. A water sample was taken on May 3, 1995 and analyzed for metals and VOCs. A summary of the results from this sampling event indicated that only five parameters (three metals and two VOCs) were found in concentrations above the method detection limits. The two VOCs that were found were TCE (62 ppb) and 1,2-DCE (17 ppb).

Section 3 - SITE INVESTIGATION ACTIVITIES

1998 Site Investigation [details provided in Sections 3.1 - 3.9]

A Work Assignment (WA), to perform the Site Investigation at the Scobell Chemical site (OU#1), was issued to Parsons Engineering Science, Inc. on February 10, 1998. The Scope of Work included in the WA included the preparation of work plans to accomplish the following objectives:

- Evaluate localized groundwater flow patterns (with the use of exploratory groundwater monitoring points) to determine groundwater flow direction from the contaminant source area.

- As a part of past work at the site by NYSDOT most of the subsurface soils have been adequately characterized, with the exception of the northeast corner of the site. As a result, one of the objectives was to characterize the contaminant concentrations present in subsurface soils located in the northeast corner of the site.

- Field screen subsurface soils in an attempt to determine if LNAPL and/or DNAPL was present..

- Conduct a site survey and prepare a basemap.

- Based on the information collected as a part of the initial phase of this WA, install overburden and shallow bedrock groundwater monitoring wells to evaluate groundwater quality and determine the extent of any contaminant plume from this site.

- Determine if surface water/sediments have been impacted.

- Conduct a vapor extraction system pilot study.

Parsons Engineering Science, Inc. prepared the November 1998 Site Investigation Summary Data Report to document the work which they performed; this document is included as Attachment 1.

<u>2000 Remedial Investigation - OU#2 [details provided in Sections 3.10 - 3.16]</u>

A Work Assignment (WA), to perform the Site Investigation at the Scobell Chemical site (OU#2), was issued to URS Corporation on July 3, 2000. The Investigation was performed in the summer/fall of 2000; the Report documenting the Investigation is dated May 2001. The Scope of Work included in the WA included the preparation of work plans to accomplish the following objectives:

- Additional off-site investigation to determine the extent of both the aqueous and the non-aqueous contamination present off-site as the result of migration from the on-site area. This work included the installation of nine additional monitoring wells, including one overburden well and four shallow/deep bedrock well pairs.
- A seismic reflection survey and a resistivity survey were conducted at this site to gather information for the potential design and placement of DNAPL recovery wells.
- A site survey was performed and used to update the current site basemap to include the sample points/areas investigated as a part of this Work Assignment.
- Additional surface water samples were collected/analyzed (performed by NYSDEC).

URS Corporation prepared the May 2001 Remedial Investigation Data Summary Report to document the work which they performed; this document is included as Attachment 2.

1998 SITE INVESTIGATION

3.1 Determination of Groundwater Use in the Area

A review of groundwater usage in the vicinity of the site was conducted to determine whether water supply wells are currently in service near the site.

. 3.2 Evaluation of the Seep Prevention System

As discussed in Section 1.3, as a part of the work performed by NYSDOT a seep prevention system was installed to make sure that contaminated groundwater did not seep onto the highway at the exposed bedrock located along the southeastern edge of the site. This seep prevention system was inspected in order to determine: 1) its current condition; 2) if it is continuing to collect contaminated groundwater from the site, and if so, where that water is going; and 3) if the seep collection system has any potential for future use for the containment/collection of contaminated groundwater. A water sample was also collected from the sump basin and sent to an approved laboratory for VOC, pesticide, and metals analysis.

3.3 Small Diameter Groundwater Monitoring Point Installation

This initial part of this phase of the Site Investigation included the installation of 21 on-site and 4 off-site exploratory subsurface soil/groundwater monitoring points, GP-1 through GP-25, to bedrock (approximately 7-10 feet below ground surface) using a small diameter groundwater probe (e.g., Geoprobe^{tm} or equivalent method). This work was conducted between May 13, 1998 and May 15, 1998. The approximate locations of these points (on-site) were established on a 50 foot grid (see Attachment 1, figure 2.1).

At all 25 of the points continuous soil samples were collected for geological characterization, PID field screening, and field screening for the presence of NAPL using a hydrophobic dye (Sudan IV). At 10 of the locations (6 on-site/4 off-site) soil samples were collected from two different depths and sent for laboratory analysis; the depths were chosen based upon the results of the PID field screening. These samples were sent for laboratory analysis in order to fill in data gaps from NYSDOT's 1988 sampling, as well as to characterize the soils from the off-site geoprobe locations. Piezometers were installed at 19 of the 21 on-site locations and at the 4 off-site locations. Groundwater samples were collected for laboratory analysis at 3 on-site locations and 3 off-site locations (the fourth piezometer was dry).

On June 28, 1998 seven additional piezometers, GP-26 through GP-32, were installed to the north of the site, on Rochester Gas and Electric's property. Groundwater samples were collected from 5 of the piezometers; the other two piezometers were dry.

3.4 Monitoring Well Installation

The placement of the monitoring wells was based upon the information on groundwater flow direction gathered from the small diameter groundwater monitoring points, discussed in the previous section. Five monitoring well pairs, consisting of an overburden well and a shallow bedrock well, were originally planned. However, at three of the locations groundwater was not encountered in the overburden. Overburden monitoring wells were not installed at these locations, resulting in the installation of two overburden wells and five shallow bedrock wells (see Attachment 1, figure 2.1).

3.4.1 Shallow Bedrock Well Installation Method

Five shallow bedrock wells were installed (MW-1D, -2D, -3D, -4D, and -5D). At each well pair location the bedrock well was installed first in order to evaluate the integrity of the top-of-rock, in order to determine how to install the overburden well (see Section 3.4.2).

For the installation of the shallow bedrock monitoring wells, soils were drilled to bedrock using 6-1/4 inch inside diameter (I.D.) hollow-stem augers, with continuous split spoon sampling to the top of bedrock. A six inch spin casing was inserted into the hole and seated into the top-of-rock to allow for the containment of the drill water. The bedrock was then cored using HX coring methods, inside the six inch spin casing, to a depth of five feet into bedrock. A 5-7/8 inch roller bit was then used to ream out the hole and a four inch steel casing was set (with cement/bentonite grout) into the rock socket and was extended approximately two feet above the ground surface. Excess grout inside the steel casing was flushed out using potable water. After the grout had been allowed to set for at least 24 hours, HX coring methods were used to advance the hole up to 30 feet into the bedrock (Pennfield dolostone). Drilling logs are included in Appendix A of Attachment 1.

Monitoring wells were constructed of two inch ID threaded schedule 40 PVC flush-joint casing with a ten foot machine slotted 0.010-inch well screen. The annulus around the well screen was backfilled with No. 1 Morie sand. The sand pack extended one to two feet above the well screen. A bentonite seal was placed above the sand pack to form a two-three foot seal. Cement/bentonite grout was placed to the surface. Grout was lost in a high permeability zone below the steel casing at MW-1D, MW-2D, and MW-3D, so the remaining annular space was filled with hydrated bentonite chips. Each well had a vented cap placed on the monitoring well casing and a locking cover was placed on the 4-inch steel casing. A cement pad was installed around each steel well casing to channel surface water away from the well.

3.4.2 Overburden Well Installation Method

Only two overburden wells were installed (MW-4S and MW-5S); at the other three locations where overburden wells were to be installed, no water was encountered in the overburden when the bedrock wells were being installed. As a result, there was no point installing overburden wells at these locations. Prior to beginning the installation of the overburden well at the other two locations, the rock cores from the bedrock well were examined to determine the integrity of the top-of-rock (thickness of the "weathered bedrock"). Overburden monitoring wells were advanced with 4-1/4-inch inside diameter (ID) hollow-stem augers to the top of the bedrock. The well borings were continued through the augers 2.3-2.5 feet into the top of rock using a 5-7/8-inch outside diameter (OD) roller bit and water rotary drilling methods.

Monitoring wells were constructed of two inch ID threaded schedule 40 PVC flush-joint casing and ten feet of machine slotted 0.010-inch well screen. The overburden wells were screened across the water table so that any LNAPL that may be present, could be detected. The annulus around the well screen was backfilled with No. 1 Morie sand. The sand pack extended to one-two feet above the well screen. A bentonite seal was placed above the sand pack to form a two-three foot seal. Cement/bentonite grout was placed to within three feet of the surface, if there was enough space. Each monitoring well casing had a vented cap placed on it and a locking four inch diameter steel protective casing, with a hinged locking cover, was cemented into place over each overburden well. A cement pad was installed around each protective casing to channel surface water away from the well.

3.4.3 Vapor Extraction Well Installation

A vapor extraction well was installed near the western-central portion of the site. Soils were drilled with using 6-1/4 inch inside diameter (I.D.) hollow-stem augers, and continuous split spoon sampling, to the top of bedrock. The extraction well was constructed of 4 inch PVC schedule 40 pipe with a 0.040 inch slotted PVC screen. The screen will extend from the bottom of the hole to within 2.5 feet of the ground surface. A sand pack, with a grain size appropriate for 0.040 inch slotted screen, was installed surrounding the screened interval with a bentonite seal installed to within six inches of the surface. The extraction well was completed with a protective casing and a lockable cover.

3.5 Well Development and Slug Testing

Well development was conducted from June 29, 1998 through July 2, 1998. Monitoring wells were developed using pumping and surging, or by bailing, until temperature, conductivity, and pH stabilized and turbidity of less than 50 NTUs was achieved. Well evacuation was accomplished using a disposable polyethylene bailer or a pump and polyethylene tubing. MW-3D did not sustain satisfactory quantities of water during development so it was surged and agitated with a bailer in an effort to clean the sand pack while being bailed to dryness.

All monitoring wells were slug tested to estimate aquifer properties. Rising head (slug out) and falling head (slug in) slug tests were conducted using a combination of electronic water level monitoring and electronic data logger equipment. The slug tests were conducted between August 10, 1998 and August 12, 1998.

3.6 Vapor Extraction System Pilot Study Procedures

With the nature of many of the contaminants of concern at this site (volatile organics), and the type of unconsolidated material present below the site, vapor extraction may be a viable remedial technology. As such, a vapor extraction system (VES) pilot study was conducted from August 26, 1998 through September 3, 1998 with the use of the vapor extraction well (SVE-1) and five vapor monitoring points (GP-6, -16, -17, -20, and -22). A blower was connected to the vapor extraction well, air was extracted from the vapor extraction well and the surrounding soil (the air was passed through a carbon cannister), and the induced vacuum was monitored at the five monitoring points. Vapor extraction continued for a period of five days until breakthrough was observed at the carbon cannister.

At regular intervals during the first four hours of the pilot study vacuum response (at the piezometers being monitored) and VOC concentration at the extraction well (with a PID) were measured; after the first four hours measurements were taken at the end of the first and fifth days. PID readings were also taken from in the piezometers during the pilot study, as well as three days after the blower was turned off.

During the pilot study four air samples were taken and analyzed for VOCs in a laboratory. Three of the samples were collected from the extraction well (1 hour, 22 hours, and 120 hours after initiation of the pilot test) and one sample was taken from the effluent of the carbon treatment cannister (22 hours after test initiation).

3.7 Handling of Investigation Derived Waste

Excess drill cuttings, generated from the installation of the monitoring wells, were drummed and staged on-site until off-site disposal could be arranged. One composite sample was taken from the drill cuttings generated from the installation of the soil vapor extraction well and one composite sample was collected from the drums containing the rest of the drill cutting being staged at the site. The two samples were analyzed by the toxicity characteristic leaching procedure (TCLP) for VOCs, pesticides/herbicides, and metals.

All decontamination and drill water from the on-site wells and piezometers was allowed to infiltrate back into the site, making sure that runoff/surface flow was not allowed (a small area of the 9"-12" clay cover, installed as a part of the 1988 NYSDOT IRM, was temporarily removed to facilitate the infiltration). Drilling water, development water, and purge water from the upgradient and downgradient monitoring wells was containerized pending the results of the groundwater samples taken from those wells. The water generated from the upgradient well was later disposed of at the site; the water generated from the downgradient wells was not allowed to infiltrate into the ground at the site. Arrangements were made for the off-site disposal of the drill cuttings and water that had been staged at the site during the site investigation field work.

3.8 Collection of Samples

As a part of the Site Investigation field work samples of the following environmental media were collected: surface soil, subsurface soil, sediment, surface water, groundwater, dense non-aqueous phase liquid (DNAPL), and soil vapor. The number of samples for each media, the phase of the field work when the samples were collected, and the method of analysis for the samples is summarized in Table 3.1.

3.8.1 Small Diameter Groundwater Monitoring Points

During the small diameter groundwater monitoring point (geoprobe^{TM}) installation, subsurface soil samples were collected continuously from ground surface to the top of bedrock at each of the initial 25 soil boring locations. The soils were visually examined for geological characteristics and evidence of contamination. A portion of each sample was placed in a zip-lock bag and the headspace was screened for the presence of organic vapors using a photoionization detector (PID). Two soil samples from each of the borings, one near the top of the water table and one near the top of bedrock, were also screened for the presence of LNAPL and DNAPL with Sudan IV, a hydrophobic dye. Soil samples were not collected in the additional seven borings installed north of the site.

A total of ten of the geoprobe locations were designated for the collection of subsurface soil samples; six on-site, to fill in data gaps, and at all of the four off-site locations, since no soil data previously been collected downgradient of the site. Two subsurface soil samples were collected, from each of the ten locations, based on the field screening results. The 20 samples were submitted for laboratory analysis, as summarized in Table 3.1.

