Final
Quality Assurance Project Plan Addendum
for
Occidental Chemical Corporation Property Data Gap and Lewiston-Porter Central School District Investigations at the Former Lake Ontario Ordnance Works (LOOW) Niagara County, New York

Addendum to the
Phase IV Remedial Investigation of the
Wastewater Treatment Plant (EU7)
Quality Assurance Project Plan

August 2010

Prepared for

U.S. Army Corps of Engineers
Baltimore District

Contract W912DR-06-D-0002
Delivery Order 0009

Prepared by

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Approvers:

[redacted]

3 August 2010

[redacted]
Date

Project Manager

[redacted]

3 August 2010

[redacted]
Date

Program Manager

COMPLETION OF SENIOR TECHNICAL REVIEW

This document has been produced within the framework of the Earth Resources Technology, Inc. (ERT) and EA Engineering, Science, and Technology, Inc. (EA) quality management system. As such, a senior technical review, as defined in the Quality Control Plan for this project, has been conducted. This included review of the overall design addressed within the document, proposed or utilized technologies and alternatives and their applications with respect to project objectives and framework of the United States Army Corps of Engineers (USACE) regulatory constraints under the current Defense Environmental Restoration Program – Formerly Used Defense Site (DERP-FUDS) No. C02NY0025 project, within which this work has been completed.

[redacted]

12 July 2010

[redacted] (EA) Date

Senior Technical Reviewer

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

This document has been produced within the framework of ERT's total quality management system. As such, an independent technical review, appropriate to the level of risk and complexity inherent in the project as defined in the Quality Control Plan (QCP) for this project, has been conducted. This included review of assumptions (methods, procedures, and material used in analyses), alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the project objectives. Comments and concerns resulting from review of the document have been addressed and corrected as necessary.

[redacted]

9 July 2010

[redacted] Date

Independent Technical Reviewer (ERT)

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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
CAS	Chemical Abstracts Service
CLP	Contract Laboratory Program
COPC	Chemicals of Potential Concern
DOD	Department of Defense
DOE	Department of Energy
DI	Deionized
DQI	Data Quality Indicator
DQL	Data Quality Limit
DQO	Data Quality Objective
EA	EA Engineering, Science and Technology, Inc
ELAP	Environmental Laboratory Accreditation Program
ERT	Earth Resources Technology, Inc
EU	Exposure Unit
EU 7	Wastewater Treatment Plant
EU 8	Occidental Chemical Corporation Occidental Chemical Corporation Chemical Corporation Property
HCl	Hydrochloric Acid
HNO_3	Nitric Acid
HPLC	High Pressure Liquid Chromatography
HTRW	Hazardous, Toxic and Radioactive Waste
ITR	Internal Technical Review
LCL	Lower Control Limit
LCS	Laboratory Control Sample
LOOW	Lake Ontario Ordnance Works
LQAM	Laboratory Quality Assurance Manual
MDL	Method Detection Limit
MCGI	Meridian Consultant Group, Inc.
mg/kg	milligrams per kilogram
mg/L	milligram per Liter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NA	Not Applicable or Not Available
NELAP	National Environmental Laboratory Accreditation Program
NS	None Specified
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
PCB	Polychlorinated Biphenyls
pCi/g	Picocuries Per Gram
pCi/L	Picocuries Per Liter
pH	Potential of Hydrogen
PRG	Preliminary Remediation Goal
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control

QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RL	Reporting Limit
RSL	Regional Screening Level
SOP	Standard Operating Procedure
SOW	Scope of Work
SVOC	Semivolatile Organic Compound
SWDD	Southwestern Drainage Ditch
TA	Test America
TAL	Target Analyte List
TBC	To Be Considered
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
µg/kg	micrograms per kilogram
µg/L	microgram per Liter
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
°C	Degrees Celsius

1.0 INTRODUCTION

This section of the original Phase IV Remedial Investigation (RI) Quality Assurance Project Plan (QAPP) Addendum (U.S. Army Corps of Engineers (USACE)/Earth Resources Technology, Inc. (ERT), 2009) is hereby replaced in its entirety by the following.

This QAPP Addendum comprises the second part of the Sampling and Analysis Plan, and presents the organization, objectives and specific quality assurance/quality control (QA/QC) procedures associated with the Occidental Chemical Corporation Data Gap and Lewiston-Porter Central School District Investigations at the former Lake Ontario Ordnance Works (LOOW) in Lewiston, New York.

The QAPP details specific protocols in place for field sampling, sample handling and storage, chain-of-custody, laboratory analysis, and data handling and management. The QAPP was prepared in accordance with the USACE project guidance documents which include:

- *USACE Requirements for the Preparation of Sampling and Analysis Plans (EM 200-1-3 February 2001),*
- *USACE Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects (EM-200-1-6, October 1997),*
- *USACE Chemical Data Quality Managements for Hazardous, Toxic and Radioactive Waste Remedial Activities (EM-1110-1-263, April 1998),* and
- *Department of Defense Quality Systems Manual for Environmental Laboratories (April 2009).*

U.S. Environmental Protection Agency (USEPA) QAPP guidance documents utilized to prepare this project QAPP include:

- *USEPA Requirements for Quality Assurance Project Plans (USEPA QA/R-5, March 2001),*
- *USEPA Guidance for Quality Assurance Project Plans (USEPA QA/G-5, December 2002),* and
- *USEPA Guidance for the Data Quality Objective Process (USEPA QA/G-4, February 2006).*

The data generated from these investigations will be used to determine the following:

- extent of explosives constituent and chromium contaminated soil in exceedance of potential cleanup goals at the Occidental Chemical Corporation Occidental Chemical Corporation Chemical Corporation Property (Exposure Unit [EU] 8) that were previously identified in the Phase II RI Report and related to former Department of Defense (DOD) activities;
- evaluate the extent of contamination, identify chemicals of potential concern (COPC), and identify impacted areas associated with historic soil disturbances and the Southwest Drainage Ditch (SWDD) at the undeveloped areas of the Lewiston-Porter Central School District related to former DOD activities. Lewiston-Porter Central School District.

A list of the potential parameters to be analyzed, including their respective reporting limits (RLs), and Data Quality Limits (DQLs), are presented Section 3.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

2.1 Internal Technical Review

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) is hereby replaced in its entirety by the following.

[redacted], who performs ERT's independent technical review (ITR), will insure that the QA/QC plan is implemented and will oversee data validation. [redacted] will provide oversight and technical support for the sampling and analytical procedures followed in this project. This individual has the broad authority to approve or disapprove project plans, specific analyses, and final reports. The ERT ITR is independent from the data generation activities. In general, the ITR will be responsible for reviewing and advising on all QA/QC aspects and scheduled activities of this program.

2.2 Project Chemist

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) is hereby replaced in its entirety by the following.

The Project Chemist for this project will be determined prior to the start of the field activities. The selected individual will be responsible for ensuring sample analysis protocols and overseeing data reduction and review processes. This individual will ensure that the QA process detailed in the Test America, Inc. (TA) Laboratory Quality Assurance Manual (LQAM) are followed which may require occasional visits to the contracted laboratory facilities. This individual will work closely with the assigned Laboratory Project Manger.

2.3 Project Laboratory Organization

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) is hereby replaced in its entirety by the following.

TA will be conducting sample analysis for these investigations and is a New York State Department of Health National Environmental Laboratory Accreditation Program (NELAP) certified laboratory, has been certified by the National Environmental Laboratory Accreditation Conference having demonstrated the proficiency required for performing the analytical methods required for this project, and has current DOD – Environmental Laboratory Accreditation Program (ELAP) certification for analytical methods required for this project. A copy of the DOD Quality Systems Manual (QSM) self-certification, current NELAP certifications, current DOD-ELAP certifications and all other applicable certifications are included in Appendix A. The laboratories will communicate directly with ERT regarding the analytical results and reporting, and will be responsible for providing all labels, sample containers, field blank water, trip blanks, shipping coolers, and laboratory documentation.

