Final

GROUNDWATER INVESTIGATION REPORT
SCOTIA DEPOT
SCOTIA, NEW YORK

Prepared For:

U. S. Army Corps of Engineers

Huntsville Center

Contract No. DACA87-95-D-0018
Delivery Order 0065

and

General Services Administration

Contract No. GS-10F-0179J

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August 2001

PARSONS

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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	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.

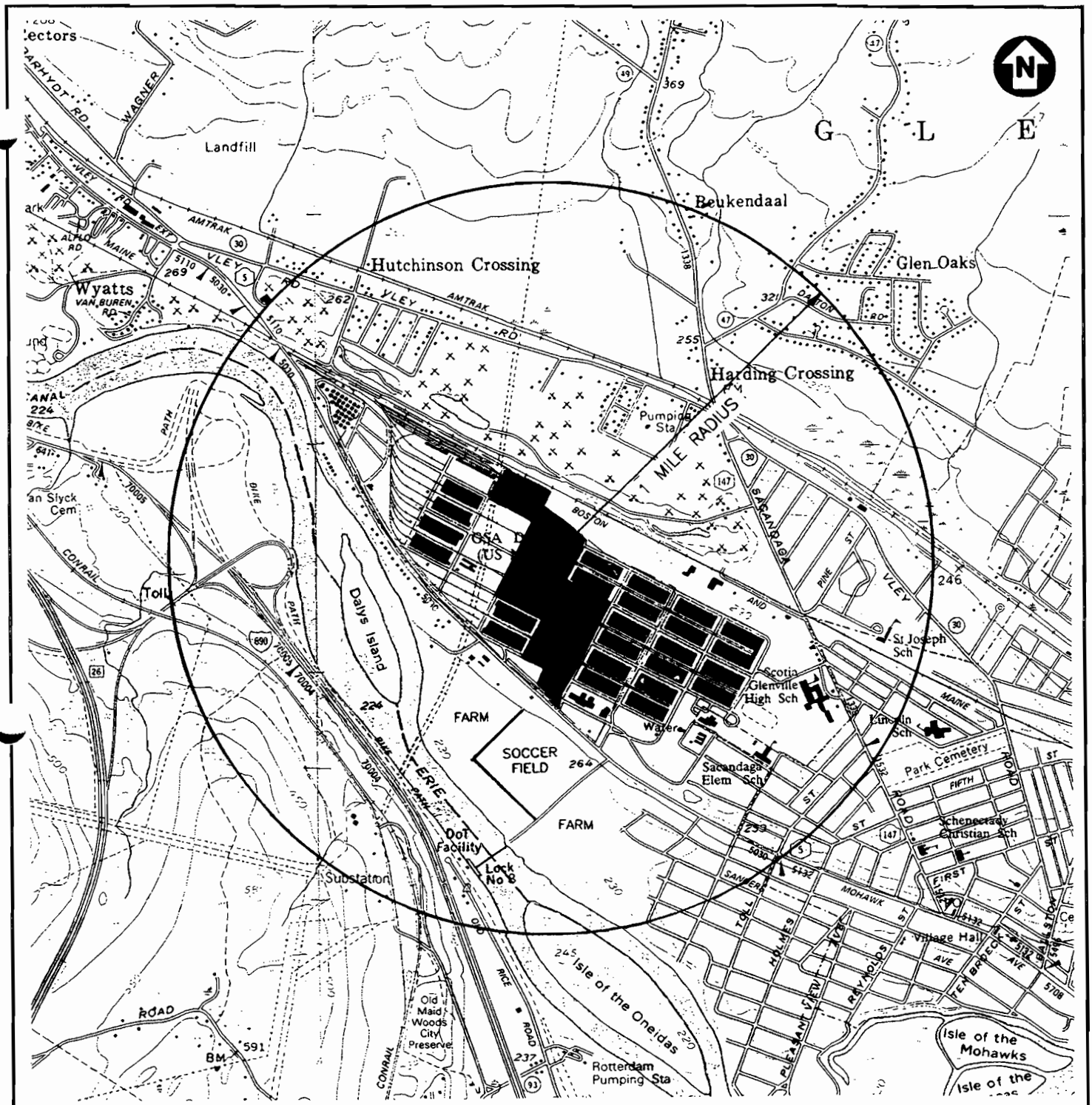
2.1.2 The current Depot property is approximately 59.7 acres in size (see highlighted portion of Figure 2-1). The Depot consists of five warehouses with a total storage capacity of 582,826 square feet, two outdoor open storage areas with a total storage capacity of 336,098 square feet, five support buildings 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).



LEGEND:

CURRENT DEPOT PROPERTY

2000 1000 0 2000 4000

SCALE: 1"=2000'

DATE: 06/25/98 (SEH)
FILE: P:\CAD\733496\33496G01.DWG
SCALE: MODEL SCALE, 1=1
XREF'S: NONE

FIGURE 2-1

DLA/DNSC SCOTIA DEPOT

SITE VICINITY MAP

PARSONS ENGINEERING SCIENCE, INC.
DESIGN * RESEARCH * PLANNING
290 ELWOOD DAVIS ROAD * SUITE 312 * LIVERPOOL, N.Y. 13088 * 315/451-9560
OFFICES IN PRINCIPAL CITIES

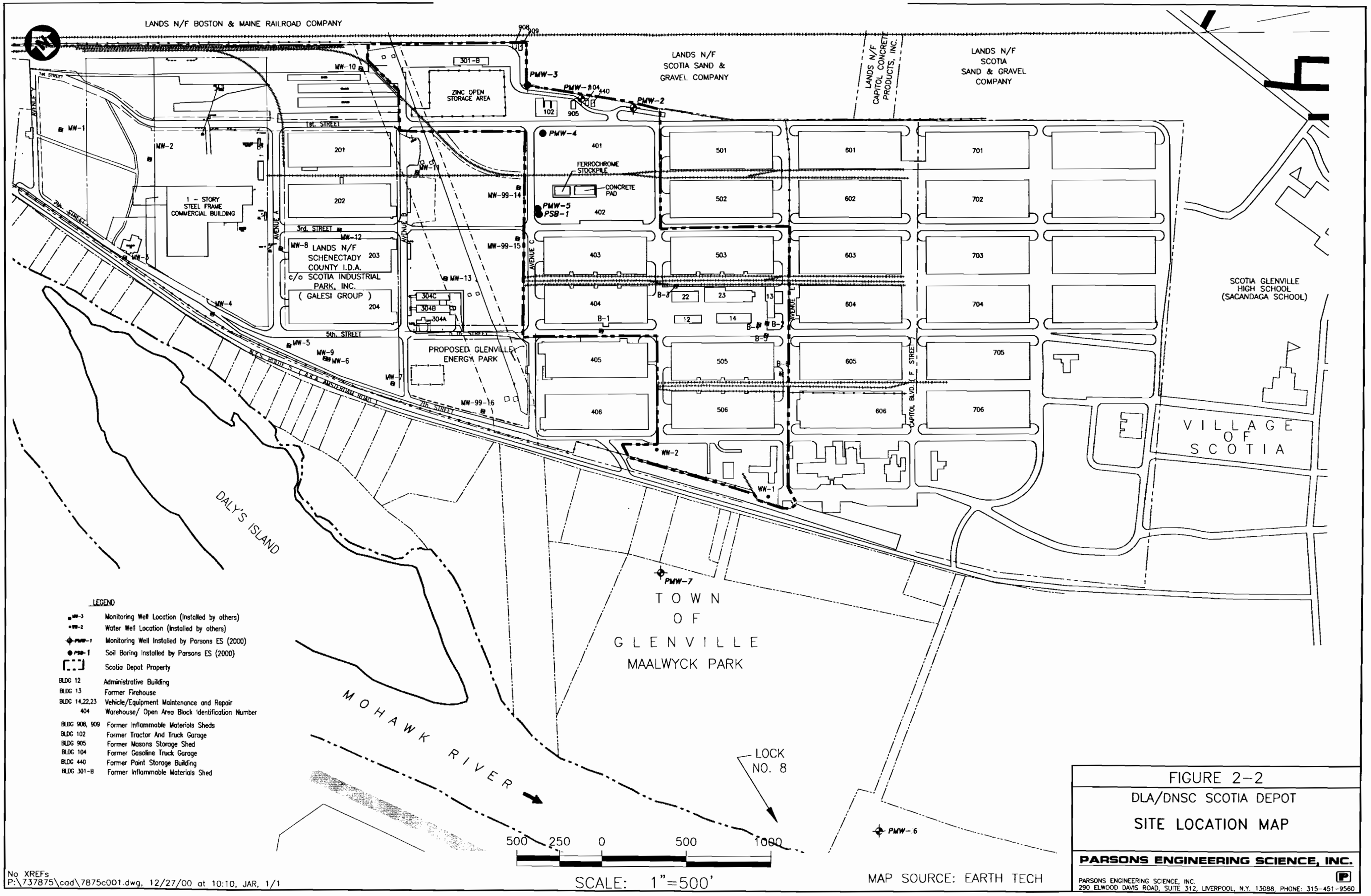


FIGURE 2-2

DLA/DNSC SCOTIA DEPOT

SITE LOCATION MAP

PARSONS ENGINEERING SCIENCE, INC.

PARSONS ENGINEERING SCIENCE, INC.
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

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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

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).

TABLE 2-1
SCOTIA DEPOT
Groundwater Elevation Data

WELL	Screen Length	Top of Screen	Bottom of Screen	Screen Elevation	Ground Elevation	Top of Casing Elevation	6/16/00		7/18/00		10/30/00	
							Depth To Water from TOC	Groundwater Elevation	Depth To Water from TOC	Groundwater Elevation	Depth To Water from TOC	Groundwater Elevation
PMW-1	20	63	83	216.58 - 236.58	299.58	302.2	68.42	233.78	67.71	234.49	70.67	231.53
PMW-2	20	64	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	65.09	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	NA	NA	18	214.2	18.17	214.03
PMW-7	20	14.8	34.8	196.76 - 216.76	231.56	234.63	NA	NA	12.65	221.83	13.35	221.15
B-1	20	48	68	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	NA	NA	NA	NA	288.04	285.94	56.87	229.07	55.39	230.55	55.75	230.2
B-5	NA	NA	NA	NA	287.2	284.99	56.09	228.9	54.77	230.22	54.82	230.15
B-6	20	50	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

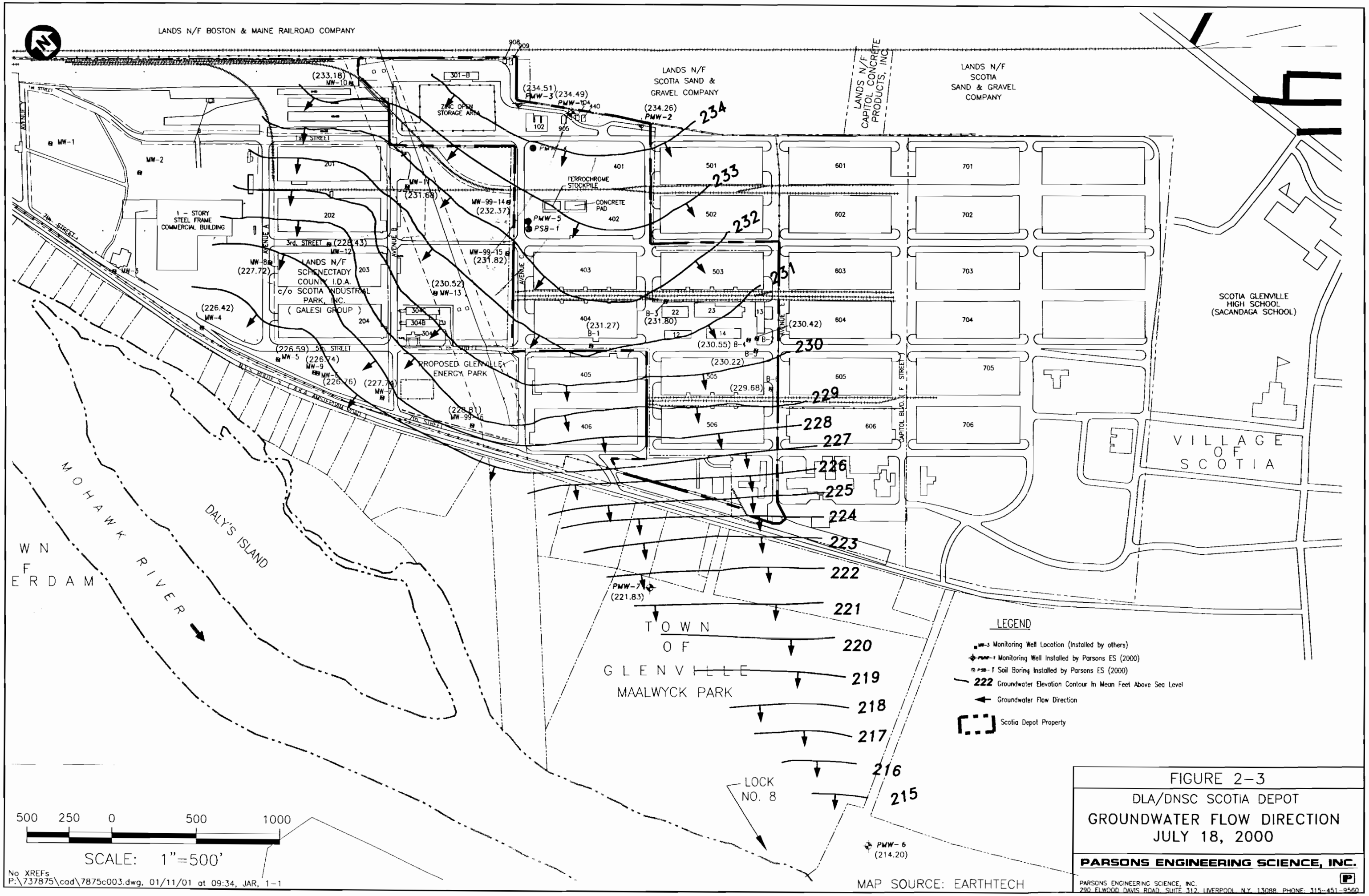

FIGURE 2-3

DLA/DNSC SCOTIA DEPOT

GROUNDWATER FLOW DIRECTION
JULY 18, 2000

PARSONS ENGINEERING SCIENCE, INC.

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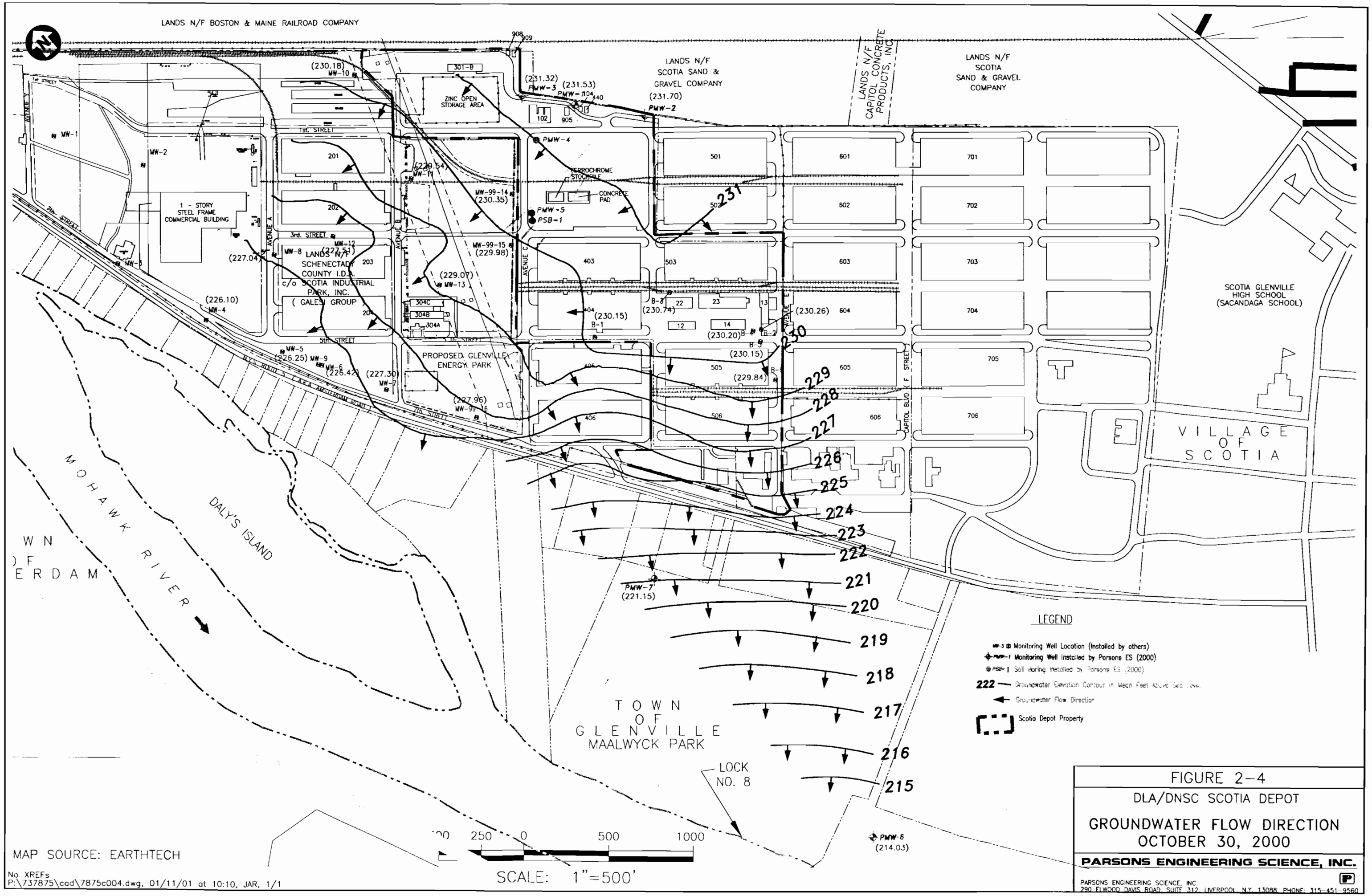

FIGURE 2-4

DLA/DNSC SCOTIA DEPOT

GROUNDWATER FLOW DIRECTION
OCTOBER 30, 2000

PARSONS ENGINEERING SCIENCE, INC.