Groundwater samples were collected from six piezometers (GP-1, GP-2, GP-4, GP-5, GP-9, and GP-24) on May 26 and 27, 1998 and analyzed for VOCs, pesticides, and metals. Prior to sampling, each of the piezometers were purged a minimum of three well volumes of water, or to dryness and then allowed to recover. Four of the seven piezometers originally planned for sampling were dry (GP-3, GP-19, GP-23, and GP-25), therefore three new sample locations were substituted (GP-5, G-9, and GP-24). Purging and sampling were conducted using a combination of a peristaltic pump with dedicated tubing(purging) and small bailers (sampling). Groundwater sampling logs are presented in Appendix B of Attachment 1.

3.8.2 Miscellaneous Site Investigation Samples

Surface water and sediment samples were collected from the site on May 28, 1998 (Attachment 1, Figure 2.1). Two surface water samples (SW01 and SW02) and two sediment samples (SED01 and SED02) were collected from the highway stormwater retention pond, located approximately 0.25 miles northeast of the site. Samples SW01 and SED01 were collected at the southwestern (influent) end of the stormwater retention pond approximately 25 feet northeast of the box culvert. Samples SW02 and SED02 were collected near the base of a hill adjacent to a groundwater seep located on the western side of the marshy area at the southwestern end of the retention pond (i.e. northwest of SW-1). Sediment sample (SED03) was collected from the drainage ditch north of the railroad tracks and east of the Rochester Gas and Electric substation. There was no standing water in the ditch during the site investigation so surface water was not sampled.

A **water sample (SUMP1)** was collected from the seep prevention sump (vault) located adjacent to the southeastern edge of the site along the I-590 off ramp. The sump sample was collected by lowering a disposable bailer and other sampling apparatus into the sump from the top.

Four **surface soil samples** (SS01 to SS04) were collected along the western and northern boundaries of the site on May 27, 1998. Samples SS01 and SS02 were located in the area between the building and the fence along the west side of the site. Samples SS03 and SS04 were located near the base of the railroad embankment along the north side of the site. At each location, the surface debris and sod was removed. The surface soil samples were then collected from a depth of approximately 0 to 2 inches.

3.8.3 Monitoring Wells/Vapor Extraction Well

Continuous split spoon samples were collected through the overburden to the top of bedrock at each well location (if a well pair was to be installed at a certain location, split spooning occurred during the drilling of the deeper well). The soils were visually examined for geological characteristics and evidence of contamination. A portion of each sample was placed in a zip-lock bag and the headspace was screened for the presence of organic vapors using a PID. Two soil samples from each well pair location, one near the top of the water table and one near the top of bedrock, were also screened for the presence of NAPL with Sudan IV, a hydrophobic dye.

Two subsurface soil samples were collected from the overburden section in the two onsite monitoring wells for laboratory analyses. In addition, samples from the two on-site and two downgradient well locations (one at each of the on-site locations and two at each of the off-site locations) were analyzed for "physical parameters" including moisture content, total organic carbon, and particle size distribution.

Two soil samples were collected from the split spoons taken during the installation of the vapor extraction well. These samples were submitted for analysis of "physical parameters" including moisture content, total organic carbon, and particle size distribution.

During the purging of the monitoring wells, prior to the collection of groundwater samples, the presence of dense nonaqueous phase liquid (DNAPL)was encountered in MW-3D and MW-4D. Samples of the DNAPL were collected for VOC analysis.

Four air (soil gas) samples were collected during the SVE pilot test for laboratory VOC analysis. Air samples were collected from the vapor extraction well (SVE-1) approximately 1 hour, 22 hours, and
120 hours after test initiation. In addition, an air sample was collected from the effluent of the carbon canister 22 hours after test initiation. The air samples were collected in tedlar bags and shipped overnight to the analytical laboratory for VOC analysis.

3.9 Site Survey/Preparation of Basemap

It was necessary to perform the site survey in two phases. The placement of the monitoring wells was based upon the interpretation of the groundwater levels from the piezometers installed as a part of the initial site investigation field work. As a result, the piezometers had to be surveyed for vertical control in order to properly evaluate the groundwater levels. Once the monitoring wells were installed a second phase of surveying was conducted to include all of the sampling points on the basemap.

The first phase of the site survey was conducted on May 28, 1998 and consisted of surveying the piezometers, conducting a topographical survey, establishing a site benchmark, and preparing a preliminary site basemap. The second phase of the site survey was conducted on July 2, 1998 and July 9, 1998 and included surveying the monitoring wells/ additional piezometers, as well as any sampling point not previously surveyed. All wells/piezometers/ sampling points were surveyed for vertical and horizontal control. In addition, at each piezometer the top-of-casing elevation was recorded and at each monitoring well the elevation of the inner and outer casing was collected. A site basemap, which included all sampling locations and a one foot topographical interval, was completed and included with the Site Investigation Report.

2000 REMEDIAL INVESTIGATION (OU#2)

3.10 Monitoring Well Installation/Development /Hydraulic Conductivity Testing

Four monitoring well couplets (MW-6S/MW-6D through MW-9S/MW-9D) were installed approximately 15 to 25 feet below ground surface (bgs) and approximately 60 to 80 feet bgs into the bedrock aquifer. They were located based on the results of a fracture trace analysis; the intent was to locate the wells along predominant fractures (as interpreted from the fracture trace analysis) to evaluate the potential for non-aqueous phase (NAPL) contamination to migrate from the site via gravity flow in bedrock fractures. The wells were installed following the methods and procedures identified in the *Final RI/FS Work Plan* (URS 1999). One overburden well, OB-1, was installed near an apartment complex, located on the south side of Blossom Road, north-northeast of the site. The bedrock wells consist of open bedrock monitors approximately 10 to 15 feet. All monitoring wells were fitted with either an aboveground steel protective casing or a flush-mounted curb box.

After the new monitoring wells were installed the wells were developed using a submersible pump with dedicated/disposable high-density polyethylene tubing. Well development was completed as the wells were installed. Water quality parameters including temperature, pH, specific conductance, and turbidity were monitored during development. Most monitoring wells were pumped dry several times during development because most of the newly-installed wells were relatively low producing. In general, the newly-installed monitoring wells were developed to desired specifications [i.e., stable water quality parameters and turbidity less than 50 nephelometric turbidity units (NTUs)]. However in monitoring well (MW-9D), the desired specifications could not be achieved despite the efforts to do so. This monitoring well was extremely low producing (less than 2 gallons per day).

In situ hydraulic conductivity testing (slug tests) was performed to estimate the hydraulic conductivity and variability of the bedrock aquifer. Slug tests were conducted by lowering the water level within the monitoring well by inserting and removing a slug of known volume, and monitoring the return of the water level to its static level. Slug tests were conducted after the monitoring wells were developed.

See Attachment 2 for the procedures/details of the monitoring well installation, well development, hydraulic conductivity testing, and the collection of groundwater levels from the monitoring wells (newly installed wells along with the existing wells).

3.11 Groundwater Sampling

As part of the OU #2 field activities, groundwater samples were collected from seven existing wells installed as part of the OU #1 RI (MW-1D, MW-2D, MW-3D, MW-4D, MW-4S, MW-5D, and MW-5S) and the nine monitoring wells installed as part of the OU #2 RI (MW-6S/6D, MW-7S/7D, MW-8S/8D, MW-9S/9D, and overburden well OB-1). The sampling took place between November 1 and November 4, 2000. Each well was purged before sampling using the low-flow aeration method following the procedures specified in the *Final RI/FS Work Plan* (URS 1999). All samples were analyzed for Target Compounds List (TCL) VOCs and Target Analyte List (TAL) metals. The analytical parameters tested and methods of analyses are summarized in Attachment 2, Table 2-4; results are summarized in Section 4.0 of Attachment 2.

3.12 Surface Water Sampling

As a part of the OU#2 field work, NYSDEC personnel collected surface water samples from five locations in the Grass Creek drainage system. The samples were collected on August 16, 2000 from the following locations (listed in order moving downstream): 1) from the inlet (south end) of the detention pond, located just northeast of the site along the west side of I-590, 2) from the east side of the detention pond, approximately halfway between the inlet and the outlet of the pond, 3) from the west side of the detention pond, approximately halfway between the inlet and the outlet of the pond, 4) from the stream located approximately halfway between the outlet of the pond and Blossom Road, and 5) from just north of Blossom Road between I-590N and the on-ramp from Blossom Road to I-590N. The surface water sampler was decontaminated between samples; samples were transferred to samples containers and delivered to the Contract Laboratory on the same day they were collected.

3.13 Site Survey and Mapping

Following the field activities, sampling locations were surveyed for horizontal location and elevation. Horizontal coordinates are based on the New York State Plane Coordinate System Transverse Mercator Projection, East Zone, North American Datum of 1983. Elevations are based on the North American Vertical Datum of 1988 (mean sea level or msl). Surveyed locations and elevations of the monitoring wells are summarized in Table 2-5 of Attachment 2, and the survey notes are provided in Appendix F of Attachment 2. The survey information was used to develop a broader base map of the site.

3.14 Investigation-Derived Waste Characterization and Disposal

Investigative-derived waste (IDW) generated as part of the field investigation included selected soil cuttings, decontamination fluids, well development water, personal protective equipment, and high-density polyethylene (HDPE) tubing. During the field investigation, decontamination fluids and well development water were containerized on site in a bulk holding tank. Soils were contained in four 55-gallon drums. The fluids and soils were manifested as hazardous waste by URS and Frank's Vacuum Service of Niagara Falls, New York. After characterization, the fluids were transported and treated by CECOS International of Niagara Falls, New York. HDPE tubing and personal protective equipment were disposed of by Waste Management as nonhazardous waste. Copies of the hazardous waste manifests are provided in Appendix H of Attachment 2.

3.15 Geophysical Studies

3.15.1 Shear Wave Seismic Reflection Survey

Blackhawk Geoscience in conjunction with Bay Geophysical, Inc., performed a shear wave seismic reflection survey at the site. The purpose of the seismic survey was to determine the presence and orientation of fractures within the dolomitic bedrock. The information can be used to predict preferential migration pathways for the dissolved-phase contaminants and to identify where DNAPL potentially may be present.

The shear wave seismic reflection survey was conducted between November 2 and 6, 2000. The shear wave seismic survey processing results are presented in Section 3.6/Appendix I of Attachment 2.

3.15.2 Multi-electrode Resistivity Survey

Geophysical Applications Inc. conducted a multi-electrode electrical resistivity survey along nine traverses established by Blackhawk Geoscience. The purpose of the survey was to determine the presence and orientation of fractures within the bedrock. The resistivity survey was designed to compliment the seismic survey and targeted the electrical properties of water-bearing fractures in the bedrock. The geophysical report is included in Section 3.6/Appendix I of Attachment 2.

Section 4 - RESULTS OF THE SITE INVESTIGATION

Except as noted, the following synopsis is largely based upon the "Site Investigation Summary Data Report for the Scobell Chemical Site", Parsons Engineering Science, Inc., November 1998 (Attachment 1) and the "Remedial Investigation Data Summary Report for the Scobell Chemical Site - Operable Unit #2", URS Corporation, May 2001 (Attachment 2).

4.1 Physiography and Climate

Relative to regional features, the Scobell Chemical site is: approximately 6.0 miles south of Lake Ontario, 2.2 miles west of Irondequoit Creek, 1.4 miles east of the Genessee River and 7 miles north of the New York State Thruway. The site is located in the Town of Brighton, on the municipal boundary with the City of Rochester, in the Irondequoit Creek drainage basin. Rochester lies in the Lake Erie - Lake Ontario Lowland and extends from the Lake Plain southward up to the Lockport Escarpment. The climate is temperate, with average daily maximum temperatures of 38 degrees (F) in the winter and 76 degrees (F) in the summer. Annual precipitation is about 32 inches, including the meltwater from an average 80 inches of snowfall. The land is characterized by gently rolling terrain underlain by dolomitic sandstone and dolomite bedrock which is veneered with glacial sediments.

4.2 Geology

4.2.1 Regional Geology

The Town of Brighton and eastern portion of the City of Rochester is situated in the Erie-Ontario Lowlands physiographic province of New York State (Broughton, et al. 1966). The province is characterized by low plains with little relief. In the Ontario lowland south of Lake Ontario, two escarpments occur which correspond to the underlying Onondaga Limestone and Lockport Dolomite bedrock units. These rock units are more resistant to erosion than underlying units and over many years have formed these prominent features. The site is situated on a portion of the Lockport

Dolomite escarpment. The overburden deposits in the region have been mapped largely as glacial till, which consists of a well-graded mixture of clay, silt, sand, and gravel (USGS 1985). In the region, it varies in thickness from a few feet to more than 100 feet.

Beneath the overburden deposits near the site are the Lockport Dolomite and Rochester Shale bedrock units. These rocks are Silurian in age, strike east-west, and dip gently to the south at approximately 1 degree or 40 to 50 feet per mile (New York State Museum and Science Service 1970).

The dip of the rocks follow the structural trend of a homocline affecting the Paleozoic basement rocks across western and southern New York State. In general, dip increases from west to east across western and central New York. Bedrock joints are common in the Lockport Formation and are a result of structural stresses during the late Paleozoic Appalachian deformation (Zenger 1965).

An independent fracture trace analysis was performed by Resolution Resources, Inc. as part of the OU #1 RI (Resolution 1999). Aerial photographs taken between 1937 and 1996 were obtained from the Monroe County Environment Management Council. The 1988 aerial photograph was used for the fracture trace analysis because of the I-490 /I-590 interchange exposed bedrock and linear fractures. Figure 3-1 of Attachment 2 depicts the fracture trace analysis in the site vicinity. Lineaments are shown in red. The most prominent lineaments trend northwest to southeast and northeast to southwest. Other less prominent lineaments trend more or less east to west.

