

QUALITY CONTROL ELEMENTS OF SW-846 METHODS

STL North Canton conducts a quality assurance/quality control (QA/QC) program designed to provide scientifically valid and legally defensible data. Toward this end, several types of quality control indicators are incorporated into the QA/QC program, which is described in detail in QA Policy, QA-003. These indicators are introduced into the sample testing process to provide a mechanism for the assessment of the analytical data.

QC BATCH

Environmental samples are taken through the testing process in groups called **QUALITY CONTROL BATCHES (QC batches)**. A QC batch contains up to twenty environmental samples of a similar matrix (water, soil) that are processed using the same reagents and standards. STL North Canton requires that each environmental sample be associated with a QC batch.

Several quality control samples are included in each QC batch and are processed identically to the twenty environmental samples. These QC samples include a **METHOD BLANK (MB)**, a **LABORATORY CONTROL SAMPLE (LCS)** and, where appropriate, a **MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)** pair or a **MATRIX SPIKE/SAMPLE DUPLICATE (MS/DU)** pair. If there is insufficient sample to perform an MS/MSD or an MS/DU, then a **LABORATORY CONTROL SAMPLE DUPLICATE (LCSD)** is included in the QC batch.

LABORATORY CONTROL SAMPLE

The Laboratory Control Sample is a QC sample that is created by adding known concentrations of a full or partial set of target analytes to a matrix similar to that of the environmental samples in the QC batch. The LCS analyte recovery results are used to monitor the analytical process and provide evidence that the laboratory is performing the method within acceptable guidelines. All control analytes indicated by a bold type in the LCS must meet acceptance criteria. Failure to meet the established recovery guidelines requires the reparation and reanalysis of all samples in the QC batch. The only exception is that if the LCS recoveries are biased high and the associated sample is ND (non-detected) for the parameter(s) of interest, the batch is acceptable.

At times, a Laboratory Control Sample Duplicate (LCSD) is also included in the QC batch. An LCSD is a QC sample that is created and handled identically to the LCS. Analyte recovery data from the LCSD is assessed in the same way as that of the LCS. The LCSD recoveries, together with the LCS recoveries, are used to determine the reproducibility (precision) of the analytical system. Precision data are expressed as relative percent differences (RPDs). If the RPD fails for an LCS/LCSD and yet the recoveries are within acceptance criteria, the batch is still acceptable.

METHOD BLANK

The Method Blank is a QC sample consisting of all the reagents used in analyzing the environmental samples contained in the QC batch. Method Blank results are used to determine if interference or contamination in the analytical system could lead to the reporting of false positive data or elevated analyte concentrations. All target analytes must be below the reporting limits (RL) or the associated sample(s) must be ND except under the following circumstances:

- Common organic contaminants may be present at concentrations up to 5 times the reporting limits. Common metals contaminants may be present at concentrations up to 2 times the reporting limit, or the reported blank concentration must be twenty fold less than the concentration reported in the associated environmental samples. (See common laboratory contaminants listed below.)

Volatile (GC or GC/MS)

Methylene chloride
Acetone
2-Butanone

Semivolatile (GC/MS)

Phthalate Esters

Metals

Copper
Iron
Zinc
Lead*

- for analyses run on TJA Trace ICP, ICPMS or GFAA only
- Organic blanks will be accepted if compounds detected in the blank are present in the associated samples at levels 10 times the blank level. Inorganic blanks will be accepted if elements detected in the blank are present in the associated samples at 20 times the blank level.

QUALITY CONTROL ELEMENTS OF SW-846 METHODS (Continued)

- Blanks will be accepted if the compounds/elements detected are not present in any of the associated environmental samples.

Failure to meet these Method Blank criteria requires the repreparation and reanalysis of all samples in the QC batch.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

A Matrix Spike and a Matrix Spike Duplicate are a pair of environmental samples to which known concentrations of a full or partial set of target analytes are added. The MS/MSD results are determined in the same manner as the results of the environmental sample used to prepare the MS/MSD. The analyte recoveries and the relative percent differences (RPDs) of the recoveries are calculated and used to evaluate the effect of the sample matrix on the analytical results. Due to the potential variability of the matrix of each sample, the MS/MSD results may not have an immediate bearing on any samples except the one spiked; therefore, the associated batch MS/MSD may not reflect the same compounds as the samples contained in the analytical report. When these MS/MSD results fail to meet acceptance criteria, the data is evaluated. If the LCS is within acceptance criteria, the batch is considered acceptable. The acceptance criteria do not apply to samples that are diluted for organics if the native sample amount is 4x the concentration of the spike.

For certain methods, a Matrix Spike/Sample Duplicate (MS/DU) may be included in the QC batch in place of the MS/MSD. For the parameters (i.e. pH, ignitability) where it is not possible to prepare a spiked sample, a Sample Duplicate may be included in the QC batch. However, a Sample Duplicate is less likely to provide usable precision statistics depending on the likelihood of finding concentrations below the standard reporting limit. When the Sample Duplicate result fails to meet acceptance criteria, the data is evaluated.

SURROGATE COMPOUNDS

In addition to these batch-related QC indicators, each organic environmental and QC sample is spiked with surrogate compounds. Surrogates are organic chemicals that behave similarly to the analytes of interest and that are rarely present in the environment. Surrogate recoveries are used to monitor the individual performance of a sample in the analytical system.

If surrogate recoveries are biased high in the LCS, LCSD, or the Method Blank, and the associated sample(s) are ND, the batch is acceptable. Otherwise, if the LCS, LCSD, or Method Blank surrogate(s) fail to meet recovery criteria, the entire sample batch is repped and reanalyzed. If the surrogate recoveries are outside criteria for environmental samples, the samples will be repped and reanalyzed unless there is objective evidence of matrix interference or if the sample dilution is greater than the threshold outlined in the associated method SOP.

For the GC/MS BNA methods, the surrogate criterion is that two of the three surrogates for each fraction must meet acceptance criteria. The third surrogate must have a recovery of ten percent or greater.

For the Pesticide, PCB, PAH, and Herbicide methods, the surrogate criterion is that one of two surrogate compounds must meet acceptance criteria.



STL North Canton Certifications and Approvals:

Alabama (#41170), California (#2157), Connecticut (#PH-0590), Florida (#E87225),
Illinois (#100439), Kansas (#E10336), Kentucky (#90021), Massachusetts (#M-OH048),
Maryland (#272), Minnesota (#39-999-348), Missouri (#6090), New Jersey (#74001),
New York (#10975), North Dakota (#R-156), Ohio (#6090), OhioVAP (#CL0024),
Pennsylvania (#68-340), Rhode Island (#237), South Carolina (#92007001, #92007002, #92007003),
Tennessee (#02903), West Virginia (#210), Wisconsin (#999518190), NAVY, ARMY,
USDA Soil Permit, ACIL Seal of Excellence - Participating Lab Status Award (#82)

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc. SDG Number: A2791
 Matrix: (soil/water) WG Lab Sample ID: A1K210141 001
 Method: SW846 8021B
 Volatile Organics (8021B)
 Sample WT/Vol: 5 / mL Date Received: 11/21/01
 Work Order: EPDVP1AA Date Extracted: 11/21/01
 Dilution factor: 1 Date Analyzed: 11/21/01
 Moisture %:
 Client Sample Id: EB110801 QC Batch: 1330464

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
71-43-2	Benzene	1.0		U
100-41-4	Ethylbenzene	1.0		U
108-88-3	Toluene	1.0		U
1330-20-7	Xylenes (total)	1.0		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 002

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDV81AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 16

QC Batch: 1330458

Client Sample Id: VC10.W

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
75-35-4	1,1-Dichloroethene	1.2		U
79-01-6	Trichloroethene	1.2		U
108-90-7	Chlorobenzene	1.2		U
71-43-2	Benzene	1.2		U
100-41-4	Ethylbenzene	1.2		U
108-88-3	Toluene	1.2		U
1330-20-7	Xylenes (total)	1.2		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 003

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDWE1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 14

QC Batch: 1330458

Client Sample Id: VC10.V

CONCENTRATION UNITS:

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
71-43-2	Benzene	1.2		U
100-41-4	Ethylbenzene	1.2		U
108-88-3	Toluene	1.2		U
1330-20-7	Xylenes (total)	1.2		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 004

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDW11AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 57

QC Batch: 1330458

Client Sample Id: VC10.UB

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
71-43-2	Benzene	2.3		U
100-41-4	Ethylbenzene	2.3		U
108-88-3	Toluene	2.3		U
1330-20-7	Xylenes (total)	2.3		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 005

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDW21AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 54

QC Batch: 1330458

Client Sample Id: VC10.T

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
71-43-2	Benzene	2.2		U
100-41-4	Ethylbenzene	2.2		U
108-88-3	Toluene	2.2		U
1330-20-7	Xylenes (total)	2.2		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 006

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDW41AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 14

QC Batch: 1330458

Client Sample Id: VC15.A

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
71-43-2	Benzene	1.2		U
100-41-4	Ethylbenzene	1.2		U
108-88-3	Toluene	1.2		U
1330-20-7	Xylenes (total)	1.2		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141.007

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / mL

Date Received: 11/21/01

Work Order: EPDW51AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %:

QC Batch: 1330464

Client Sample Id: FB110801

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/L
71-43-2	Benzene	1.0	U
100-41-4	Ethylbenzene	1.0	U
108-88-3	Toluene	1.0	U
1330-20-7	Xylenes (total)	1.0	U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 008

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / mL

Date Received: 11/21/01

Work Order: EPDW71AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %:

QC Batch: 1330464

Client Sample Id: EB111301

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
71-43-2	Benzene	1.0		U
100-41-4	Ethylbenzene	1.0		U
108-88-3	Toluene	1.0		U
1330-20-7	Xylenes (total)	1.0		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 009

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDW91AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 43

QC Batch: 1330458

Client Sample Id: VC10.N

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
71-43-2	Benzene	1.8		U
100-41-4	Ethylbenzene	1.8		U
108-88-3	Toluene	1.8		U
1330-20-7	Xylenes (total)	1.8		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc. SDG Number: A2791
 Matrix: (soil/water) WG Lab Sample ID: A1K210141 010
 Method: SW846 8021B
 Volatile Organics (8021B)
 Sample WT/Vol: 5 / g Date Received: 11/21/01
 Work Order: EPDXA1AA Date Extracted: 11/21/01
 Dilution factor: 1 Date Analyzed: 11/21/01
 Moisture %: 54
 Client Sample Id: VC10.S QC Batch: 1330458

