

# PARSONS

**Parsons Engineering Science Inc.**

**A Unit of Parsons Infrastructure & Technology Group**

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## Letter of Transmittal

To: NYSDEC  
625 Broadway 11<sup>th</sup> Floor  
Albany NY 12233-7015

Date: August 1, 2001

Attn: Jeff McCullough

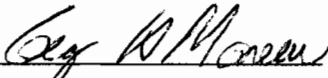
We are sending you  Enclosed  Under Separate Cover  
the following items:

One copy of the Final Groundwater Investigation Report for the Scotia Depot.

Copies of the comments and associated responses to reviews of the DRAFT FINAL report are attached to this letter for your information.

These are transmitted as checked below:

For Your Information       For Your Use       Approved as Noted  
 As Requested       For Approval       For Review

Signed:   
George H. Moreau



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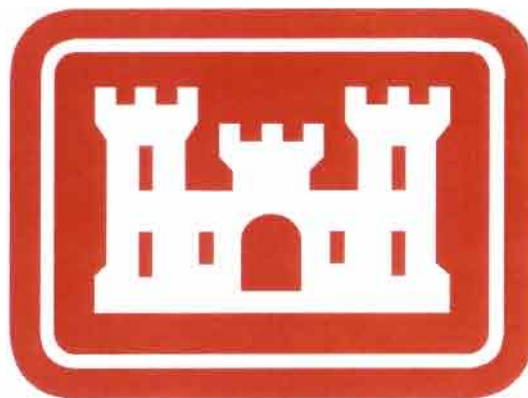
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**GROUNDWATER INVESTIGATION  
WORK PLAN  
SCOTIA DEPOT  
Scotia, New York**

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*PREPARED FOR:*



**U.S. Army Corps of Engineers  
Huntsville Center**

**Contract No. DACA87-95-D-0018**

**and**

**General Services Administration**

**Contract No. GS-10F-1079J**

*PREPARED BY:*

**PARSONS ENGINEERING SCIENCE, INC.**



MAY 2000

**GROUNDWATER INVESTIGATION  
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**

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**May 2000**

## TABLE OF CONTENTS

	<u>PAGE</u>
<b>SECTION 1 INTRODUCTION .....</b>	<b>1-1</b>
1.1 PURPOSE.....	1-1
1.2 PROJECT BACKGROUND.....	1-1
1.3 SITE DESCRIPTION.....	1-2
1.4 OPERATIONAL HISTORY .....	1-3
1.5 GEOLOGIC AND HYDROGEOLOGIC SETTING.....	1-3
1.6 GROUNDWATER USE .....	1-4
<b>SECTION 2 SCOPE OF WORK .....</b>	<b>2-1</b>
2.1 OBJECTIVES.....	2-1
2.2 SOIL BORINGS AND MONITORING WELL INSTALLATIONS .....	2-1
2.3 CHEMICAL ANALYSIS.....	2-3
2.4 PROJECT SCHEDULE .....	2-5
<b>SECTION 3 REFERENCES.....</b>	<b>3-1</b>

**LIST OF FIGURES**

Figure 1.1 Site Vicinity Map and Proposed Off-site Well Location ..... 1-5  
Figure 1.2 Proposed On-Site Well Locations ..... 1-6

**LIST OF TABLES**

Table 2.1 Gas Chromatography for Volatile Organics ..... 2-3

**LIST OF ATTACHMENTS**

- ATTACHMENT A Severn-Trent Mobile Laboratory SOP For Method 8021B  
and Staff Qualifications
- ATTACHMENT B QUANTERRA ELAP Certification

## SECTION 1

### INTRODUCTION

#### 1.1 PURPOSE

The purpose of this groundwater investigation is to assess whether a disposal area located northeast of the Scotia Depot is the source of a groundwater plume containing trichloroethene (TCE). This work is being funded jointly by the Depot property owner, General Services Administration (GSA) and the Depot operator, the Defense Logistics Agency (DLA) Defense National Stockpile Center (DNSC). The latter agency is funding 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 is 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 metallurgical 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 disposal area, which is located upgradient of the groundwater TCE plume identified by the NYSDEC PSA.

### 1.3 SITE DESCRIPTION

1.3.1 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 1.1 shows the location of the site, and the surrounding natural and manmade features.

1.3.2 The current Depot property is approximately 71 acres in size (see highlighted portion of Figure 1.1). 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, and an administrative building (Figure 1.2).

1.3.3 The current Depot property is situated in the center of an industrial/commercial business park, which was formerly 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.

1.3.4 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.

1.3.5 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 aquifer, and the northern Depot property line coincides with the recharge zone and wellhead protection zone for the Village of Scotia well field.

1.3.6 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).

1.3.7 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.

#### 1.4 OPERATIONAL HISTORY

1.4.1 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 a commercial/industrial business park. The remaining active portion of the Depot is owned by the GSA, and operated by the DLA.

1.4.2 The ores at the Scotia Depot are currently stored in piles, either on concrete pads or on a crushed, compacted stone surface. Other materials are stored in warehouses in drums, boxes, bags, etc. Figure 1.2 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, rubber, cobalt, iodine, tungsten ferrotungsten, ferrochrome, tungstic acid, columbium, tantalum, mica, graphite, cadmium, and talc (Reference 11).

1.4.3 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).

1.4.4 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, and petroleum underground storage tanks (USTs); landscaping; and vegetation control by herbicide spraying.

1.4.5 Thirteen people are typically on-site as permanent duty personnel assigned to Depot operations, exclusive of contracted security personnel (Reference 14).

#### 1.5 GEOLOGIC AND HYDROGEOLOGIC SETTING

1.5.1 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.

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1.5.2 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 was deposited upstream from the lake, and those deposits occur in the western part of the main valley, including the vicinity of the Depot.

1.5.3 The Village of Scotia water supply, averaging 1.5 million gallons per day (mgd), is obtained from three wells screened 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.

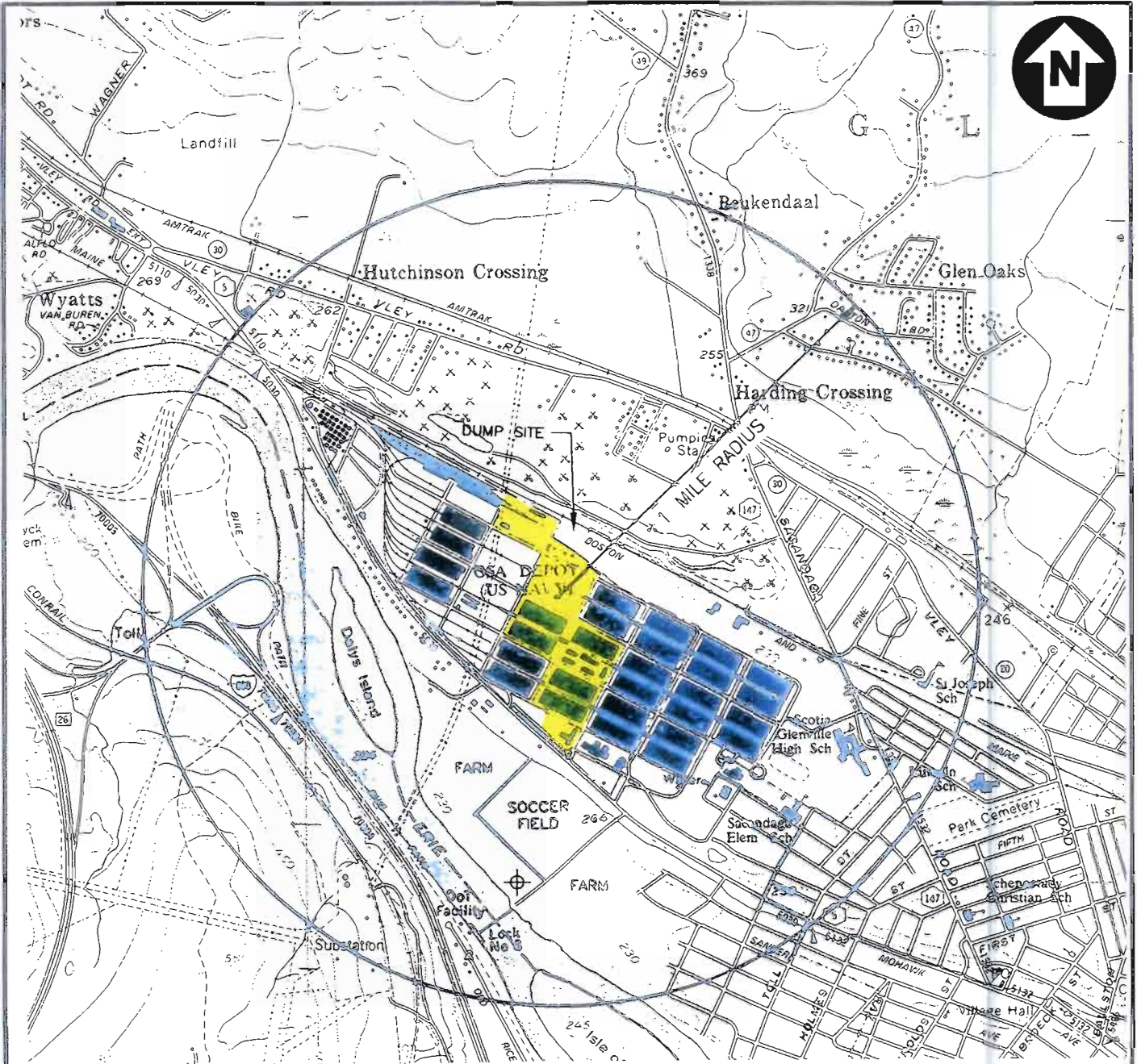
1.5.4 Results of pumping tests suggest that the well field derives some recharge from the gravel pit pond located immediately north of the Scotia Depot (Reference 5).