4.2.2 Site Geology

The stratigraphic sequence near the site includes the following units from the surface down: miscellaneous and scattered fill; unconsolidated silt, sand, clay, and gravel (glacial till); and bedrock. On-site (OU#1) there is a silty clay cover that was placed over the onsite area as part of the IRM in 1988. The overburden ranges from approximately 5.5 feet to 15.5 feet thick. The bedrock, to depths of approximately 230 feet, consists of the Lockport Dolomite and Rochester Shale Formations (see Figure 5-3). The bedrock is divided into the Oak Orchard, Penfield, and DeCew Members of the Lockport Formation, and the Gates Dolomite and Rochester Shale of the Rochester Shale Formation. The rock units also vary in thickness around the site but in general, the Lockport Formation is interpreted to be approximately 80 to 90 feet and the underlying Rochester Formation is reportedly approximately 150 feet thick. Figure 2-1 of Attachment 2 depicts the location of cross-section A-A' which is shown in Figure 3-2 (Attachment 2). Table 3-1 (Attachment 2) presents a summary of the stratigraphic data interpreted from the well-borings and piezometers advanced as part of the OU #1 and OU #2 RIs.

<u>Overburden</u>

The overburden material at the site consists of scattered fill overlying glacial till. The fill consists of primarily cinders, brick, glass, and coal. Glacial till, consisting of a mixture of silty sands, silts, and gravel, overlies the bedrock surface beneath the fill. The overburden sequence in borings advanced as part of the offsite RI consists of mixtures of silty sands, silts, and gravel (i.e., glacial till). Fill was not encountered in any of the offsite borings. Boring logs illustrating the stratigraphic sequence in borings advanced as part of the OU #2 RI are presented in Attachment 2/Appendix A.

Bedrock

Information obtained from piezometers and well borings were used to determine the depth to bedrock and prepare bedrock surface maps. Attachment 2/Figure 3-3 depicts the bedrock surface in the onsite area. The bedrock surface slopes gently toward the north and east. Attachment 2/Figure 3-4 depicts the bedrock surface in the offsite area. The bedrock surface slopes gently toward the north-northwest. Beneath the site vicinity, bedrock was identified as dolostones of the Lockport Formation. Argillaceous dolostones and shales of the Rochester Shale Formation lie beneath the Lockport Formation.

Lockport Formation

The uppermost bedrock units encountered are the Oak Orchard and Penfield Members. The Oak Orchard rock unit varies in thickness from approximately 6 feet at MW-9D to 8 feet at MW-6D. It is characterized as a brownish-gray, medium to thick bedded dolomite. Based upon URS's interpretation, the Penfield rock unit varies in thickness from approximately 49 feet at MW-6D to 58 feet at MW-9D. The Penfield is characterized as hard, medium gray, medium grained, and thin to medium bedded, siliceous dolomite.

The DeCew Member lies beneath the Penfield Member. The stratigraphic contact between the DeCew and Penfield Members is conformable and gradational. The DeCew Member is characterized as hard, medium to dark gray, thin to medium bedded, fine-grained dolomite. The full extent of the DeCew was not penetrated as part of the drilling program. It is classified as a siliceous dolomite and reportedly is approximately 12 feet thick (Zenger 1965).

Rochester Shale Formation

The Gates Member lies beneath the DeCew Member of the Lockport Formation. Because of its shaly character, it is considered a part of the Rochester Shale Formation. It is regarded as a transitional unit between the overlying Lockport Dolomite and underlying finer, less dolomitic shales of the Rochester Formation (Zenger 1965). The contact between the DeCew and Gates was not penetrated as part of the drilling program. The Gates Member, reported to be approximately 18 feet thick, is characterized as dark-gray, fine-grained, medium hard, thin bedded argillaceous and siliceous dolomite (Zenger 1965). The rocks beneath it are considered as Rochester shale which are characterized as thin to medium bedded, dark gray to black, medium hard to medium soft, argillaceous shale and dolomitic shale.

4.3 Hydrology

4.3.1 Regional Hydrology

The Scobell site is in the Irondequoit Creek drainage basin, which empties into Lake Ontario via Irondequoit Bay. It is located between the Irondequoit valley and the gorge of the Genesee River. Regional ground water flow in the vicinity of the site is northward, toward Irondequoit Bay.

4.3.2 Site Hydrology

Surface water hydrology at the site is controlled by built features, especially the railroad that borders the site to the north and the drainage facilities associated with arterial highways I-490 and I-590 to the south and east. The stormwater drainage system consists of catch basins, drainage culverts, a retention pond and surface intermittent stream. Adjacent to the site, along the southeast side, shallow groundwater appears to be infiltrating into this drainage system. At the site groundwater has been found in the overburden at elevations in the 445-448 feet amsl range with groundwater elevations of approximately 433 amsl in the two on-site shallow bedrock monitoring wells. The inverts of the drainpipes along the highway near the site have elevations of approximately 430 feet above mean sea level (amsl). The drainage flows generally from the bluff along the highway at the southeastern edge of the site, northward to the retention pond; the invert elevation of the box culvert that discharges to the pond is approximately 428.7 feet amsl. From the pond water flow eventually reaches Grass Creek, and from there it flows to Irondequoit Creek.

The **ground water** flow regime is separate from surface flow. In the **overburden**, direction and velocity vary according to the geologic material described under surficial geology above. For practical purposes infiltration to the natural surficial deposits, in the immediate vicinity of the site, is limited by the silty clay cover material that was artificially placed in 1988. Horizontal recharge to the surficial deposits is limited by removal of overburden to the south and east in conjunction with highway construction. Recharge from the west is limited by built features of the area (paved parking lots and buildings). The shallow groundwater table appears to be perched in a thin zone above the overburden/bedrock interface. During on-site subsurface exploration work ground water was encountered at typical depths of 4.2 to 9.4 feet below the ground surface. Water level measurements indicate that most of the shallow groundwater on-site flows to the south, towards the I-590 ramp; shallow groundwater off-site, to the north of the railroad tracks, flows to the northeast.

Ground water flow in the bedrock, on the other hand, is an important consideration at the Scobell site. In this case flow is controlled by the bulk characteristics of the rock formation and the hydraulic head driving the water from its source toward the point where it exits the ground. The uppermost bedrock formations (Oak Orchard and Penfield) are dolostone and dolomitic sandstone.

Because of the magnesium present in dolomite it is far less soluble in natural waters than is calcite, the principle constituent in limestone. Both limestone and dolomite found at the site tend to break into blocks, bounded by bedding planes on the top and bottom, and vertical fractures called joints on the sides. The more soluble character of limestone frequently results in enlargement of vertical joints and bedding planes due to dissolution of the rock matrix. This crack network provides potential pathways for migration of contaminants, in both the pure non-aqueous phase and in the dissolved phase.

The rocks of the Oak Orchard and Penfield formations are brittle, and exhibit interlocking grain structure. This means that there is relatively little opportunity for contaminant migration through the rock matrix itself. Voids in the rock such as vugs and hollows between bone fragments in fossiliferous zones increase the porosity and can provide enhanced migration pathways where they are interconnected. However, as noted above, migration can readily take place through fractures and most migration takes place in this way. Where exposed to the over-riding ice during glaciation, the uppermost several feet of either formation has fractured in response to the stress of the ice mass. This results in a very permeable zone immediately beneath the overburden-bedrock interface.

Sandstone also develops bedding and joint fracture sets. However, because it is composed of rounded sand grains cemented with another - usually softer - mineral, it fractures more like concrete. Some sandstones are massively bedded, and solution enlargement of bedding planes is much less prevalent. In the sandy horizons, the cement may be dissolved over time, resulting in increased permeability and increased ground water flow. These considerations pertain to the bedrock at depths of 75 to 100 feet below the ground surface.

Ground water was encountered in the shallow bedrock at depths ranging from 10.5 to 20.7 feet below ground surface. While the differences in depth to water suggest that the water in the surficial deposits may be "perched", visual staining of the basal sand (as well as its presence in two of the bedrock wells) suggests that DNAPL has penetrated any confining layer that may be present. Flow direction in the shallow bedrock appears to be to the northeast (Parsons, 1998).

4.3.3 Hydraulic Conductivities

During the **1998 Site Investigation** slug tests were conducted in the seven newly installed monitoring wells; two screened across the overburden-bedrock interface and five screened within the bedrock. The slug test data were analyzed using the Bouwer and Rice method (Bouwer and Rice, 1976 and 1989). Results of the slug test analyses are summarized in Attachment 1/Table 3.3. Detailed data and graphed results for each well are presented in Attachment 1/Appendix C. The hydraulic conductivity for wells screened across the overburden-bedrock interface ranges from 1.06 x 10^{-2} centimeters per second (cm/sec) (45.41 feet per day (ft/day)) to 2.48 x 10^{-2} cm/sec (70.36 ft/day); the hydraulic conductivity for wells screened in the bedrock ranges from 3.86 x 10^{-6} cm/sec (0.01 ft/day) to 9.74 x 10^{-4} cm/sec (1.36 ft/day).

During the **2000 Remedial Investigation** for OU#2 slug tests were conducted by inserting (falling head test) or removing (rising head test) a stainless-steel slug of known volume and recording the rate of recovery of the water level in the well. Recovery data was gathered with a Hermit Data Logger. The slug test data was analyzed using the methods of Bouwer and Rice (1976) and/or Bouwer (1989). The bedrock wells installed in 2000 have monitored intervals entirely within the bedrock. Because the method of analysis assumes that the aquifer is a porous media, the values obtained by the method should be considered as relative order of magnitude estimates. Slug tests were performed on six of the eight new bedrock wells (bedrock wells MW-7D and MW-9D and overburden wells OB-1 could not be slug tested because there was insufficient water in the wells). **Of these six wells, the hydraulic conductivities of three** of them (**MW-6S, MW-7S, and MW-8D**) were **too low to be effectively estimated** by slug tests. Of the three wells where hydraulic conductivity values could be generated, a wide range of hydraulic conductivities were estimated. This is indicative of the heterogeneity of the aquifer's fractured bedrock.

Tests performed during the Site Investigations indicate that the groundwater can move relatively easily through the thin zone of saturated soil (overburden) on top of bedrock (average hydraulic conductivity is 1.8 x 10^{-2} cm/sec). In the shallow bedrock wells located north of the railroad tracks, the ability of the water to flow is much lower (the average hydraulic conductivity was approximately 10^{-5} cm/sec for MW-4D and MW-5D; the hydraulic conductivities were too low to be measured in MW-6S and MW-7S [all of which are shallow bedrock wells located north on the on-site area]). Of the four deep bedrock wells, one had a hydraulic conductivity of 2.86 x 10^{-4} cm/sec (MW-6D) while the other three either did not produce enough water to perform the appropriate conductivity testing, or had a hydraulic conductivity too low to be measured.

4.4 Groundwater Use

Groundwater in the vicinity of the Scobell site is not used as a source of drinking water. The City of Rochester obtains municipal water from Canadice and Hemlock Lakes located in Livingston and Ontario Counties. The Monroe County Water Authority (from which the Towns and Villages of East Rochester, Brighton, and Pittsford obtain water) obtains drinking water from Lake Ontario. The Village of Webster obtains drinking water from 6 municipal wells located on Dewitt Road and 5 wells located on the sandbar between Irondquoit Bay and Lake Ontario. The wells are approximately 350 to 400 feet deep and are located over 7 miles north of the site.

The Monroe County Health Department reviewed their records for all streets within ½ mile of the site and did not identify any private water wells.

4.5 Summary of Analytical Results

1998 SITE INVESTIGATION - OPERABLE UNIT #1

4.5.1 Groundwater

ON-SITE - OVERBURDEN

Groundwater samples were collected from three of the on-site geoprobe points, one from each corner of the triangular shaped site. The results indicated that, in general, the highest contaminant concentrations were present in the northwest corner of the site. The analytical results indicated the presence of chloroform (non-detect (ND) - 180 ppb), ethylbenzene (ND - 74 ppb), xylene (1 ppb - 49 ppb), trichloroethene ((TCE) 3 ppb - 38 ppb), tetrachloroethene ((PCE) ND - 27 ppb), toluene (ND - 25 ppb), 1,2-DCE (ND - 6 ppb), and benzene (ND - 6 ppb).

Elevated metals concentrations were found in the groundwater samples taken from the three on-site geoprobe points. The metals that indicated elevated concentrations (above SCGs) in at least two of these three samples included: arsenic (40 and 26 ppb compared to a standard of 25 ppb); chromium

(397, 65, and 61 ppb compared to a standard of 50 ppb); lead (136, 165, and 1140 ppb compared to a standard of 25 ppb); zinc (2170, 2370, and 4770 ppb compared to a standard of 2000 ppb). The highest metals concentrations were found in the sample taken from GP-05, near the northwest corner of the site. Although some metals were found on-site at elevated concentrations, none of the metals listed above were detected off-site at concentrations above groundwater standards. This is an indication that these metals are not migrating from the site.

In addition, a groundwater sample was collected from the vapor extraction well (SVE-1). The following VOCs were detected: toluene (300,000 ppb), 1,2-DCE (12,000 ppb), TCE (7400 ppb), vinyl chloride (140 ppb), xylene (140 ppb), and ethylbenzene (54 ppb).