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
71-43-2	Benzene	2.2		U
100-41-4	Ethylbenzene	2.2		U
108-88-3	Toluene	2.2		U
1330-20-7	Xylenes (total)	2.2		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 011

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / mL

Date Received: 11/21/01

Work Order: EPDXD1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %:

QC Batch: 1330464

Client Sample Id: FB111301

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/L Q
71-43-2	Benzene	1.0	U
100-41-4	Ethylbenzene	1.0	U
108-88-3	Toluene	1.0	U
1330-20-7	Xylenes (total)	1.0	U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 012

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDXE1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 48

QC Batch: 1330458

Client Sample Id: VC10.P

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/kg
71-43-2	Benzene	1.9	U
100-41-4	Ethylbenzene	1.9	U
108-88-3	Toluene	1.9	U
1330-20-7	Xylenes (total)	1.9	U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 013

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDXH1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 49

QC Batch: 1330458

Client Sample Id: VC10.0

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/kg)	ug/kg	Q
71-43-2	Benzene	2.0		U
100-41-4	Ethylbenzene	2.0		U
108-88-3	Toluene	2.0		U
1330-20-7	Xylenes (total)	2.0		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 014

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDXJ1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 43

QC Batch: 1330458

Client Sample Id: VC10.RA

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/kg
71-43-2	Benzene	1.8	U
100-41-4	Ethylbenzene	1.8	U
108-88-3	Toluene	1.8	U
1330-20-7	Xylenes (total)	1.8	U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 015

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDXL1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 45

QC Batch: 1330458

Client Sample Id: VC10.OA (REP 1)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
71-43-2	Benzene	1.8		U
100-41-4	Ethylbenzene	1.8		U
108-88-3	Toluene	1.8		U
1330-20-7	Xylenes (total)	1.8		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: A2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210141 016

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDXN1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 45

QC Batch: 1330458

Client Sample Id: VC10.OA (REP 2)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
71-43-2	Benzene	1.8		U
100-41-4	Ethylbenzene	1.8		U
108-88-3	Toluene	1.8		U
1330-20-7	Xylenes (total)	1.8		U



STL Connecticut

SUBCONTRACTED DATA

Client:	TRC ENVIRONMENTAL
Project ID:	ISLANDER EAST
P.O.	38077
SDG #:	B2791
STL ID:	7001-2791B

CASE NARRATIVE

A1K210149

The following report contains the analytical results for two water samples and two solid samples submitted to STL North Canton by STL Connecticut, project number 7001-2791B. The samples were received November 21, 2001, according to documented sample acceptance procedures.

STL utilizes only USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameters listed on the analytical methods summary page in accordance with the methods indicated. A summary of QC data for these analyses is included at the rear of the report.

The results included in this report have been reviewed for compliance with the laboratory QA/QC plan. All data have been found to be compliant with laboratory protocol.

SUPPLEMENTAL QC INFORMATION

GC VOLATILES

Due to analyst error, no MS/MSD was performed; therefore, an LCS/LCSD was provided for batch 1330458.

An LCS/LCSD was provided for batch 1330464 since there was insufficient sample volume to perform an MS/MSD.

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2-Butanone

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Lead*

- *for analyses run on TJA Trace ICP, ICPMS or GFAA only*
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QUALITY CONTROL ELEMENTS OF SW-846 METHODS (Continued)

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For the Pesticide, PCB, PAH, and Herbicide methods, the surrogate criterion is that one of two surrogate compounds must meet acceptance criteria.

STL North Canton Certifications and Approvals:

Alabama (#41170), California (#2157), Connecticut (#PH-0590), Florida (#E87225),
Illinois (#100439), Kansas (#E10336), Kentucky (#90021), Massachusetts (#M-OH048),
Maryland (#272), Minnesota (#39-999-348), Missouri (#6099), New Jersey (#74001),
New York (#10975), North Dakota (#R-156), Ohio (#6090), OhioVAP (#CL0024),
Pennsylvania (#68-340), Rhode Island (#237), South Carolina (#92007001, #92007002, #92007003),
Tennessee (#02903), West Virginia (#210), Wisconsin (#999518190), NAVY, ARMY,
USDA Soil Permit, ACIL Seal of Excellence - Participating Lab Status Award (#82)



STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc. SDG Number: B2791

Matrix: (soil/water) WG Lab Sample ID: A1K210149 001
 Method: SW846 8021B
 Volatile Organics (8021B)

Sample WT/Vol: 5 / mL Date Received: 11/21/01
 Work Order: EPDQ1AA Date Extracted: 11/21/01
 Dilution factor: 1 Date Analyzed: 11/21/01
 Moisture %:

QC Batch: 1330464

Client Sample Id: EB111501

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/L
71-43-2	Benzene	1.0	U
100-41-4	Ethylbenzene	1.0	U
108-88-3	Toluene	1.0	U
1330-20-7	Xylenes (total)	1.0	U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: B2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210149 002

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPD0V1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 40

QC Batch: 1330458

Client Sample Id: VC10.MB

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/kg
71-43-2	Benzene	1.7	U
100-41-4	Ethylbenzene	1.7	U
108-88-3	Toluene	1.7	U
1330-20-7	Xylenes (total)	1.7	U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc.

SDG Number: B2791

Matrix: (soil/water) WG

Lab Sample ID: A1K210149 003

Method: SW846 8021B

Volatile Organics (8021B)

Sample WT/Vol: 5 / g

Date Received: 11/21/01

Work Order: EPDOW1AA

Date Extracted: 11/21/01

Dilution factor: 1

Date Analyzed: 11/21/01

Moisture %: 41

QC Batch: 1330458

Client Sample Id: VC10.L

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/kg	
71-43-2	Benzene	1.7		U
100-41-4	Ethylbenzene	1.7		U
108-88-3	Toluene	1.7		U
1330-20-7	Xylenes (total)	1.7		U

STL CONNECTICUT

Lab Name: Severn Trent Laboratories, Inc. SDG Number: B2791

Matrix: (soil/water) WG Lab Sample ID: A1K210149.004

Method: SW846 8021B
 Volatile Organics (8021B)

Sample WT/Vol: 5 / mL Date Received: 11/21/01

Work Order: EPD0X1AA Date Extracted: 11/21/01

Dilution factor: 1 Date Analyzed: 11/21/01

Moisture %: QC Batch: 1330464

Client Sample Id: FB111501

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/L
71-43-2	Benzene	1.0	U
100-41-4	Ethylbenzene	1.0	U
108-88-3	Toluene	1.0	U
1330-20-7	Xylenes (total)	1.0	U



STL Connecticut

SPECIFIC GRAVITY

Client:	TRC ENVIRONMENTAL
Project ID:	ISLANDER EAST
P.O.	38077
SDG #:	B2791
STL ID:	7001-2791B

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December 5, 2001

Ms. Johanna Dubauskas
Severn Trent Laboratories
128 Long Hill Cross Road
Shelton, CT 06484

Re: Laboratory Project No. 21000
Case: 21000; SDG: B2791

Dear Ms. Dubauskas:

Enclosed are the analytical results of samples received intact by Severn Trent Laboratories on November 20, and 21, 2001. Laboratory numbers have been assigned and designated as follows:

<u>Lab ID</u>	<u>Client Sample ID</u>	<u>Sample Date</u>	<u>Sample Matrix</u>
Received: 11/20/01 ETR No: 85654			
471551	VC10.MB	11/15/01	Soil
471552	VC10.L	11/15/01	Soil
471553	VC10.K	11/15/01	Soil
471554	VC15.J	11/15/01	Soil
Received: 11/21/01 ETR No: 85669			
471636	VC10.E	11/17/01	Soil
471637	VC10.D	11/17/01	Soil
471638	VC10.F	11/17/01	Soil
471639	VC10.H	11/17/01	Soil
471640	VC10.G	11/17/01	Soil

Documentation that identifies the condition of the samples at the time of sample receipt and the issues arising at the time of sample log-in is included in the Sample Handling section of this submittal.

Please note that no exceptions to the method prescribed quality control criteria were observed during the analysis of the samples in this delivery group.

Client specific matrix spike/matrix spike duplicate samples were not performed, nor requested with this sample delivery group.

If there are any questions regarding this submittal, please contact Ron Pentkowski at (802) 655-1203.

001A

Ms. Johanna Dubauskas
December 5, 2001
Page 2



STL Burlington

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I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data, submitted on floppy diskette, has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Wheeler". The signature is written in a cursive style with a long horizontal line extending to the right.

Michael F. Wheeler, Ph.D
Laboratory Director

Enclosure

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Severn Trent Laboratories, Inc.

SAMPLE DATA SUMMARY PACKAGE

FOR Specific Gravity

Specific Gravity of Soils By ASTM Method D854

Client: <u>STLCT</u>	ETR(s): <u>85654</u>
Client Code: <u>STLCT</u>	SDG(s): <u>85654</u>
Project: <u>21000</u>	Analyst(s): <u>MRD</u>
Job #: <u>Isle East</u>	Start Date: <u>04-Dec-01</u>
Date Received: <u>20-Nov-01</u>	End Date: <u>05-Dec-01</u>

Sample No:	471551	471552	471553	471554
Sample ID:	VC10.MB	VC10.L	VC10.K	VC15.J
Flask No.	551	552	553	554
Flask Volume, ml	100	100	100	100
Flask Weight, g	63.87	67.01	66.41	65.05
Flask/H2O Weight, g	163.60	166.80	166.18	164.89
Flask/H2O Temp., °C	23.0	23.0	23.0	23.0
Flask/H2O/Sample Weight, g	186.04	187.39	186.99	190.34
Flask/H2O/Sample Temp., °C	20.0	20.0	20.0	20.0
Pan, g	63.87	67.01	66.41	65.05
Pan/sample, g	99.87	100.60	100.22	106.43
Oven dried sample mass, g	36.00	33.59	33.81	41.38
Dens @ H2O temp	0.998	0.998	0.998	0.998
Dens @ smpl temp	0.998	0.998	0.998	0.998
Specific gravity	2.64	2.57	2.59	2.59

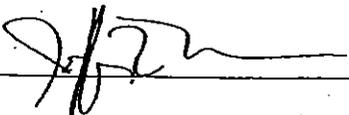
Submitted By: 

Date: 12/05/01

Specific Gravity of Soils By ASTM Method D854

Client: <u>STLCT</u>	ETR(s): <u>85669</u>
Client Code: <u>STLCT</u>	SDG(s): <u>B2791</u>
Project: <u>21000</u>	Analyst(s): <u>MRD</u>
Job #: <u>Islander East</u>	Start Date: <u>04-Dec-01</u>
Date Received: <u>21-Nov-01</u>	End Date: <u>05-Dec-01</u>