As required by NELAP, DOD-ELAP and the TA LQAM, a quality system has been incorporated by TA to ensure data QC is achieved. General laboratory organization, including key personnel

specific to this project, is presented within TA's LQAM, in Appendix B. [redacted] will serve as the laboratory Project Manager and will oversee all analytical activities associated with this project.

2.3.1 Laboratory Project Manager

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

2.3.2 Laboratory Quality Assurance Manager

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

2.3.3 Laboratory Analysts

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

2.4 Data Validation

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) is hereby replaced in its entirety by the following.

Meridian Consultant Group, Inc. (MCGI) will be performing third party independent data review for all laboratory analyzed samples collected during this investigation. MCGI is a minority-owned, small business providing analytical data review and validation services for over 15 years. MCGI has a long history of providing outstanding client support to several DOD environmental services, including U.S. Department of the Navy and USACE Environmental Support Program.

3.0 QA OBJECTIVES FOR DATA MANAGEMENT

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

3.1 DQO Process

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) is hereby replaced in its entirety by the following.

The data quality objective (DQO) process is defined by seven steps designed specifically for data collection and analysis which supports informed decision making. The process utilizes systematic and statistical hypothesis testing to differentiate between defined alternatives. DQOs are statements, both qualitative and quantitative, that define objectives, appropriate data necessary to make informed decisions, and tolerance levels for potential errors.

The DQO process provides the framework for performance criteria that limit the potential for data errors by considering the reason for collecting data, defining appropriate data needs, and establishing tolerance levels for errors.

The seven-step DQO process includes:

Step 1. "State the Problem" – Potential health risks posed by and in the vicinity of aerial anomalies (visible in the timeframe of DOD ownership) and the SWDD in the undeveloped area of the Lewiston-Porter Central School District at the former LOOW,is unknown. Furthermore, the quantity of material impacted with constituents of concern in exceedance of potential cleanup goals at the Occidental Chemical Corporation Occidental Chemical Corporation Chemical Corporation Property (EU8) has not been determined to a sufficient resolution.

Step 2. "Identify the Goals of the Study" – The results of these investigations will be utilized to determine if COPC are present and represent a risk to human health or the environment at the Lewiston-Porter Central School District property, and to further delineate the extent of the constituents of concern at EU8 on Occidental Chemical Corporation Petroleum Corporation property.

Step 3. "Identify the Information Inputs" – Inputs include data types and information required to make informed decisions. For the investigations, these include:

- Analytical results (for the target compound list [TCL] and target analyte list [TAL]) for surface and subsurface soil, terrestrial sediment, and, possibly, ground water. The TCL and TAL parameters are presented in Tables 3-1 and 3-2.

- Potential chemical specific applicable or relevant and appropriate requirements (ARARs) and risk-based "to be considered" (TBC) criteria.

- Sample location, type, and depth.

Step 4. "Define the Boundaries of the Study" – The Occidental Chemical Corporation Data Gap and Lewiston-Porter Central School District Investigation are confined as follows:

The Occidental Chemical Corporation Data Gap Investigation is intended to refine the delineation of the explosives constituents and chromium concentrations exceeding potential cleanup goals (site-specific preliminary remediation goals [PRGs] calculated based upon the results of the Phase II RI). Therefore, the study area is confined to the vicinity of the Occidental Chemical Corporation Occidental Chemical Corporation Chemical Corporation Property where previously reported explosives and chromium concentrations exceed the PRGs.

The Lewiston-Porter Central School District Investigation is intended to investigate historic soil disturbances and the SWDD located on the undeveloped areas of the school campus.

Step 5. "Develop the Analytical Approach" – If analytical data results exceed potential chemical specific ARARs and risk-based TBC criteria (U.S. EPA Regional Screening Levels [RSLs], or in the absence of RSLs, New York State Department of Environmental Conservation [NYSDEC] Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 375 standards and guidance [inclusive of 6NYCRR Part 703]) then additional evaluations of potential human health and environmental risks may be warranted.

Step 6. "Specify Performance and Acceptance Criteria" –Performance and acceptance criteria were developed in order to minimize the potential for study error rates. Quantitative project specific objectives for the data quality indicators of precision, accuracy, completeness and sensitivity have been developed in order to define acceptable measurement error.

Step 7. "Develop the Plan for Obtaining Data" – The QAPP was developed based on the needs of the project and obtaining sufficient quality data to address the project objective.

3.2 Data Use

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

3.3 Analytical Data Quality

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) is hereby replaced in its entirety by the following.

The overall QA objective defined in the QAPP is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will result in sound datum that are scientifically valid, and achieve standards that meet the specific DQOs for the site. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, and corrective action are described in other sections of this QAPP.

The analytical methods to be used at this site will provide data quality sufficient to meet DQOs such that data can be used to determine the extent of contamination related to former DOD activities,

identify COPCs, identify any impacted areas, perform sound risk assessments, evaluate remedial alternatives if necessary, and to compare the results of future remedial actions to site-specific cleanup goals. To ensure that the analytical methodologies are capable of achieving the DQOs, data quality indicators (DQIs) such precision, accuracy, representativeness, comparability, completeness, and sensitivity will be evaluated. Quantitative measurement performance criteria have been set for the analytical data in terms of accuracy, precision, and completeness. Calculations for determining these quantitative DQIs are presented in the TA LQAM.

Tables 3-1, 3-2, and 3-3 present chemical parameters and analytical methods to be utilized during the Phase IV RI. Table 3-1, 3-2, and 3-3 provide an evaluation of analytical sensitivity with regards to chemical-specific ARARs and TBC risk-based criteria. Table 3-4 presents the precision and accuracy requirements established for each parameter that potentially will be analyzed. The laboratory will be required to meet or surpass specific quantitative QA objectives for soil set forth in NELAP, DOD-ELAP and DOD-QSM objectives.

The QA objectives of accuracy, precision, completeness, representativeness and comparability, and sensitivity are defined as follows:

3.3.1 Precision

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

3.3.2 Accuracy

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

3.3.3 Comparability

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

3.3.4 Completeness

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

3.3.5 Representativeness

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

3.3.6 Sensitivity

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

3.4 Internal Quality Control

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

Table 3-1. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Solid Matrices			
Parameter	**RL**	**MDL**	**DQL[1]**
	Test America, Inc.		
Volatile Organic Compounds (VOCs) (µg/kg) – TCL	**Extraction Method:** SW5035		
	Determinative Method: SW8260B – Low Level		
1,1,1-Trichloroethane	5	0.49	910,000[2]
1,1,2,2-Tetrachloroethane	5	0.72	560
1,1,2-Trichloroethane	5	0.83	1,100
1,1-Dichloroethane	5	0.58	3,300
1,1-Dichloroethene	5	0.85	24,000[2]
1,2-Dibromo-3-chloropropane	5	0.75	5.4
1,2-Dibromoethane	5	0.61	**3.4**
1,2-Dichlorobenzene	5	0.80	190,000[2]
1,2-Dichloroethane	5	0.96	430
1,2-Dichloropropane	5	0.54	890
1,3-Dichlorobenzene	5	0.66	NS
1,3-Dichloropropane	5	0.77	160,000[2]
1,4-Dichlorobenzene	5	0.64	2,400
2-Butanone	5	0.88	2,800,000[2]
2-Chlorotoluene	5	0.65	160,000
2-Hexanone	5	0.57	21,000[2]
4-Chlorotoluene	5	0.85	550,000[2]
4-Methyl-2-pentanone	5	0.65	530,000[2]
Acetone	20	1.8	6,100,000[2]
Benzene	5	0.68	1,100
Bromoform	5	0.44	61,000
Bromomethane	5	0.74	730[2]
Carbon disulfide	5	0.51	82,000[2]
Carbon tetrachloride	5	0.45	610
Chlorobenzene	5	0.76	29,000[2]
Chlorodibromomethane	5	0.71	680
Chloroethane	5	1.5	1,500,000[2]
Chloroform	5	0.58	290
Chloromethane	5	0.85	120,000
cis-1,2-Dichloroethene	5	0.70	78,000[2]
cis-1,3-Dichloropropene	5	0.68	NS
Dibromochloromethane	5	0.71	680
Ethylbenzene	5	0.64	5,400
Isopropylbenzene	5	0.68	210,000[2]
Methyl tert-butyl ether	5	0.75	43,000
Methylene chloride	5	0.67	11,000
m-Xylene & p-Xylene	10	1.5	340,000[2]
o-Xylene	5	0.78	380,000[2]
Styrene	5	0.53	630,000[2]