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2.4 GROUNDWATER USE

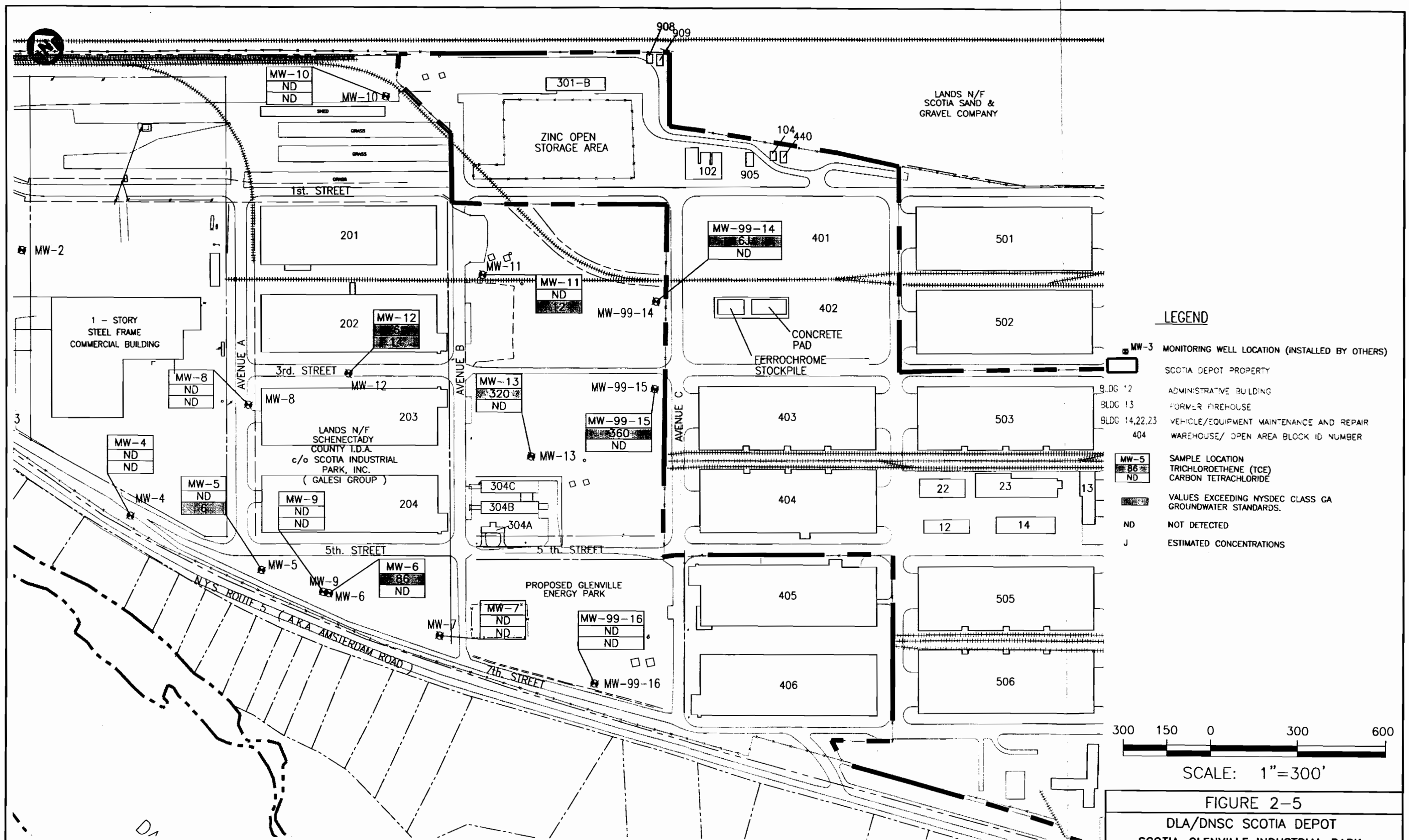
About 120,000 people use groundwater as a drinking source from wells located within four miles of the site (References 5 and 15). This includes the Schenectady and Rotterdam municipal well fields. Low concentrations of TCE (below the drinking water standard) have, in the past, been detected in these 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.



LEGEND

- MW-3 — MONITORING WELL LOCATION (INSTALLED BY OTHERS)
- SCOTIA DEPOT PROPERTY
- BLDG 12 — ADMINISTRATIVE BUILDING
- BLDG 13 — FORMER FIREHOUSE
- BLDG 14,22,23 — VEHICLE/EQUIPMENT MAINTENANCE AND REPAIR
- 404 — WAREHOUSE/ OPEN AREA BLOCK ID NUMBER
- MW-5 / 86 / ND — SAMPLE LOCATION; TRICHLOROETHENE (TCE); CARBON TETRACHLORIDE
- VALUES EXCEEDING NYSDEC CLASS GA GROUNDWATER STANDARDS.
- ND — NOT DETECTED
- J — ESTIMATED CONCENTRATIONS

300 150 0 300 600

SCALE: 1"=300'

MAP SOURCE: EARTHTECH

FIGURE 2-5

DLA/DNSC SCOTIA DEPOT

SCOTIA-GLENVILLE INDUSTRIAL PARK: RECENT GROUNDWATER RESULTS SEPTEMBER 1, 1999-AUGUST 1, 2000

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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

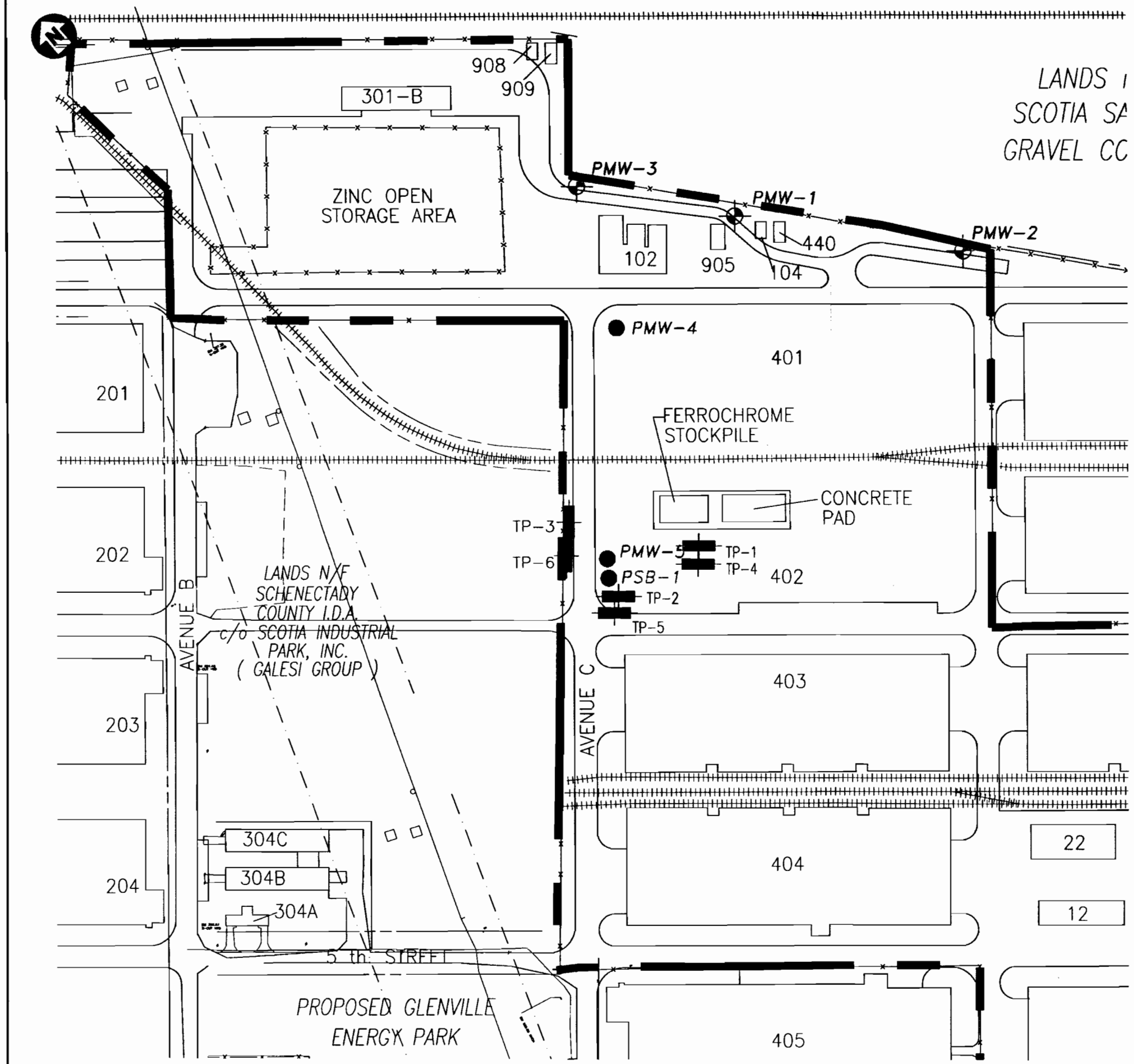
(2) Assess the lateral and vertical extent of the plume, if present, within a predefined area along the northeastern fence line, and assess the presence of TCE south of the Depot near Lock 8 in the Mohawk River/Erie Canal.

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).



LANDS I
SCOTIA SA
GRAVEL CC

LEGEND:

PMW-1	Monitoring Well Installed by Parsons ES (2000)
PSB-1	Soil Boring Installed by Parsons ES (2000)
TP-4	Test Pit Excavated By Parsons ES (2000)
	SCOTIA DEPOT PROPERTY
BLDG 12	ADMINISTRATIVE BUILDING
BLDG 13	FORMER FIREHOUSE
BLDG 14,22,23	VEHICLE/ EQUIPMENT MAINTENANCE AND REPAIR
404	WAREHOUSE/ OPEN AREA BLOCK ID NUMBER
BLDG 908, 909	FORMER INFLAMMABLE MATERIALS SHEDS
BLDG 102	FORMER TRACTOR AND TRUCK GARAGE
BLDG 905	FORMER MASONS STORAGE SHED
BLDG 104	FORMER GASOLINE TRUCK GARAGE
BLDG 440	FORMER PAINT STORAGE BUILDING
BLDG 301-B	FORMER INFLAMMABLE MATERIALS SHED

200 100 0 200 400

SCALE: 1"=200'

MAP SOURCE: EARTHTECH

FIGURE 3-1

DLA/DNSC SCOTIA DEPOT

TEST PIT AND BORING LOCATIONS

PARSONS ENGINEERING SCIENCE, INC.

PARSONS ENGINEERING SCIENCE, INC.
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088 PHONE: 315-451-9560

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
Scotia Depot and Maalwyck Park

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: 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

P:/737875/WP/SCOTIA/37875S02.xls

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.

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

Compound	Recommended NYSDEC Soil Cleanup Criteria (ppb)		Reported Values									
		Sample I.D.	PMW-1S0	PMW-1S5	PMW-1S10	PMW-1S20	PMW-1S40	BD 905	BD 908	NFSA-1	PSB-1S10	PSB-1S20
		Depth (ft):	0.2	5	10	20	40	2	0.5	0.2	10	20
		Area:	Northern Fence	Northern Fence	Northern Fence	Northern Fence	Northern Fence	Northern Fence	BD 908 & 909	BD 908 & 909	400 Block	400 Block
		Date:	5/16/00	5/17/00	5/17/00	5/17/00	5/17/00	5/24/00	5/24/00	6/9/00	7/10/00	7/10/00
		Sampled by:	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES
Trichloroethene (TCE)	700		ND	ND	ND	ND	ND	ND	ND	ND	ND	2

Compound	Recommended NYSDEC Soil Cleanup Criteria (ppb)		Reported Values									
		Sample I.D.	PSB-1S25	TP-4	TP-5	TP-6	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6
		Depth (ft):	25	4.5	4.5	4.5	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings
		Area:	400 Block	400 Block	400 Block	300 Block	MW-1	MW-2, MW-3	MW-4, MW-5	MW-6, MW-7	MW-4, MW-5	MW-4, MW-5
		Date:	7/10/00	7/6/00	7/6/00	7/6/00	5/30/00	6/21/00	7/5/00	7/6/00	7/7/00	7/7/00
		Sampled by:	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES
Trichloroethene (TCE)	700		3	ND	ND	ND	ND	ND	4	ND	ND	ND

Notes:

Listed compounds are those that have been detected in soil.
Shaded values exceed cleanup criteria.
ND Not Detected
ppb - parts per billion
ft - feet
I.D. - identification

4-2

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

Compound	NYSDEC Class GA Groundwater Standards/ Guidance Values (ug/L)		Reported Values								
		Sample I.D.	PMW-1W78	PMW-1W98	PMW-1	PMW-2W78	PMW-2	PMW-2	PMW-3W78	PMW-3	PMW-3
		Depth (ft):	78	98	64.82	78	64.53	63.64	78	61.76	62.09
		Area:	Northern Fence	Northern Fence	Northern Fence	Northern Fence	Northern Fence	Northern Fence	Northern Fence	Northern Fence	Northern Fence
		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
Volatile Organic Compounds		Sampled by:	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES
Trichloroethene (TCE)	5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5		ND	ND	ND	ND	ND	ND	4	4	4
Toluene	5		[redacted]	4	ND	4	[redacted]	ND	ND	ND	ND

Compound	NYSDEC Class GA Groundwater Standards/ Guidance Values (ug/L)		Reported Values							
		Sample I.D.	PMW-4W78	PMW-5W78	PMW-6W38	PMW-6	PMW-6	PMW-7W38	PMW-7	PMW-7
		Depth (ft):	78	78	38	16	16.64	38	10.1	9.94
		Area:	400 Block	400 Block	Lock # 8	Lock # 8	Lock # 8	Maalwyck Park	Maalwyck Park	Maalwyck Park
		Date:	6/14/2000	6/20/2000	6/29/2000	7/10/2000	7/13/2000	7/6/2000	7/10/2000	7/13/2000
Volatile Organic Compounds		Sampled by:	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES	Parsons ES
Trichloroethene (TCE)	5		ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5		ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5		ND	ND	ND	[redacted]	ND	ND	[redacted]	ND

Notes:

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
ft - feet
ug/L - micrograms per liter

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

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 1 Detected Compound Summary		NYSDEC Class GA Groundwater Standards/Guidance Values	SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED: UNITS:	PMW-1 COH030303-003 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	PMW-2 COH030303-001 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	Dup of PMW-2 PMW-102 COH030303-002 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	PMW-3 COH030303-004 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	PMW-6 COH030303-005 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	PMW-7 COH030303-006 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000
CAS NO.	COMPOUND								
	VOLATILES								
67-64-1	Acetone	50 (G)	ug/L	7.7 J	-	-	-	-	2.2 J
56-23-5	Carbon tetrachloride	5	ug/L	0.74 J	-	-	3.3	-	-
79-01-6	Trichloroethene	5	ug/L	-	0.84 J	0.99 J	-	0.35 J	-
	SEMIVOLATILES								
117-81-7	bis(2-Ethylhexyl) phthalate	5	ug/L	8.5 J	81 J	9.7 J	-	-	-
	PESTICIDES								
	None Detected		ug/L						
	INORGANICS								
7429-90-5	Aluminum	NS	ug/L	18200	722	669	445	35.2 J	2480
7440-36-0	Antimony	3	ug/L	-	-	-	-	1.5 J	-
7440-38-2	Arsenic	25	ug/L	17.3	-	-	-	-	-
7440-39-3	Barium	1000	ug/L	159 J	37 J	36.6 J	42 J	15.3 J	86.8 J
7440-41-7	Beryllium	3 (G)	ug/L	0.98 J	-	0.14 J	0.14 J	0.09 J	0.16 J
7440-43-9	Cadmium	5	ug/L	-	-	3.7 J	-	1.1 J	-
7440-70-2	Calcium	NS	ug/L	165000	75800	75500	75300	52500	98500
7440-47-3	Chromium	50	ug/L	29.5	2.1 J	2.6 J	2.3 J	-	4.2 J
7440-48-4	Cobalt	NS	ug/L	17 J	-	-	-	-	-
7440-50-8	Copper	200	ug/L	65.5	-	2.5 J	-	-	-
7439-89-6	Iron	300 *	ug/L	1500	1500	1500	1500	118	1500
7439-92-1	Lead	25	ug/L	16.2	-	-	-	-	-
7439-95-4	Magnesium	35000 (G)	ug/L	32900	21000	20700	16200	9400	30300
7439-96-5	Manganese	300 *	ug/L	1500	58.9	55.1	45	1.2 J	199
7439-97-6	Mercury	0.7	ug/L	0.055 J	-	-	0.071 J	-	-
7440-02-0	Nickel	100	ug/L	27 J	-	-	-	-	-
2023695	Potassium	NS	ug/L	6690	635 J	752 J	1220 J	1470 J	1930 J
7782-49-2	Selenium	10	ug/L	6.4	-	-	-	-	-
7440-23-5	Sodium	20000	ug/L	10200	2020 J	2200 J	15300	14100	21000
7440-28-0	Thallium	0.5 (G)	ug/L	-	-	-	0.7 J	-	-
7440-62-2	Vanadium	NS	ug/L	42.7 J	3.7 J	2.3 J	-	-	4.7 J
7440-66-6	Zinc	2000 (G)	ug/L	121	37.2	28.5	19.3 J	14.4 J	16.2 J