ON-SITE - SHALLOW BEDROCK

Groundwater samples were collected from the two on-site shallow bedrock monitoring wells (MW-2D and MW-3D). Very high concentrations of TCE (480,000 ppb - 1,000,000 ppb) and 1,2-DCE (3200 ppb - 19,000 ppb) were detected. In addition, elevated levels of PCE (930 ppb - 1100 ppb), vinyl chloride (ND - 480 ppb), toluene (ND - 380 ppb), and 1,1-DCE (ND - 130 ppb) were detected. When MW-3D, located in the northwest corner of the site, was sampled a dense non-aqueous phase liquid (DNAPL) was encountered. A sample of the **DNAPL** from MW-3D was collected; the results indicated that the DNAPL is made up predominantly TCE (790,000,000 ppb) and PCE (6,900,000 ppb).

OFF-SITE - OVERBURDEN

During the initial phase of field work four geoprobe points were installed off-site, north of the railroad tracks. Groundwater samples were taken from three of these geoprobe points (GP-03 was dry) and the results indicated the presence of TCE as high as 1200 parts per billion (ppb) and the presence of 1,2-dichloroethene (1,2-DCE) as high as 3400 ppb. Vinyl chloride was detected in two of the off-site geoprobe points at concentrations as high as 9 ppb.

During the installation of groundwater monitoring wells two well pairs (overburden/shallow bedrock well in each pair) were installed off-site, to the north on Rochester Gas & Electric's (RG&E) property. Seven additional piezometers were also installed, to the top of bedrock, on RG&E's property. Five overburden groundwater samples were taken from the piezometers (GP-28 and -32 were dry) and two overburden groundwater samples were taken from monitoring wells. The results indicated elevated concentrations of 1,2-DCE (47 ppb - 3000 ppb), TCE (46 ppb - 730 ppb), and vinyl chloride (ND - 29 ppb).

The off-site shallow groundwater samples were collected in a "corridor" to the north-northeast of the site. The sample collected closest to the site (GP-1) was relatively clean; the only VOC detected above groundwater standards was TCE at 11 ppb (standard = 5ppb). All of the groundwater samples collected along the western edge of the corridor (GP-27, -29, -30, and -31) indicated that all VOC concentrations were below standards. Three of the five monitoring points along the eastern edge of the corridor were dry (GP-3, -28, and -32); the other two (GP-4 and -26) did contain elevated VOC concentrations. The two monitoring points that are the most downgradient are located approximately 900 feet north-northeast of the site (GP-31 & 32).

OFF-SITE - SHALLOW BEDROCK

There are two shallow bedrock wells located downgradient of the site; MW-4D is located approximately 300 feet to the north-northeast of the site and MW-5D is located approximately 475 feet to the north-northeast of the site. The groundwater sample from MW-4D indicated very high concentrations of TCE (770,000 ppb), PCE (7500 ppb), chloroform (7300 ppb), and 1,2-DCE (1900 ppb); the groundwater sample from MW-5D indicated very high concentrations of TCE (150,000 ppb), PCE (21,000 ppb), and 1,2-DCE (27,000 ppb). When MW-4D was sampled DNAPL was encountered. A sample from MW-4D indicated that the **DNAPL** is made up of predominantly TCE (640,000,000 ppb) and PCE (43,000,000 ppb).

4.5.2 Surface soil

Four surface soil samples were collected, two from along the western edge of the site and two from along the northern edge of the site. The results indicated that VOC concentrations in all four samples were far below potential levels of concern (i.e., the highest concentration of TCE detected was 0.014 ppm compared to the cleanup objective of 0.7 ppm presented in the Division of Environmental Remediation's Technical and Guidance Memorandum 4046, or TAGM 4046). Two pesticides were detected slightly above concentrations presented in TAGM 4046. Specifically, endrin was detected in SS02 at a concentration of 0.13 ppm (compared to 0.1 ppm presented in the TAGM); heptachlor epoxide was detected at a concentration of 0.023 ppm (compared to 0.020 ppm presented in the TAGM). In addition, some of the metals concentrations were elevated including cadmium (up to 33.3 ppm), chromium (up to 164 ppm), lead (up to 668 ppm), mercury (up to 0.94 ppm), and zinc (up to 2320 ppm).

4.5.3 Subsurface Soil

Subsurface soil samples were taken from north of the site as well as on the site itself to fill in some data gaps. The results from the **off-site samples** did not indicate elevated concentrations of VOCs or pesticides. Certain semi-volatile organic compounds (SVOCs) were present at somewhat elevated concentrations. However, after reviewing the sample results from samples taken on-site, these SVOCs do not appear to be related to what has been found at the site.

A total of 16 **on-site subsurface soil samples** were taken at eight locations (GP-5, -11, -12, -13, -14, and -24; MW-2D and MW-3D). The analytical results indicated that elevated VOC concentrations were were present at GP-11 and GP-12 including toluene (up to 1,100 ppm from GP-11 @ 6'-8'), TCE (up to 200 ppm from GP-11 @ 6'-8'), PCE (up to 46 ppm from GP-11 @ 6'-8'), xylene (up to 16 ppm from GP-11 @ 6'-8'), 1,1,1-trichloroethane (up to 13 ppm from GP-11 @ 6'-8'), and 1,2-DCE (up to 0.46 ppm from GP-11 @ 1'-3').

Subsurface soil contamination appears to be limited to on-site areas and is predominantly made up of volatile organic constituents (see also Section 2.1, above, for a summary of 1988 NYSDOT sample results).

4.5.4 Surface Water/Sediment

Three surface water/sediment sample locations were established. These samples were located: at the southern end of the stormwater retention pond, near the influent of the pond (SW-01/SED-01); along the southwestern perimeter of the stormwater retention pond, approximately 175 feet northwest of SW-01/SED-01 (SW-02/SED-02); and in the drainage ditch located on RG&E property north of the site and east of RG&E's substation (SED-03). The drainage ditch at location #3 was dry so a total of three sediment samples and two surface water samples were collected.

The results from SW-01 indicated concentrations of 1,2-DCE (28 ppb) and TCE (23 ppb) above surface water standards (the standard for both 1,2-DCE and TCE is 5 ppb); the results from SW-02 did not indicate elevated concentrations of VOCs.

Relatively low levels of certain volatile organics were detected in the sediment samples; the compounds that had the highest levels detected included 1,2-DCE (0.29 ppm @ SED-03 and 0.21 ppm @ SED-01), TCE (0.081 ppm @ SED-03 and 0.065 ppm @ SED-01), and vinyl chloride (0.3 ppm @ SED-02). Contaminant concentrations in sediment, for the contaminants listed above, are usually evaluated/screened relative to how the contaminant "moves" from the sediment to the surface water, then to fish living in the water, and from the fish to humans through the consumption of those fish. This type of potential exposure scenario is not really relevant, or appropriate, for the situation present in the highway retention pond where the sediment samples were taken. To perform some kind of comparison, the concentrations were evaluated relative to recommended soil cleanup objectives. Only one sediment sample slightly exceeded the recommended objective for one contaminant (vinyl chloride in SED-02 was 0.3 ppm vs. 0.2 ppm for the recommended soil cleanup objective).

4.5.5 Seep Prevention Sump (water)

A water sample was collected from the seep prevention sump, located at the bottom of the slope below the northeast corner of the site. The results indicated elevated VOC concentrations including 1,2-DCE (20,000 ppb), 1,1,1-TCA (1300 ppb), vinyl chloride (1200 ppb), toluene (970 ppb), xylene (320 ppb), and 1,1-DCA (170 ppb); 1,1-DCE, benzene, ethylbenzene, TCE, 1,2-DCA, and PCE were also detected at concentrations ranging from 18 ppb - 94 ppb.

4.5.6 Data Validation

Analytical samples were collected from various media at the Scobell Chemical site during the site investigation (see Table 3.1). All analytical data were evaluated according to NYSDEC Department of Environmental Remediation (DER) Data Usability Summary Report (DUSR) guidelines. Laboratory and field data were reviewed to determine the limitations, if any, of the data and to assure that the procedures were effective and that the data generated provides sufficient information to achieve the project objectives. All data qualifications were documented following the NYSDEC ASP 1995 Revision guidelines. The data usability summary report and complete validated laboratory analytical results are presented in Appendix D of Attachment 1.

The data usability summary report, presented in Attachment 1, was reviewed by a chemist in DER's

Quality Assurance Unit. The chemist concluded that the data evaluation was thorough and accurately followed the data validation guidelines (10/14/98 memorandum from C. McGrath to J. Moras); the data is valid and usable as qualified.

4.5.7 Vapor Extraction Pilot Study

During the pilot test, air was extracted from the vapor extraction well (SVE-1) at a rate of approximately 39 cubic feet per minute and an average vacuum of 3 inches of mercury. The vacuum response at each piezometer was measured at regular intervals during the test. Table 5.1 of Attachment 1 summarizes the vacuum measurements at each piezometer during the pilot test. The vacuum response measured at the piezometers showed variability throughout the duration of the test. However, the maximum vacuum response in each piezometer was recorded during the first day of vapor extraction. Based on the vacuum response data, an air permeability for the site soils has been estimated to be approximately 9.5 darcy units (or cm^2). This value is typical of soils with moderate permeability.

The maximum vacuum response at each piezometer versus distance from the vapor extraction well is presented on Figure 5.1 of Attachment 1. As shown, the relationship between maximum vacuum response and distance is linear. Based on this data, the radius of influence for the vapor extraction well has been estimated at approximately 40 feet. The radius of influence was obtained by assuming a conservative minimum vacuum response of 0.3 inches of water and interpolating the corresponding radius of influence from the regression line. Over time, the radius of influence may exceed 40 feet as soil moisture decreases and preferential flow pathways are established. However, due to the vertical heterogeneity of the soil, a conservative radius of influence of 40 feet should be used for design purposes.

4.5.7.1 Volatile Organic Compound Removal

Effluent VOC concentrations from the vapor extraction well were measured with a PID during the pilot test. The data is presented in Attachment 1: VOC concentrations are summarized in Table 5.2 and plotted on Figure 5.2. Results indicate that VOC concentrations in the extracted air stream were reduced by approximately 66 percent during the test. The highest PID reading of 3,062 ppm was measured following 30 minutes of vapor extraction. PID readings were near or below 1,000 ppm after the fifth day of vapor extraction.

Four air samples were collected during the pilot test for laboratory analyses of VOCs. Three samples were collected prior to carbon treatment and one sample was collected after carbon treatment. Laboratory analytical results are summarized in Attachment 1, Table 5.3. A total of 12 VOCs were detected in the air samples. The highest VOC concentrations were detected in samples collected before carbon treatment after one and 22 hours of vapor extraction. Total VOC concentrations before carbon treatment ranged from 1,654 ppb to 2,326 ppb, with the maximum concentration detected in the sample collected following 22 hours of extraction.

VOCs detected in the air samples consisted primarily of toluene, trichloroethene and *cis*-1,2-

dichloroethene. Toluene concentrations ranged from 1,600 ppb to 2,000 ppb and accounted for approximately 86% to 96% of the total VOC concentration. Trichloroethene concentrations ranged from 39 ppb to 220 ppb and accounted for approximately 2% to 10% of the total VOC concentration. *Cis*-1,2-dichloroethene concentrations ranged from 12 ppb to 75 ppb and accounted for approximately 0.7% to 3% of the total VOC concentration. Vinyl chloride was detected at a maximum concentration of 11 ppb after one hour of extraction. The concentration decreased to 0.3 ppb after 120 hours of extraction.

Based on the air sampling data, an estimated 37 pounds of VOCs, or an average of 7.4 pounds per day of VOCs were removed from the soil during the pilot test.

4.5.7.2 Air Emissions Control

The extracted air stream during the pilot test was treated with air-phase carbon prior to discharging to the atmosphere. An air sample was collected from the discharge side of the carbon canister during the second day of the pilot test. Three VOCs (acetone, methylene chloride, and toluene) were detected in the sample at estimated concentrations below the detection limit of 1 ppb.

Air emissions from the carbon canister were monitored for VOCs with a PID to estimate whether breakthrough of the carbon canister had occurred. Following the fifth day of the pilot test, elevated PID readings were detected on the discharge side of the carbon canister. Since breakthrough had apparently occurred, the SVE system was turned off and the pilot test was ended.

4.5.7.3 Conclusions

Based on the results of the pilot test, SVE appears to be an effective remedial approach for removing the key VOCs detected in site soils. The following additional conclusions and recommendations can be made from the results of the vapor extraction pilot test:

- Estimated air permeability of the site soils is approximately 9.5 darcys, which is typical of soil with moderate permeability.

- The vacuum radius of influence is approximately 40 feet.

- VOCs in the extracted air stream consisted primarily of toluene, trichloroethene, and *cis*-1,2,-dichloroethylene, with toluene accounting for between 86 percent and 96 percent of the total VOC concentration. These were the primary VOCs detected in site soils and groundwater.

- An average of approximately 7.4 pounds per day of VOCs were removed from the vapor extraction well during the test.

Sixteen monitoring wells were sampled as part of the OU #2 offsite RI including seven existing wells and nine newly-installed wells. There were thirteen bedrock wells, two interface wells, and one overburden well. The bedrock wells monitor both the shallow bedrock aquifer (MW-1D, MW-2D, MW-3D, MW-4D, MW-5D, MW-6S, MW-7S, MW-8S and MW-9S) and deeper portions of the bedrock aquifer (MW-6D, MW-7D, MW-8D, and MW-9D). All samples were analyzed for TCL VOCs and TAL metals; **Table 5-8 [Attachment 2/Table 4-1] summarizes the groundwater analytical data.** Sample locations are presented on **Figure 5-1**.

The primary volatile contaminants detected included benzene, toluene, ethylbenzene, and xylenes (BTEX), and chlorinated VOCs. For presentation purposes, the following discussion is divided into three discrete hydrogeological zones, corresponding to the overburden, shallow bedrock, and deep bedrock groundwater zones.

