GROUNDWATER INVESTIGATION REPORT SCOTIA DEPOT SCOTIA, NEW YORK

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TABLE OF CONTENTS

PAGE
LIST OF ACRONYMS1
EXECUTIVE SUMMARYE-1
SECTION 1 INTRODUCTION1-1
1.1 PURPOSE1-1
1.2 PROJECT BACKGROUND1-1
SECTION 2 SITE DESCRIPTION AND HISTORY2-1
2.1 SITE DESCRIPTION2-1
2.2 OPERATIONAL HISTORY2-4
2.3 GEOLOGIC AND HYDROGEOLOGIC SETTING2-4
2.4 GROUNDWATER USE2-9
2.5 HISTORY OF TCE PLUME IDENTIFICATION2-9
2.6 HISTORY OF DEPOT ENVIRONMENTAL ASSESSMENTS2-10
SECTION 3 GROUNDWATER INVESTIGATION SCOPE AND OBJECTIVES
3.1 OBJECTIVES3-1
3.2 SOIL BORINGS AND MONITORING WELL INSTALLATIONS 3-1
3.3 CHEMICAL ANALYSIS OF SAMPLES
3.4 DATA VALIDATION
3.5 GROUNDWATER MODELING

TABLE OF CONTENTS (CONTINUED)

FAGI
SECTION 4 GROUNDWATER INVESTIGATION RESULTS4-1
4.1 HYDROGEOLOGIC CONDITIONS4-1
4.2 ANALYTICAL DATA PRESENTATION ISSUES 4-1
4.3 SOIL SAMPLE ANALYSIS RESULTS4-6
4.4 GROUNDWATER SAMPLE ANALYSIS RESULTS
LIST OF APPENDICES
APPENDIX A GEOLOGIC LOGS AND MONITORING WELL SCHEMATICS
AT ENDIA A GEOLOGIC LOGS AND MONTORING WEEL SCILEMITTES
APPENDIX B PHOTOLOG OF BORING LOCATIONS
APPENDIX C DATA VALIDATION REPORT
ADDENDIY D. COOLINDWATED MODELING DEPORT

LIST OF FIGURES

	PAGE
Figure 2-1	Site Vicinity Map2-2
Figure 2-2	Site Location Map2-3
Figure 2-3	Groundwater Flow Direction July 18th, 2000
Figure 2-4	Groundwater Flow Direction October 30 th , 2000
Figure 2-5	Scotia-Glenville Industrial Park: Recent Groundwater Results September 1 st , 1999 to August 1 st , 2000
Figure 3-1	Test Pit and Boring Locations
Figure 4-1	Soil Sample Results
Figure 4-2	Groundwater Sample Results August 1 st , 2000 and November 1 st , 2000
Figure 4-3	Model Results4-13
	LIST OF TABLES
Table 2-1	Groundwater Elevation Data
Table 3-1	Well Construction Data
Table 4-1	Summary of Soil Results4-2
Table 4-2	Summary of Groundwater Screening Results
Table 4-3	Validated Groundwater Results, Round 1
Table 4-4	Validated Groundwater Results, Round 2

LIST OF ACRONYMS

AOC Area of Concern

ASP Analytical Services Protocol

bgs below ground surface

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

DLA Defense Logistics Agency

DNSC Defense National Stockpile Center

DNAPL dense, non-aqueous phase liquid

ELCD Electronic conductivity detector

ELAP Environmental Laboratory Approval Program

FUDS Formerly Utilized Defense Site

GSA General Services Administration

ID inside diameter

mgd million gallons per day

mg/kg milligrams per kilogram

mg/L milligrams per liter

MW monitoring well

NAD 83 North American Datum 1983

NGVD 29 National Geodetic Vertical Datum 1929

ND not detected

NTU nephelometric turbidity unit

LIST OF ACRONYMS (CONT'D)

NYSDEC New York State Department of Environmental Conservation

NYSDOH New York State Department of Health

PA Preliminary Assessment

PAH polycyclic aromatic hydrocarbon

Parsons ES Parsons Engineering Science, Inc.

PCB polychlorinated biphenyls

PID photoionization detector

PMK Group, Consulting Environmental Engineers

PSA Preliminary Site Assessment

PVC Polyvinyl Chloride

QA/QC quality assurance, quality control

RI Remedial Investigation

SB soil boring

SI Site Investigation

STL Severn-Trent Laboratories

SVOC semivolatile organic compound

TAL Target Analyte List

TCE Trichloroethene

PCE Tetrachloroethene

TCL Target Compound List

ug/kg micrograms per kilogram

LIST OF ACRONYMS (CONT'D)

ug/L micrograms per liter

USEPA United States Environmental Protection Agency

VOC volatile organic compound

UST underground storage tank

EXECUTIVE SUMMARY

DEPOT MISSION

The Scotia Depot is currently owned by the Federal Government and operated by the Department of Defense (DoD), Defense Logistics Agency (DLA). The Scotia Depot is operated under the National Stockpile Program for the purpose of storing metallurgical ores and other materials necessary for manufacturing defense materials or strategic materials used in national defense.

OPERATIONAL HISTORY

The Scotia Depot was commissioned on March 30, 1943 and was constructed in 10 months. After World War II ended, portions of the Depot were sold and converted to commercial/industrial business parks. The remaining active portion of the Depot is owned by the GSA and operated by the Defense National Stockpile Center (DNSC).

Operations at the site have historically been related to the maintenance and movement of the stockpiled materials from one Depot to another. Hazardous waste materials are not routinely generated during site operations, and no on-site hazardous waste disposal has been documented.

PROJECT BACKGROUND AND PURPOSE

A Preliminary Site Assessment (PSA) was completed by the New York State Department of Environmental Conservation (NYSDEC) in 1999 at the former Building #15 in the former Scotia Navy Depot in Scotia, New York. That investigation identified a groundwater plume containing TCE, other chlorinated volatile organic compounds (VOCs), and metals. The source of the plume is not known, but one suspected source is an off-site disposal area located adjacent to, and northeast of, the Scotia Depot.

In 1998, the General Services Administration (GSA), the government entity that owns the Scotia Depot property, commissioned a Phase II Assessment of the Depot property. During the Phase II Site Assessment, an off-site disposal area was identified and designated as Area of Concern (AOC) - A. A portion of the off-site disposal area was reportedly used by Depot employees for disposal of landscaping debris, construction/demolition debris, and other materials. Other portions of the off-site disposal area have apparently been used as an unauthorized dumpsite for household and other debris by unidentified parties. Soil samples collected in the portion of the off-site disposal area formerly used by Depot employees contained volatile organic compounds (VOC)s, including trichloroethene (TCE), at concentrations above the NYSDEC Recommended Soil Cleanup Criteria. The NYSDEC requested that DLA and GSA conduct a groundwater investigation based on the presence of TCE in the off-site disposal

area, which is located upgradient of the groundwater TCE plume identified in the NYSDEC PSA.

The purpose of this Groundwater Investigation was to assess whether the disposal area located northeast of the Scotia Depot is the source of a groundwater plume containing TCE. The work was funded jointly by the GSA and the Depot operator, the DNSC. The scope of this groundwater investigation was based on a request by the NYSDEC, as communicated in a letter from M. Chen, dated January 25, 2000.

OBJECTIVES AND SCOPE OF WORK

The objectives of the groundwater investigation were to:

- Assess whether the disposal area located northeast of the Scotia Depot is the source of the TCE groundwater plume, and
- Assess the lateral and vertical extent of the plume, if present, within a predefined area along the northeastern fence line, and assess the presence of TCE south of the Depot near Lock 8 in the Mohawk River/Erie Canal.

The primary scope of work involved drilling five well borings and three soil borings, excavating test pits, analyzing soil and groundwater samples, installing and sampling five monitoring wells and completing a groundwater model for the site.

CONCLUSIONS

The groundwater investigation led to the following conclusions:

- A TCE groundwater plume was not identified in the wells along the northeastern fence line. However, groundwater could not be characterized throughout the entire thickness of the aquifer as originally planned due to heaving sand conditions.
- Groundwater and soil samples along the northern fence line at the Scotia Depot did not
 contain high concentrations of TCE (at levels above NYSDEC soil and groundwater
 criteria). On the basis of the data collected, the disposal area located northeast of the
 Scotia Depot is not the source of the TCE plume.
- A groundwater model was developed to identify any areas on the Scotia Depot which have a high probability of being the source area for the TCE plume. The model indicated there were no areas on the Depot that had a high probability of being the source of the plume. On that basis, and based on the data collected to date, no further investigations are deemed necessary on the Depot property.

SECTION 1

INTRODUCTION

1.1 PURPOSE

The purpose of this Groundwater Investigation was to assess whether a disposal area located northeast of the Scotia Depot is the source of a groundwater plume containing trichloroethene (TCE). The work was funded jointly by the Depot property owner, the General Services Administration (GSA) and the Depot operator, the Defense Logistics Agency (DLA) Defense National Stockpile Center (DNSC). The latter agency funded the work via a contract between Parsons Engineering Science (Parsons ES) and the United States Army Corps of Engineers (USACE). The scope of this groundwater investigation was based on a request by the New York State Department of Environmental Conservation (NYSDEC), as communicated in a letter from M. Chen, dated January 25, 2000.

1.2 PROJECT BACKGROUND

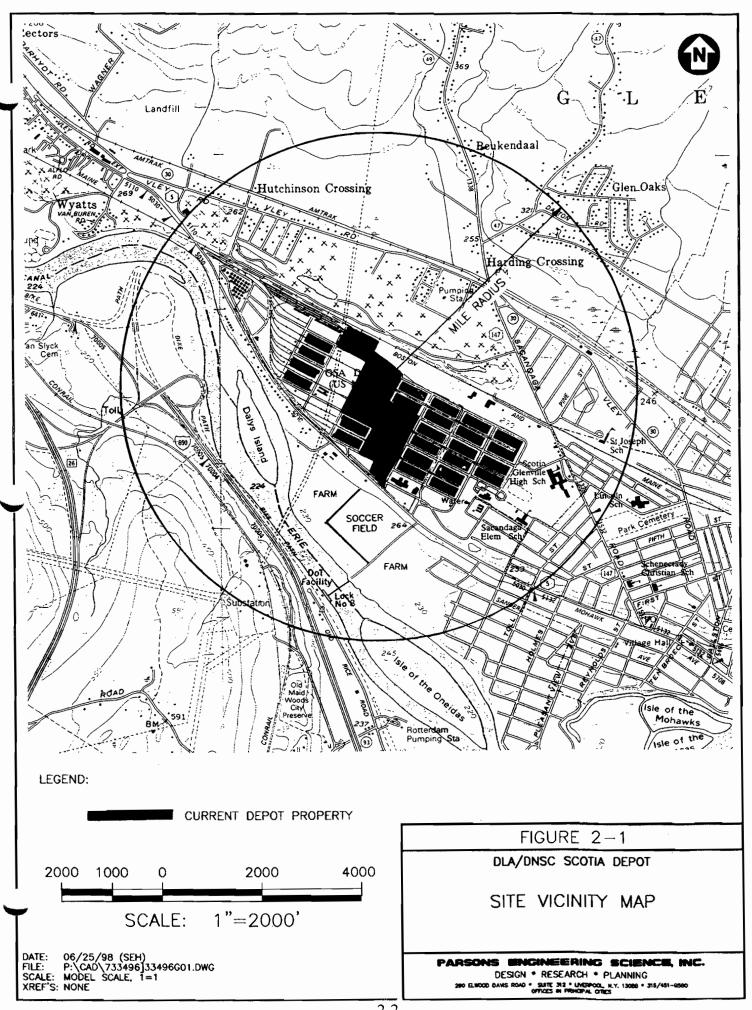
- 1.2.1 A Preliminary Site Assessment (PSA) was completed by NYSDEC in 1999 at the former Building #15 in the former Scotia Navy Depot in Scotia, New York (Reference 1). That investigation identified a groundwater plume containing TCE, other chlorinated volatile organic compounds (VOCs), and metals. The source of the plume is not known, but one suspected source is an off-site disposal area located adjacent to, and northeast of, the Scotia Depot.
- 1.2.2 The Scotia Depot is currently owned by the GSA and operated by the DLA/DNSC. The Scotia Depot is operated under the National Stockpile Program for the purpose of storing metal ores and other materials necessary for manufacturing defense materials or strategic materials used in national defense.
- 1.2.3 A Phase II Site Assessment Report was completed for the Scotia Depot in July 1999 by PMK Group, and Edwards and Kelcey (Reference 2). The Phase II Site Assessment was commissioned by the GSA. The GSA was implementing a program of investigations at GSA-owned properties, independent of the PSA being conducted by the NYSDEC.
- 1.2.4 During the Phase II Site Assessment, an off-site disposal area was identified and designated as Area of Concern (AOC) A. A portion of the off-site disposal area was reportedly used by Depot employees for disposal of landscaping debris, construction/demolition debris, and other materials. Other portions of the off-site disposal area have apparently been used as an unauthorized dumpsite for household and other debris by unidentified parties. Soil samples collected in the portion of the off-site disposal area formerly used by Depot employees contained VOCs, including TCE, at concentrations above the NYSDEC Recommended Soil Cleanup Criteria (Reference 3). The NYSDEC requested that DLA and GSA conduct a groundwater investigation based on the presence of TCE in the off-site disposal area, which is located upgradient of the groundwater TCE plume identified in the NYSDEC PSA.

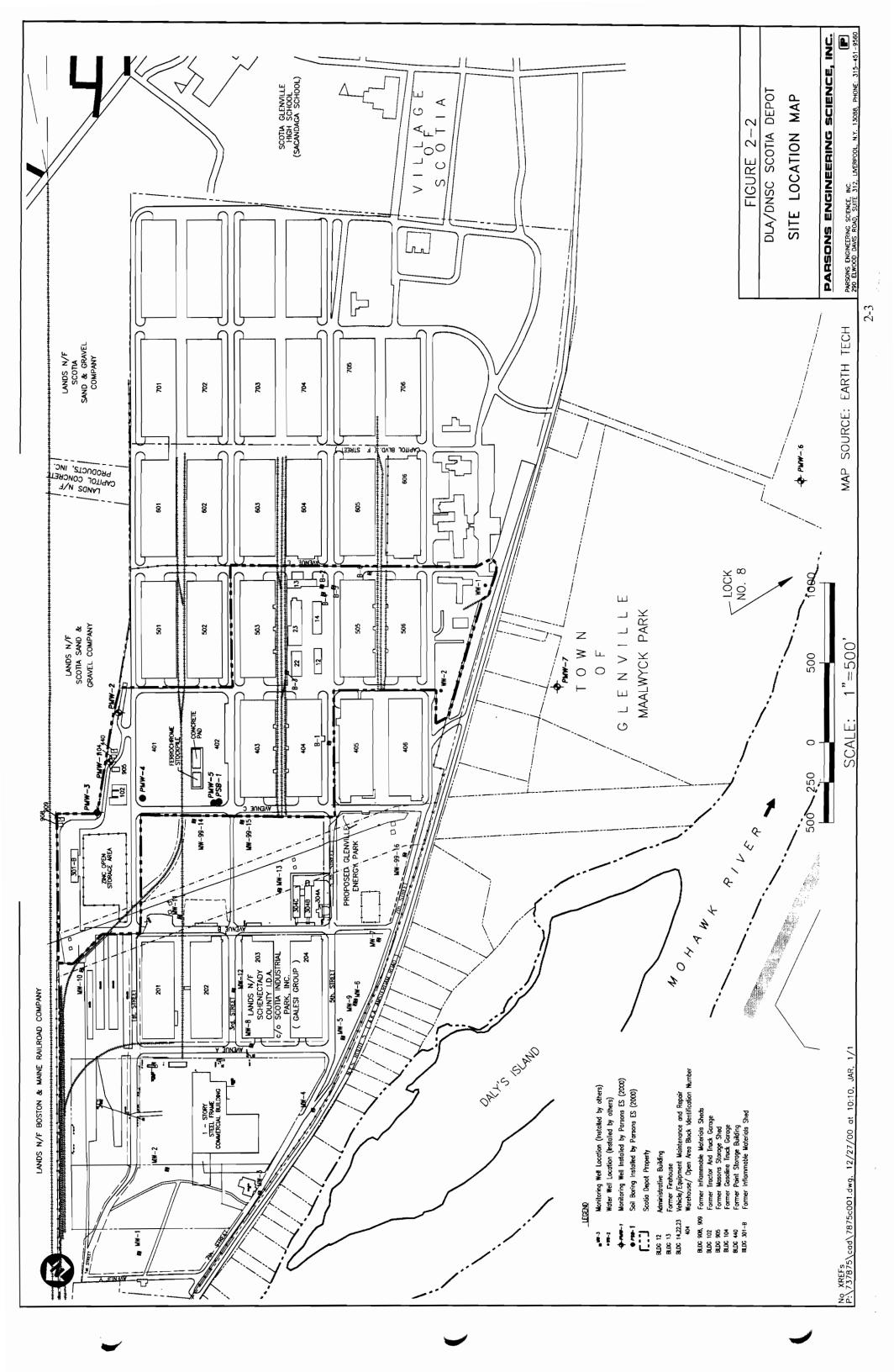
SECTION 2

SITE DESCRIPTION AND HISTORY

2.1 SITE DESCRIPTION

- 2.1.1 The Scotia Depot is located on Route 5, just west of the Village of Scotia, New York. The geographic coordinates are 45° 50' 29" north latitude and 73° 59' 15" west longitude (Reference 4). Figure 2-1 shows the location of the site, and the surrounding natural and manmade features.
- 2.1.2 The current Depot property is approximately 59.7 acres in size (see highlighted portion of Figure 2-1). The Depot consists of five warehouses with a total storage capacity of 582,826 square feet, two outdoor open storage areas with a total storage capacity of 336,098 square feet, five support buildings used primarily for vehicle/equipment maintenance and repair, security, and administration (Figure 2-2).
- 2.1.3 The current Depot property is between two commercial business parks, which were originally part of the former 337-acre Scotia Navy Depot. The adjacent land use to the east and west of the Depot is commercial/industrial. Further to the east and west, the land use is mixed residential/commercial. Land use to the south of the Depot is a mixture of residential, commercial, recreational and agricultural (Reference 4). The Erie Canal/Mohawk River is about 2,000 feet south of the Depot. To the north of the Depot is a large sand and gravel quarry; north of the quarry the land use is primarily residential.
- 2.1.4 A high school and elementary school are located about 3,000 feet east of the Depot, and the nearest residence is about 200 feet south of the Depot, across Route 5. Access to the Depot is controlled by a completely-encircling fence and 24-hour security personnel. The Depot is also separated from the nearest residents and schools by the commercial/industrial business park and the quarry. Those land uses, along with Route 5, create a buffer zone around the Depot.
- 2.1.5 The Scotia Depot is situated over the Schenectady Aquifer, which is a sole-source aquifer that supplies approximately 90 percent of Schenectady County with drinking water (Reference 5). The Depot is within the general recharge zone of the Schenectady Aquifer. The northern Depot property line coincides with the limits of the recharge zone and wellhead protection zone for the Village of Scotia well field.
- 2.1.6 The Village of Scotia water supply well field is located about 1,500 feet north of the Depot property line (Reference 5). The Towns of Glenville and Rotterdam, the City of Schenectady, and a private water company all have municipal/community water supply wells located within 1 to 3 miles of the Depot. A drinking water intake is located on the Erie Canal/Mohawk River, approximately 15 miles downstream from the Depot (Reference 6).





2.1.7 There are no habitats for threatened or endangered species within 0.5 miles of the Depot (References 7 and 8). The nearest wetland is approximately 1.1 miles downstream of the site on the Erie Canal/Mohawk River (Reference 9). The Erie Canal/Mohawk River is also used for recreational boating and fishing.

2.2 OPERATIONAL HISTORY

- 2.2.1 The Scotia Depot was commissioned on March 30, 1943 and was constructed in 10 months (Reference 10). After World War II ended, portions of the Depot were sold and converted to commercial/industrial business parks. The remaining active portion of the Depot is owned by the GSA and operated by the DNSC.
- 2.2.2 The metals and ores at the Scotia Depot are currently stored in piles, either on concrete pads (e.g. ferrochrome ore) or on a crushed, compacted stone surface (e.g. zinc ingots, and until 2000, lead ingots). Other materials are stored in warehouses in drums, boxes, bags, etc. Figure 2-2 provides a current diagram of the facility, including the locations of storage piles and warehouses. The warehouses are single-story concrete block construction with concrete floors. They are protected by dry-pipe sprinkler systems, and are kept locked and sealed unless required to be open for use. All commodities in the warehouses are arranged neatly with several feet of aisle space between pallets. The warehouses are used to store drums and other containers of the following materials: tannin, cobalt, tungsten, ferrotungsten, tungstic acid, columbium, tantalum, mica, graphite, cadmium, and talc (Reference 11).
- 2.2.3 Operations at the site have historically been related to the maintenance and movement of the stockpiled materials from one Depot to another. Hazardous waste materials are not routinely generated during site operations, and no on-site hazardous waste disposal has been documented (Reference 12). However, the facility is occasionally a hazardous waste generator, such as in 1992 when a large drum repainting project resulted in waste zinc chromate paint cans being taken from the site by a contractor for proper disposal (Reference 13).
- 2.2.4 Supporting operations related to maintenance of the Depot include: building repairs and painting, vehicle repairs, maintenance and refueling, removal and replacement of polychlorinated biphenyl (PCB)-containing transformers, asbestos-containing materials, petroleum underground storage tanks (USTs), landscaping, and vegetation control by herbicide spraying.
- 2.2.5 Thirteen people are typically on-site as permanent duty personnel assigned to Depot operations, exclusive of contracted security personnel (Reference 14).

2.3 GEOLOGIC AND HYDROGEOLOGIC SETTING

2.3.1 The Scotia Depot is situated over the "Great Flats" or "Schenectady" Aquifer, which is a highly permeable, unconfined, glacial-drift, sole-source aquifer that occupies a portion of the Mohawk River Valley (Reference 5). The aquifer is about 14 miles long and underlies

Final August 2001

approximately 25 square miles in the lower Mohawk River Basin in Schenectady County. Approximately one-half mile wide at its western end, and more than five miles wide at Schenectady to the east, the aquifer lies between the upland hills to the west, and the Hudson River lowlands to the east.

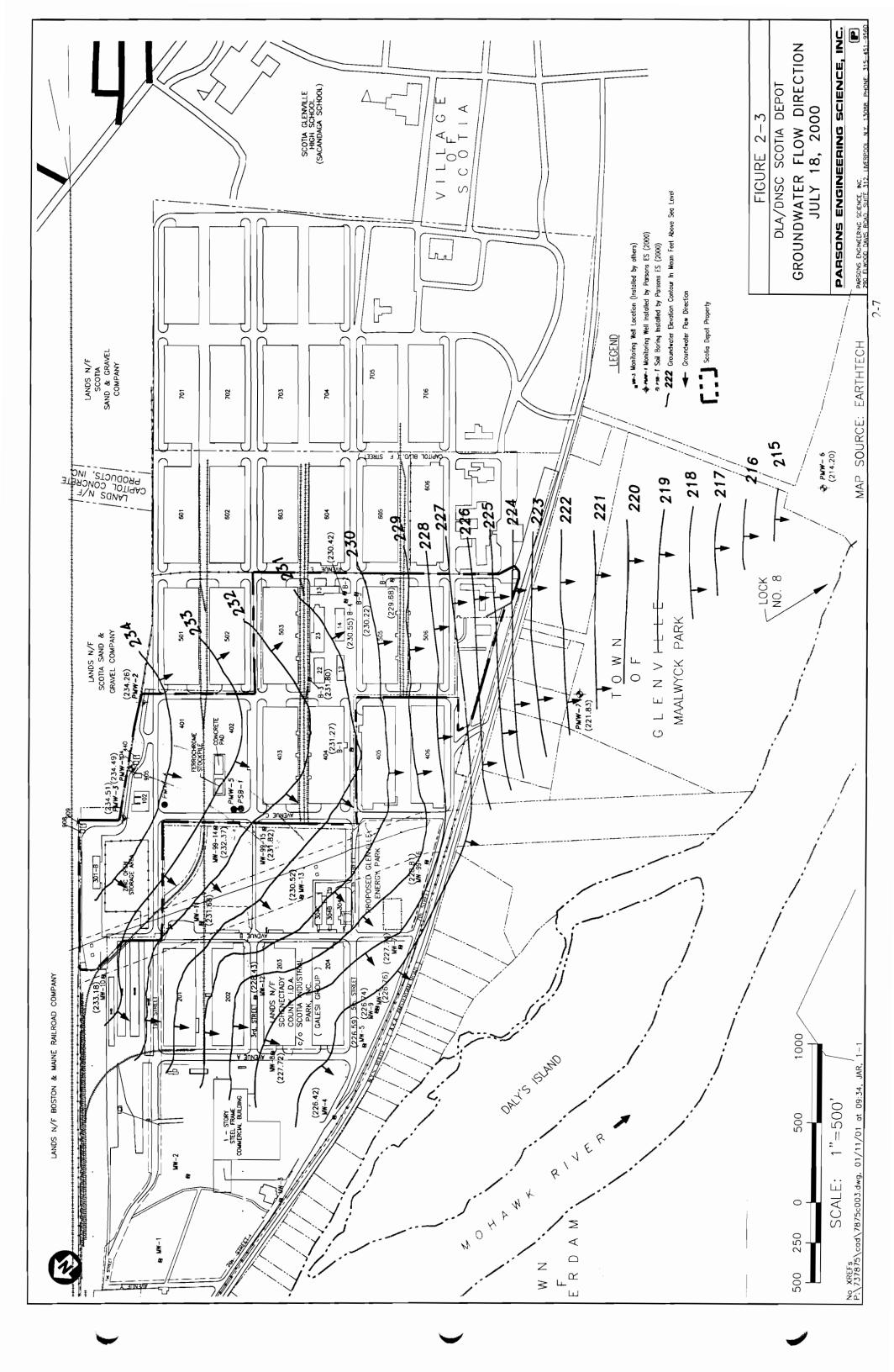
- 2.3.2 Bedrock underlying the Mohawk Valley in the Schenectady area is shale with some interbedded siltstone (Reference 5). Glacial till, silt and sand overlie bedrock throughout most of the area. The till is exposed primarily in the upland areas. Fine-grained sand, silt, and clay were carried in glacial melt water and deposited in a large temporary glacial lake now termed Lake Albany, which covered much of the mid-Hudson Valley, including the Schenectady area. Coarse sand and gravel deposits occur in the western part of the main valley, including the vicinity of the Depot.
- 2.3.3 The Village of Scotia water supply, averaging 1.5 million gallons per day (mgd), is obtained from three wells having screened sections in the coarse sand and gravel deposits, at depths of 98, 70, and 85 feet, respectively (Reference 5). The Scotia well field is completed in 70 to 100 feet of sand and gravel outwash underlain by glacial till. No significant fine-grained deposits overlie the outwash, so surface infiltration to the aquifer is not restricted. The outwash deposits extend continuously up and down the valley from the well field and toward the Erie Canal/Mohawk River.
- 2.3.4 The Erie Canal/Mohawk River is both a gaining and losing stream in the region southwest of the Scotia Depot and Scotia-Glenville Industrial Park. This qualification is dependent on the time of year and the pumping rate in the Rotterdam and Schenectady well fields. However, with respect to shallow groundwater migrating from the Depot and the industrial park, the Erie Canal/Mohawk River is a gaining stream.
- 2.3.5 During the Groundwater Investigation at the Scotia Depot, three monitoring wells and three soil borings were drilled on-site. At the deepest boring location, MW-1, fine to coarse sand, gravel, and cobbles were encountered to a depth of 108 feet below ground surface (bgs). The subsurface conditions changed to silt and very fine sand at this depth and extended to 153 feet bgs, the total depth of the boring (Appendix A). Due to the drilling method and difficult subsurface conditions, undisturbed sampling could not be used to identify the detailed subsurface stratigraphy.
- 2.3.6 Groundwater flow beneath the Scotia Depot is predominantly west to southwest toward the Erie Canal/Mohawk River. Groundwater data from the Depot wells indicates groundwater flows west to southwest toward the Erie Canal/Mohawk River (Figures 2-3 and 2-4). The water table is approximately 65 feet bgs at the site (Table 2-1).