Sample No:	471636	471637	471638	471639	471640
Sample ID:	VC10.E	VC10.D	VC10.F	VC10.H	VC10.G
Flask No.	7	572	19	20	640
Flask Volume, ml	100	100	100	100	100
Flask Weight, g	66.48	71.38	68.58	66.51	67.01
Flask/H2O Weight, g	166.22	171.19	168.48	166.31	166.94
Flask/H2O Temp., °C	21.0	21.0	21.0	21.0	21.0
Flask/H2O/Sample Weight, g	185.75	191.33	190.24	187.76	186.31
Flask/H2O/Sample Temp., °C	20.0	20.0	20.0	20.0	20.0
Pan, g	66.48	71.38	68.58	66.51	67.01
Pan/sample, g	98.51	104.42	104.45	101.88	98.88
Oven dried sample mass, g	32.03	33.04	35.87	35.37	31.87
Dens @ H2O temp	0.998	0.998	0.998	0.998	0.998
Dens @ smpl temp	0.998	0.998	0.998	0.998	0.998
Specific gravity	2.56	2.56	2.54	2.54	2.54

Submitted By:  Date: 12/05/01

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December 5, 2001

Ms. Johanna Dubauskas
Severn Trent Laboratories
128 Long Hill Cross Road
Shelton, CT 06484

Re: Laboratory Project No. 21000
Case: 21000; SDG: B2791

Dear Ms. Dubauskas:

Enclosed are the analytical results of samples received intact by Severn Trent Laboratories on November 20, and 21, 2001. Laboratory numbers have been assigned and designated as follows:

<u>Lab ID</u>	<u>Client Sample ID</u>	<u>Sample Date</u>	<u>Sample Matrix</u>
Received: 11/20/01 ETR No: 85654			
471551	VC10.MB	11/15/01	Soil
471552	VC10.L	11/15/01	Soil
471553	VC10.K	11/15/01	Soil
471554	VC15.J	11/15/01	Soil
Received: 11/21/01 ETR No: 85669			
471636	VC10.E	11/17/01	Soil
471637	VC10.D	11/17/01	Soil
471638	VC10.F	11/17/01	Soil
471639	VC10.H	11/17/01	Soil
471640	VC10.G	11/17/01	Soil

Documentation that identifies the condition of the samples at the time of sample receipt and the issues arising at the time of sample log-in is included in the Sample Handling section of this submittal.

Please note that no exceptions to the method prescribed quality control criteria were observed during the analysis of the samples in this delivery group.

Client specific matrix spike/matrix spike duplicate samples were not performed, nor requested with this sample delivery group.

If there are any questions regarding this submittal, please contact Ron Pentkowski at (802) 655-1203.

001A

Ms. Johanna Dubauskas
December 5, 2001
Page 2



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Sincerely,

A handwritten signature in black ink, appearing to read "Michael Wheeler". The signature is stylized with a large, circular flourish at the end.

Michael F. Wheeler, Ph.D
Laboratory Director

Enclosure



STL Connecticut

SUBCONTRACTED SPECIFIC GRAVITY

Client:	TRC ENVIRONMENTAL
Project ID:	ISLANDER EAST
P.O.:	38077
SDG #:	A2791
STL ID:	7001-2791A

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December 5, 2001

Ms. Johanna Dubauskas
Severn Trent Laboratories
128 Long Hill Cross Road
Shelton, CT 06484

Re: Laboratory Project No. 21000
Case: 21000; SDG: A2791

Dear Ms. Dubauskas:

Enclosed are the analytical results of samples received intact by Severn Trent Laboratories on November 13, 19, and 20, 2001. Laboratory numbers have been assigned and designated as follows:

<u>Lab ID</u>	<u>Client Sample ID</u>	<u>Sample Date</u>	<u>Sample Matrix</u>
Received: 11/13/01 ETR No: 85561			
471009	VC10.AB	11/06/01	Soil
471010	VC10.B	11/06/01	Soil
471011	VC10.W	11/08/01	Soil
471012	VC10.V	11/08/01	Soil
471013	VC10.UB	11/08/01	Soil
471014	VC10.T	11/08/01	Soil

Received: 11/19/01 ETR No: 85636			
471426	VC10.N	11/13/01	Soil
471427	VC10.S	11/13/01	Soil
471428	VC10.P	11/13/01	Soil
471429	VC10.Q	11/13/01	Soil
471430	VC10.OA	11/13/01	Soil
471431	VC10.OAREP1	11/13/01	Soil
471432	VC10.OAREP2	11/13/01	Soil



STL Burlington

<u>Lab ID</u>	<u>Client Sample ID</u>	<u>Sample Date</u>	<u>Sample Matrix</u>
Received: 11/20/01 ETR No: 85652			
471548	VC10.RA	11/13/01	Soil
471549	VC.I	11/15/01	Soil
471550	VC10.C	11/16/01	Soil

Documentation that identifies the condition of the samples at the time of sample receipt and the issues arising at the time of sample log-in is included in the Sample Handling section of this submittal.

Please note that no exceptions to the method prescribed quality control criteria were observed during the analysis of the samples in this delivery group.

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If there are any questions regarding this submittal, please contact Ron Pentkowski at (802) 655-1203.

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Sincerely,

Michael F. Wheeler, Ph.D.
Laboratory Director

Enclosure

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Severn Trent Laboratories, Inc.

SAMPLE DATA SUMMARY PACKAGE

FOR Specific Gravity

Specific Gravity of Soils By ASTM Method D854

Client: STLCT
 Client Code: STLCT
 Project: 21000
 Job #: N/A
 Date Received: 13-Nov-01

ETR(s): 85561
 SDG(s): A2791
 Analyst(s): MRD
 Start Date: 14-Nov-01
 End Date: 21-Nov-01

Sample No: Sample ID:	471009 VC10.AB	471010 VC10.B	471011 VC10.W	471012 VC10.V	471013 VC10.UB	471014 VC10.T
Flask No.	1	2	3	4	5	6
Flask Volume, ml	100	100	100	100	100	100
Flask Weight, g	65.55	66.53	68.61	61.93	67.58	70.73
Flask/H2O Weight, g	165.40	166.32	168.48	161.72	167.40	170.47
Flask/H2O Temp., °C	19.0	19.0	19.0	19.0	19.0	19.0
Flask/H2O/Sample Weight, g	186.83	183.21	192.59	183.60	182.56	187.45
Flask/H2O/Sample Temp., °C	21.0	21.0	21.0	21.0	21.0	21.0
Pan, g	65.55	66.53	68.61	61.93	67.58	70.73
Pan/sample, g	100.08	93.91	107.52	97.26	92.31	98.39
Oven dried sample mass, g	34.53	27.38	38.91	35.33	24.73	27.66
Dens @ H2O temp.	0.998	0.998	0.998	0.998	0.998	0.998
Dens @ smpl temp	0.998	0.998	0.998	0.998	0.998	0.998
Specific gravity	2.64	2.62	2.64	2.64	2.60	2.60

Submitted By:  Date: 11/21/01

Specific Gravity of Soils By ASTM Method D854

Client: STLCT
Client Code: STLCT
Project: 21000
Job #: N/A
Date Received: 13-Nov-01

ETR(s): 85561
SDG(s): A2791
Analyst(s): MRD
Start Date: 14-Nov-01
End Date: 21-Nov-01

Sample No:	471009	471010	471011	471012	471013	471014
Sample ID:	VC10.AB	VC10.B	VC10.W	VC10.V	VC10.UB	VC10.T
Flask No.	1	2	3	4	5	6
Flask Volume, ml	100	100	100	100	100	100
Flask Weight, g	65.55	66.53	68.61	61.93	67.58	70.73
Flask/H2O Weight, g	165.40	166.32	168.48	161.72	167.40	170.47
Flask/H2O Temp., °C	19.0	19.0	19.0	19.0	19.0	19.0
Flask/H2O/Sample Weight, g	186.83	183.21	192.59	183.60	182.56	187.45
Flask/H2O/Sample Temp., °C	21.0	21.0	21.0	21.0	21.0	21.0
Pan, g	65.55	66.53	68.61	61.93	67.58	70.73
Pan/sample, g	100.08	93.91	107.52	97.26	92.31	98.39
Oven dried sample mass, g	34.53	27.38	38.91	35.33	24.73	27.66
Dens @ H2O temp	0.998	0.998	0.998	0.998	0.998	0.998
Dens @ smpl temp	0.998	0.998	0.998	0.998	0.998	0.998
Specific gravity	2.64	2.62	2.64	2.64	2.60	2.60

Submitted By: 

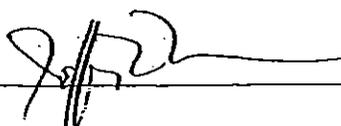
Date: 11/21/01

Specific Gravity of Soils By ASTM Method D854

Client: STLCT
Client Code: STLCT
Project: 21000
Job #: n/a
Date Received: 19-Nov-01

ETR(s): 85636
SDG(s): A2791
Analyst(s): MRD
Start Date: 04-Dec-01
End Date: 05-Dec-01

Sample No:	471426	471427	471428	471429	471430	471431
Sample ID:	VC10.N	VC10.S	VC10.P	VC10.Q	VC10.OA	VC10.OAREPI
Flask No.	A	B	C	D	E	F
Flask Volume, ml	100	100	100	100	100	100
Flask Weight, g	70.69	70.50	61.93	65.54	67.59	61.66
Flask/H ₂ O Weight, g	170.48	170.40	161.72	165.42	167.44	161.51
Flask/H ₂ O Temp., °C	19.5	19.5	19.5	19.5	19.5	19.5
Flask/H ₂ O/Sample Weight, g	191.59	187.12	182.24	186.34	181.88	175.95
Flask/H ₂ O/Sample Temp., °C	20.0	20.0	20.0	20.0	20.0	20.0
Pan, g	70.69	70.50	61.93	65.54	67.59	61.66
Pan/sample, g	107.77	98.57	95.15	99.79	91.24	85.89
Oven dried sample mass, g	37.08	28.07	33.22	34.25	23.65	24.23
Dens @ H ₂ O temp	0.998	0.998	0.998	0.998	0.998	0.998
Dens @ smpl temp	0.998	0.998	0.998	0.998	0.998	0.998
Specific gravity	2.32	2.48	2.62	2.57	2.57	2.48

Submitted By: 

Date: 12/05/01

Specific Gravity of Soils By ASTM Method D854

Client: <u>STLCT</u>	ETR(s): <u>85636</u>
Client Code: <u>STLCT</u>	SDG(s): <u>A2791</u>
Project: <u>21000</u>	Analyst(s): <u>MRD</u>
Job #: <u>n/a</u>	Start Date: <u>04-Dec-01</u>
Date Received: <u>19-Nov-01</u>	End Date: <u>05-Dec-01</u>