Greater detail/analysis of the data can be found in Attachment 2.

4.5.8 Overburden Groundwater

Monitoring wells in the overburden include MW-4S, MW-5S, and OB-1. Total detected VOC concentrations ranged from 9 ug/L in OB-1 (the farthest from the on-site area) to 7,959 ug/L in MW-4S (closest to the on-site area). Reported concentrations of total VOCs are highest nearest the onsite area and decrease away from the site. The majority of VOCs detected were chlorinated VOCs. As a percentage of the total VOCs, chlorinated VOCs comprise nearly 100%. Only trace quantities of BTEX VOCs were detected in MW-4S. Analytes reported at concentrations above their respective New York State groundwater criteria included vinyl chloride, 1,1-DCE, 1,2-DCE, TCE, PCE, iron, sodium, lead, magnesium, and manganese.

4.5.9 Shallow Bedrock Groundwater

Monitoring wells in the shallow bedrock zone include MW-1D, MW-2D, MW-3D, MW-4D, MW-5D, MW-6S, MW-7S, MW-8S, and MW-9S. Total detected VOC concentrations ranged from 2 μg/L in MW-1D to 763,784 μg/L in MW-3D. The majority of VOC detections were chlorinated VOCs, particularly TCE and PCE. There also was a BTEX component of VOC detections.

Contamination is present at the highest concentrations at and just north of the on-site area. The concentrations decrease relatively quickly as you move downgradient (north-northeast) with concentrations at MW-7S two orders of magnitude (a factor of 100) less than at MW-4D; MW-7S is approximately 600 feet north-northeast of MW-4D. Contaminant concentrations at MW-6S (approximately 150 feet west, or sidegradient, of the line between the on-site area and MW-4D) are also two orders of magnitude less relative to MW-4D.

TCE was also detected above groundwater standards at MW-9S (140 ppb; this is above standards, but three orders of magnitude less than what has been detected on-site), located approximately 900 feet south-southeast of the on-site area. It is possible contamination may have been transported to this area in the past as a small slug of product that moved along bedrock fractures. If the on-site area is the source of this contamination the transport mechanism was not the result of migration as a dissolved component of the groundwater, since groundwater flow is to the northeast.

Analytes reported at concentrations above their respective New York State groundwater criteria included vinyl chloride, methylene chloride, chloroform, carbon disulfide, 1,1-DCE, 1,1-DCA, 1,2-DCE, chloroform, 1,1,1-TCA, carbon tetrachloride, TCE, 1,1,2-TCA, benzene, PCE, toluene, chlorobenzene, ethylbenzene, xylene, acetone, iron, lead, magnesium, manganese, and sodium.

4.5.10 “Deep” Bedrock Groundwater

Monitoring wells in the deep bedrock groundwater zone include MW-6D, MW-7D, MW-8D, and MW-9D. Total detected VOC concentrations ranged from 115 μg/L in MW-9D to 4,010 μg/L in MW-6D. In monitoring wells MW-6D and MW-7D, the majority of VOCs detected were primarily chlorinated VOCs. In monitoring well MW-8D, the majority of VOCs detected were BTEX compounds. Chlorinated VOCs were not detected in upgradient monitoring well MW-9D. However, low concentrations of BTEX compounds were reported in MW-9D indicating the site may not be the source of the BTEX in the deep bedrock. Levels of BTEX, where detected, were generally quite low and could be due to small localized spilling of fuel such as during re-fueling yard equipment.

Site related chlorinated VOCs (i.e., TCE, DCE) were present in the “deep” bedrock at elevated concentrations; the concentrations just north of the on-site area were the highest (3300 ppb of DCE at MW-6D) with the concentrations quickly dropping to the north-northeast (140 ppb DCE/ 220 TCE at MW-7D, located approximately 750 feet northeast of MW-6D).

Analytes reported at concentrations above their respective New York State groundwater criteria included vinyl chloride, carbon disulfide, 1,1-DCE, 1,2-DCE, TCE, benzene, ethylbenzene, PCE, toluene, xylene, iron, magnesium, manganese, sodium, antimony, and chromium.

Many of the metals detected at elevated concentrations were elevated at the background monitoring well (MW-1D) or at wells that are not truly downgradient for the migration of groundwater/whatever may be dissolved in the groundwater from the site (e.g., MW-9S/MW-9D). This is an indication that some of these metals occur naturally at relatively high concentrations in this area. The source for the elevated concentrations of chromium in the groundwater is unclear. Although elevated concentrations of chromium were detected in on-site soils during the 1988 NYSDOT soil sampling, the groundwater samples from on-site and just north of the railroad tracks did not indicate chromium concentrations above standards; the only samples that indicated chromium concentrations above the groundwater standard were those collected from the east side of I-590 (MW-8D) and south of I-490 (MW-9D).

4.5.11 Surface Water

A total of five surface water samples were taken downstream of the site (to the northeast); three of the samples were taken from the detention pond, located west of I-590 and north of the railroad tracks, and two of the samples were taken downstream of the outlet of the detention pond (see Figure 5-1). The sample located furthest downstream (SW-5) was collected just north of Blossom Road between I-590 and the on-ramp from Blossom Road to I-590N. TCE and DCE were the only two contaminants detected in the surface water samples. The results (**see Table 5-10**) indicated concentrations ranging from 30 ppb (for both TCE & DCE at SW-1, located closest to the site) to non-detect (TCE was not detected at SW-3, located at the midpoint/west side of the pond). TCE and DCE were detected at the downstream sample location (SW-5), but the concentrations detected were below surface water standards for those contaminants.

4.5.12 DNAPL

One DNAPL sample was collected from MW-3D. Measurable DNAPL was also present in MW-4D, but there was insufficient volume to obtain a sample. Analytical results of the DNAPL sample indicated that the highest organic contaminant concentration was for TCE at 780 ppm; the results are summarized in **Table 5-9** [Attachment 2/Table 4-4].

4.5.13 Data Validation

The data packages were prepared by the laboratory in accordance with the NYSDEC's Analytical Services Protocol (ASP) Category B Deliverable requirements. They were reviewed for compliance with the applicable methods and Untied States Environmental Protection Agency (USEPA) Region II *Contract Laboratory Program (CLP) Organic Data Review, SOP No. HW-6,* Rev. 11, June 1996, and USEPA Region II *Evaluation of Metals Data for the Contract Laboratory Program (CLP), SOP No. HW-2,* Rev. 11, January 1992. Qualifications applied to the sample results include "R" (rejected, data are unusable), "D" (result reported from a diluted analysis), "U" (undetected), and "J" (estimated value due to quality control QC outliers or concentration below the quantitation limit). The data validation summary tables are located in Appendix G of Attachment 2.

The DUSR was prepared following the guidelines provided in NYSDEC Division of Environmental Remediation's document entitled, *Guidance for the Development of Data Usability Summary Reports* (1997) and the approved project *Final RI/FS Work Plan*, (URS 1999). The DUSR was submitted separately.

The DUSR, submitted by URS for the groundwater data, and the data package for the five surface water samples, submitted by the Department's Contract laboratory, were reviewed by a chemist in the Division of Environmental Remediation (2/8/01 memorandum from T. Lebarron to J. Moras). Comments were addressed in the final RI Data Summary Report; all of the analytical data was found to be complete and useable.

4.5.14 Additional Information

In April 1999, as a part of activities unrelated to the Scobell Chemical Investigation, a monitoring well was installed approximately 600 feet south of Blossom Road next to the dirt road leading into

Rochester Gas and Electric's substation (see Attachment 2, Figure 2-1, "MW-01"). Data obtained indicated that this monitoring well was constructed from 2" PVC casings and was screened from approximately 22 to 32 feet below ground surface. The boring log was not available, but bedrock in this area is at a depth of approximately 8 feet below ground surface. Although a final report/final data was not obtained, preliminary data indicated concentrations of site related contamination in the groundwater at concentrations below 1 ppm (tetrachloroethene at approximately 10 ppb, trichloroethene at approximately 500 ppb, and dichloroethene at approximately 50 ppb). MW-01 is located approximately 450 north (downgradient) of MW-7S and indicated the presence of lower contaminant concentrations than those seen in groundwater samples from MW-7S (e.g., TCE concentration of 500 ppb vs. 1500 ppb at MW-7S)

4.5.15 Summary

Significant VOC contamination is present on-site in the overburden groundwater. At the site the contamination has moved down in to the bedrock and has moved off-site in the bedrock.

Based upon the groundwater flow direction in the shallow bedrock zone, the existing monitoring wells appear to be sufficient in evaluating the nature and extent of bedrock groundwater contamination in the source area. However, the horizontal extent of groundwater contamination in both the shallow and deeper bedrock zones generally have not been completely delineated. Based upon the November 2000 groundwater data, the contaminants detected in the shallow bedrock zone are more highly concentrated than the deeper bedrock zone.

Vertical hydraulic gradients between the shallow and deep bedrock zones are generally downward, indicating the recharge tendency of the aquifer. The vertical gradients also affect the vertical distribution of contaminants. However, the vertical extent of contamination is probably more a function of bedrock fracturing and fracture apertures (openings or open spaces). Because fracture frequency and apertures decrease with depth in bedrock, the horizontal extent of the contamination is more widespread than the vertical extent of contamination.

Although some metals were found in on-site overburden groundwater samples at elevated concentrations, only one of the metals listed in Section 4.5.1 were detected off-site at concentrations above groundwater standards. Lead was found above standards (39.6 ppb vs. a standard of 25 ppb) in well OB-1; OB-1 is the monitoring point farthest from the on -site area with the points in between there and the site not indicating concentrations above standards. Relative to the bedrock groundwater samples, many of the metals detected at elevated concentrations were elevated at the background monitoring well (MW-1D) or at wells that are not truly downgradient for the migration of groundwater (e.g., MW-9S/MW-9D). This may be due to the naturally occurring presence of these metals in the bedrock at relatively high concentrations in this area. All of the information summarized in this paragraph is an indication that metals are not migrating from the site at concentrations of concern.

Various forces are/may be acting on the plume of dissolved VOC contamination including advection, dispersion, adsorption and biodegradation. At the Scobell Chemical site, the plume is present within a fractured bedrock aquifer. Groundwater flow occurs predominantly within the fractures (secondary porosity). Therefore, advection takes place more rapidly than in a porous medium of comparable hydraulic conductivity. Also, in a highly fractured aquifer, dispersion is significant. Under such conditions, plumes tend to be of relatively large areal extent but relatively low concentrations. Adsorption occurs as a result of diffusion of contaminants from the contaminated water (or NAPL) contained within the fractures into the pore spaces of the rock matrix. This process is slow; however, over a long period of time (years or decades) it can account for a significant loss of mass from the plume. The contamination that diffuses into the pore spaces of the rock matrix is virtually immobilized, because groundwater flow through the matrix is negligible. However, if the concentration of contaminants in the groundwater decreases, contaminant mass "stored" in the pore spaces of the rock matrix will diffuse back into the fractures, creating a slow release source.

Biodegradation may occur within the aquifer at the site. There is only a limited amount of indicator parameter data available from the 1998 Site Investigation, such as methane, sulfate, nitrate, and total organic carbon. Evaluation of this information was inconclusive. However, due to the high concentrations of contaminants in the aqueous phase, along with the presence of non-aqueous phase liquid, it is not probable that natural processes are significantly reducing contaminant concentrations before the contaminated groundwater had migrated a significant distance from the site. Therefore degradation probably plays a minor role.

In summary, the bulk of the contaminant mass at the Scobell site occurs as DNAPL contained with bedrock fractures, and as contamination diffused into the rock matrix. Both are present mostly in the source area on-site and just north of the railroad tracks off-site (e.g., MW-3D/MW4D areas). DNAPL and contamination within the rock matrix will create a slow release and a relatively persistent source. The plume of dissolved contamination originating from the source is relatively large, but the concentrations decrease quickly as you move away from the source area. The attenuation of the plume will take place mostly as a result of dispersion processes, with biodegradation most likely playing a relatively minor role.

Section 5 -NATURE AND EXTENT OF CONTAMINATION

5.1 Applicable Standards, Criteria, and Guidance (SCGs)

In order to identify potential exposure pathways, applicable SCGs must be identified. 6 NYCRR Part 375-1.10(c)(1)(I) requires that remedial actions comply with SCGs "unless good cause exists why conformity should be dispensed with." Standards and Criteria are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance. Guidance includes non-promulgated criteria and guidelines that are not legal requirements; however, the site's remedial program should be designed with consideration given to guidance that, based on professional judgement, is determined to be applicable to the site.

SCGs are categorized as chemical specific, location specific, or action specific. These categories are defined as the following:

Chemical Specific: These are health or risk based numerical values or methodologies which, when applied to site specific conditions, result in the establishment of numerical values for the chemicals of interest. These values establish the acceptable amount or concentration of a chemical that may be found in or discharged to the environment.

Location Specific: These are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because they occur in a specific location.

Action Specific: These are usually technology or activity based requirements or limitations on actions taken with respect to hazardous waste management and site cleanup.

The following lists the principal SCGs that have been identified for the Scobell Chemical site:

General - 6 NYCRR Part 375, Inactive Hazardous Waste Disposal Site Remedial Program

Soil - NYSDEC Division of Hazardous Waste Remediation Technical and Administrative Guidance Memorandum (TAGM) 4046, Determination of Soil Cleanup Objectives and Cleanup Levels

- 6 NYCRR Part 371, Identification and Listing of Hazardous Wastes

– 6 NYCRR Part 376 - Land Disposal Restrictions

- NYSDEC Division of Hazardous Substance Regulation TAGM 3028, "Contained in Criteria for Environmental Media" (11/92)

Groundwater - 6NYCRR Part 700-705, Water Quality Regulations for Surface Water and Groundwater
- NYSDEC Division of Water TOGS 1.1.1

Air - Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants

A comprehensive list of all of the potential SCGs for this site is included in Table 5.1.