- Downgradient concentrations which exceed the Class GA criteria

NS = No Standard

- = Not Detected

J = 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 Duplicate

SDG - Sample Delivery Group

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

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		NYSDEC Class GA Groundwater	SAMPLE ID:	PMW-1	PMW-2	Dup of PMW-2 PMW-102	PMW-3	PMW-6	PMW-7	B-3	B-6
			LAB ID:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			SOURCE:	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh
			SDG:	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2	SCOTIA2
			MATRIX:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			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
			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	Standards/Guidance Values	UNITS:								
	VOCs										
67-64-1	Acetone	50 (G)	ug/L	-	-	-	-	-	-	-	-
78-93-3	2-Butanone	50 (G)	ug/L	R	-	-	-	-	-	-	-
56-23-5	Carbon tetrachloride	5	ug/L	-	-	-	3.4	-	-	-	-
67-66-3	Chloroform	7	ug/L	-	-	-	0.21 J	-	-	-	-
127-18-4	Tetrachloroethene	5	ug/L	-	-	-	-	-	-	[redacted]	-
79-01-6	Trichloroethene	5	ug/L	0.27 J	-	-	-	0.54 J	-	-	-
	SVOCs										
	None Detected										
	PCBs										
	None Detected										
	Pesticides										
	None Detected										
	Inorganics										
7429-90-5	Aluminum	NS	ug/L	7390 J	1490 J	962 J	4140 J	387 J	5420 J		
7440-38-2	Arsenic	25	ug/L	4.1 J	-	-	4.2 J	-	6.2 J		
7440-39-3	Barium	1000	ug/L	91.6 J	39.4 J	34.9 J	60.1 J	18.8 J	116 J		
7440-41-7	Beryllium	3 (G)	ug/L	0.41 J	-	-	0.17 J	-	0.29 J		
7440-70-2	Calcium	NS	ug/L	111000	66700	62000	82300	55500	95000		
7440-47-3	Chromium	50	ug/L	11.6	2.9 J	2 J	5.7 J	1.5 J	8.4 J		
7440-48-4	Cobalt	NS	ug/L	8 J	-	-	-	-	-		
7440-50-8	Copper	200	ug/L	25 J	7.1 J	2.3 J	10.6 J	15.9 J	7.5 J		
7439-89-6	Iron	300 *	ug/L	17000	2660	1450	[redacted]	[redacted]	[redacted]		
7439-92-1	Lead	25	ug/L	6.7	3.1 J	-	4.9	2.7 J	4.1		
7439-95-4	Magnesium	35000 (G)	ug/L	25400	19300	18200	16600	9840	28800		
7439-96-5	Manganese	300 *	ug/L	[redacted]	75.5 J	39.6 J	253	10.5 J	[redacted]		
7439-97-6	Mercury	0.7	ug/L	-	-	0.045 J	-	0.055 J	0.049 J		
7440-02-0	Nickel	100	ug/L	10.9 J	-	-	8.5 J	-	7.2 J		
7440-09-7	Potassium	NS	ug/L	3550 J	2150 J	1240 J	2560 J	1430 J	2840 J		
7782-49-2	Selenium	10	ug/L	2.7 J	-	-	2.5 J	-	-		
7440-23-5	Sodium	20000	ug/L	9690	2310 J	2050 J	19000	14900	[redacted]		
7440-28-0	Thallium	0.5 (G)	ug/L	-	-	4 J	-	-	-		
7440-62-2	Vanadium	NS	ug/L	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		

[redacted] - Downgradient concentrations which exceed the Class GA criteria

NS = No Standard

- = Not Detected

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

(G) = Guidance Value

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

B = Acetone was also detected in a trip blank

R = data rejected during data validation.

Dup - Field Duplicate

SDG - 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.

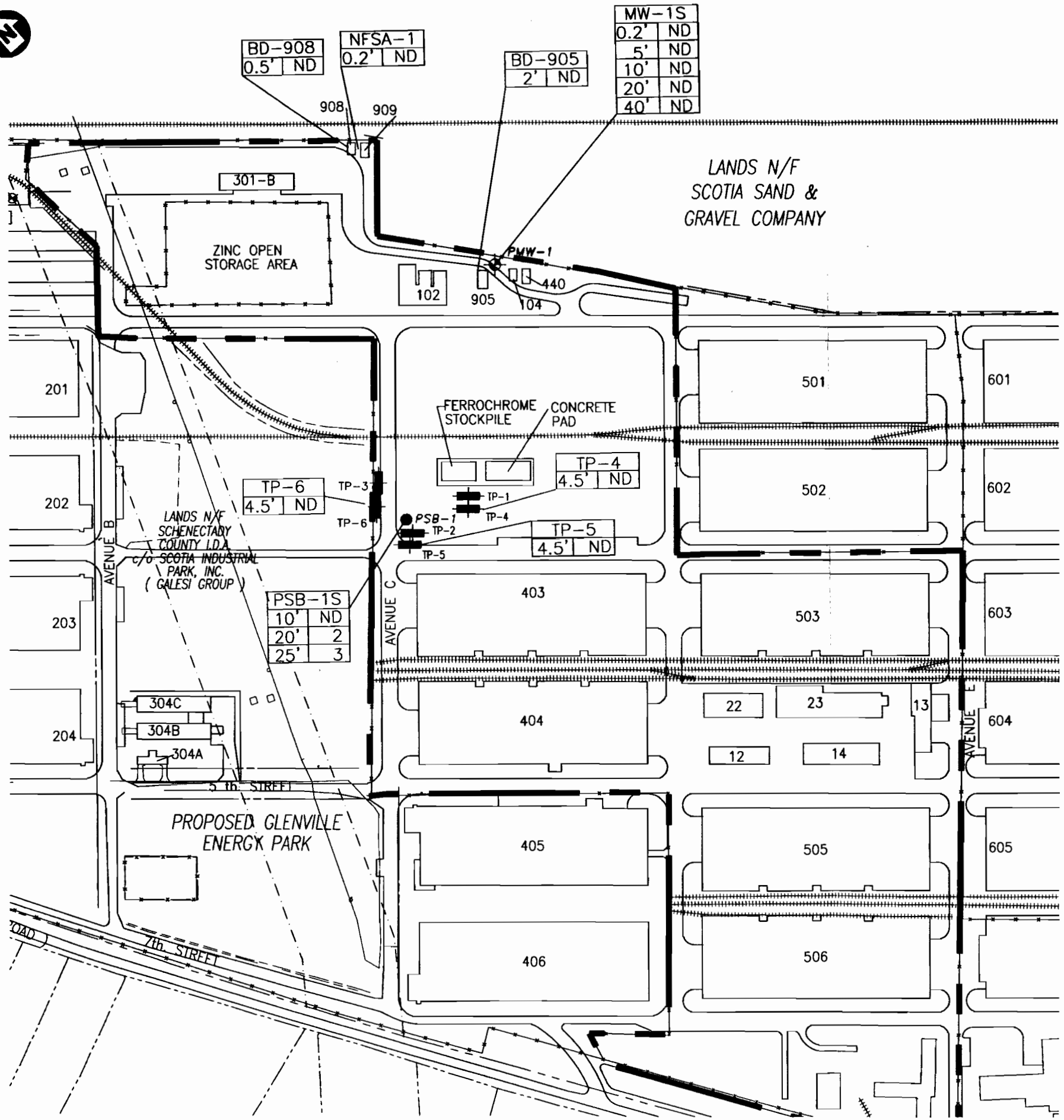
4.3 SOIL SAMPLE ANALYSIS RESULTS

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



LEGEND

- **PMW-1** Monitoring Well Installed by Parsons ES (2000)
- **PSB-4** Soil Boring Installed by Parsons ES (2000)
- TP-4 Test Pit

Depth in Feet BGS	TCE Concentration (ug/kg)

ND Not Detected

SCOTIA DEPOT PROPERTY

BLDG 12	ADMINISTRATIVE BUILDING
BLDG 13	FORMER FIREHOUSE
BLDG 14,22,23	VEHICLE/ EQUIPMENT MAINTENANCE AND REPAIR
404	WAREHOUSE/ OPEN AREA BLOCK ID NUMBER
BLDG 908, 909	FORMER INFLAMMABLE MATERIALS SHEDS
BLDG 102	FORMER TRACTOR AND TRUCK GARAGE
BLDG 905	FORMER MASONS STORAGE SHED
BLDG 104	FORMER GASOLINE TRUCK GARAGE
BLDG 440	FORMER PAINT STORAGE BUILDING
BLDG 301-B	FORMER INFLAMMABLE MATERIALS SHED

300 150 0 300 600

SCALE: 1"=300'

MAP SOURCE: EARTHTECH

FIGURE 4-1

DLA/DNSC SCOTIA DEPOT

SOIL SAMPLING RESULTS

PARSONS ENGINEERING SCIENCE, INC.

PARSONS ENGINEERING SCIENCE, INC.
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

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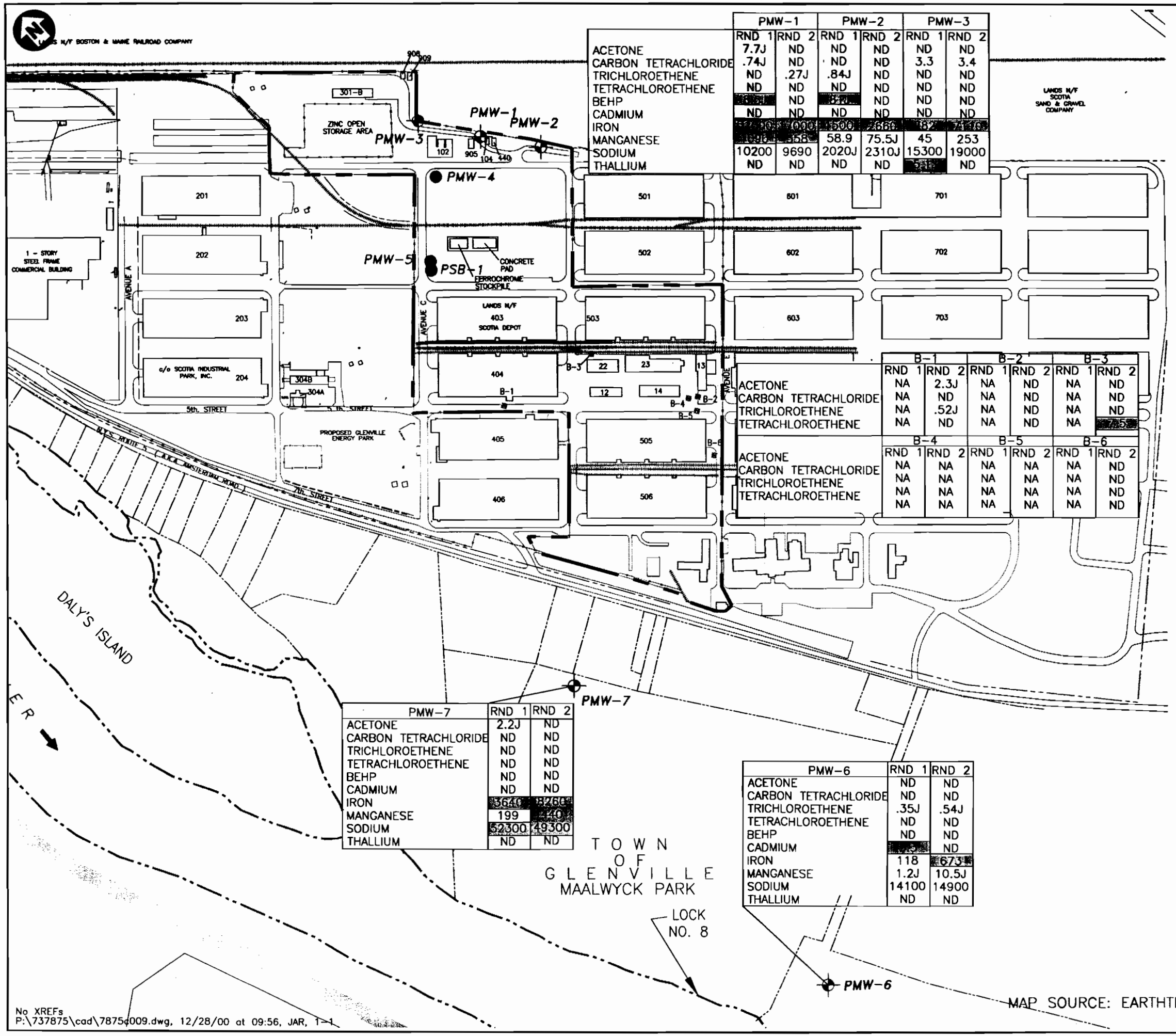

	PMW-1		PMW-2		PMW-3	
	RND 1	RND 2	RND 1	RND 2	RND 1	RND 2
ACETONE	7.7J	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	.74J	ND	ND	ND	3.3	3.4
TRICHLOROETHENE	ND	.27J	.84J	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND
BEHP	[redacted]	ND	[redacted]	ND	ND	ND
CADMIUM	ND	ND	ND	ND	ND	ND
IRON	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MANGANESE	[redacted]	[redacted]	58.9	75.5J	45	253
SODIUM	10200	9690	2020J	2310J	15300	19000
THALLIUM	ND	ND	ND	ND	[redacted]	ND

	B-1		B-2		B-3	
	RND 1	RND 2	RND 1	RND 2	RND 1	RND 2
ACETONE	NA	2.3J	NA	ND	NA	ND
CARBON TETRACHLORIDE	NA	ND	NA	ND	NA	ND
TRICHLOROETHENE	NA	.52J	NA	ND	NA	ND
TETRACHLOROETHENE	NA	ND	NA	ND	NA	[redacted]

	B-4		B-5		B-6	
	RND 1	RND 2	RND 1	RND 2	RND 1	RND 2
ACETONE	NA	NA	NA	NA	NA	ND
CARBON TETRACHLORIDE	NA	NA	NA	NA	NA	ND
TRICHLOROETHENE	NA	NA	NA	NA	NA	ND
TETRACHLOROETHENE	NA	NA	NA	NA	NA	ND

PMW-7	RND 1	RND 2
ACETONE	2.2J	ND
CARBON TETRACHLORIDE	ND	ND
TRICHLOROETHENE	ND	ND
TETRACHLOROETHENE	ND	ND
BEHP	ND	ND
CADMIUM	ND	ND
IRON	[redacted]	[redacted]
MANGANESE	199	[redacted]
SODIUM	[redacted]	[redacted]
THALLIUM	ND	ND

PMW-6	RND 1	RND 2
ACETONE	ND	ND
CARBON TETRACHLORIDE	ND	ND
TRICHLOROETHENE	.35J	.54J
TETRACHLOROETHENE	ND	ND
BEHP	ND	ND
CADMIUM	[redacted]	ND
IRON	118	[redacted]
MANGANESE	1.2J	10.5J
SODIUM	14100	14900
THALLIUM	ND	ND

LEGEND

- MW-3 — MONITORING WELL LOCATION (INSTALLED BY OTHERS)
- PMW-1 — MONITORING WELL INSTALLED BY PARSONS (2000)
- PSB-4 — SOIL BORING INSTALLED BY PARSONS (2000)
- PMW-6 / NA — SAMPLE LOCATION / COMPOUND
- [redacted] — VALUES EXCEEDING NYSDEC CLASS GA GROUNDWATER STANDARDS.
- NA — NOT ANALYZED
- ND — NOT DETECTED
- J — ESTIMATED CONCENTRATIONS
- BEHP — bis(2-ethylhexyl)PHTHALATE
- SCOTIA DEPOT PROPERTY
- BLDG 12 — ADMINISTRATIVE BUILDING
- BLDG 13 — FORMER FIREHOUSE
- BLDG 14,22,23 — VEHICLE/ EQUIPMENT MAINTENANCE AND REPAIR
- 404 — WAREHOUSE/ OPEN AREA BLOCK ID NUMBER

500 250 0 500 1000

SCALE: 1"=500'

FIGURE 4-2

DLA/DNSC SCOTIA DEPOT

GROUNDWATER SAMPLING RESULTS AUGUST 1 & NOVEMBER 1, 2000

PARSONS ENGINEERING SCIENCE, INC.