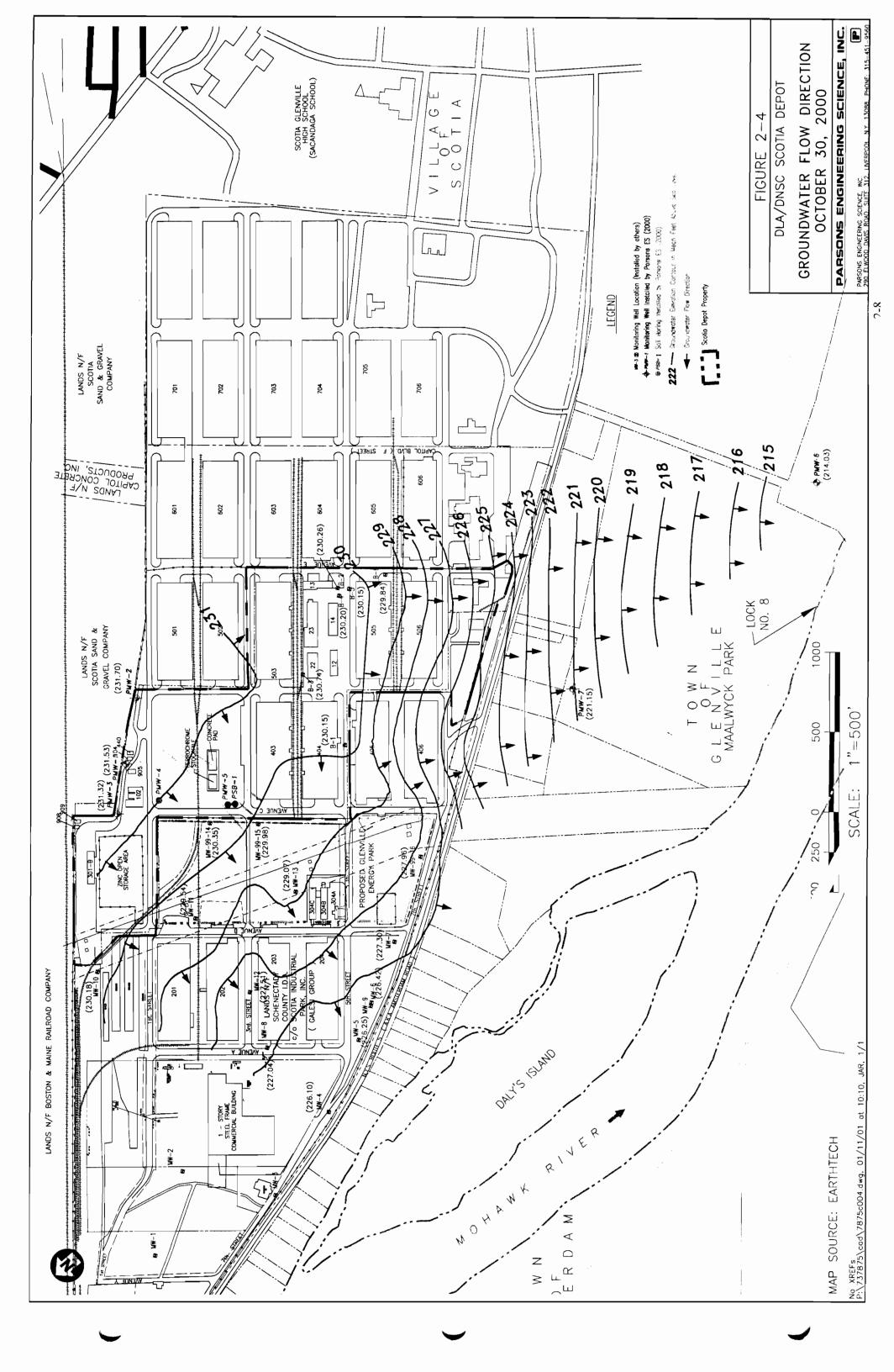
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Groundwater Elevation Data TABLE 2-1 SCOTIA DEPOT

							6/16/00	00	2/18/00	00	10/30/00	00
WELL	Screen	Top of	Bottom of	Screen	Ground	Top of Casing	Depth To Water	Groundwater	Top of Casing Depth To Water Groundwater Depth To Water Groundwater	Groundwater	Depth To Water Groundwater	Groundwater
	Length	Screen	Screen	Elevation	Elevation	Elevation	from TOC	Elevation	from TOC	Elevation	from TOC	Elevation
PMW-1	20	83	83	216.58 - 236.58	299.58	302.2	68.42	233.78	67.71	234.49	70.67	231.53
PMW-2	20	99	84	213.79 - 233.79	297.79	300.77	67.53	233.24	66.51	234.26	69.07	231.7
PMW-3	20	60.5	80.5	215.86 - 235.86	296.36	299.2	62:09	234.11	64.69	234.51	67.88	231.32
PMW-6	20	13.6	33.6	196.19 - 216.19	229.79	232.37	AN	AN	18	214.2	18.17	214.03
PMW-7	20	14.8	34.8	196.76 - 216.76	231.56	234.63	NA	Ą	12.65	221.83	13.35	221.15
B-1	20	48	89	219.4 - 239.4	287.4	287.09	57.31	229.78	55.82	231.27	56.99	230.15
B-2	20	44.2	64.2	224.23 - 244.23	288.43	287.88	58.8	229.08	57.46	230.42	57.61	230.26
B-3	20	47.5	67.5	219.86 - 239.86	287.36	287.02	56.61	230.41	55.22	231.8	56.31	230.74
B-4	Ą	A A	¥.	NA	288.04	285.94	56.87	229.07	55.39	230.55	55.75	230.2
B-5	ΑN	¥	NA	NA	287.2	284.99	56.09	228.9	54.77	230.22	54.82	230.15
B-6	20	20	70	218.52 - 238.52	288.52	288.39	60.05	228.34	58.71	229.68	58.55	229.84

Note: All measurements are in feet.
Screen depths are measured from ground surface.
Elevations are in feet above mean sea level (AMSL).
TOC: Top of Casing
NA: Not Available



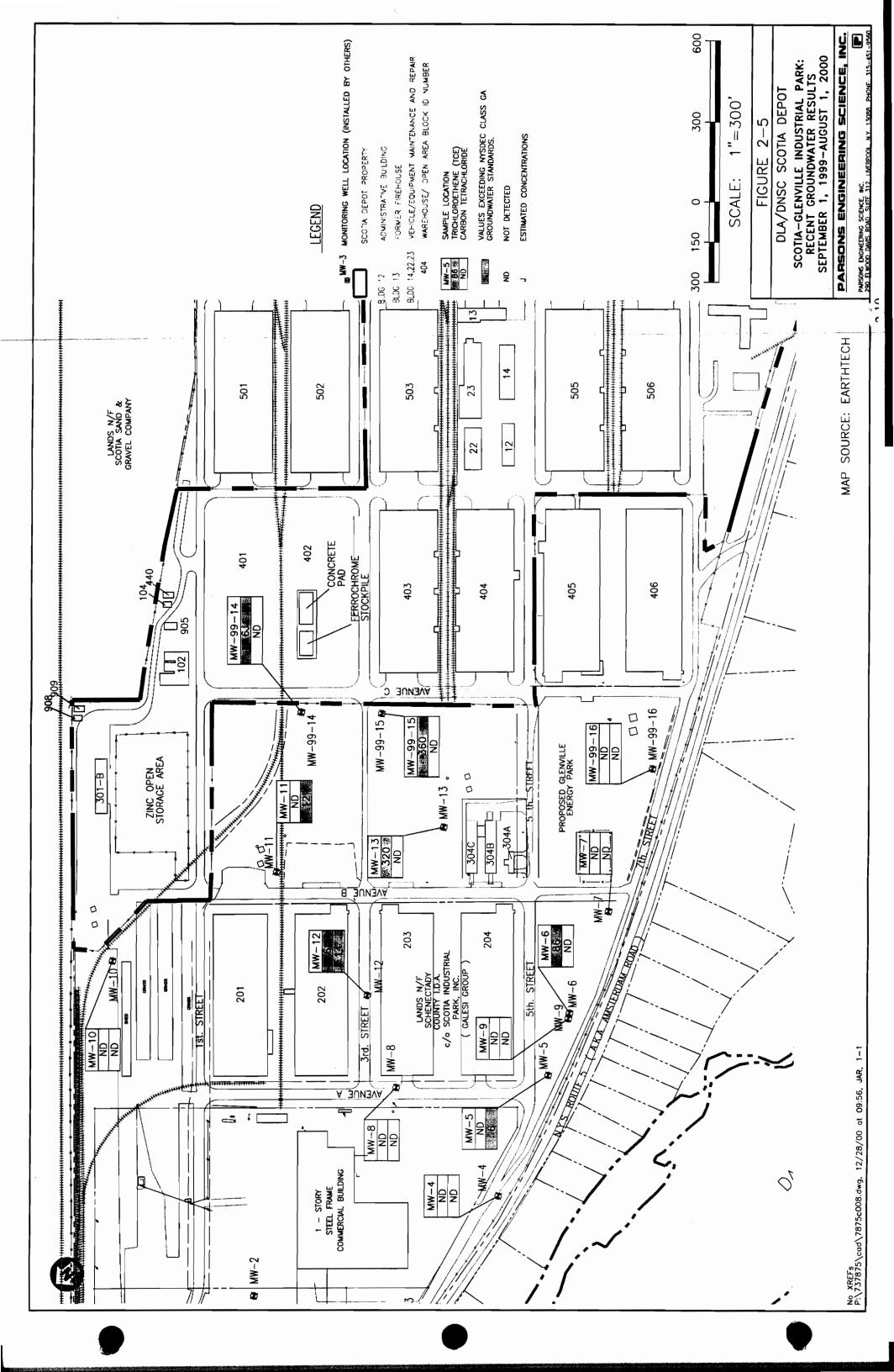


2.4 GROUNDWATER USE

About 120,000 people use groundwater as a drinking source from wells located within four miles of the site (References 5 and 15). This includes the Schenectady and Rotterdam municipal well fields. Low concentrations of TCE (below the drinking water standard) have, in the past, been detected in these well fields. The New York State and Schenectady County Departments of Health began searching for the source of TCE in the late 1980's, when the low levels of TCE were detected in those municipal wells. The site is over a sole-source aquifer, and there are six public water supply well fields within a four-mile radius of the site (Reference 6). The nearest drinking water well is in the Village of Scotia municipal well field, which is 2,000 feet from the northern Depot property line. There have been no complaints about the water quality, and analytical results from the last five years show all analyzed parameters are below regulatory levels (Reference 15). At least two residences located across Route 5 from the Scotia Depot are not connected to public water, and use a private well as their sole source of potable water. The NYSDOH sampled both wells in the past year and no TCE was detected (Reference 16). The nearest surface water intake on the Erie Canal/Mohawk River is 15 miles downstream of the site and serves the Latham Water District.

2.5 HISTORY OF TCE PLUME IDENTIFICATION

- 2.5.1 In the late 1980s, low levels of TCE were detected in the Schenectady/Rotterdam municipal wells. The New York State and Schenectady County Departments of Health began searching for the source of the TCE at that time.
- 2.5.2 The residences located along the south side of Route 5 previously used water wells as a water supply for their homes. In the early 1990s, when the NYSDOH identified TCE in residential wells, the residents were taken off well water and connected to the municipal water system.
- 2.5.3 In 1995, NYSDEC began a PSA Task 1 investigation at the Scotia-Glenville Industrial Park site; the PSA report was released in December 1999 (Reference 1). VOCs were detected in several of the wells on the industrial park property, which were located on the southeastern portion of the industrial park. Organic compounds were not detected in the wells located in the northern and western portions of the industrial park. Three residential wells located southeast of the industrial park were found to contain several VOCs, including TCE, above NYSDEC regulatory criteria. Due to the evidence of TCE in the groundwater at the industrial park and on the southwest side of Route 5, it was evident that a TCE plume existed and was migrating across the Scotia-Glenville Industrial Park property toward the Erie Canal/Mohawk River. Recent groundwater concentrations for TCE and carbon tetrachloride, as detected in the industrial park wells, are shown on Figure 2-5.



2.6 HISTORY OF DEPOT ENVIRONMENTAL ASSESSMENTS

- 2.6.1 A significant environmental issue associated with the present Depot site has been the removal of petroleum USTs and subsequent groundwater remediation. In 1989 and 1990, the Depot executed a program of removing and replacing USTs containing No. 2 fuel oil, gasoline, and diesel fuel (Reference 17). Several of the tanks were found to have been leaking, and as a result, over 900 tons of contaminated soil were removed and disposed off-site (Reference 18). On April 30, 1991, NYSDEC requested that the Depot investigate and remediate a petroleum spill near Building 14 (Reference 19). The UST had leaked gasoline (Reference 14). A groundwater remediation system was subsequently installed and by late 1996, semi-annual monitoring of groundwater showed the system was no longer needed. On December 30, 1996, NYSDEC allowed the Depot to shut down the remediation system and continue with quarterly monitoring of wells (Reference 20). Based on analytical data from the wells, the NYSDEC closed the file on February 2, 1998 and the remedial project required no further site work (Reference 21).
- 2.6.2 A Preliminary Assessment Report was completed by Parsons ES in December 1998 to determine what hazardous substances have been or are currently stored at the Depot, the threat posed to human health and the environment, and the need for further investigation. Due to the high groundwater and surface water pathway scores, a Focused Site Investigation was recommended (Reference 22).
- 2.6.3 A Phase II Site Assessment Report was completed in July 1999 by PMK Group, and Edwards and Kelcey (Reference 2). The Phase II Site Assessment was commissioned by the GSA, who owns the Scotia Depot property. The assessment conducted by PMK Group included many of the same sampling activities originally proposed for the Focused SI by Parsons ES. As a result, Parsons ES modified the Focused SI Sampling Plan to complement the Phase II Site Assessment data. The Focused SI fieldwork was completed in 1999, and a Draft Focused SI Report was issued in March 2000 (Reference 22).
- 2.6.4 The Focused SI Report combined the data from the Phase II Site Assessment and the Focused SI to delineate the presence and extent of site-related impacts. The Focused SI Report presented the following conclusions:
 - In certain areas within the Depot property line, the concentrations of PAHs and certain metals in surface soil, subsoil, and sediments exceed background and regulatory criteria. All areas where impacts were identified are inside the Depot security fence. Access to the site is controlled, and the public is unlikely to come into contact with these impacted areas. In order to be exposed to the PAHs and metals in the soil, a person would have to ingest the soil, or inhale dust blowing off the soils, or be in direct skin contact with the soil.
 - The groundwater sample results suggest that very minor impacts exist. Only one organic compound, bis(2-Ethylhexyl) phthalate (BEHP), was detected above NYSDEC

- criteria (GW-4). The source of the BEHP is not known, however, it is a common lab contaminant. The only metals which exceeded Class GA standards, and which were in excess of upgradient concentrations, were manganese and sodium at GW-4. BEHP, manganese, and sodium are not known to be major soil contaminants on-site.
- The surface water results suggest minor impacts exist. Sampling downstream in the storm sewer system would help determine whether concentrations are above Class A criteria at the discharge points from the site. Field filtering the samples would also indicate whether the metals are in the dissolved phase or suspended solids phase.
- The sediment results indicate the former lead and current zinc stockpiles are leaching metals, which are accumulating in the storm sewer sediments. The extent of these impacts in the storm sewer system should be determined by further sampling.
- 2.6.5 Since the Focused SI only included those areas operated by the DNSC, the off-site disposal area sample results were not included in the Focused SI Report (Reference 23). However, The PMK Group/Edwards and Kelcey Phase II Site Assessment did incorporate the off-site disposal area. The Phase II Site Assessment Report described soil sample results from the off-site disposal area that exceeded NYSDEC soil criteria for TCE. That information, combined with the NYSDEC's prior identification of a TCE groundwater plume in the 1999 PSA Report, led NYSDEC to request this Groundwater Investigation. NYSDEC's objective was to assess whether the off-site disposal area is the source of the TCE groundwater plume.

SECTION 3

GROUNDWATER INVESTIGATION SCOPE AND OBJECTIVES

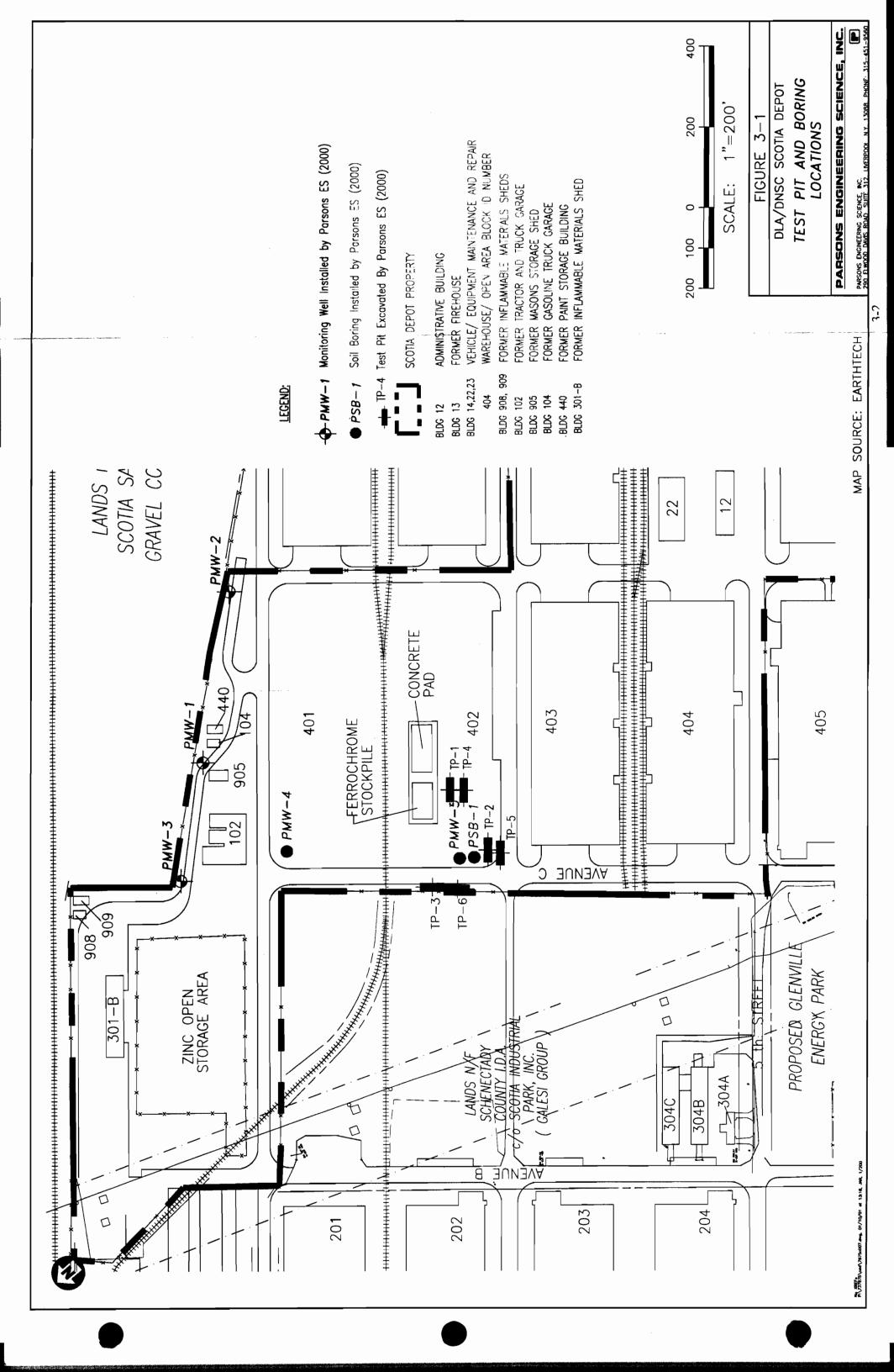
3.1 OBJECTIVES

The objectives of the groundwater investigation were to:

- (1) Assess whether the disposal area located northeast of the Scotia Depot is the source of the TCE groundwater plume, and
- (2) Assess the lateral and vertical extent of the plume, if present, within a predefined area along the northeastern fence line, and assess the presence of TCE south of the Depot near Lock 8 in the Mohawk River/Erie Canal.

3.2 SOIL BORINGS AND MONITORING WELL INSTALLATIONS

- 3.2.1 This investigation was funded jointly by the Scotia Depot property owner (GSA) and the operator of the Scotia Depot (DLA/DNSC). The primary scope of work involved drilling five well borings and three soil borings, excavating test pits, analyzing soil and groundwater samples, and installing and sampling five monitoring wells (Figure 3-1).
- 3.2.2 Due to the confusing nature of the well identification labels at the Scotia-Glenville Industrial Park and the wells installed during this Groundwater Investigation, the well labels were modified with a "P" in front of existing label. For instance, the former MW-1 at the Depot has become PMW-1 to avoid confusion when discussing data from the Industrial Park wells and those located at the Scotia Depot and Maalwyck Park.
- 3.2.3 Three wells were drilled on Depot property adjacent to the northeastern fence line to assess whether the off-site disposal area is the source of the TCE plume (Figure 3-1). Well location PMW-1 was situated between Building 905 and the northeastern fence line. The initial 12 feet of the well were drilled with hollow-stem augers to collect split-spoon soil samples. Soil samples were collected at 0, 5, and 10 feet bgs to outline subsurface conditions. No indication of fill material or buried debris was present at this location. Due to coarse gravel and cobbles, auger refusal was encountered at 12 feet bgs. A dual wall circulation drilling method, Concentrix, was used to drill the remaining depth of the well boring. Soil samples were collected at 20 feet and 40 feet from the cuttings produced by the Concentrix drilling method. After consultation with a representative of the NYSDEC, the continued use of augers and split spoons at each monitoring well boring was terminated due to subsurface conditions which made these methods ineffective (Reference 24).



3.2.4 Eight-inch steel casing was advanced using the Concentrix drilling method at PMW-1 to a depth of 153 feet bgs. Groundwater was encountered at approximately 65 feet bgs. The well boring was purged of 197 gallons before groundwater screening samples were collected and analyzed for VOCs from 78 feet and 98 feet bgs. Due to the drilling technique, the 78- and 98-foot depth intervals were the first two opportunities for groundwater sample collection. Further sampling was prevented by silt and very fine sand heaving up within the casing. Several attempts were made to impede the heaving with a sand pump without success.

3.2.5 Equipment failure required that the PMW-1 well boring be terminated at 153 feet. Once the casing was extracted from the boring, the flowing silt and fine sand filled in the void space below the casing to a depth of 60 feet bgs. Six-inch casing was advanced through the caved material and the well was set at 83 feet bgs.

3.2.6 Because of the problems encountered with the flowing silt and sand at depth, the decision was made to modify the proposed investigation plan and install wells with a 20-foot screen straddling the water table (i.e., upper zone of the aquifer). A NYSDEC representative agreed this setup would provide the desired information, considering the industrial park monitoring wells and the B series wells are also screened in this zone (Reference 25).

3.2.7 The remainder of the wells were drilled using six-inch casing. PMW-2 was installed in the northeast corner of the Depot adjacent to the fence line and purged of 34 gallons of groundwater before a screening sample was collected at 78 feet bgs. PMW-3 was located north of Building 102 near the corner of the northeastern fence and purged of 49 gallons of groundwater before a screening sample was collected at 78 feet bgs. Groundwater screening samples from both these locations were analyzed for VOCs, but TCE was not detected. Details of the sampling results are presented in Section 4.

3.2.8 Soil and groundwater screening sample results indicated that high concentrations of TCE, indicative of a source area, were not present in the well locations along the northeastern fence line. After reviewing several groundwater flow maps, and at the desire of the NYSDEC, soil boring PMW-4 was drilled in the northern corner of the 401 block at the Depot (Figure 3-1) (Reference 26). The purpose of this location was to assess whether the TCE source area was beneath the former maintenance buildings 102, 905, 104, and 440 located nearby. Six-inch casing was advanced to 78 feet bgs, 25 gallons of groundwater were purged from the boring, and a groundwater screening sample was collected. The analytical results revealed that TCE was not present in the sample. Due to the lack of TCE in the groundwater screening sample, it was deemed unnecessary to install a monitoring well at this location.

3.2.9 Soil boring PMW-5 was drilled in the southwest corner of the 402 block (Figure 3-1). The objective was to assess whether the TCE plume could be southwest of PMW-2, such that the plume would not have been intercepted by PMW-1, 2, 3 and 4. The casing was advanced to 78

feet bgs, 45 gallons of groundwater were purged from the boring, and a groundwater screening sample was collected and analyzed. TCE was not detected in this sample

3.2.10 One additional auger boring (PSB-1) was completed five feet south of PMW-5 to assess soil quality at depth in the vicinity of the industrial park wells. Soil samples were collected from 10, 20, and 25 feet bgs at PSB-1 based on photoionization detector (PID) field screening results. These samples were analyzed for VOCs. No evidence of fill material or debris was present to a depth of 41 feet, where auger refusal was encountered. TCE was detected in two of the three samples at concentrations of two and three micrograms/kilogram (ug/kg). These concentrations are not indicative of a source area for the groundwater plume.

3.2.11 Two water-table monitoring wells were installed in Maalwyck Park in the Town of Glenville near Lock No. 8 on the Erie Canal/Mohawk River (Figure 2-2). PMW-6 is located east of the parking lot adjacent to Lock No. 8. PMW-7 is south of the Scotia-Glenville Industrial Park at the north end of Maalwyck Park. Before groundwater screening samples were collected, 75 gallons of groundwater were purged from PMW-6 and 19 gallons of groundwater were purged from PMW-7. These screening samples were analyzed for VOCs, but none were detected. These two wells are intended to be "sentry" wells to assess whether the TCE plume has extended downgradient, toward the Rotterdam/Schenectady well fields.

3.2.12 Each of the five monitoring wells installed at the Depot and in Maalwyck Park has a 20-foot section of 0.10-inch slotted screen constructed with 2-inch inside-diameter PVC. Sand packs, bentonite seals, and cement/bentonite grout were placed around the well screen and riser pipe. Each well was finished with a 3-foot by 3-foot concrete pad and a 4-inch inside-diameter steel casing and padlock. Table 3-1 presents the well construction data for the five new monitoring wells. After a minimum period of 48 hours, the wells were developed by removing water until pH, conductivity, and temperature readings stabilized to within 20% of successive readings and the turbidity was less than 50 NTUs. A photolog of the boring locations is presented in Appendix B.

3.2.13 After the wells were installed, the elevations of the top of the PVC well pipe, top of the protective casing, and ground surface adjacent to each well were surveyed relative to the North American Datum 83 (NAD 83) and the National Geodetic Vertical Datum 29 (NGVD 29). The existing wells MW-99-14 and MW-99-15 located on the adjacent industrial park property were used as benchmarks to tie in the new well locations. Surveying was performed by CT Male and Associates, a licensed New York State surveyor.

3.2.14 Prior to sampling, water levels were measured from the five wells installed during the Groundwater Investigation, the wells on the adjacent industrial park property and from the "B-series" wells on the Depot near Building 12 to provide a larger view of the groundwater flow direction. Results from these measurements are presented on Table 3-2 and Figures 2-3 and 2-4.

TABLE 3-1
Well Construction Data
Scotla Depot and Maalwyck Park

Well I.D.	Well I.D. Date Installed	Ground Surface Elevation	Total Depth (ft)	TOC Elevation	Depth of Screen	Screen Elevations	Location
PMW-1	16-Jun-00	299.58	83.00	302.20	63 - 83	216.58 - 236.58	Northeast of building 905 next to the northern fence.
PMW-2	7-Jun-00	297.79	84.00	300.77	64 - 84	213.79 - 233.79	Adjacent to building 105 on the east side of the Depot.
PMW-3	12-Jun-00	296.36	80.50	299.20	60.5 - 80.5	215.86 - 235.86	North of building 102 adjacent to the fence gate.
PMW-6	30-Jun-00	229.79	33.60	232.20	13.6 - 33.6	196.19 - 216.19	East of the Lock #8 parking lot in Maalwyck Park.
PMW-7	6-Jul-00	231.56	34.80	234.48	14.8 - 34.8	196.76 - 216.76	Located on the west side of Maalwyck Park.

Note:

3-5

All measurements are in feet.

All wells were constructed using 2 inch PVC riser and 10 slot screen.

Cement/Bentonite grout, bentonite pellets, and No. 1 sand were used to fill the annular space.

Elevation measurements are in feet above mean sea level (AMSL).

TOC: Top of Casing

3.2.15 Additional soil samples were collected in two locations along the northeastern fence line to assess possible source areas. Two composite samples of the fill around and beneath the foundation pads from former Buildings 908 and 909 were collected and analyzed for VOCs (Figure 3-1). These buildings were listed as non-flammable storage areas on a historical Depot site map. The concrete floor in Building 905 was also excavated due to contrasting cement pour lines around the center of the building. It was hypothesized that the floor could have previously contained a pit for vehicle maintenance and/or waste disposal. The subsurface soil beneath the floor appeared to be clean, undisturbed, glacial outwash, and a soil sample was collected to confirm this observation. TCE was not detected in these samples.

3.2.16 Six test pits were excavated to a depth of 4.5 feet near the southwest corner of the 402 block (Figure 3-1). These excavations were completed to assess areas of stressed vegetation on the south side of the ferrochrome pile, and the presence of low concentrations of TCE (below regulatory criteria) in the drill cuttings from PMW-5. As a precautionary measure, three soil samples (TP-4, 5 and 6) were collected for VOC analysis. All soils in the test pit excavations appeared to be native fine to coarse glacial outwash with no sign of fill material. TCE was not detected in these samples.

3.3 CHEMICAL ANALYSIS OF SAMPLES

3.3.1 The Groundwater Investigation Work Plan called for field screening of soil and groundwater samples by a Severn-Trent mobile laboratory situated at the Scotia Depot. Due to the difficult drilling conditions, the frequency of sample collection was considerably slower than anticipated, making the on-site laboratory unnecessary. As an alternative, a local laboratory was used, and a courier delivered samples to Adirondack Laboratories in Albany, NY. One-hour analytical turnaround was specified to allow the field geologist to evaluate sample results and make immediate field decisions.

3.3.2 Groundwater screening samples were collected from each of the five monitoring wells along with the PMW-4 and PMW-5 soil borings. Five soil samples were collected from the PMW-1 boring and three soil samples were collected from the six test pits. These samples were analyzed for VOCs using the modified SW-8021 method.

3.3.3 Following installation and development of the monitoring wells, two rounds of samples were collected in August and November, 2000. All groundwater samples were analyzed for Target Compound List (TCL) VOCs by Method 8260, and for Target Analyte List (TAL) metals by Methods 6010/7000. In addition, PMW-1 and PMW-2 were analyzed for TCL semivolatile organic compounds (SVOCs) by Method 8270 and for pesticide/PCBs by Methods 8081/8082. In addition to the groundwater samples, two field duplicate, and matrix spike and matrix spike duplicate samples were collected for quality control purposes and analyzed for TCL VOCs, SVOCs, pesticide/PCBs, and TAL metals.

3.3.4 Source blanks from off-site and on-site water used in equipment decontamination, waste water produced during the drilling process, and soil drill cuttings were analyzed by Adirondack Laboratories for VOCs. To assess the potential impact of the drilling process on groundwater sample quality, a sample of the air/water stream used to power the drilling process was analyzed by Severn Trent's Pittsburgh Laboratory for TCL VOCs, SVOCs, pesticide/PCBs, and TAL metals. Copies of these results are presented in Appendix C.

3.3.5 Samples were analyzed by Severn Trent in accordance with the methods and quality control criteria as specified in SW846 and all amendments/revisions. The laboratory reported the results in NYSDEC Analytical Services Protocol (ASP) Category B deliverable format, and followed all NYSDEC ASP sample preservation and holding time criteria.

3.4 DATA VALIDATION

3.4.1 Data validation has been completed for the NYSDEC ASP Category B data packages generated by Severn-Trent Laboratories (STL) for Round 1 and Round 2 groundwater samples collected from the Scotia site. The specific samples contained in these data packages, the analyses performed, and a usability summary are presented in the data validation report in Appendix C.

3.4.2 Data validation was performed for all samples in accordance with the most current editions of the USEPA Region II SOPs and the NYSDEC ASP for organic and inorganic data review. This data validation and usability report is presented by analysis type in Appendix C.

3.5 GROUNDWATER MODELING

A probabilistic groundwater model was developed to identify any areas on the Scotia Depot which have a high probability of being source areas for the TCE plume. The results of the model are presented in the next section.

SECTION 4

GROUNDWATER INVESTIGATION RESULTS

4.1 HYDROGEOLOGIC CONDITIONS

4.1.1 The Scotia Depot is situated over the "Great Flats" or "Schenectady" Aquifer, which is a highly permeable, unconfined, glacial-drift, sole-source aquifer that occupies a portion of the Mohawk River Valley (Reference 5). Bedrock underlying the Mohawk Valley in the Schenectady area is shale with some interbedded siltstone (Reference 5). Glacial till, silt and sand overlie bedrock throughout most of the area. The till is exposed primarily in the upland areas. Coarse sand and gravel deposits occur in the western part of the main valley, including the vicinity of the Scotia Depot.

4.1.2 During the Groundwater Investigation at the Scotia Depot, three monitoring wells and three soil borings were drilled on-site. At the deepest boring location, PMW-1, fine to coarse sand, gravel, and cobbles were encountered to a depth of 108 feet bgs. The subsurface conditions changed to silt and very fine sand at this depth and extended to 153 feet bgs (Appendix A). Due to the drilling method and difficult subsurface conditions, undisturbed sampling could not be used to further delineate subsurface stratigraphy.

4.1.3 Groundwater flow beneath the southern portion of the Scotia Depot is predominantly southwest toward the Erie Canal/Mohawk River. Current groundwater elevation data from the industrial park located west of the Depot indicates groundwater in the northern part of the Scotia Depot flows west toward the Erie Canal/Mohawk River (Figures 2-3 and 2-4). The water table is approximately 65 feet bgs at the site (Table 2-1).

4.2 ANALYTICAL DATA PRESENTATION ISSUES

4.2.1 The analytical data tables (Tables 4-1, 4-2, 4-3, and 4-4) presented in this section are "summary" tables, that present results for only those compounds that were detected in one or more samples. This allows the discussion to be focused on the analytes detected in the samples. The summary tables also list the NYSDEC criteria against which the sample results are compared. Sample concentrations that exceed the referenced regulatory criteria are shaded to help the reader identify the results of most concern.

4.2.2 A complete listing of all validated analytical results can be found in Appendix C. The analytical tables in Appendix C list results for all compounds analyzed for each sample during the Groundwater Investigation.

Summary of Soil Results Scotia, New York Scotia Depot Table 4-1

Compound	Recommended		Reported									
	NYSDEC		Values									
	Soil Cleanup	Sample I.D.	PMW-1S0	PMW-1S5	PMW-1S10	PMW-1S10 PMW-1S20	PMW-1540	8D 906	906 CB	NFSA-1	PSB-1510	PSB-1S20
	Criteria (ppb)	Depth (ft):	0.2	10	10	20	07	2	0.6	0.2	10	8
		Area:	Northern Fence	Northern Fence	Northern Fence	Northern Fence	Northern Fence Northern Fence Northern Fence Northern Fence Northern Fence Northern Fence BD 908 & 909 & 909 & 909	Northern Fence	BD 908 & 909	BD 808 & 909	400 Block	400 Block
		Date:	5/16/00	5/17/00	6/17/00	5/17/00	9/17/00	5/24/00	5/24/00	6/9/00	7/10/00	7/10/00
		Sempled by:	Pareone ES	Parsons ES	Parsons ES	Parsons ES	Paraons ES	Paraons ES Paraons ES Paraons ES	Paraone ES	Persons ES	Parsons ES	Parsons ES
Trichloroethene (TCE)	200		QN	QN	QN	QN	QN	ON	ON	ON	QN	2

Compound	Recommended		Reported		,							
	NYSDEC	ei .	Values									
	Soil Cleanup	Sample I.D.	PSB-1S25	TP-4	TP-5	TP-6	1-00	DC-2	೯೦೦	DC-4	9-00	DC-6
	Criteria (ppb)	Depth (ft):	23	4.5	4.5	4.5	Cuttings	Cuttings	Cuttings	Cuttinge	Cuttings	Cuttings
		Area:	400 Block	400 Block	400 Block	300 Block	MW-1	MW-2, MW-3	MW-4, MW-6	MW-8, MW-7	MW-2, MW-3 MW-4, MW-5 MW-6, MW-7 MW-4, MW-5 MW-4, MW-5	NW-4, MW-5
		Dete:	7/10/00	7/6/00	7/6/00	7/6/00	9/30/00	6/21/00	7/5/00	7/8/00	00/2/2	7/7/00
		Sempled by:	Parsone ES	Parsons ES	Paraona ES	Parsons ES	Persons ES	Parsons ES				
Trichloroethene (TCE)	700		3	QN	Q	ND	Q	QN	*	9	QN	Q

Listed compounds are those that have been detected in soil.
Shaded values exceed dearup orterts.