Sample No:	471432
Sample ID:	VC10.0AREP2
Flask No.	G
Flask Volume, ml	100
Flask Weight, g	66.22
Flask/H2O Weight, g	166.05
Flask/H2O Temp., °C	19.5
Flask/H2O/Sample Weight, g	179.33
Flask/H2O/Sample Temp., °C	20.0
Pan, g	66.22
Pan/sample, g	87.88
Oven dried sample mass, g	21.66
Dens @ H2O temp	0.998
Dens @ smpl temp	0.998
Specific gravity	2.59

Submitted By:  Date: 12/05/01

Specific Gravity of Soils By ASTM Method D854

Client: STLCT
Client Code: STLCT
Project: 21000
Job #: Isle East
Date Received: 20-Nov-01

ETR(s): 85652
SDG(s): A2791
Analyst(s): MRD
Start Date: 04-Dec-01
End Date: 05-Dec-01

Sample No:	471548	471549	471550
Sample ID:	VC10.RA	VC.I	VC10.C
Flask No.	548	549	550
Flask Volume, ml	100	100	100
Flask Weight, g	65.82	66.72	58.89
Flask/H2O Weight, g	165.61	166.61	158.81
Flask/H2O Temp., °C	20.5	20.5	20.5
Flask/H2O/Sample Weight, g	187.20	190.50	179.18
Flask/H2O/Sample Temp., °C	20.0	20.0	20.0
Pan, g	65.82	66.72	58.89
Pan/sample, g	100.85	105.41	92.30
Oven dried sample mass, g	35.03	38.69	33.41
Dens @ H2O temp	0.998	0.998	0.998
Dens @ smpl temp	0.998	0.998	0.998
Specific gravity	2.60	2.61	2.56

Submitted By: 

Date: 12/05/01

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Severn Trent Laboratories, Inc.

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STL Burlington
208 South Park Drive
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Tel: 802 655 1203
Fax: 802 655 1248
www.stl-inc.com

December 5, 2001

Ms. Johanna Dubauskas
Severn Trent Laboratories
128 Long Hill Cross Road
Shelton, CT 06484

Re: Laboratory Project No. 21000
Case: 21000; SDG: A2791

Dear Ms. Dubauskas:

Enclosed are the analytical results of samples received intact by Severn Trent Laboratories on November 13, 19, and 20, 2001. Laboratory numbers have been assigned and designated as follows:

<u>Lab ID</u>	<u>Client Sample ID</u>	<u>Sample Date</u>	<u>Sample Matrix</u>
Received: 11/13/01 ETR No: 85561			
471009	VC10.AB	11/06/01	Soil
471010	VC10.B	11/06/01	Soil
471011	VC10.W	11/08/01	Soil
471012	VC10.V	11/08/01	Soil
471013	VC10.UB	11/08/01	Soil
471014	VC10.T	11/08/01	Soil

Received: 11/19/01 ETR No: 85636			
471426	VC10.N	11/13/01	Soil
471427	VC10.S	11/13/01	Soil
471428	VC10.P	11/13/01	Soil
471429	VC10.Q	11/13/01	Soil
471430	VC10.OA	11/13/01	Soil
471431	VC10.0AREP1	11/13/01	Soil
471432	VC10.0AREP2	11/13/01	Soil



STL Burlington

<u>Lab ID</u>	<u>Client Sample ID</u>	<u>Sample Date</u>	<u>Sample Matrix</u>
		Received: 11/20/01 ETR No: 85652	
471548	VC10.RA	11/13/01	Soil
471549	VC.I	11/15/01	Soil
471550	VC10.C	11/16/01	Soil

Documentation that identifies the condition of the samples at the time of sample receipt and the issues arising at the time of sample log-in is included in the Sample Handling section of this submittal.

Please note that no exceptions to the method prescribed quality control criteria were observed during the analysis of the samples in this delivery group.

Client specific matrix spike/matrix spike duplicate samples were not performed, nor requested with this sample delivery group.

If there are any questions regarding this submittal, please contact Ron Pentkowski at (802) 655-1203.

This report shall not be reproduced, except in full, without the written approval of the laboratory. This report is sequentially numbered starting with page 0001 and ending with page 14.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data, submitted on floppy diskette, has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Sincerely,

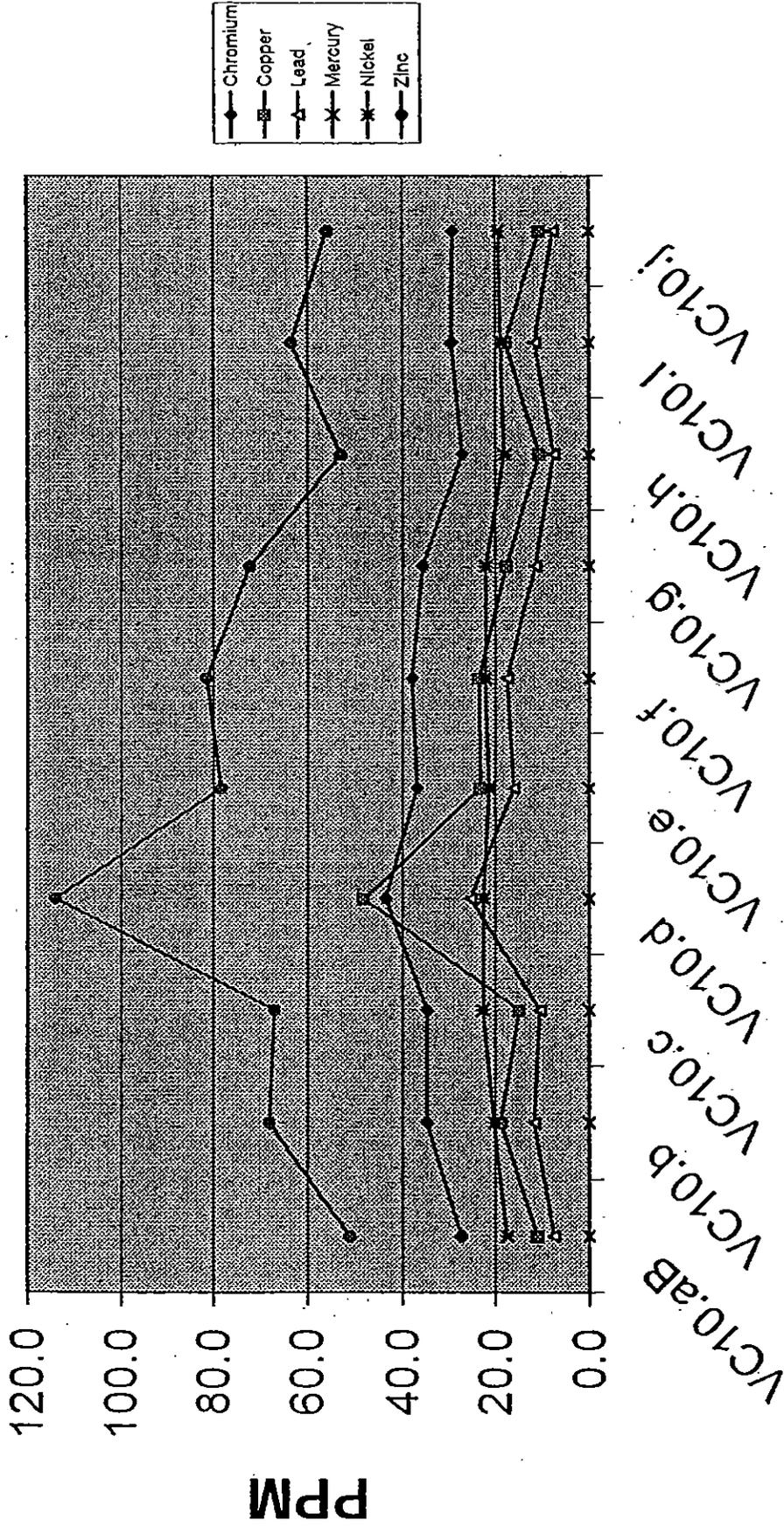
Michael F. Wheeler, Ph.D.
Laboratory Director