PARSONS ENGINEERING SCIENCE, INC.
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

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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,

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.

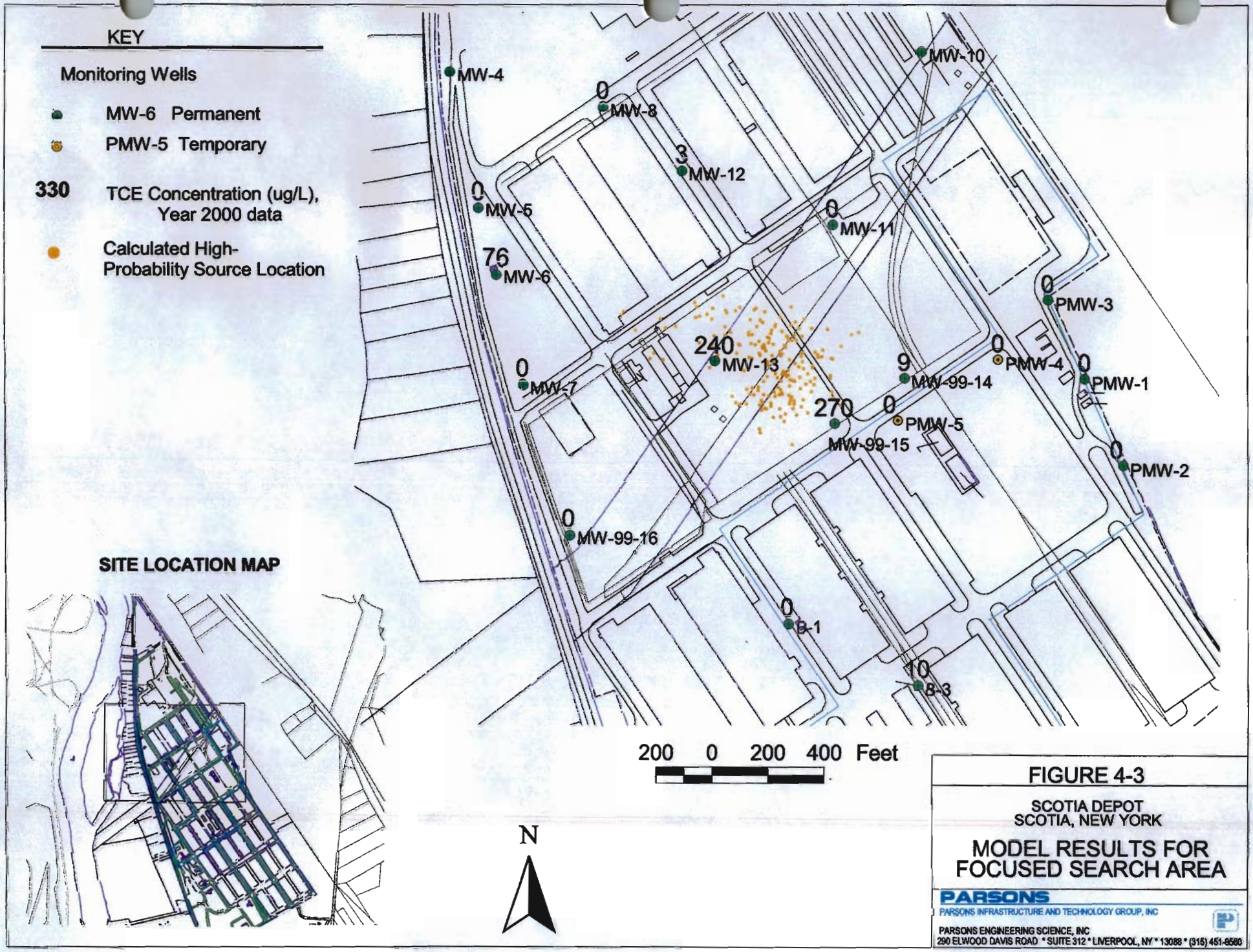

FIGURE 4-3

SCOTIA DEPOT
SCOTIA, NEW YORK

MODEL RESULTS FOR FOCUSED SEARCH AREA

PARSONS
PARSONS INFRASTRUCTURE AND TECHNOLOGY GROUP, INC
PARSONS ENGINEERING SCIENCE, INC
290 ELWOOD DAVIS ROAD * SUITE 312 * LIVERPOOL, NY * 13088 * (315) 451-9560

SECTION 5

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.

SECTION 6

REFERENCES

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APPENDIX A

GEOLOGIC LOGS AND MONITORING WELL SCHEMATICS

Contractor:	Hanson Drilling	**PARSONS ENGINEERING SCIENCE, INC.**	**BORING/** Sheet 1 of 3
Driller:	Jeff Orsini	**DRILLING RECORD**	**WELL NO. PMW-1**
Inspector:	Johnson	**PROJECT NAME:** DLA/DNSC - Scotia Depot	**Location Description:** Located adjacent to the fence
Rig Type:	Ingersol-Rand	**PROJECT NUMBER:** 737875.03000	between Buildings 905 and 104.

GROUNDWATER OBSERVATIONS				
Water Level	68.42 ft	67.82 ft		
Date	6/16/00	7/13/00		
Time	8:00 a.m.	9:30 a.m.		
Meas. From	TOC	TOC		

Weather: Day to Day

Date/Time Start: May 17th, 2000 at 7:40 a.m.

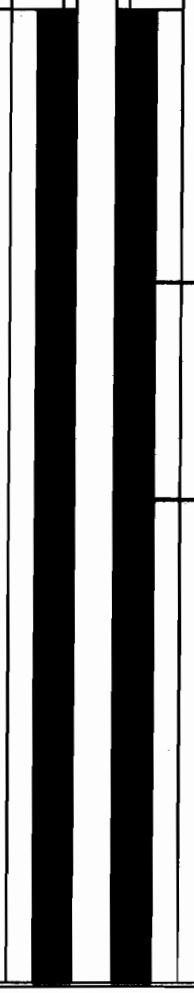
Date/Time Finish: June 16th, 2000 at 12:05 p.m.

Location Plan N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+9					
+6					
+3					
0					
3					
	PMW-1S5	41-68-39-47	50	0	Fine to coarse Sand, some rock fragments, little fine to coarse gravel, dry,
6					no stain or odor.
9	PMW-1S10	98-96-100/.4	80	0	Fine to coarse Sand, some fine to coarse gravel, little rock fragments, dry,
					no stain or odor.
12					Auger refusal at 12 feet.
		AR			
15		AR			
		AR			
		AR			
	PMW-1S20	AR			
21		AR			
		AR			
24		AR			
		AR			
27		AR			
		AR			
30		AR		0	
		AR			
33		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.
		AR			(0' to 108' feet.)
36		AR			
		AR			
39		AR			
	PMW-1S20	AR			
42		AR			
		AR			
45		AR			
		AR			
48		AR			
		AR		0	
51		AR			
		AR			
54		AR			

SCHEMATIC



COMMENTS

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

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 hole caved to 60 feet.
Six inch casing was advanced through this to a depth of 88 feet and the bottom of the well screen was set at 83 feet below grade.
MW-1W78 and MW-1W98 Water screening samples collected and analyzed for volatile organic compounds.
AR = Air Rotary Drilling

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. PMW-1 — Sheet 2 of 3

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER: 737875.03000

Location Description: Located adjacent to the fence between Buildings 905 and 104.

Location Plan — See Site Plan

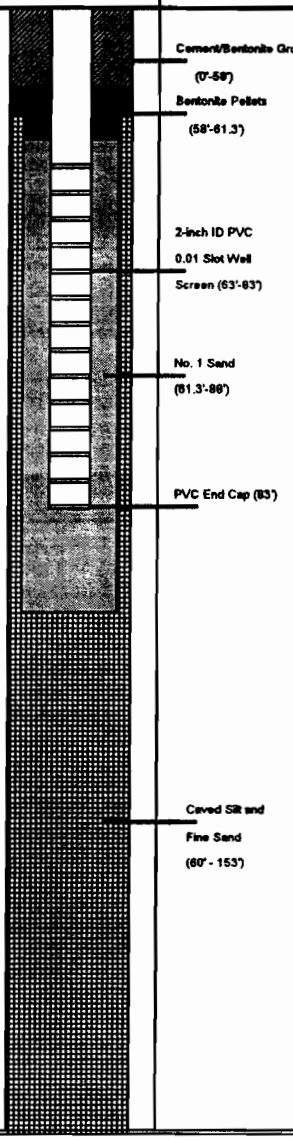
Weather: Day to Day
Date/Time Start: May 17th, 2000 at 7:40 a.m.
Date/Time Finish: June 16th, 2000 at 12:05 p.m.

GROUNDWATER OBSERVATIONS

Water Level	68.42 ft	67.82 ft		
Date	6/16/00	7/13/00		
Time	8:00 a.m.	9:30 a.m.		
Meas. From	TOC	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
		AR			
57		AR			
		AR			
60		AR			
		AR			Boring caved to 60 feet when eight inch casing was removed.
63		AR			
		AR			
66		AR			
		AR			
69		AR			
		AR		0	
72		AR			
		AR			
75		AR			
		AR			
78	PMW-1W7	AR			
		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.
81		AR			(0' to 108' feet.)
		AR			
84		AR			
		AR			
87		AR			
		AR			
90		AR			
		AR			
93		AR			
		AR			Silt and very fine sand flow and heave to this depth.
96		AR			
	PMW-1W9	AR			
99		AR			
		AR			
102		AR			
		AR			
105		AR			
		AR			
108		AR			Formation change to silt and very fine sand.
		AR			
111		AR			
		AR			
114		AR			
		AR			
117		AR			
		AR			

SCHEMATIC



COMMENTS

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
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 hole caved to 60 feet.
Six inch casing was advanced through this to a depth of 88 feet and the bottom of the well screen was set at 83 feet below grade.
PMW-1W78 and PMW-1W98 Water screening samples collected and analyzed for volatile organic compounds.
AR = Air Rotary Drilling

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. PMW-1 Sheet 3 of 3

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER: 737875.03000

Location Description: Located adjacent to the fence between Buildings 905 and 104.

GROUNDWATER OBSERVATIONS				
Water Level	68.42 ft	67.82 ft		
Date	6/16/00	7/13/00		
Time	8:00 a.m.	9:30 a.m.		
Meas. From	TOC	TOC		

Weather: Day to Day
Date/Time Start: May 17th, 2000 at 7:40 a.m.
Date/Time Finish: June 16th, 2000 at 12:05 p.m.

Location Plan — See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
120		AR			Silt and very fine sand (108' - 153')		Caved Silt and Fine Sand (60' - 153')
		AR					
123		AR					
		AR					
126		AR					
		AR					
129		AR					
		AR					
132		AR					
		AR					
135		AR					
		AR					
138		AR					
		AR					
141		AR					
		AR					
144		AR					
		AR					
147		AR					
		AR					
150		AR					
		AR					
153		AR					
156					Boring terminated at 153 feet.		
159							
162							
165							
168							
171							
174							
177							
180							
183							

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
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 hole caved to 60 feet.
Six inch casing was advanced through this to a depth of 88 feet and the bottom of the well screen was set at 83 feet below grade.
PMW-1W78 and PMW-1W98 Water screening samples collected and analyzed for volatile organic compounds.
AR = Air Rotary Drilling

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER 737875.03000

BORING/ WELL NO. PMW-2 Sheet 1 of 2

Location Description: Located adjacent to the fence near Building 105.

Location Plan N

See Site Plan

Weather: Day to Day

Date/Time Start: June 1st, 2000 at 7:15 a.m.

Date/Time Finish: June 7th, 2000 at 7:00 p.m.

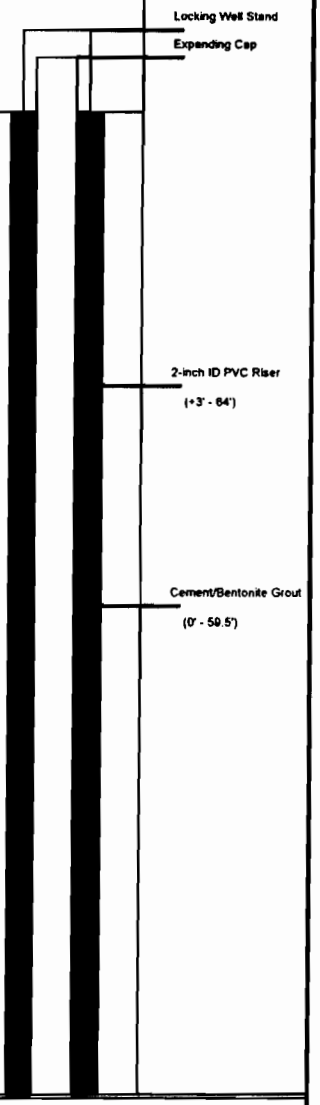
GROUNDWATER OBSERVATIONS				
Water Level	67.53 ft	66.64 ft		
Date	6/16/00	7/13/00		
Time	8:10 a.m.	9:30 a.m.		
Meas. From	TOC	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)
+9				
+6				
+3				
0				
		AR		
3		AR		
		AR		
6		AR		
		AR		
9		AR		
		AR		0
12		AR		
		AR		
15		AR		
		AR		
18		AR		
		AR		
21		AR		
		AR		
24		AR		
		AR		
27		AR		
		AR		
30		AR		0
		AR		
33		AR		
		AR		
36		AR		
		AR		
39		AR		
		AR		
42		AR		
		AR		
45		AR		
		AR		
48		AR		
		AR		0
51		AR		
		AR		
54		AR		

FIELD IDENTIFICATION OF MATERIAL

Fine to coarse gravel, fine to coarse sand, silt some cobbles.
(Glacial outwash 0' to 88')

SCHEMATIC



COMMENTS

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
PMW-2W78 Water screening sample collected and analyzed for volatile organic compounds.
AR = Air Rotary Drilling

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER: 737875.03000

BORING/ WELL NO. PMW-2 Sheet 2 of 2

Location Description: Located adjacent to the fence near Building 105.

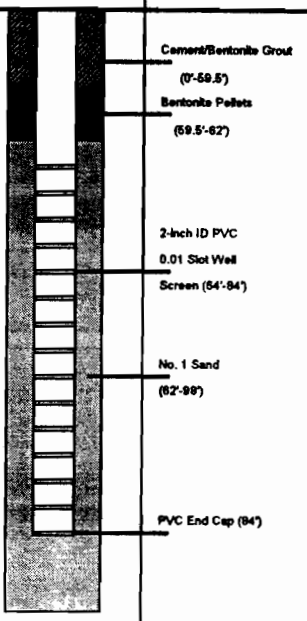
Location Plan See Site Plan

GROUNDWATER OBSERVATIONS				
Water Level	67.53 ft	66.64 ft		
Date	6/16/00	7/13/00		
Time	8:10	9:30 a.m.		
Meas. From	TOC	TOC		

Weather: Day to Day
Date/Time Start: June 1st, 2000 at 7:15 a.m.
Date/Time Finish: June 7th, 2000 at 7:00 p.m.

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
		AR			
57		AR			
		AR			
60		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.
		AR			(Glacial outwash 0' to 88' feet.)
63		AR			
		AR			
66		AR			
		AR			
69		AR			
		AR			
72		AR			
		AR			
75		AR			
		AR			
78	PMW-2W7	AR			
		AR			
81		AR			
		AR			
84		AR			
		AR			
87		AR			
		AR			
90					Boring terminated at 88 feet.
93					
96					
99					
102					
105					
108					
111					
114					
117					

SCHEMATIC



COMMENTS

COMMENTS:
PMW-2W78 Water screening sample collected and analyzed for volatile organic compounds.
AR = Air Rotary Drilling

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. PMW-3 Sheet 1 of 2

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER: 737875.03000

Location Description: Located adjacent to the gate in the fence on the north side of the depot.