Table 3-1. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Solid Matrices			
Parameter	**RL**	**MDL**	**DQL[1]**
	Test America, Inc.		
Tetrachloroethene	5	0.68	550
Toluene	5	0.73	500,000[2]
trans-1,2-Dichloroethene	5	0.60	15,000[2]
trans-1,3-Dichloropropene	5	0.60	NS
Trichloroethene	5	0.66	2,800
Trichlorofluoromethane	5	0.92	79,000[2]
Vinyl chloride	5	0.47	60
Xylenes (total)	15	2.2	63,000[2]
Semivolatile Organic Compounds (SVOCs) (µg/kg) – TCL	**Extraction Method**: SW3540C		
	Determinative Method: SW8270C		
1,2,4-Trichlorobenzene	330	18	22,000
1,2-Dichlorobenzene	330	35	190,000[2]
1,3-Dichlorobenzene	330	26	NS
1,4-Dichlorobenzene	330	24	2,400
2,4,5-Trichlorophenol	330	36	610,000[2]
2,4,6-Trichlorophenol	330	50	44,000
2,4-Dichlorophenol	67	6.7	18,000[2]
2,4-Dimethylphenol	330	52	120,000[2]
2,4-Dinitrophenol	1700	397	12,000[2]
2,4-Dinitrotoluene	330	27	1,600
2,6-Dinitrotoluene	330	34	6,100[2]
2-Chloronaphthalene	67	7.0	NS
2-Chlorophenol	330	27	39,000[2]
2-Methylnaphthalene	67	6.0	NS
2-Methylphenol	330	23	310,000[2]
2-Nitroaniline	1,700	149	61,000[2]
2-Nitrophenol	330	37	NS
3,3'-Dichlorobenzidine	330	35	1,100
3-Nitroaniline	1,700	137	NS
4,6-Dinitro-2-methylphenol	1,700	134	**490[2]**
4-Bromophenyl phenyl ether	330	29	NS
4-Chloro-3-methylphenol	330	31	610,000[2]
4-Chloroaniline	330	27	2,400
4-Chlorophenyl phenyl ether	330	37	NS
4-Methylphenol	330	33	NS
4-Nitroaniline	1700	135	24,000
4-Nitrophenol	1700	114	NS
Acenaphthene	67	6.4	340,000[2]
Acenaphthylene	67	7.6	NS
Benzo(a)anthracene	67	8.4	1,700,000[2]
Benzo(a)pyrene	67	6.7	**15**
Benzo(b)fluoranthene	67	10	150

Table 3-1. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Solid Matrices			
Parameter	**RL**	**MDL**	**DQL[1]**
	Test America, Inc.		
Benzo(ghi)perylene	67	6.6	NS
Benzo(k)fluoranthene	67	13	1,500
bis(2-Chloroethoxy)methane	330	22	18,000[2]
bis(2-Chloroethyl) ether	67	9.0	210
bis(2-Chloroisopropyl) ether	67	7.2	4,600
bis(2-Ethylhexyl) phthalate	670	54	35,000
Butyl benzyl phthalate	330	46	260,000
Carbazole	67	6.1	NS
Chrysene	67	7.9	15,000
Dibenz(a,h)anthracene	67	7.4	**15**
Dibenzofuran	330	32	7,800[2]
Diethyl phthalate	330	36	4,900,000[2]
Dimethyl phthalate	330	36	NS
Di-n-butyl phthalate	330	42	610,000[2]
Di-n-octyl phthalate	330	35	NS
Fluoranthene	67	7.1	230,000[2]
Fluorene	67	8.8	230,000[2]
Hexachlorobenzene	67	7.1	300
Hexachlorobutadiene	67	7.5	6,200
Hexachlorocyclopentadiene	330	36	37,000[2]
Hexachloroethane	330	24	35,000
Indeno(1,2,3-cd)pyrene	67	6.9	150
Isophorone	330	25	510,000
Naphthalene	67	5.8	3,600
Nitrobenzene	670	28	4,800
N-Nitrosodi-n-propylamine	67	7.8	69
N-Nitrosodiphenylamine	330	31	99,000
Pentachlorophenol	330	30	3,000
Phenanthrene	67	11	NS
Phenol	67	7.9	1,800,000[2]
Pyrene	67	6.7	170,000[2]
Metals (mg/kg) – TAL	**Digestion Method:** SW3050B		
	Determinative Methods: SW6020A/7471A		
Aluminum	7.5	1.1	7,700[2]
Antimony	0.5	0.16	3.1[2]
Arsenic	1.0	0.20	**0.39**
Barium	2.0	0.06	1,500[2]
Beryllium	0.1	0.01	16[2]
Boron	10	3.3	1,600[2]
Cadmium	0.06	0.01	NS
Calcium	60	2.5	NS
Chromium	1.9	0.30	NS
Cobalt	0.2	0.04	2.3[2]

Table 3-1. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Solid Matrices			
Parameter	**RL**	**MDL**	**DQL[1]**
	Test America, Inc.		
Copper	1.0	0.05	310[2]
Iron	12	3.3	5,500[2]
Lead	0.30	0.03	400
Lithium	1	0.08	16[2]
Magnesium	50	0.73	NS
Manganese	0.5	0.05	180[2]
Mercury	0.04	0.01	0.56[2]
Molybdenum	0.5	0.08	39[2]
Nickel	0.5	0.08	150[2]
Potassium	10	1.1	NS
Selenium	0.50	0.04	39[2]
Silver	0.2	0.01	39[2]
Sodium	25	4.1	NS
Thallium	0.45	0.06	NS
Vanadium	1.0	0.74	39[2]
Zinc	2.0	1.3	2,300[2]
Hexavalent Chromium (µg/kg)	**Preparatory Method:** SW3060A		
	Determinative Method: SW7196A		
Chromium, hexavalent	0.4	0.11	**0.29**
Polychlorinated Biphenyls (PCBs) (µg/kg)	**Extraction Method**: SW3540C		
	Determinative Method: SW8082		
Aroclor 1016	16.67	2.5	390[2]
Aroclor 1221	16.67	3.2	140
Aroclor 1232	16.67	2.9	140
Aroclor 1242	16.67	2.7	220
Aroclor 1248	16.67	1.6	220
Aroclor 1254	16.67	2.4	220
Aroclor 1260	16.67	2.4	220
Explosives (µg/kg)	**Extraction Method**: SW3540C		
	Determinative Method: SW8330B		
1,3,5-Trinitrobenzene	250	27	220,000[2]
1,3-Dinitrobenzene	250	35	610[2]
2,4,6-Trinitrotoluene (TNT)	250	36	19,000
2,4-Dinitrotoluene	250	33	1,600
2,6-Dinitrotoluene	250	53	6,100[2]
2-Amino-4,6-Dinitrotoluene	250	43	15,000[2]
2-Nitrotoluene	250	55	2,900
3-Nitrotoluene	250	43	610[2]
4-Amino-2,6-Dinitrotoluene	300	93	15,000[2]
4-Nitrotoluene	250	34	30,000
HMX	250	39	380,000[2]
Nitrobenzene	250	43	4,800[2]