Enclosure

ATTACHMENT IV

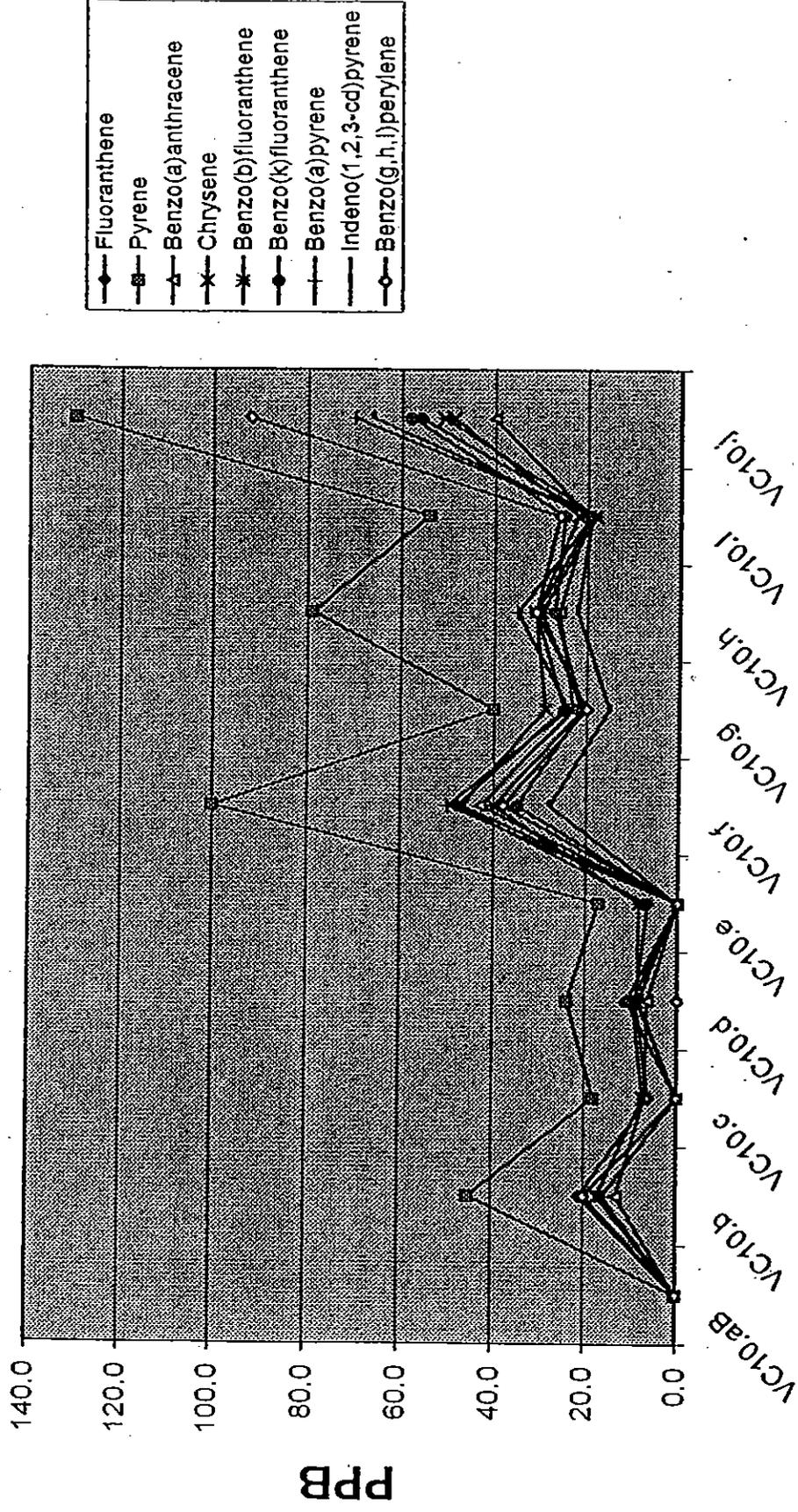
GRAPHS

Metals Analysis, CT



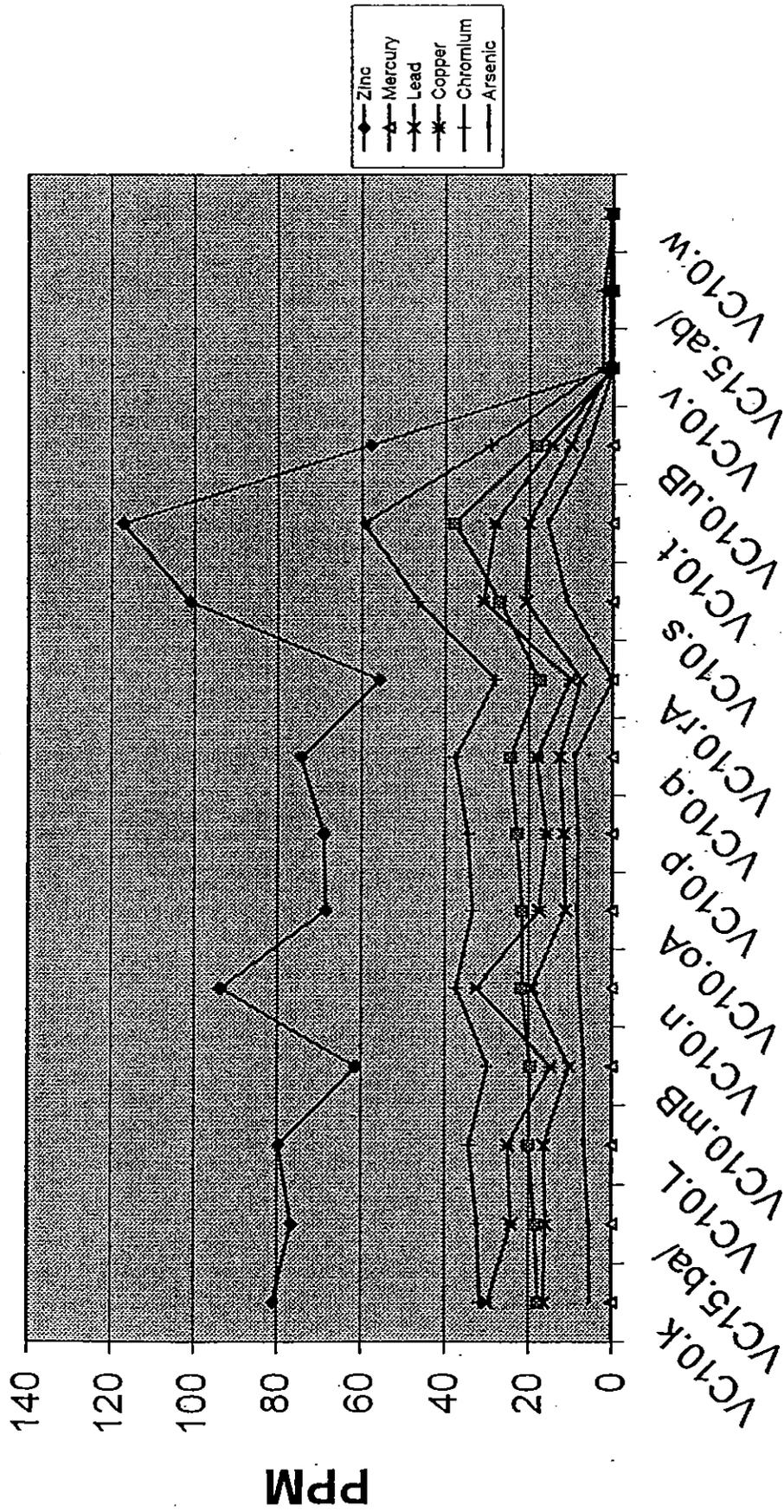
Sample ID

PAH Analysis, Connecticut



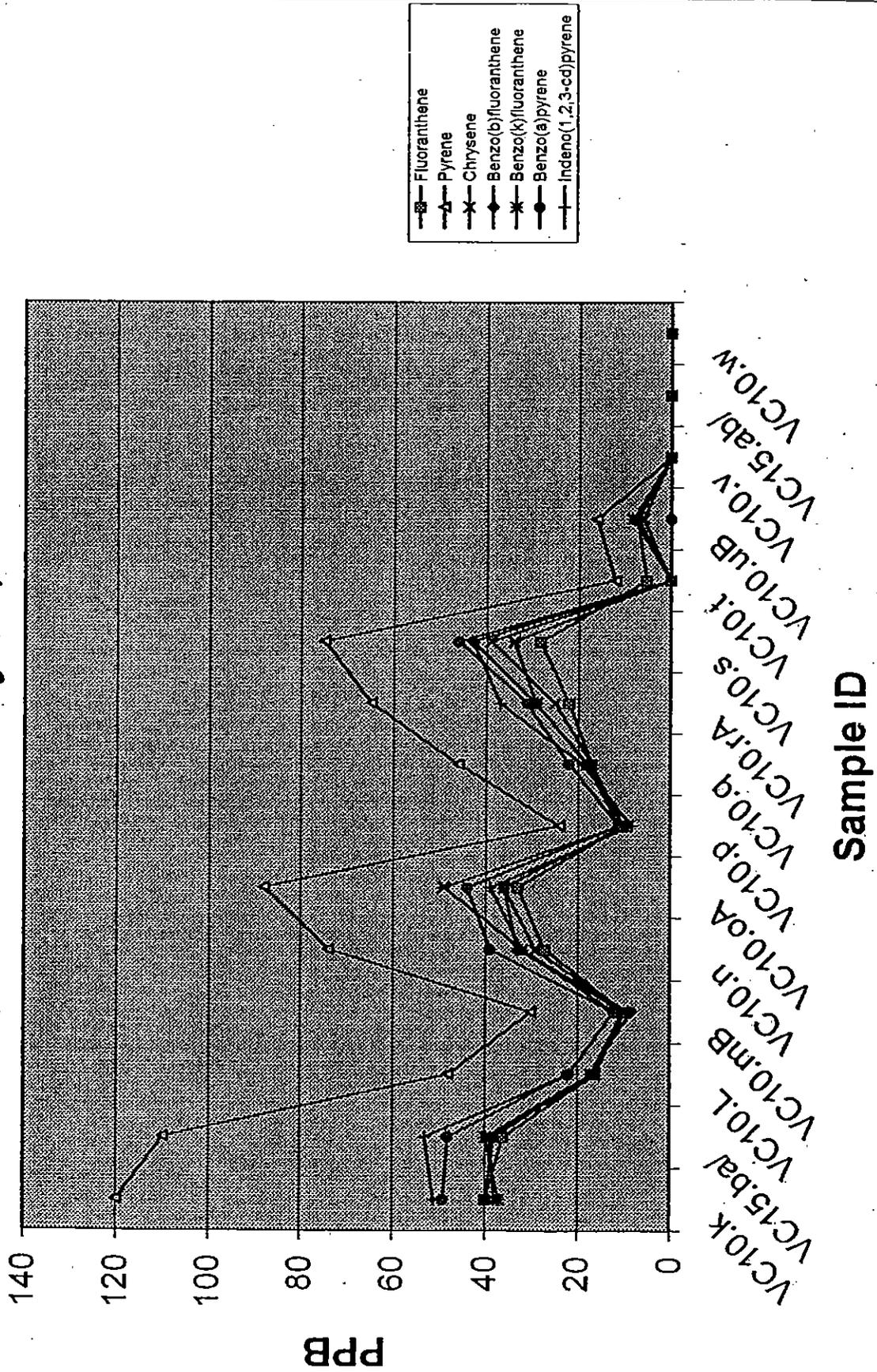
Sample ID

Metals Analysis, NY



Sample ID

PAH Analysis, NY



ATTACHMENT V

PHOTOS

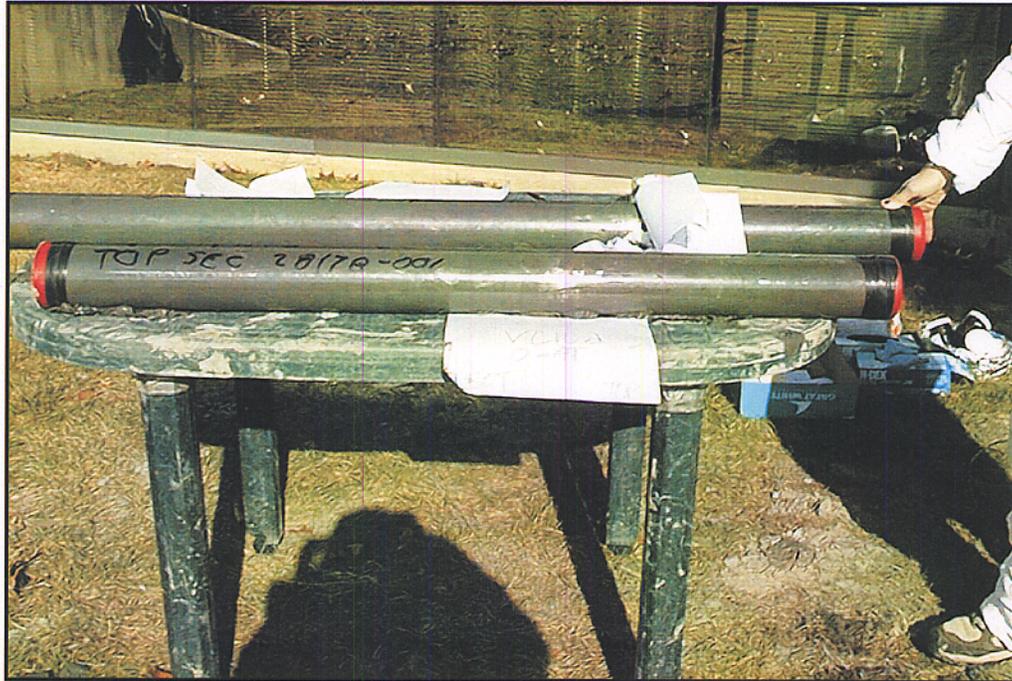


PHOTO 1: VC10.d Bottom = 47-107"
Top = 0-47"