Location Plan N

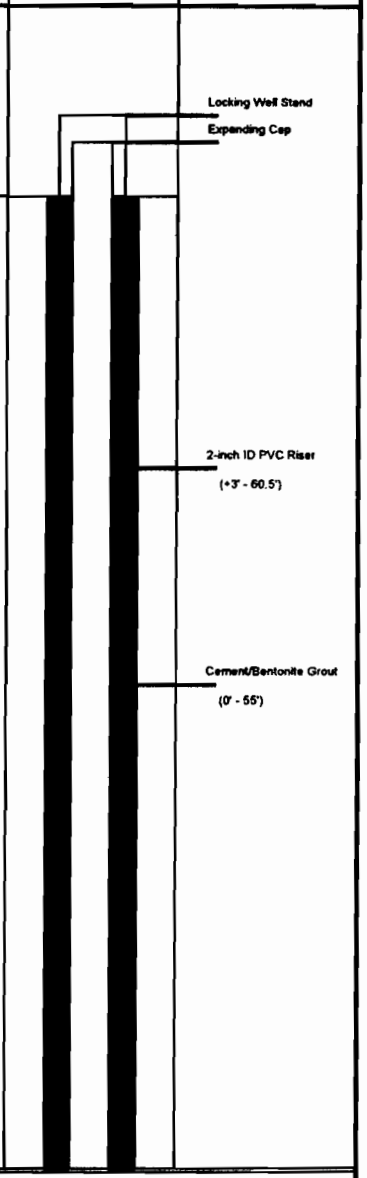
See Site Plan

Weather: Day to Day
Date/Time Start: June 6th, 2000 at 2:45 p.m.
Date/Time Finish: June 12th, 2000 at 1:30 p.m.

GROUNDWATER OBSERVATIONS

Water Level	65.09 ft	64.76 ft		
Date	6/16/00	7/13/00		
Time	8:20 a.m.	9:30 a.m.		
Meas. From	TOC	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+9					
+6					
+3					
0					
		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')
		AR		0	
12		AR			
		AR			
15		AR			
		AR			
18		AR			
		AR			
21		AR			
		AR			
24		AR			
		AR			
27		AR			
		AR			
30		AR		0	
		AR			
33		AR			
		AR			
36		AR			
		AR			
39		AR			
		AR			
42		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.
		AR			(Glacial outwash 0' to 84')
45		AR			
		AR			
48		AR			
		AR		0	
51		AR			
		AR			
54		AR			



SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
PMW-3W78 Water screening sample collected and analyzed for volatile organic compounds.
AR = Air Rotary Drilling

Contractor: Hanson Drilling Driller: Jeff Orsini Inspector: Johnson Rig Type: Ingersol-Rand	**PARSONS ENGINEERING SCIENCE, INC.** **DRILLING RECORD** PROJECT NAME: DLA/DNSC - Scotia Depot PROJECT NUMBER: 737875.03000	**BORING/** Sheet 2 of 2 **WELL NO.** PMW-3 **Location Description:** Located adjacent to the gate in the fence on the north side of the depot.

GROUNDWATER OBSERVATIONS				
Water Level	65.09 ft	64.76 ft		
Date	6/16/00	7/13/00		
Time	8:20 a.m.	9:30 a.m.		
Meas. From	TOC	TOC		

Weather: Day to Day

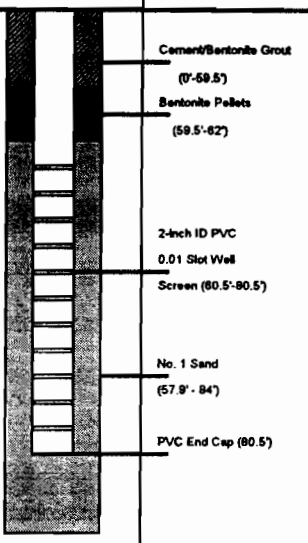
Date/Time Start: June 6th, 2000 at 2:45 p.m.

Date/Time Finish: June 12th, 2000 at 1:30 p.m.

Location Plan N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
		AR					
57		AR					
		AR					
60		AR			Fine to coarse gravel, fine to coarse sand, silt some cobbles.		
		AR			(Glacial outwash 0' to 84' feet.)		
63		AR					
		AR					
66		AR					
		AR					
69		AR					
		AR					
72		AR					
		AR					
75		AR					
		AR					
78	PMW-3W7	AR					
		AR					
81		AR					
		AR					
84		AR					
87					Boring terminted at 84 feet.		
90							
93							
96							
99							
102							
105							
108							
111							
114							
117							



SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
PMW-3W78 Water screening sample collected and analyzed for volatile organic compounds.
AR = Air Rotary Drilling

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. PMW-4 Sheet 1 of 2

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER: 737875.03000

Location Description: Located across from building 102 near the ferrochrome storage area.

Location Plan See Site Plan

Weather: Day to Day
Date/Time Start: June 14th, 2000 at 7:30 a.m.
Date/Time Finish: June 15th, 2000 at 6:00 p.m.

GROUNDWATER OBSERVATIONS

Water Level	60.9 ft			
Date	6/15/00			
Time	7:30 a.m.			
Meas. From	Grade			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
+9							
+6							
+3							
0							
		AR					
3		AR					
		AR					
6		AR					
		AR			Fine to medium sand, some silt, little cobbles, little fine to coarse gravel.		
9		AR			(Glacial outwash 0' to 88')		
		AR		0			
12		AR					
		AR					
15		AR					Cement/Bentonite Grout (0' - 88')
		AR					
18		AR					
		AR					
21		AR					
		AR					
24		AR					
		AR					
27		AR					
		AR					
30		AR		0			
		AR					
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 88')		
		AR					
42		AR					
		AR					
45		AR					
		AR					
48		AR					
		AR					
51		AR		0			
		AR					
54		AR					

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Boring was grouted based on a water screening sample collected using a polyethelene bailer.
AR = Air Rotary Drilling

Contractor: Hanson Drilling Driller: Jeff Orsini Inspector: Johnson Rig Type: Ingersol-Rand	**PARSONS ENGINEERING SCIENCE, INC.** **DRILLING RECORD** PROJECT NAME: DLA/DNSC - Scotia Depot PROJECT NUMBER: 737875.03000	**BORING/ WELL NO.** PMW-4 Sheet 2 of 2 **Location Description:** Located across from building 102 near the ferrochrome storage area.

GROUNDWATER OBSERVATIONS				
Water Level	60.9 ft			
Date	6/15/00			
Time	7:30 a.m.			
Meas. From	Grade			

Weather: Day to Day

Date/Time Start: June 14th, 2000 at 7:30 a.m.

Date/Time Finish: June 15th, 2000 at 6:00 p.m.

Location Plan

N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
		AR					
57		AR					
		AR					
60		AR					
		AR					
63		AR					
		AR			Fine to medium sand, some silt, little fine to coarse gravel.		
66		AR			(Glacial outwash 0' to 88')		
		AR					
69		AR					
		AR					
72		AR					
		AR					
75		AR					
		AR					
78	PMW-4W7	AR					
		AR					
81		AR					
		AR					
84		AR					
		AR					
87		AR					
		AR					
90							
					Boring terminated at 88 feet.		
93							
96							
99							
102							
105							
108							
111							
114							
117							

Cement/Bentonite Grout (0'-88')

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Boring was grouted based on a water screening sample collected using a polyethelene bailer.
AR = Air Rotary Drilling

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. PMW-5 Sheet 1 of 2

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER: 737875.03000

Location Description: Located southwest of the ferrochrome stockpile in the open storage area.

Location Plan N

See Site Plan

Weather: Day to Day
Date/Time Start: June 19th, 2000 at 8:00 a.m.
Date/Time Finish: June 21th, 2000 at 1:00 p.m.

GROUNDWATER OBSERVATIONS

Water Level	60.95 ft			
Date	6/20/00			
Time	7:20 a.m.			
Meas. From	Grade			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
+9							
+6							
+3							
0							
		AR					
3		AR					
		AR					
6		AR					
		AR			Fine to medium sand, some silt, little cobbles, little fine to coarse gravel.		
9		AR			(Glacial outwash 0' to 83')		
		AR		0			
12		AR					
		AR					
15		AR					Cement/Bentonite Grout (0' - 83')
		AR					
18		AR					
		AR					
21		AR					
		AR					
24		AR					
		AR					
27		AR					
		AR					
30		AR		0			
		AR					
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					
		AR					
48		AR					
		AR		0			
51		AR					
		AR					
54		AR					

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Boring was grouted based on a water screening sample collected using a polyethelene bailer.
AR = Air Rotary Drilling

Contractor:	Hanson Drilling
Driller:	Jeff Orsini
Inspector:	Johnson
Rig Type:	Ingersol-Rand

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER: 737875.03000

BORING/ WELL NO. PMW-5 Sheet 2 of 2

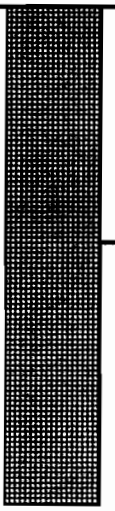
Location Description: Located southwest of the ferrochrome stockpile in the open storage area.

GROUNDWATER OBSERVATIONS				
Water Level	60.95 ft			
Date	6/20/00			
Time	7:20 a.m.			
Meas. From	Grade			

Weather: Day to Day
Date/Time Start: June 19th, 2000 at 8:00 a.m.
Date/Time Finish: June 21th, 2000 at 1:00 p.m.

Location Plan

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
		AR			Fine to medium sand, some silt, little fine to coarse gravel. (Glacial outwash 0' to 83')		Cement/Bentonite Grout (0'-83')
57		AR					
		AR					
60		AR					
		AR					
63		AR					
		AR					
66		AR					
		AR					
69		AR					
		AR					
72		AR					
		AR					
75		AR					
		AR					
78	PMW-5W7	AR					
		AR					
81		AR					
		AR					
84					Boring terminated at 83 feet.		
87							
90							
93							
96							
99							
102							
105							
108							
111							
114							
117							

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Boring was grouted based on a water screening sample collected using a polyethelene bailer.
AR = Air Rotary Drilling

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. PMW-6 Sheet 1 of 1

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER 737983.03000

Location Description: Located in Maalwyck Park on the eastern side of the parking lot.

Location Plan N

See Site Plan

Weather: Day to Day

Date/Time Start: June 29th, 2000 at 1:30 p.m.

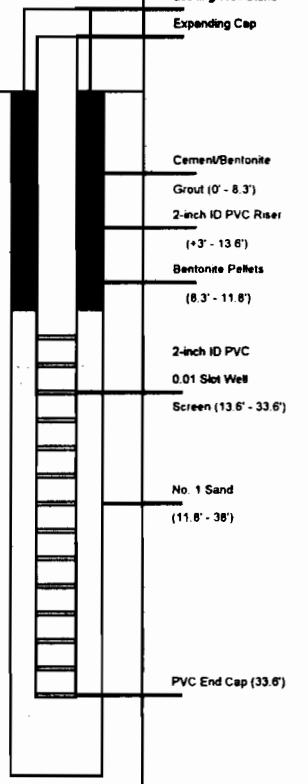
Date/Time Finish: June 30th, 2000 at 11:30 a.m.

GROUNDWATER OBSERVATIONS

Water Level	18.78 ft	19.24 ft		
Date	7/5/00	7/13/00		
Time	9:00 a.m.	9:30 a.m.		
Meas. From	TOC	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+9					
+6					
+3					
0					
		AR			
3		AR			
		AR			Fine to coarse Sand, some fine gravel, outwash. (0' - 10')
6		AR			
		AR			
9		AR			
		AR		0	
12		AR			
		AR			
15		AR			
		AR			
18		AR			
		AR			
21		AR			
		AR			
24		AR			Dark brown to gray Silt, some clay, little fine sand. (10' - 38')
		AR			
27		AR			
		AR			
30		AR		0	
		AR			
33		AR			
		AR			
36		AR			
	PMW-6W38	AR			
39					Boring terminated at 38 feet.
42					
45					
48					
51					
54					

SCHEMATIC



COMMENTS:

PMW-6W38 Water screening sample collected and analyzed for volatile organic compounds.

AR = Air Rotary Drilling

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. PMW-7 Sheet 1 of 1

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER 737983.03000

Location Description: Located in the field west of Maalwyck Park.

GROUNDWATER OBSERVATIONS

Water Level	12.94 ft			
Date	7/13/00			
Time	9:30 a.m.			
Meas. From	TOC			

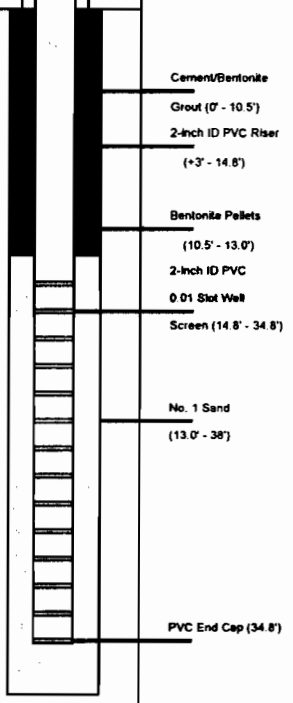
Weather: Day to Day
Date/Time Start: July 5th, 2000 at 2:30 p.m.
Date/Time Finish: July 6th, 2000 at 4:00 p.m.

Location Plan N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+9					
+6					
+3					
0					
		AR			
3		AR			
		AR			
6		AR			
		AR			
9		AR			
		AR		0	
12		AR			
		AR			Dark brown Silt, little fine sand. (0' - 38')
15		AR			
		AR			
18		AR			
		AR			
21		AR			
		AR			
24		AR			
		AR			
27		AR			
		AR			
30		AR		0	
		AR			
33		AR			
		AR			
36		AR			
	PMW-7W38	AR			
39					
					Boring terminated at 38 feet.
42					
45					
48					
51					
54					

SCHEMATIC



COMMENTS:

PMW-7W38 Water screening sample collected and analyzed for volatile organic compounds.

AR = Air Rotary Drilling

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. PSB-1 Sheet 1 of 1

Contractor: Hanson Drilling
Driller: Jeff Orsini
Inspector: Johnson
Rig Type: Ingersol-Rand

PROJECT NAME: DLA/DNSC - Scotia Depot
PROJECT NUMBER: 737875.03000

Location Description: Located adjacent to PMW-5.

GROUNDWATER OBSERVATIONS

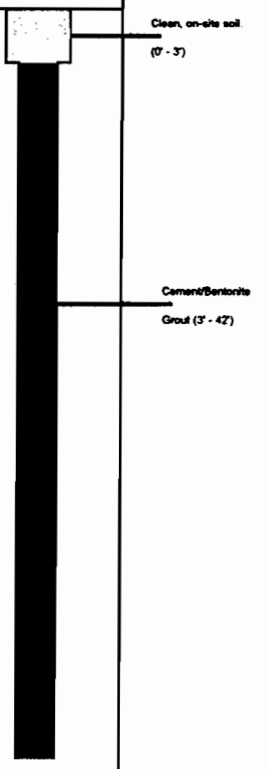
Water Level				
Date				
Time				
Meas. From				

Weather: Day to Day
Date/Time Start: July 10th, 2000 at 9:15 a.m.
Date/Time Finish: July 12th, 2000 at 11:00 a.m.

Location Plan — See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+9					
+6					
+3					
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	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,
18					dry, no stain or odor.
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	60	0	(30-32) Same as above.
33					
36		63-55-30-34	80	0	(35-37) Brown medium to coarse Sand, some cobble fragments, dry, no stain
39					or odor.
		53-37-40-102	80	0	(40-42) Brown fine sand, little rock fragments, very slight moisture, no stain
42					or odor.
45					Boring terminated at 42 feet.
48					
51					
54					

SCHEMATIC



COMMENTS

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
The boring began to cave at the surface due to auger agitation. The glacial outwash caved in creating a void approximately three feet deep by two feet wide. A test pit was completed adjacent to the boring to check for buried material, but none was found.
Soil samples collected at 10,20, and 25 feet for volatile organic compounds.