Table 3-1. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Solid Matrices

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
RDX	250	28	5,500
Tetryl	250	27	24,000[2]

[1] DQL based on USEPA Residential Soil Screening Levels (USEPA, 2010) unless otherwise specified
[2] DQL based on 1/10th non-carcinogenic value from USEPA Residential Soil Screening Levels (USEPA, 2010)
RL Reporting Limit
MDL Method Detection Limit
DQL Data Quality Limit
NS None specified
Bold RL>DQL

Table 3-2. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Aqueous Matrices

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
Volatile Organic Compounds (VOCs) (µg/L) – TCL	**Extraction Method:** SW3540C		
	Determinative Method: SW8260B – Low Level		
1,1,1-Trichloroethane	5	1.0	910[2]
1,1,1,2-Tetrachloroethane	5	0.68	**0.52**
1,1,2,2-Tetrachloroethane	5	0.93	**0.067**
1,1,2-Trichloroethane	5	1.2	**0.24**
1,1-Dichloroethane	5	1.0	**2.4**
1,1-Dichloroethene	5	1.1	5.0[3]
1,2-Dibromo-3-chloropropane	5	0.35	**0.00034**
1,2-Dibromoethane	5	0.61	**0.0065**
1,2-Dichlorobenzene	5	0.68	37[2]
1,2-Dichloroethane	5	0.96	**0.15**
1,2-Dichloropropane	5	1.3	**0.39**
1,3-Dichlorobenzene	5	0.51	3.0[3]
1,3-Dichloropropane	5	0.86	73[2]
1,4-Dichlorobenzene	5	0.53	**0.43**
2-Butanone	5	1.01	710[2]
2-Chlorotoluene	5	0.65	73[2]
2-Hexanone	5	0.57	**4.7[2]**
4-Chlorotoluene	5	0.85	260[2]
4-Methyl-2-pentanone	5	0.59	200[2]
Acetone	20	1.7	2,200[2]
Benzene	5	0.99	**0.41**
Bromoform	5	1.1	8.5
Bromomethane	5	1.6	**0.87[2]**
Carbon disulfide	5	1.1	100[2]
Carbon tetrachloride	5	1.1	**0.44**
Chlorobenzene	5	0.53	9.1[2]
Chloroethane	5	0.75	2,100[2]
Chloroform	5	1.1	**0.19**
Chloromethane	5	1.4	19[2]
cis-1,2-Dichloroethene	5	0.67	37[2]
cis-1,3-Dichloropropene	5	0.73	NS
Dibromochloromethane	5	0.65	**0.15**
Ethylbenzene	5	0.62	**1.5**
Isopropylbenzene	5	0.53	68[2]
Methyl tert-butyl ether	5	1.0	140[2]
Methylene chloride	5	1.1	12
m-Xylene & p-Xylene	10	1.23	120[2]
o-Xylene	5	0.73	120[2]

Table 3-2. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Aqueous Matrices

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
Styrene	5	0.64	160[2]
Tetrachloroethene	5	0.83	**0.11**
Toluene	5	0.85	230[2]
trans-1,2-Dichloroethene	5	0.75	11[2]
trans-1,3-Dichloropropene	5	0.58	NS
Trichloroethene	5	0.80	**2**
Trichlorofluoromethane	5	1.1	130[2]
Vinyl chloride	5	1.3	**0.016**
Xylenes (total)	15	2.0	120[2]
Semivolatile Organic Compounds (SVOCs) (µg/L) – TCL	**Extraction Method:** SW3540C **Determinative Method:** SW8270C		
1,2,4-Trichlorobenzene	10	0.71	**2.3**
1,2-Dichlorobenzene	10	0.75	37[2]
1,3-Dichlorobenzene	10	0.74	NS
1,4-Dichlorobenzene	10	0.74	**0.43**
2,4,5-Trichlorophenol	10	1.5	370[2]
2,4,6-Trichlorophenol	10	1.7	**6.1**
2,4-Dichlorophenol	2	0.33	11[2]
2,4-Dimethylphenol	10	0.85	73[2]
2,4-Dinitrophenol	50	6.1	**7.3[2]**
2,4-Dinitrotoluene	10	0.54	**0.22**
2,6-Dinitrotoluene	10	1.7	**3.7[2]**
2-Chloronaphthalene	2	0.33	290[2]
2-Chlorophenol	10	0.85	18[2]
2-Methlynaphthalene	2	0.12	15[2]
2-Methylphenol	10	0.86	180[2]
2-Nitroaniline	50	3.5	**37[2]**
2-Nitrophenol	10	1.7	NS
3,3-Dichlorobenzidine	10	1.1	**0.15**
3-Nitroaniline	50	3.2	NS
4,6-Dinitro-2-methyl phenol	50	2.2	**0.29[2]**
4-Bromophenyl-phenylether	10	0.64	NS
4-Chloro-3-methylphenol	10	0.75	370[2]
4-Chloroaniline	10	0.88	**0.34**
4-Chlorophenyl phenyl ether	10	0.50	NS
4-Methylphenol	10	0.90	NS
4-Nitroaniline	50	1.7	**3.4**
4-Nitrophenol	50	6.0	NS
Acenaphthene	2	0.14	220[2]
Acenaphthylene	2	0.15	NS

Table 3-2. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Aqueous Matrices

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
Anthracene	2	0.15	1,100[2]
Benzo(a)anthracene	2	0.15	**0.029**
Benzo(a)pyrene	2	0.13	**0.0029**
Benzo(b)flouranthene	2	0.16	**0.029**
Benzo(g,h,i)perylene	2	0.15	NS
Benzo(k)flouranthene	2	0.55	**0.29**
Benzyl butyl phthalate	10	1.4	35
Bis(2-chloroethoxy) methane	10	0.58	11[2]
Bis(2-chloroethyl) ether	2	0.25	**0.012**
Bis(2-chloroisopropyl) ether	2	0.20	**0.32**
Bis(2-ethylhexyl) phthalate	20	8.0	**4.8**
Carbazole	2	0.16	NS
Chrysene	2	0.14	2.9
Dibenz(a,h)anthracene	2	0.16	**0.0029**
Dibenzofuran	10	0.62	**3.7[2]**
Diethyl phthalate	10	1.5	2,900[2]
Dimethyl phthalate	10	0.76	NS
Di-n-butyl phthalate	10	1.2	370[2]
Di-n-octyl phthalate	10	2.1	NS
Flouranthene	2	0.16	150[2]
Flourene	2	0.22	150[2]
Hexachlorobenzene	2	0.18	**0.042**
Hexachlorobutadiene	2	0.17	**0.86**
Hexachlorocyclopentadiene	10	0.52	22[3]
Hexachloroethane	10	0.63	4.8[3]
Ideno(1,2,3-c,d)pyrene	2	0.20	**0.029**
Isophorone	10	0.64	71
Naphthalene	2	0.14	**0.14**
n-Nitroso-di-n-propylamine	2	0.31	**0.0096**
n-Nitrosodiphenylamine	10	0.85	14
Pentachlorophenol	10	0.66	**0.56**
Phenanthrene	2	0.43	NS
Phenol	2	0.58	1,100[2]
Pyrene	2	0.16	110[2]
Metals (µg/L) – TAL	**Digestion Method:** SW3010A		
	Determinative Methods: SW6020A/7470		
Aluminum	30	4.5	3,700[2]
Antimony	5	1.1	**1.5[2]**
Arsenic	**10**	**0.95**	**0.045**
Barium	2	0.20	730[2]
Beryllium	0.5	0.11	7.3[2]