ND Not Detected
ppb - parts per billion
fi - lest
LD - identification

Summary of Groundwater Screening Results Scotia, New York **Scotia Depot** Table 4-2

Compound	NYSDEC		Reported								
	Class GA		Values								
	Groundwater	Sample I.D.	PMW-1W78	PMW-1W98	PMW-1	PMW-2W78	PMW-2	PMW-2	PMW-3W78	PMW-3	PMW-3
	Standards/	Depth (ft):	78	86	64.82	78	64.53	63.64	78	61.76	62.09
	Guidance	Area:	Northern Fence	Northern Fence							
	Values (ug/L)	Date:	5/19/2000	5/22/2000	7/13/2000	6/2/2000	6/16/2000	7/13/2000	6/8/2000	7/13/2000	6/16/2000
		Sampled by:	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES
Trichloroethene (TCE)	S		9	9	2	ð	2	2	2	Q	Q
Carbon Tetrachloride	S		QV	9	9	9	Q	2	4	4	4
Toluene	5			4	₽	4		Ð	S	NO.	Ð

Compound	NYSDEC		Reported							
l	Class GA		Values							
	Groundwater	Sample I.D.	PMW-4W78	PMW-5W78	PMW-6W38	9-MMd	PWW-6	PMW-7W38	PMW-7	PMW-7
	Standards/	Depth (ft):	78	78	38	16	16.64	38	10.1	9.94
	Guidance	Area:	400 Block	400 Block	Lock # 8	Lock # 8	Lock # 8	Maalwyck Park	Maahnyck Park Maahnyck Park	Maalwyck Park
	Values (ug/L)	Date:	6/14/2000	6/20/2000	6/29/2000	7/10/2000	0002/61/2	2/6/2000	7/10/2000	7/13/2000
A STATE OF THE PARTY OF THE PAR		Sampled by:	Parsons ES	Parsons ES	Parsons ES					
Trichloroethene (TCE)	\$		2	9	2	₽	2	2	2	Q
Carbon Tetrachloride	s		Q	2	2	Q	ō	ō	Ñ	2
Toluene	s		Q	2	9		QN	2		2

Listed compounds are those that have been detected in groundwater.
Shaded values exceed NYSDEC Class GA Groundwater Standards/Guidance Values.
ND Not Detected
Sample depth is measured below ground surface.
I.D. - identification
it - feet

ug/L - micrograms per liter

Table 4-3
Validated Groundwater Results Scotia Depot Scotia, NY Round 1

						Dup of PMW-2			
Defense Log	Defense Logistics Agency		SAMPLE ID:	PMW-1	PMW-2	PWW-102	PMW-3	PMW-6	PMW-7
Scotia. NY			LABIO	СОН030303-003	COH030303-001	COH030303-002	COH030303-004	COH030303-008	COH030303-008
Validated Gr	Validated Groundwater Sampling		SOURCE	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh
Round 1			SDG:	сонозозоз	COH030303	COH030303	COH030303	COHOSOSOS	COH030303
Detected Cor	Detected Compound Summary	NYSDEC	MATRIX:	Water	Water	Water	Water	Water	Water
		Class GA	SAMPLED:	8/1/2000	6/1/2000	8/1/2000	8/1/2000	9002/1/8	8/1/2000
		Groundwater	VALIDATED:	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000
CAS NO.	COMPOUND	Standards/Guidance Values UNITS:	UNITS						
67-64-1	Acetone	(G) 90	γgn	7.7			•		2.2 J
56-23-5	Cerbon tetrachloride	S	Įψ.	0.74 J			3.3	•	
79-01-6	Trichloroethene	S	νδη		0.84 J	7 66 :0	•	0.35 J	
,				1 4 0 E	Act 100 000 000 000	が、これのおおおの			
/-18-/11	DIS(2-Eurymaxyl) primarate	n	5		D 11 G	1000年の大阪の大阪	,	•	•
	None Detected		Į.						
	MUNICIPAL CONTROL		'n					,	
7429-90-5	Aliminum	SX	Von	18200	722	699	445	35.2 J	2480
7440-36-0	Antimony	m	ž	•				1.5 J	•
7440-38-2	Arsenic	25	Ŋ	17.3			•	•	
7440-39-3	Barium	1000	ηgη	159 J	37 J	36.6 J	45 J	15.3 J	86.8 J
7440-41-7	Beryllium	3 (G)	ng/L	0.98 J		0.14 J	0.14 J	0.09	0.16 J
7440-43-9	Cadmium	vo.	Ngu T	•		3.7 J	,		
7440-70-2	Calcium	SN	νgΛ	165000	75800	75500	75300	22500	98500
7440-47-3	Chromium	8	νgΛ	29.5	2.1 J	2.6 J	2.3 J		4.2 J
7440-48-4	Cobalt	NS	νgΛ	17.1			•		
7440-50-8	Copper	200	γğı	65.5		2.5 J			
7439-89-6	iron	• 000	γgn		1500			118	
7439-92-1	Pead	52	Υğı	16.2			,		
7439-95-4	Magnesium	35000 (G)	Z,	32900	21000	20700	16200	8	30300
7439-96-5	Manganese	• 000	Z,		58.9	56.1	£	†2 J	2
7439-97-6	Mercury	0.7	Ŋ	0.055 J			0.071 J		
7440-02-0	Nickel	\$	Υğı	27 J		•			
2023695	Potassium	SN	Ŕ	0699	635 J	752 J	1220 J	1470 J	1930 J
7782-49-2	Selenium	5	Ą	6.4	•	,			
7440-23-5	Sodium	20000	υgγΓ	10200	2020 €	2200 J	15300	14100	
7440-28-0	Thallium	0.5 (G)	νgΛ	•					
7440-62-2	Vanadium	SN	νgν	4 2.7 J	3.7 J	2.3 J			4.7 J
7440-66-6	Zinc	2000 (G)	υg/L	121	37.2	28.5	19.3 J	14.4 J	16.2 J

NS = No Standard

- B No Detected

- Estimated Value - concentrations which exceed the Class GA criteria

- B Not Detected

- Estimated Value - concentration is below the detection (quantitation limit)

(G) = Guidance Value

- Sum of Iron and Manganese cannot exceed 500 ug/L

ug/L. Micrograms Per Liter

Dup - Field Dupticate

SDG - Sample Delivery Group

Table 4-4
Validated Groundwater Results **Scotia Depot** Scotia, NY Round 2

PANNA PANN							Dup of PMW-2					
Control	Defense Log	istics Agency		SAMPLE ID:	PMM-1	PMW-2	PMW-102	PMW-3	PWW-6	PMM-7	2	I
COMPOUND SCORE ST. Pelebargh St. Peleb	Scotia, NY			CAB ID:	COLOTOPIAGOEZ	COUSTO140003	C0.316140004	C0.0310140001	CONTRACTOR	CONTRACTOR	CONDINCEDED	COMPHEDBOOKS
Secondary Seco	Validated Gr	pundwater Sampling		SOURCE	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pataburgh	STL Pitaburgh	STL Pittsburgh	STI. Pitteburgh	STL Pitteburgh
COMPOSING Characteristic Character	Round 2			SDG:	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIN2	8COTA2	SCOTIA2
CONTICUENT Con	SDG: Scotia	-	NYSDEC	MATRIX:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
COMPOUND Standardougher VALUE COMPOUND Standardougher VALUE COMPOUND Standardougher Standa			Class GA	SAMPLED:	10/30/2000	10/30/2000	10/30/2000	10/30/2000	11/1/2000	11/1/2000	10/31/2000	10/31/2000
Compound Compound			Groundwater	VALIDATED:	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/6/2000	12/8/2000	12/8/2000
Authorities 2-Butanove 2-Butanove 2-Butanove 2-Butanove 2-Butanove 3-Butanove 3-	CAS NO.	COMPOUND	Standards/Guidance Values	UNITS:								
Adjustment Adj												
2-Businone 5 (c) ugh R 3.4 Carbustonic Control Characteristics 5 (c) ugh Train-choracteristics 5 (c) ugh	67-64-1	Acetone	(g) 95	ል								
Curbon intrachloride 5 ug/L	78-93-3	2-Butanone	(g) 95	Ą	œ							
Culture Cult	56-23-5	Carbon tetrachloride	S	Z,				3.4				
Trichioverhene	67-88-3	Chloroform	7	Ϋ́	•			0.21 J				
Trickborethene S Ug/L C27 J C27 J C25 J	127-18-4	Tetrachloroethene	so.	J/Gn			,					
None Detected No. Up/L 7390 J 1490 J 962 J 4140 J 387 J 42 J<	79-01-6	Trichtoroethene	wn	Ą	0.27 J				0.54		•	
None Description NS ug/L 7390 J 1490 J 962 J 4140 J 387 J 45 J 42 J 42 J 42 J 43 J 42												
None Designed NS ug/L 7390 J 1490 J 662 J 4140 J 387 J 15 J Authorium Actanic Logic 4.1 J - - 4.2 J - - 4.2 J - <t< th=""><th></th><th>None Detected</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>		None Detected										
None Description NS Ug/L 7390 J 1490 J 962 J 4140 J 347 J 54		None Detacted										
Noine Detected Noine Detected Autminum NS ug/L 7390 J 1490 J 962 J 4140 J 387 J 158 J Autminum 25 ug/L 71 J 394 J 34 J 46 J 16.5 J 16.5 J Autminum 30 ug/L 111000 66700 62000 82300 8500 87 Captum NS ug/L 116 2.9 J 2.3 J 1.5 J 1.5 J Copper Ug/L 310 7.1 J 2.3 J 1.6 J 1.5 J Led 3500 ug/L 37.0 J 1.6 J 1.5 J 1.5 J Magnesium 3500 ug/L 3500 1.6 J 1.6 J 1.6 J Magnesium 300 ug/L 3500 1.6 J 1.6 J 1.6 J Magnesium 100 ug/L 3500 J 1.6 J 1.6 J 1.6 J Magnesium 100 ug/L 3500 J 1.6 J 1.6 J 1.6 J												
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Arraenic 25 ug/L 41.1 - 42.1 - 42.1 - 42.1 - 42.1 - 42.1 - 42.1 - 42.1 - 42.1 - 42.1 - 42.1 - - 42.1 -	7429-90-5	Aluminum	SN	γgn	7390 J	1490 J	962 J	4140 J	387 J	5420 J		
Barrium 1000 ug/L 916.J 34.9.J 34.9.J 66.1.J 18.8.J Calculum NS ug/L 111000 66700 62000 82300 859.D Chromium NS ug/L 11100 66700 66700 8500 98 Chromium NS ug/L 116 2.9.J 2.J 15.J 15.J Chromium NS ug/L 25.J 7.1.J 2.3.J 10.6.J 15.J Copeat 200 ug/L 25.D 7.1.J 2.3.J 10.6.J 15.J Magnesium 300 ** ug/L 25.D 33.J 10.6.J 1.5.J Magnesium 300 ** ug/L 25.D 3.0.4.J 4.9 2.7.J 1.5.J Magnesium 300 ** ug/L 350.J 1.0.9.J 1.490.J 2.5.J 1.0.6.J 1.0.5.J NS ug/L 350.J 1.25.J 2.1.J 2.5.J 2.5.J 1.490.J	7440-38-2	Arsenic	22	ፉ	4.1.		,	4.2 J		6.2 J		
Beryillum Sign Ug/L 11000 66700 62300 85500 98 Cabium NS Ug/L 11600 66700 66200 82300 85500 98 Cabium NS Ug/L 116 2.9 J 2.9 J 2.7 J 1.5 J	7440-39-3	Barium	1000	ል	91.6 J	39.4 J	34.9 J	60.1	18.8 J	116 J		
Cabicum NS ug/L 11100 66700 62000 82900 84500 87 Cobatt NS ug/L 16 29 2 3 1.5 <td< td=""><td>7440-41-7</td><td>Beryllium</td><td>3 (G)</td><td>ል</td><td>0.41 J</td><td></td><td></td><td>0.17 J</td><td></td><td>0.29</td><td></td><td></td></td<>	7440-41-7	Beryllium	3 (G)	ል	0.41 J			0.17 J		0.29		
Chromium 50 ug/L 116 2 9 J 2 J 57 J 15 J Cobalt NS ug/L 25 J 77 J 2 J 168 J 15 J Copper 200 ug/L 3500 ug/L 3700 15 J 15 J Licon 300 ug/L 2540 1820 1660 27 J 27 J Magnesium 3500 (c) ug/L 2540 1820 1650 27 J Magnesium 300 (c) ug/L 2550 120 J 105 J 105 J Marcury 100 ug/L 3550 J 215 J 20 J 1490 J Selenium 20000 ug/L 27 J 205 J 1490 J 25 J Thailum NS ug/L 18 J 46 J 51 J 25 J 165 J Amadium NS ug/L 18 J 46 J 51 J 25 J 165 J	7440-70-2	Calcium	SN	J/6n	111000	00299	62000	82300	25500	92000		
Cobalit NS up/L 8 J 7.1 J 2.3 J 15.9 J Copper Lead 25 up/L 25.00 up/L 25.00 15.9 J 27.1 J 2.3 J 16.6 J 15.9 J Lead 3500 up/L 25.400 18200 18200 16.60 98-40 27.1 J Magnesium 3500 up/L 25.400 18200 16.60 98-40 27.1 J Nickel 0.7 up/L 25.400 1820 16.60 98-40 27.1 J Nickel 0.7 up/L 25.50 175.5 J 39.6 J 25.3 10.5 J Nickel Nickel 100 up/L 35.50 J 124.0 J 25.6 J 1490 Sodium 2000 up/L 35.50 J 124.0 J 25.5 J 1490 Vandium NS up/L 26.0 J 1490 1490 1490 Zinc up/L 4.2 S 9.4 J 5.1 J 25 10.5 J	7440-47-3	Chromium	s	Jg.	1.6	2.9 J	2 J	5.7 J	1.5 J	4.4		
Copper 200 ug/L 25 J 7,1 J 2.3 J 158 J Led 100 ug/L 6.7 3.40 16.60 84.0 2.7 J Led 35000 (G) ug/L 24.00 19300 16500 1660 84.0 2.7 J Margarete 300 * ug/L 24.00 19300 1660 25.3 10.5 J Nickel 0.7 ug/L 25.5 2.96 J 2.33 10.5 J Nickel NS ug/L 25.5 12.0 J 2.5 1.0.5 J Selenium 20000 ug/L 25.0 1.20 J 1.30 J 1.5 Thailum NS ug/L 26.9 2310 J 2.050 J 1.900 Thailum NS ug/L 4.6 J 2.5 2.5 1.0.5 J Vandadium NS ug/L 4.6 J 2.1 J 2.5 10.5 J	7440-48-4	Cobalt	SN	λĝη	- B	,		•	•			
Left 300 - upl 17000 200 - upl 4.9 2.7 J 2.400 18200 18	7440-50-8	Copper	200	λģi	25 J	7.1 J	2.3 J	10.6 J	15.9 J	7.5 J		
Lead 25	7439-89-6	Iron	300	ል	1,7000	2660	1460					
Magnesium 35000 (5) ug/L 25400 19300 18200 16600 9840 22 Marquese 300 ug/L 10,5 J 75,5 J 39.6 J 253 10,5 J 10,5 J Nickel 00 ug/L 3550 J 215,0 J 2560 J 1430 J 3560 J 150,0 J 150	7439-92-1	Lead	25	1/gs	6.7	3.1 J		6.4	2.7 3	7		
Managanese 300* ug/L 10.9 J 75.5 J 396 J 253 10.5 J Nickat 0.7 ug/L 10.9 J 10.9 J 10.65 J 10.5 J Polassium 100 ug/L 3550 J 2150 J 1240 J 2560 J 1430 J Sodenium 2000 ug/L 27 J 2050 J 1490 J 170 J Thallium NS ug/L 18.3 J 46 J 19.5 J 10.5 J Zinc 2000 (G) ug/L 18.3 J 4.6 J 2.5 J 2.5 J Zinc 2000 (G) ug/L 18.3 J 4.6 J 2.5 J 2.5 J	7439-95-4	Magnesium	35000 (G)	Z,	25400	19300	18200	16600	9840	28800		
Mercuny 0.7 ug/L 10.9 0.045 J 0.045 J 0.055 J<	7439-96-5	Manganese	300	765		75.5 J	39.6 J	253	10.5 J			
Nicket 100 ug/L 10.9 J 15.9 J 15.6 J 1430 J 15.5 J Selenium Sodium 100 ug/L 25.6 J 1260 J 1430 J 15.6 J Thallium 0.5 (G) ug/L 9690 2310 J 2050 J 19000 19000 Thallium 0.5 (G) ug/L 18.3 J 4.6 J 1.9 J 1.5 J 1.5 J Zinc 2000 (G) ug/L 42.6 J 1.3 J 2.5 J 1.5 J 2.5 J 1.5 J	7439-97-6	Mercury	0.7	780			0.045 J		0.055 J	0.049		
Potassium	7440-02-0	Nickel	8	Ϋ́	10.9 J			8.5 J		7.2 J		
Solenium 10 ug/L 2.7 J . 2.5 J .	7440-09-7	Potassium	SN	Jør	3550 J	2150 J	1240 J	2560 J	1430 J	2840 7		
Sodium 20000 ug/L 9690 2310 J 20050 J 19000 14900 Thailum 0.5 (c) ug/L - - - - - - Vanadium NS ug/L 42.6 94.J 5.1 J 25 10.5 J	7782-49-2	Selenium	5	760	2.7 J		,	2.5 J				
Thailium 05 (G) ug/L .	7440-23-5	Sodium	20000	780	0696	2310 J	2050 J	19000	14900			
Vanadium NS ug/L 18.3 4.6 . 9.5	7440-28-0	Thallium	0.5 (G)	ል			•		,	•		
Zinc 2000 (G) ug/L 42.6 9.4.J 5.1.J 25 1 10.5.J	7440-62-2	Vanadium	NS	765	18.3 J	4.6 J	,	9.5 J		13.4 J		
	7440-66-6	Zinc	2000 (G)	ug/L	42.6	9.4 J	5.1 J	25	10.5 J	21.1		,

NS = No Sundard

- No Sundard

- No Dougradient concentrations which exceed the Class GA criteria

NS = No Sundard

- Not Detected

J = Estimated Value - concentration is below the detection (quantitation limit)

(c) = Cuidance Value

* = Sum of Iron and Manganese cannot exceed 500 ug/L.

B = Accessor was also detected in a trip blank

R = data rejected during data validation.

Dup = Field Dupictate

SGG - Sample Delivery Group

4.2.3 The data presented in this section reflect the results of the data validation process which followed USEPA data validation guidance. A detailed data validation report is presented in Appendix C. The data validation process reviews the analytical data package provided by the lab, and assures that the data meet the quality control criteria established for the particular analytical method by USEPA, and that the reported results meet established criteria for accuracy and precision. For instance, some concentrations are flagged with a "J", meaning the precision of the concentration did not meet certain criteria and should be considered an "estimated" concentration.

4.2.4 Three figures have been prepared to allow the reader to visualize the data on a map of the site. The soil sample data posted on Figure 4-1 are for TCE concentrations; TCE was the only compound detected in any of the soil samples. Figure 4-2 presents the two rounds of sampling from the new wells at the Depot and Maalwyck Park. The two rounds are presented together for ease of discussion and understanding.

4.2.5 For quality assurance purposes, field duplicate samples were collected during the two rounds of sampling to assess the representativeness of the sample collection methods. The field duplicate samples are presented in the summary tables next to the associated field sample results for ease of comparison. Since field duplicate samples are for quality control purposes, the results are typically not used to characterize the site.

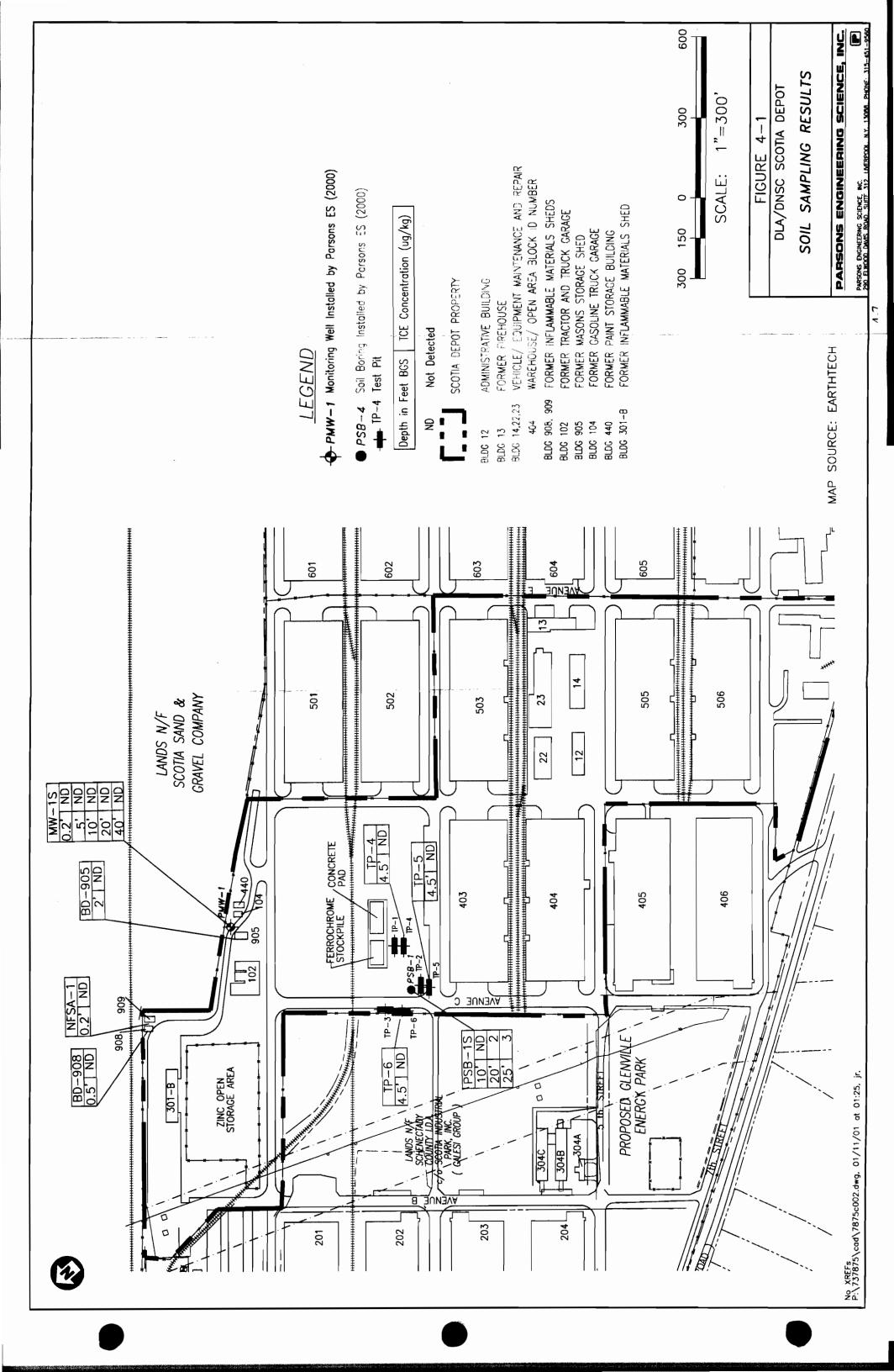
4.3 SOIL SAMPLE ANALYSIS RESULTS

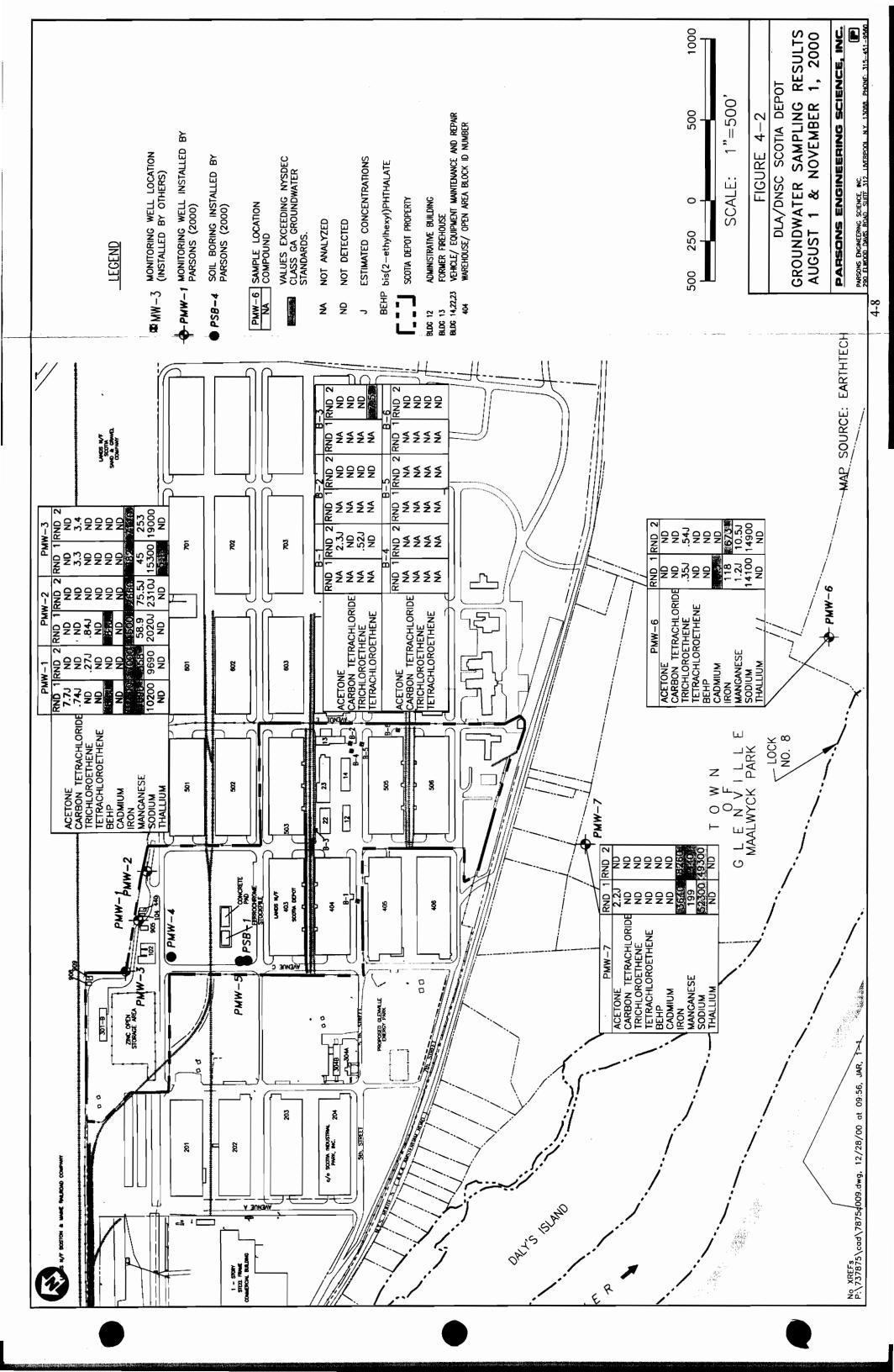
4.3.1 Twenty soil samples were collected and analyzed for VOCs during the Groundwater Investigation. These samples were analyzed for screening purposes to identify any fill areas and to characterize the drill cuttings. The concentrations of all VOCs in all samples were below the NYSDEC soil cleanup criteria. TCE was detected at low concentrations in three samples; no other VOCs were detected in any of the 20 samples (Table 4-1 and Figure 4-1).

4.3.2 Five soil samples were collected from well boring PMW-1 at depths of 0.2, 5, 10, 20 and 40 feet below ground surface. There was no indication of fill material beneath the surface at this location. No VOCs were detected in any of the samples.

4.3.3 Visual observations of the floor in Building 905 outlined a distinctive pour line in the concrete floor. It appeared the floor had been poured in two sections, possibly outlining a dry well or vehicle maintenance pit. Excavation of the floor along the eastern seam revealed sand and gravel deposits that appeared to be native. To confirm this hypothesis, a soil sample was collected from the soil beneath the floor and analyzed for VOCs. No VOCs were detected.

4.3.4 Buildings 908 and 909 were listed on the historical Depot site plans as inflammable material sheds (Figure 4-1). The concrete pads from these structures were still intact and exposed at the surface. Soil samples were collected from the soils beneath each of the pads and





composited (BD-908). One additional composite soil sample was collected from the soil surrounding the two concrete pads to assess the presence of spills in soils surrounding the non-flammable storage area buildings (NFSA-1). VOCs were not detected in either sample (Figure 4-1).

- 4.3.5 Throughout drilling activities, the drill cuttings were collected into roll-off containers and analyzed for VOCs. The soils in the roll-offs were characterized prior to disposal. One sample from the roll-off at the PMW-5 location contained TCE at levels below NYSDEC criteria (4 ug/kg). The roll-off contained soils from both PMW-4 and PMW-5; however, the soil sample (DC-3) was collected from the portion only containing soil from PMW-5. The container was subsequently re-sampled twice, (once from the same spot within the container, and once from a different section), and no VOCs were detected. The other five drill cutting samples collected from roll-offs did not contain any VOCs.
- 4.3.6 Due to the presence of TCE at low levels in the soils in the roll-off from PMW-5, soil boring PSB-1 was completed five feet south of PMW-5. Soil samples were collected every five feet to 41 feet bgs. The 10-, 20-, and 25-foot bgs samples were sent to the lab for VOC analysis based on field screening results using a PID. All results for TCE were below NYSDEC criteria: 10 feet (not detected), 20 feet (2 ug/kg) and 25 feet (3 ug/kg).
- 4.3.7 Due to the presence of TCE in the PMW-5 roll-off and at PSB-1, six test pits were excavated near the southwest corner of the 402 block (Figure 4-1). A visual inspection did not reveal any fill material in any of the test pits. Test pits 4, 5 and 6 were sampled for VOCs to confirm the visual observations (Figure 4-1). No VOCs were detected in any samples.

4.4 GROUNDWATER SAMPLE ANALYSIS RESULTS

4.4.1 Groundwater Screening Sample Results

- 4.4.1.1 Groundwater screening samples were collected during drilling activities with a dedicated polyethylene bailer. Drill water was used very sparingly, if at all, during drilling activities so the integrity of the screening samples would not be compromised by dilution. Furthermore, three to five borehole volumes were purged from each well/soil boring prior to collection of the screening sample. These groundwater screening samples were analyzed for VOCs by Method SW-8021B.
- 4.4.1.2 A total of 17 groundwater screening samples were collected from five well borings and two soil borings drilled at the Scotia Depot and Maalwyck Park, and analyzed for VOCs. These screening sample results were used to make field decisions about well locations (Table 4-2).
- 4.4.1.3 Two VOCs were detected. Toluene was detected at PMW-1 (ND to 41 ug/L), PMW-2 (ND to 6 ug/L), PMW-6 (ND to 7 ug/L) and PMW-7 (ND to 9 ug/L). In four instances, PARSONS ENGINEERING SCIENCE, INC

the concentration exceeded the groundwater standard. The source of toluene is not known. Carbon tetrachloride was the second constituent detected during the screening sampling, but only at PMW-3. On three separate occasions carbon tetrachloride was detected at 4 ug/L, which is below the NYSDEC criteria. This constituent has been detected in several downgradient industrial park wells, but the source is not known. Groundwater screening samples from soil borings PMW-4 and PMW-5 did not contain any VOCs.