APPENDIX B

PHOTOLOG OF BORING LOCATIONS

APPENDIX B
MONITORING WELL AND BORING LOCATIONS

Description: Drill rig set up on PMW-5. Facing: South
Date: June 19, 2000

Description: Drill rig set up on PMW-6. Facing: East
Date: June 29, 2000

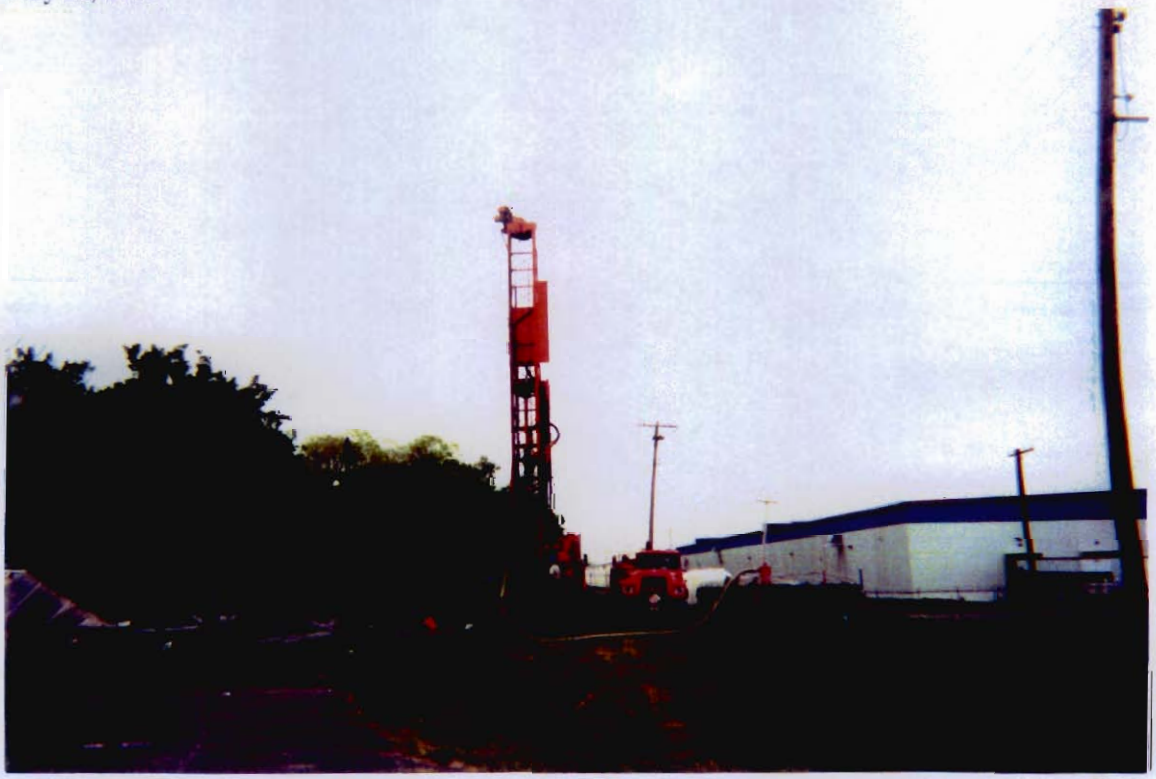
APPENDIX B
MONITORING WELL AND BORING LOCATIONS

Description: Drill rig set up on PMW-3. Facing: Northwest
Date: June 7, 2000

Description: Drill rig set up on PMW-4. Facing: Southwest
Date: June 13, 2000

APPENDIX B
MONITORING WELL AND BORING LOCATIONS

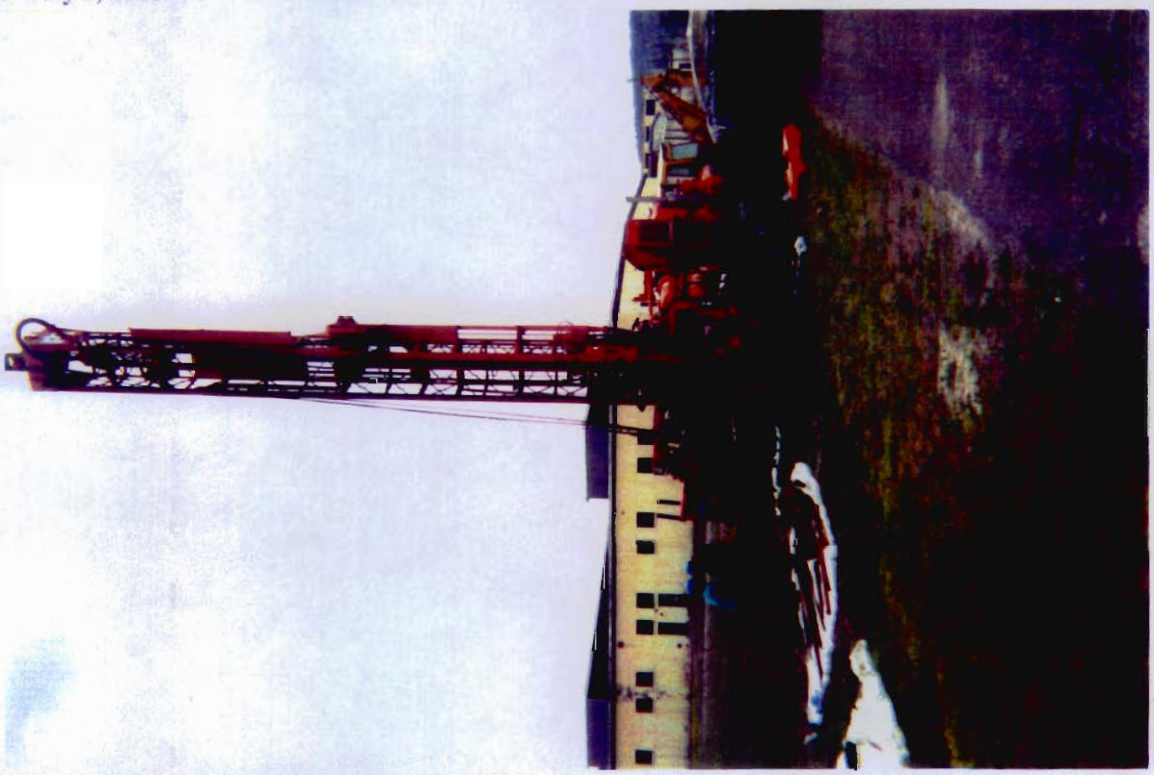
Description: Drill rig set up on PMW-1. Facing: East
Date: May 22, 2000



Description: Drill rig set up on PMW-2. Facing: East
Date: June 1, 2000

APPENDIX B
MONITORING WELL AND BORING LOCATIONS

Description: Drill rig set up on PMW-7. Facing: East
Date: July 5, 2000



Description: Drill rig set up on PSB-1. Facing: South
Date: July 10, 2000

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

PARSONS

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SECTION 1

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.

SECTION 2

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 µg/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 DATE	TCL VOCs	TCL SVOCs	TCL PEST/PCBs	TAL METALS
MW-2	WATER	8/1/00	OK	OK	OK	OK
MW-102	WATER	8/1/00	OK	OK	OK	OK
MW-1	WATER	8/1/00	OK	OK	OK	OK
MW-3	WATER	8/1/00	OK			OK
MW-6	WATER	8/1/00	OK			OK
MW-7	WATER	8/1/00	OK			OK
TRIP BLANK	WATER	8/1/00	OK			
TOTAL SAMPLES:			7	3	3	6

NOTES: OK - Sample analysis considered valid and usable.

ATTACHMENT A

VALIDATED LABORATORY DATA

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 1 SDG: COH030303		SAMPLE ID:	MW-1	MW-2	Dup of MW-2 MW-102	MW-3	MW-6	MW-7	TRIPBLANK
		LAB ID:	COH030303-003	COH030303-001	COH030303-002	COH030303-004	COH030303-005	COH030303-006	COH030303-007
		SOURCE:	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh
		SDG:	COH030303	COH030303	COH030303	COH030303	COH030303	COH030303	COH030303
		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:							
67-64-1	Acetone	ug/L	7.7 J	10 UJ	10 UJ	10 UJ	10 UJ	2.2 J	10 UJ
71-43-2	Benzene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
75-27-4	Bromodichloromethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
75-25-2	Bromoform	ug/L	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
74-83-9	Bromomethane	ug/L	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ
78-93-3	2-Butanone	ug/L	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ
75-15-0	Carbon disulfide	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
56-23-5	Carbon tetrachloride	ug/L	0.74 J	1 U	1 U	3.3	1 U	1 U	1 U
108-90-7	Chlorobenzene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
124-48-1	Dibromochloromethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
75-00-3	Chloroethane	ug/L	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ
67-66-3	Chloroform	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
74-87-3	Chloromethane	ug/L	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ
75-34-3	1,1-Dichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
107-06-2	1,2-Dichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
75-35-4	1,1-Dichloroethene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
540-59-0	1,2-Dichloroethene (total)	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
78-87-5	1,2-Dichloropropane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
10061-01-5	cis-1,3-Dichloropropene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
10061-02-6	trans-1,3-Dichloropropene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
100-41-4	Ethylbenzene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
591-78-6	2-Hexanone	ug/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U
75-09-2	Methylene chloride	ug/L	2 U	2 U	2 U	2 U	2 U	2 U	3.9
108-10-1	4-Methyl-2-pentanone	ug/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U
100-42-5	Styrene	ug/L	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
79-34-5	1,1,2,2-Tetrachloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
127-18-4	Tetrachloroethene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
108-88-3	Toluene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
71-55-6	1,1,1-Trichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
79-00-5	1,1,2-Trichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U
79-01-6	Trichloroethene	ug/L	1 U	0.84 J	0.99 J	1 U	0.35 J	1 U	1 U
75-01-4	Vinyl chloride	ug/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1330-20-7	Xylenes (total)	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 1 SDG: COH030303		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	MW-1 COH030303-003 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	MW-2 COH030303-001 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	Dup of MW-2 MW-102 COH030303-002 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	MW-3 COH030303-004 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	MW-6 COH030303-005 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	MW-7 COH030303-006 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	TRIPBLANK COH030303-007 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000
CAS NO.	COMPOUND	UNITS:							
	[redacted]								
83-32-9	Acenaphthene	ug/L	10 U	10 U	10 U				
208-96-8	Acenaphthylene	ug/L	10 U	10 U	10 U				
120-12-7	Anthracene	ug/L	10 U	10 U	10 U				
56-55-3	Benzo(a)anthracene	ug/L	10 U	10 U	10 U				
50-32-8	Benzo(a)pyrene	ug/L	10 U	10 U	10 U				
205-99-2	Benzo(b)fluoranthene	ug/L	10 U	10 U	10 U				
207-08-9	Benzo(k)fluoranthene	ug/L	10 U	10 U	10 U				
191-24-2	Benzo(ghi)perylene	ug/L	10 U	10 U	10 U				
111-91-1	bis(2-Chloroethoxy)methane	ug/L	10 U	10 U	10 U				
111-44-4	bis(2-Chloroethyl) ether	ug/L	10 U	10 U	10 U				
117-81-7	bis(2-Ethylhexyl) phthalate	ug/L	8.5 J	81 J	9.5 J				
101-55-3	4-Bromophenyl phenyl ether	ug/L	10 U	10 U	10 U				
85-68-7	Butyl benzyl phthalate	ug/L	10 U	10 U	10 U				
86-74-8	Carbazole	ug/L	10 U	10 U	10 U				
106-47-8	4-Chloroaniline	ug/L	10 U	10 U	10 U				
59-50-7	4-Chloro-3-methylphenol	ug/L	10 U	10 U	10 U				
91-58-7	2-Chloronaphthalene	ug/L	10 U	10 U	10 U				
95-57-8	2-Chlorophenol	ug/L	10 U	10 U	10 U				
7005-72-3	4-Chlorophenyl phenyl ether	ug/L	10 U	10 U	10 U				
218-01-9	Chrysene	ug/L	10 U	10 U	10 U				
53-70-3	Dibenz(a,h)anthracene	ug/L	10 U	10 U	10 U				
132-64-9	Dibenzofuran	ug/L	10 U	10 U	10 U				
95-50-1	1,2-Dichlorobenzene	ug/L	10 U	10 U	10 U				
541-73-1	1,3-Dichlorobenzene	ug/L	10 U	10 U	10 U				
106-46-7	1,4-Dichlorobenzene	ug/L	10 U	10 U	10 U				
91-94-1	3,3'-Dichlorobenzidine	ug/L	50 U	50 U	50 U				
120-83-2	2,4-Dichlorophenol	ug/L	10 U	10 U	10 U				
84-66-2	Diethyl phthalate	ug/L	10 U	10 U	10 U				
105-67-9	2,4-Dimethylphenol	ug/L	10 U	10 U	10 U				
131-11-3	Dimethyl phthalate	ug/L	10 U	10 U	10 U				
84-74-2	Di-n-butyl phthalate	ug/L	10 U	10 U	10 U				
117-84-0	Di-n-octyl phthalate	ug/L	10 U	10 U	10 U				

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 1 SDG: COH030303		SAMPLE ID:	MW-1	MW-2	Dup of MW-2 MW-102	MW-3	MW-6	MW-7	TRIPBLANK
		LAB ID:	COH030303-003	COH030303-001	COH030303-002	COH030303-004	COH030303-005	COH030303-006	COH030303-007
		SOURCE:	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh
		SDG:	COH030303	COH030303	COH030303	COH030303	COH030303	COH030303	COH030303
		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:							
51-28-5	2,4-Dinitrophenol	ug/L	50 UJ	50 UJ	50 UJ				
534-52-1	4,6-Dinitro-2-methylphenol	ug/L	50 U	50 U	50 U				
121-14-2	2,4-Dinitrotoluene	ug/L	10 U	10 U	10 U				
606-20-2	2,6-Dinitrotoluene	ug/L	10 U	10 U	10 U				
206-44-0	Fluoranthene	ug/L	10 U	10 U	10 U				
86-73-7	Fluorene	ug/L	10 U	10 U	10 U				
118-74-1	Hexachlorobenzene	ug/L	10 U	10 U	10 U				
87-68-3	Hexachlorobutadiene	ug/L	10 U	10 U	10 U				
77-47-4	Hexachlorocyclopentadiene	ug/L	50 U	50 U	50 U				
67-72-1	Hexachloroethane	ug/L	10 U	10 U	10 U				
193-39-5	Indeno(1,2,3-cd)pyrene	ug/L	10 U	10 U	10 U				
78-59-1	Isophorone	ug/L	10 U	10 U	10 U				
91-57-6	2-Methylnaphthalene	ug/L	10 U	10 U	10 U				
95-48-7	2-Methylphenol	ug/L	10 U	10 U	10 U				
65794-96-9	3-Methylphenol & 4-Methylphenol	ug/L	20 U	20 U	20 U				
91-20-3	Naphthalene	ug/L	10 U	10 U	10 U				
88-74-4	2-Nitroaniline	ug/L	50 U	50 U	50 U				
99-09-2	3-Nitroaniline	ug/L	50 U	50 U	50 U				
100-01-6	4-Nitroaniline	ug/L	50 U	50 U	50 U				
98-95-3	Nitrobenzene	ug/L	10 U	10 U	10 U				
88-75-5	2-Nitrophenol	ug/L	10 U	10 U	10 U				
100-02-7	4-Nitrophenol	ug/L	50 U	50 U	50 U				
621-64-7	N-Nitrosodi-n-propylamine	ug/L	10 U	10 U	10 U				
86-30-6	N-Nitrosodiphenylamine	ug/L	10 U	10 U	10 U				
108-60-1	2,2'-oxybis(1-Chloropropane)	ug/L	10 U	10 U	10 U				
87-86-5	Pentachlorophenol	ug/L	50 U	50 U	50 U				
85-01-8	Phenanthrene	ug/L	10 U	10 U	10 U				
108-95-2	Phenol	ug/L	10 U	10 U	10 U				
129-00-0	Pyrene	ug/L	10 U	10 U	10 U				
120-82-1	1,2,4-Trichlorobenzene	ug/L	10 U	10 U	10 U				
95-95-4	2,4,5-Trichlorophenol	ug/L	10 U	10 U	10 U				
88-06-2	2,4,6-Trichlorophenol	ug/L	10 U	10 U	10 U				

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 1 SDG: COH030303		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	MW-1 COH030303-003 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	MW-2 COH030303-001 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	Dup of MW-2 MW-102 COH030303-002 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	MW-3 COH030303-004 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	MW-6 COH030303-005 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	MW-7 COH030303-006 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000	TRIPBLANK COH030303-007 STL Pittsburgh COH030303 Water 8/1/2000 9/15/2000
CAS NO.	COMPOUND	UNITS:							
319-84-6	alpha-BHC	ug/L	0.05 U	0.05 U	0.05 U				
319-85-7	beta-BHC	ug/L	0.05 U	0.05 U	0.05 U				
319-86-8	delta-BHC	ug/L	0.05 U	0.05 U	0.05 U				
58-89-9	gamma-BHC (Lindane)	ug/L	0.05 U	0.05 U	0.05 U				
76-44-8	Heptachlor	ug/L	0.05 U	0.05 U	0.05 U				
309-00-2	Aldrin	ug/L	0.05 U	0.05 U	0.05 U				
1024-57-3	Heptachlor epoxide	ug/L	0.05 U	0.05 U	0.05 U				
959-98-8	Endosulfan I	ug/L	0.05 U	0.05 U	0.05 U				
60-57-1	Dieldrin	ug/L	0.05 U	0.05 U	0.05 U				
72-55-9	4,4'-DDE	ug/L	0.05 U	0.05 U	0.05 U				
72-20-8	Endrin	ug/L	0.05 U	0.05 U	0.05 U				
53494-70-5	Endrin ketone	ug/L	0.05 U	0.05 U	0.05 U				
7421-93-4	Endrin aldehyde	ug/L	0.05 U	0.05 U	0.05 U				
33213-65-9	Endosulfan II	ug/L	0.05 U	0.05 U	0.05 U				
72-54-8	4,4'-DDD	ug/L	0.05 U	0.05 U	0.05 U				
1031-07-8	Endosulfan sulfate	ug/L	0.05 U	0.05 U	0.05 U				
50-29-3	4,4'-DDT	ug/L	0.05 U	0.05 U	0.05 U				
72-43-5	Methoxychlor	ug/L	0.1 U	0.1 U	0.1 U				
5103-71-9	alpha-Chlordane	ug/L	0.05 U	0.05 U	0.05 U				
5103-74-2	gamma-Chlordane	ug/L	0.05 U	0.05 U	0.05 U				
8001-35-2	Toxaphene	ug/L	2 U	2 U	2 U				
12674-11-2	Aroclor 1016	ug/L	1 U	1 U	1 U				
11104-28-2	Aroclor 1221	ug/L	1 U	1 U	1 U				
11141-16-5	Aroclor 1232	ug/L	1 U	1 U	1 U				
53469-21-9	Aroclor 1242	ug/L	1 U	1 U	1 U				
12672-29-6	Aroclor 1248	ug/L	1 U	1 U	1 U				
11097-69-1	Aroclor 1254	ug/L	1 U	1 U	1 U				
11096-82-5	Aroclor 1260	ug/L	1 U	1 U	1 U				