Table 3-2. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Aqueous Matrices

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
Boron	54	7.5	730[2]
Cadmium	0.5	0.06	1.8[2]
Calcium	100	49	NS
Chromium	10	3.3	5,500[2]
Cobalt	2	0.22	**1.1[2]**
Copper	3	0.10	150[2]
Iron	50	20	2,600[2]
Lead	3	0.17	NS
Lithium	5	0.67	7.3[2]
Magnesium	50	1.7	NS
Manganese	2	0.23	88[2]
Mercury	0.2	0.05	**0.057[2]**
Molybdenum	5	0.22	18[2]
Nickel	5	0.23	73[2]
Potassium	100	8.3	NS
Selenium	5	0.31	18[2]
Silver	2	0.04	18[2]
Sodium	50	5.3	NS
Thallium	2.00	0.55	NS
Vanadium	10	2.4	**0.26[2]**
Zinc	12	3.7	1,100[2]
Polychlorinated Biphenyls (PCBs) (µg/L)	**Extraction Method:** SW3540C **Determinative Method:** SW8082		
Aroclor 1016	0.4	0.10	0.96
Aroclor 1221	0.4	0.10	**0.0068**
Aroclor 1232	0.4	0.12	**0.0068**
Aroclor 1242	0.4	0.07	**0.034**
Aroclor 1248	0.4	0.09	**0.034**
Aroclor 1254	0.4	0.09	**0.034**
Aroclor 1260	0.4	0.05	**0.034**
Explosives (µg/L)	**Extraction Method:** SW3540C **Determinative Method:** SW8330		
1,3,5-Trinitrobenzene	0.20	0.06	110[2]
1,3-Dinitrobenzene	0.20	0.09	0.37[2]
2,4,6-Trinitrotoluene (TNT)	0.25	0.08	2.2
2,4-Dinitrotoluene	0.25	0.08	**0.22**
2,6-Dinitrotoluene	0.40	0.13	3.7[2]
2-Amino-4,6-Dinitrotoluene	0.30	0.10	7.3[2]
2-Nitrotoluene	0.5	0.10	**0.31**
3-Nitrotoluene	0.50	0.12	**0.37[2]**
4-Amino-2,6-Dinitrotoluene	0.40	0.12	7.3[2]

Table 3-2. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Aqueous Matrices

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
4-Nitrotoluene	0.5	0.10	4.2
HMX	0.35	0.11	180[2]
Nitrobenzene	0.25	0.08	**0.12**
RDX	0.30	0.09	0.61
Tetryl	0.25	0.06	15[2]

[1] DQL based on USEPA Regional Tapwater Screening Levels (USEPA, 2010) unless otherwise specified
[2] DQL based on 1/10th non-carcinogenic value from USEPA Regional Tapwater Screening Levels (USEPA, 2010)
[3] DQL based on NYSDEC Groundwater TOGS Value
RL Reporting Limit
MDL Method Detection Limit
DQL Data Quality Limit
NS None specified
Bold RL>DQL
Shaded MDL>DQL

Table 3-3. Analyte Parameters, Reporting Limits and Data Quality Limits Specific to Investigative Derived Waste Samples

Parameter	RL Test America, Inc.	DQL[1]
TCLP VOCs (mg/L)	**Preparatory Method: SW1311** **Determinative Method: 8260B**	
Benzene	0.05	0.5
2-Butanone	0.05	200
Carbon tetrachloride	0.05	0.5
Chlorobenzene	0.05	100
Chloroform	0.05	6
1,2-Dichloroethane	0.05	0.5
1,1-Dichloroethene	0.05	0.7
Tetrachloroethene	0.05	0.7
Trichloroethene	0.05	0.5
Vinyl chloride	0.05	0.2
TCLP SVOCs (mg/L)	**Preparatory Method: SW1311** **Determinative Method: 8270C**	
Cresols (total)	0.05	200
1,4-Dichlorobenzene	0.01	7.5
2,4-Dinitrotoluene	0.05	0.13
Hexachlorobenzene	0.01	0.13
Hexachlorobutadiene	0.01	0.5
Hexachloroethane	0.05	3
Nitrobenzene	0.01	2
Pentachlorophenol	0.05	100
Pyridine	0.05	5
2,4,5-Trichlorophenol	0.05	400
2,4,6-Trichlorophenol	0.05	2
TCLP Pesticides (mg/L)	**Preparatory Method: SW1311** **Determinative Method: 8081A**	
Lindane	0.0005	0.4
Chlordane (technical)	0.005	0.03
Endrin	0.0005	0.02
Heptachlor	0.0005	0.008
Heptachlor epoxide	0.0005	0.008
Methoxychlor	0.001	10
Toxaphene	0.02	0.5
TCLP Metals (mg/L)	**Preparatory Method: SW1311** **Determinative Method: 6020A**	
Arsenic	0.05	5
Barium	0.2	100

Table 3-3. Analyte Parameters, Reporting Limits and Data Quality Limits Specific to Investigative Derived Waste Samples

Parameter	RL	DQL[1]
	Test America, Inc.	
Cadmium	0.05	1
Chromium	0.05	5
Lead	0.05	5
Mercury	0.0002	0.2
Selenium	0.05	1
Silver	0.05	5
Radiological Parameters (pCi/g)*		
Gross Alpha/Beta	10	NS
Gamma Spec	10	11
Radium 226	1.0	3.5/0.7
Radium 228	NS	3.2/2.6
Isotopic Uranium	0.1	13/8/14
Isotopic Thorium	0.1	4.7/1.8/1.1
Isotopic Plutonium	0.1	2.5/2.3
Strontium 90	3	NS
Resource Conservation and Recovery Act (RCRA) Characteristics		
Ignitability	Flashpoint <60°C	Flashpoint <60°C
Corrosivity	pH 0.5 – 14.0	pH<2.0 or >12.5
Sulfide (mg/kg)	30	500
Cyanide (mg/kg)	0.5	160

1 DQL based on TCLP standards (SW-846 Chapter 7, Table 7-1) and RCRA characteristics of hazardous waste.
* Reporting limits will vary depending upon matrix interferences and the signal-to-noise ratio for each congener.
RL Reporting Limit
DQL Data Quality Limit
NS None Specified