4.4.2 First Round of Groundwater Sampling (August 1, 2000)

- 4.4.2.1 Once the monitoring wells had been installed and developed, they were allowed to sit for several weeks before the first round of sampling was conducted on August 1, 2000. The monitoring wells on the Depot property (PMW-1, PMW-2, and PMW-3) were sampled for TCL VOCs, SVOCs, pesticides and PCBs, and TAL metals. The Maalwyck Park wells (PMW-6 and PMW-7) were analyzed for TCL VOCs and TAL metals.
- 4.4.2.2 The concentrations of VOCs in all samples were below NYSDEC criteria (Table 4-3). TCE was present below the detection (quantitation) limit at PMW-2 (0.84 ug/L) and PMW-6 (0.35 ug/L). TCE was also detected at a similar concentration in the field duplicate of PMW-2 (PMW-102 at 0.99 ug/L) Only one semivolatile compound, bis(2-ethylhexyl)phthalate (BEHP), exceeded the NYSDEC criteria in PMW-1 (8.5 ug/L) and PMW-2 (81 ug/L). The source of BEHP is not known. BEHP is known to be a common laboratory contaminant, and is a constituent of many plastic products. BEHP may also have naturally occurring sources, although information is not definitive. No other SVOCs were detected.
 - 4.4.2.3 Pesticides and PCBs were not detected in any of the five wells (Table 4-3).
- 4.4.2.4 Cadmium, iron, manganese, sodium and thallium were detected above NYSDEC criteria in one or more of the five monitoring wells (Table 4-3). All other metals concentrations were below NYSDEC groundwater criteria.

4.4.3 Second Round of Groundwater Sampling October 31 - November 1, 2000

- 4.4.3.1 The second round of sampling was conducted on October 31, 2000 and November 1, 2000. The same sampling protocol was used as during the first round. Four additional wells on the Depot property were sampled during the second round at the request of the NYSDEC (Reference 27). Monitoring wells B-1, B-2, B-3, and B-6 are located in the southeast section of the Depot and were sampled for VOCs (Figure 4-2). These wells were originally installed in relation to the 1991 UST investigation and remediation.
- 4.4.3.2 Tetrachloroethene was the only VOC detected above groundwater standards during the second round of sampling, in B-3 at 7.5 ug/L (Table 4-4). All other VOCs were below NYSDEC criteria. The source of tetrachloroethene is not known, but it is not thought to be a remnant of the UST remediation.

- 4.4.3.3 Tetrachloroethene was not detected in the Round 1 or Round 2 samples from PMW-1, 2, 3, 6 and 7. Carbon tetrachloride was again detected in PMW-3, at nearly the same concentration (3.4 ug/L) as during Round 1 (3.3 ug/L). Carbon tetrachloride was not detected at PMW-1 during Round 2; the Round 1 result was below the detection limit (0.74 ug/L). TCE was detected again below the detection limit at PMW-6 (0.54 ug/L). TCE was also detected below detection limits at B-1 and PMW-1.
 - 4.4.3.4 SVOCs were not detected in any of the wells (Table 4-4)
 - 4.4.3.5 Pesticides and PCBs were not detected in the any of the wells (Table 4-4).
- 4.4.3.6 Iron, thallium, and manganese were present in two or more of the five wells above NYSDEC criteria (Table 4-4). The most consistent trend in the metals data for Rounds 1 and 2 is the widespread occurrence of iron, and the relatively high levels of sodium in PMW-7. The widespread occurrence of iron may be indicative of naturally high levels in the local groundwater. The reason for the high levels of sodium in PMW-7 is not known.

4.4.4 Comparison of Screening Data and Monitoring Well Results

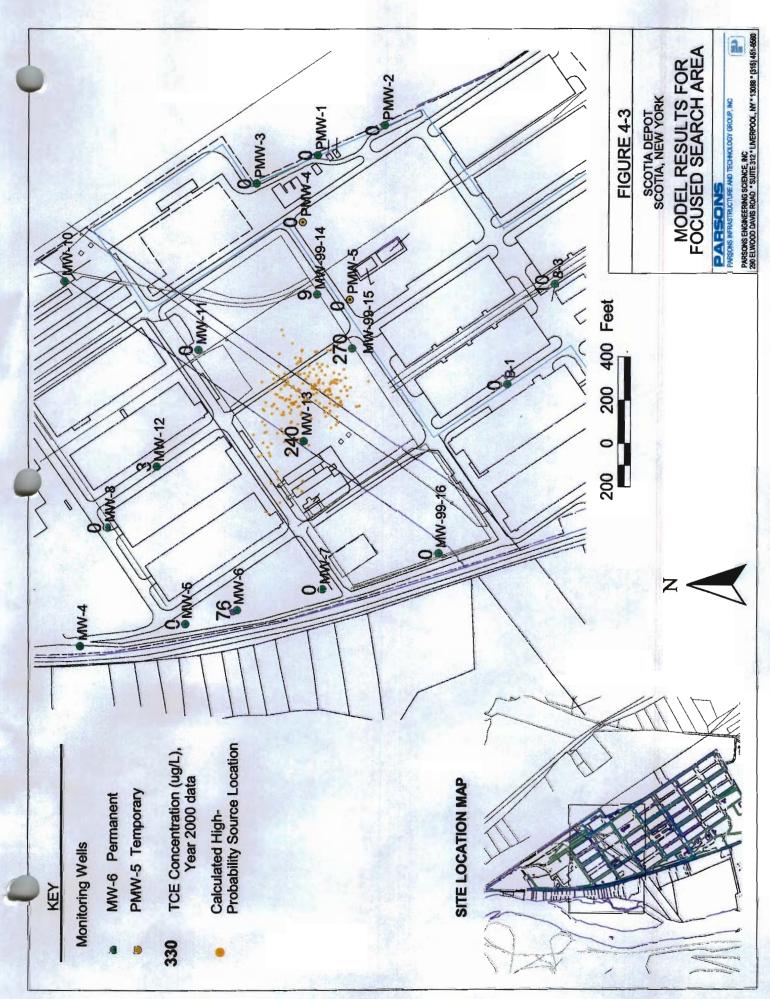
The groundwater screening sample results (Table 4-2) were consistent with the Round 1 and Round 2 monitoring well results from August and November. TCE was below the 1 ug/L detection limit at all locations during the preliminary screening and during the two rounds of sampling. Carbon tetrachloride was detected at PMW-3 each of the five times it was sampled at concentrations between 3.3 ug/L and 4.0 ug/L. This consistency provides assurance about the validity and representativeness of the groundwater screening sample results, and their appropriateness for making field decisions.

4.5 GROUNDWATER MODEL RESULTS

- 4.5.1 A probabilistic groundwater model was developed to identify any areas on the Scotia Depot which have a high probability of being source areas for the TCE plume. The model was based on a simple, analytical solute-transport equation (Reference 28). The basic assumptions of the equation are that the aquifer is isotropic and homogeneous, and that groundwater flow is uniform. Since groundwater quality data are only available for the upper 25 feet of the aquifer, the model assumptions included a vertical line source running through the upper 25 feet of the aquifer with the source being small relative to the area of interest.
- 4.5.2 It is known on a regional scale that the Schenectady Aquifer is not homogeneous, and that there is a shallow groundwater divide at the site. The groundwater divide is located south of the evaluation area, and separates the evaluation area from areas that could not be sources because of their location south of the divide. Variations in aquifer properties and variation in groundwater flow direction within the area of evaluation were taken into account by varying the

model inputs, as described in the next paragraph. Full documentation for the model is contained in Appendix D.

- 4.5.3 One approach to modeling would be to take known aquifer parameters and best-judgements about unknown parameters and calibrate a solute-transport model to the observed contaminant distribution. However, for this evaluation, a more objective "Monte-Carlo" approach was used. First, a large search area was defined. Then, potential source locations within the search area were randomly picked by the computer. Model parameters, including groundwater flow direction, groundwater flow rate, transverse and longitudinal dispersivity, contaminant retardation, and source strength were randomly chosen within a specified range by the computer and the model was run. The concentrations calculated by the model were compared with the concentrations observed in the monitoring wells and an index number, indicating how well the results matched, was calculated.
- 4.5.4 Several million simulations at several hundred thousand locations were conducted. The highest probability locations for the source area are posted on Figure 4-3. The model results indicated that the probability that the Sacadaga Landfill is a major source of the TCE plume is very low, which is consistent with the soil and groundwater data collected in and around the landfill. The highest probability locations showing the best fit to the observed data were clustered between monitoring well MW-99-15 and MW-13, located west of the Depot.



CONCLUSIONS

This section presents conclusions which address each of the project objectives.

OBJECTIVE 1: Assess whether the disposal area located northeast of the Scotia Depot is the source of the TCE groundwater plume.

CONCLUSIONS:

- The data collected during this investigation indicate that the disposal area located northeast of the Scotia Depot is not the source of the TCE groundwater plume. Groundwater and soil samples along the northeastern fence line did not contain high concentrations of TCE (at levels above NYSDEC soil and groundwater criteria).
- Based on the groundwater model and assessment of the available data, it is thought
 that the most probable location of the source of the TCE plume is in a vacant area
 immediately west of the Scotia Depot. That area was formerly part of the Scotia
 Navy Depot/GSA Depot. The NYSDEC requested that an investigation of the vacant
 area be conducted by the USACE under the Formerly Utilized Defense Sites (FUDS)
 Program. USACE has agreed in principal to investigate that area under the FUDS
 program.

OBJECTIVE 2: Assess the lateral and vertical extent of the plume, if present, within a predefined area along the northeastern fence line, and assess the presence of TCE south of the Depot near Lock 8 in the Mohawk River/Erie Canal.

CONCLUSIONS:

- A TCE groundwater plume was not identified in the three wells along the northeastern fence line. However, groundwater could not be characterized throughout the entire thickness of the aquifer as originally planned due to heaving sand conditions.
- TCE was detected in a well south of the Depot near Lock 8 (PMW-6) at concentrations (0.35-0.54 ug/L) far below the NYSDEC drinking water criteria (5 ug/L).

PUBLIC AVAILABILITY SESSION

A public availability session was held on March 22, 2001 to inform interested parties about the study results and conclusions.

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APPENDIX A

GEOLOGIC LOGS AND MONITORING WELL SCHEMATICS

Contrac	Contractor: Hanson Drilling				PARSONS ENGINEERING SCIENCE, INC. DRILLING RECORD BORING/ Sheet WELL NO. PMW-1				
iler:		Jeff Orsini	ing	-	DRILLING RECORD	Location Description:			
ecto	r:	Johnson		-	PROJECT NAME: DLA/DNSC - Scotia Depot	Located adjacent			
Rig Typ		Ingersol-Ran		-	PROJECT NUMBER: 737875,03000	between Building			
				-		Danum	3 303 and 104.		
G	GROUNDWATER OBSERVATIONS					Location Plan			
Water					Weather: Day to Day		Ņ		
	68.42 ft	67.82 ft					ı		
			ļ	Date/Time Start: May 17th, 2000 at 7:40 a.m.	See Site Plan				
Time	8:00 a.m.	9:30 a.m.	ļ	 					
Meas. From	тос	TOC		1	Date/Time Finish: June 16th, 2000 at 12:05 p.m.				
Sample	Sample	SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS		
Depth	I.D.	311	Rec.	(ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS		
+9				(FF)					
+6									
							Locking Well Stand		
+3							Expanding Cap		
0									
3	D1411/ 106	11 (0 20 47							
6	PMW-1S5	41-68-39-47	50	0	Fine to coarse Sand, some rock fragments, little fine to coarse gravel, dry, no stain or odor.				
- 6					no stain or odor.				
9	PMW-1510	98-96-100/.4	80	0	Fine to coarse Sand, some fine to coarse gravel, little rock fragments, dry,				
		70 70 1007.4		L -	no stain or odor.				
12				<u> </u>	Auger refusal at 12 feet.				
		AR							
15		AR					2-inch ID PVC Riser		
		AR					(+3 - 63')		
3		AR							
	PMW-1S20	AR							
21		AR							
24		AR							
24		AR AR							
27		AR		\vdash			Cement/Bentonite Grout		
		AR					(0' - 58')		
30		AR		0			(0 - 58)		
		AR							
33		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.				
		AR			(0' to 108' feet.)				
36		AR							
20		AR							
39	D1 411/ 1022	AR							
42	PMW-IS20	AR							
44		AR AR							
45		AR		-					
.,		AR							
48		AR							
		AR		0					
51		AR							
		AR							
54		AR							
					COMMENTS:				
	SAMPLING M	ETHOD			Due to a broken drill bit, the eight inch boring was terminated at 153 feet below grade. Once the eight		ne hole caved to 60 feet.		
	SS = SPLIT SP				Six inch casing was advanced through this to a depth of 88 feet and the bottom of the well screen with				
	A = AUGER C	UTTINGS			MW-1W78 and MW-1W98 Water screening samples collected and analyzed for volatile organic	compounds.			
	C = CORED				AR = Air Rotary Drilling				

					PARSONS ENGINEERING SCIENCE, INC.	BORING/	Sheet 2 of 3	
Contract	tor:	Hanson Dr			DRILLING RECORD	WELL NO. PMW-1		
iller:		Jeff Orsini				Location Description		
pecto		Johnson		- !	PROJECT NAME: DLA/DNSC - Scotia Depot	Located adjacent t		
Rig Typ	e:	Ingersol-Rand PROJECT NUMBER: 737875.03000				between Buildings	between Buildings 905 and 104.	
GRO	DUNDWA	TER OBSE	RVATIO	ONS		Location Plan		
Water					Weather: Day to Day		Ņ	
Level	68.42 ft	67.82 ft					ı	
Date	6/16/00	7/13/00			Date/Time Start: May 17th, 2000 at 7:40 a.m.	See Site Plan		
Time	ne 8:00 a.m. 9:30 a.m.							
Meas.			1		Date/Time Finish: June 16th, 2000 at 12:05 p.m.	_		
	TOC	TOC	4/	777	THE RESIDENCE OF A CONTRACT OF	OCCUPATION I	CO) () (D) TO	
Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS	
Depth	1.D.	AR	Rec.	(рріп)		W/X 2/2		
57		AR					Coment/Bentonite Grout	
		AR		 			(U-58)	
60		AR					Bentonite Pellets	
		AR			Boring caved to 60 feet when eight inch casing was removed.		(58'-61.3')	
63		AR						
		AR						
66		AR						
		AR					2-inch ID PVC	
69		AR					0.01 Slot Well	
		AR		0			Screen (63'-83')	
72		AR						
		AR						
75		AR					No. 1 Sand	
		AR					(61.3'-89')	
78	PMW-JW7	AR						
		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.			
81		AR			(0' to 108' feet.)			
		AR					PVC End Cap (B3)	
84		AR	_					
02		AR						
87		AR						
90		AR AR				3.5		
-50		AR						
93		AR						
		AR			Silt and very fine sand flow and heave to this depth.			
96		AR			,			
	PMW-1W9	AR						
99		AR						
		AR					Caved Silt and	
102		AR					Fine Send	
		AR					(60' - 153')	
105		AR						
105		AR						
108		AR			Formation change to silt and very fine sand.			
,,,		AR						
111		AR						
114		AR						
114		AR AR						
117		AR						
417		AR						
					COMMENTS:			
,	SAMPLING	METHOD			Due to a broken drill bit, the eight inch boring was terminated at 153 feet below grade. Once the eight	ht inch casing was removed, the ho	le caved to 60 feet.	
					Six inch casing was advanced through this to a depth of 88 feet and the bottom of the well screen w			
SS = SPLIT SPOON A * AUGER CUTTINGS					PMW-1W78 and PMW-1W98 Water screening samples collected and analyzed for volatile organ			

					PARSONS ENGINEERING SCIENCE, INC.		Sheet 3 of 3
Contrac	tor:	Hanson Dr	illing	_	DRILLING RECORD	WELL NO. PM	
Driller:		Jeff Orsini		_		Location Description	
Inspecto		Johnson		-	PROJECT NAME: DLA/DNSC - Scotia Depot	Located adjacent	
Rig Typ	e:	Ingersol-R	and PROJECT NUMBER: 737875.03000 between Buildin			between Building	s 905 and 104.
GROUNDWATER OBSERVATIONS						Location Plan	
Water			1	1	Weather: Day to Day		Ä
Level	68.42 ft	67.82 ft					ŀ
	6/16/00	7/13/00			Date/Time Start: May 17th, 2000 at 7:40 a.m.	See Site Plan	ı
	8:00 a.m.	9:30 a.m.	ļ				
Meas. From	тос	тос			Date/Time Finish: June 16th, 2000 at 12:05 p.m.	-	
Sample		SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
Depth	I.D.		Rec.	(ppm)			
120	_	AR					
		AR					
123		AR					
126		AR					
120		AR AR					
129		AR		\vdash			
147		AR			Silt and very fine sand (108' - 153')		
132		AR					
		AR					Caved Sitt and Fine
135		AR					Sænd (60" - 153")
120		AR					
138		AR					
141		AR AR		-			
17/		AR					
144		AR					
		AR					
147		AR					
160		AR		[<u>-</u>			
150		AR AR		$\vdash \vdash \vdash$			
153		AR					
100							
156				<u>'</u>	Boring terminated at 153 feet.		
159						1	
160						}	
162				\vdash			
165				$\vdash \dashv$			
100							
168							
171				\vdash			
174		_					
1/4	_						
177						1	
180							
183							
100					COMMENTS:		
	SAMPLING	METHOD			Due to a broken drill bit, the eight inch boring was terminated at 153 feet below grade. Once the eight	inch casing was removed, the l	nole caved to 60 feet.
	SS = SPLIT	SPOON			Six inch casing was advanced through this to a depth of 88 feet and the bottom of the well screen was		
	A = AUGER	CUTTINGS			PMW-1W78 and PMW-1W98 Water screening samples collected and analyzed for volatile organic co	empounds.	
	C = CORED				AR = Air Rotary Dritting		

Contrac	tor	Hanson Dril	lina		PARSONS ENGINEERING SCIENCE, INC. DRILLING RECORD	BORING/ WELL NO. PM	Sheet 1 of 2
	riller: Jeff Orsini		-	DRILLING RECORD	Location Description:		
specto	·	Johnson		-	PROJECT NAME: DLA/DNSC - Scotia Depot	Located adjacent	
-	Type: Ingersol-Rand		-	PROJECT NUMBER 737875.03000	Building 105.	to the fence near	
- 5 P	ing Type: Ingersor-Rand				TROUBLY 157075,05000	Dunding 103.	
GR	OUNDWA	TER OBSE	RVATIO	NS		Location Plan	A
Water					Weather: Day to Day		Ŋ
.evei	ei 67.53 ft 66.64 ft e 6/16/00 7/13/00					1	
Date				Date/Time Start: June 1st, 2000 at 7:15 a.m.	See Site Plan	1	
	8:10 a.m.	9:30 a.m.				Í	
Meas.			l	[]	Date/Time Finish: June 7th, 2000 at 7:00 p.m.		
	TOC	TOC	-	DID	MINT IN THE PROPERTY OF MAINTAIN	0000000	00101000
Sample Depth	Sample I.D.	SPT	% Rec.	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
+9	I.D.		Rec.	(ppm)	<u> </u>		
			1				
+6						ĺ	
							Locking Well Stand
+3							Expending Cap
0							
		AR					
3		AR					
		AR					
6		AR	L				
		AR		-	Fine to coarse gravel, fine to coarse sand, silt some cobbles.		
9		AR		0	(Glacial outwash 0' to 88')		
12		AR AR	_				
12		AR					
15		AR					2-inch ID PVC Riser
		AR	_				(+3' - 64')
8	_	AR					(1.0 - 04)
		AR					
21		AR					
		AR					
24		AR					
		AR					
27		AR					Cement/Bentonite Grou
		AR					(0' - 59.5')
30		AR		0			
22		AR					
33		AR AR					
36		AR					
30		AR					
39		AR					
		AR					
42		AR					
		AR					
45		AR					
40		AR					
48		AR					
		AR		0			
51		AR					
54		AR AR					
J4		AK.			COMMENTS.		
4.1111 N.G. 14770-2-					COMMENTS:		
SAMPLING METHOD SS = SPLIT SPOON					PMW-2W78 Water screening sample collected and analyzed for volatile organic compounds. AR a Air Resear Drilling		
	S = SPLII S A = AUGER (AR = Air Rotary Drilling		
\	C = CORED	COTTINGS					

					PARSONS ENGINEERING SCIENCE, INC.	BORING/	Sheet 2 of 2
Contrac	tor:	Hanson Dr	illing	_	DRILLING RECORD	WELL NO. PM	W-2
iller:		Jeff Orsini		_		Location Description	n:
pecto	or:	Johnson		_	PROJECT NAME: DLA/DNSC - Scotia Depot	Located adjacent	to the fence near
akig Typ	e:	Ingersol-R	and	-	PROJECT NUMBER: 737875.03000	Building 105.	
				-			
GRO	OUNDWA	TER OBSE	RVATIO	ONS		Location Plan	
Water				Ĭ .	Weather: Day to Day		й
	67.53 ft	66.64 ft	ľ	1		1	Ĩ
Date	6/16/00	7/13/00	1	T	Date/Time Start: June 1st, 2000 at 7:15 a.m.	See Site Plan	•
Time	8:10	9:30 a.m.		T		1	•
Meas.		1			Date/Time Finish: June 7th, 2000 at 7:00 p.m.		
	TOC	TOC				1	
Sample		SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
Depth	LD.		Rec.	(ppm)			
		AR		1		(20) (SE)	
57		AR					Cement/Bentonite Grout
		AR					(0'-69.5')
60		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.		Bentonite Pellets
		AR	t		(Glacial outwash 0' to 88' feet.)		(59.5'-62')
63		AR	-		, (3.132.1 3.11.12.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3.1 3		(05.5-02)
		AR				·	
66		AR	·				[
		AR	1				2-inch ID PVC
69		AR					0.01 Slot Well
 		AR					Screen (64'-84')
72		AR					(G1-04)
		AR	-				
75		AR					No. 1 Sand
		AR		_		 	(62'-98')
78	PMW-2W7	AR					(02-88)
	71414-2447	AR					
81		AR		-			
<u> </u>		AR					
4		AR					PVC End Cap (84")
		AR					- Pro Elio Cap (64)
87		AR					
 "		AR					
90							
					Boring terminated at 88 feet.		
93				\vdash	Doring terminated at 60 100t.		
96							
99							
102							
102		-					
105							
-1-5							
108					·		
100							
111							
114							
117							

					COMMENTS:		
	SAMPLING	METHOD			PMW-2W78 Water screening sample collected and analyzed for volatile organic compounds.		
	SS = SPLIT S						
	a = auger				AR = Air Rotary Drilling		
	C = CORED	00111100					

					PARSONS ENGINEERING SCIENCE, INC.		of 2		
Contractor: Hanson Drilling			ing	-	DRILLING RECORD		WELL NO. PMW-3		
riller:				-		Location Description:			
pecto		Johnson		-	PROJECT NAME: DLA/DNSC - Scotia Depot	Located adjacent to the gate in			
kig Type	e:	Ingersol-Ran	<u>d</u>	-	PROJECT NUMBER: 737875.03000	fence on the north side of the de	epot.		
GR	OUNDW	ATER OBSER	VATIO	NS		Location Plan	4		
Water	nter				Weather: Day to Day		Ņ		
	65.09 ft	64.76 ft					ı		
_	te 6/16/00 7/13/00				Date/Time Start: June 6th, 2000 at 2:45 p.m.	See Site Plan			
	8:20 a.m.	9:30 a.m.	 	 		1			
Meas. From	тос	тос	1	F	Date/Time Finish: June 12th, 2000 at 1:30 p.m.				
Sample		SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC COMME	ENTS		
Depth	I.D.		Rec.	(ppm)					
+9									
+6						- (
+3	·					Locking Well S			
73			-			Expending Cer	7		
0				_					
<u> </u>		AR							
3		AR							
		AR							
6		AR							
		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.				
9		AR			(Glacial outwash 0' to 84')				
-,2		AR		0					
12		AR	_						
15		AR AR				2-inch ID PVC	Diese		
13		AR	-			2-inch 1D PVC (+3' - 60.5')			
8		AR	_			(*3 - 60.5)			
Ž	_	AR							
21		AR							
		AR							
24		AR							
		AR							
27		AR				Cement/Benton	nite Grout		
30		AR		0		(0' - 55')			
30		AR AR		\ <u>\</u>					
33		AR							
		AR							
36		AR							
		AR							
39		AR							
42		AR	$oxed{oxed}$						
42		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.				
45		AR AR			(Glacial outwash 0' to 84')				
43		AR							
48		AR							
		AR		0					
51		AR							
		AR							
54		AR							
					COMMENTS:				
	SAMPLING				PMW-3W78 Water screening sample collected and analyzed for volatile organic compounds.				
SS = SPLIT SPOON A = AUGER CUTTINGS					AR = Air Rotary Drilling				

					PARSONS ENGINEERING SCIENCE, INC.	BORING/	Sheet 2 of 2
Contrac	tor:	Hanson Dr		-	DRILLING RECORD	WELL NO. PM	
Priller:		Jeff Orsini		-	DECIRCT NAME. DI A DISC Costis Dones	Location Description	
Rig Typ	_	Johnson Ingersol-R	nnd .	-	PROJECT NAME: DLA/DNSC - Scotia Depot PROJECT NUMBER: 737875.03000	Located adjacent	a side of the depot.
Nig 13p		nigersor-ic	410	-	1 ROBECT NOMBER: 13/0/3/0500	Tonce on the Iron	raide of the depot.
GR	DUNDWA	TER OBSE	RVATIO	ONS		Location Plan	
Water					Weather: Day to Day		Ņ
		64.76 ft				1	i
	6/16/00	7/13/00		-	Date/Time Start: June 6th, 2000 at 2:45 p.m.	See Site Plan	n
	8:20 a.m.	9:30 a.m.	_	├	TO 4. 677 777-1-1. Torre 1201-2000-4-1-20		
Meas. From	TOC	TOC		[Date/Time Finish: June 12th, 2000 at 1:30 p.m.	1	
Sample		SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
Depth	I.D.		Rec.	(ppm)			
		AR					
57		AR					Cement/Bentonite Grout
60		AR			P' 4	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	(0'-69.5)
- 60	<u> </u>	AR AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles. (Glacial outwash 0' to 84' feet.)) -	Bentonite Pellets (59.5'-62')
63		AR	 		(Olacia) outward o to 64 feet.)	133	(58.5-62)
		AR					ľ
66		AR					}
		AR					2-Inch ID PVC
69		AR					0.01 Slot Well
72		AR AR					Screen (60.5'-80.5')
12		AR					}
75		AR		_			No. 1 Sand
		AR					(57.9' - 84')
78	PMW-3W7	AR					
		AR					PVC End Cap (80.5")
81		AR				# -	
84		AR AR				1.0	
94	-	711		-			
87					Boring terminted at 84 feet.	[
						,	
90						,	
03						}	
93				\vdash			
96						[
						1	
99							
100							
102							
105							
105							
108							
111				\Box		[
114	_						
114				-			
117							
					The second secon		
					COMMENTS:		
	SAMPLING				PMW-3W78 Water screening sample collected and analyzed for volatile organic compounds.		 -
	SS == SPLIT S A == AUGER				AR = Air Rotary Drilling		
l	C = CORED						

Contrac	tor:	Hanson Drill	ing		PARSONS ENGINEERING SCIENCE, INC. DRILLING RECORD	BORING/ WELL NO. PMV	Sheet 1 of 2	
iller:		Jeff Orsini				Location Description		
pecto	r:	Johnson		•	PROJECT NAME: DLA/DNSC - Scotia Depot	Located across from		
Rig Typ		Ingersol-Ran	d		PROJECT NUMBER: 737875.03000	near the ferrochron		
GR	ROUNDWA	TER OBSER	OLLAN	NS		Location Plan	4	
Water			1		Weather: Day to Day		Ņ	
Level	60.9 ft							
Date	6/15/00				Date/Time Start: June 14th, 2000 at 7:30 a.m.	See Site Plan		
Time	7:30 a.m.					i		
Meas.					Date/Time Finish: June 15th, 2000 at 6:00 p.m.	_		
	Grade		<u> </u>					
Sample		SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS	
Depth	I.D.		Rec.	(ppm)				
+9	,					1		
						1		
+6								
				\vdash				
+3								
_								
0								
		AR						
3		AR						
		AR						
6		AR			W			
		AR			Fine to medium sand, some silt, little cobbles, little fine to coarse gravel.			
9		AR			(Glacial outwash 0' to 88')			
-12		AR		0				
12		AR						
72		AR						
15		AR					Cement/Bentonite Grout	
		AR					(0 88.)	
18		AR	\vdash		,			
-21		AR						
21		AR						
24		AR						
24		AR AR						
27								
21		AR						
30		AR		0				
30		AR		U				
33		AR						
33		AR	-					
36		AR						
36		AR AR			Fine to medium sand, some silt, little cobbles, little fine to coarse gravel.			
39		AR			(Glacial outwash 0' to 88')			
37		AR	-		(Cinetial Cathalast o to an)			
42		AR	-					
 -		AR						
45		AR						
		AR						
48		AR						
		AR						
51		AR		0				
		AR		Ť				
54		AR		$\overline{}$				
J					COMMENTS:			
	CAMBI INC	METHAR			Boring was grouted based on a water screening sample collected using a polyethele	na bailer		
	SAMPLING					ene caner.		
	SS = SPLIT S A = AUGER (AR = Air Rotary Drilling			

					PARSONS ENGINEERING SCIENCE, INC.	BORING/	Sheet 2 of 2
Contrac	tor:	Hanson Dr		_	DRILLING RECORD	WELL NO. PM	
riller:		Jeff Orsini		_		Location Description	
specte	or:	Johnson		_	PROJECT NAME: DLA/DNSC - Scotia Depot	Located across fro	om building 102
Rig Typ	e:	Ingersol-R	and	-	PROJECT NUMBER: 737875.03000	near the ferrochro	me storage area.
GR	OUNDWA	TER OBSE	RVATIO	ONS		Location Plan	
Water					Weather: Day to Day		й
	60.9 ft						ļ
Date	6/15/00	ļ	ļ	ļ	Date/Time Start: June 14th, 2000 at 7:30 a.m.	See Site Plan	n
Time Meas.	7:30 a.m.	ļ	-	1	Date/Time Finish: June 15th, 2000 at 6:00 p.m.		
From	Grade		1		Date/1 lime Finish: // // // // // // // // // // // // //	-	
Sample		SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
Depth	I.D.		Rec.	(ppm)			
		AR					
57		AR					
		AR					
60		AR		<u> </u>			
<u> </u>		AR		<u> </u>			
63		AR	-				
66		AR AR	_		Fine to medium sand, some silt, little fine to coarse gravel.		
-00		AR	 	 	(Glacial outwash 0' to 88')		Coment/Bentonite Grout
69	_	AR	-	1		_	(0:-88)
 "		AR	1				(0-88)
72		AR					
		AR					
75		AR					
		AR					
78	PMW-4W7	AR					
		AR					
81		AR					
84		AR					
04		AR AR	ļ				
87		AR					
<u> </u>		AR		\vdash			
90							
					Boring terminated at 88 feet.		
93							
96							
			_				
99							
102							
 							
105	_						
108							
111							
114							
114							
117							
 * * * 							
				<u> </u>	COMMENTS:		*****
	SAMPLING	METHOD			Boring was grouted based on a water screening sample collected using a polyethelen-	e bailer.	
,	SS = SPLIT S	POON			AR = Air Rotary Drilling		
	A = AUGER	CUTTINGS					
•	C = CORED						

Contrac	tor:	Hanson Drill	ina		PARSONS ENGINEERING SCIENCE, INC. DRILLING RECORD BORING/ Sheet WELL NO. PMW-5				
iller:		Jeff Orsini	ıng	-	DRILLING RECORD	Location Description			
ecto		Johnson		-	PROJECT NAME: DLA/DNSC - Scotia Depot		of the ferrochrome		
		Ingersol-Ran	d	-	PROJECT NUMBER: 737875.03000	stockpile in the open			
Rig Typ		Higeisor-Kan	<u> </u>	-	PROJECT NUMBER: 13/6/3,03000	Stockpile in the op	en storage area.		
GF	OUNDWA	ATER OBSER	VATIO	NS		Location Plan	4		
Water			T		Weather: Day to Day		Ņ		
	60.95 ft		1			7	Ĩ		
	6/20/00				Date/Time Start: June 19th, 2000 at 8:00 a.m.	See Site Plan			
	7:20 a.m.					1			
Meas.					Date/Fime Finish: June 21th, 2000 at 1:00 p.m.				
From	Grade								
Sample	Sample	SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS		
Depth	I.D.		Rec.	(ppm)					
+9									
+6									
						1			
+3									
0									
		AR		ļ					
3		AR							
		AR	<u> </u>						
6		AR							
		AR			Fine to medium sand, some silt, little cobbles, little fine to coarse gravel.				
9		AR			(Glacial outwash 0' to 83')				
12		AR		0					
12		AR							
15		AR	-						
13		AR					Cement/Bentonite Grout		
8		AR	-				(0, - 83.)		
0		AR	-	\vdash					
21		AR AR							
-21		AR							
24		AR							
24		AR							
27		AR							
		AR							
30		AR		0					
		AR		<u> </u>					
33		AR							
		AR							
36		AR							
		AR			Fine to medium sand, some silt, little cobbles, little fine to coarse gravel.				
39		AR			(Glacial outwash 0' to 83')				
		AR							
42		AR							
		AR							
45		AR							
1.5		AR				g. 6.,			
48		AR		\Box					
		AR		0					
51		AR							
54		AR							
34		AR	· · · · · · · · · · · · · · · · · · ·				<u>-</u>		
					COMMENTS:				
	SAMPLING				Boring was grouted based on a water screening sample collected using a polyetheler	ne bailer.			
	SS = SPLIT S				AR = Air Rotary Drilling				
		CUTTINGS							
	C = CORED								