1.5.5 During an underground storage tank (UST) removal program at the Scotia Depot, several wells were drilled on-site. Boring logs for these wells confirm the presence of sand and gravel deposits from ground surface to at least 68 feet, the maximum depth of the borings (Reference 15). The water table is approximately 60 feet beneath the site.

1.5.6 Groundwater flow beneath most of the Scotia Depot mostly follows the ground surface topography toward the south and the Erie Canal/Mohawk River. However, in the northern part of the Depot there may be a northerly component of flow toward the Village of Scotia well field, given that the well field recharge zone appears to include the gravel pit immediately north of the Depot (Reference 5). Previous groundwater data from the western section of the industrial park located west of the Depot indicates groundwater generally flows south toward the Erie Canal/Mohawk River.


## 1.6 GROUNDWATER USE

About 120,000 people use groundwater as a drinking source from wells located within four miles of the site (References 5 and 16). 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 recent analytical results show all analyzed parameters are below regulatory levels (Reference 17). The nearest surface water intake on the Erie Canal/Mohawk River is 15 miles downstream of the site and serves the Latham Water District.



LEGEND:

 CURRENT DEPOT PROPERTY

 PROPOSED WELL LOCATION



SCALE: 1"=2000'

FIGURE 1.1

DLA/DNSC SCOTIA DEPOT

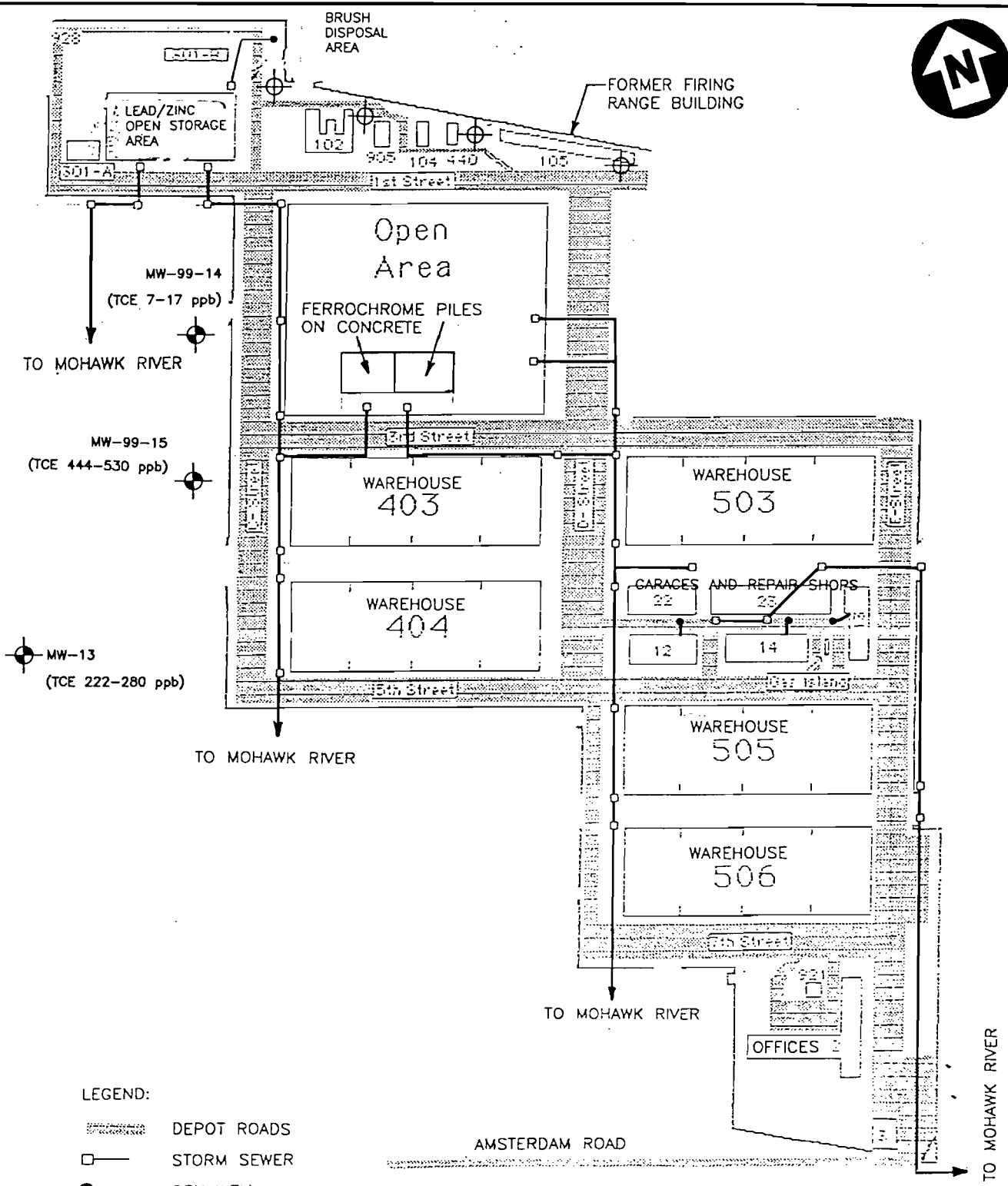
SITE VICINITY MAP  
AND PROPOSED OFF-SITE  
WELL LOCATION

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




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**LEGEND:**

-  DEPOT ROADS
-  STORM SEWER
-  DRY WELL
-  PROPOSED WELL LOCATION
-  MW-13 EXISTING WELL (APPROXIMATE LOCATION)
- TCE (ppb)** CONCENTRATION OF TRICHLOROETHENE IN PARTS PER BILLION AS REPORTED FOR 1999 (NYSDEC)

**FIGURE 1.2**

DLA/DNSC SCOTIA DEPOT

**PROPOSED ON-SITE WELL LOCATION**

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## SECTION 2

### SCOPE OF WORK

#### 2.1 OBJECTIVES

2.1.1 This investigation is being funded jointly by the Scotia Depot property owner (GSA) and the operator of the Scotia Depot (DLA/DNSC). The primary scope of work involves drilling six well borings, analyzing soil and groundwater samples, and installing six monitoring wells. GSA is funding two wells and DLA/DNSC is funding four wells.

2.1.2 The objectives of the groundwater investigation are 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 in an area to the south of the Depot, near Lock 8 in the Mohawk River/Erie Canal.

#### 2.2 SOIL BORINGS AND MONITORING WELL INSTALLATIONS

2.2.1 The scope of this activity includes collection of soil and groundwater samples from six monitoring well borings. Two will be drilled in Maalwyck Park in the Town of Glenville near Lock No. 8 (Figure 1.1). Note that the exact location of one of the wells in Maalwyck Park has yet to be finalized; therefore, it is not shown on Figure 1.1. The wells in Maalwyck Park are intended to be "sentry" wells to assess whether the plume has extended downgradient from the source area, toward the Rotterdam/Schenectady well fields. Four wells will be drilled on Depot property, close to the northeastern fence line to assess whether the off-site disposal area is the source of the TCE plume (Figure 1.2). Two well borings will be drilled as deep as 250 feet below the water table or a maximum of 330 feet below ground surface. One will be on Depot property, the other in Maalwyck Park. Four well borings will be drilled as deep as 100 feet below the water table or a maximum of 180 feet below ground surface. Three will be on Depot property and one in Maalwyck Park.

2.2.2 The initial 20 feet of all borings will be drilled with hollow-stem augers to collect split-spoon soil samples, and to ensure that the presence of any fill materials or buried debris are identified. In all borings, soil screening samples will be collected with split-spoons at 0, 5, 10, and 20 feet below ground surface. A dual wall circulation drilling method, Concentrix, will be used to drill the remaining depth of the well borings. Soil screening samples will then be collected at 20-foot intervals to the water table; these samples will be taken from the cuttings produced by the Concentrix drilling method. If drilling conditions dictate an alternative method be used, then mud rotary drilling methods, using Revert as the drilling fluid, will be used to drill the monitoring well borings. The diameter of the drilled hole will be at least six inches in



diameter. Note that if a potential confining layer or aquitard is identified, the boring may be terminated to avoid creating a preferential pathway.

2.2.3 Groundwater screening samples will be collected at intervals of 20 feet below the water table to the maximum depth of the boring. These groundwater samples will be used to assess the lateral and vertical extent of the plume, and to determine well screen placement.

2.2.4 These groundwater screening samples will be collected as drilling proceeds. Due to the expected presence of cobbles in the formation, a temporary PVC well will be set beneath the drill casing to collect groundwater samples. Three to five borehole volumes will be purged from the temporary well prior to collecting a groundwater sample with a decontaminated stainless steel bailer or a disposable polyethylene bailer. These groundwater screening samples will be analyzed in the on-site mobile laboratory for VOCs by Method SW-8021B.

2.2.5 The groundwater screening data will be used to determine the depth at which the monitoring well screen will be placed. Each well will have a 10-foot section of screen, and be constructed with 2-inch inside diameter PVC. Sand packs, bentonite seals, and cement/bentonite grout will be backfilled around the well pipe. The bentonite seal will be allowed to hydrate for at least one hour prior to placement of the grout. Each well will be finished with a 3-foot by 3-foot concrete pad and a 4-inch inside diameter steel casing and padlock. After the wells have set for at least 48 hours, the wells will be developed by removing water until pH, conductivity, and temperature readings stabilize to within 20% of successive readings, or until the turbidity is 50 NTUs or less.