Table 3-4. TA Laboratory Data Quality Objectives: Precision and Accuracy

Spike Analyte	CAS #	Type of Spike	Precision Control Limits Relative Percent Difference		Accuracy Control Limits Percent Recovery			
			Liquids (MS/MSD)	Solids (MS/MSD)	Liquids LCL	Liquids UCL	Solids LCL	Solids UCL
Volatile Organic Compounds (SW-846 Method 8260B)								
1,1,1-Trichloroethane	71-55-6	LCS/MS	30	30	65	130	70	135
1,1,1,2-Tetrachloroethane	630-20-6	LCS/MS	30	30	80	130	75	125
1,1,2,2-Tetrachloroethane	79-34-5	LCS/MS	30	30	65	130	55	130
1,1,2-Trichloroethane	79-00-5	LCS/MS	30	30	75	125	60	125
1,1-Dichloroethane	75-34-3	LCS/MS	30	47	70	135	75	125
1,1-Dichloroethene	75-35-4	LCS/MS	30	30	70	130	65	135
1,2-Dibromo-3-chloropropane	96-12-8	LCS/MS	30	30	50	130	40	135
1,2-Dibromoethane	106-93-4	LCS/MS	30	30	80	120	70	125
1,2-Dichlorobenzene	95-50-1	LCS/MS	30	30	70	120	75	120
1,2-Dichloroethane	107-06-2	LCS/MS	30	43	70	130	70	135
1,2-Dichloropropane	78-87-5	LCS/MS	30	30	75	125	70	120
1,3-Dichlorobenzene	541-73-1	LCS/MS	30	30	75	125	70	125
1,3-Dichloropropane	541-73-1	LCS/MS	30	30	75	125	75	125
1,4-Dichlorobenzene	142-28-9	LCS/MS	30	30	75	125	70	125
2-Butanone	78-93-3	LCS/MS	30	30	30	150	30	160
2-Chlorotoluene	95-49-8	LCS/MS	30	30	75	125	70	130
2-Hexanone	591-78-6	LCS/MS	30	31	55	130	45	145
4-Chlorotoluene	106-43-4	LCS/MS	30	30	75	130	75	125
4-Methyl-2-pentanone	108-10-1	LCS/MS	30	30	60	135	45	145
Acetone	67-64-1	LCS/MS	30	30	40	140	20	160
Benzene	71-43-2	LCS/MS	30	30	80	120	75	125
Bromoform	75-25-2	LCS/MS	30	30	70	130	55	135
Bromomethane	74-83-9	LCS/MS	30	30	30	145	30	160
Carbon disulfide	75-15-0	LCS/MS	30	36	35	160	45	160

Table 3-4. TA Laboratory Data Quality Objectives: Precision and Accuracy

Spike Analyte	CAS #	Type of Spike	Precision Control Limits Relative Percent Difference		Accuracy Control Limits Percent Recovery			
			Liquids (MS/MSD)	Solids (MS/MSD)	Liquids LCL	Liquids UCL	Solids LCL	Solids UCL
Carbon tetrachloride	56-23-5	LCS/MS	30	30	65	140	65	135
Chlorobenzene	108-90-7	LCS/MS	30	30	80	120	75	125
Chlorodibromomethane	124-48-1	LCS/MS	30	30	60	135	65	130
Chloroethane	75-00-3	LCS/MS	30	30	60	135	40	155
Chloroform	67-66-3	LCS/MS	30	30	65	135	70	125
Chloromethane	74-87-3	LCS/MS	30	30	40	125	50	130
cis-1,2-Dichloroethene	156-59-2	LCS/MS	30	30	70	125	65	125
cis-1,3-Dichloropropene	10061-01-5	LCS/MS	30	40	70	130	70	125
Dichlorobromomethane	75-27-4	LCS/MS	30	30	75	120	70	130
Dichlorodifluoromethane	75-71-8	LCS/MS	30	30	30	155	35	135
Ethylbenzene	100-41-4	LCS/MS	30	30	75	125	75	125
Isopropylbenzene	98-82-8	LCS/MS	30	30	75	125	75	130
Methyl tert-butyl ether	1634-04-4	LCS/MS	50	NS	65	125	NS	NS
Methylene chloride	75-09-2	LCS/MS	30	30	55	140	55	140
m-Xylene & p-Xylene	108-38-3/106-42-3	LCS/MS	30	30	75	130	80	125
Styrene	100-42-5	LCS/MS	30	30	65	135	75	125
Tetrachloroethene	127-18-4	LCS/MS	30	30	45	150	65	140
Toluene	108-88-3	LCS/MS	30	30	75	120	70	125
trans-1,2-Dichloroethene	156-60-5	LCS/MS	30	30	60	140	65	135
trans-1,3-Dichloropropene	10061-02-6	LCS/MS	30	30	55	140	65	125
Trichloroethene	79-01-6	LCS/MS	30	30	70	125	75	125
Trichlorofluoromethane	75-69-4	LCS/MS	30	30	60	145	25	185
Vinyl chloride	75-01-4	LCS/MS	30	30	50	145	60	125
Xylenes (total)	NS	LCS/MS	30	30	75	130	75	125

Table 3-4. TA Laboratory Data Quality Objectives: Precision and Accuracy

Spike Analyte	CAS #	Type of Spike	Precision Control Limits Relative Percent Difference		Accuracy Control Limits Percent Recovery			
			Liquids (MS/MSD)	Solids (MS/MSD)	Liquids LCL	Liquids UCL	Solids LCL	Solids UCL
Semivolatile Organic Compounds (SW-846 Method 8270C)								
1,2,4-Trichlorobenzene	120-82-1	LCS/MS	30	30	35	105	45	110
1,2-Dichlorobenzene	95-50-1	LCS/MS	30	30	35	100	45	95
1,3-Dichlorobenzene	541-73-1	LCS/MS	30	30	30	100	40	100
1,4-Dichlorobenzene	106-46-7	LCS/MS	30	30	30	100	35	105
2,4,5-Trichlorophenol	95-95-4	LCS/MS	30	30	50	110	50	110
2,4,6-Trichlorophenol	88-06-2	LCS/MS	30	30	50	115	45	110
2,4-Dichlorophenol	120-83-2	LCS/MS	30	30	50	105	45	110
2,4-Dimethylphenol	105-67-9	LCS/MS	30	30	30	110	30	105
2,4-Dinitrophenol	51-28-5	LCS/MS	30	30	15	140	15	130
2,4-Dinitrotoluene	121-14-2	LCS/MS	30	30	50	120	50	115
2,6-Dinitrotoluene	606-20-2	LCS/MS	30	30	50	115	50	110
2-Chloronaphthalene	91-58-7	LCS/MS	30	30	50	105	45	105
2-Chlorophenol	95-57-8	LCS/MS	30	30	35	105	45	105
2-Methlynaphthalene	91-57-6	LCS/MS	30	30	45	105	45	105
2-Methylphenol	95-48-7	LCS/MS	30	30	40	110	40	105
2-Nitroaniline	88-74-4	LCS/MS	30	30	50	115	45	120
2-Nitrophenol	88-75-5	LCS/MS	30	30	40	115	40	110
3,3-Dichlorobenzidine	91-94-1	LCS/MS	30	30	20	110	10	130
3-Nitroaniline	99-09-2	LCS/MS	30	30	20	125	25	110
4,6-Dinitro-2-methyl phenol	534-52-1	LCS/MS	30	30	40	130	30	135
4-Bromophenyl-phenylether	101-55-3	LCS/MS	30	30	50	115	45	115
4-Chloro-3-methylphenol	59-50-7	LCS/MS	30	30	45	110	45	115
4-Chloroaniline	106-47-8	LCS/MS	30	30	15	110	10	95
4-Chlorophenyl phenyl ether	7005-72-3	LCS/MS	30	30	50	110	45	110