5.2 Summary of Nature and Extent of Contaminated Media - Operable Unit #1 (On-site)

Based on the information developed during previous studies and this RI, chemical compounds of potential concern by environmental medium have been identified. Compounds of potential concern were selected based on frequency of detection, range of concentrations, and potential for migration. As discussed above in Section 4.5, analytical results confirm the presence of contamination in on-site soil and groundwater.

The main source of contamination at this site is most likely the result of spills that occurred, due to past storage and handling practices, over a long period of time. Volatile organic contamination is present at the site as dissolved constituents in the ground water and apparently as free product which is more dense than water and has/is moving down into the aquifer (dense non-aqueous phase liquid or DNAPL). Some solvents remain in the on-site soil above the water table in the vicinity of the source area. This contamination exists as a residual that did not migrate to the base of the aquifer, but rather bound to individual soil particles as it passed through the unsaturated soil.

Four surface soil samples were taken from the perimeter of the site, two each from along the western and northern borders of the site. Two pesticides (endrin and heptachlor epoxide) and five metals (cadmium, chromium, lead, mercury, and zinc) were detected at elevated concentrations.

Subsurface soil contamination appears to be limited to on-site areas and is predominantly made up of volatile organic constituents (see also Section 2.1, above, for a summary of 1988 NYSDOT sample results). A total of 16 on-site subsurface soil samples were taken at eight locations during the RI. These samples were taken to supplement the subsurface soil samples collected in 1988 by NYSDOT (see Section 2.1). Elevated concentrations of the following contaminants have been found in on-site subsurface soil: TCE, PCE, 1,2-DCE, toluene, xylene, 1,1,1-TCA, lead, chromium, zinc, and MCPP.

The results of the groundwater samples taken from on-site monitoring points indicated the presence of chloroform, ethylbenzene, xylene, TCE ,PCE, toluene, 1,2-DCE, 1,1-DCE, vinyl chloride, and benzene. In addition the following metals were detected at elevated concentrations in the on-site overburden groundwater: cadmium, chromium, lead, and zinc.

5.2.1 **Contaminants of Concern** (On-site)

Compounds of potential concern were selected based on frequency of detection, range of concentrations, and potential for migration. The following contaminants have been found (historically and/or during Site Investigation) at elevated concentrations at the Scobell Chemical site, operable unit #1:

SURFACE SOIL
endrin
heptachlor epoxide
cadmium
chromium
lead
mercury
zinc

SUBSURFACE SOIL
1,2-dichloroethene (1,2-DCE)
MCPP (herbicide) [seen in one sample during 1988 NYSDOT sampling]
tetrachloroethene (PCE)
toluene
1,1,1-trichloroethane (1,1,1-TCA)
trichloroethene (TCE)
xylene
chromium
lead
zinc

GROUNDWATER
benzene
chloroform
1,1-dichloroethene
1,2-dichloroethene
ethylbenzene
tetrachloroethene
toluene
trichloroethene
vinyl chloride
xylene
cadmium
chromium
lead
zinc

The attached analytical data summary tables (see Tables 5.2- 5.7) present SCGs for the contaminants analyzed for in each media (i.e., soil, sediments, water, etc.).

5.3 Summary of Nature and Extent of Contaminated Media - Operable Unit #2 (Off-site)

Based on the information developed during previous studies and this RI, chemical compounds of potential concern by environmental medium have been identified. Compounds of potential concern were selected based on frequency of detection, range of concentrations, and potential for migration. As discussed above in Section 4.5, analytical results confirm the presence of contamination in off-site surface water and groundwater.

The main source of contamination on-site is most likely the result of spills that occurred, due to past storage and handling practices, over a long period of time. Volatile organic contamination is present at the site as dissolved constituents in the ground water and apparently as free product which is more dense than water and has/is moving down into the aquifer (dense non-aqueous phase liquid or DNAPL). Contamination that is present off-site (operable unit #2) is there mainly because of migration, from the on-site area, of aqueous and non-aqueous phase (NAPL) contamination in the bedrock; to a lesser extent, some contamination has moved off-site in surface water and in the sediments samples collected from the retention pond adjacent to the highway.

Although some metals were found in on-site overburden groundwater samples at elevated concentrations, only one of the metals listed in Section 4.5.1 were detected off-site at concentrations above groundwater standards. Lead was found above standards (39.6 ppb vs. a standard of 25 ppb) in well OB-1; OB-1 is the monitoring point farthest from the on -site area with the points in between there and the site not indicating concentrations above standards. Relative to the bedrock groundwater samples, many of the metals detected at elevated concentrations were elevated at the background monitoring well (MW-1D) or at wells that are not truly downgradient for the migration of groundwater (e.g., MW-9S/MW-9D). This may be due to the naturally occurring presence of these metals in the bedrock at relatively high concentrations in this area. All of the information summarized in this paragraph is an indication that metals are not migrating from the site at concentrations of concern.

Significant VOC contamination is present on-site in the overburden groundwater. At the site the contamination has moved down in to the bedrock and has moved off-site in the bedrock. The results of the groundwater samples taken from off-site monitoring wells indicated the presence of elevated concentrations of vinyl chloride, carbon disulfide, dichloroethene, trichloroethene, tetrachloroethene, benzene, toluene, and xylene. The contaminants present at the highest concentrations are present in the **shallow bedrock** and include trichloroethene (maximum concentration of 500,000 ug/L at MW-4D), dichloroethene (maximum concentration of 49,000 ug/L at MW-5D), and tetrachloroethene (maximum concentration of 21,000 ug/L at MW-5D). The most significant off-site contamination is present just north-northeast of the railroad tracks (MW-4 and MW-5 well clusters); the concentrations drop significantly as you move from this area away from the MW-4/MW-5 area. The concentration of trichloroethene decreased by a factor of 300 from MW-4D to MW-7S; both wells monitor the shallow bedrock and MW-7S is located approximately 600 feet to the north-northeast of MW-4D. The concentration of trichloroethene decreased by a factor of 700 from MW-3D (northwest corner of the on-site area) to MW-6S; both wells monitor the shallow bedrock and MW-6S is located approximately 250 feet to the north-northwest of MW-3D. The highest contaminant concentrations present in the **"deep" bedrock** were present at MW-6D (DCE = 3300 ug/L, TCE = 370 ug/L, PCE = 28 ug/L). Although these concentrations are much greater than the groundwater standards, they decrease rapidly as you move away from the MW-6D and they are present at much lower concentrations as compared to the shallow bedrock groundwater. This information is presented graphically in Attachment 2, Figures 4-1 through 4-11.

The results of the surface water samples indicated concentrations ranging from 30 ppb (for both TCE & DCE at SW-1, located closest to the site) to non-detect (TCE was not detected at SW-3, located at the midpoint/west side of the pond). TCE and DCE were detected at the downstream sample location (SW-5), but the concentrations detected were below surface water standards for those contaminants.

5.3.1 Contaminants of Concern (Off-site)

Compounds of potential concern were selected based on frequency of detection, range of concentrations, and potential for migration. The following contaminants have been found (historically and/or during Site Investigation) at elevated concentrations at the Scobell Chemical site, operable unit #2:

GROUNDWATER
benzene
carbon disulfide
1,1-dichloroethene
1,2-dichloroethene
tetrachloroethene
toluene
trichloroethene
vinyl chloride
xylene

SURFACE WATER
1,2-dichloroethene
trichloroethene

The attached analytical data summary tables (see Tables 5-8, 5-9, and 5-10) present SCGs for the contaminants analyzed for in each media (i.e., surface water & groundwater).

Section 6 - EXPOSURE PATHWAY ANALYSIS

An exposure pathway describes the course that a contaminant takes from the source of the contamination to the exposed individual. An exposure pathway links the source(s) with the receptor and consists of: (1) a source of contamination; (2) a transport media (i.e., soil, water, air); (3) a point of potential contact by the receptor with the contaminated media; and (4) an exposure route (e.g., ingestion) at the contact point. This information has been used to generate a qualitative human health exposure assessment, as documented below.

6.1 Human Exposure Pathway Analysis

This Human Exposure Pathway Analysis has been performed to qualitatively evaluate the potential for current or future adverse human health effects which might result from exposure to contaminants at or migrating from the Scobell Chemical site. This analysis was performed assuming current site conditions, in the absence of any further action to control or remove the identified contamination. The analysis provides a discussion of potential exposure to site contaminants, identification of media of concern, and identification of potential receptors based on available data from this RI and previous studies. It has been prepared to assist in determining the need for remediation.

6.1.1 Identification of Media of Concern (On-Site)

Compounds of potential concern were selected based on frequency of detection, range of concentrations, and potential for migration. As discussed above, in Sections 4.5/5.2, analytical results confirm the presence of contamination in on-site soil and groundwater.

The main source of contamination at this site is most likely the result of spills that occurred, due to past storage and handling practices, over a long period of time. Volatile organic contamination is present at the site as dissolved constituents in the ground water and apparently as free product which is more dense than water and has/is moving down into the aquifer (dense non-aqueous phase liquid or DNAPL). Some solvents remain in the on-site soil above the water table in the vicinity of the source area. This contamination exists as a residual that did not migrate to the base of the aquifer, but rather bound to individual soil particles as it passed through the unsaturated soil.

Four surface soil samples were taken from the perimeter of the site; two pesticides (endrin and heptachlor epoxide) and three metals (chromium, lead, and zinc) were detected at elevated concentrations.

Subsurface soil contamination appears to be limited to on-site areas and is predominantly made up of volatile organic constituents (see also Section 2.1, above, for a summary of 1988 NYSDOT sample results). Elevated concentrations of the following contaminants have been found in on-site subsurface soil: TCE, PCE, 1,2-DCE, toluene, xylene, 1,1,1-TCA, lead, chromium, and MCPP.

The results of the groundwater samples taken from on-site monitoring points indicated the presence of chloroform, ethylbenzene, xylene, TCE ,PCE, toluene, 1,2-DCE, 1,1-DCE, vinyl chloride, and benzene.

6.1.2 Identification of Point of Potential Contact (On-Site)

All available data indicates that a majority of the contamination is present in the subsurface, as contaminated subsurface soil, as contaminated groundwater, or as DNAPL present in the subsurface. The exception is the presence of contaminants in surface soil at the perimeter of the site (most likely just outside of the footprint where the soil cover was placed as a part of NYSDOT’s 1988 IRM), as summarized in the previous section.

6.1.3 Summary of Human Exposure Pathway Analysis (On-site)

All groundwater in New York State is classified by the NYSDEC as GA (best usage, drinking water), however, groundwater in the area is currently not used for drinking water; the area is served with municipal water. Section 4.2 summarizes the findings of the “Determination of Groundwater Use,” performed as a part of the Site Investigation (see Attachment 1). Direct contact with groundwater could occur if shallow well points are used within the plume for irrigation or other non-potable purposes.

Trespassers, who could obtain access to the site, could come in contact with the limited amount of surface soil contamination that is present around the perimeter of the site.

On-site workers could be exposed during excavation or subsurface maintenance activities via dermal contact with contaminated materials, inhalation of vapors and airborne particulates, or incidental ingestion due to soiled hands when working in the on-site area of contamination.

If there is future development in areas where subsurface contamination is present there is the potential for infiltration (and the potential for exposure) of contaminated groundwater/vapors into basements.

6.1.4 Identification of Media of Concern (Off-Site)

Compounds of potential concern were selected based on frequency of detection, range of concentrations, and potential for migration. As discussed above, in Sections 4.5/5.3, analytical results confirm the presence of contamination in off-site groundwater and surface water.

Contamination that is present off-site (operable unit #2) is there mainly because of migration, from the on-site area, of aqueous and non-aqueous phase (NAPL) contamination in the bedrock; to a much lesser extent, some contamination has moved off-site in surface water.

The results of the groundwater samples taken from off-site monitoring points indicated elevated concentrations of benzene, carbon disulfide, 1,1-dichloroethene, 1,2-dichloroethene, tetrachloroethene, toluene, trichloroethene, vinyl chloride, and xylene.

Surface water drainage in the area of the site is controlled by storm sewers along the highway that drain into the retention pond, located a few hundred feet northeast of the site on the west side of I-590. Surface water samples were collected from the pond, as well as from downstream of the outlet of the pond. The results of the surface water samples indicated concentrations of 1,2-dichloroethene and trichloroethene above surface water standards (the highest concentration was 30 ppb vs. a standard of 5 ppb), but at relatively low concentrations compared to those in groundwater at/near the site.

6.1.5 Identification of Point of Potential Contact (Off-Site)

All available data indicates that a majority of the contamination is present in the subsurface, as contaminated groundwater, or as DNAPL present in the subsurface. The exception is the presence of contaminants in surface water, as summarized in the previous section. The surface water samples that exceeded standards contained contaminant concentrations at relatively low concentrations and were taken in a highway retention pond where the potential for exposure is low.