2.2.6 All development water, drill cuttings, drilling fluids and other waste must be contained in tanks, drums or a roll-off. Waste characterization testing and arranging for disposal will be addressed by Parsons ES. Any containers or equipment must be moved out of the public park at the completion of the boring. The containers and other equipment may be left across the street at the Scotia Depot, if necessary.

2.2.7 All work will be conducted in modified Level D personal protection. All site workers should be 40-hour trained for hazardous waste site work, and have all training, medical monitoring, etc. as required by the Occupational Safety and Health Administration (OSHA) and 29CFR 1910 and 1926. Parsons ES's Health and Safety Plan, or approved equivalent, must be followed by the subcontractors.

2.2.8 After the wells are installed, the elevation of a reference point on each PVC well casing will be measured relative to the existing Depot wells near Building 12, and the existing wells MW-7, 11, 12, 13, 14, 15, and 16 located on the adjacent industrial park property. Surveying will be performed by a New York State-licensed surveyor.

2.2.9 Following well development, one round of groundwater samples will be collected from each well for chemical analysis (refer to Section 2.3.3). Prior to sampling, the water levels in the wells will be measured and the wells will be purged of three to five borehole volumes. Water levels in existing wells MW-7, 11, 12, 13, 14, 15, and 16, located on the adjacent

industrial park property, will also be measured. In addition, water levels in existing wells on the Depot near Building 12 will be measured to provide a larger view of the groundwater flow direction.

### 2.3 CHEMICAL ANALYSIS

2.3.1 During the drilling of the monitoring well borings, the soil and groundwater samples will be analyzed by a Severn-Trent mobile laboratory situated at the Scotia Depot. Information on Severn-Trent's mobile laboratory facilities are provided in Attachment A. The soil and groundwater screening samples will be analyzed for VOCs as listed on Table 2.1 on a lab-grade Hewlett Packard Model 5890II Gas Chromatograph (GC) outfitted with an Electrolytic Conductivity Detector (ELCD) and a Photoionization Detector (PID) via a modified United States Environmental Protection Agency (USEPA) Method 8021. In addition to the GC, the analytical system will have an OI Analytical Model 4560 Purge & Trap concentrator, an OI Analytical MPM-16 multi-station autosampler, and a Pentium-based personal computer with a Laserjet printer.

**TABLE 2.1**  
**EPA Method 8021. Modified**  
**Gas Chromatography for Volatile Organics**

Compound	Water Det. Limit µg/L	Soil Det. Limit ug/kg
Vinyl Chloride	1.0	1.0
1,1 Dichloroethene	1.0	1.0
Methylene Chloride	1.0	1.0
t-1,2-Dichloroethene	1.0	1.0
1,1-Dichloroethane	1.0	1.0
c-1,2-Dichloroethene	1.0	1.0
1,1,1-Trichloroethane	1.0	1.0
Carbon Tetrachloride	1.0	1.0
1,2-Dichloroethane	1.0	1.0
Trichloroethene	1.0	1.0
Tetrachloroethene	1.0	1.0
Benzene	1.0	1.0
Toluene	1.0	1.0
Chlorobenzene	1.0	1.0
Ethylbenzene	1.0	1.0
M&P-xylene	1.0	1.0
o-xylene	1.0	1.0

2.3.2 The quality control analyses and the acceptance criteria for the volatile organics analyses for the mobile lab are as follows:

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2.3.2.1 Initial Calibration – A 3-point initial calibration is conducted on the analytical system prior to project initiation. The instrument is calibrated and the correlation coefficient ( $r$ ) is calculated for each analyte. For all analytes the ( $r$ ) value must be greater than 0.990 or recalibration is performed.

2.3.2.2 Calibration Check Standards – At the beginning of each day, after every ten samples, and at the end of each day, a mid-point calibration check standard is analyzed to verify that the analytical sensitivity has not changed from the initial calibration. Percent Recovery (%R) values are calculated for each analyte and compared to the 75-125% criteria. If the %R value is outside the control limits, the analyst notes this on the QC form and the system is recalibrated.

2.3.2.3 QC Standards – A QC standard is analyzed on a daily basis and used to verify the accuracy of the calibration standards. The QC standard is a standard from a second source, other than the calibration standards. %R values are calculated and compared to the 75-125% criteria.

2.3.2.4 Method Blanks – A sample of analyte-free water is processed at the beginning of the day and after every ten sample analyses to verify that the analytical system is contaminant-free. Concentrations of detected analytes should be less than half the method detection limit. Small contaminants may be noted as detected in the blank and labeled with a “B”. Significant contaminant levels necessitate corrective action, i.e., cleaning of the instrument.

2.3.2.5 Surrogate Standards – Surrogate standards are added to all samples, standards, and blanks to measure the potential for matrix interferences. %R values are calculated and are compared to the 75-125% criteria. Small deviations are marked as outside control limits while large deviations necessitate reanalysis.

2.3.2.6 Duplicates – Five percent (5%) of all samples are analyzed in duplicate on a daily basis to determine the precision of the analyses. Relative Percent Difference (RPD) values are calculated and compared to the 20% acceptance limit. Values significantly over this level require corrective action, otherwise, they are highlighted as being outside QC limits.

2.3.2.7 Matrix Spike Analyses – Five percent (5%) of the samples analyzed on each day are spiked with a mid-level standard. The %R values are calculated and %R values should be 75-125%.

2.3.3 The round of samples collected from the completed monitoring wells will be analyzed by Quanterra’s Pittsburgh, PA laboratory. Quanterra has NYS Department of Health Environmental Laboratory Analytical Program (ELAP) approval (see Attachment B). All groundwater samples will be analyzed for Target Compound List (TCL) VOCs by Method 8260, and for Target Analyte List (TAL) metals by Methods 6010/7000. In addition, two of the newly completed wells on Depot property will be analyzed for TCL semivolatile organic compounds (SVOCs) by Method 8270, and for pesticide/PCBs by Methods 8081/8082.

2.3.4 Samples analyzed in the laboratory will be analyzed in accordance with the methods and quality control criteria as specified in SW846 and all amendments/revisions. The laboratory

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will report the results in NYSDEC Analytical Services Protocol (ASP) Category B deliverable format, and will follow all NYSDEC ASP sample preservation and holding time criteria.

2.3.5 In addition to the groundwater samples, one field duplicate and quality control matrix spike/matrix spike duplicate samples will also be collected and analyzed for TCL VOCs, SVOCs, pesticide/PCBs, and TAL metals. Samples of the waste water produced from the drilling process, the equipment decontamination process, and the well development will be analyzed by the mobile laboratory for VOCs for waste characterization purposes. The waste soil cuttings will be analyzed by the Toxicity Characteristic Leaching Procedure (TCLP) by Quanterra, for the analytes as identified by the waste hauler. To assess the potential impact of the drilling process on the groundwater sample quality, a sample of the air/water stream used to power the drilling process will be analyzed by Quanterra for TCL VOCs, SVOCs, pesticide/PCBs, and TAL metals. A sample of the oil used to cool the air compressor will also be analyzed by Quanterra for TCL VOCs, SVOCs, pesticide/PCBs, and TAL metals.

## 2.4 PROJECT SCHEDULE

A tentative project schedule is as follows:

- |                                     |            |
|-------------------------------------|------------|
| • Initiate Drilling Field Work      | May 15     |
| • Complete Drilling Field Work      | June 15    |
| • Complete Monitoring Well Sampling | July 15    |
| • Submit Draft Report               | October 20 |
| • Submit Final Report               | December 4 |



## SECTION 3

### REFERENCES

1. NYSDEC, 1999 "Final Preliminary Site Assessment Investigation Report Scotia Navy Depot Building #15", dated December 1999.
2. PMK Group, 1999. "Phase II Site Assessment Report GSA Naval Depot Route 5 Scotia New York", prepared by PMK Group and Edwards and Kelcey, July 19, 1999.
3. NYSDEC, 1994. Technical and Administrative Guidance Memorandum 4046.
4. Parsons Engineering Science, Inc., Observations made during site inspection at Scotia Depot, June 1-3, 1998.
5. Schenectady County Intermunicipal Watershed Rules Committee, "Hydrogeologic Report Schenectady Aquifer Protection Zones Final Report", February 1989.
6. New York State Department of Health, "New York State Atlas of Community Water System Sources 1982".
7. New York State Department of Environmental Conservation (NYSDEC), Letter to I. Reks from K. Seteen regarding presence of rare and endangered species, dated May 19, 1998.
8. United States Department of the Interior, Fish and Wildlife Service, Letter to I. Reks from S. Morgan, dated May 27, 1998, regarding presence of endangered or threatened species.
9. NYSDEC, Freshwater Wetlands Map Schenectady County Map 7 of 11, last revision 1994.
10. Defense National Stockpile Center (DNSC), "General Site Information - DLA/DNSC Scotia Depot" (not dated).
11. DNSC-MOSC Scotia Depot, "Quarterly Space Inventory Report", dated March 31, 1998.
12. General Services Administration (GSA), Memorandum from F. Suhr Depot Manager, dated April 25, 1984.
13. Army Environmental Hygiene Agency, Outbriefing Notes for the Environmental Program Review, Scotia Depot, dated July 6-10, 1992.
14. Defense Logistics Agency (DLA), "Notification of Stockpile Inspection" compiled by Anthony Delicati, December 14, 1994.