Table 3-4. TA Laboratory Data Quality Objectives: Precision and Accuracy

Spike Analyte	CAS #	Type of Spike	Precision Control Limits Relative Percent Difference		Accuracy Control Limits Percent Recovery			
			Liquids (MS/MSD)	Solids (MS/MSD)	Liquids LCL	Liquids UCL	Solids LCL	Solids UCL
4-Methylphenol	8001-28-3	LCS/MS	30	30	30	110	40	105
4-Nitroaniline	100-01-6	LCS/MS	30	30	35	120	35	115
4-Nitrophenol	100-02-7	LCS/MS	30	30	10	125	15	140
Acenaphthene	83-32-9	LCS/MS	30	30	45	110	45	110
Acenaphthylene	208-96-8	LCS/MS	30	30	50	105	45	105
Anthracene	120-12-7	LCS/MS	30	30	55	110	55	105
Benzo(a)anthracene	56-55-3	LCS/MS	30	30	55	110	50	110
Benzo(a)pyrene	50-32-8	LCS/MS	30	30	55	110	50	110
Benzo(b)flouranthene	205-99-2	LCS/MS	30	30	45	120	45	115
Benzo(g,h,i)perylene	191-24-2	LCS/MS	30	30	40	125	40	125
Benzo(k)flouranthene	207-08-9	LCS/MS	30	30	45	125	45	125
Benzyl butyl phthalate	85-68-7	LCS/MS	30	30	45	115	50	125
Bis(2-chloroethoxy) methane	111-91-1	LCS/MS	30	30	45	105	45	110
Bis(2-chloroethyl) ether	111-44-4	LCS/MS	30	30	35	110	40	105
Bis(2-chloroisopropyl) ether	108-60-1	LCS/MS	30	30	25	130	20	115
Bis(2-ethylhexyl) phthalate	117-81-7	LCS/MS	30	30	40	125	45	125
Carbazole	86-74-8	LCS/MS	30	30	50	115	45	115
Chrysene	218-01-9	LCS/MS	30	30	55	110	55	110
Dibenz(a,h)anthracene	53-70-3	LCS/MS	30	30	40	125	40	125
Dibenzofuran	132-64-9	LCS/MS	30	30	55	105	50	105
Diethyl phthalate	84-66-2	LCS/MS	30	30	40	120	50	115
Dimethyl phthalate	131-11-3	LCS/MS	30	30	25	125	50	110
Di-n-butyl phthalate	84-74-2	LCS/MS	30	30	55	115	55	110
Di-n-octyl phthalate	117-84-0	LCS/MS	30	30	35	135	40	130
Flouranthene	206-44-0	LCS/MS	30	30	55	115	55	115
Flourene	86-73-7	LCS/MS	30	30	50	110	50	110

Table 3-4. TA Laboratory Data Quality Objectives: Precision and Accuracy

Spike Analyte	CAS #	Type of Spike	Precision Control Limits Relative Percent Difference		Accuracy Control Limits Percent Recovery			
			Liquids (MS/MSD)	Solids (MS/MSD)	Liquids LCL	Liquids UCL	Solids LCL	Solids UCL
Hexachlorobenzene	118-74-1	LCS/MS	30	30	50	110	45	120
Hexachlorobutadiene	87-68-3	LCS/MS	30	30	25	105	40	115
Hexachlorocyclopentadiene	77-47-4	LCS/MS	30	30	15	150	26	105
Hexachloroethane	67-72-1	LCS/MS	30	30	30	95	35	110
Ideno(1,2,3-c,d)pyrene	193-39-5	LCS/MS	30	30	45	125	40	120
Isophorone	78-59-1	LCS/MS	30	30	50	110	45	110
Naphthalene	91-20-3	LCS/MS	30	30	40	100	40	105
n-Nitroso-di-n-propylamine	621-64-7	LCS/MS	30	30	35	130	40	115
n-Nitrosodiphenylamine	86-30-6	LCS/MS	30	30	50	110	50	115
Pentachlorophenol	87-86-5	LCS/MS	30	30	40	115	25	120
Phenanthrene	85-01-8	LCS/MS	30	30	50	115	50	110
Phenol	108-95-2	LCS/MS	30	30	10	115	40	100
Pyrene	129-00-0	LCS/MS	30	30	50	130	45	125
Explosives by High Pressure Liquid Chromatography (HPLC) (SW-846 Method 8330B)								
1,3,5-Trinitrobenzene	99-35-4	LCS/MS	30	30	65	140	75	125
1,3-Dinitrobenzene	99-65-0	LCS/MS	30	30	45	160	80	125
2,4,6-Trinitrotoluene (TNT)	118-96-7	LCS/MS	30	30	50	145	55	140
2,4-Dinitrotoluene	121-14-2	LCS/MS	30	30	60	135	80	125
2,6-Dinitrotoluene	606-20-2	LCS/MS	30	30	60	135	80	120
2-Amino-4,6-Dinitrotoluene	35572-78-2	LCS/MS	30	30	50	155	80	125
2-Nitrotoluene	88-72-2	LCS/MS	30	30	45	135	80	125
3-Nitrotoluene	99-08-1	LCS/MS	30	30	50	130	75	120
4-Amino-2,6-Dinitrotoluene	19406-51-0	LCS/MS	30	30	55	155	80	125
4-Nitrotoluene	99-99-0	LCS/MS	30	30	50	130	75	125
HMX	2691-41-0	LCS/MS	30	30	80	115	75	125

Table 3-4. TA Laboratory Data Quality Objectives: Precision and Accuracy

Spike Analyte	CAS #	Type of Spike	Precision Control Limits Relative Percent Difference		Accuracy Control Limits Percent Recovery			
			Liquids (MS/MSD)	Solids (MS/MSD)	Liquids LCL	Liquids UCL	Solids LCL	Solids UCL
Nitrobenzene	98-95-3	LCS/MS	30	30	50	140	75	125
RDX	121-82-4	LCS/MS	30	30	50	160	70	135
Tetryl	479-45-8	LCS/MS	30	30	20	175	10	150
PCBs (SW-846 Method 8082)								
Aroclor 1016	12674-11-2	LCS/MS	30	30	25	145	40	140
Aroclor 1221	11104-28-2	LCS/MS	NS	NS	NS	NS	NS	NS
Aroclor 1232	11141-16-5	LCS/MS	NS	NS	NS	NS	NS	NS
Aroclor 1242	53469-21-9	LCS/MS	NS	NS	NS	NS	NS	NS
Aroclor 1248	12672-29-6	LCS/MS	NS	NS	NS	NS	NS	NS
Aroclor 1254	11097-69-1	LCS/MS	NS	NS	NS	NS	NS	NS
Aroclor 1260	11096-82-5	LCS/MS	30	30	30	145	60	130
Metals (SW-846 Method 6020A/7470/7471)								
Aluminum	7429-90-5	LCS/MS	20	20	80	120	80	120
Antimony	7440-36-0	LCS/MS	20	20	80	120	80	120
Arsenic	7440-38-2	LCS/MS	20	20	80	120	80	120
Barium	7440-39-3	LCS/MS	20	20	80	120	80	120
Beryllium	7440-41-7	LCS/MS	20	20	80	120	80	120
Boron	7440-42-8	LCS/MS	20	20	80	120	80	120
Cadmium	7440-43-9	LCS/MS	20	20	80	120	80	120
Calcium	7440-70-2	LCS/MS	20	20	80	120	80	120
Chromium	7440-47-3	LCS/MS	20	20	80	120	80	120
Cobalt	7440-48-4	LCS/MS	20	20	80	120	80	120
Copper	7440-50-8	LCS/MS	20	20	80	120	80	120
Iron	7439-89-6	LCS/MS	20	20	80	120	80	120
Lead	7439-92-1	LCS/MS	20	20	80	120	80	120