		_			PARSONS ENGINEERING SCIENCE, INC.					
Contrac	tor:	Hanson Dr.	illing		DRILLING RECORD WELL NO. PMW-5					
riller:		Jeff Orsini			DDO VECT NAME. DI A DNIGC. Contin Donat	Location Description				
pecto acig Typ		Johnson Ingersol-Ra	nd.		PROJECT NAME: DLA/DNSC - Scotia Depot PROJECT NUMBER: 737875.03000	stockpile in the or	t of the ferrochrome			
Taug xyp	ing Type			•	1 ROUSE 1 ROUSE 157875.05000	stockpile in the op	on storage area.			
GRO	DUNDWA	TER OBSE	RVATIC	NS		Location Plan	A			
Water					Weather: Day to Day		Й			
	60.95 ft 6/20/00		-		Date/Time Start: June 19th, 2000 at 8:00 a.m.	See Site Plan	. '			
	7:20 a.m.		-		Date Time Start. June 1944, 2000 at 6.00 a.m.	- See Site Flan	•			
Meas.					Date/Time Finish: June 21th, 2000 at 1:00 p.m.					
	Grade									
Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS			
Deptil	I.D.	AR	Net.	(ррш)						
57		AR								
		AR								
60		AR								
63		AR AR								
- 55		AR			Fine to medium sand, some silt, little fine to coarse gravel.					
66		AR			(Glacial outwash 0' to 83')					
		AR					Cement/Bentonite Grout			
69		AR AR					(0:-83)			
72		AR								
		AR								
75		AR								
78	PMW-5W7	AR AR								
78	PMW-3W/	AR								
81		AR								
		AR								
34					Daving terminated at 92 feet	1				
87					Boring terminated at 83 feet.					
90										
93										
96										
00										
99		_								
102										
105										
108										
100			_							
111										
114										
117										
	COMMENTS:									
	SAMPLING				Boring was grouted based on a water screening sample collected using a polyethele AR = Air Rotary Drilling	ene bailer.				
l	SS = SPLIT S A = AUGER				AR - All ROWLY Drilling					
	C = CORED									

					PARSONS ENGINEERING SCIENCE, INC.		Sheet 1 of 1
Contrac	tor <u>:</u>	Hanson Drill	ing	-	DRILLING RECORD	WELL NO. PM	
iller:		Jeff Orsini				Location Description	
pecto)г:	Johnson		_	PROJECT NAME: DLA/DNSC - Scotia Depot	Located in Maaly	
Rig Typ	e:	Ingersol-Ran	ıd	-	PROJECT NUMBER 737983.03000	the eastern side o	f the parking lot.
GP	GROUNDWATER OBSERVATIONS					Location Plan	
Water	OUNDWA	LIER OBSER	I	143	Weather: Day to Day	Document 1 in	ń T
	18.78 ft	19.24 ft				7	ı
	7/5/00	7/13/00			Date/Time Start: June 29th, 2000 at 1:30 p.m.	See Site Plan	1
Time	9:00 a.m.	9:30 a.m.					
Meas.					Date/Time Finish: June 30th, 2000 at 11:30 a.m.	4	
From	TOC	TOC				COMPRESSO	COM ATTAINS
Sample	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
Depth +9	1.D.	!	Rec.	(ppm)		+	
							
+6							
							Locking Well Stand
+3							Expending Cap
0						┼┈┷┙╘┷┈┤	
2		AR					
3		AR AR			Fine to coarse Sand, some fine gravel, outwash. (0' - 10')		Cement/Bentonite
6		AR			Time to course omin, some time planer, outmost. (v - 10)		Grout (0' - 8.3')
- 0		AR					2-inch ID PVC Riser
9		AR					(+3' - 13 6')
		AR		0			Bentonite Pellets
12		AR					(8.3' - 11.8')
		AR					
15		AR					2-inch ID PVC
		AR					0.01 Slot Well
18		AR					Screen (13.6' - 33.6')
- 01		AR					
21		AR AR					No. 1 Sand
24		AR			Dark brown to gray Silt, some clay, little fine sand. (10' - 38')		(11.8' - 38')
27		AR			Dank of own to gray ont, some early, made into saind. (10 00)		1
27		AR					
		AR					
30		AR		0			
		AR					
33		AR					PVC End Cap (33.6')
		AR					
36		AR					
39	PMW-6W38	AR				┦ └───┤ │	
37					Boring terminated at 38 feet.		
42					Some to mineral at 50 took		
45							
48							
51							
54							
J4					COMMENTS:		
	CAMBI INC	METHOR			PMW-6W38 Water screening sample collected and analyzed for volatile organic compounds.		
	SAMPLING SS = SPLIT				AR = Air Rotary Drilling		
		CUTTINGS			······································		
	C = CORED						

					PARSONS ENGINEERING SCIENCE, INC.	BORING/ Sheet 1 of 1	
Contrac		Hanson Drilling			DRILLING RECORD	WELL NO. PMW-7	
pector:		Jeff Orsini Johnson			PROJECT NAME: DLA/DNSC - Scotia Depot	Location Description: Located in the field west of	
Rig Typ		Johnson Ingersol-Rand			PROJECT NUMBER 737983.03000	Maalwyck Park.	
ועי ציאן	<u> </u>	Ingersor-Kar	10	-	TROJECT NUMBER 757783.03000	Waarwyck I ark.	
GF	OUNDWA	ATER OBSER	OITAVS	NS		Location Plan	A
Water			1		Weather: Day to Day		Ņ
Level	12.94 ft					7	i
Date	7/13/00		1		Date/Time Start: July 5th, 2000 at 2:30 p.m.	See Site Plan	n
	9:30 a.m.						
Meas.					Date/Time Finish: July 6th, 2000 at 4:00 p.m.	4	
	TOC	a war	 			COURT	00100000
Sample Depth	Sample I.D.	SPT	% Rec.	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
+9	1.D.		Rec.	(ppm)			
			—				
+6							
							Locking Well Stand
+3							Expanding Cap
0							
<u> </u>		AR					
3		AR AR					Cement/Bentonite
6		AR					Grout (0' - 10.5')
		AR					2-inch ID PVC Riser
9		AR					(+3' - 14.8')
<u> </u>		AR	 	0			(2,
12		AR					Bentonite Pellets
		AR			Dark brown Silt, little fine sand. (0' - 38')		(10.5' - 13.0')
15		AR					2-Inch ID PVC
	_	AR					0.01 Slot Well
8		AR					Screen (14.8' - 34.8')
21		AR AR					
-21		AR	_	LI			No. 1 Sand
24		AR					(13.0' - 38')
		AR					(10.0 - 55)
27		AR					
		AR					
30		AR		0			
		AR					
33		AR					
37		AR					PVC End Cep (34.8')
36	PMW-7W38	AR AR					
39	: M144-1479	AK				┥ └──┘ │	
			-		Boring terminated at 38 feet.		
42							
45							
48							
51							
51							
54							
J 1					COMMENTS:		
SAMPLING METHOD					PMW-7W38 Water screening sample collected and analyzed for volatile organic compounds.		
	SS = SPLIT S				AR = Air Rotary Drilling		
	A = AUGER						
	C = CORED						

G	-4	11 D.::::-	_		PARSONS ENGINEERING SCIENCE, INC.	BORING/	Sheet 1 of 1	
Contractor: Hanson Drilling Priller: Jeff Orsini			g	-	DRILLING RECORD	WELL NO. PSB-1		
pect					PROJECT NAME: DLA/DNSC - Scotia Depot	Location Description: Located adjacent to PMW-5.		
Rig Ty		Ingersol-Rand		-	PROJECT NUMBER: 737875.03000	200ated adjacent	W1111W-5.	
				-				
	ROUNDW	ATER OBSER	OITAV	NS.		Location Plan	4	
Water					Weather: Day to Day	4	ř	
Level Date		-	 		D-4-771 Standa Tala 10th 2000 -4 0-15 a m	See Site Plan		
Time	-		+	+	Date/Time Start: July 10th, 2000 at 9:15 a.m.	See Site Flan	1	
Meas.					Date/Time Finish: July 12th, 2000 at 11:00 a.m.			
From						<u> </u>		
Sample		SPT	%	PID	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS	
Depth	I.D.		Rec.	(ppm)				
+9	1		-					
+6	-	-	+					
			-					
+3								
0			ļ			<u> </u>		
3				_			Clean, on-site soil.	
	<u> </u>		 	 		▎▕▄▄▞▏▕	(0" - 3")	
6		26-133/.1	20	0	(5-7) Brown fine to coarse sand, some coarse gravel, dry, no stain or odor.			
9								
- 12	202 1010		L.,	L	40.40.0			
12	PSB-1S10	30-32-25-29	40	1.7	(10-12) Same as above.			
15				 				
		87-150-176/.1	50	3.4	(15-17) Fine to coarse sand, some fine to coarse gravel, little cobble fragments,		Cement/Bentonite	
18					dry, no stain or odor.		Grout (3' - 47')	
21								
21	PSB-1S20	50-37-52-54	80	6.2	(20-22) Brown fine to coarse sand, little fine gravel, dry, no stain or odor.			
24								
	PSB-1S25	27-63-147/.1	40	12.4	(25-27) Brown fine sand, some silt, little cobble fragments, slightly moist, no			
27					stain or odor.			
30		59-74-72-58			(20.22) Communication			
33		39-14-12-38	60	0	(30-32) Same as above.			
- 55		-						
36		63-55-30-34	80	0	(35-37) Brown medium to coarse Sand, some cobble fragments, dry, no stain			
					or odor.			
39		62 27 40 102	80	0	(40-42) Brown fine sand, little rock fragments, very slight moisture, no stain			
42		53-37-40-102	80	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	or odor.			
								
45		***			Boring terminated at 42 feet.			
- 10								
48								
51								
				\vdash				
54								
					COMMENTS:			
SAMPLING METHOD					The boring began to cave at the surface due to auger agitation. The glacial outwash caved in creating a void approximately three feet deep			
	SS = SPLIT SPOON A = AUGER CUTTINGS				by two feet wide. A test pit was completed adjacent to the boring to check for buried material, but none was Soil samples collected at 10,20, and 25 feet for volatile organic compounds.	as round.		
	C = CORED							

APPENDIX B PHOTOLOG OF BORING LOCATIONS



Description: Drill rig set up on PMW-5.

Date: June 19, 2000





Description: Drill rig set up on PMW-6.

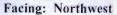
Date: June 29, 2000

Facing: East



Description: Drill rig set up on PMW-3.

Date: June 7, 2000





Description: Drill rig set up on PMW-4.

Date: June 13, 2000

Facing: Southwest



Description: Drill rig set up on PMW-1.

Date: May 22, 2000





Description: Drill rig set up on PMW-2.

Date: June 1, 2000

Facing: East



Description: Drill rig set up on PMW-7.

Date: July 5, 2000

Facing: East



Description: Drill rig set up on PSB-1.

Date: July 10, 2000

Facing: South

APPENDIX C DATA VALIDATION REPORT

DATA USABILITY SUMMARY REPORT

Prepared For:

UNITED STATES ARMY CORPS OF ENGINEERS

Scotia Army Depot Scotia, New York

Prepared By:

PARSONS ENGINEERING SCIENCE, INC.

290 Elwood Davis Road, Suite 312 Liverpool, New York 13088 Phone: (315) 451-9560 Fax: (315) 451-9570

SEPTEMBER 2000



TABLE OF CONTENTS

	<u>PAGE</u>
SECTIO	ON 1 DATA USABILITY SUMMARY1-1
1.1	Laboratory Data Packages 1-1
1.2	Sampling and Chain-of-Custody 1-1
1.3	Laboratory Analytical Methods 1-1 1.3.1 Volatile Organic Analysis 1-2 1.3.2 Semivolatile Organic Analysis 1-2 1.3.3 Pesticide/PCB Organic Analysis 1-2 1.3.4 Metals Analysis 1-2
SECTIO	ON 2 DATA VALIDATION REPORTS2-1
2.1	Groundwater 2-1 2.1.1 TCL Volatiles 2-1 2.1.2 TCL Semivolatiles 2-2 2.1.3 TCL Pesticide/PCBs 2-4 2.1.4 TAL Metals 2-4
	LIST OF TABLES
Table 2.	1-1 Summary of Sample Analyses and Usability - Groundwater2-6
	LIST OF ATTACHMENTS

Attachment A Validated Laboratory Data

DATA USABILITY SUMMARY

Groundwater samples were collected from the Scotia site in Scotia, New York on August 1, 2000. Analytical results from these samples were validated and reviewed by Parsons Engineering Science, Inc. (Parsons ES) for usability with respect to the following requirements:

- Work Plan,
- NYSDEC Analytical Services Protocol (ASP) dated September 1989 with October 1995 revisions, and
- USEPA Region II Standard Operating Procedures (SOP) in "CLP Organics Data Review and Preliminary Review," SOP No. HW-6, Revision #8, January 1992, and "Evaluation of Metals Data for the CLP Based on SOW 3/90," SOP No. HW-2, Revision #11, January 1992.

The analytical laboratory for this project was Severn Trent Laboratories - Pittsburgh (STL).

1.1 LABORATORY DATA PACKAGES

The laboratory data package turnaround time, defined as the time from sample receipt by the laboratory to receipt of the analytical data packages by Parsons ES, was 25 days on average for the water samples.

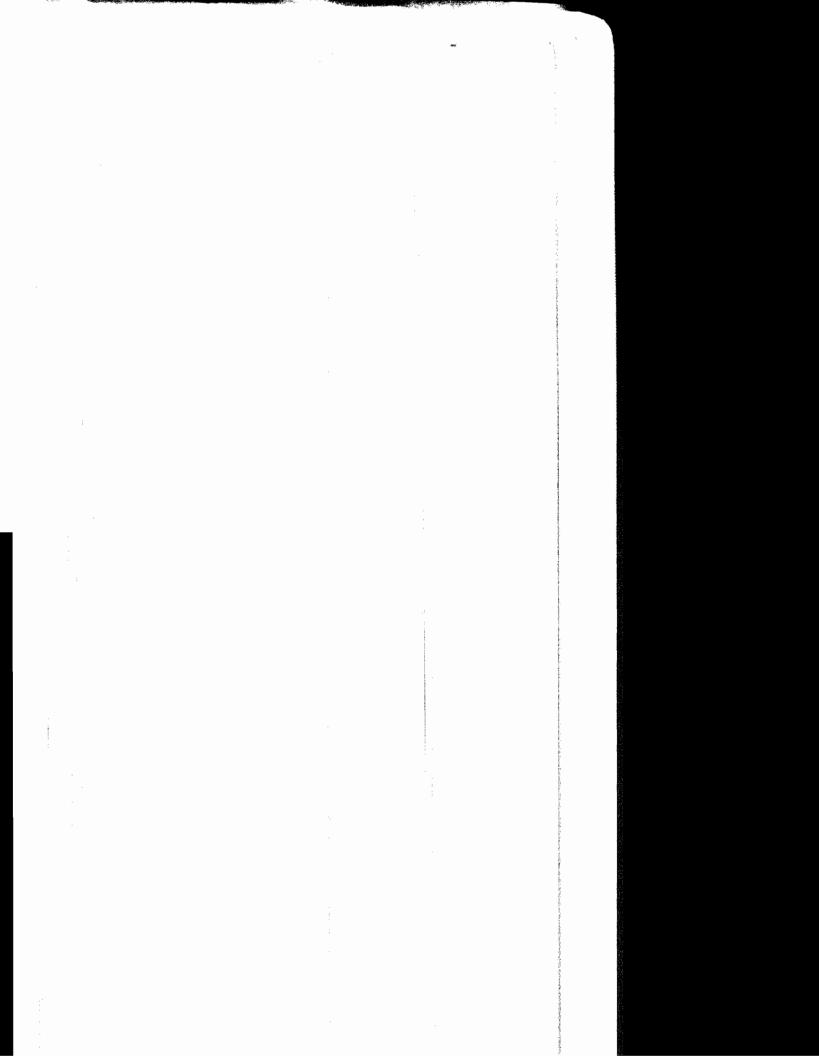
The data packages received from STL were paginated, complete, and overall were of good quality. Comments on specific quality control (QC) and other requirements are discussed in detail in the attached data validation report summarized in Section 2.

1.2 SAMPLING AND CHAIN-OF-CUSTODY

Water samples were collected, properly preserved, shipped under a COC record, and received at STL within two days of sampling. All samples were received intact and in good condition at STL.

1.3 LABORATORY ANALYTICAL METHODS

Groundwater samples were collected from the Scotia site and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. Summaries of issues concerning these laboratory analyses are presented in Subsections 1.3.1 through 1.3.4. The data qualifications resulting from the data validation review and statements on the laboratory analytical precision, accuracy, representativeness, completeness, and comparability (PARCC) are discussed for each analytical method in Section 2. The laboratory data were reviewed and may be qualified with the following validation flags:



"U" - not detected at the value given,

"UJ" - estimated and not detected at the value given,

"J" - estimated at the value given,

"N" - presumptive evidence at the value given, and

"R" - unusable value.

The validated laboratory data were tabulated and are presented in Attachment A.

1.3.1 Volatile Organic Analysis

The groundwater samples collected from the Scotia site were analyzed by STL for target compound list (TCL) VOCs using the NYSDEC ASP 8260B analytical method. Certain reported results for the TCL VOC samples were qualified as estimated due to noncompliant instrument calibrations. Therefore, the reported TCL VOC analytical results were 100% complete (i.e., usable) for the groundwater data presented by STL, and PARCC requirements were met overall.

1.3.2 Semivolatile Organic Analysis

The groundwater samples collected from the Scotia site were analyzed by STL for TCL SVOCs using the NYSDEC ASP 8270C analytical method. Certain reported results for the TCL SVOC samples were qualified as estimated due to noncompliant instrument calibrations and field duplicate precision. Therefore, the reported TCL SVOC analytical results were 100% complete with all data considered usable and valid for the groundwater data presented by STL, and PARCC requirements were met overall.

1.3.3 Pesticide/PCB Organic Analysis

The groundwater samples collected from the Scotia site were analyzed by STL for TCL pesticide/PCBs using the NYSDEC ASP 8081A/8082 analytical methods. The pesticide/PCB data did not require qualification resulting from data validation. Therefore, the reported TCL pesticide/PCB analytical results were 100% complete with all data considered usable and valid for the groundwater data presented by STL, and PARCC requirements were met overall.

1.3.4 Metals Analysis

The groundwater samples collected from the Scotia site were analyzed by STL for target analyte list (TAL) metals using the NYSDEC ASP 6010B/7470A analytical methods. The metals sample data did not require qualification resulting from data validation. All of the metals data were considered usable and 100% complete for the groundwater data presented by STL, and PARCC requirements were met overall.

DATA VALIDATION REPORTS

2.1 GROUNDWATER

Data review has been completed for data packages generated by STL containing groundwater samples collected from the Scotia site. The specific samples contained in these data packages, the analyses performed, and a usability summary are presented in Table 2.1-1. All of these samples were properly preserved, shipped under a COC record, and received intact by the analytical laboratory. The validated laboratory data are presented in Attachment A.

Data validation was performed for all samples in accordance with the most current editions of the USEPA Region II SOPs and the NYSDEC ASP for organic and inorganic data review. This data validation and usability report is presented by analysis type.

2.1.1 TCL Volatiles

The following items were reviewed for compliancy in the volatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Matrix spike blank (MSB) recoveries
- Laboratory control sample (LCS) recoveries
- Laboratory method blank and trip blank contamination
- GC/MS instrument performance
- Sample result verification and identification
- Initial and continuing calibrations
- Internal standard area counts and retention times
- Field duplicate precision
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of blank contamination and initial and continuing calibrations.

Blank Contamination

The trip blank associated with the Scotia groundwater samples contained methylene chloride at a concentration of 3.9 μ g/L. However, validation qualification of the groundwater samples was not required due to this blank contamination since methylene chloride was not detected in these samples.

Initial and Continuing Calibrations

All initial calibration compounds were compliant with a minimum relative response factor (RRF) of 0.05 and a maximum relative standard deviation (%RSD) of 30% with the exception of styrene (30.2% RSD) and bromoform (31.3% RSD) for the initial calibration associated with all samples. Therefore, all results for styrene and bromoform were considered estimated with positive results qualified "J" and nondetected results qualified "UJ".

All continuing calibration compounds were compliant with a minimum relative response factor (RRF) of 0.05 and a maximum percent difference (%D) of ±25% with the exception of the %Ds for chloromethane (28.2% D), acetone (31.3% D), bromomethane (64.9% D), chloroethane (65.2% D), and 2-butanone (43.4% D) for the continuing calibration associated with all samples. Therefore, all results for chloromethane, acetone, bromomethane, chloroethane, and 2-butanone were considered estimated with positive results qualified "J" and nondetected results qualified "UJ".

Usability

All TCL volatile sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The volatile data presented by STL were 100% complete (i.e., usable). The validated volatile laboratory data are tabulated and presented in Attachment A.

2.1.2 TCL Semivolatiles

The following items were reviewed for compliancy in the semivolatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- MS/MSD precision and accuracy
- MSB recoveries
- LCS recoveries

- Laboratory method blank
- GC/MS instrument performance
- Sample result verification and identification
- Initial and continuing calibrations
- Internal standard area counts and retention times
- Field duplicate precision
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols, with the exception of MS/MSD precision and accuracy, initial calibrations, and field duplicate precision.

MS/MSD Precision and Accuracy

All MS/MSD precision (relative percent difference; RPD) and accuracy (percent recovery; %R) results were acceptable and within QC limits during the spiked analyses of MW-1 with the exception of the high MS/MSD recoveries for 2,4-dinitrotoluene (140%/145%; QC limit 31-131% R). Validation qualification of the unspiked sample MW-1 was not warranted since 2,4-dinitrotoluene was not detected.

Initial Calibrations

All initial calibration compounds were compliant with a minimum RRF of 0.05 and a maximum %RSD of 30% with the exception of the %RSD 2,4-dinitrophenol (32.1% RSD) for the initial calibration associated with all samples. Therefore, all 2,4-dinitrophenol results were considered estimated with positive results qualified "J" and nondetected results qualified "UJ".

Field Duplicate Precision

All field duplicate results were considered acceptable for the field duplicate pair MW-2 and MW-102 with the exception of the bis(2-ethylhexyl)phthalate results (81 and 9.5 µg/L, respectively). Therefore, these results were considered estimated and qualified "J".

Usability

All TCL semivolatile sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The semivolatile data presented

by STL were 100% complete with all data considered usable and valid. The validated semivolatile laboratory data are tabulated and presented in Attachment A.

2.1.3 TCL Pesticide/PCBs

The following items were reviewed for compliancy in the pesticide/PCB analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- MS/MSD precision and accuracy
- MSB recoveries
- LCS recoveries
- Laboratory method blank contamination
- Sample result verification and identification
- Initial calibrations
- Verification calibrations
- Analytical sequence
- Chromatogram quality
- Field duplicate precision
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols.

Usability

All TCL pesticide/PCB sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The pesticide/PCB data presented by STL were 100% complete and all data were considered valid and usable. The validated pesticide/PCB data are tabulated and presented in Attachment A.

2.1.4 TAL Metals

The following items were reviewed for compliancy in the metals analysis:

- Custody documentation
- Holding times
- Initial and continuing calibration verifications
- Initial and continuing calibration and laboratory preparation blank contamination
- Inductively coupled plasma (ICP) interference check sample (ICS)
- Matrix spike recoveries
- Laboratory duplicate precision
- Field duplicate precision
- Laboratory control sample
- ICP serial dilution
- Sample result verification and identification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols.

Usability

All metals sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The metals data presented by STL were 100% complete and all data were considered valid and usable. The validated metals laboratory data are tabulated and presented in Attachment A.

TABLE 2.1-1
SUMMARY OF SAMPLE ANALYSES AND USABILITY
GROUNDWATER – SCOTIA

SAMPLE ID	MATRIX	SAMPLE <u>DATE</u>	TCL <u>VOCs</u>	TCL SVOCs	TCL PEST/PCBs	TAL <u>METALS</u>	
MW-2	WATER	8/1/00	ОК	OK	ок	OK	
MW-102	WATER	8/1/00	ок	ОК	ок	ОК	
MW-1	WATER	8/1/00	OK	ок	ОК	ОК	
MW-3	WATER	8/1/00	OK			ОК	
MW-6	WATER	8/1/00	OK			ОК	
MW-7	WATER	8/1/00	ОК			ОК	
TRIP BLANK	WATER	8/1/00	OK				
TOTAL SAMPL	ES:		7	3	3	6	

NOTES:

OK

- Sample analysis considered valid and usable.

ATTACHMENT A VALIDATED LABORATORY DATA

					Dup of MW-2				
Defense Log	Defense Logistics Agency	SAMPLE ID:	MW-1	MW-2	MV-102	MW-3	MW-6	MW-7	TRIPBLANK
Scotia, NY		58 0:	COH030303-003	СОН030303-001	СОН030303-002	СОН030303-004	СОН030303-005	COH030303-006	COH030303-007
Validated Gr	Validated Groundwater Sampling	SOURCE:	STL Pittsburgh						
Round 1		SDG:	COH030303	COH030303	COH030303	COH030303	COH030303	СОН030303	COH030303
SDG: COH030303	330303	MATRIX:	Water						
		SAMPLED:	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000
		VALIDATED:	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000
CAS NO.	COMPOUND	UNITS:							
67-64-1	Acetone	Jg.	۲.7 ب	5 S	10 UJ	3	± €	2.2 J	10 U
71-43-2	Benzene	ηgη	۱ د	7	7	7	10	10	10
75-27-4	Bromodichloromethane	γgν	10	-	7	10	10		10
75-25-2	Вготобот	ηď	3	3	3	3	3	3	10.1
74-83-9	Bromomethane	Ng/L	2 W	2 U)	2 ₪	2 C	2 C	7	2 00
78-93-3	2-Butanone	ηgη	S UJ	2 ₪	5 UJ	5 U	5 U	200	20.2
75-15-0	Carbon disulfide	γgν	<u>-</u>	10	7	-	10		, n
56-23-5	Carbon tetrachioride	ug/L	0.74 J	1	-	3.3	10	7	10
108-90-7	Chlorobenzene	ug/L	٦ د	<u>۔</u> ت	-	7	10	7	10
124-48-1	Dibromochloromethane	ng/L	٦ ا	7	7	7	- 0	7	10
75-00-3	Chloroethane	ηď	2 ₪	2 W	2 UJ	2 0	2 W	2 0.0	2 UN
67-66-3	Chioroform	ng/L	٦ 0	-	7	7	10	10	10
74-87-3	Chloromethane	ηď	2 W	2 W	2 ₪	2 W	2 W	2 W	2 W
75-34-3	1,1-Dichloroethane	νgΛ	٦ 0	-	1	7	10	10	10
107-06-2	1,2-Dichloroethane	υgγ	-	-	1	7	10	7	10
75-35-4	1,1-Dichloroethene	ηď	٦ د	-	1	-	- 0	7	10
540-59-0	1,2-Dichloroethene (total)	ηď	٦ 0	-	1 0	-	7	7	7
78-87-5	1,2-Dichloropropane	ηĝη	- -	-	7	<u>-</u>	10	7	7
10061-01-5	cis-1,3-Dichloropropene	ηĝη	-	-	-	<u>۔</u>	٦ C	-	7
10061-02-6	trans-1,3-Dichloropropene	1 0	٦ 0	- -	-	-	٦ 0	٦ 0	٦ 0
414001	Ethylbenzene	rg/	٦ -	-	1	<u> </u>	10	<u>۱</u>	10
591-78-6	2-Hexanone	ηď	2 U	2 ∪	2 ∩	2 ∪	2 ∪	2 ∪	5 U
75-09-2	Methylene chloride	ng/L	2 U	2 ∪	2 U	2 U	2 U	2 ∪	3.9
108-10-1	4-Methyl-2-pentanone	ng/L	9 N	2 ∩	5 U	5 U	2 ∩	2 ∩	2 ∪
100-42-5	Styrene	ngγ	1	3	-	3	- 3	3	-
79-34-5	1,1,2,2-Tetrachloroethane	ηď	7	-	- -	-	7	10	10
127-18-4	Tetrachloroethene	ηgη	-	<u>-</u>		-	10	-	7
108-88-3	Toluene	ηď	٦	<u>۔</u> د	- -	7	-	7	7
71-55-6	1,1,1-Trichloroethane	ng/L	-	-	- -	-	-	-	-
79-00-5	1,1,2-Trichloroethane	ngγ	٦ د	<u>-</u>	- -	-	_ 	-	10
79-01-6	Trichloroethene	ng/L	٦ ٢	0.84	ر 66.0	1	0.35 J	7	7
75-01-4	Vinyi chloride	γgη	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1330-20-7	Xylenes (total)	ug/L	1 U	1 N	1 U	10	10	10	7

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 1 SDG: COH030303 SDG: COH030303 CAS NO. COMPOUND 83-32-9 Acenaphthene 208-96-8 Acenaphthylene 120-12-7 Anthracene 205-99-2 Benzo(a)nthracene 205-99-2 Benzo(b)fluoranthene 191-24-2 Benzo(b)fluoranthene 191-24-2 Benzo(b)fluoranthene 191-24-2 Benzo(b)fluoranthene 191-24-2 Benzo(b)fluoranthene 101-35-3 Benzo(b)fluoranthene 111-44-4 bis(2-Chloroethoxy)methane 111-44-7 bis(2-Chloroethoxy)methane 111-44-7 Benzo(phenzyl phthalate 101-55-3 4-Bromophenyl phenyl ether 108-57-8 2-Chlorophenol 91-58-7 2-Chlorophenol 91-58-7 2-Chlorophenyl phenyl ether	SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED: UNITS:	MWV-1 COH030303-003 STL Pittsburgh COH039303 Water 8/1/2000	MW-2 COH030303-001	MW-102	MW-3	MW-6	MW-7	TRIPBLANK
29 HO 0	LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED: UNITS:	STL Pittsburgh COH039303 Water 8/1/2000	COH030303-001			Son entrenance		200 00000000000000000000000000000000000
OHO CONTRACTOR OF CONTRACTOR O	SOURCE: SDG: MATRIX: SAMPLED: VALIDATED: UNITS:	STL Pittsburgh COH030303 Water 8/1/2000	STI Pittsburgh	COH030303-002	COH030303-004		COH030303-006	
OH03 - 1 - 2 - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2	SDG: MATRIX: SAMPLED: VALIDATED: UNITS:	COH030303 Water 8/1/2000		STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STI. Pittsburgh
OHO S S S S S S S S S S S S S S S S S S	MATRIX: SAMPLED: VALIDATED: UNITS: ug/L	Water 8/1/2000	COH030303	СОН030303	COH030303	COH030303	COHO30303	COH030303
	SAMPLED: VALIDATED: UNITS: ug/L	8/1/2000	Water	Water	Water	Water	Weter	Water
	VALIDATED: UNITS: ug/L	0/15/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	6/1/2000	8/1/2000
	UNITS:	2007	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	J _o gu Losi							
m	J/gv							
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	75.	10 C	10 U	10 U				
- 0.00.0 = + b.00 m m	3	10 U	10 C	10 U				
202-+>0	Jon	10 C	10 U	10 U				
202-+	J/gn	10 U	10 U	10 U				
N 0 N - + > 0 0 0	J/gn	10 U	10 U	10 U				
m × - + > m	ng/k	10 O	10 U	10 U				
~ - + b m m %	- Joh	10 C	10 0	10 U				
-+	no/L	10 U						
*** " "	Jøn	10 U		. p				
	l/on	10 O	10 01					
	1 2 3 3	8.5	. 18 . L) -C				
	ng/k	10 C	10 01	10 11				
	ng/L	2 0	10 0	. p				
ه ۳	ng/t	10 C	10 U	10 U				
٠ <u>.</u>	J/gn	10 U	10 U	10 U				
<u>.</u>	- Ag	10 U	10 0	10 U				
	1 8	10 C	10 C					
ေ	J/gn	10 C	10 U	10 U				
	ng/L	10 U	10 U	10 U				
218-01-9 Chrysene	ηď	10 U	10 U	10 U				
	γδη	10 U	10 U	10 U				
<u></u>	760	10 U	10 U	10 C				
_	J/gn	10 C	10 U	10 U				
541-73-1 1,3-Dichlorobenzene	J/gn	10 U	10 U	10 U				
106-46-7 1,4-Dichlorobenzene	ng/L	10 U	10 U	10 U				
91-94-1 3,3'-Dichlorobenzidine	Ug/L	20 C	20 ∩	20 0				
120-83-2 2,4-Dichlorophenol	1	10 C	10 U	10 U				
84-66-2 Diethyl phthalate	νgn	5 D	10 U	10 U				
105-67-9 2,4-Dimethylphenol	ηď	10 U	10 U	10 U				
131-11-3 Dimethyl phthalate	νgη	10 U	10 U	10 U				
84-74-2 Di-n-butyl phthalate	ng/L	10 U	10 U	10 U				
117-84-0 Di-n-octyl phthalate	ug/l.	10 U	10 U	10 U				