15. Empire Soils Investigations, Inc. Transmittal of Subsurface Logs and Well Diagrams, dated September 21, 1990.
16. Parsons Engineering Science, Inc., Memorandum to File, Telephone Call from George Moreau to Tom Cushing - Scotia Water Department, dated June 26, 1998, and copy of analytical report for water analysis dated February 7, 1996.
17. DLA, Memorandum from K. Frye, Jr., dated May 20, 1992.

**ATTACHMENT A**

**SEVERN-TRENT MOBILE LABORATORY SOP FOR METHOD 8021B  
AND STAFF QUALIFICATIONS**



**SEVERN TRENT LABORATORIES  
ON-SITE TECHNOLOGIES (OST) DIVISION  
STANDARD OPERATING PROCEDURE**

**Field Analysis of Volatile Organic Compounds by Gas Chromatography  
using Photoionization and Electrolytic Conductivity Detectors in Series:  
Capillary Column Technique  
EPA SW-8021B**

**SOP Number: OSS01802.MA**

**Date Written: 02/15/00  
Date Revised: 3/18/99**

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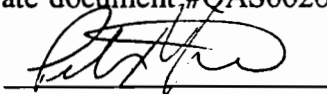
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## 1.0 APPROVALS

The signatures of the following individuals indicates that this SOP is complete and meets the requirements specified in corporate document #QAS00200.NET.

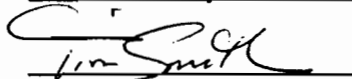
Laboratory Director



Quality Assurance Manager



Technical Director



## 2.0 SCOPE AND APPLICATION

2.1 This method is utilized in a mobile laboratory for the detection and measurement of purgeable organics and is applicable to water, wastewater, soil, sludge and wastes. This method is suitable for working concentration range from 1.0 to 40  $\mu\text{g/L}$ . Appropriate dilutions should be made to maintain the highest positive detection in the upper half of the calibration curve's linear range. Appendix I contains a list of compounds STL routinely analyzes for by this method in the field. Selected compounds can be removed from this list or others added with the approval of the Laboratory Director.

2.2 It is the policy of STL and of the On-Site Technologies Division to ensure that we administer contracts and orders for goods and services in a manner that is fully compliant with governmental laws and regulations, as well as the STL Policy Statement on Business Ethics and Conduct.

2.3 The document control number for this SOP is OSS01802.MA.

## 3.0 Terms and Definitions

3.1 There are many definitions used within the laboratory, which may be generic to all laboratory analyses, or more specific for certain methods. For the most recent terms and definitions used within the laboratory, reference the SOP of Terms and Definitions.

## 4.0 SUMMARY OF METHOD

4.1 The sample is analyzed for Volatile Organic Compounds by purging helium gas through the sample and concentrating the volatile compounds onto the appropriate trapping material. The resulting concentrated sample is then desorbed from the trap and analyzed using GC techniques and PID and ELCD detectors in series.

## 5.0 INTERFERENCES

- 5.1 Major contamination sources are volatile contaminants that are present in the laboratory environment such as methylene chloride, acetone and other solvents. Reagent blanks are analyzed with each run to determine contamination from laboratory sources. Blank subtraction can not be used.
- 5.2 Impurities in the purging gas or the sorbent trap can be a source of contamination. Only chromatography grade gasses are used. All carrier gas lines are made of copper or stainless steel tubing to prevent the permeation by methylene chloride of plastic tubing.
- 5.3 To prevent other sources of contamination, only PTFE sealants or devices that could come into contact with the standards or samples shall be used.
- 5.4 Interfering contamination can occur from carryover from preceding samples that contain a high concentration of a target analyte. Suspected high concentration samples should be analyzed at a dilution. If carry-over occurs, one or more method blanks should be analyzed between samples.
- 5.5 Samples may also be contaminated through the PTFE seals on the vials. Trip blanks (when received) are analyzed with each set of samples to determine if the samples have been contaminated through absorption.
- 5.6 Site contamination can also affect the VOC analysis. The Mobile Laboratory should be located such that ambient levels of VOCs do not interfere with the analysis

## 6.0 SAFETY

- 6.1 It is strongly recommended that analysts shall treat all samples as if they are hazardous and take all appropriate safety precautions. Analysts shall wear:

lab coats  
safety glasses with side shields and  
impervious gloves (Nitrile, eg. Sol-Vex)

when transferring samples between refrigerators.

- 6.2 Proper precautions should be taken when formulating new standards, or handling suspected high concentration samples.
- 6.3 MSDS sheets are located in the Mobile Laboratory.

- 6.4 High temperatures are present in the heated zones of the GC system including transfer lines, valves and detector/injector zones. Care should be taken when working around these areas and if direct contact is required then these zones should be cooled prior to initiating the work.
- 6.5 Electrical shock may be a hazard when working on instruments with high voltage power sources. All instruments should be powered off and disconnected from electrical power prior to initiating work.

## **7.0 SAMPLE HANDLING & PRESERVATION**

- 7.1 Water samples are collected in 40 mL glass VOA vials with Teflon septum caps. These containers are designed to have zero headspace when filled with water. The vials for water samples are inspected by the Mobile Laboratory Analyst upon receipt and should not contain any air bubbles. Soil samples are collected either in 40 mL VOA vials, 4 oz. wide mouth glass containers with septum-lined caps, same containers with 1:1 ratio of methanol and/or Encore type sampler. Samples are generally analyzed immediately and therefore preservation may not be required for these samples.
- 7.2 Samples are stored in the volatile lab refrigerator at 4°C.
- 7.3 Holding time: 14 days from sample date for preserved water and soil.

## **8.0 APPARATUS AND MATERIALS**

- 8.1 Hewlett Packard 5890 Series II Gas Chromatograph.
- 8.2 Hewlett Packard Chemstation or Enviroquant data acquisition software.
- 8.3 J&W Scientific DB-624 75m X 0.53 mm ID analytical column.
- 8.4 OI 4560 purge and trap concentrator.
- 8.5 OI MPM 16 autosampler.
- 8.6 5 mL glass purge tubes.
- 8.7 5 mL Hamilton gas tight syringe.
- 8.8 10 µL Hamilton syringes.



8.9 Miscellaneous Class A volumetric glassware for the preparation of reagents/standards.

## 9.0 REAGENTS AND STANDARD PREPARATION

9.1 Reagent grade chemicals shall be used in all tests.

9.2 Organic free reagent water is made from tap water that is purged with helium to remove any volatiles.

9.3 Methanol, CH<sub>3</sub>OH (MeOH) - Purge and trap grade or equivalent. Demonstrated to be free of analytes. Store apart from other solvents.

9.4 1:1 Hydrochloric acid (HCl) - Add a measured volume of concentrated HCl to a volume of organic free distilled water.

9.5 Primary Stock Standard Solutions - Are purchased as certified solutions using the following commercial sources.

### Initial and Continuing Calibration Standards

- Absolute Mix 8021B 200 mg/L
- Absolute Mix Gases 200 mg/L
- Absolute 1,4-Dichlorobutane (1,4-DCB) + 4-BFB Surr. Std. custom mix 5ng/uL.

Primary stock standards are stored in the Volatile freezer at -5°C and are used or replaced every month or sooner if problems with the gas compounds are seen.

9.6 Secondary Stock Standard: 50 ng/uL of 8021B Compounds. Listed below are the volumes, measured using glass syringes, of MeOH and primary standards used. This standard is prepared in MeOH and stored in an autosampler 2.0 mL vial.

8021B Secondary Stock Std. 50 ng/uL 1 mL Final Volume	
Standard	Volume $\mu$ L
Absolute Mix 8021B 200 mg/L	250
Absolute Gases Mix 200 mg/L	250

9.7 Tertiary Stock Standard: 5 ng/uL of 8021B Compounds. Listed below are the volumes, measured using glass syringes, of MeOH and secondary source standards used. This standard is prepared in MeOH and stored in an autosampler 2.0 mL vial.

8021B Tertiary Stock Std. 5 ng/uL 1 mL Final Volume	
Standard	Volume $\mu$ L
8021B Second Source Standard 50 ng/uL	100

9.8 Daily Working Standards - Prepared daily for initial and continuing calibrations or calibration checks using the following formulations. Standards are prepared by adding the secondary stock standard to a clean 5mL syringe containing 5 mL of organic free water. Then, they are transferred to spargers on the purge and trap auto-sampler.

Daily Working Standards	10ng (2 $\mu$ g/L)	50ng (10 $\mu$ g/L)	100ng (20 $\mu$ g/L)
Surr. Stock 5 ng/uL	2 uL	10uL	20 uL
8021B Tertiary Stock Std. 5 ng/uL	2 uL	10 uL	20 uL

- 9.9 The surrogates used for this analysis are 4-Bromofluorobenzene (4-BFB) and 1,4-Dichlorobutane (1,4-DCB). A 5.0 mL sample is spiked with 10  $\mu$ L of surrogate standard resulting in a sample concentration of 50ng (10  $\mu$ g/L).

Surrogate standards are stored in the freezer at  $-5^{\circ}\text{C}$  and are used or replaced every month or sooner if problems are encountered.