6.1.6 Summary of Human Exposure Pathway Analysis (Off-site)

Potential residential exposure to site related contamination could occur via ingestion of, or direct contact with contaminated groundwater, or inhalation of vapors released from contaminated water. All groundwater in New York State is classified by the NYSDEC as GA (best usage, drinking water). However, groundwater in the area is currently not used for drinking water; the area is served with municipal water. Section 4.2 summarizes the findings of the “Determination of Groundwater Use,” performed as a part of the Site Investigation (see Attachment 1). Direct contact with groundwater could occur if shallow well points are used within the plume for irrigation or other non-potable purposes. During the groundwater sampling, performed as a part of both the OU#1 and OU#2 Investigations, groundwater samples were taken from the overburden/bedrock interface along the north and northeast edges of the overburden groundwater plume (the directions where potential off-site exposure could occur). Groundwater samples were taken from geoprobe points GP-29,GP-30, and GP-31, located along the substation access road/driveway, between the substation and the apartment complex to the northwest of OU#2. The results indicated no detections of any site related contamination. Also, an overburden/bedrock interface groundwater sample was taken from the leading edge of the plume at monitoring well OB-1. The results indicated the detection of one site related contaminant (1,2-dichloroethene) at a concentration only slightly above the groundwater standard (detected at 9 ppb vs. standard of 5 ppb).

Off-site workers could be exposed during excavation or subsurface maintenance activities via dermal contact with contaminated materials, inhalation of vapors and airborne particulates, or incidental ingestion due to contaminant contact with hands when working in the off-site area of contamination (i.e., area north of the railroad tracks). There is the potential for dermal contact with contaminated surface water and sediments, located in the highway retention pond a few hundred feet to the northeast of the site. The surface water and sediment samples contained contaminant concentrations at relatively low concentrations and were taken in a highway retention pond where the potential for exposure is low.

If there is future development in areas where subsurface contamination is present there is the potential for infiltration (and the potential for exposure) of contaminated groundwater/vapors into basements.

6.2 Fish and Wildlife Impact Analysis (On-site & Off-site)

A Fish and Wildlife Impact Analysis (FWIA) is performed during a RI when it is determined that an impact to wildlife may exist as a result of contamination from the site. Field observations were made in conjunction with environmental sampling towards determining if such an assessment was necessary for this RI.

The potential impacts or routes of exposure to wildlife, from site-related contamination, include but are not limited to the following:

- Uptake of contaminants by plant life on or near the site.
- Consumption of contaminated plants by animals in the area.
- Direct contact with contaminants at the surface by animal life on or near the site.

Stressed vegetation on site or off-site was not found to exist. A large majority of the contamination identified at the site is subsurface and is not impacted by surface runoff during storm events. There are relatively low levels of site related contaminants in the surface water adjacent to the site, but these contaminants are not persistent in the environment (e.g., when exposed at the surface they volatilize quickly/they don’t tend to bio-accumulate). After consideration of the above mentioned potential impacts, relative to the conditions present at the site, it was determined that impacts to wildlife as a result of contamination from the site was not occurring. Therefore, the FWIA was not carried any further.

Section 7 - CONCLUSIONS AND RECOMMENDATIONS

7.1 1998 Site Investigation

The site is underlain by approximately ten feet of overburden consisting of (from the surface down): a silty clay cover (approximately one foot thick - placed as a part of the 1988 IRM); approximately four to five feet of fill and disturbed soil consisting of cinders/brick/glass; up to seven feet of silt and clay with some sand. The bedrock present immediately below the overburden is a Dolostone.

Groundwater at the site was encountered near the bedrock overburden interface. A thin zone of groundwater (generally less than 3 ½ feet thick, and non-existent in some areas of the site) was found in the overburden and appears to flow to the south, towards the I-590 ramp. The overburden groundwater levels north of the site are lower than on-site (following surface elevations which are approximately five feet lower on the north side of the railroad tracks, compared to the surface elevations on-site). As a result, the possibility exists that there is some overburden groundwater which may flow from the northern edge of the site to the north. Bedrock groundwater elevations are approximately ten feet below the surface of the bedrock on-site and at, or just below the surface of the bedrock north of the site (MW-4D and MW-5D). Groundwater flow in the bedrock appears to flow to the northeast. Slug tests performed during the Site Investigation indicate average hydraulic conductivities at the overburden/bedrock interface of approximately 1.8×10^{-2} centimeters/second (cm/sec), and approximately 8.8×10^{-5} cm/sec in the shallow bedrock.

The findings of the Site Investigation indicated the presence of significant on-site volatile organic contamination in subsurface soil, overburden groundwater, and shallow bedrock groundwater (including the presence of DNAPL). In addition, the contamination has migrated to the north with significant contamination found in the downgradient bedrock wells (including DNAPL found in MW-4D).

The 1998 Site Investigation generated enough information, for the site area itself, to develop and screen remedial alternatives as a part of the Feasibility Study (FS) for OU#1. However, additional information was needed to define the extent of the contamination downgradient of the site. As a result, the site was divided into two operable units: the on-site operable unit and the off-site operable unit. Since enough information was available for the on-site area, the FS for that operable unit was performed while the investigation of the off-site area continued; the Record of Decision (ROD) for the on-site operable unit was issued in March 1999.

7.2 2000 Remedial Investigation- OU#2

The off-site area is underlain by approximately six to eight feet of overburden consisting of silty fine sand with some clay. The bedrock present immediately below the overburden is a Dolostone. During the RI for this site (both OU#1 & OU#2) wells were installed to monitor “shallow” and “deep” bedrock groundwater. The shallow bedrock groundwater wells monitor the groundwater present approximately 15 to 25 feet below the ground surface; the deep bedrock groundwater wells monitor the groundwater present approximately 60 to 80 feet below the ground surface.

Groundwater at the off-site area was encountered near the bedrock overburden interface. A thin zone of groundwater (generally less than 3 ½ feet thick, and non-existent in some areas of the off-site area) was found in the overburden and appears to flow to the north-northeast. Groundwater can move relatively easily through the thin zone of saturated soil (overburden) on top of bedrock (average hydraulic conductivity is 1.8 x 10^{-2} cm/sec). Bedrock groundwater elevations are approximately one-three feet below the surface of the bedrock at the off-site operable unit, just north of the railroad tracks. Groundwater flow in the bedrock appears to flow to the northeast. Slug tests were performed on six of the eight new bedrock wells (bedrock wells MW-7D and MW-9D and overburden wells OB-1 could not be slug tested because there was insufficient water in the wells). Of these six wells, the hydraulic conductivities of three of them (MW-6S, MW-7S, and MW-8D) were too low to be effectively estimated by slug tests. Of the three wells where hydraulic conductivity values could be generated, a wide range of hydraulic conductivities were estimated. This is indicative of the heterogeneity of the aquifer's fractured bedrock. In the shallow bedrock the ability of the water to flow is much lower than at the overburden-bedrock interface (the average hydraulic conductivity was approximately 10^{-5} cm/sec for MW-4D and MW-5D; the hydraulic conductivities were too low to be measured in MW-6S and MW-7S [all of which are shallow bedrock wells located north on the on-site area]). Of the four deep bedrock wells, one had a hydraulic conductivity of 2.86 x 10^{-4} cm/sec (MW-6D) while the other three either did not produce enough water to perform the appropriate conductivity testing, or had a hydraulic conductivity too low to be measured.

Although some metals were found in on-site overburden groundwater samples at elevated concentrations, only one of the metals listed in Section 4.5.1 were detected off-site at concentrations above groundwater standards. Lead was found above standards (39.6 ppb vs. a standard of 25 ppb) in well OB-1; OB-1 is the monitoring point farthest from the on -site area with the points in between there and the site not indicating concentrations above standards. Relative to the bedrock groundwater samples, many of the metals detected at elevated concentrations were elevated at the background monitoring well (MW-1D) or at wells that are not truly downgradient for the migration of groundwater (e.g., MW-9S/MW-9D). This may be due to the naturally occurring presence of these metals in the bedrock at relatively high concentrations in this area. All of the information summarized in this paragraph is an indication that metals are not migrating from the site at concentrations of concern.

The findings of the Remedial Investigation for OU#2 indicated the presence of significant volatile organic contamination in shallow bedrock groundwater (including the presence of DNAPL) just north of the on-site area. Significant VOC contamination is present on-site OU#1) in the overburden groundwater. At the site the contamination has moved down in to the bedrock and has moved off-site in the bedrock. There has been relatively low levels of contamination detected off-site at the overburden/bedrock interface, however the highest off-site contaminant concentrations are present in the bedrock groundwater in the off-site area immediately north of the railroad tracks.

A bedrock monitoring well pair (MW-9S/MW-9D) was installed to the southeast, on the other side of the I-490/I-590 interchange from the site. The groundwater sample collected from the shallow bedrock (MW-9S) indicated the presence of relatively low levels of two site related contaminants (TCE @ 140 ppb and 1,2-DCE @ 3ppb). Contaminant movement mechanisms, other than aqueous phase migration with groundwater (groundwater flow direction is to the north-northeast), have apparently led to some site-related contamination to be present in the groundwater southeast of the former Scobell Chemical property. In the past it is possible that there was some movement to the southeast of a small amount of non-aqueous phase contamination (contamination not dissolved in water) in bedrock fractures that has led to the relatively low concentrations detected in these monitoring wells. Some groundwater samples collected from wells not hydraulically downgradient of the site (MW-8S/-8D, MW-9S/-9D) also contained low levels of VOCs that are found in petroleum based products. Specifically, those compounds are: benzene, toluene, and xylene. Levels, where detected, were generally quite low and could be due to small localized spilling of fuel.

Potential exposure to site related contamination could occur via ingestion of, or direct contact with contaminated groundwater. Since groundwater in the area around the site is not used as a potable water source, ingestion of contaminated groundwater is not occurring During the groundwater sampling, performed as a part of both the OU#1 and OU#2 Investigations, groundwater samples were taken from the overburden/bedrock interface along the north and northeast edges of the groundwater plume (the directions where potential off-site exposure could occur). Groundwater samples were taken from geoprobe points GP-29,GP-30, and GP-31, located along the substation access road/driveway, between the substation and the apartment complex to the northwest of OU#2. The results indicated no detections of any site related contamination. Also, an overburden/bedrock interface groundwater sample was taken from the leading edge of the plume at monitoring well OB-1. The results indicated the detection of one site related contaminant (1,2-dichloroethene) at a concentration only slightly above the groundwater standard (detected at 9 ppb vs. standard of 5 ppb).

Additional information is needed to define the downgradient extent of the contamination in the bedrock groundwater. However, based on the information that exists, there are no completed exposure pathways immediately downgradient of the site (see Section 6.1.6) and the nature, and a large part of the extent of the contamination has been characterized. Therefore, the 2000 Remedial Investigation fieldwork for OU#2 generated enough information to develop and screen remedial alternatives as a part of the Feasibility Study (FS). At some point in the near future, possibly during the remedial design for the off-site operable unit, additional downgradient monitoring wells will be installed to help define the downgradient extent of the contamination in the bedrock groundwater. The main purpose for installing additional wells would be to use them during the long-term monitoring program once a remedy is implemented at the site.

Section 8 - REFERENCES

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Monroe DOH. 1992. Grass Creek Stream Samples. Monroe County Department of Health Memorandum from Joseph J. Albert to Richard S. Elliott, P.E. May 13, 1992.

Seeler. 1995. Blossom Village Apartments Groundwater Assessment. Seeler Associates letter from Tim A. Seeler, P.E. to Ms. Susan Salone (Blossom Village Housing Development Fund, Inc.). May 18, 1995.

TABLES & FIGURES

Insert Figure 2.1 - 1988 SAMPLE LOCATION SUMMARY

Table 2.1
DATA SUMMARY FROM PREVIOUS SAMPLING/INVESTIGATIONS

DATA SUMMARY OF 1988 NYSDOT SOIL DATA SAMPLE LOCATIONS WITH THE HIGHEST SOIL CONCENTRATIONS

Sample Location (Depth)	Toluene (ppm)	TCE (ppm)	PCE (ppm)	1,2-DCE (ppm)	Pest (ppm)	Herb (ppm)	EP Toxicity(mg/L)	
							Cr	Pb
88-29 (12"-36")	5.73		0.254	3.65				
(36"-60")	30.1		6.06	6.03				
(60"-104.4")	<0.020		<0.010	<0.01				
88-30 (36"-60")						12.9 (MCPP)		
88-60 (0-18")	0.0635	0.207		0.0555				
(18"-36")	2.84	0.118		76.1				
(84"-108")	22.6	3.84		1.63				
88-61 (0-18")	0.849	34.3		5.8				
(18"-36")	14.1	6.4		1				
(84"-107)	525	116		5				
88-62 (0-18")				6.25				
(18"-36")				1.11				
(84"-102")				2.4				
88-71 (Surface) “A”							8.32	
(18"-36") “B”								12.2
88-72 (Surface) “A”	0.601		0.181				758	
(12"-36")	0.515		0.0569					
(36"-60")	<5		<5					
(72"-80.4")	266	1.05	4.25					
88-73 (Surface) “A”							11.1	5.64
88-75 (Surface)							11.1	
88-76 (Surface)							15.3	
(0-18")								4.87
88-85 (0-18")	47.4	22.4	16.4					
(18"-36")	51.6	13	9.38					
88-89 (0-18")	19.3	1.38	36					
(18"-36")	530	6.32	73.6					
88-91 (0-18")	334							
88-92 (0-18")	126							
(18"-36")	74.9							

DATA SUMMARY OF 1988 NYSDOT SOIL DATA SAMPLE LOCATIONS WITH THE HIGHEST SOIL CONCENTRATIONS

Sample Location (Depth)		Toluene (ppm)	TCE (ppm)	PCE (ppm)	1,2-DCE (ppm)	Pest (ppm)	Herb (ppm)	EP Toxicity(mg/L)	
								Cr	Pb
88-93	(0-18")	411							
88-93	(18"-36")	93.1							
88-95	(Surface)	<2.5							
	(0-18")	<5							
	(18"-36")	64							
88-96	(Surface)	0.037							
	(0-18")	14.2							
	(18"-36")	73.2							
88-97	(0-18")	574	1.92						
	(18"-36")	139	<2.5						
88-98	(Surface)	<0.025							
	(0-18")	37							
	(18"-36")	364							
	(36"-76")	989							