PHOTO 2: VC10.d Bottom = 47-107"
Top = 0-47"





PHOTO 5: VC10.f Bottom = 51-111"
Top = 0-51"



PHOTO 6: VC10.g Bottom = 53-113"
Top = 0-53"



PHOTO 7: VC10.j Bottom = 39-99"
Top = 0-39"



PHOTO 8: VC10.j Bottom = 39-99"
Top = 0-39"



PHOTO 9: VC10.k Bottom = 55-115"
Top = 0-55"



PHOTO 10: VC10.k Bottom = 55-115"
Top = 0-55"



PHOTO 11: VC10.L Bottom = 60-120"
Top = 0-60"

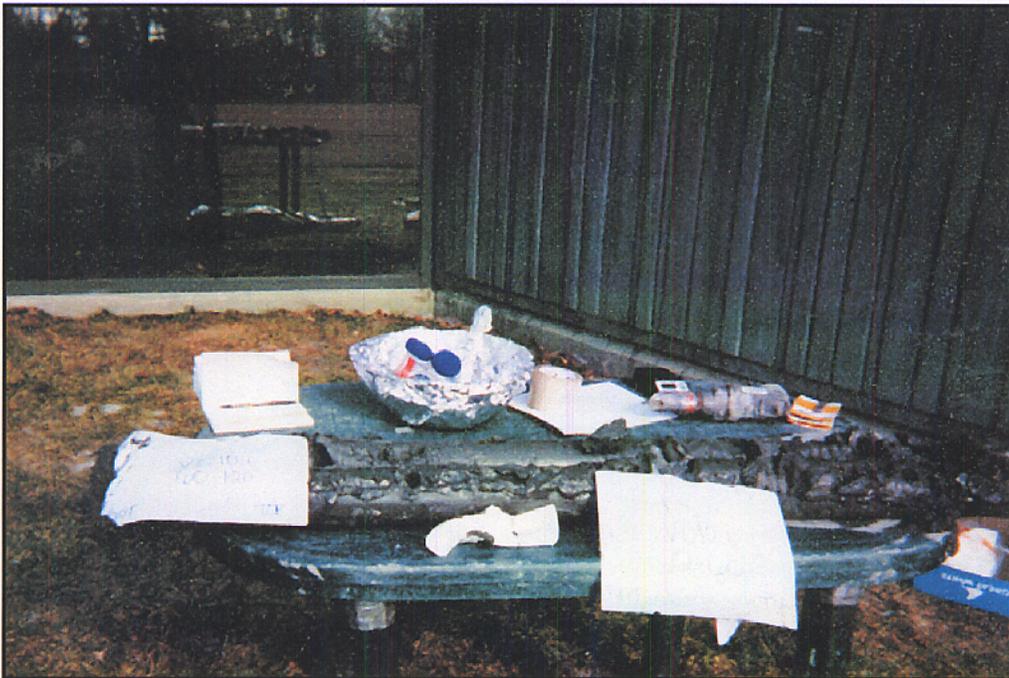


PHOTO 12: VC10.L Bottom = 60-120"
Top = 0-60"



PHOTO 13: VC10.mB Bottom = 49-109"
Top = 0-49"



PHOTO 14: VC10.mB Bottom = 49-109"
Top = 0-49"

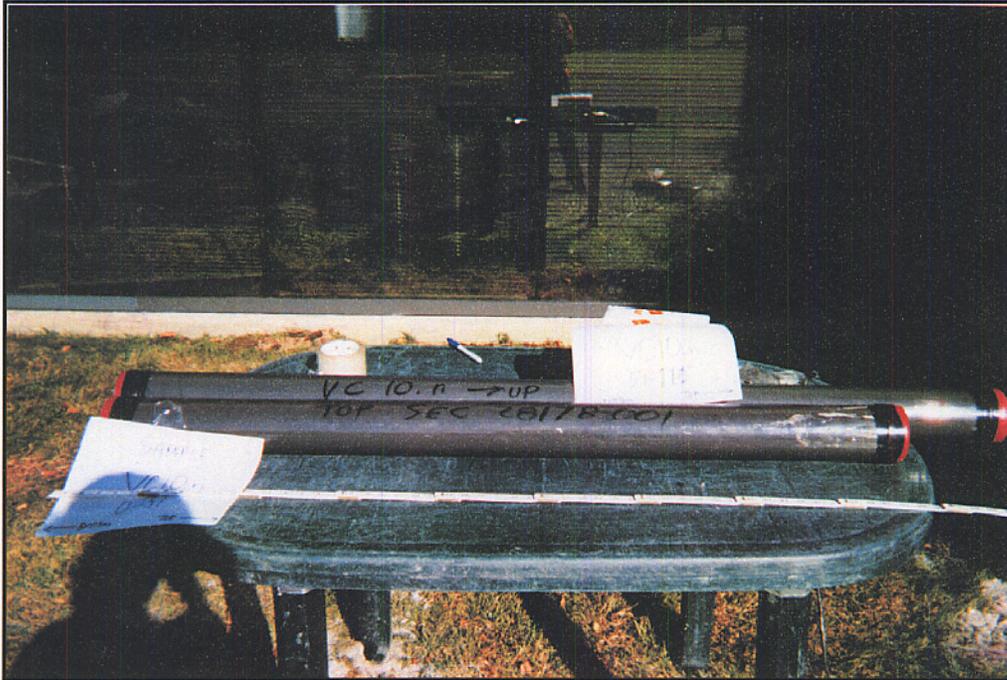


PHOTO 15: VC10.n Bottom = 51-110"
Top = 0-51"



PHOTO 16: VC10.n Bottom = 51-110"
Top = 0-51"



PHOTO 17: VC10.p Bottom = 46-106"
Top = 0-46"

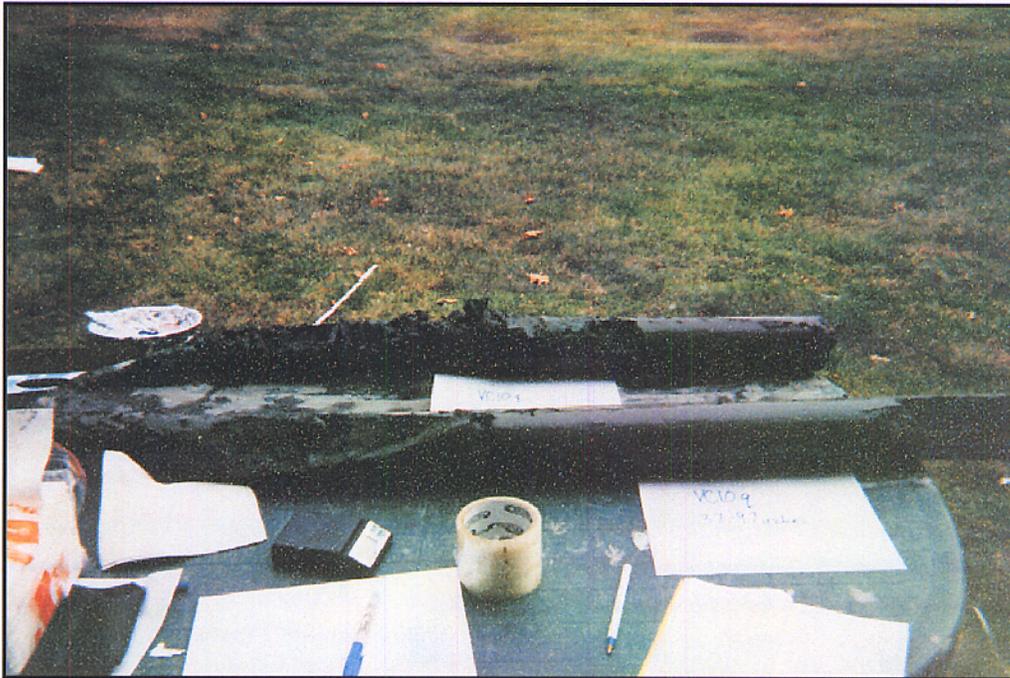


PHOTO 18: VC10.q Bottom = 37-97"
Top = 0-37"

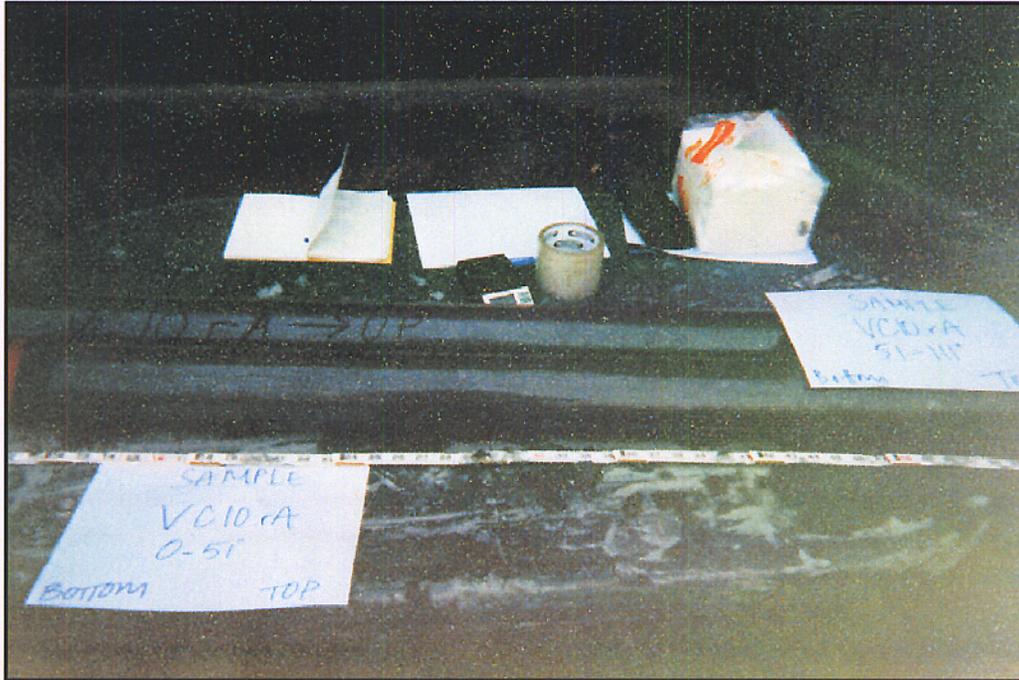


PHOTO 19: VC10.rA Bottom = 51-111"
Top = 0-51"