- 9.10 Preparation information for all standards, including purchased primary standards, is documented in the Volatiles Standards Logbook. This information includes: names of standard, date of preparation, initials of analyst, primary stock standard name, source lot #, concentration, date opened, amount added, final volume and concentration of standard. Standard lab procedures for Traceability of Standards must be followed in the preparation of all these solutions.
- 9.11 Preparation of an Initial Calibration Verification (ICV) standard is required each time a new calibration curve is conducted to check the calibration standard accuracy. This standard must be purchased from a second source, must contain all the target analytes and must be prepared and analyzed separately from the calibration standards.

ICV Std. is prepared from the following solutions:

- Ultra Scientific - EPA method 8021B set of std mixes 200  $\mu$ g/mL in MeOH.

This primary standard is stored in MeOH @  $-5^{\circ}\text{C}$  in a 2.0 mL autosampler vial when not in use. The Daily Working Std. is made each time samples are loaded on the instrument.

#### 9.12 MATRIX SPIKE/MATRIX SPIKE DUPLICATE STANDARDS

To prepare the MS/MSD, 10  $\mu$ L of the 8021B Tertiary Stock Standard Solution (5 ng/uL) is added to 5 mL of a water sample or 5 g of a soil sample to achieve a 50ng (10  $\mu$ g/L or 10  $\mu$ g/kg wet weight) spike level.

#### 9.13 LABORATORY CONTROL SAMPLE (LCS)

To prepare the LCS, 10  $\mu$ L of the 8021B Tertiary Stock Standard Solution (5 ng/uL) is added to 5 mL of a Method Blank water.

#### 9.14 METHOD BLANK WATER

Method blank water is supplied from an offsite well located on 4 Pocumtuck Dr., S. Deerfield, MA (Director's home well). The water is stored in clean 2.5 L glass containers with teflon-lined caps. The water is stored in the Mobile Laboratory. Each bottle is assigned a unique Lot No. to ensure traceability. The Lot No. is recorded in the Sequence Log when Method Blanks are loaded onto the instrument.

#### 10.0 PREVENTATIVE MAINTENANCE

- 10.1 The Gas Chromatograph should be monitored daily by checking temperature setpoints and the detector signals on the GC and also by checking the readouts on the OI 5200 Detector controller. A normal reading for the PID is 1-20 mV and 680-740 mV for the ELCD. The temperature on the ELCD should be at 900 °C and the solvent flow should be established at about 40%.

Ongoing detector maintenance is essential for good performance of this detector system. The following provides the minimum routine maintenance required and the operation manual for the systems should be followed to carry out the following maintenance procedures.

The nickel reaction tube and associated ferrules in the ELCD should be replaced periodically; approximately once every 2-3 months depending upon use or when detector sensitivity changes. At the same time the transfer lines should be backflushed with Isopropanol and the Isopropanol reservoir topped off. If continued sensitivity problems are encountered or if excessive peak tailing is noticed then the transfer lines in the ELCD should be replaced and backflushed again. Temperature problems or fluctuations are indications that the reactor core is failing and needs replacement. Excessive spiking and split or jagged peaks are indicators of detector cell problems and the cell may need backflushing, cleaning or replacement.

The PID lamp should be cleaned periodically or when a decrease in detector sensitivity is noticed. Samples containing high concentrations of heavy hydrocarbons can deposit a film on the detector window. If the signal continues to be low after cleaning or if a silver coating is present on the lamp glass, then lamp replacement may be necessary.

Any abnormalities should be brought to the attention of the Technical Director. If contamination is suspected in the instrument, blanks should be analyzed for confirmation. If contamination is still present, notify the Technical Director for appropriate corrective actions.

## 11.0 CALIBRATION

### 11.1 INITIAL CALIBRATION

The initial GC calibration is based on an external standard and a minimum three point curve, (5 pts may be required for certain projects), ranging between 5ng to 100ng (1  $\mu\text{g/L}$  to 20  $\mu\text{g/L}$ ). The concentrations of the standards are 10ng (2  $\mu\text{g/L}$ ), 50ng (10  $\mu\text{g/L}$ ), and 100ng (20  $\mu\text{g/L}$ ). Each compound has a linear regression calibration plot of concentration versus the response constructed by the chemstation software and an equation for the line is generated. The analyst checks the linearity of this line by evaluating the correlation coefficient (r-value) against the method QC criteria of  $r \geq 0.99$  (see section 12.1).

11.2 For water and soil analysis the purge tubes may need to be heated to a temperature of 40 °C using the heater jackets supplied with the Autosampler. This may be required to maintain consistency in the changing mobile laboratory environment (i.e. temperature fluctuations). If utilized, in addition to heating all samples and QC samples, the calibration curve must also be heated.

### 11.3 CONTINUING CALIBRATION CHECK

A continuing calibration standard is required before analyzing samples unless the system was calibrated with an initial cal. curve. The continuing calibration standard should be analyzed first in the sequence and should be at the midpoint of the curve: 50 ng (10  $\mu\text{g/L}$ ). Acceptable criteria for the continuing calibration is to meet the method QC criteria of  $\leq 20\% R$  from the true value. If the continuing calibration criteria is met then the curve is considered valid and the initial calibration is used for quantitation. A continuing calibration check should be analyzed after every 10 sample analyses and at the closing of a sequence.

## 12.0 QUALITY CONTROL

12.1 The quality control of the methods consists of the following:

TABLE 2 - METHOD 8021B QC ANALYSES

QC Analysis	Frequency	Acceptance Criteria	Corrective Action
Initial Calibration	At start-up and when cont. cal fails. 3 points minimum.	r-value $\geq 0.99$ for all method analytes (or $< 20\%$ RSD on RF's)	check for injection problems reanalyze std. or recalibrate
Initial Calibration Verification (ICV)	After each initial calibration	$\pm 20\%$ Recovery from true value.	Check for errors, rerun ICV or recalibrate
Laboratory Control Sample (LCS)	Per Batch of 20 samples or less	$\pm 20\%$ Recovery from the true value.	Correct problem, rerun LCS or recalibrate
Method Blank (MB)	following initial cal. or cont. cal.	All analytes $< \frac{1}{2}$ Det. Limit	Clean system, reanalyze MB or report samples with a "B" flag
Continuing Calibration	Mid-point std. 1X per 10 sample analyses	All analytes $\pm 20\%$ R	Correct Problem rerun Cont. Cal. If still out recalibrate & rerun samples back to last passing (CC).
MS/MSD	Per Batch of 20 samples or less	All analytes $\pm 25\%$ R for water and $\pm 30\%$ R for soils. RPD = 20%	Check analysis, rerun MS/MSD and then Check LCS %R
Surrogates	All samples and QC analyses - 2 compounds	Lab established limits $\pm 20\%$ R for water and $\pm 25\%$ for soils	Check analysis -then rerun sample
MDL	Run Yearly	Requires QA Officer; Lab Director Approval	Rerun if not approved.

## 12.2 METHOD DETECTION LIMIT (MDL) STUDIES

On a yearly basis, the analyst must run a soil and water MDL study following EPA 40 CFR Part 136 Appendix B and calculate new MDL's. This MDL study is conducted by running 7 replicate analyses of a standard prepared at 2-3 times the expected detection limit. The average and standard deviation (s) of the 7 readings are calculated and the MDL is calculated as 3.143 times s. Examples are contained in Appendix II.

## 12.3 CORRECTIVE ACTIONS

An analyst must take corrective actions when a quality control parameter is not met during routine analyses. These corrective actions are outlined below. If a corrective action still produces data that is outside the QC limits, then a Senior Field Chemist or the Technical Director is to be notified in order to initiate a course of action.

### 12.3.1 Initial calibration - After running the 3-point initial calibration an analyst must first evaluate the r-values from the linear regression equation (calculated and evaluated as in section 11.1).

If any of the compounds do not meet the r-value criteria then the system must be checked for leaks or reactive sites prior to proceeding. Obvious problems with individual standard injection can be corrected by reanalyzing the standard and replacing in the calibration curve. If the calibration is still not passing then the analyst should consult with a Senior Field Chemist or Technical Director for a course of action. Recalibration is required for r-values not meeting criteria.

In both of these instances, the consultation must be completed prior to proceeding with use of the initial calibration (unless the initial cal. is part of an automated unattended run).

### 12.3.2 Continuing Calibration - The acceptance criteria for the continuing calibration is a 10 $\mu\text{g/L}$ standard with the $\%R \leq 20\%$ . If the continuing calibration fails to pass these criteria then the analyst must recalibrate according to section 11.1 and any samples analyzed after the continuing calibration must be reanalyzed.

### 12.3.3 Laboratory Control Sample (LCS) - This is a second source standard analyzed prior to any samples to verify the calibration and to act as a check for system performance when the MS/MSD results are outside the QC acceptance criteria. If the % recovery criteria are not met (see Table 2) then a second LCS should be analyzed. If the second LCS is still failing for those compounds out in the first LCS, then the issue must be brought to the attention of a Senior Field Chemist or Technical Director as soon as possible. In most instances, recalibration and reanalysis of samples will be necessary.

12.3.4 Matrix Spike/Matrix Spike Duplicate - After running the MS/MSD (per section 9.12) the analyst must compare the % recovery of the spiked compounds to limits established by the laboratory (see Table 2). If any of the %R's are outside these limits then the analyst should consider reanalyzing the spike as a first step. If the spike is still outside limits then evaluate the LCS. If the LCS is in control then the problem is considered to be the matrix and no further reanalysis is required. The analyst must document any deviations on a QC Deviation Form. The sample used for spiking should be reported as estimated due to matrix interference.