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 1 SDG: COH030303		SAMPLE ID:	MW-1	MW-2	Dup of MW-2 MW-102	MW-3	MW-6	MW-7	TRIPBLANK
		LAB ID:	COH030303-003	COH030303-001	COH030303-002	COH030303-004	COH030303-005	COH030303-006	COH030303-007
		SOURCE:	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh	STL Pittsburgh
		SDG:	COH030303	COH030303	COH030303	COH030303	COH030303	COH030303	COH030303
		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	669	445	35.2 J	2480	
7440-36-0	Antimony	ug/L	1.5 U	1.5 U	1.5 U	1.5 U	1.5 J	1.5 U	
7440-38-2	Arsenic	ug/L	17.3	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	
7440-39-3	Barium	ug/L	159 J	37 J	36.6 J	42 J	15.3 J	86.8 J	
7440-41-7	Beryllium	ug/L	0.98 J	0.071 U	0.14 J	0.14 J	0.09 J	0.16 J	
7440-43-9	Cadmium	ug/L	0.49 U	0.49 U	3.7 J	0.49 U	5.3	0.49 U	
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	1 U	4.2 J	
7440-48-4	Cobalt	ug/L	17 J	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	
7440-50-8	Copper	ug/L	65.5	2.2 U	2.5 J	2.2 U	2.2 U	2.2 U	
7439-89-6	Iron	ug/L	51000	1500	1390	782	118	3640	
7439-92-1	Lead	ug/L	16.2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	
7439-95-4	Magnesium	ug/L	32900	21000	20700	16200	9400	30300	
7439-96-5	Manganese	ug/L	1090	58.9	55.1	45	1.2 J	199	
7439-97-6	Mercury	ug/L	0.055 J	0.045 U	0.045 U	0.071 J	0.045 U	0.045 U	
7440-02-0	Nickel	ug/L	27 J	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	
2023695	Potassium	ug/L	6690	635 J	752 J	1220 J	1470 J	1930 J	
7782-49-2	Selenium	ug/L	6.4	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	
7440-22-4	Silver	ug/L	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	
7440-23-5	Sodium	ug/L	10200	2020 J	2200 J	15300	14100	52300	
7440-28-0	Thallium	ug/L	3.9 U	3.9 U	3.9 U	5.1 J	3.9 U	3.9 U	
7440-62-2	Vanadium	ug/L	42.7 J	3.7 J	2.3 J	1.8 U	1.8 U	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

Scotia Army Depot
Scotia, New York

Prepared By:

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DECEMBER 2000

PARSONS

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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 µg/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 ±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 µg/L, respectively) and lead (3.1 µg/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 METALS	FOOTNOTES
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	OK	OK	OK	
TB-8	WATER	10/30/00	OK				
B-2	WATER	10/31/00	OK				
B-6	WATER	10/31/00	OK				
B-1	WATER	10/31/00	OK				
B-3	WATER	10/31/00	OK				
TB-9	WATER	10/31/00	OK				
MW-7	WATER	11/1/00	OK			OK	
MW-6	WATER	11/1/00	OK			OK	
TB-10	WATER	11/1/00	OK				
TOTAL SAMPLES:			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 Date – Time	TCL Volatile	%D or RRF	Associated Samples
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

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	B-1 C0K010280003 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-2 C0K010280001 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-3 C0K010280004 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-6 C0K010280002 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	MW-1 C0J310140002 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-2 C0J310140003 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	Dup of MW-2 MW-102 C0J310140004 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-3 C0J310140001 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:								
67-64-1	Acetone	ug/L	2.3 J	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
71-43-2	Benzene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
75-27-4	Bromodichloromethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
75-25-2	Bromoform	ug/L	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U
74-83-9	Bromomethane	ug/L	2 UJ	2 UJ	2 UJ	2 UJ	2 U	2 UJ	2 UJ	2 UJ
78-93-3	2-Butanone	ug/L	5 U	5 U	5 U	5 U	R	5 UJ	5 UJ	5 UJ
75-15-0	Carbon disulfide	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
56-23-5	Carbon tetrachloride	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.4
108-90-7	Chlorobenzene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
124-48-1	Dibromochloromethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
75-00-3	Chloroethane	ug/L	2 UJ	2 UJ	2 UJ	2 U	2 UJ	2 U	2 U	2 U
67-66-3	Chloroform	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.21 J
74-87-3	Chloromethane	ug/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
75-34-3	1,1-Dichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
107-06-2	1,2-Dichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
75-35-4	1,1-Dichloroethene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
540-59-0	1,2-Dichloroethene (total)	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
78-87-5	1,2-Dichloropropane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
10061-01-5	cis-1,3-Dichloropropene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
10061-02-6	trans-1,3-Dichloropropene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
100-41-4	Ethylbenzene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
591-78-6	2-Hexanone	ug/L	5 U	5 U	5 U	5 U	5 UJ	5 UJ	5 UJ	5 UJ
75-09-2	Methylene chloride	ug/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
108-10-1	4-Methyl-2-pentanone	ug/L	5 U	5 U	5 U	5 U	5 UJ	5 UJ	5 UJ	5 UJ
100-42-5	Styrene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
79-34-5	1,1,2,2-Tetrachloroethane	ug/L	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U
127-18-4	Tetrachloroethene	ug/L	1 U	1 U	7.5	1 U	1 U	1 U	1 U	1 U
108-88-3	Toluene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
71-55-6	1,1,1-Trichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
79-00-5	1,1,2-Trichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
79-01-6	Trichloroethene	ug/L	0.52 J	1 U	1 U	1 U	0.27 J	1 U	1 U	1 U
75-01-4	Vinyl chloride	ug/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1330-20-7	Xylenes (total)	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	B-1 C0K010280003 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-2 C0K010280001 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-3 C0K010280004 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-6 C0K010280002 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	MW-1 C0J310140002 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-2 C0J310140003 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	Dup of MW-2 MW-102 C0J310140004 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-3 C0J310140001 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:								
83-32-9	Acenaphthene	ug/L					10 U	10 U	10 U	
208-96-8	Acenaphthylene	ug/L					10 U	10 U	10 U	
120-12-7	Anthracene	ug/L					10 U	10 U	10 U	
56-55-3	Benzo(a)anthracene	ug/L					10 U	10 U	10 U	
50-32-8	Benzo(a)pyrene	ug/L					10 U	10 U	10 U	
205-99-2	Benzo(b)fluoranthene	ug/L					10 U	10 U	10 U	
207-08-9	Benzo(k)fluoranthene	ug/L					10 U	10 U	10 U	
191-24-2	Benzo(ghi)perylene	ug/L					10 U	10 U	10 U	
111-91-1	bis(2-Chloroethoxy)methane	ug/L					10 U	10 U	10 U	
111-44-4	bis(2-Chloroethyl) ether	ug/L					10 U	10 U	10 U	
117-81-7	bis(2-Ethylhexyl) phthalate	ug/L					10 U	10 U	10 U	
101-55-3	4-Bromophenyl phenyl ether	ug/L					10 U	10 U	10 U	
85-68-7	Butyl benzyl phthalate	ug/L					10 U	10 U	10 U	
86-74-8	Carbazole	ug/L					10 U	10 U	10 U	
106-47-8	4-Chloroaniline	ug/L					10 U	10 U	10 U	
59-50-7	4-Chloro-3-methylphenol	ug/L					10 U	10 U	10 U	
91-58-7	2-Chloronaphthalene	ug/L					10 U	10 U	10 U	
95-57-8	2-Chlorophenol	ug/L					10 U	10 U	10 U	
7005-72-3	4-Chlorophenyl phenyl ether	ug/L					10 U	10 U	10 U	
218-01-9	Chrysene	ug/L					10 U	10 U	10 U	
53-70-3	Dibenz(a,h)anthracene	ug/L					10 U	10 U	10 U	
132-64-9	Dibenzofuran	ug/L					10 U	10 U	10 U	
95-50-1	1,2-Dichlorobenzene	ug/L					10 U	10 U	10 U	
541-73-1	1,3-Dichlorobenzene	ug/L					10 U	10 U	10 U	
106-46-7	1,4-Dichlorobenzene	ug/L					10 U	10 U	10 U	
91-94-1	3,3'-Dichlorobenzidine	ug/L					50 U	50 U	50 U	
120-83-2	2,4-Dichlorophenol	ug/L					10 U	10 U	10 U	
84-66-2	Diethyl phthalate	ug/L					10 U	10 U	10 U	
105-67-9	2,4-Dimethylphenol	ug/L					10 U	10 U	10 U	
131-11-3	Dimethyl phthalate	ug/L					10 U	10 U	10 U	
84-74-2	Di-n-butyl phthalate	ug/L					10 U	10 U	10 U	
117-84-0	Di-n-octyl phthalate	ug/L					10 U	10 U	10 U	

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	B-1 C0K010280003 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-2 C0K010280001 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-3 C0K010280004 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-6 C0K010280002 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	MW-1 C0J310140002 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-2 C0J310140003 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	Dup of MW-2 MW-102 C0J310140004 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-3 C0J310140001 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:								
51-28-5	2,4-Dinitrophenol	ug/L					50 U	50 U	50 U	
534-52-1	4,6-Dinitro-2-methylphenol	ug/L					50 U	50 U	50 U	
121-14-2	2,4-Dinitrotoluene	ug/L					10 U	10 U	10 U	
606-20-2	2,6-Dinitrotoluene	ug/L					10 U	10 U	10 U	
206-44-0	Fluoranthene	ug/L					10 U	10 U	10 U	
86-73-7	Fluorene	ug/L					10 U	10 U	10 U	
118-74-1	Hexachlorobenzene	ug/L					10 U	10 U	10 U	
87-68-3	Hexachlorobutadiene	ug/L					10 U	10 U	10 U	
77-47-4	Hexachlorocyclopentadiene	ug/L					50 U	50 U	50 U	
67-72-1	Hexachloroethane	ug/L					10 U	10 U	10 U	
193-39-5	Indeno(1,2,3-cd)pyrene	ug/L					10 U	10 U	10 U	
78-59-1	Isophorone	ug/L					10 U	10 U	10 U	
91-57-6	2-Methylnaphthalene	ug/L					10 U	10 U	10 U	
95-48-7	2-Methylphenol	ug/L					10 U	10 U	10 U	
65794-96-9	3-Methylphenol & 4-Methylphenol	ug/L					20 U	20 U	20 U	
91-20-3	Naphthalene	ug/L					10 U	10 U	10 U	
88-74-4	2-Nitroaniline	ug/L					50 U	50 U	50 U	
99-09-2	3-Nitroaniline	ug/L					50 U	50 U	50 U	
100-01-6	4-Nitroaniline	ug/L					50 U	50 U	50 U	
98-95-3	Nitrobenzene	ug/L					10 U	10 U	10 U	
88-75-5	2-Nitrophenol	ug/L					10 U	10 U	10 U	
100-02-7	4-Nitrophenol	ug/L					50 U	50 U	50 U	
621-64-7	N-Nitrosodi-n-propylamine	ug/L					10 U	10 U	10 U	
86-30-6	N-Nitrosodiphenylamine	ug/L					10 U	10 U	10 U	
108-60-1	2,2'-oxybis(1-Chloropropane)	ug/L					10 U	10 U	10 U	
87-86-5	Pentachlorophenol	ug/L					50 U	50 U	50 U	
85-01-8	Phenanthrene	ug/L					10 U	10 U	10 U	
108-95-2	Phenol	ug/L					10 U	10 U	10 U	
129-00-0	Pyrene	ug/L					10 U	10 U	10 U	
120-82-1	1,2,4-Trichlorobenzene	ug/L					10 U	10 U	10 U	
95-95-4	2,4,5-Trichlorophenol	ug/L					10 U	10 U	10 U	
88-06-2	2,4,6-Trichlorophenol	ug/L					10 U	10 U	10 U	

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	B-1 C0K010280003 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-2 C0K010280001 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-3 C0K010280004 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-6 C0K010280002 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	MW-1 C0J310140002 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-2 C0J310140003 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	Dup of MW-2 MW-102 C0J310140004 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-3 C0J310140001 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:								
319-84-6	alpha-BHC	ug/L					0.05 U	0.05 U	0.05 U	
319-85-7	beta-BHC	ug/L					0.05 UJ	0.05 UJ	0.05 UJ	
319-86-8	delta-BHC	ug/L					0.05 U	0.05 U	0.05 U	
58-89-9	gamma-BHC (Lindane)	ug/L					0.05 U	0.05 U	0.05 U	
76-44-8	Heptachlor	ug/L					0.05 U	0.05 U	0.05 U	
309-00-2	Aldrin	ug/L					0.05 U	0.05 U	0.05 U	
1024-57-3	Heptachlor epoxide	ug/L					0.05 U	0.05 U	0.05 U	
959-98-8	Endosulfan I	ug/L					0.05 U	0.05 U	0.05 U	
60-57-1	Dieldrin	ug/L					0.05 U	0.05 U	0.05 U	
72-55-9	4,4'-DDE	ug/L					0.05 U	0.05 U	0.05 U	
72-20-8	Endrin	ug/L					0.05 U	0.05 U	0.05 U	
53494-70-5	Endrin ketone	ug/L					0.05 U	0.05 U	0.05 U	
7421-93-4	Endrin aldehyde	ug/L					0.05 U	0.05 U	0.05 U	
33213-65-9	Endosulfan II	ug/L					0.05 U	0.05 U	0.05 U	
72-54-8	4,4'-DDD	ug/L					0.05 UJ	0.05 UJ	0.05 UJ	
1031-07-8	Endosulfan sulfate	ug/L					0.05 U	0.05 U	0.05 U	
50-29-3	4,4'-DDT	ug/L					0.05 U	0.05 U	0.05 U	
72-43-5	Methoxychlor	ug/L					0.1 U	0.1 U	0.1 U	
5103-71-9	alpha-Chlordane	ug/L					0.05 U	0.05 U	0.05 U	
5103-74-2	gamma-Chlordane	ug/L					0.05 U	0.05 U	0.05 U	
8001-35-2	Toxaphene	ug/L					2 U	2 U	2 U	
12674-11-2	Aroclor 1016	ug/L					1 U	1 U	1 U	
11104-28-2	Aroclor 1221	ug/L					1 U	1 U	1 U	
11141-16-5	Aroclor 1232	ug/L					1 U	1 U	1 U	
53469-21-9	Aroclor 1242	ug/L					1 U	1 U	1 U	
12672-29-6	Aroclor 1248	ug/L					1 U	1 U	1 U	
11097-69-1	Aroclor 1254	ug/L					1 U	1 U	1 U	
11096-82-5	Aroclor 1260	ug/L					1 U	1 U	1 U	

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	B-1 C0K010280003 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-2 C0K010280001 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-3 C0K010280004 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	B-6 C0K010280002 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	MW-1 C0J310140002 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-2 C0J310140003 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	Dup of MW-2 MW-102 C0J310140004 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	MW-3 C0J310140001 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:								
7429-90-5	Aluminum	ug/L					7390 J	1490 J	962 J	4140 J
7440-36-0	Antimony	ug/L					1.5 U	1.5 U	1.5 U	1.5 U
7440-38-2	Arsenic	ug/L					4.1 J	2.6 U	2.6 U	4.2 J
7440-39-3	Barium	ug/L					91.6 J	39.4 J	34.9 J	60.1 J
7440-41-7	Beryllium	ug/L					0.41 J	0.071 U	0.071 U	0.17 J
7440-43-9	Cadmium	ug/L					0.49 U	0.49 U	0.49 U	0.49 U
7440-70-2	Calcium	ug/L					111000	66700	62000	82300
7440-47-3	Chromium	ug/L					11.6	2.9 J	2 J	5.7 J
7440-48-4	Cobalt	ug/L					8 J	3.2 U	3.2 U	3.2 U
7440-50-8	Copper	ug/L					25 J	7.1 J	2.3 J	10.6 J
7439-89-6	Iron	ug/L					17000	2660	1450	7110
7439-92-1	Lead	ug/L					6.7	3.1 J	1.9 UJ	4.9
7439-95-4	Magnesium	ug/L					25400	19300	18200	16600
7439-96-5	Manganese	ug/L					358	75.5 J	39.6 J	253
7439-97-6	Mercury	ug/L					0.045 U	0.045 U	0.045 J	0.045 U
7440-02-0	Nickel	ug/L					10.9 J	6.1 U	6.1 U	8.5 J
7440-09-7	Potassium	ug/L					3550 J	2150 J	1240 J	2560 J
7782-49-2	Selenium	ug/L					2.7 J	2.1 U	2.1 U	2.5 J
7440-22-4	Silver	ug/L					0.94 U	0.94 U	0.94 U	0.94 U
7440-23-5	Sodium	ug/L					9690	2310 J	2050 J	19000
7440-28-0	Thallium	ug/L					3.9 U	3.9 U	4 J	3.9 U
7440-62-2	Vanadium	ug/L					18.3 J	4.6 J	1.8 U	9.5 J
7440-66-6	Zinc	ug/L					42.6	9.4 J	5.1 J	25