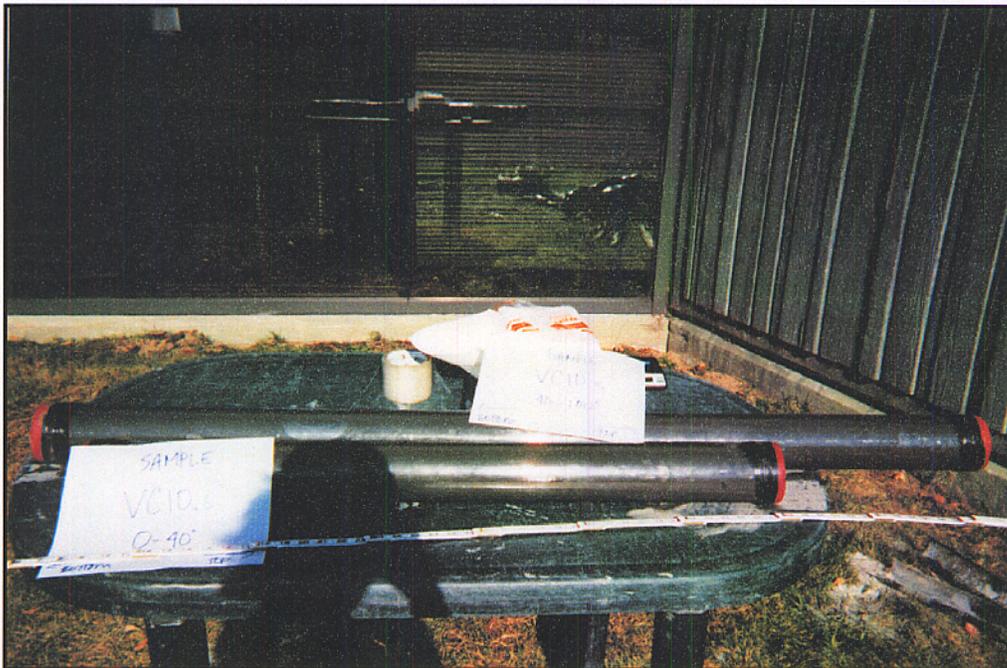


PHOTO 20: VC10.s Bottom = 40-100"
Top = 0-40"



PHOTO 21: VC10.t Bottom = 56-116"
Top = 0-56"

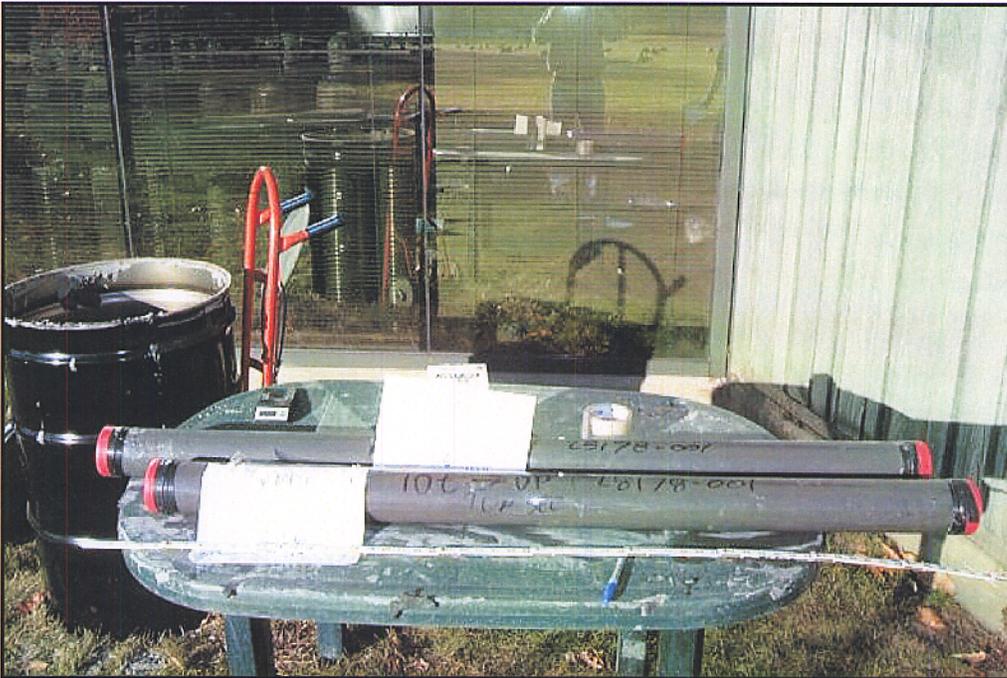


PHOTO 22: VC10.t Bottom = 56-116"
Top = 0-56"

ATTACHMENT VI

**SEDIMENT SAMPLING TO CHARACTERIZE PROPOSED
DREDGE MATERIAL (NYSDEC)**

SEDIMENT SAMPLING TO CHARACTERIZE PROPOSED DREDGE MATERIAL

Core samples are collected and analyzed to characterize the physical and chemical properties of the sediment in situ, prior to the dredging operation. Physical analysis should include grain size and TOC determinations. Chemical analysis should include case-appropriate parameters from Table 1. Evaluation of the data results of these samples will help determine the disposal and/or reuse options that might be considered, the types of dredging equipment that can be employed, and the environmental controls that may be necessary to reduce the potential impacts to fish and wildlife during dredging.

The sampling required by the Divisions to determine whether to grant a dredge permit is not the same testing required by the USACE. It must be acknowledged that for some dredging projects the USACE may require applicants to conduct a suite of biological tests to support their permit application. If such test results are available, and if open water disposal is planned, the Divisions may elect to use this information to make permit decisions in lieu of or in addition to chemical tests and criteria described in this TOGS. Under USACE requirements, sampling would be required for open water disposal according to the most recent version of "Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual" (USACE, Green Book) or "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual Inland Testing Manual" (USACE Gold Book). The Divisions may also require in-bio zone analyses based on the biological test results.

1. Sampling Exemptions

There are instances where sediment testing is not necessary. If there are no recent spill incidents (within the past ten years) or contamination problems associated with the site or its environs, sampling and analysis of sediments for proposed dredging projects will generally not be required under the following circumstances:

- a. the material to be dredged is at least 90% sand and gravel
or
- b. the entire project involves less than 1,500 cubic yards of dredge material
or
- c. the Divisions determine that the site has been appropriately sampled and analyzed within the last five years and that data reveals sediments with no appreciable contamination.

Note: Sampling exemptions are generally not available for projects involving open water disposal.

Additional sampling waivers may be applicable on a case by case basis.

2. Collection of Samples to Characterize Sediment

A sampling plan should be submitted to the Divisions prior to sampling indicating the type, number and location of samples to ensure proper characterization of the proposed dredge material.

- a. **Type of Sample.** Samples would usually necessitate the collection of sediment cores that represent the complete depth of the material to be dredged plus an additional one foot of overdredge depth. Each core is broken into two segments for analysis: a dredging depth segment and a substrate segment representing the top six inches of the sediment to be exposed after dredging. If chemical analysis of the dredging depth segment reveals moderate or high levels of contaminants in the sediments, then some or all substrate segments may need to be analyzed. If analysis of the material six inches below proposed bottom elevation reveals a risk of increased contamination exposure after dredging, the post-dredging sediment surface should again be sampled and analyzed for contaminants of concern to assure that their values do not exceed pre-dredging levels. Sampling procedures are more fully described in Attachment 1.
- b. **Number and Location of Samples.** The applicant should propose how many samples will be collected and explain how this number was derived and why it is adequate to characterize the dredge material, including the detection of potential "hot spots" of highly contaminated sediments. The plan should also detail the locations of the sampling sites and state how they afford spatial representativeness while also providing coverage for areas likely to have been affected by specific contamination (i.e., a sampling bias should exist toward areas known to be affected by outfalls, tributaries, other industrial sources, historical spill areas, etc.). Sampling should include no less than three sample locations for any given project.
- c. **Cost Reduction Strategies.** If the cost of chemical analyses for the number of proposed samples exceeds 10 percent of the project cost (i.e., small project, small marina operation, etc.), strategies are available to reduce the cost of the analyses. These strategies should yield a reasonably accurate representation of the spatial and vertical stratigraphy and contaminant distribution in the area to be dredged and take into account historical and current pollutant inputs. Division approval must be obtained before any of the sample size reduction strategies are used. Unless otherwise exempt from the sampling requirements, a minimum of three sediment samples should be analyzed to characterize any proposed dredging project. Cost reduction strategies may include:
 - i. Collect the required number of cores, then select those with the highest organic carbon levels and closest to known/potential contaminant sources for analysis.

If the results of the initial analysis are valid, representative and indicate clean

material, the other cores could be assumed likewise. More specifically, if the sediment with the highest silt and clay fraction reveals no appreciable contamination, then it is likely that relatively coarser, textured samples would reveal similar or less contaminated results. If the results indicated contamination, however, then the other cores could be assumed contaminated or they could be analyzed by the applicant.

ii. Collect the required number of cores and composite those with similar characteristics (e.g., grain size, TOC, color, etc.) for analysis. If this is done, a record of the cores that were composited, including their percentages of total organic carbon and USCS descriptions, as well as the post-compositing analytical results, should be submitted to the Divisions. Do not composite the cores if the grain size, TOC and likelihood of contamination based on core lithology and known contamination history indicates that individual horizons between the cores may be significantly different in contaminant sediment quality. Instead, sample and analyze the horizons separately or contact the Division of Water for guidance.