12.3.5 Method Blank - After analysis of the method blank (per section 9.14) the analyst should verify that all analytes are  $< \frac{1}{2}$  the Report Limit (RL). If any values are detected above  $\frac{1}{2}$  the RL then a second MB can be analyzed to check the system prior to sample analyses. The system should be cleaned prior to proceeding with analysis. If the second blank still shows contamination or the blank was run as part of an automated analytical run and shows contamination then the following guidelines may be followed upon review by a Senior Field Chemist or Technical Director.

If the blank levels are  $> \frac{1}{2}$  RL and no analytes are detected in the samples then data can be reported without qualification. The system contamination must be corrected prior to further analysis.

If the blank levels are above the RL but the concentration in the sample is greater than 5X the blank level ( $> 10X$  for Methylene chloride) then results can be reported without qualification.

If the blank levels are above the RL and the sample concentration is  $< 5X$  the blank level ( $< 10X$  for  $\text{MeCl}_2$ ), then samples should either be reanalyzed or data must be reported with a qualifier.

12.3.6 Surrogate Standards - If surrogate % recoveries are out of control then the system should be checked for problems and the samples rerun. If the surrogates are still out of control then the data is reported. The data may be qualified if the Mobile Lab Analyst deems the recoveries are low enough to impact the validity of the data following consultation with either the Technical Director or Laboratory Director.

## 13.0 SAMPLE RECEIPT AND PROCEDURE

13.1 The mobile laboratory analyst receives samples on a daily basis and enters the information onto a Chain of Custody form. The analyst will also check and record the sample date to insure that all VOA analyses are performed within the required holding times.



13.2 The volatile analyst must be thoroughly trained in the correct operating procedures of the GC instruments and their computer operating systems. The actual procedures to operate the HP 5890II GC with OI Detectors and OI 4560 Purge and Trap system and PC-Chemstation system can be found in their appropriate operating manuals.

13.2 CALIBRATION - See section 11.0.

13.3 METHOD BLANK - Prepare one method blank for each continuing calibration check standards (and one after initial calibration) by adding 5 mL of Organic-free reagent water to a 5 mL syringe. Add 10  $\mu$ L of the surrogate solution and inject into the sparger assembly on the autosampler. The method blank should be analyzed immediately following the initial calibration and following each continuing calibration standard.

To demonstrate the system is free of contamination, the method blank must not contain any analyte at a concentration of  $\frac{1}{2}$  the report limit or greater or corrective action is required (see section 12.3)

13.4 LABORATORY CONTROL SAMPLE (LCS) - Prepare one LCS per batch of 20 samples by adding 10  $\mu$ L of the 8021B Tertiary Stock Standard Solution (5 ng/uL) to 5 mL of a Method Blank water and inject into the sparger assembly on the autosampler.

Analyze the LCS and compare the values against the acceptance criteria in Table 2. It is preferable to run and evaluate the LCS prior to loading any samples on the instrument. If problems occur with the LCS it is likely that recalibration and reanalysis of samples will be necessary.

13.5 MATRIX SPIKE/MATRIX SPIKE DUPLICATE - Prepare MS/MSD per batch of 20 samples or less by selecting one sample from the batch for spiking. Measure two separate aliquots of 5 mL sample (or 5 g if a soil sample) and add 10  $\mu$ L of the 8021 Secondary Stock Std. solution (see section 9.7) to each and load these onto the sparger assembly of the autosampler.

Run the MS/MSD, calculate the % recovery of the spike compounds and compare to those in Table 2. If any of the compounds do not meet these acceptance criteria then follow the corrective actions section 12.3.

13.6 SAMPLE ANALYSES - All samples are warmed to ambient temperature. The 40 mL vial containing the water sample is opened, and poured into the barrel of a clean 5 mL syringe. Additional vials are collected and held for sample reanalysis, if required.

The syringe is spiked with 10  $\mu$ L surrogates standard solution. The syringe is then connected to the sparger fitting on the auto sampler of the purge and trap, and injected into the sparger. The water sample is now ready to be purged for analysis.

If the ambient temperature in the mobile laboratory is unstable, place the heating jacket around the purge tube and check that the MHC heater control unit is powered on and the temperature is set to 40 °C. All samples and QC samples must be heated.

Note: When the samples are opened and it is apparent that they have high concentrations or when screening results are available, the sample will initially be run at a dilution.

The Hewlett-Packard 5890II GC with OI PID/ELCD Detectors Systems are currently set up for GC-VOA analysis. These are connected to OI Analytical 4560 Purge and Trap Concentrator and an OI MPM-16 Autosampler. The samples are purged onto the trap for 7.0 minutes. They are desorbed from the trap at 4 minutes and the trap is baked for 15 minutes. An OI 4560 #9 3-part trap is used with tenax, charcoal and silica gel. A J&W Scientific DB-624 75m X 0.53mm inside diameter GC Column is installed in the 5890II GC. The oven initial temperature is 38°C held for 8 minutes. It is then ramped at 6°C/min until it reaches a temperature of 120°C. and is held for 4.0 min. A second ramp takes the temperature at 30°C/min. to 190 °C and has a final hold time of 7.0 min. The total run time is 35 minutes.

Soil samples are weighed to the nearest 0.1 g on a top-loading balance. Soils are weighed directly into the sparger tubes and immediately transferred to the autosampler. Soil weights of 1 or 5 grams are preferable. Follow section 14.1 for water and standards addition.

## 14.0 CALCULATIONS

### 14.1 QUANTITATION

Quantitation is based on the external standard method. The sample concentration of each compound is calculated using the following equations:

#### Water Samples

$$\text{Concentration } \mu\text{g/L} = A \times \text{RF}$$

A = Area of the compound being measured.

RF = Response factor for compound being measured in amount (ug/L per area).

#### Soil/Solid Samples

$$\text{Conc. } \mu\text{g/kg} = ((\text{conc. } \mu\text{g/L}) \times (\text{Purge vol. L}) / (\text{weight g} \times (\% \text{ sol.})) \times 1000 \text{g/kg}$$

where: Purge vol. = 0.005 L

weight = sample weight of sample in grams

% Sol. = decimal notation for sample % solids

(Note: In most cases soils are reported on a wet weight basis unless a project specifically requires dry weight reporting.)

### 14.2 RETENTION TIME (RT) WINDOWS

Peak identification must be based on use of daily retention time windows derived from three injections of standard mixtures containing the analytes of interest over a 72-hr. period. Calculate the RT windows as plus or minus three (3) times the standard deviation of the retention times for each standard. If available use the average of the opening and the closing mid-point calibration standards as the middle point of the windows and use the 3 most recent calibration standards prior to the opening mid-point standard. Set the Chemstation RT window wider than the calculated window from the RT window study to provide false positives for interpretation by the analyst. Compare the analyte peak in the sample to the windows established for the day. If the peak is outside the window then the analyst should cross-out the analyte and note that the RT was out of the window. If the RT is within the window and above the reporting limit then the analyst calls the peak as a positive identification.

## 15.0 ACCEPTANCE OF DATA

- 15.1 Method Blank: <1/2 Detection Limit for all analytes
- 15.2 Surrogate Standard Recovery: R% = 80 - 120% waters, 75 - 125% soils
- 15.3 Accuracy control limits for LCS: %R = 80 - 120%
- 15.4 Accuracy control limits for MS/MSD: %R = 75 - 125% waters, 70 - 130% soils
- 15.5 Precision control limits for MS/MSD and LCS/LCSD: RPD  $\leq$ 20%
- 15.6 Accuracy control limits for ICV: %R = 80 - 120%
- 15.7 Accuracy control limits for Cont. Cal.: %R = 80 - 120%

## 16.0 REPORTING OF RESULTS

- 6.1 Data is initially reviewed by the analyst and the Data Review Checklist (Appendix III) is completed for the primary review. Out of control events are documented and the data pack is passed on to the secondary reviewer. A secondary review is performed on the data by a data review specialist. The data review specialist verifies all QC limits are met. The identification of reported compounds are verified, along with checking the data for reasonability. The secondary reviewer also completes the Data Review Checklist (See Appendix III) for their review. If for any reason there is a question of the data, it is then brought to the attention of the Technical Director. After data is signed off twice, it is then entered into the final mobile laboratory report. The concentration values are reported to two significant figures. A dilution factor, (DF), needs to be reported in the sample header. If there is no dilution of the sample, the DF factor is 1.

Dilution Factor (DF) Calculation:

### Water

$$DF = \frac{A}{B} \quad A = \text{total purge volume } (\mu\text{L}) \\ B = \text{amount sample purged } (\mu\text{L})$$

eg. 250  $\mu\text{L}$  of sample, total volume = 5000  $\mu\text{L}$

$$DF = \frac{5000 \mu\text{L}}{250 \mu\text{L}} = 20$$

Soil

$$DF = \frac{A}{(B)(C)}$$

A = 5 grams  
B = total grams purged  
C = % Solid of sample (decimal notation)

If sample is med. level, the additional dilution of extract is multiplied.

(Note: In most cases soils are reported on a wet weight basis unless a project specifically requires dry weight reporting.)

**17.0 SUPPLEMENTAL DOCUMENTS**

17.1 STL Corporate Quality Management Plan, September 1999.

**18.0 REFERENCES**

18.1 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Final Update III, 12/96.