NATIONALIST SAMPLE ID: COMMONSTORY						Dup of MW-2				
Controlled Con	Defense Log	istics Agency	SAMPLE ID:	MW-1	MW-2	MW-102	MW-3	MW-6	MW-7	TRIPBLANK
GOMPOUND ST. Pittaburgh ST. Pittab	Scotia, NY		LAB ID:	COH030303-003	COH030303-001	COH030303-002	COH030303-004	COH030303-005	COHOSOSOS ODE	COHUMOSOSTOOS
COMPOUND COMPOUND	Validated Gr	oundwater Sampling	SOURCE:	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STI Pittsburgh	STI Pittshumb	STI Pittsburgh	STI Dittehumh
COMPOUND SAMPLED: 81/12000 81/12000	Round 1	•	spe:	COH030303	COH030303	COH030303	COHO30303	COHO30303	COHOSOSOS	COHOSOSOS
COMPOUND SAMPLED: 81/120000 81/120000 81/120000 81/120000 81/120000 81/120000 81/120000 81/120000 81/120000 81/1200000 81/1200000 81/1200000 81/1200000 81/12000000 81/120000 81/120000000 81/1200000000 81/1200000000 81/12000000000 81/1200000000000 81/1200000000000000000000000000000000000	SDG: COHO	30303	MATRIX:	Water	Water	Water	Water	Water	Water	Water
COMPOUND VALIDATED: 8115/2000 8115/2000 8115/200			SAMPLED:	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000
COMPOUND UNITS: 2.4-Diritrophenol ug/L 50 UJ 50 UJ 2.4-Diritrophenol ug/L 10 U 10	,		VALIDATED:	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000
2.4-Dintrophenol ug/L 50 UJ 50 UJ 2.4-Dintrophenol ug/L 10 U 10 U 2.4-Dintrophenol ug/L 10 U 10 U 2.4-Dintrophenol ug/L 10 U 10 U Fluoranthene ug/L 10 U 10 U Fluoranthene ug/L 10 U 10 U Hexachloroberasene ug/L 10 U 10 U Hexachloroberadelene ug/L 10 U 10 U Le-Betrylphenol ug/L 10 U 10 U S-Metrylphenol ug/L 50 U 50 U S-Metrylphenol ug/L 50 U 50 U S-Metrylphenol ug/L 50 U 50 U A-Nitroaniline ug/L 50 U 50 U	CAS NO.	COMPOUND	UNITS:							
2.4-Diritrophenol ug/L 50 UJ 50 UJ 4.6-Diritrophenol ug/L 50 U 50 UJ 2.4-Diritrophenol ug/L 10 U 10 U 2.6-Diritrotoluene ug/L 10 U 10 U 1.5-Diritrotoluene ug/L 10 U 10 U 1.6-Diritrotoluene ug/L 10 U 10 U 1.6-Loranthene ug/L 10 U 10 U 1.6-Loranthene ug/L 10 U 10 U 1.6-Mitrotoloretradiene ug/L 10 U 10 U 1.6-Matchiphenol ug/L 10 U 10 U 1.6-Methylphenol ug/L 10 U 10 U 2-Methylphenol ug/L 20 U 20 U 2-Methylphenol ug/L 50 U 50 U 3-Methylphenol ug/L 50 U 50 U 3-Methylphenol ug/L 50 U 50 U 4-Nitrophenol ug/L 10 U 10 U Nhitoberzere ug/L 10 U 10 U										
2.4-Diritro2-methylphenol ug/L 50 U 50 U 2.4-Diritrotoluene ug/L 10 U 10 U 10 U 1.2-Christrotoluene ug/L 10 U 10 U 10 U 10 U Fluorene ug/L 10 U 10 U 10 U 10 U 10 U Hexachloroberache ug/L 10 U	51-28-5	2,4-Dinitrophenol	ug/L	20 OJ	50 UJ	50 UJ				
2.4-Dinitrotoluene ug/L 10 U 10	534-52-1	4.6-Dinitro-2-methylphenol	γgη	20 ∩	20 ∩	O OS				
2.8-Diritrotoluene ug/L 10 U 10	121-14-2	2,4-Dinitrotoluene	Ngv	10 U	5 U	10 0				
Fluorenthene ug/L 10 10 10 10 Hexachlorobenzene ug/L 10 10 10 10 Hexachlorocyclopentadiene ug/L 10 10 10 10 10 10 10 1	606-20-2	2,6-Dinitrotoluene	γgn		10 U	10 U				
Hexachlorobenzene ug/L 10 10 10 Hexachlorobenzene ug/L 10 10 10 10 Hexachlorobutadiene ug/L 10 10 10 10 10 10 10 1	206-44-0	Fluoranthene	ng/L		- - -	10 U				
Hexachlorobenzene	86-73-7	Fluorene	γgn	10 U	10 U	10 U				
Hexachlorobutadiene ug/L 10 U 10 U	118-74-1	Hexachiorobenzene	4	10 U	10 U	10 D				
Hexachlorocyclopentadiene ug/L 10 U 10	87-68-3	Hexachiorobutadiene	7	10 U	10 D	10 01				
Hexachloroethane ug/L 10 U 10	77-47-4	Hexachlorocyclopentadiene	νgν	50 U	O 09	20 0				
Indeno(1,2,3-cd)pyrene ug/L 10 U 10 U	67-72-1	Hexachioroethane	, gs	10 U	10 U	10 D				
Sophorone	193-39-5	Indeno(1,2,3-cd)pyrene	νgν.	10 U	10 U	10 0				
2-Methylaphtalene ug/L 10 U 10 U 2-Methylaphtalenel ug/L 10 U 10 U 3-Methylphenol & 4-Methylphenol ug/L 20 U 20 U 2-Nitroaniline ug/L 50 U 50 U 3-Nitroaniline ug/L 50 U 50 U 4-Nitroaniline ug/L 50 U 50 U 7-Nitrophenol ug/L 10 U 10 U 1-C-Laybis(1-Chloroporane) ug/L 10 U 10 U 1-C-Laybis(1-Chlorophenol ug/L 10 U 10 U 1-C-Laybis(1-Chlorophenol ug/L 10 U 10 U 1-C-Laybis(1-Chlorophenol ug/L 10 U 10 U	78-59-1	Isophorone	ng/L	10 U	10 U	10 0				
2-Methylphenol ug/L 10 U 10 U Naphthalene 4-Methylphenol 4-Methylphenol 20 U 20 U 2-Nitroaniline ug/L 50 U 50 U 50 U 3-Nitroaniline ug/L 50 U 50 U 50 U 4-Nitroaniline ug/L 50 U 50 U 50 U 2-Nitrophenol ug/L 10 U 10 U 10 U 7 - Nitrophenol ug/L 10 U 10 U 10 U 7 - Nitrophenol ug/L 10 U 10 U 10 U 7 - Nitrophenol ug/L 10 U 10 U 10 U 7 - Nitrophenol ug/L 10 U 10 U 10 U 7 - Nitrophenol ug/L 10 U 10 U 10 U 8 - Z-oxybis(1-Chloroponane) ug/L 10 U 10 U 10 U 9 - Phenol ug/L 10 U 10 U 10 U 1 - Z-t-frichlorophenol ug/L 10 U 10 U 10 U 2 - A E-Trichlorophenol ug/L	91-57-6	2-Methylnaphthalene	ug/L	10 U	10 U	10 U				
Naphthalene A-Methylphenol ug/L 10 U 20 U	95-48-7	2-Methylphenol	ug/L	10 U	10 U	10 U				
Naphthalene ug/L 10 U 10 U 2-Nitroaniline ug/L 50 U 50 U 3-Nitroaniline ug/L 50 U 50 U 4-Nitroaniline ug/L 50 U 50 U 7-Nitrophenol ug/L 10 U 10 U 8-Nitrophenol ug/L 10 U 10 U 9-Phenol ug/L 10 U 10 U 10 L ug/L 10 U 10 U <	65794-96-9	3-Methylphenol & 4-Methylphenol	γgν		O 02	20 U				
2-Nitroanitine ug/L 50 U 50 U 3-Nitroanitine ug/L 50 U 50 U 4-Nitroanitine ug/L 50 U 50 U 2-Nitrophenol ug/L 10 U 10 U 7 A-Nitrophenol ug/L 10 U 10 U 7 N-Nitroscotiphenol ug/L 10 U 10 U 8-Z-Y-Sybis(1-Chloropropane) ug/L 10 U 10 U 8-Z-Y-S-Trichlorophenol ug/L 10 U 10 U 8-Z-Y-Trichlorophenol ug/L 10 U 10 U	91-20-3	Naphthalene	ng√	10 U	10 U	10 U				
3-Nitroanitine ug/L 50 U 50 U 4-Nitrobenzene ug/L 10 U 10 U 10 U 2-Nitrophenol ug/L 10 U 10	88-74-4	2-Nitroaniline	ug/L	50 U	20 C	20 0				
4-Nitrobenizene ug/L 50 U 50 U Nitrobenzene ug/L 10 U 10 U 2-Nitrophenol ug/L 10 U 10 U 4-Nitrosodi-n-propylamine ug/L 10 U 10 U N-Nitrosodiphenylamine ug/L 10 U 10 U 2-2-oxybis(1-Chloropropane) ug/L 10 U 10 U Phenatchlorophenol ug/L 10 U 10 U Phenol ug/L 10 U 10 U Pyrene ug/L 10 U 10 U Pyrene ug/L 10 U 10 U 2.4.5-Trichlorobenzene ug/L 10 U 10 U 2.4.5-Trichlorophenol ug/L 10 U 10 U	99-09-2	3-Nitroaniine	76 0	20 U	20 0	20 C				
Nitrobenzene ug/L 10 U 10 U 10 U 2-Nitrophenol ug/L 10 U 10	100-01-6	4-Nitroaniline	γgν	20 U	20 ∩	50 U				
2-Nitrophenol ug/L 10 U 10 U 4-Nitrophenol ug/L 50 U 50 U N-Nitrosodi-n-propylamine ug/L 10 U 10 U N-Nitrosodiphenylamine ug/L 10 U 10 U 2,2-oxybis(1-Chloropropane) ug/L 50 U 50 U Phenachiorophenol ug/L 50 U 50 U Phenal ug/L 10 U 10 U Pyrene ug/L 10 U 10 U 1,2,4-Trichlorobenzene ug/L 10 U 10 U 2,4,5-Trichlorophenol ug/L 10 U 10 U 2,4,5-Trichlorophenol ug/L 10 U 10 U	98-95-3	Nitrobenzene	NgV		10 U	10 U				
4-Nitrophenol ug/L 50 U 50 U N-Nitrosodi-n-propylamine ug/L 10 U 10 U N-Nitrosodiphenylamine ug/L 10 U 10 U 2,2-oxybis(1-Chloropropane) ug/L 50 U 50 U Pentachiorophenol ug/L 10 U 10 U Phenal ug/L 10 U 10 U Pyrene ug/L 10 U 10 U 1,2,4-Trichlorobenzene ug/L 10 U 10 U 2,4,5-Trichlorophenol ug/L 10 U 10 U 2,4,5-Trichlorophenol ug/L 10 U 10 U	88-75-5	2-Nitrophenol	γgν	10 U	10 U	10 U				
N-Nitrosodi-n-propylamine ug/L 10 U 10	100-02-7	4-Nitrophenol	vg/L		O 03	20 0				
N-Nitrosodiphenylamine ug/L 10 U 10 U 2,2'-oxybis(1-Chloropropane) ug/L 10 U 10 U Pentachlorophenol ug/L 10 U 10 U Phenol ug/L 10 U 10 U Pyrene ug/L 10 U 10 U 1,2,4-Trichlorobenzene ug/L 10 U 10 U 2,4,5-Trichlorophenol ug/L 10 U 10 U	621-64-7	N-Nitrosodi-n-propylamine	7gv	10 U	5 U	10 U				
2,2'-oxybis(1-Chloropropane) ug/L 10 U 10 U Pentachlorophenol ug/L 50 U 50 U Phenanthrene ug/L 10 U 10 U Pyrene ug/L 10 U 10 U 1,2,4-Trichlorobenzene ug/L 10 U 10 U 2,4,5-Trichlorophenol ug/L 10 U 10 U	86-30-6	N-Nitrosodiphenylamine	ug/L	10 U	10 U	10 U				
Pentachiorophenol ug/L 50 U 50 U Phenanthrene ug/L 10 U 10 U Phenol ug/L 10 U 10 U Pyrene ug/L 10 U 10 U 1,2,4-Tricklorophenol ug/L 10 U 10 U 2,4,5-Tricklorophenol ug/L 10 U 10 U	108-60-1	2,2'-oxybis(1-Chloropropane)	ng/L	10 U	10 U	10 U				
Phenalthrene ug/L 10 U 10 U 10 U Phenol Ug/L 10 U 10 U 10 U 10 U 1,2,4-Trichlorobenzene ug/L 10 U 10 U 2,4,5-Trichlorophenol ug/L 10 U 10	87-86-5	Pentachiorophenol	ng/L	20 U	20 C	20 U				
Phenol	85-01-8	Phenanthrene	ng/L	10 U	10 U	10 0				
Pyrene 1,2,4-Trichlorobenzene ug/L 10 U 10 U 10 U 2,4,5-Trichlorophenol ug/L 10 U 10	108-95-2	Phenol	υg/L	10 U	10 U	10 U				
1.2.4-Trichlorobenzene ug/L 10 U 10 U 2.4.5-Trichlorophenol ug/L 10 U 10 U 2.4.5-Trichlorophenol ug/L 10 U 10 U 10 U	129-00-0	Pyrene	υgΛ	10 U	10 U	10 U				
2.4.5-Trichlorophenol ug/L 10 U 10 U	120-82-1	1,2,4-Trichlorobenzene	ωγ	10 U	10 U	10 U				
2 & A. Trichlorophenol	95-95-4	2,4,5-Trichlorophenol	γģγ	10 U	10 U	10 U				
	88-06-2	2,4,6-Trichlorophenol	7/2	10 U	2 00	10 11				

MAY-2 MAY-1 MAY-2 MAY-1 MAY-2 MAY-2 MAY-1 MAY-2 MAY-1 MAY-2 MAY-1 MAY-2 MAY-						Cup of MW-2				
Control Cont	Defense Log	stics Agency	SAMPLE ID:	MW-1	MW-2	MW-102	MW-3	MW-6	27AM	TRIPBLANK
SOURICE: STL Prisburgh STL STL Prisburgh STL STL Prisburgh STL	Scotia, NY		LAB ID:	COH030303-003	COH030303-001	COH030303-002	COH030303-004	COH030303-005	СОН030303-006	СОН030303-007
SACIONATIONAL SAMPLED: Water Wat	Validated Gro	oundwater Sampling	SOURCE	STL Pittsburgh	STI. Pittsburgh					
National Compound	Round 1		SDG:	COH030303	COH030303	COH030303	COH030303	COH030303	СОН030303	COH030303
SAMPLED: 81/2000 81/	SDG: COHO	30303	MATRIX:	Water						
COMPOUND VALIDATED: 9/15/2000 9/15/2			SAMPLED:	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000
COMPOUND UNITS: COMPOUND UNITS: COMPOUND UNITS: COMPOUND UNITS: COMPOUND COMPOU			VALIDATED:	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	8/15/2000	9/15/2000
apha-BHC beta-BHC beta-BHC cannot bet	CAS NO.	COMPOUND	UNITS:							
alpha-BHC ug/L 0.05 U 0.05 U beta-BHC ug/L 0.05 U 0.05 U defta-BHC ug/L 0.05 U 0.05 U gamma-BHC (Lindane) ug/L 0.05 U 0.05 U Addrin ug/L 0.05 U 0.05 U Heptachlor epoxide ug/L 0.05 U 0.05 U Endosulfan I ug/L 0.05 U 0.05 U Endosulfan I ug/L 0.05 U 0.05 U Endosulfan I ug/L 0.05 U 0.05 U Endosulfan sulfate ug/L 0.05 U 0.05 U Endosulfan II ug/L 0.05 U 0.05 U Endosulfan sulfate ug/L 0.05 U 0.05 U Endosulfan sulfate ug/L 0.05 U 0.05 U A+-DDD ug/L 0.05 U 0.05 U Endosulfan sulfate ug/L 0.05 U 0.05 U Endosulfan sulfate ug/L 0.05 U 0.05 U Endosulfan sulfate ug/L 0.05 U 0.05 U										
beta-BHC deta-BHC ug/L 0.05 U 0.05	319-84-6	alpha-BHC	ug/L	0.05 U	0.05 U	0.05 ∪				
detta-BHC ug/L 0.05 U 0.05 U Gamma-BHC (Lindane) ug/L 0.05 U 0.05 U Addin ug/L 0.05 U 0.05 U Heptachlor epoxide ug/L 0.05 U 0.05 U Endosulfan I ug/L 0.05 U 0.05 U Endosulfan I ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endrin sulfate ug/L 0.05 U 0.05 U Endosulfan II ug/L 0.05 U 0.05 U Endosulfan II ug/L 0.05 U 0.05 U Endosulfan II ug/L 0.05 U 0.05 U Methoxychlor ug/L 0.05 U 0.05 U Ar-DDD ug/L 0.05 U 0.05 U Arodor 1221 ug/L 0.05 U 0.05 U Arodor 1221 ug/L 0.05 U 0.05 U Arodor 1232 ug/L 0.05 U 0.05 U <td< th=""><th>319-85-7</th><th>beta-BHC</th><th>Ngv.</th><th>0.05 U</th><th>0.05 U</th><th>0.05 ∪</th><th></th><th></th><th></th><th></th></td<>	319-85-7	beta-BHC	Ngv.	0.05 U	0.05 U	0.05 ∪				
gamma-BHC (Lindane) ug/L 0.05 U 0.05 U Heptachlor ug/L 0.05 U 0.05 U 0.05 U Aldrin ug/L 0.05 U 0.05 U 0.05 U Endosulfan I ug/L 0.05 U 0.05 U 0.05 U Dieldrin ug/L 0.05 U 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U 0.05 U Endrin stetone ug/L 0.05 U 0.05 U 0.05 U Endrin stetone ug/L 0.05 U 0.05 U 0.05 U Endrin stetone ug/L 0.05 U 0.05 U 0.05 U Endrin stetone ug/L 0.05 U 0.05 U 0.05 U Endrin stetone ug/L 0.05 U 0.05 U 0.05 U Endrin suffate ug/L 0.05 U 0.05 U 0.05 U Arodor 1221 ug/L 1 U 1 U Arodor 1224 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U	319-86-8	detta-BHC	ng/L	0.05 U	0.05 U	0.05 U				
Heptachlor ug/L 0.05 U 0.05 U Aldrin ug/L 0.05 U 0.05 U 0.05 U Endosulfan I ug/L 0.05 U 0.05 U 0.05 U Diedrin 4,4-DDE ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U 0.05 U Ardolor 1221 ug/L 0.05 U 0.05 U 0.05 U Arodor 1221 ug/L 1 U 1 U Arodor 124 ug/L 1 U 1 U Arodor 124 ug/L 1 U 1 U Ar	58-89-9	gamma-BHC (Lindane)	Ng/L	0.05 U	0.05 U					
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Heptachlor epoxide ug/L 0.05 U 0.05 U Endosulfan I ug/L 0.05 U 0.05 U A,4'-DDE ug/L 0.05 U 0.05 U Endrin ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endrin sidehyde ug/L 0.05 U 0.05 U Endosulfan silfehyde ug/L 0.05 U 0.05 U Endosulfan sulfate ug/L 0.05 U 0.05 U A,4'-DDD ug/L 0.05 U 0.05 U A,4'-DDT ug/L 0.05 U 0.05 U Balpha-Chlordane ug/L 0.05 U 0.05 U Arockor 1016 ug/L 1 U 1 U Arockor 1221 ug/L 1 U 1 U Arockor 1248 ug/L 1 U 1 U Arockor 1254 ug/L 1 U 1 U Arockor 1254 ug/L 1 U 1 U Arockor 1254	309-00-2	Aldrin	γgΛ	0.05 U	0.05 U					
Endosulfan I ug/L 0.05 U 0.05 U Dieldrin ug/L 0.05 U 0.05 U 4,4'-DDE ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endrin stdehyde ug/L 0.05 U 0.05 U Endosulfan sulfate ug/L 0.05 U 0.05 U 4,4'-DDD ug/L 0.05 U 0.05 U A+4'-DDT ug/L 0.05 U 0.05 U gamma-Chlordane ug/L 0.05 U 0.05 U gamma-Chlordane ug/L 0.05 U 0.05 U Arockor 1221 ug/L 1 U 1 U Arockor 1221 ug/L 1 U 1 U Arockor 1248 ug/L 1 U 1 U Arockor 1254 ug/L 1 U 1 U Arockor 1254 ug/L 1 U 1 U Arockor 1254 ug/L 1 U 1 U	1024-57-3	Heptachlor epoxide	ug/L	0.05 U	0.05 U	0.05 ∪				
Dieldrin ug/L 0.05 U 0.05 U 4,4*-DDE ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endosulfan ill ug/L 0.05 U 0.05 U 4,4*-DDD ug/L 0.05 U 0.05 U A+4*-DDT ug/L 0.05 U 0.05 U Arockrior ug/L 0.05 U 0.05 U Arockriorane ug/L 0.05 U 0.05 U Arockriorane ug/L 1 U 1 U Arockrior 122 ug/L 1 U 1 U Arockrior 123 ug/L 1 U 1 U Arockrior 124 ug/L 1 U 1 U Arockrior 124 ug/L 1 U 1 U Arockrior 1254 ug/L 1 U 1 U	959-98-8	Endosulfan I	νøν	0.05 ∪	0.05 U	0.05 U				
### Chlore ### Chlore ### Chlore ### Chlordane ### Chl	60-57-1	Dieldrin	νgν	0.05 U	0.05 U	0.05 U				
Endrin ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endosulfan il ug/L 0.05 U 0.05 U 4,4'-DDD ug/L 0.05 U 0.05 U 4,4'-DDT ug/L 0.05 U 0.05 U Ar-DDT ug/L 0.05 U 0.05 U Arockor 1016 ug/L 1 U 1 U Arockor 1221 ug/L 1 U 1 U Arockor 1242 ug/L 1 U 1 U Arockor 1248 ug/L 1 U 1 U Arockor 1254 ug/L 1 U 1 U Arockor 1254 ug/L 1 U 1 U Arockor 1248 ug/L 1 U 1 U Arockor 1254 ug/L 1 U 1 U	72-55-9	4,4'-DDE	ug/L	0.05 U	0.05 U	0.05 ∪				
Endrin ketone ug/L 0.05 U 0.05 U Endrin aldehyde ug/L 0.05 U 0.05 U Endosulfan II ug/L 0.05 U 0.05 U 4,4'-DDD ug/L 0.05 U 0.05 U 4,4'-DDT ug/L 0.05 U 0.05 U gamma-Chlordane ug/L 0.05 U 0.05 U Arodor 121 ug/L 1 U 1 U Arodor 1221 ug/L 1 U 1 U Arodor 1242 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U	72-20-8	Endrin	ugV	0.05 U	0.05 U					
Endrin aldehyde ug/L 0.05 U 0.05 U Endosulfan II ug/L 0.05 U 0.05 U 4,4'-DDD ug/L 0.05 U 0.05 U 4,4'-DDT ug/L 0.05 U 0.05 U Methoxychlor ug/L 0.05 U 0.05 U gamma-Chlordane ug/L 0.05 U 2 U Arodor 121 ug/L 1 U 1 U Arodor 1221 ug/L 1 U 1 U Arodor 1242 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U	53494-70-5	Endrin ketone	ያ	0.05 U	0.05 U					
Endosulfan II ug/L 0.05 U 1 U 1 U 1 U 1 U 1 U 1 U 0.05 U 1 U 0.05 U 0.05 U 1 U 0.05 U 0.05 U 1 U 1 U 1 U 1 U 1 U 1 U 0.05 U 0.05 U 0.05 U 0.05 U 1 U 0.05 U 0.05 U 1 U 0.05 U 0.05 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U	7421-93-4	Endrin aldehyde	ug/L	0.05 U	0.05 U					
### Arciol 100	33213-65-9	Endosulfan II	ሜ	0.05 U	0.05 U					
Endosulfan sulfate ug/L 0.05 U 1 U 1 U 1 U 1 U 1 U 1 U 0.05 U 0.05 U 0.05 U 1 U 0.05 U 1 U 0.05 U 0.05 U 1 U 1 U 1 U 1 U 1 U 0.05 U 0.05 U 0.05 U 0.05 U 0.05 U 1 U 0.05 U 0.05 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U	72-54-8	4,4'-DDD	ηď	0.05 ∪	0.05 U	0.05 ∪				
4,4'-DDT ug/L 0.05 U 0.05 U Methoxychlor ug/L 0.1 U 0.1 U gamma-Chlordane ug/L 0.05 U 0.05 U Toxaphene ug/L 1 U 1 U Arodor 121 ug/L 1 U 1 U Arodor 1221 ug/L 1 U 1 U Arodor 1242 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U	1031-07-8	Endosulfan sulfate	ng/L	0.05 U	0.05 ∪	0.05 U				
Methoxychlor ug/L 0.1 U 0.1 U alpha-Chlordane ug/L 0.05 U 0.05 U Toxaphene 2 U 2 U 2 U Arodor 121 ug/L 1 U 1 U Arodor 1221 ug/L 1 U 1 U Arodor 1242 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U	50-29-3	4,4'-DDT	ng/L	0.05 U	0.05 U	0.05 U				
alpha-Chlordane ug/L 0.05 U 0.05 U gamma-Chlordane ug/L 0.05 U 0.05 U Toxaphene 2 U 2 U 2 U Arodor 1016 ug/L 1 U 1 U Arodor 1221 ug/L 1 U 1 U Arodor 1242 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U Arodor 1254 ug/L 1 U 1 U	72-43-5	Methoxychlor	Ug/L	0.1 U	0.1 ∪	0.1 U				
gamma-Chlordane ug/L 0.05 U 2 U	5103-71-9	alpha-Chlordane	γgn	0.05 U	0.05 ∪	0.05 U				
Toxaphene ug/L 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 1 U	5103-74-2	gamma-Chlordane	Ng.	0.05 U	0.05 U	0.05 U				
Arodor 1016 Arodor 1221 Arodor 1232 Ug/L 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1	8001-35-2	Toxaphene	μgη							
Arodor 1216 ug/L 1 U 1 U 1 U 1 U 1 U Arodor 1221 ug/L 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1										
Arodor 1221 ug/L 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1	12674-11-2	Aroclor 1016	Ug/L	10	1	10				
Arodor 1232 ug/L 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1	11104-28-2	Aroctor 1221	νδη	10	7	10				
Arodor 1254 ug/L 1 U 1 U 1 L Arodor 1254 ug/L 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1	11141-16-5	Aroclor 1232	ug/L	1 0	1	10				
Arodor 1254 ug/L 1 U 1 U 1	53469-21-9	Aroclor 1242	Ug/L	10	7	10				
Arodor 1254 ug/L 1 U 1 U	12672-29-6	Arodor 1248	ug/L	10	10	10				
	11097-69-1	Aroclor 1254	ug/L	-	10	10				,
Arodor 1260 ug/L 1 1 U 1 1 U 1	11096-82-5	Aroclor 1260	ug/L	10	10	10				

					Dup of MW-2				
Defense Log	Defense Logistics Agency	SAMPLE ID:	MW-1	MW-2	MW-102	MW-3	MW-6	MW-7	TRIPBLANK
Scotia, NY		LAB ID:	COH030303-003	COH030303-001	СОН030303-002	СОН030303-004	COH030303-005	COH030303-008	COH030303-007
Validated G	Validated Groundwater Sampling	SOURCE	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittaburgh	STL Pittsburgh
Round 1		SDG:	COH030303	COH030303	COH030303	COH030303	COHo30303	COH030303	COH030303
SDG: COH030303	030303	MATRIX:	Water	Water	Water	Water	Water	Water	Water
		SAMPLED:	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000	8/1/2000
		VALIDATED:	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000	9/15/2000
CAS NO.	COMPOUND	UNITS:							
7429-90-5	Aluminum	ug/L	18200	722	699	\$	35.2 J	2480	
7440-36-0	Antimony	John John	1.5 U	1.5 U	1.5 U	1.5 U	1.5 J	1.5 U	
7440-38-2	Arsenic	γ'n	17.3	2.6 ∪	2.6 ∪	2.6 ∪	2.6 U	2.6 ∪	
7440-39-3	Barium	γgη	159 J	37 J	36.6 J	42)	15.3 J	86.8	
7440-41-7	Beryllium	정	0.98 J	0.071 U	0.14 J	0.14 J	0.09	0.16 J	
7440-43-9	Cadmium	J/gn	0.49	0.49 ∪	3.7 J	0.49 U	5.3	0.49	
7440-70-2	Calcium	ug/L	165000	75800	75500	75300	52500	98500	
7440-47-3	Chromium	Ug/L	29.5	2.1 J	2.6 J	2.3 J	-	4.2 J	
7440-48-4	Cobatt	ug/L	17 J	3.2 U	3.2 ∪	3.2 U	3.2 ∪	3.2 U	
7440-50-8	Copper	γ	65.5	2.2 U	2.5 J	2.2 ∪	2.2 ∪	2.2 U	
7439-89-6	Iron	γg	51000	1500	1390	782	118	3840	
7439-92-1	Lead	ug/L	16.2	1.9 U	1.9 ∪	1.9 U	1.9 U	1.9 U	
7439-95-4	Magnesium	ug/L	32900	21000	20700	16200	8	30300	
7439-96-5	Manganese	78	1090	58.9	55.1	5	1.2 J	189	
7439-97-6	Mercury	ሜሊ	0.055 J	0.045 U	0.045 U	0.071 J	0.045 U	0.045 U	
7440-02-0	Nickel	γ ₂ ν	27 J	6.1 U	6.1 ∪	6.1 ∪	6.1 U	6.1 ∪	
202369	2023695 Potassium	ارم	0699	635 J	752 J	1220 J	1470 J	1930 J	
7782-49-2	Selenium	상	6.4	2.1 U	2.1 U	2.1 ∪	2.1 U	2.1 C	
7440-22-4	Silver	ug/L	o. 2 ⊃	0.94 U	O.94 ∪	⊃ 3 .0	o.9 20.0	⊃ \$ 6.0	
7440-23-5	Sodium	78	10200	2020 J	2200 J	15300	14100	52300	_
7440-28-0	Thailtern	7	3.9 ∪	3.9 ∪	3.9 U	5.1 J	3.9 ∪	3.9 ∪	
7440-62-2	Vanadium	ሌያ/L	42.7 J	3.7 J	2.3 J	1.8 ∪	1.8 ∪	4.7 J	
7440-66-6	Zinc	ug/L	121	37.2	28.5	19.3 J	14.4 J	16.2 J	

DATA USABILITY SUMMARY REPORT

Prepared For:

UNITED STATES ARMY CORPS OF ENGINEERS

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TABLE OF CONTENTS

	PAGE
SECTION 1 DATA USABILITY SUMMARY	1-1
1.1 Laboratory Data Packages	1-1
1.2 Sampling and Chain-of-Custody	1-1
1.3 Laboratory Analytical Methods	
SECTION 2 DATA VALIDATION REPORT	2-1
2.1 Groundwater	
LIST OF TABLES	
Table 2.1-1 Summary of Sample Analyses and Usability - G	roundwater2-6
Table 2.1-2 TCL Volatile Continuing Calibration Outliers	2-7
LIST OF ATTACHMENT	s
ATTACHMENT A VALIDATED LABORATOR	Y DATA

SECTION 1

DATA USABILITY SUMMARY

Groundwater samples were collected from the Scotia site in Scotia, New York from October 30, 2000 through November 1, 2000. Analytical results from these samples were validated and reviewed by Parsons Engineering Science, Inc. (Parsons ES) for usability with respect to the following requirements:

- Work Plan,
- NYSDEC Analytical Services Protocol (ASP) dated September 1989 with October 1995 revisions, and
- USEPA Region II Standard Operating Procedures (SOP) in "CLP Organics Data Review and Preliminary Review," SOP No. HW-6, Revision #8, January 1992, and "Evaluation of Metals Data for the CLP Based on SOW 3/90," SOP No. HW-2, Revision #11, January 1992.