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	MW-6 C0K020256002 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	MW-7 C0K020256001 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	TB-8 C0J310140006 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	TB-9 C0K010280005 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	TB-10 C0K020256003 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:					
67-64-1	Acetone	ug/L	10 UJ	10 UJ	10 UJ	10 UJ	2.5 J
71-43-2	Benzene	ug/L	1 U	1 U	1 U	1 U	1 U
75-27-4	Bromodichloromethane	ug/L	1 U	1 U	1 U	1 U	1 U
75-25-2	Bromoform	ug/L	1 U	1 U	1 U	1 U	1 U
74-83-9	Bromomethane	ug/L	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ
78-93-3	2-Butanone	ug/L	5 U	5 U	5 UJ	5 U	5 U
75-15-0	Carbon disulfide	ug/L	1 U	1 U	1 U	1 U	1 U
56-23-5	Carbon tetrachloride	ug/L	1 U	1 U	1 U	1 U	1 U
108-90-7	Chlorobenzene	ug/L	1 U	1 U	1 U	1 U	1 U
124-48-1	Dibromochloromethane	ug/L	1 U	1 U	1 U	1 U	1 U
75-00-3	Chloroethane	ug/L	2 UJ	2 UJ	2 U	2 UJ	2 UJ
67-66-3	Chloroform	ug/L	1 U	1 U	1 U	1 U	1 U
74-87-3	Chloromethane	ug/L	2 U	2 U	2 U	2 U	2 U
75-34-3	1,1-Dichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U
107-06-2	1,2-Dichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U
75-35-4	1,1-Dichloroethene	ug/L	1 U	1 U	1 U	1 U	1 U
540-59-0	1,2-Dichloroethene (total)	ug/L	1 U	1 U	1 U	1 U	1 U
78-87-5	1,2-Dichloropropane	ug/L	1 U	1 U	1 U	1 U	1 U
10061-01-5	cis-1,3-Dichloropropene	ug/L	1 U	1 U	1 U	1 U	1 U
10061-02-6	trans-1,3-Dichloropropene	ug/L	1 U	1 U	1 U	1 U	1 U
100-41-4	Ethylbenzene	ug/L	1 U	1 U	1 U	1 U	1 U
591-78-6	2-Hexanone	ug/L	5 U	5 U	5 UJ	5 U	5 U
75-09-2	Methylene chloride	ug/L	2 U	2 U	2 U	0.78 J	2 U
108-10-1	4-Methyl-2-pentanone	ug/L	5 U	5 U	5 UJ	5 U	5 U
100-42-5	Styrene	ug/L	1 U	1 U	1 U	1 U	1 U
79-34-5	1,1,2,2-Tetrachloroethane	ug/L	1 U	1 U	1 U	1 U	1 U
127-18-4	Tetrachloroethene	ug/L	1 U	1 U	1 U	1 U	1 U
108-88-3	Toluene	ug/L	1 U	1 U	1 U	1 U	1 U
71-55-6	1,1,1-Trichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U
79-00-5	1,1,2-Trichloroethane	ug/L	1 U	1 U	1 U	1 U	1 U
79-01-6	Trichloroethene	ug/L	0.54 J	1 U	1 U	1 U	1 U
75-01-4	Vinyl chloride	ug/L	2 U	2 U	2 U	2 U	2 U
1330-20-7	Xylenes (total)	ug/L	1 U	1 U	1 U	1 U	1 U

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	MW-6 C0K020256002 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	MW-7 C0K020256001 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	TB-8 C0J310140005 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	TB-9 C0K010280005 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	TB-10 C0K020256003 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:					
83-32-9	Acenaphthene	ug/L					
208-96-8	Acenaphthylene	ug/L					
120-12-7	Anthracene	ug/L					
56-55-3	Benzo(a)anthracene	ug/L					
50-32-8	Benzo(a)pyrene	ug/L					
205-99-2	Benzo(b)fluoranthene	ug/L					
207-08-9	Benzo(k)fluoranthene	ug/L					
191-24-2	Benzo(ghi)perylene	ug/L					
111-91-1	bis(2-Chloroethoxy)methane	ug/L					
111-44-4	bis(2-Chloroethyl) ether	ug/L					
117-81-7	bis(2-Ethylhexyl) phthalate	ug/L					
101-55-3	4-Bromophenyl phenyl ether	ug/L					
85-68-7	Butyl benzyl phthalate	ug/L					
86-74-8	Carbazole	ug/L					
106-47-8	4-Chloroaniline	ug/L					
59-50-7	4-Chloro-3-methylphenol	ug/L					
91-58-7	2-Chloronaphthalene	ug/L					
95-57-8	2-Chlorophenol	ug/L					
7005-72-3	4-Chlorophenyl phenyl ether	ug/L					
218-01-9	Chrysene	ug/L					
53-70-3	Dibenz(a,h)anthracene	ug/L					
132-64-9	Dibenzofuran	ug/L					
95-50-1	1,2-Dichlorobenzene	ug/L					
541-73-1	1,3-Dichlorobenzene	ug/L					
106-46-7	1,4-Dichlorobenzene	ug/L					
91-94-1	3,3'-Dichlorobenzidine	ug/L					
120-83-2	2,4-Dichlorophenol	ug/L					
84-66-2	Diethyl phthalate	ug/L					
105-67-9	2,4-Dimethylphenol	ug/L					
131-11-3	Dimethyl phthalate	ug/L					
84-74-2	Di-n-butyl phthalate	ug/L					
117-84-0	Di-n-octyl phthalate	ug/L					

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	MW-6 C0K020256002 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	MW-7 C0K020256001 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	TB-8 C0J310140005 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	TB-9 C0K010280005 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	TB-10 C0K020256003 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:					
51-28-5	2,4-Dinitrophenol	ug/L					
534-52-1	4,6-Dinitro-2-methylphenol	ug/L					
121-14-2	2,4-Dinitrotoluene	ug/L					
606-20-2	2,6-Dinitrotoluene	ug/L					
206-44-0	Fluoranthene	ug/L					
86-73-7	Fluorene	ug/L					
118-74-1	Hexachlorobenzene	ug/L					
87-68-3	Hexachlorobutadiene	ug/L					
77-47-4	Hexachlorocyclopentadiene	ug/L					
67-72-1	Hexachloroethane	ug/L					
193-39-5	Indeno(1,2,3-cd)pyrene	ug/L					
78-59-1	Isophorone	ug/L					
91-57-6	2-Methylnaphthalene	ug/L					
95-48-7	2-Methylphenol	ug/L					
65794-96-9	3-Methylphenol & 4-Methylphenol	ug/L					
91-20-3	Naphthalene	ug/L					
88-74-4	2-Nitroaniline	ug/L					
99-09-2	3-Nitroaniline	ug/L					
100-01-6	4-Nitroaniline	ug/L					
98-95-3	Nitrobenzene	ug/L					
88-75-5	2-Nitrophenol	ug/L					
100-02-7	4-Nitrophenol	ug/L					
621-64-7	N-Nitrosodi-n-propylamine	ug/L					
86-30-6	N-Nitrosodiphenylamine	ug/L					
108-60-1	2,2'-oxybis(1-Chloropropane)	ug/L					
87-86-5	Pentachlorophenol	ug/L					
85-01-8	Phenanthrene	ug/L					
108-95-2	Phenol	ug/L					
129-00-0	Pyrene	ug/L					
120-82-1	1,2,4-Trichlorobenzene	ug/L					
95-95-4	2,4,5-Trichlorophenol	ug/L					
88-06-2	2,4,6-Trichlorophenol	ug/L					

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	MW-6 C0K020256002 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	MW-7 C0K020256001 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	TB-8 C0J310140005 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	TB-9 C0K010280005 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	TB-10 C0K020256003 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:					
	[redacted]						
319-84-6	alpha-BHC	ug/L					
319-85-7	beta-BHC	ug/L					
319-86-8	delta-BHC	ug/L					
58-89-9	gamma-BHC (Lindane)	ug/L					
76-44-8	Heptachlor	ug/L					
309-00-2	Aldrin	ug/L					
1024-57-3	Heptachlor epoxide	ug/L					
959-98-8	Endosulfan I	ug/L					
60-57-1	Dieldrin	ug/L					
72-55-9	4,4'-DDE	ug/L					
72-20-8	Endrin	ug/L					
53494-70-5	Endrin ketone	ug/L					
7421-93-4	Endrin aldehyde	ug/L					
33213-65-9	Endosulfan II	ug/L					
72-54-8	4,4'-DDD	ug/L					
1031-07-8	Endosulfan sulfate	ug/L					
50-29-3	4,4'-DDT	ug/L					
72-43-5	Methoxychlor	ug/L					
5103-71-9	alpha-Chlordane	ug/L					
5103-74-2	gamma-Chlordane	ug/L					
8001-35-2	Toxaphene	ug/L					
	[redacted]						
12674-11-2	Aroclor 1016	ug/L					
11104-28-2	Aroclor 1221	ug/L					
11141-16-5	Aroclor 1232	ug/L					
53469-21-9	Aroclor 1242	ug/L					
12672-29-6	Aroclor 1248	ug/L					
11097-69-1	Aroclor 1254	ug/L					
11096-82-5	Aroclor 1260	ug/L					

Defense Logistics Agency Scotia, NY Validated Groundwater Sampling Round 2 SDG: Scotia2		SAMPLE ID: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	MW-6 C0K020256002 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	MW-7 C0K020256001 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000	TB-8 C0J310140005 STL Pittsburgh SCOTIA2 WATER 10/30/2000 12/8/2000	TB-9 C0K010280005 STL Pittsburgh SCOTIA2 WATER 10/31/2000 12/8/2000	TB-10 C0K020256003 STL Pittsburgh SCOTIA2 WATER 11/1/2000 12/8/2000
CAS NO.	COMPOUND	UNITS:					
7429-90-5	Aluminum	ug/L	387 J	5420 J			
7440-36-0	Antimony	ug/L	1.5 U	1.5 U			
7440-38-2	Arsenic	ug/L	2.6 U	6.2 J			
7440-39-3	Barium	ug/L	18.8 J	116 J			
7440-41-7	Beryllium	ug/L	0.071 U	0.29 J			
7440-43-9	Cadmium	ug/L	0.49 U	0.49 U			
7440-70-2	Calcium	ug/L	55500	95000			
7440-47-3	Chromium	ug/L	1.5 J	8.4 J			
7440-48-4	Cobalt	ug/L	3.2 U	3.2 U			
7440-50-8	Copper	ug/L	15.9 J	7.5 J			
7439-89-6	Iron	ug/L	673	8260			
7439-92-1	Lead	ug/L	2.7 J	4.1			
7439-95-4	Magnesium	ug/L	9840	28800			
7439-96-5	Manganese	ug/L	10.5 J	440			
7439-97-6	Mercury	ug/L	0.055 J	0.049 J			
7440-02-0	Nickel	ug/L	6.1 U	7.2 J			
7440-09-7	Potassium	ug/L	1430 J	2840 J			
7782-49-2	Selenium	ug/L	2.1 U	2.1 U			
7440-22-4	Silver	ug/L	0.94 U	0.94 U			
7440-23-5	Sodium	ug/L	14900	49300			
7440-28-0	Thallium	ug/L	3.9 U	3.9 U			
7440-62-2	Vanadium	ug/L	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):

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

where:

C = contaminant concentration in the groundwater

C_T = adsorbed contaminant concentration

D_x = dispersion coefficient in the x direction

D_y = 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:

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

where:

C_0 = the source concentration

C = the concentration in the aquifer

λ = 1st order decay constant

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

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

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

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 Excel™ workbook. An Excel worksheet was used to enter the input parameters and concentration targets, while the calculations were performed using Microsoft Visual Basic for Applications™. 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 Variation	Type
Aquifer Thickness (ft)	m =	25	0%	Constant
Seepage Velocity (ft/day)	V =	20	99%	Log-Normal
Aquifer Porosity	θ =	0.2	30%	Uniform
Hydraulic Gradient Angle (degrees)	δ =	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_0 =	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.

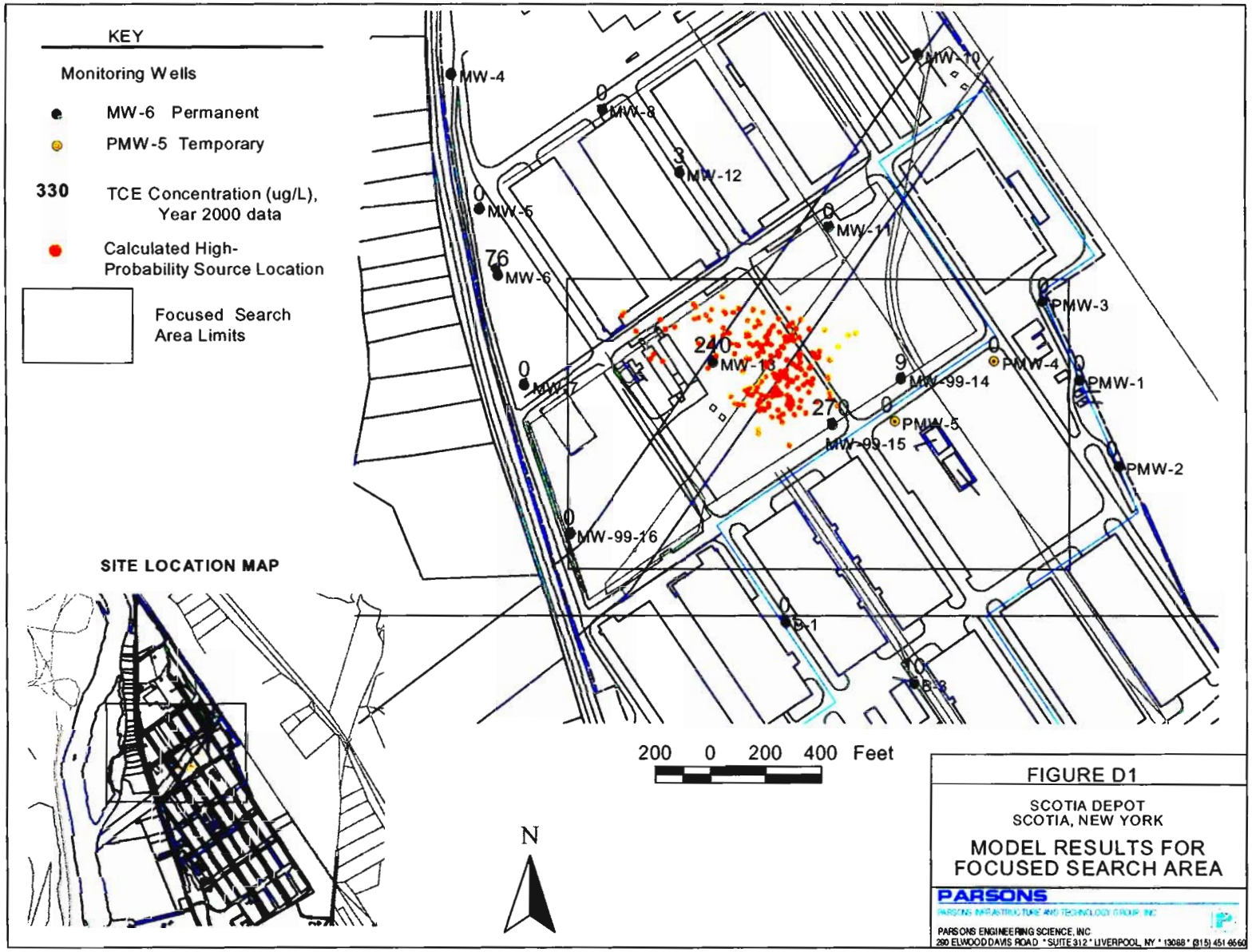
KEY
Monitoring Wells
MW-6 Permanent
PMW-5 Temporary
330 TCE Concentration (ug/L), Year 2000 data
Calculated High-Probability Source Location
Focused Search Area Limits
SITE LOCATION MAP
MW-4
MW-8
MW-12
MW-5
MW-11
MW-6
MW-10
PMW-3
PMW-4
PMW-1
MW-7
MW-13
MW-99-14
PMW-5
MW-99-15
PMW-2
MW-99-16
B-1
B-3
0
3
76
240
9
270
10
200 0 200 400 Feet
N
FIGURE D1
SCOTIA DEPOT
SCOTIA, NEW YORK
MODEL RESULTS FOR FOCUSED SEARCH AREA
PARSONS
PARSONS ENGINEERING SCIENCE, INC.
260 ELWOOD DAVIS ROAD * SUITE 312 * LIVERPOOL, NY * 13088 * (315) 451-9560

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.

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