18.2 Operation Manuals for the HP 5890 Series II GC and Chemstation or Enviroquant Data System, Hewlett Packard.

18.3 Operation Manuals for the OI MPM-16 auto sampler and 4560 purge and trap concentrator, OI Corporation.

18.4 Severn Trent Laboratories QC Manual.

**19.0 SUBSTANTIVE REVISIONS**

19.1 Original issue.

19.2 Revision #1 - 3/18/99

**APPENDIX 1**  
**METHOD 8021 COMPOUND LIST WITH EST. QUANTITATION LIMITS**

<u>ANALYTE</u>	<u>EST. QUANT. LIMIT (<math>\mu\text{g/L}</math>)</u>
Vinyl Chloride	1.0
1,1-Dichloroethene	1.0
Methylene Chloride	1.0
t-1,2-Dichloroethene	1.0
1,1-Dichloroethane	1.0
c-1,2-Dichloroethene	1.0
1,1,1-Trichloroethane	1.0
Carbon Tetrachloride	1.0
1,2-Dichloroethane	1.0
Trichloroethene	1.0
Tetrachlorethene	1.0
Benzene	1.0
Toluene	1.0
Chlorobenzene	1.0
Ethylbenzene	1.0
M&P-Xylene	1.0
O-Xylene	1.0
Chloroform	1.0

## Severn Trent Laboratories- On Site Technologies Division

## Method Detection Limit Study 2000

MDL Study for : VOC's  
 Analyst: TJS  
 Instrument: mobile lab GC #1  
 Date Analyzed: 1/28/00  
 Units: ug/L

Approval  
 QA Coordinator: DEB 2/23/00  
 Laboratory Director: (Signature) 2/3/00

Compound	Spike Conc.	MDL1	MDL2	MDL3	MDL4	MDL5	MDL6	MDL7	AVE.	Standard Deviation	MDL	Report Level
Vinyl Chloride	2	1.429	1.788	1.772	1.898	2.221	2.049	1.693	1.836	0.255	0.801	1.0
1,1-Dichloroethene	2	2.052	2.037	1.984	2.011	2.064	1.998	1.685	1.976	0.132	0.414	1.0
Methylene Chloride	2	2.419	2.214	1.899	2.025	1.952	1.963	2.062	2.076	0.182	0.572	1.0
t-1,2-Dichloroethene	2	2.378	2.213	1.924	2.083	1.997	1.988	1.810	2.056	0.189	0.595	1.0
1,1-Dichloroethane	2	2.070	1.990	1.802	1.977	1.961	1.951	1.637	1.913	0.146	0.457	1.0
c-1,2-Dichloroethene	2	2.064	1.943	1.837	1.888	1.907	1.900	1.765	1.901	0.092	0.290	1.0
1,1,1-Trichloroethane	2	2.007	1.862	1.837	1.878	1.876	1.810	1.784	1.865	0.072	0.225	1.0
Carbon Tetrachloride	2	2.154	2.088	2.067	2.109	2.143	2.062	1.806	2.061	0.118	0.371	1.0
1,2-Dichloroethane	2	1.955	1.969	1.847	2.004	2.065	2.084	1.638	1.938	0.153	0.482	1.0
Trichloroethene	2	2.136	2.065	1.923	2.109	2.132	2.012	1.724	2.014	0.149	0.468	1.0
Tetrachloroethene	2	2.004	1.994	1.989	2.130	2.175	1.997	1.819	2.015	0.115	0.360	1.0
Benzene	2	1.937	1.876	1.834	1.752	1.893	1.755	1.718	1.824	0.083	0.262	1.0
Toluene	2	2.177	2.039	2.116	2.163	2.087	2.003	2.003	2.084	0.072	0.226	1.0
Chlorobenzene	2	2.212	2.064	2.085	2.179	2.220	2.061	2.092	2.130	0.070	0.221	1.0
Ethylbenzene	2	2.174	2.013	2.013	2.116	2.142	1.966	1.999	2.060	0.081	0.256	1.0
m&p-Xylene	4	4.378	4.130	4.126	4.293	4.375	4.063	4.105	4.210	0.134	0.422	1.0
o-Xylene	2	2.174	2.083	2.081	2.177	2.237	2.072	2.101	2.132	0.064	0.200	1.0



## Joined Severn Trent Laboratories in 1984

### PETER A. LAW

#### Laboratory Director – On-Site Technologies Division

For Severn Trent Laboratories (STL), Peter Law serves as the Laboratory Director for STL's On-Site Technologies Division (OST). OST is responsible for a variety of on-site services including the operation of Mobile Laboratories, staffing and operating Contract/Op laboratories, innovative in-situ analyses and oversight of Field Services activities. Mr. Law is responsible for assessing new potential markets, proposal development, contract review and approvals, maintaining client satisfaction and project management activities for all OST projects. Mr. Law supervises sample collection and in-situ analytical programs currently totalling several million dollars per year for clients such as Environmental Consultants, Industry and Government agencies.

With over seventeen years of experience in the field of environmental testing, Mr. Law is familiar with the broad spectrum of regulations pertaining to the field of environmental analysis. He routinely oversees sampling and analytical protocols for projects conducted for a variety of regulatory agencies. Mr. Law has overseen analytical projects relative to site assessment and investigations, contaminated soil removals, plume delineations, monitoring well placement, remediation projects, soil gas surveys and ambient air monitoring projects for private clients and government agencies.

Typical of this experience are the following analytical projects completed under Mr. Law's supervision:

- Coordination of all in-situ analytical requirements for a multi-year AFCEE site assessment project. Analyses included GC/MS VOCs and EDB by GC method 504. A full data deliverable package including a detailed EDD submittal was required within seven days of sample receipt – all analytical results were provided within 24 hours. On average, twenty five samples per day were analyzed for each of the organic parameters. Mr. Law was responsible for ensuring all analyses were completed on time, meeting the high level of Quality Assurance required.
- Operation of a USACE validated laboratory at an EPA Superfund Pump & Treat facility. This COE validated laboratory provides daily organic and inorganic analyses including VOC and SVOC by GC/MS, Pesticides by GC/ECD and metals by ICP. Mr. Law is responsible for all aspects of this facility including staff, Quality Assurance, facility and instrument maintenance.





## Peter A. Law

- Oversight of a fifteen month long project completed in September 1996 at the Massachusetts Military Reservation. This analytical project consisted of establishing a mobile laboratory on-site providing for VOC and EDB analyses by methods 502 and 504, respectively, along with additional base lab analyses when required. This project required rapid turnaround times for results as well as complete 30-day deliverable packages. Over 4000 samples were analyzed during this site assessment project.
- Two-phase in-situ project involving the analyses of soil samples for PCBs, VOCs and metals at a US EPA Superfund Site. Two laboratories were established on-site during both mobilizations to provide for rapid organic and inorganic analyses. Sample loads of up to 65 samples per day were analyzed for each parameter with a 24 hour turnaround time. A complete data package and EDD submittal was required for this project. Mr. Law was responsible for all project oversight.

Prior to assuming the Directorship role for OST, Mr. Law worked in environmental testing laboratories serving in the roles of General Manager, Laboratory Director, Laboratory Manager and GC-GC/MS Chemist.

### Education:

Bachelor of Science, Environmental Sciences, 1982; University of Massachusetts

### Professional Affiliations:

- ACIL
- American Chemical Society
- Water Environment Federation
- MADEP Laboratory Advisory Committee
- MA Independent Testing Laboratory Association – Co-Founder and Former President

### Work History

1982 – 1984 GC & GC/MS Analyst  
1984 – 1992 Laboratory Manager  
1992 – 1995 Laboratory Manager/Director  
1995 – 1997 General Manager  
1997 – 1999 Business Development Director  
1999 – present Lab Director, On-Site Technologies



**GIANINA BURNETT**

**Project Manager –  
On-Site Technologies  
Division**

Joined Severn Trent Laboratories in 1992

Ms. Burnett serves as a project manager in STL’s On-Site Technologies (OST) division. Her experience covers a broad range of analytical programs including CLP, AFCEE, and USACE requirements. Ms. Burnett has served as the project manager for a number of field analytical projects undertaken by STL. Typical projects involve the analysis of soil, groundwater and/or air samples for test procedures such as Volatile Organic Compounds, Semi-volatile Organic Compounds, Pesticides and PCBs, Total Petroleum Hydrocarbons and Metals.

Typical projects Ms. Burnett has been involved with include the following;

- Multi-year contract for the operation of a USACE validated laboratory at a USEPA Superfund site. Analyses of groundwater and sludge samples for VOCs, SVOCs, Pesticides and Metals.
- AFCEE site investigation requiring GC/MS and GC analyses of groundwater samples.
- USEPA superfund site investigation of soil and groundwater for VOCs, PCBs and metals.
- RCRA site investigation for a high level mercury site assessment project.
- PCB soil remediation project conducted for the New York Department of Environmental Conservation.

For these projects, Ms. Burnett is responsible to ensure project requirements are met and that report deliverables are completed as required by the project-specific quality control program. Gianina is also responsible for the production of all Electronic Data Deliverables (EDDs) when required by a specific project.

**Prior to becoming a project manager for the OST division, Gianina served in a similar capacity for the STL-MA base laboratory operating in Westfield, MA.**

**Experience**

1992 – 1995	Office Support
1995 - Present	Project Manager



**TIMOTHY J. SMITH**

**Senior Mobile Lab  
Analyst –  
On-Site Technologies  
Division**

Joined Severn Trent Laboratories in 1989

As a senior mobile lab analyst, Mr. Smith is responsible for the day to day operation of the mobile laboratories and project oversight. He conducts field analyses on soil, water and gaseous samples for the presence of organic and inorganic contaminants including Volatile Organic Compounds, Semi-Volatile Organic Compounds, Petroleum Hydrocarbon, Metals and PCBs. He is familiar with the EPA procedures for these analyses and their implementation in the field laboratory.