The analytical laboratory for this project was Severn Trent laboratories (STL)-Pittsburgh.

1.1 LABORATORY DATA PACKAGES

The laboratory data package turnaround time, defined as the time from sample receipt by the laboratory to receipt of the analytical data packages by Parsons ES, was 30 days on average for the water samples.

The data packages received from STL were paginated, complete, and overall were of good quality. Comments on specific quality control (QC) and other requirements are discussed in detail in the attached data validation report in Section 2.

1.2 SAMPLING AND CHAIN-OF-CUSTODY

The groundwater samples were collected, properly preserved, shipped under a COC record, and received at STL within one day of sampling. All samples were received intact and in good condition at STL.

1.3 LABORATORY ANALYTICAL METHODS

Groundwater samples were collected from the Scotia site and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. Summaries of issues concerning these laboratory analyses are presented in Subsections 1.3.1 through 1.3.4. The data qualifications resulting from the data validation review and statements on the laboratory analytical precision, accuracy, representativeness, completeness, and comparability (PARCC) are discussed for each analytical method in Section 2. The laboratory data were reviewed and may be qualified with the following validation flags:

"U" - not detected at the value given,

"UJ" - estimated and not detected at the value given,

"J" - estimated at the value given,

"N" - presumptive evidence at the value given, and

"R" - unusable value.

The validated laboratory data were tabulated and are presented in Attachment A.

1.3.1 Volatile Organic Analysis

The groundwater samples collected from the Scotia site were analyzed by STL for target compound list (TCL) VOCs using the NYSDEC ASP 8260B analytical method. Certain reported results for the TCL VOC samples were qualified as estimated due to noncompliant instrument calibrations. Certain reported TCL VOC sample results were considered unusable and qualified "R" due to poor instrument calibration linearity. Therefore, the reported TCL VOC analytical results were 99.8% complete (i.e., usable) for the groundwater data presented by STL, and PARCC requirements were met overall.

1.3.2 Semivolatile Organic Analysis

Certain groundwater samples collected from the Scotia site were analyzed by STL for TCL SVOCs using the NYSDEC ASP 8270C analytical method. The semivolatile sample data did not require qualification resulting from data validation. Therefore, the reported TCL SVOC analytical results were 100% complete with all data considered usable and valid for the groundwater data presented by STL, and PARCC requirements were met overall.

1.3.3 Pesticide/PCB Organic Analysis

Certain groundwater samples collected from the Scotia site were analyzed by STL for TCL pesticide/PCBs using the NYSDEC ASP 8081A and 8082 analytical methods. Certain reported results for the TCL pesticide/PCBs samples were qualified as estimated due to noncompliant instrument calibrations. Therefore, the reported TCL pesticide/PCB analytical results were 100% complete with all data considered usable and valid for the groundwater data presented by STL, and PARCC requirements were met overall.

1.3.4 Metals Analysis

Certain groundwater samples collected from the Scotia site were analyzed by STL for target analyte list (TAL) metals using the NYSDEC ASP 6010B/7470A /7471A analytical methods. Certain reported results for the metals samples were qualified as estimated due to noncompliant matrix spike recoveries and field duplicate precision. All of the metals data were considered usable and 100% complete for the groundwater data presented by STL, and PARCC requirements were met overall.

SECTION 2

DATA VALIDATION REPORT

2.1 GROUNDWATER

Data review has been completed for data packages generated by STL containing groundwater samples collected from the Scotia site. The specific samples contained in these data packages, the analyses performed, and a usability summary are presented in Table 2.1-1. All of these samples were properly preserved, shipped under a COC record, and received intact by the analytical laboratory. The validated laboratory data are presented in Attachment A.

Data validation was performed for all samples in accordance with the most current editions of the USEPA Region II SOPs and the NYSDEC ASP for organic and inorganic data review. This data validation and usability report is presented by analysis type.

2.1.1 TCL Volatiles

The following items were reviewed for compliancy in the volatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Matrix spike blank (MSB) recoveries
- Laboratory control sample (LCS) recoveries
- Laboratory method blank and trip blank contamination
- GC/MS instrument performance
- Sample result verification and identification
- Initial and continuing calibrations
- Internal standard area counts and retention times
- Field duplicate precision
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of blank contamination and initial and continuing calibrations.

Blank Contamination

The laboratory method blanks and trip blanks did not contain any TCL VOCs with the exception of trip blank TB-9 associated with B-2, 6, 1, and 3 and trip blank TB-10 associated with MW-6 and 7 which contained methylene chloride and acetone, respectively, at concentrations of 0.78 and 2.5 μ g/L, respectively. Since associated sample results were nondetects, validation qualification was not warranted for these samples due to these blank contamination.

Initial and Continuing Calibrations

All initial calibration compounds were compliant with a minimum relative response factor (RRF) of 0.05 and a maximum relative standard deviation (%RSD) of 30% with the exception of the %RSD for acetone (44.9% RSD) for the initial calibration associated with all samples. Therefore, all results for acetone were considered estimated with positive results qualified "J" and nondetected results qualified "UJ".

All continuing calibration compounds were compliant with a minimum relative response factor (RRF) of 0.05 and a maximum percent difference (%D) of ±25% with the exception of those compounds summarized in Table 2.1-2. Therefore, all results for these compounds in the associated samples were considered estimated with positive results qualified "J" and nondetected results qualified "UJ". However, the nondetected 2-butanone result for sample MW-1 was considered unusable and qualified "R" since the RRF for 2-butanone in the associated continuing calibration was noncompliant and less than 0.05.

Usability

All TCL volatile sample results were considered usable following data validation with the exception of the nondetected 2-butanone result for sample MW-1 due to poor calibration linearity for this compound.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The volatile data presented by STL were 99.8% complete (i.e., usable). The validated volatile laboratory data are tabulated and presented in Attachment A.

2.1.2 TCL Semivolatiles

The following items were reviewed for compliancy in the semivolatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- MS/MSD precision and accuracy

- MSB recoveries
- LCS recoveries
- Laboratory method blank and field blank contamination
- GC/MS instrument performance
- Sample result verification and identification
- Initial and continuing calibrations
- Internal standard area counts and retention times
- Field duplicate precision
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of MS/MSD precision and accuracy and LCS recoveries.

MS/MSD Precision and Accuracy and LCS Recoveries

All MS/MSD precision (relative percent difference; RPD) and accuracy (percent recovery; %R) measurements were compliant and within QC acceptance ranges with the exception of the MS/MSD recoveries for N-nitroso-di-n-propylamine (QC limit 18-115% R) during the spiked analyses of MW-1 (17% R/15% R). It was observed that this compound experienced similar recoveries during the spiked analyses of the LCS/LCSD (17% R/16% R). Therefore, since sample surrogates and internal standard responses were compliant, validation qualification was not warranted for the semivolatile samples due to these noncompliances. These noncompliances may be resulting from laboratory spiking errors.

Usability

All TCL semivolatile sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The semivolatile data presented by STL were 100% complete with all data considered usable and valid. The validated semivolatile laboratory data are tabulated and presented in Attachment A.

2.1.3 TCL Pesticides/PCBs

The following items were reviewed for compliancy in the pesticide/PCB analysis:

- Custody documentation
- Holding times
- Surrogate recoveries

- MS/MSD precision and accuracy
- MSB recoveries
- Laboratory method blank contamination
- Sample result verification and identification
- Initial calibrations
- Performance evaluation mixtures
- Verification calibrations
- Analytical sequence
- Cleanup efficiency
- Chromatogram quality
- Field duplicate precision
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of continuing calibrations.

Continuing Calibration Verification

All continuing calibration compounds were compliant with a maximum %D of $\pm 20\%$ with the exception of 4,4-DDD (28.2%D) and beta-BHC (-25.6%D) on the continuing calibration associated with all samples. Therefore, sample results for these noncompliant compounds were considered estimated with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples.

Usability

All TCL pesticide/PCB results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The pesticide/PCB data presented by STL were 100% complete with all data considered usable and valid. The validated pesticide/PCB data are tabulated and presented in Attachment A.

2.1.4 TAL Metals

The following items were reviewed for compliancy in the metals analysis:

- Custody documentation
- Holding times

- Initial and continuing calibration, laboratory preparation blank, and field blank contamination
- Inductively coupled plasma (ICP) interference check sample (ICS)
- Matrix spike recoveries
- Laboratory duplicate precision
- Field duplicate precision
- Laboratory control sample
- ICP serial dilution
- Sample result verification and identification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of matrix spike recoveries and field duplicate precision.

Matrix Spike Recoveries

All the MS recoveries were within the 75-125% control limits and have concentrations less than four times the spiking concentration with the exception of the recoveries for aluminum (239.8%R and 235.5%R) associated with all groundwater samples. Therefore, positive aluminum results for these samples were considered estimated, possibly biased high, and qualified "J".

Field Duplicate Precision

All field duplicate results for sample MW-2 and its field duplicate MW-102 were considered acceptable with the exception of the results for manganese (75.5 and 39.6 μ g/L, respectively) and lead (3.1 μ g/L and nondetect, respectively). Therefore, these results in MW-2 and MW-102 were considered estimated with positive results qualified "J" and nondetected results qualified "UJ".

Usability

All metals sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The metals data presented by STL were 100% complete and all data were considered valid and usable. The validated metals laboratory data are tabulated and presented in Attachment A.

TABLE 2.1-1
SUMMARY OF SAMPLE ANALYSES AND USABILITY
GROUNDWATER – SCOTIA

SAMPLE ID	MATRIX	SAMPLE DATE	TCL VOCs	TCL SVOCs	TCL PEST/PCBs	TAL <u>METALS</u>	<u>FOOTNOTES</u>
MW-3	WATER	10/30/00	OK			OK	
MW-1	WATER	10/30/00	NO	OK	OK	OK	1
MW-2	WATER	10/30/00	OK	OK	OK	OK	
MW-102	WATER	10/30/00	OK	ОК	OK	OK	
TB-8	WATER	10/30/00	ОК				
B-2	WATER	10/31/00	ОК				
B-6	WATER	10/31/00	OK				
B-1	WATER	10/31/00	OK				
B-3	WATER	10/31/00	ОК				
TB-9	WATER	10/31/00	OK				
MW-7	WATER	11/1/00	ОК			OK	
MW-6	WATER	11/1/00	OK			OK	
TB-10	WATER	11/1/00	ОК				
TOTAL SAMPLE			13	3	3	6	

NOTES:

OK -Sample analysis considered valid and usable.

NO -Sample analysis has noncompliances resulting in unusable data. See appropriate footnote.

FOOTNOTES:

(1) Poor volatile calibration linearity for 2-butanone.

TABLE 2.1-2

TCL VOLATILE CONTINUING CALIBRATION OUTLIERS

GROUNDWATER - SCOTIA

Continuing Calibration	TCI Voletile	9/ D or DDF	Associated
<u>Date – Time</u>	TCL Volatile	<u>%D or RRF</u>	<u>Samples</u>
11/5/00 - 11:18	Chloroethane	28.4%D	MW-1
	Bromoform	31.5%D	
	1,1,2,2-Tetrachloroethane	35.4%D	
	2-butanone	63.3%D, RRF=0.040	
	4-methyl-2-pentanone	70.0%D	
	2-hexanone	70.7%D	
11/6/00 - 07:44	Bromomethane	26.7%D	MW-2, 102, 3, TB-8
	Acetone	32.5%D	
	2-butanone	33.9%D	
	4-methyl-2-pentanone	31.5%D	
	2-hexanone	33.8%D	
11/7/00 - 06:56	Bromomethane	28.4%D	MW-6, 7, TB-9, TB-10,
	Chloroethane	33.3%D	B-1, 2, 3, 6

NOTES: %D - Percent difference.

RRF - Relative response factor

ATTACHMENT A VALIDATED LABORATORY DATA

									7	
Defense Logistics Agency	ics Agency	SAMPLE ID:	7	B-2	2	2	MW-1	MW-2	MW-102	MW-3
Scotia, NY		¥8 ⊡	COK010280003	C0K010280001	COK010280004	COK010280002	C01310140002	CQ1310140003	C01310140004	CQ1310140001
Validated Grou	Validated Groundwater Sampling	SOURCE	STL Pittsburgh							
Round 2		SDG:	SCOTIA2							
SDG: Scotta2		MATRIX:	WATER							
		SAMPLED: VALIDATED:	10/31/2000	10/31/2000	10/31/2000	10/31/2000	10/30/2000	10/30/2000	10/30/2000	10/30/2000
CAS NO.	COMPOUND	UNITS:								
Γ										
67-64-1 A	Acetone	Ą	2.3 J	9 E	3 2 3	10 U	₽	10 W	5 W	10 UJ
71-43-2 B	Benzene	Ą) -	10	n •	1	1 C	10	10	10
75-27-4 B	Bromodichioromethane	ል	- -	10		7	-) -	10	10
75-25-2 B	Bromoform	Ng/	-	- -	-	- -	3	1	1 C	10
	Bromomethane	Ϋ́	2 W	2 W	2 W	3 M	2 U	2 W	2 W	2 W
	2-Butanone	ğ	5 U	5 U	5 U	2 ∪	œ	3 E	2 m	3 E
75-15-0	Carbon disuffide	Ą	- -	1 0	1 0	1 C	1 0	10	10	10
56-23-5 C	Carbon tetrachloride	Ź	٦ ٢	1 0	10	10	10	10	10	3.4
Ť	Chlorobenzene	Ž	10	10	10	10	10	1 0	10	10
124-48-1	Dibromochloromethane	ž	10	10	10	10	10	10	10	10
75-00-3	Chloroethane	ል	2 W	2 W	2 W	2 U	2 W	2 ∪	2 U	2 U
_	Chloroform	정	10	10	10	10	10	1 0	10	0.21 J
_	Chloromethane	Ϋ́	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	1,1-Dichloroethane	Ž,) 1	٦ ٢	٠ د	10	10	1 0	10	1 0
~	1,2-Dichloroethane	%	1 0	-	10	10	10	-	10	10
	1,1-Dichloroethene	76	-	-	10	10	10	٦ ٦	10	- -
_	1,2-Dichloroethene (total)	호 ·)) -	O :	10	10	1	٦ ٢	10
	1,2-Dichloropropane	Ng.) 1) -	D	10	٠ ١	-	7	1 0
_	cis-1,3-Dichloropropene	1	1) -	10	- -	10	-	1 C	- -
φ	trans-1,3-Dichloropropene	8	10)) 	10	1 0	-	10	10
	Ethylbenzene	5	0:) : - '	0:) : - '	0 :	o :)
	Z-rexanone	3 5) : ;	0 :	0 :	0 :	3 :	3 :		3 :
7-60-67	Metrylene Circline 4 Methyl 2 pentanone	3 3	2 2) = 	0 =		0 %	2 4	0.7	0 4
	Shampe) on	7 0			7 0	3 =	3 =	3 =	3 =
_	1,1,2,2-Tetrachloroethane	Ą	10) T	10	10	1 20	7		7
_	Tetrachioroethene	, Ja	10	10	7.5	10	10	10	0 1	100
	Toluene	J/gn	10) -	10	10	10	7	10	
71-55-6	1,1,1-Trichloroethane	ug/L	1 0	10	10	10	10	٦ ٢	10	7
79-00-5	1,1,2-Trichloroethane	ng/L	10	10	1 U	10	10	٦ ٢	10	7
	Trichloroethene	ug/L		1	10	10	0.27 J	٦ ٦	10	1 C
	Vinyl chloride	ng/L	2 U	2 U	2 0	2 0	2 U	2 U	2 U	2 U
1330-20-7	Xylenes (total)	ug/L	10	7	10	10	1 C	٦ ٦	1 U	10

Defense Logistics Agency Scotta, NY Validated Groundwater Sampling Round 2 SDG: Scotta2 SDG: Scotta2 CAS NO. COMPOUND 83-32-9 Acenaphthene 208-96-8 Acenaphthene 120-12-7 Anthracene 50-32-8 Benzo(a)anthracene 50-32-8 Benzo(a)anthracene 205-99-2 Benzo(b)fluoranthene 207-98-9 Benzo(b)fluoranthene	gring scene	SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX:	B-1 Coronozeooo3	B-2 COKO10280001 STI Pitteburrih	B-3 COK010280004	B-6 COK010280002	MW-1 C0J310140002	MW-2 C01310140003	MW-102 C0.316146004	MW-3 CQU310140001
d Ge	grand acene	LAB ID: SOURCE: SDG: MATRIX: SAMPLED:	COK010280003	COK010280001	COK010280004	COK010280002	C01310140002	CQ1310140003	C0.0310140004	C0.310140001
d Grading	pling scene	SOURCE: SDG: MATRIX: SAMPLED:	CTI Diffehimb	STI Pittshumb	CTI Dillachimet					CT Different
ootia2	9000	SDG: MATRIX: SAMPLED:	こうごうきにしょう			STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	
Sodia2	9000	MATRIX: SAMPLED:	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2
	90000	SAMPLED	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	e e e e e e e e e e e e e e e e e e e		10/31/2000	10/31/2000	10/31/2000	10/31/2000	10/30/2000	10/30/2000	10/30/2000	10/30/2000
	9000	VACIONIEU:	12/8/2000	0002/8/71	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000
	90000	UNITS:								
	e eeee	5					107	11 04	11 07	
	acene	5						2 5		
	icene	ğ					2 2	2 =	2 5	
	•	ş					100	5 5	2 0	
		ş						- P	1 O C	
	nthene	Z,					10 0	10 0	10 0	
	nthene	궣					10 0	10 0	10 C	
	riene	ş					10 U	10 U	10 C	
	bis(2-Chloroethoxy)methane	76V					10 0	10 U	10 C	
	nyi) ether	형					10 U	10 U	-0 -0 -0	
117-81-7 bis(2-Ethythexyr) phthalate	yf) phthalate	궣					10 U	10 U	10 U	
<u>۔</u>	1 phenyl ether	ş					10 C	J 01	10 U	
	hthalate	ş					10 U	10 U	10 U	
		호						10 U		
8		호					10 U	₽	- - -	
	thylphenol	3					10 U	10 U	10 U	
	halene	ş					10 U	5 ∪	10 U	
	-	ş					10 U	10 U	10 U	
e 6	4-Chlorophenyl phenyl ether	\$					10 U	₽	- - - -	
3		1					10 OF	우 그	5 0	
-	hracene	1						0 0	10 U	
		호					10 O	2 0 C	- - - -	
	nzene	5					10 U	10 U	-0 -0 -0	
	uzene	Ngv.					10 0	10 U	10 U	
_	nzene	19gh					10 U	10 U	10 U	
	enzidine enzidine	ug/L					20 ∩	20 ∩	20 ∩	
120-83-2 [2,4-Dichlorophenol	enol	ng/L					10 01	10 U	10 U	
	ite	Jør L					10 0	10 0	10 C	
105-67-9 2,4-Dimethylpheno	louer	ug/L					10 C	10 U	10 U	
131-11-3 Dimethyl phthalate	Nate	J/gn					10 U	10 U	10 U	
	alate	ng/L					10 0	10 U	10 U	
117-84-0 Di-n-octyl phthalate	alate	ng/L					10 U	200	10 0	

									Dup of MW-2	
Defense Logistics Agency	istics Agency	SAMPLE ID:	1-8	B-2	£-8	9-8	MW-1	MW-2	MW-102	MW-3
Scotia, NY		Ç a¥	COK010280003	C0K010280001	COK010280004	COK010280002	C01310140002	C01310140003	C01310140004	C0,310140001
Validated Gro	Validated Groundwater Sampling	SOURCE	STL Pittsburgh	STL Pittsburgh	STL Pittaburgh	STL Pittsburgh				
Round 2		SDG:	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2
SDG: Scotta2	8	MATRIX:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		SAMPLED: VALIDATED:	10/31/2000	10/31/2000	10/31/2000	10/31/2000	10/30/2000	10/30/2000	10/30/2000	10/30/2000
CAS NO.	COMPOUND	UNITS:					3	2020	20200	200200
41.28.K	2 4 Piritmohonol	1/01					Ş	5		
534.52.4	4 & Chiltre 2 mathritane	\$ 5					3 5	3 8	8 8	
121-14-2	2.4-Diritmtohiana	2					3 =	8 5	8 5	
606-20-2	2.6-Dintrotoluene	, S					5 5	2 0	5 5	
206-44-0	Fluoranthene	Z,					10 C	10 0	10 0	
86-73-7	Fluorene	¥					10 0 €	10 C	10 U	
118-74-1	Hexachlorobenzene	ž					-0 -0 -0	- - - -	10 C	
87-68-3	Hexachlorobutadlene	Ϋ́					10 C	10 C	10 0	
77-47-4	Hexachlorocyclopentadiene	첳					S ⊃	SS C	20 O	
67-72-1	Hexachloroethane	성					10 U	10 U	10 U	
193-39-5	Indeno(1,2,3-cd)pyrene	¥						10 C	10 U	
78-59-1	Isophorone	Z Z					0	10 C	10 U	
91-57-6	2-Methylnaphthalene	Į,					0 0	10 C	₽	
95-48-7	2-Methylphenol	5) 0 :	9 9 9	9 0 :	
65/84-96-9	3-Methylphenol & 4-Methylphenol	\$						2		
91-20-3	Naphrualene	, g					0 3	0 :	₽ (F	
99-79-2	3-Nitroeniine	3 3					8 8	2 2	2 2 3 5	
10001-6	4-Nitroaniine	705					200	28.88	2 2	
98-95-3	Nitrobenzene	, An					10 0	100	9 9	
88-75-5	2-Nitrophenol	70					- - - -	- O-	10 0	
100-02-7	4-Nitrophenoi	γď						∩ 0¢	20 0€	
621-64-7	N-Nitrosodi-n-propylamine	Jø,					10 U	10 O	10 U	
86-30-6	N-Nitrosodiphenylamine	Ą					- - - -	10 C	10 U	
108-60-1	2,2'-oxybis(1-Chloropropane)	76n					₽	10 U	10 U	
87-86-5	Pentachlorophenol	J/gn					S ⊃	S ⊃	os ∩	
85-01-8	Phenanthrene	ng/L					1 0 €	10 C	10 U	
108-95-2	Phenol	ng/L					10 U	10 C	10 U	
129-00-0	Pyrene	Ą					♀	10 C	10 U	
120-82-1	1,2,4-Trichlorobenzene	rg/L					₽	1 0 C	- 10 C	
95-95-4	2,4,5-Trichlorophenol	/g/					₽	. 0	10 U	
88-06-2	2,4,6-Trichlorophenoi	ng/L					10 U	10 U	10 U	

SAMPLE ID: B-1									COD OF MAY-2	
MATER CAURINGOOD CAURINGO		AMPLE ID:	<u>4</u>	8-5	8 3	2	MW-1	MW-2	MW-102	MW-3
SOURCE STIL Pittaburgh SCOTIAZ		AB ID:	COK010280003	COK010280001	COK010280004	COK010280002	C0J310140002	C0J310140003	C0.310140004	C01310140001
SCOTIAZ SCOTIAZ SCOTIAZ SCOTIAZ SCOTIAZ SCOTIAZ WATER	Sroundwater Sampling	OURCE:	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STI. Pittsburgh	STL Pittsburgh	STL Pettsbaroh	STI Piffschurch
MATRIX: WATER WA		ä	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2
SAMPLED: 1031/2000 1031/2000 1031/2000 1030/	-	MTRIX:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
VALIDATED: 128/2000	S	AMPLED:	10/31/2000	10/31/2000	10/31/2000	10/31/2000	10/30/2000	10/30/2000	10/30/2000	10/30/2000
COMPOUND UNITS: Units: COMPOUND Units: U	>	ALIDATED:	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000
ajchte-BHC ug/L ug/L 0.05 U 0	COMPOUND	NITS:								
Debt SHC										
Detar BHC Deta		2					0.05 U	0.05 ∪	0.05 ∪	
Heptachic ught 0.05 U		ፉ					0.05 UE	0.05 UL	0.05 U	
Heptachlor ug/L u		10 0					0.05 ∪	0.05 U	0.05 ∪	
Heptachlor ug/L Addrin ug/L		Ŕ					0.05 ∪	0.05 ∪	0.05 U	
Matrix	_	ng.					0.05 ∪	0.05 ∪	0.05 ∪	
Heptachlor epoxide ug/L Endosulfan ug/L U		Z,					0.05 U	0.05 U	0.05 ∪	
Endosulfan ug/L 0.05 U	_	Ą					0.05 ∪	0.05 U	0.05 ∪	
Dieldrin Ug/L O.05 U O		Ź					0.05 ∪	0.05 U	0.05 U	
4,4'-DDE ug/L 0.05 U 0.05 U Endrin ketone ug/L 0.05 U 0.05 U Endosusidan suffate ug/L 0.05 U 0.05 U Endosusifan suffate ug/L 0.05 U 0.05 U Endosusifan suffate ug/L 0.05 U 0.05 U A,4'-DDT ug/L 0.05 U 0.05 U Methoxychlor ug/L 0.05 U 0.05 U genma-Chlordane ug/L 0.05 U 0.05 U Toxaphene ug/L 1 U 1 U Arodor 1221 ug/L 1 U 1 U Arodor 1222 ug/L 1 U 1 U Arodor 1242 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U	_	Ą					0.05 ∪	0.05 ∪	0.05 ∪	
Endrin ketone ug/L Endrin ketone ug/L Endosulfan II ug/L 4.4-DDT Methoxychlor ug/L A4-DDT Methoxychlor ug/L A4-DDT Methoxychlor ug/L Arodor 1221 ug/L Arodor 1232 ug/L Arodor 1248 ug/L		γgη					0.05	0.05 U	0.05 U	
Endrin ketone ug/L Endrin aldehyde ug/L Endrin aldehyde ug/L Endosulfan II 4/4-DDD Gros U Gro		7					0.05 ∪	0.05 U	0.05 U	
Endrin aldehyde ug/L 0.05 U 0.		ል					0.05 ∪	0.0 5 U	0.05 U	
Endosulfan II ug/L 4,4'-DDD Endosulfan sulfate ug/L 4,4'-DDD Methoxychlor alpha-Chlordane ug/L Aroclor 1221 ug/L Aroclor 1221 ug/L Aroclor 1248 ug/L Aroclor 1248	_	Ž,					0.05 ∪	0.05 ∪	0.05 ∪	
4,4'-DDD ug/L 0.05 UJ 0.05 UJ Endosulfan sulfate ug/L 0.05 UJ 0.05 UJ 4,4'-DDT 0.05 UJ 0.05 UJ 0.05 UJ Methoxychlor ug/L 0.1 UJ 0.1 UJ gamma-Chlordane ug/L 0.05 UJ 0.05 UJ Arockor 1221 ug/L 1 UJ 1 UJ Arockor 1221 ug/L 1 UJ 1 UJ Arockor 1232 ug/L 1 UJ 1 UJ Arockor 1242 ug/L 1 UJ 1 UJ Arockor 1248 ug/L 1 UJ 1 UJ Arockor 1248 ug/L 1 UJ 1 UJ		ug/L					0.05 ∪	0.05 U	0.05 ∪	
Endosulfan sulfate ug/L 0.05 U 0.1 U 0.1 U 0.1 U 0.1 U 0.01 U 0.05 U 0		γ					0.05 UZ	0.05 UL	0.05 E	
4,4'-DDT ug/L 0.05 U 0.05 U Methoxychlor ug/L 0.1 U 0.1 U alpha-Chlordane ug/L 0.05 U 0.05 U Arockor 1221 ug/L 1 U 1 U Arockor 1232 ug/L 1 U 1 U Arockor 1242 ug/L 1 U 1 U Arockor 1248 ug/L 1 U 1 U Arockor 1248 ug/L 1 U 1 U Arockor 1248 ug/L 1 U 1 U	٣	J/8n					0.05 ∪	0.05 ∪	0.05 ∪	
Methoxychlor ug/L 0.1 U 0.1 U 0.1 U 0.1 U 0.1 U 0.1 U 0.05 U <th>_</th> <th>Ą</th> <th></th> <th></th> <th></th> <th></th> <th>0.05 ∪</th> <th>0.05 U</th> <th>0.05 ∪</th> <th></th>	_	Ą					0.05 ∪	0.0 5 U	0.05 ∪	
alpha-Chlordane ug/L 0.05 U 0.05 U gamma-Chlordane ug/L 2 U 2 U Arodor 1221 ug/L 1 U 1 U Arodor 1232 ug/L 1 U 1 U Arodor 1242 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U Arodor 1248 ug/L 1 U 1 U	_	궣					0.1 O	0.1 U	0.10	
gamma-Chlordane ug/L 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 2 U 1 U		Ą					0.05 U	0.05 ∪	0.05 ∪	
Toxaphene ug/L 2 U 2 Arodor 1016 ug/L 1 U 1 Arodor 1221 ug/L 1 U 1 Arodor 1242 ug/L 1 U 1 Arodor 1248 ug/L 1 U 1		Ž,					0.05 ∪	0.05 ∪	0.05 ∪	
Arodor 1016 Arodor 1221 Arodor 1232 Ug/L Arodor 1242 Ug/L Arodor 1248 Ug/L Arodor 1248	_	₩,					2 U		2 U	
Arodor 1016 Arodor 1221 Arodor 1232 Ug/L Arodor 1242 Ug/L Arodor 1248 Ug/L Arodor 1248 Ug/L					-					
Arockor 1221 ug/L 1U 1 1U		- - -						-	_ _	
Aroclor 1242 ug/L 1U 1 1U		Z,					-	10	10	
Arodor 1242 ug/L 1U 1		궣					<u> </u>	٦ -	_ 	
Aroclor 1248 ug/L 1 U		7					10	10	10	
Mar. 1	_	/gn					-	10	-	
Arodor 1254 Ug/L 1 0 1	11097-69-1 Arodor 1254	ug/L					7	7	10	
		ug/L					7	10	10	

Defense Loo	Defense Logistics Agency	SAMPLE ID.	2	2	B-3	2	LAW.1	LAMA 2	144/400	100.0
	(aa.			;		3		7-44	701-144	2
Scotia, NY		<u> </u>	COK010280003	COK010280001	C0K010280004	COK010280002	C0J310140D02	C0J310140003	C0,310140004	C01310140001
Validated Gn	Validated Groundwater Sampling	SOURCE	STL Pittsburgh							
Round 2		SDG:	SCOTIA2							
SDG: Scotta2	2	MATRIX:	WATER							
		SAMPLED:	10/31/2000	10/31/2000	10/31/2000	10/31/2000	10/30/2000	10/30/2000	10/30/2000	10/30/2000
		VALIDATED:	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000
CAS NO.	COMPOUND	UNITS:								
ľ										
7429-90-5	Aluminum	Ŋ					7390 J	1490 J	962 J	4140 J
7440-36-0	Antimony	Zď.					1.5 U	1.5 U	1.5 U	1.5 U
7440-38-2	Arsenic	ş					4.1 5	2.6 ∪	2.6 ∪	4.2 J
7440-39-3	Barium	ž		-			91.6 J	39.4 J	34.9 J	60.1
7440-41-7	Beryllum	7					0.41	0.071 U	0.071 U	0.17 J
7440-43-9	Cadmium	ş					0.49 ∪	0.49 U	0.49 U	0.49 U
7440-70-2	Calcium	ş					111000	96700	62000	82300
7440-47-3	Chromium	2					11.6	2.9 J	2 J	5.7 J
7440-48-4	Cobat	2					- R	3.2 ∪	3.2 ∪	3.2 ∪
7440-50-8	Copper	Ž,					7 22	7.1 J	2.3 J	10.6
7439-89-6	tron	ž					17000	2860	1450	7110
7439-92-1	Leed	ğ					6.7	3.1 J	1.9 W	4.9
7439-95-4	Magnesium	ş	_				25400	19300	18200	16600
7439-96-5	Manganese	Ž,					358	75.5 J	39.6 J	253
7439-97-6	Mercury	Ž	_				0.045 U	0.045 U	0.045 J	0.045 U
7440-02-0	Nickel	7					10.9	6.1 ∪	6.1 ∪	8.5 J
7440-09-7	Potassium	ž		_			3550 J	2150 J	1240 J	2560 J
7782-49-2	Selenium	760					2.7 J	2.1 U	2.1 U	2.5 J
7440-22-4	Silver	78					0.94 U	0.94 U	0.94 C	0.94 U
7440-23-5	Sodium	궣		_			0696	2310 J	2050 J	19000
7440-28-0	Thaffum	7g/					3.9 ∪	3.9 ∪	٠4	3.9 ∪
7440-62-2	Vanadium	76					18.3 J	4.6 J	1.8 ∪	9.5 J
7440-66-6	Zinc	ng/L					42.6	9.4 J	5.1 J	52