These strategies may also be used to reduce the number of substrate samples that need to be analyzed to characterize the sediment to be exposed as a result of the dredging operation. Analysis cost may also be reduced, for these samples, by limiting the analytical parameters to those found to be at moderate or high levels of contamination in the dredging interval samples.

d. Quality Assurance and Quality Control. The goal of the sampling strategies is to provide sediment data which are accurate, representative and legally defensible. Therefore, the importance of Quality Assurance/Quality Control (QA/QC) measures in sampling sediments cannot be overlooked. Failure to use proper containers and appropriate methods of sample collection and preservation, collect an adequate number and type of QC samples, provide strict sample identification and chain-of-custody documentation and employ correct laboratory procedures can limit data usability, or render sample results invalid.

The project-specific sampling and analysis plan for each dredging application should include a description of the project QA/QC program. The NYSDEC Analytical Services Protocol (ASP), dated June 2000, provides the in-laboratory QA/QC requirements and should be referenced and adhered to in the project QA/QC program. All data should be reported via ASP Category B deliverables. In-field QA/QC requirements should be specified in the project sampling and analysis plan. These requirements should include, but not necessarily be limited to: sample collection methods; decontamination of sampling equipment; sample container selection; sample preservation methods; number and type of QC samples (i.e., Matrix Spike/Matrix Spike Duplicate [MS/MSD], duplicates, etc.) to be collected; sample identification; and chain-of-custody procedures. General guidelines for these elements of the QA/QC

program are specified in Attachment 1. A glossary of selected QA/QC terminology and qualifiers is also included.

3. Analytical Requirements

Core samples should be analyzed for sediment quality parameters, grain size, TOC, and Unified Soils Classification System (USCS) classification. The required method detection limits and EPA methods are listed in Table 1 below. Method detection limits must be met in order to classify the material to be dredged. The analytical laboratory selected must be certified by the New York State Department of Health.

Table 1
Minimum Quantitation Limits and Suggested Methods

Parameter Sediment/Soil	EPA Method CLP/RCRA	Required Method Detection Limits (mg/kg, ppm)
Arsenic	Metals - EPA 6010B	1.0
Mercury	Metals - EPA 6010B	2
Cadmium	Metals - EPA 6010B	0.5
Lead	Metals - EPA 6010B	5.0
Copper *	Metals - EPA 6010B	2.5
Chlordane *	EPA 8081	.031
Sum of DDT+DDE+DDD	EPA 8081	.029
Dieldrin	EPA 8081	.019
Total PCBs	EPA 8082	.025
Total PAH	EPA 8270	.33
Total BTX	EPA 8020; 8021; 8260	.002
Benzene	EPA 8020; 8021; 8260	.002
Mirex *	EPA 8081	.189
Dioxin (Toxic Equivalency Total) *	EPA 1613B	0.000002

* Case-specific parameter.

ATTACHMENT 1

Sampling Procedures

Core Samples

Sediment cores should be collected using a vibra-coring apparatus, or other appropriate coring apparatus, used in accordance with the manufacturer's instructions. Clean, decontaminated core tube liners must be used. The bottom of the coring tube liner should be immediately capped and taped upon removal of the coring apparatus from the water. The core tube liner should then be removed from the coring apparatus and its top immediately capped and taped.

The core tube liner and boat deck should then be rinsed with ambient water to reduce the risk of contaminated sediments becoming airborne as they dry.

A visual inspection of the sediment cores should then be performed. Individual horizons or strata within each core should be measured along with the overall core length. These measurements and all significant features should be documented in a field notebook along with the date, time, and location of sample collection. Using a permanent marker, the date, time, and sample location should also be recorded on the sediment core tube liner. Photographs of the cores may be taken using color print film.

The sediment core should be broken into two segments: a dredging depth segment and a substrate segment representing the top six inches of sediment to be exposed after dredging. Each segment should be emptied into a clean tub and mixed with a clean spatula made of appropriate material. Generally, sediment to be analyzed for trace metals should not come into contact with metals and sediment to be analyzed for organic compounds should not come into contact with plastics. When the sediment appears mixed to a uniform color and consistency, a clean scoop should be used to place the material into acid washed wide mouth glass jars with Teflon® lined screw lids. After a jar is capped and labeled, it should be immediately placed on ice in a cooler.

All sample containers should be labeled using a permanent marker to indicate the date, time, and sampling location. This information should then be recorded in a field log book and on a chain of custody form which will follow the samples. Sediment material not placed in sample bottles should be returned to the location from which it was collected. All sample bottles should be placed in coolers with ice and delivered to the laboratory.

QC SAMPLES FOR SEDIMENTS			
Sample Type	Purpose	Collection	Documentation
Duplicate	Check laboratory and field procedures	1 sample per week or 10% of all field samples, whichever is greater.	Assign two separate sample numbers; submit blind to the lab
Field Blank	Check cross-contamination during sample collection and shipment and in the laboratory	1 sample per day	Assign separate sample number
Equipment (Rinseate) Blank	Check field decontamination procedures	Collect when sampling equipment is decontaminated and reused in the field.	Assign separate sample number
Matrix Spike and Matrix Spike Duplicate (MS/MSD)*	Required by laboratory protocols.	1 sample per twenty sediment samples	Assign both samples the same sample number. Indicate MS/MSD on chain-of-custody form.

*This is not necessary with PCB congener method or high resolution pesticide method or dioxin/furan analyses.

SAMPLE CONTAINERS AND VOLUMES FOR SEDIMENT SAMPLES

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)
Purgeable (Volatile) Organics	2-oz. glass jar with Teflon-lined cap.	Two; fill completely
Extractable Organics, Dioxin/Furan, Pesticides/PCBs	8-oz. amber glass jar with Teflon-lined cap	One; fill completely
Metals	8-oz. glass jar with Teflon-lined cap	One; fill half full
Cyanide Amenable and Total	8-oz. glass jar with Teflon-lined cap	One; fill completely

SAMPLING, PRESERVATION AND HOLDING TIMES FOR SEDIMENT SAMPLES		
Parameter	Preservation	Holding Time
Volatiles	Cool to 4°C	7 days
PCBs/Pesticides	Cool to 4°C	Extract within 5 days, analyze within 40 days
Extractable organics	Cool to 4°C	Extract within 5 days, analyze within 40 days
Metals	Cool to 4°C	6 months
Mercury	Cool to 4°C	26 days
Cyanide, Amenable, and Total	Cool to 4°C	12 days
Dioxin/Furan	Cool to 4°C	Extract within 30 days, analyze within 1 year

Holding times are based on verified time of sample receipt (VTSR). Source NYSDEC Analytical Services Protocol.

Sediment Data Qualifiers

Qualifiers for Organics Analyses

- Value** If the result is a value greater than or equal to the quantification limit, report the value.
- U** Indicates compound was analyzed for, but not detected.
- J** Indicates an estimated value.
- N** Indicates presumptive evidence of a compound.
- P** This flag is used for a pesticide/Aroclor target analyte where there is greater than 25% difference for detected concentrations between the two GC columns (see Form X). The lower of the two values is reported on Form I and flagged with a "P".
- C** This flag applies to pesticide results where the identification has been confirmed by GC/MS.
- B** This flag is used when the analyte is found in the associated blank as well as in the sample.
- E** This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.
- D** This flag identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is re-analyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the "D" flag. This flag alerts data users that any discrepancies between the concentrations reported may be due to dilution of the sample or extract.

Qualifiers for Metals Analyses

- B** The reported value is less than the Contract Required Detection Limit but greater than the Instrument Detection Limit.
- U** The Analyte was analyzed for but not detected, i.e., less than the Instrument Detection Limit.
- E** The reported value is estimated because of the presence of an interference.

Glossary of Selected QA/QC Terms
(source: NYSDEC ASP, 10/95)

Analytical Services Protocol (ASP) - the collection of analytical methods and corresponding reporting and quality control procedures that has been adopted by the Divisions.

Contract Required Quantitation Limit (CRQL) - minimum level of quantitation acceptable under the ASP.

Equipment Rinseate - a sample of analyte-free media which has been used to rinse the sampling equipment. It is collected after completion of decontamination and prior to sampling. This plank is useful in documenting adequate decontamination of sampling equipment.

Field Blank - any sample submitted to the laboratory identified as a blank prepared in the field. The purpose of the field blank is to document whether or not there was contamination introduced in the collection of the sample.

Field Duplicates - an additional sample taken from the same homogenized sample and set to the analytical laboratory for identical analysis.

Holding Time - the elapsed time, expressed in days, from the date of receipt of the sample by the laboratory until the date of its preparation (digestion, distillation or extraction) and/or analysis.

Matrix - the predominant material, component, or substrate (e.g., sediment) of which the sample to be analyzed is composed. Matrix is not synonymous with phase (liquid or solid).

Matrix Spike (MS) - aliquot of a sample fortified (spiked) with known quantities of specific compounds (target analytes) and subjected to the entire analytical procedure in order to indicate the appropriateness of the method for the matrix by measuring recovery. The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Matrix Spike Duplicate (MSD) - a second aliquot of the same matrix as the MS that is spiked with identical concentrations of target analytes as the MS, in order to document the precision and bias of the method in a given sample matrix.

Method Detection Limit (MDL) - the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.

Minimum Quantitation Limit - the minimum level that an analyte can be quantitated within a specified precision.

Percent Moisture - an approximation of the amount of water in a sediment sample made by drying an aliquot of the sample at 105 °C. The percent moisture determined in this manner also includes contributions from all compounds that may volatilize at or

below 105 °C, including water. Percent moisture may be determined from decanted samples and from samples that are not decanted.

Practical Quantitation Limit (PQL) - is the lowest level that can be measured within specified limits of precision during routine laboratory operations on most effluent matrices.

Project - single or multiple data collection activities that are related through the same planning sequence.

Replicate - independent samples which are collected as close as possible to the sample point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently at the same laboratory. These replicates are used to characterize sediment heterogeneity.

Semivolatile Compounds - compounds amenable to analysis by extraction of the sample with an organic solvent. Used synonymously with Base/Neutral Acid (BNA) compounds.

Tentatively Identified Compounds (TICs) - compounds detected in samples that are not target compounds, internal standards or surrogate standards. Up to 30 peaks (those greater than 10% of peak areas or heights of nearest internal standards) are subjected to mass spectral library searches for tentative identification.

Time - when required to record time on any deliverable item, time shall be expressed as Military Time, i.e., a 24-hour clock.

Trip Blank - a sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures.

Validated Time of Sample Receipt (VTSR) - the date on which a sample is received at the laboratory facility, as recorded on the shipper's delivery receipt and chain of custody.

Volatile Compounds - compounds amenable to analysis by the purge and trap technique. Used synonymously with purgeable compounds.

Wet Weight - the weight of a sample aliquot including moisture (undried).