In his position as senior mobile lab analyst, Mr. Smith is familiar with the operation of a Gas Chromatograph (GC) with Photoionization Detector, Electrolytic Conductivity Detector, Electron Capture Detector and Flame Ionization detectors plus Gas Chromatography/Mass Spectrometry (GC/MS) and XRF techniques.

Typical projects completed under the guidance of Mr. Smith include the following:

- On site VOC (8021), PCB (8082) and XRF analyses on soil samples taken at a USEPA Superfund site. Mr. Smith coordinated the activities of three additional field chemists to ensure a 24 hour turnaround time was met for all analyses. During the course of this project over 2500 sample analyses were completed.
- Established a 45 foot laboratory on location to provide for GC/MS and GC analyses of groundwater samples taken for an AFCEE site investigation. Mr. Smith not only performed many of the required analyses during this multi-year project he also trained additional staff to complete the required analyses and report deliverables.
- Performance of VOC analyses and a specialized TPH procedure on soils at a large international airport during site assessment activities.

Mr. Smith is currently responsible for the day-to-day oversight of numerous on-site analytical programs.

**Education**

Bachelor of Science, Environmental Science, 1984; Johnson State College



**TIMOTHY SMITH**

**Professional Licenses:**

Massachusetts Drinking Water Plant Operator Grade 4

Massachusetts Wastewater Treatment Plant Operator Grade 6

**Work History**

1989- 1990    Laboratory Analyst

1990 – 1991    Field Services Coordinator

1991 – Present Senior Mobile Lab Analyst

TJS.DOC



## TIMOTHY KNOLLMEYER

**Senior Mobile Lab  
Analyst –  
On-Site Technologies  
Division**

Joined Severn Trent Laboratories in 1992

Mr. Knollmeyer serves as a senior field analyst in our mobile laboratory department as well as the coordinator for Field Services at the STL-MA laboratories. His analytical experience includes the analyses of soil and water samples for Total Petroleum Hydrocarbons (TPH), and volatile organic compounds by Gas Chromatography (GC) including use of purge and trap concentration and photoionization, flame ionization and electrolytic conductivity detectors. Mr. Knollmeyer also has a great deal of experience with the analysis of Polychlorinated biphenyls (PCB's), metals by X-ray Fluorescence and other organic and inorganic analytes. Mr. Knollmeyer has served as the on-site project manager for a number of field analytical projects undertaken by Severn Trent Laboratories.

As a field analyst, Mr. Knollmeyer is familiar with the analyses for volatile organics (8021), TPH (8015 and 418.1), PAHs (8100), PCBs (8082) and the various extraction techniques required by each. Mr. Knollmeyer also has extensive experience with gas chromatographic equipment set-up, operation and maintenance, and other field laboratory techniques. In addition, Mr. Knollmeyer can coordinate and review the daily reports generated and act as the liason between Severn Trent Laboratories and our clients.

Prior to becoming a field analyst at Severn Trent Laboratories, Mr. Knollmeyer was responsible for field sampling of soil, water and gaseous samples utilizing a wide variety of sampling techniques including bailers, automatic samplers, composite samplers and others. He is familiar with sample handling and preservation procedures, chain-of-custody procedures and sample log-in and tracking protocols.

### Education

Bachelor of Arts, Political Science, 1988; University of Massachusetts

### Experience

1992 – 1993                      Field Technician

1993 - Present                      Field Analyst

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**ATTACHMENT B  
QUANTERRA ELAP CERTIFICATION**



STATE OF NEW YORK  
DEPARTMENT OF HEALTH

Wadsworth Center    The Governor Nelson A. Rockefeller Empire State Plaza    P.O. Box 509    Albany, New York 12201-0509

Antonia C. Novello, M.D., M.P.H.  
Commissioner

Dennis-P. Whalen  
Executive Deputy Commissioner

MARCH 10, 2000

Dear Laboratory Director:

Please note that although your ELAP Certificate of Approval expires on 12:01 AM April 1, 2000, it is still valid until June 30, 2000, as per ELAP Certification Manual, No. 140, Page 13 of 42, dated 12/6/95, Part 55-2.4e NYCRR. "...during any extension or grace period permitted by this Subpart, a laboratory approval shall remain in force beyond the expiration date of the certificate of approval, unless such approval is specifically terminated or suspended in writing."

Further verification of your laboratory's approved ELAP status is available by calling the Program Office at (518) 485-5570.

Sincerely,

A handwritten signature in cursive script that reads "Linda L. Madlin".

Linda L. Madlin  
Administrative Assistant  
Environmental Laboratory  
Approval Program

LLM:da

**NYSDOH - WADSWORTH CENTER - ELAP - PO BOX 509 - ALBANY NY 12201-0509**  
**Phone: 518-485-5570                      www.wadsworth.org/labcert                      Fax: 518-485-5568**

NEW YORK STATE DEPARTMENT OF HEALTH

ANTONIA C. NOVELLO, M.D., M.P.H. Commissioner



Expires 12:01 AM June 30, 2001  
ISSUED April 1, 2000  
REVISED April 3, 2000

**CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE**

*Issued in accordance with and pursuant to section 502 Public Health Law of New York State*

Lab ID No.: 11182

Director: MR. ALBERT VICINIE

Lab Name: STL - PITTSBURGH

Address : 450 WILLIAM PITT WAY - BLDG 6

PITTSBURGH PA 15238

is hereby APPROVED as an Environmental Laboratory for the category

**ENVIRONMENTAL ANALYSES NON POTABLE WATER**

All approved subcategories and/or analytes are listed below:

Wastewater Miscellaneous :	Mineral :	Nutrient :	Acrolein and Acrylonitrile (ALL)
Bromide	Acidity	Ammonia (as N)	Benzidines (ALL)
Boron, Total	Alkalinity	Nitrite (as N)	Chlorophenoxy Acid Pesticides (ALL)
Cyanide, Total	Calcium Hardness	Nitrate (as N)	Chlor. Hydrocarbon Pesticides (ALL)
Color	Chloride	Chlorinated Hydrocarbons (ALL)	Demand (ALL)
Corrosivity	Sulfate (as SO <sub>4</sub> )	Haloethers (ALL)	Wastewater Metals III (ALL)
Phenols	Hardness, Total	Wastewater Metals I (ALL)	Wastewater Metals II (ALL)
Oil & Grease Total Recoverable	Nitroaromatics and Isophorone (ALL)	Nitrosoamines (ALL)	Organophosphate Pesticides (ALL)
Hydrogen Ion (pH)	Polynuclear Aromatics (ALL)	Polychlorinated Biphenyls (ALL)	Phthalate Esters (ALL)
Specific Conductance	Priority Pollutant Phenols (ALL)	Purgeable Aromatics (ALL)	Purgeable Halocarbons (ALL)
Silica, Dissolved	Residue (ALL)	TCLP Additional Compounds (ALL)	Volatile Chlorinated Organics (ALL)
Sulfide (as S)			
Surfactant (MBAS)			

Serial No.: 106513

Wadsworth Center

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Must be conspicuously posted. Valid certificate has a red serial number.



NEW YORK STATE DEPARTMENT OF HEALTH

ANTONIA C. NOVELLO, M.D., M.P.H. Commissioner



Expires 12:01 AM June 30, 2000  
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Lab Name: STL - PITTSBURGH  
Address : 450 WILLIAM PITT WAY - BLDG 6  
PITTSBURGH PA 15238

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES/SOLID AND HAZARDOUS WASTE

All approved subcategories and/or analytes are listed below:

Characteristic Testing :	Miscellaneous :	Acrolein and Acrylonitrile (ALL)	Chlorophenoxy Acid Pesticides (ALL)
Corrosivity	Cyanide, Total	Chlor. Hydrocarbon Pesticides (ALL)	Chlorinated Hydrocarbons (ALL)
Ignitability	Hydrogen Ion (pH)	Haloethers (ALL)	Metals I (ALL)
Reactivity	Sulfide (as S)	Metals II (ALL)	Nitroaromatics Isophorone (ALL)
TCLP	Organophosphate Pesticides (ALL)	Polynuclear Arom. Hydrocarbon (ALL)	Polychlorinated Biphenyls (ALL)
E.P. Toxicity	Phthalate Esters (ALL)	Priority Pollutant Phenols (ALL)	Purgeable Aromatics (ALL)
Purgeable Halocarbons (ALL)	Volatile Chlorinate Organics (ALL)		

Serial No.: 106525

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NEW YORK STATE DEPARTMENT OF HEALTH

ANTONIA C. NOVELLO, M.D., M.P.H. Commissioner



Expires 12:01 AM June 30, 2000  
ISSUED April 1, 2000  
REVISED April 3, 2000

**CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE**

*Issued in accordance with and pursuant to section 502 Public Health Law of New York State*

Lab ID No.: 11182

Director: MR. ALBERT VICINIE  
Lab Name: STL - PITTSBURGH  
Address : 450 WILLIAM PITT WAY - BLDG 6  
PITTSBURGH PA 15238

*is hereby APPROVED as an Environmental Laboratory for the category*

**CONTRACT LABORATORY PROTOCOL (CLP)**

*All approved subcategories and/or analytes are listed below:*

CLP Inorganics

CLP PCB/Pesticides

CLP Semi-Volatile Organics

CLP Volatile Organics

Serial No.: 106530

Wadsworth Center

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