VIA 111.00				J- AAIAI	2	B	21-4
2 BB0		.¥8.⊡	COKOZOZSEOOZ	COK020256001	C0J310140006	COKO10280005	COKORORANDO
Validated Groundwater Sampling	dwater Sampling	SOURCE:	STL Pittsburgh				
Round 2	•	SDG:	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2
SDG: Scotia2		MATRIX:	WATER	WATER	WATER	WATER	WATER
		SAMPLED:	11/1/2000	11/1/2000	10/30/2000	10/31/2000	11/1/2000
Ì		VALIDATED:	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000
CAS NO. CC	COMPOUND	UNITS:					
67.64.1	Acatona	 	10 11	101	101	1	7 36
	Benzena	100	3 =	3 =	3 =	3 =	7
	Bromodichioromethane	100	? =) =			
	Bromoform	2	2	2	-		
	Bromomethane	J/On	2 W	2 W	2 W	2 W	2 E
•	2-Butanone	ug/L	2 ∪	2 ∩	2 W	5 U	5 U
_	Carbon disulfide	J/gv	10	_ _	-	7	-
_	Carbon tetrachloride	7gn	10	- -	-	1 0	1
	Chlorobenzene	1 00	-	1	10	10	10
124-48-1 DE	Dibromachloromethane	ng/L	-	1	<u> </u>	10	-
_	Chloroethane	Ng/	2 W	3 7	5 N 2	2 W	2 2 2
_	Chloroform	Age.	-	-	10	10	10
_	Chloromethane	ng/L	20	2 U	2 U	2 U	2 U
•	I,1-Dichioroethane	Υğ	1	_ 	•	10	1
<u>`</u>	1,2-Dichloroethane	ng/L	- -	7	10	10	-
_	1,1-Dichioroethene	1 66	-	- -	-	-	-
_	1,2-Dichloroethene (total)	ng/L	1 0	- -	-	10	-
_	,2-Dichloropropane	₩,	7	10	10	10	10
Ť	cis-1,3-Dichloropropene	Ng/	10	- -) 	- -	-
<u></u> φ	rans-1,3-Dichloropropene	2	1 0	-	-	1	-
_	Ethylbenzene	Ng/	10	-	-	- -	10
<u>~</u>	2-Hexanone	7gn	2 U	20	3	2 U	5 U
_	Methylene chloride	769	2 O	2 U	2 O	0.78 J	2 U
_	4-Methyi-2-pentanone	ng/L	20	5 U	3 2 2	5 U	2 O
<u> </u>	Styrene	ng/L	10	-	- -	10	10
_	1,1,2,2-Tetrachloroethane	ng/L	-	-	_ _	10	⊃ •
_	Tetrachloroethene	ng/L	7	_ _	10	10	10
108-88-3 To	Toluene	ng/L	1 0	10	10	10	10
	1,1,1-Trichloroethane	ng/L	7	- -	7	10	-
	1,1,2-Trichloroethane	ng/L	10	_ _		10	10
•	Trichloroethene	ng/L	0.54 J	- -	- -	10	1
	Vinyl chloride	ng/L	2 U	2 O	2 U	2 U	2 O
1330-20-7 Xy	Xylenes (total)	ng/L	10	10	1 U	10	10

Defense Log	Defense Logistics Agency	SAMPLE ID:	9-MM	MW-7	28	1	14-15 5-16
Scotia, NY		LAB ID:	COK020256002	C0K020256001	C01310140005	COK010280005	COKOZOZIBOOS
Validated Gn	Validated Groundwater Sampling	SOURCE:	STL Pittsburgh				
Round 2		SDG	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2
SDG: Scotta2	લ	MATRIX:	WATER	WATER	WATER	WATER	WATER
		SAMPLED:	11/1/2000	11/1/2000	10/30/2000	10/31/2000	11/1/2000
		VALIDATED:	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000
CAS NO.	COMPOUND	UNITS:					
82-10-0	Averagible	V					
208.06.8	Acerophyleses	3 2					
120-12-7	Anthonyone	3 2					
20.75		3 !					
2000		3 1					
90-36-0	Denzo a pyrene	3					
205-99-2	Benzo(b)Noranthene	5					
207-08-9	Benzo(k)fluoranthene	Z,					
191-24-2	Benzo(ghi)perylene	J⁄8n					
111-91-1	bis(2-Chloroethoxy)methane	J/gn					
111444	bis(2-Chloroethyl) ether	J/gn					
117-81-7	bis(2-Ethythexyt) phthalate	Ŋ					
101-55-3	4-Bromophenyi phenyi ether	/on					
85-68-7	Butyl benzyl phthalate	Z,					
86-74-8	Carbazole	Ngv.					
106-47-8	4-Chloroaniline	J/6n					
59-50-7	4-Chloro-3-methylphenol	Jon					
91-58-7	2-Chloronaphthalene	Ngv					
95-57-8	2-Chlorophenol	νgγ					
7005-72-3	4-Chlorophenyl phenyl ether	760			-		
218-01-9	Chrysene	J/Sn					
53-70-3	Dibenz(a,h)anthracene	Jon Jon					
132-64-9	Dibenzofuran	Zgn					
95-50-1	1,2-Dichlorobenzene	78					
541-73-1	1,3-Dichlorobenzene	ng/L					
106-46-7	1,4-Dichlorobenzene	760					
91-94-1	3,3'-Dichlorobenzidine	ηď					
120-83-2	2,4-Dichlorophenol	J/gn					
84-66-2	Diethyl phthalate	ng/L					
105-67-9	2,4-Dimethylphenol	ng/L					
131-11-3	Dimethyl phthalate	ng/L					
84-74-2	Di-n-butyl phthalate	ng/L					
117-84-0	Di-n-octyl phthalate	ug/L					

Defense Log	Defense Logistics Agency	SAMPLE ID:	MW-6	MW-7	TB-6	TB-9	TB-10
Scotta, NY		LAB ID:	COK020258002	C0K020256001	C01310140006	COKONICEBOOOS	COKOZOZSBOGS
Validated Gr	Validated Groundwater Sampling	SOURCE:	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittaburgh
Round 2		SDG:	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIAZ	SCOTIA2
SDG: Scotta2	લ	MATRIX:	WATER	WATER	WATER	WATER	WATER
		SAMPLED:	11/1/2000	11/1/2000	10/30/2000	10/31/2000	11/1/2000
		VALIDATED:	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000
CAS NO.	COMPOUND	UNITS:					
51-28-5	2.4-Dinimohenol	J/on				,	
534.52.1	4 & Dinim 2-methodopenal	, ,					
121-14-2	2.4-Dinitrothiuene	2/2					
ROG-20-2	2 A.Dinitrothisana	1 2					
206-44-0	Fluoranthene	, pa					
86-73-7	Fluorene	궣					
118-74-1	Hexachlorobenzene	ng/L					
87-68-3	Hexachlorobutadiene	. Joh					
77-47-4	Hexachlorocyclopentadiene	no/l					
67-72-1	Hexachloroethane	, do					
402 20 E	Indiano(4.2.4.mone	, ,					
78-59-1	Incerco, 1,4,5-culpyrene	<u> </u>					
91-57-6	Z-Wettythaphthatene	1					
		*					
65794-96-9	3-Methylphenol & 4-Methylphenol	ng/L					
91-20-3	Naphthalene	ng/L					
88-74-4	2-Nitroaniifne	ng/L					
99-09-2	3-Nitroaniline	√g/L					
100-01-6	4-Nitrograffine	ν _φ					
98-95-3	Nitrobertzene	ng/L					
88-75-5	2-Nitrophenoi	J/6n					
100-02-7	4-Nitrophenol	ug/L					
621-64-7	N-Nitrosodi-n-propylamine	ng/L					
96-30-6	N-Nitrosodiphenylamine	J/gn					
108-60-1	2,2'-oxybis(1-Chloropropane)	Jøn Jøn					
87-86-5	Pentachlorophenol	, 5 5					
85-01-8	Phenanthrene	7/50					
108-95-2	Phenot	, Joh					
129-00-0	Pyrene	, Jø					
120-82-1	1,2,4-Trichlorobenzene	/g/					
95-95-4	2,4,5-Trichlorophenol	NOV.					
88-06-2	2.4.6-Trichlorophenol	no/					

Comparison		Defense Logistics Agency	SAMPLE ID:	MW-6	MW-7	78 -8	18-0	TB-10
COMPOUND SOURCE: STL Pittaburgh	Scotia, NY		<u> 7</u> 8€	COM020256002	COK020256001	C0J310140005	COK010280006	CONCECEBOOS
### SOCIAL SCOTIAL SCO	Validated Gr	oundwater Sampling	SOURCE	STL Pittsburgh				
MATRIX: WATER WATER WATER	Round 2		SDG:	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2
SAMPLED: 11/1/2000 11/1/2000 11/1/2000 11/1/2000 11/1/2000 11/1/2000 11/1/2000 11/20/2	SDG: Scotta	2	MATRIX:	WATER	WATER	WATER	WATER	WATER
MALIDATED: 12/8/2000 12/8/2000 12/8/2000 12/8/2000			SAMPLED:	11/1/2000	11/1/2000	10/30/2000	10/31/2000	11/1/2000
alpha-BHC beta-BHC defta-BHC gamma-BHC (Lindane) Heptachlor epoxide Endoulian I Hethoxychlor Endoulian suifate Endoulian suifate H-4-DDT Methoxychlor epha-Chlordane gamma-Chlordane Toxaphene Toxaphene Toxaphene Aroclor 1221 Aroclor 1232 Aroclor 1248 Aroclor 1248 Aroclor 1254 Aroclor 1254			VALIDATED:	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000
aighte-BHC beta-BHC defta-BHC gamma-BHC (Lindane) Heptachlor epoxide Endosulfan I Deldrin 4,4-DDE Endrin ketone Endosulfan II 4,4-DDD Endrin sidehyde Endosulfan II 4,4-DDT Methoxychlor aighte-Chlordane gamma-Chlordane Toxaghene Toxaghene Aroclor 1221 Aroclor 1224 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1254	CAS NO.	COMPOUND	UNITS:					
beta-BHC detta-BHC gamma-BHC (Lindane) Heptachlor epoxide Endosulfan I Dieldrin 4,4-DDE Endrin steene Endosulfan II 4,4-DDD Endosulfan II 4,4-DDD Endosulfan elendosulfan II A,4-DDD Arockor 1016 Arockor 1221 Arockor 1221 Arockor 1232 Arockor 1248 Arockor 1248 Arockor 1254 Arockor 1254 Arockor 1254	310.84.6	sinha RHC	1/5					
deta-BHC (Lindane) Heptachlor Addrin Heptachlor epoxide Endosulfan I Dieldrin 4,4-DDE Endrin sidehyde Endosulfan II 4,4-DDD Endosulfan sulfate Archordane gamma-Chlordane gamma-Chlordane Toxaphene Toxaphene Toxaphene Arcclor 1221 Arcclor 1232 Arcclor 1248 Arcclor 1254 Arcclor 1254 Arcclor 1256	310.BE.7	Note BLO	3 5					
gamma-BHC (Lindane) Heptachlor Addrin Heptachlor epoxide Endosulfan I Dieldrin 4,4-DDE Endrin aldehyde Endosulfan II 4,4-DDD Endosulfan II 4,4-DDT Methoxychlor Endosulfan sulfale 4,4-DDT Methoxychlor alpha-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroctor 1221 Aroctor 1224 Aroctor 1242 Aroctor 1248 Aroctor 1248 Aroctor 1254 Aroctor 1254	310.86.8	OHE SHE	5 5					
Heptachlor Aldrin Heptachlor epoxide Endosulfan I Delchin 4,4-DDE Endrin Retone Endrin Retone Endrin Retone Endrin Retone Endrin sulfale 4,4-DDD Gndesulfan II A,4-DDD Gndesulfan II A,4-DDD Gndesulfan II A,4-DDT Methoxychlor Alphane gamma-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroctor 1221 Aroctor 1224 Aroctor 1232 Aroctor 1248 Aroctor 1254 Aroctor 1254	58-89-9	gamma-BHC (Lindane)	, d					
Addrin Heptachlor epoxide Endosulfan I Deldrin 4,4-DDE Endrin stetone Endrin stetone Endosulfan II 4,4-DDD Endosulfan II A,4-DDD Endosulfan Sulfale Endosulfan Sulfale Endosulfan Sulfale A,4-DDT Methoxychlor siphe-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroctor 1221 Aroctor 1222 Aroctor 1248 Aroctor 1248 Aroctor 1248 Aroctor 1254 Aroctor 1254	76-44-8	Heptachlor	NO/L					
Heptachlor epoxide Endosulfan I Deidrin 4,4-DDE Endrin ketone Endrin ketone Endosulfan II 4,4-DDD Endosulfan III A,4-DDT Methoxychlor alpha-Chlordane ganrma-Chlordane Toxaphene Toxaphene Aroclor 1221 Aroclor 1232 Aroclor 1248 Aroclor 1254 Aroclor 1254	309-00-2	Aldrin	Agu L					
Endocultan i Dieldrin 4,4'-DDE Endrin Endrin ketone Endrin ketone Endocultan II 4,4-DDD Endocultan II A,4-DDT Methoxychlor alpha-Chlordane gamma-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroctor 1221 Aroctor 1222 Aroctor 1224 Aroctor 1254 Aroctor 1254 Aroctor 1254	1024-57-3	Heptachlor epoxide	Ą					
Dieldrin 4,4'-DDE Endrin Endrin ketone Endrin ketone Endrin aldelnyde Endosulfan II 4,4'-DDD Endosulfan sulfale 4,4-DDT Methoxychlor alpha-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroclor 1221 Aroclor 1222 Aroclor 1232 Aroclor 1248 Aroclor 1254 Aroclor 1254	959-88-8	Endosulfan I	NgV.					
4,4'-DDE Endrin Endrin ketone Endrin aldehyde Endcsulfan II 4,4'-DDD Endcsulfan sulfale 4,4'-DDT Methoxychlor alpha-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroctor 1221 Aroctor 1221 Aroctor 1224 Aroctor 1248 Aroctor 1254 Aroctor 1254	60-57-1	Dieldrin	Ą					
Endrin Endrin ketone Endrin aldehyde Endosulfan II 4,4-DDD Endosulfan sulfale 4,4-DDT Methoxychlor alpha-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroclor 1221 Aroclor 1221 Aroclor 1248 Aroclor 1248 Aroclor 1254 Aroclor 1254	72-56-9	4,4'-DDE	1 8					
Endrin ketone Endrin aldehyde Endosulfan II 4,4-DDD Endosulfan sulfale 4,4-DDT Methoxychlor alpha-Chlordane gamma-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroclor 1221 Aroclor 1222 Aroclor 1248 Aroclor 1254 Aroclor 1254 Aroclor 1256	72-20-8	Endrin	Ą					
Endrin aidehyde Endosulfan II 4,4'-DDD Endosulfan sulfale 4,4'-DDT Methoxychlor aipha-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroclor 1221 Aroclor 1221 Aroclor 1248 Aroclor 1254 Aroclor 1256	53494-70-5	Endrin ketone	Jgv					
Endosulfan II 4,4'-DDD Endosulfan sulfate 4,4'-DDT Methoxychlor alpha-Chlordane gamma-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroctor 1221 Aroctor 1221 Aroctor 1248 Aroctor 1248 Aroctor 1254 Aroctor 1254	7421-93-4	Endrin aldehyde	Jg0					
4,4'-DDD Endoculfan sulfate 4,4'-DDT Methoxychlor alpha-Chlordane gamma-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroclor 1221 Aroclor 1221 Aroclor 1248 Aroclor 1254 Aroclor 1254 Aroclor 1256	33213-65-9	Endosulfan II	Ą					
Endoculfan sulfate 4,4'-DDT Methoxychlor alpha-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroclor 1221 Aroclor 1221 Aroclor 1232 Aroclor 1248 Aroclor 1254 Aroclor 1256	72-54-8	4,4'-DDD	76 0					
4,4'-DDT Methoxychlor alpha-Chlordane gamma-Chlordane Toxaphene Toxaphene Aroclor 1221 Aroclor 1232 Aroclor 1248 Aroclor 1248 Aroclor 1254 Aroclor 1256	1031-07-8	Endosulfan sulfate	ng/L					
Methoxychlor alpha-Chlordane garmna-Chlordane Toxaphene Toxaphene Arodor 1221 Arodor 1232 Arodor 1242 Arodor 1254 Arodor 1254 Arodor 1256	50-29-3	4,4'-DDT	γgγ					
alpha-Chlordane gamma-Chlordane Toxaphene Arodor 1221 Arodor 1232 Arodor 1242 Arodor 1248 Arodor 1254	72-43-5	Methoxychior	ng/t					
garma-Chlordane Toxaphene Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1248 Aroclor 1254 Aroclor 1254	5103-71-9	alpha-Chlordane	ng/t					
Toxaphene Aroctor 1016 Aroctor 1221 Aroctor 1232 Aroctor 1242 Aroctor 1254 Aroctor 1254	5103-74-2	gamma-Chlordane	Ŋ					
Aroctor 1016 Aroctor 1221 Aroctor 1232 Aroctor 1242 Aroctor 1254 Aroctor 1254	8001-35-2	Toxaphene	Ą					
Aractor 1016 Aractor 1221 Aractor 1232 Aractor 1242 Aractor 1248 Aractor 1254 Aractor 1254								
Arodor 1221 Arodor 1232 Arodor 1242 Arodor 1248 Arodor 1254 Arodor 1260	12674-11-2	Aractor 1016	J/6n					
Arodor 1232 Arodor 1242 Arodor 1248 Arodor 1254 Arodor 1260	11104-28-2	Aroclor 1221	ng/L					
Arodor 1242 Arodor 1248 Arodor 1254 Arodor 1260	11141-16-5	Aroclor 1232	ng/L					
Arodor 1248 Arodor 1254 Arodor 1260	53469-21-9	Aroctor 1242	ng/L					
Aroclor 1254 Aroclor 1260	12672-29-6	Aroclor 1248	J/6n					
Aroclor 1260	11097-69-1	Aroclor 1254	ng/L					
	11096-82-5	Aroclor 1260	ng/L					

Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2 CAS NO. COMPOUND			C0K020256002	COK020256001	C0J310140005	COK010280006	COK020256003
Validated Groundwater (Round 2 SDG: Scotia2 CAS NO. COMPOU	,						
gg T		ijį	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STI, Pittsburgh
SDG: Scotia2 CAS NO. COMPOU			SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2
			WATER	WATER	WATER	WATER	WATER
П			11/1/2000	11/1/2000	10/30/2000	10/31/2000	11/1/2000
		VALIDATED:	12/8/2000	12/8/2000	12/8/2000	12/8/2000	12/8/2000
		UNITS:					
7429-90-5 Aluminum		ug/L	387 J	5420 J			
_		700	1.5 ∪	1.5 ∪			
		700	2.6 ∪	6.2 J			
		ng/L	18.8 J	116 J			
7440-41-7 Beryflium		7	0.071 U	0.29			
		ng/L	0.49 U	0.49 ∪			
		760	55500	95000			
		Z	1.5 J	8.4 J			
		NgV	3.2 ∪	3.2 ∪			
		7	15.9 J	7.5 J			
		NgV	673	8260			
7439-92-1 Lead		NgV	2.7 J	4.			
7439-95-4 Magnesius	E	NgV	9840	28800			
_	92	76 0	10.5 J	64			
7439-97-6 Mercury		76	0.055 J	0.049 J			
7440-02-0 Nickel		ng/L	0.1 ∪	7.2 J			
7440-09-7 Potassium		76 0	1430 J	2840 J			
		γgn	2.1 U	2.1 U			
7440-22-4 Silver		Age Age	0.9 4	0.94 C			
		Z,	14900	49300			
		Ϋ́	3.9 ∪	3.9 ∪			
7440-62-2 Vanadium		76	1.8 U	13.4 J			
7440-66-6 Zinc		ug/L	10.5 J	21.1			

APPENDIX D GROUNDWATER MODELING REPORT

APPENDIX D GROUNDWATER MODEL

D.1 PURPOSE AND SCOPE

A groundwater model was developed to assist with evaluating whether the Sacandaga Landfill was a source for TCE in groundwater. The model was also used to evaluate whether any areas on the Scotia Depot which could be potential source areas and to identify the highest probability location for the source area.

The scope of work included selecting an appropriate model, defining the model boundaries and parameters, and conducting simulations to evaluate potential source areas.

D.2 MODEL SELECTION AND GOVERNING EQUATIONS

The partial differential equation for solute transport from instantaneous and continuous releases of a non-conservative (i.e. retarded) contaminant in a homogeneous, infinite aquifer of constant thickness with a uniform fluid flow field is (Wilson and Miller, 1985):

$$\frac{\partial C_T}{\partial t} + \frac{\partial (C)}{\partial x} = D_x \frac{\partial^2 (\theta C)}{\partial x^2} + D_y \frac{\partial^2 (\theta C)}{\partial y^2} + D_z \frac{\partial^2 (\theta C)}{\partial z^2} - r_t$$
[1]

where:

C = contaminant concentration in the groundwater

 C_T = adsorbed contaminant concentration

 D_x = dispersion coefficient in the x direction

 D_{v} = dispersion coefficient in the y direction

 D_z = dispersion coefficient in the z direction

 R_t = degradation rate

V = Darcy or seepage velocity in the x direction

 θ = porosity of the aquifer and

x, y, z = coordinates of the point of interest

In 1979, Wilson and Miller developed a closed-form, analytical solution for equation [1]. By assuming a vertical source throughout the full thickness of the aquifer, that the initial concentration throughout the aquifer is zero, and taking into account degradation, the numerical solution, solved for concentration, is:

$$C = \frac{C_0 EXP(\frac{V^* x}{2D_x})}{4\pi (D_x D_y)^{1/2}} W(u, B)$$
 [2]

where:

 C_{θ} = the source concentration

C = the concentration in the aquifer

 $\lambda = 1^{st}$ order decay constant

 V^* = average pore velocity = $\frac{V}{\theta}$

$$u = \frac{\left(\frac{V_x}{D_x}\right)^2 + \frac{D_x}{D_y} \left(\frac{V^*}{D_x}\right)^2}{\frac{4V^{*2}t}{R_d D_x}}$$
 [3]

$$B = \frac{1}{2} \left[\left(\frac{V^* x}{D_x} \right)^2 + \frac{D_x}{D_y} \left(\frac{V^* y}{D_x} \right)^2 \right]^{\frac{1}{2}} \left[1 + \frac{4D_x R_d \lambda}{V^{*2}} \right]^{\frac{1}{2}}$$
 [4]

and W(u,B) = the Hantush leaky aquifer well function = $\int_{u}^{\infty} \frac{1}{\varepsilon} EXP\left(-\varepsilon - \frac{B^2}{4\varepsilon}\right) d\varepsilon$.

This equation is the basis for several popular "PLUME2D" models. The most rigorous and popular version of PLUME2D was developed by Wagner, et. al. (1985) for USEPA's Robert S. Kerr Environmental Research Lab. The subroutines from Wagner's PLUME2D were used in the analytical portion of the model.

D.3 MONTE CARLO METHOD

One approach to solute transport modeling is to take known aquifer parameters and best-judgements about unknown parameters and calibrate a solute-transport model to the observed contaminant distribution. However, for this evaluation, a more objective "Monte-Carlo" approach was used.

The Monty-Carlo method is based on repeatedly solving an deterministic solute transport model (e.g. PLUME2D). A new set of parameters is generated each time a simulation is run. Each set of parameters is assumed to be an equally probable representation of the actual aquifer and transport parameters.

The name "Monte Carlo" was coined for the method because of the similarity of the technique to games of chance and the capital of Monaco was a famous city known for gambling (Fishman, 1996). The Monte Carlo method is used routinely in many diverse applications, including groundwater flow, solute transport, weather prediction, the simulation of the nuclear processes in high energy physics experiments, etc.. The primary components of a Monte Carlo simulation include the following:

- Probability distribution functions (PDFs) the system must be described by a set of PDFs (e.g. hydraulic conductivity is assumed to be log-normally distributed (El-Kadi, 1984) while the variation of hydraulic gradient is assumed to be uniformly distributed).
- Random number generation a source of uniformly distributed random numbers over the interval 0 to 1 must be available.
- Sampling rules a method for sampling from the specified PDFs, assuming the availability of random numbers on the unit interval, must be given.
- Scoring the outcomes must be accumulated into overall tallies or indices for the values
 of interest.
- Error estimation an estimate of the statistical error (variance) as a function of the number of trials and other quantities should be determined.

D.4 IMPLEMENTATION

The model was implemented in a Microsoft ExcelTM workbook. An Excel worksheet was used to enter the input parameters and concentration targets, while the calculations were performed using Microsoft Visual Basic for ApplicationsTM. Random numbers were generated using the Visual Basic RAND function. The parameter selection subroutines were developed by Vanderbilt University (Ayers, 1993), while the Hantush leaky aquifer well function subroutines were translated from FORTRAN subroutines developed by Wagner, et. al. (1985). Results of the Hantush well function were compared with published results (Abramowitz and Stegun, 1970, Hantush and Jacob, 1955) to verify their accuracy. The routines to take into account varying source locations, hydraulic gradient direction and the scoring/indexing routines were developed by Parsons ES.

The run number, x and y coordinates of the simulated source and the index were written to a database file. All of the model parameters for each run were written to a separate database file. The database was imported into the ArcView geographic information system (GIS) for final processing and display.

An explicit error estimation was not calculated. However, statistics on the mean and standard deviation of the index values were generated. A Monte-Carlo solute transport model is considered to be statistically valid when the mean and standard deviations have converged on values that are independent of sample size (Wagner, et. al., undated, assumed 1982). Sensitivity analyses indicated that convergence was achieved after 300 to 400 simulations. Therefore, the results after conducting several million simulations were considered to be statistically valid. Simulations above and beyond the number required for convergence were conducted to provide a clearer representation of the results.

D.5 MODELING APPROACH

The mean values for the parameters used for the model were based on site-specific information and published values for similar aquifer materials. Site-specific values were not available for all parameters, and it is known on a regional scale that the Schenectady Aquifer is not homogeneous. Therefore, the variations in aquifer properties and the variation in

groundwater flow direction within the area of evaluation were taken into account by applying a large coefficient of variation for each parameter (see Table D1). Furthermore, because groundwater quality data were only available for the upper 25 feet of the aquifer, the model assumptions included a vertical line source running through the upper 25 feet of the aquifer with the source being small relative to the area of interest.

The aquifer thickness was the only parameter held constant. All other model parameters, including groundwater flow direction, groundwater flow rate, transverse and longitudinal dispersivity, contaminant retardation, and source strength were varied for each simulation.

TABLE D1
MODEL PARAMETERS AND PROBABILITY DISTRIBUTION

Variable		Mean	Coefficient of	Type
			Variation	
Aquifer Thickness (ft)	<i>m</i> =	25	0%	Constant
Seepage Velocity (ft/day)	<i>V</i> =	20	99%	Log-Normal
Aquifer Porosity	$\theta =$	0.2	30%	Uniform
Hydraulic Gradient Angle (degrees)	8=	186	10%	Uniform
Longitudinal Dispersivity (ft)	Ax =	100	25%	Log-Normal
Lateral Dispersivity (ft)	Ay =	20	50%	Log-Normal
Rate of contaminant injection (lbs/day)	$C_{\theta} =$	3	99%	Uniform
Time since beginning of injection (days)	t =	9131.25	100%	Uniform
Retardation Factor	Rd =	2	99%	Uniform
Half-Life (days)	H =	5000	99%	Uniform

An initially large (2,200- by 3,300-foot) search area was defined for a screening evaluation. Then approximately one million potential source locations within the search area were randomly picked by the computer. Model parameters were randomly chosen within a specified range by the computer for each source location and the PLUME2D model was run. The concentrations calculated by the PLUME2D model were compared with the concentrations observed in the monitoring wells and an index number, indicating how well the results matched, was calculated. The index number was calculated by summing the absolute value of the difference between the log of the model concentration and the log of the observed calculation for all of the target wells (see Table D2). Zero concentrations were taken into account by assuming a concentration of 0.01 for all non-detect values.

Based on the screening evaluation, a smaller 1,000- by 2,000-foot focused search area was defined and several million simulations run as described above. The highest probability locations for the source area are posted on Figure D1.

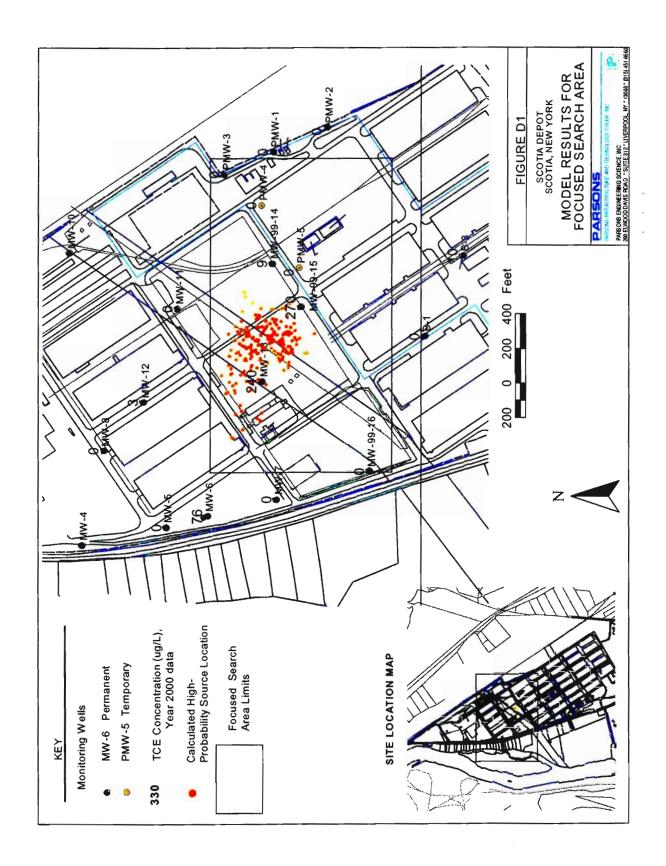


TABLE D2
TARGET WELLS AND CONCENTRATIONS

Well	Easting	Northing	Target Conc. (ug/L).
B-1	1008947.08	633574.55	0
B-3	1009410.05	633355.73	10
MW-13	1008689.00	634501.66	240
MW-99-14	1009366.28	634442.65	9
MW-99-15	1009116.34	634280.32	270
PMW-1	1010010.61	634438.65	0
PMW-2	1010148.89	634132.29	0
PMW-3	1009880.40	634719.20	0
PMW-4	1009702.92	634508.37	0
MW-11	1009108.783	634984.6745	0
MW-12	1008570.717	635178.4055	3
MW-8	1008289.046	635403.5448	0
MW-5	1007846.737	635048.4374	0
MW-6	1007911.228	634812.2963	76
MW-7	1008005.536	634419.5671	0
MW-99-16	1008167.035	633888.7535	0
PMW-5	1009343	634293	0

D6. RESULTS

The model simulations produced several hundred high probability locations (see Figure D1). The locations showing the best fit to the observed data were clustered between monitoring well MW-99-15 and MW-13, located west of the Depot. It should be noted that based on the model assumptions, no one location can be considered more likely than another.

The model results indicated that the probability that the Sacandaga Landfill is a major source of the TCE plume is very low, which is consistent with the soil and groundwater data collected in and around the landfill. Furthermore, the model indicated that there were no high-probability locations on the current Depot property.

D7. REFERENCES

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