Summary of Sample Results from 5/92 Surface Water-Sediment Sampling from Grass Creek Drainage System

sample	cis-1,2-DCE (ppb)	TCE (ppb)	vinyl chloride (ppb)
surface water #3	310	140	6
surface water #4	63	42	1

5/95 GROUNDWATER SAMPLE COLLECTED FROM OPEN EXCAVATION AT BLOSSOM VILLAGE APARTMENTS (~1/2 MILE to the N-NE)

TCE	1,2-DCE
62 ppb	17 ppb

WATER SAMPLES TAKEN FROM LEACHATE HOLDING TANK

Date Sample Collected	Methylene Chloride (ppb)	1,2-DCE (ppb)	1,2-DCA (ppb)	TCA (ppb)	TCE (ppb)	PCE (ppb)	Toluene (ppb)
4/10/89	32.8	1,360	122	31.8	224	302	150
7/6/92	36.2	9.5	21.7	93.4	435	114	<1.0

Table 3.1
SUMMARY OF RI SAMPLE COLLECTION/ANALYSES
(1998 Site Investigation)

Field Work Element	Sample Matrix	Number Of Samples	Analysis/Method [NYSDEC ASP]
Small diameter groundwater monitoring point installation	Subsurface soil	20	VOCs[1]
		6	SVOCs[2]
		15	Pesticides
		5	Pesticides/PCBs
		20	Metals
	Groundwater	11	VOCs
		6	Pesticides
		6	Metals
Miscellaneous Site Investigation Sample Collection	Surface water (including sample from seep prevention sump basin)	3	VOCs
		3	Pesticides
		3	Metals
	Sediment	3	VOCs
		3	Pesticides
		3	Metals
	Surface Soil	4	VOCs
		4	Pesticides
		4	Metals
Monitoring Well/ Vapor Extraction Well Installation	Groundwater	8	VOCs
		3	SVOCs
		4	Pesticides
		3	Pesticides/PCBs
		7	Metals
	Subsurface Soil	4	VOCs
		4	Pesticides
		4	Metals
		8	Moisture content, total organic carbon, particle size distribution
	Dense Non-Aqueous Liquid (DNAPL)	2	VOCs
	Drill Cuttings	2	TCLP[3] VOCs
		2	TCLP Pesticides/Herbicides
		2	TCLP Metals
Vapor Extraction Pilot Study	Soil Gas	4	VOCs

1 Volatile Organics Compounds
2 Semi-Volatile Organic Compounds
3 Toxicity Characteristic Leaching Procedure

Insert Table 3.2 - SAMPLE and ANALYSIS SUMMARY (2000 OU#2 Remedial Investigation)

URS TABLE 2-4

Insert Table 4.1 - SUMMARY of MONITORING WELL CONSTRUCTION DATA

URS Table 2-2 (as modified)

Insert Table 4.2 - MONITORING WELL/GEOPROBE STRATIGRAPHIC SUMMARY

URS Table 3-1

Insert Table 4.3 - GROUNDWATER ELEVATIONS

Insert URS Table 2-3

Table 4.4 - SUMMARY OF SLUG TEST ANALYSES/ HYDRAULIC CONDUCTIVITIES

	MONITORING WELL	GROUND SURFACE ELEVATION (ft)	BEDROCK SURFACE ELEVATION (ft)	MONITORED INTERVAL [Elevation (ft)]	HYDRAULIC CONDUCTIVITY (cm/sec)
Overburden/ Bedrock interface	MW-4S	443.64	431.94	439.14 - 429.14	2.48×10^{-2}
	MW-5S	442.76	432.06	439.76 - 429.76	1.33×10^{-2}
	OB-1	436.85	430.35	432.35 - 427.35	[1]
"Shallow" Bedrock	MW-1D	455.14	439.14	419.14 - 409.14	1.59×10^{-4}
	MW-2D	453.59	442.49	427.59 - 417.59	4.78×10^{-4}
	MW-3D	452.19	444.69	426.19 - 416.19	3.86×10^{-6}
	MW-4D	443.84	432.14	418.84 - 408.84	4.6×10^{-5}
	MW-5D	442.48	431.78	419.98 - 409.98	3.26×10^{-4}
	MW-6S	443.10	437.10	431.10 - 418.10	[2]
	MW-7S	440.81	432.81	428.81 - 415.81	[2]
	MW-8S	452.89	446.89	440.39 - 427.89	5.55×10^{-3}
	MW-9S	453.19	445.19	434.19 - 428.19	1.11×10^{-4}
"Deep" Bedrock	MW-6D	443.12	437.62	385.12 - 370.12	2.86×10^{-4}
	MW-7D	441.16	433.16	389.16 - 376.16	[1]
	MW-8D	453.25	447.25	388.75 - 374.75	[2]
	MW-9D	453.27	445.27	385.27 - 375.27	[1]

[1] = wells could not be slug tested because there was not enough water in the well to perform the test

[2] = hydraulic conductivity values were too low to be measured

Table 5.1
STANDARDS, CRITERIA, & GUIDANCE
Scobell Chemical Site - No. 8-28-076

Div./ Agcy.*	Title	Std./ Guid.	Requirements
DAR	Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants	G	▸ control of toxic air contaminants ▸ screening analysis for ambient air impacts ▸ toxicity classifications ▸ ambient standards - short term/annual
DAR	6 NYCRR Part 200 (200.6) - General Provisions; 1/29/93	S	▸ prohibits contravention of AAQS or causes air pollution
DAR	6 NYCRR Part 201 - Permits & Certificates; 3/31/93	S	▸ prohibits construction/operation w/o permit/certificate
DAR	6 NYCRR Part 211 (211.1) - General Prohibitions	S	▸ prohibits emissions which are injurious to human, plant, or animal life or causes a nuisance
DAR	6 NYCRR Part 212 - General Process Emission Sources	S	▸ establishes control requirements
DAR	6 NYCRR Part 257 - Air Quality Standards	S	▸ applicable air quality standards
DFW	Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (FWIA); 10/94	G	▸ habitat assessments ▸ contaminant impact assessments ▸ ecological effects of remedies ▸ remedial requirements ▸ monitoring ▸ checklist
DFW	Technical guidance for screening contaminated sediments; 7/94	G	▸ sediments screening levels
DER	TAGM HWR-89-4031 Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites; 10/27/89	G	▸ dust suppression during IRM/RA
DER	TAGM HWR-92-4030 Selection of Remedial Actions at Inactive Hazardous Waste Sites; 5/90	G	▸ remedy selection criteria/evaluations
DER	TAGM HWR-92-4042 Interim Remedial Measures; 6/1/92	G	▸ define and track IRMs
DER	TAGM HWR-92-4046 Determination of Soil Cleanup Objectives and Cleanup Levels; 1/24/94	G	▸ soil cleanup goals
DER	TAGM HWR-92-4048 Interim Remedial Measures - Procedures; 12/9/92	G	▸ identifying and implementing IRMs
DER	6 NYCRR Part 375 - Inactive Hazardous Waste Disposal Site Remedial Program; 5/92	S	▸ requirements regarding remedial programs ▸ private party programs, state funded programs, state assistance to municipalities

DOW	Analytical Services Protocols (ASP); 11/91	G	▸ analytical procedures
DOW	TOGS 1.1.2 - Groundwater Effluent Limitations; 8/94	G	▸ guidance for developing effluent limits for groundwater
DOW	TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values; 10/93	G	▸ compilation of ambient water quality stds. and guidance values
DOW	TOGS 1.2.1 -Industrial SPDES Permit Drafting Strategy for Surface Waters; 4/90	G	▸ guidance for developing effluent and monitoring limits for point source releases to surface water
DOW	TOGS 1.3.8 - New Discharges to Publicly Owned Treatment Works; 10/26/94	G	▸ limits on new or changed discharges to POTWs strict requirements regarding bioaccumulative and persistent substances plus other considerations
DOW	6 NYCRR Part 702-15(a), (b), (c), (d) & (e) -	S	▸ Empowers DEC to Apply and Enforce Guidance where there is no Promulgated Standard
DOW	6 NYCRR Part 700-705 - NYSDEC Water Quality Regulations for Surface Waters and Groundwater; 9/1/91	S	▸ 700 - Definitions, Samples and Tests; 701 - Classifications Surface Waters and Groundwaters; 702 - Derivation and Use of Standards and Guidance Values; 703 - Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards;
DOW	6 NYCRR Part 750-757 - Implementation of NPDES Program in NYS	S	▸ regulations regarding the SPDES program
DRS	6 NYCRR Part 364 - Waste Transporter Permits; 1/12/90	S	▸ regulates collection, transport, and delivery of regulated waste
DSHM	TAGM 3028 "Contained In" Criteria for Environmental Media; 11/92	G	▸ Soil Action Levels
DSHM	6 NYCRR Part 360 - Solid Waste Management Facilities; 10/9/93	S	▸ solid waste management facility requirements landfill closures; C&D landfill requirements; used oil; medical waste; etc.
DSHM	6 NYCRR Part 370 - Hazardous Waste Management System: General; 1/14/95	S	▸ definitions of terms and general standards applicable to Parts 370-374 & 376
DSHM	6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes; 1/14/95	S	▸ haz. waste determinations
DSHM	6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities; 1/14/95	S	▸ manifest system and recordkeeping, certain management standards
DSHM	6 NYCRR Part 376 - Land Disposal Restrictions - 1/14/95	S	▸ identifies hazardous waste restricted from land disposal
DSHM	6 NYCRR Subpart 373-1 - Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements; 1/14/95	S	▸ hazardous waste permitting requirements: includes substantive requirements

DSHM	6 NYCRR Subpart 373-2 - Final Status Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities; 1/14/95	S	▸ hazardous waste management standards e.g., contingency plan; releases from SWMUs; closure/post-closure; container/management; tank management; surface impoundments; waste piles; landfills; incinerators; etc.
DSHM	6 NYCRR Subpart 373-3 - Interim Status Standards for Owners and Operators of Hazardous Waste Facilities - 1/14/95	S	▸ similar to 373-2
OSHA/ PESH	29 CFR Part 1910.120; Hazardous Waste Operations and Emergency Response	S	▸ health and safety
USEPA	Hydrologic Evaluation of Landfill Performance (HELP) Model Hydrologic Simulation of Solid Wast Disposal Sites	G	▸ cover system performance/hydrology
USEPA	Integrated Risk Information System (IRIS)	G	▸ verified RfDs and cancer slope factors
USEPA	Risk Assessment Guidance for Superfund - Volume 1 - Human Health Evaluation Manual; 12/89	G	▸ human health risk assessments

DAR:	Division of Air Resources
DEP:	Division of Environmental Permits
DER:	Division of Environmental Remediation
DFW:	Division of Fish and Wildlife
DOH:	Department of Health
DOW:	Division of Water
DSHM:	Division of Solid and Hazardous Materials
USEPA:	US Environmental Protection Agency

Insert Table 5.2 - SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS (1998 Site Investigation)

Insert Table 5.3 - SUMMARY OF SUBSURFACE SURFACE SOIL ANALYTICAL RESULTS (1998 Site Investigation)

Insert Table 5.4 - SUMMARY OF GROUNDWATER ANALYTICAL RESULTS (1998 Site Investigation)

Insert Table 5.5 - SUMMARY OF DNAPL ANALYTICAL RESULTS (1998 Site Investigation)

Insert Table 5.6 - SUMMARY OF SURFACE WATER ANALYTICAL RESULTS (1998 Site Investigation)

Insert Table 5.7 - SUMMARY OF SEDIMENT ANALYTICAL RESULTS (1998 Site Investigation)

Insert Table 5.8 - GROUNDWATER ANALYTICAL RESULTS SUMMARY (2000 OU#2 Remedial Investigation)

URS TABLE 4-1

Insert Table 5.9 - DNAPL ANALYTICAL RESULTS SUMMARY (2000 OU#2 Remedial Investigation)

[URS Table 4-4]

Table 5.10 - SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
(2000 OU#2 Remedial Investigation)

	UNITS	SURFACE WATER STANDARD	SW-1 (sampled 8/16/00)	SW-2 (sampled 8/16/00)	SW-3 (sampled 8/16/00)	SW-4 (sampled 8/16/00)	SW-5 (sampled 8/16/00)
cis-1,2-dichloroethene	ug/l	5	30	16	9 (J)	6 (J)	4 (J)
trichloroethene	ug/l	5	30	17	ND (10)	6 (J)	4 (J)

J =	Indicates an estimated value. The compound is present but the concentration has been estimated because it is less than the sample quantitation limit, but greater than zero.
ND(#)=	Indicates that the compound was not detected at the quantitation limit listed in parenthesis.

Insert Figure 5-1 - SITE PLAN (with monitoring well/sample locations)

Insert Figure 5-2 - BEDROCK SURFACE ELEVATIONS

Insert Figure 5-3 - GEOLOGIC CROSS SECTION

[URS Figure 3-2]

Insert Figure 5-4 - OVERBURDEN GROUNDWATER CONTOURS (7/9/98)

Insert Figure 5-5 - SHALLOW BEDROCK GROUNDWATER CONTOURS (7/9/98)

Insert Figure 5-6 - SHALLOW BEDROCK GROUNDWATER CONTOURS (11/1/00)

ATTACHMENT 1:

SITE INVESTIGATION DATA SUMMARY REPORT

ATTACHMENT 2:

REMEDIAL INVESTIGATION
DATA SUMMARY REPORT
SCOBELL CHEMICAL - OU#2