Table 3-4. TA Laboratory Data Quality Objectives: Precision and Accuracy

Spike Analyte	CAS #	Type of Spike	Precision Control Limits Relative Percent Difference		Accuracy Control Limits Percent Recovery			
			Liquids (MS/MSD)	Solids (MS/MSD)	Liquids LCL	Liquids UCL	Solids LCL	Solids UCL
Lithium	7439-93-2	LCS/MS	20	20	80	120	80	120
Magnesium	7439-95-4	LCS/MS	20	20	80	120	80	120
Manganese	7439-96-5	LCS/MS	20	20	80	120	80	120
Mercury	7439-97-6	LCS/MS	20	20	80	120	80	120
Molybdenum	7439-98-7	LCS/MS	20	20	80	120	80	120
Nickel	7440-02-0	LCS/MS	20	20	80	120	80	120
Potassium	7440-09-7	LCS/MS	20	20	80	120	80	120
Selenium	7782-49-2	LCS/MS	20	20	80	120	80	120
Silver	7440-22-4	LCS/MS	20	20	80	120	80	120
Sodium	7440-23-5	LCS/MS	20	20	80	120	80	120
Thallium	7440-28-0	LCS/MS	20	20	80	120	80	120
Vanadium	7440-62-2	LCS/MS	20	20	80	120	80	120
Zinc	7440-66-6	LCS/MS	20	20	80	120	80	120
Inorganics (SW-846 Method 7196)								
Chromium, hexavalent	18540-29-9	LCS/MS	NA	30	NA	NA	85	115
Radiological Parameters (SW-846 Method 9310M; DOE Method GA-01-R/ A-01-R)								
Gross Alpha	12587-46-1	LCS	NA	40	NA	NA	43	123
Gross Beta	12587-47-42	LCS	NA	40	NA	NA	55	125
Radium 226	13982-63-3	LCS	NA	40	NA	NA	79	110
Radium 228	15262-20-1	LCS	NA	NS	NA	NA	NS	NS
Plutonium 238	13981-16-3	LCS	NA	40	NA	NA	75	110
Plutonium 239/40	15117-48-3/ 14119-33-6	LCS	NA	40	NA	NA	82	113
Strontium 90	10098-97-2	LCS	NA	NS	NA	NA	NS	NS

Table 3-4. TA Laboratory Data Quality Objectives: Precision and Accuracy

Spike Analyte	CAS #	Type of Spike	Precision Control Limits Relative Percent Difference		Accuracy Control Limits Percent Recovery			
			Liquids (MS/MSD)	Solids (MS/MSD)	Liquids LCL	Liquids UCL	Solids LCL	Solids UCL
Thorium 228	14274-82-9	LCS	NA	40	NA	NA	70	130
Thorium 230	14269-63-7	LCS	NA	40	NA	NA	76	115
Thorium 232	7440-29-1	LCS	NA	40	NA	NA	70	130
Uranium 234	13966-29-5	LCS	NA	40	NA	NA	70	130

CAS #	Chemical Abstracts Service Number
MS/MSD	Matrix Spike/Matrix Spike Duplicate
LCL	Lower Control Limit
UCL	Upper Control Limit
LCS	Laboratory Control Sample
NS	None Specified
NA	Not Applicable

Table 3-5. Sample Containers, Preservations and Holding Times

Sample Matrix	Analytical Parameter	Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2]
Solid	VOCs (TCL)	SW-846 Method 8260B	DI Water/ 4ºC (2 vials); Methanol/4ºC (1 vial)	2 days to prep; 14 days to analysis	3 vial TerraCore kit
Solid	SVOCs (TCL)	SW-846 Method 8270C	Cool to 4º C	14 days to extraction; 40 days from extraction to analysis	(1) 8-oz glass jar
Solid	PCBs	SW-846 Method 8082	Cool to 4º C	14 days to extraction; 40 days from extraction to analysis	
Solid	Metals (TAL)	SW-846 Method 6020A	Cool to 4º C	180 days	
Solid	Cr+6	SW-846 Method 7196	Cool to 4º C	24 hours	(1) 4 oz glass jar w/ teflon lid
Solid	Explosives	SW-846 Method 8330	Cool to 4º C	14 days to extraction;40 days from extraction to analysis	(1) 30g glass jar
Aqueous	VOCs (TCL)	SW-846 Method 8260B	pH<2 with HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) 40mL VOA vials
Aqueous	SVOCs (TCL)	SW-846 Method 8270C	Cool to 4º C	7 days to extraction; 40 days from extraction to analysis	(2) 1L amber glass bottles
Aqueous	PCBs	SW-846 Method 8082	Cool to 4º C	7 days to extraction; 40 days from extraction to analysis	(1) 1L amber glass bottle
Aqueous	Metals (TAL)	SW-846 Method 6020A	pH<2 with HNO_3; Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 500mL polyethylene bottle
Aqueous	Explosives	SW-846 Method 8330	Cool to 4º C	7 days to extraction; 40 days from extraction to analysis	(1) 1L amber glass bottle
IDW	TCLP VOC (RCRA)	SW 846 Methods 1311/8260B	Cool to 4º C; no headspace	14 days to TCLP extraction; 14 days from extraction to analysis	(1) 60 ml VOC vial
IDW	TCLP SVOC (RCRA)	SW 846 Methods 1311/ 8270C	Cool to 4º C	14 days to TCLP extraction; 40 days from extraction to analysis	(1) 950 mL amber glass jar

Table 3-5. Sample Containers, Preservations and Holding Times

Sample Matrix	Analytical Parameter	Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2]
IDW	TCLP Pesticides (RCRA)	SW-846 Methods 1311/8081A	Cool to 4º C	7 days to TCLP extraction; 40 days from extraction to analysis	(1) 950 mL amber glass jar
IDW	TCLP Metals (RCRA)	SW 846 Methods 1311/ 6010B/7000 Series	Cool to 4º C	Hg: 28 days to TCLP extraction; 28 days from extraction to analysis Other Metals: 6 months to TCLP extraction; 6 months from TCLP extraction to analysis	(1) 500 mL plastic jar
IDW	Flashpoint	SW-846 Method 1010	Cool to 4ºC	None	(1) 100 mL polyethylene container
IDW	Ignitability	SW-846 Method 1010/1030	Cool to 4º C	None specified	(1) 500 mL amber glass jar
IDW	Corrosivity	SW-846 Method 9045C	Cool to 4º C	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
IDW	Reactive cyanide	SW-846 Chapter 7, Section 7.3.3	Cool to 4º C; no headspace	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
IDW	Gross Alpha/Beta	SW-846 Method 9310m	Cool to 4º C ; HNO_3 to pH <2	48 hours to extraction 6 months from extraction to analysis	1000 mL polyethylene container
IDW	Gamma Spec – Co-60, Zn-65, Cs-137, CS-134	DOE HASL 300 Ga-01-Rm	Cool to 4º C; HNO_3 to pH <2	21 day ingrowth period prior to extraction and 6 months from extraction to analysis	(1) 1000 mL polyethylene container
IDW	Isotopic Uranium	DOE HASL 300 A-01-Rm	Cool to 4º C; HNO_3 to pH <2	6 months	(1) 1000 mL polyethylene container
IDW	Isotopic Thorium	DOE HASL 300 A-01-Rm	Cool to 4º C; HNO_3 to pH <2	6 months	(1) 1000 mL polyethylene container

Table 3-5. Sample Containers, Preservations and Holding Times

Sample Matrix	Analytical Parameter	Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2]
IDW	Isotopic Plutonium	DOE HASL 300 A-01-Rm	Cool to 4º C; HNO_3 to pH <2	6 months	(1) 1000 mL polyethylene container
IDW	Radium-226	DOE HASL 300 Ra-06-RC	Cool to 4º C; HNO_3 to pH <2	6 months	(1) 1000 mL polyethylene container
IDW	Strontium-90	DOE HASL 300 Sr-03-RC	Cool to 4º C; HNO_3 to pH <2	6 months	(1) 1000 mL polyethylene container

4.0 PREVENTATIVE MEASURES AND CALIBRATION PROCEDURES

4.1 Field Instruments

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

4.2 Laboratory Instruments

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

4.3 Laboratory QC Procedures

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) is hereby replaced in its entirety by the following.

Laboratory QC procedures are summarized in the following and detailed in the project-specific LQAM (Appendix B). In order to ensure the accuracy and precision of laboratory sample analysis, TA adheres to strict Standard Operating Procedures (SOPs) detailing QC procedures. Internal factors are associated with sample preparation and analysis, and are monitored by the use of internal QC samples. External factors are associated with the sample collection, and are monitored by field QC samples. Quality control procedures detailed in the LQAM are consistent with the DOD QSM for Environmental Laboratories (DOD, 2009).

4.3.1 Laboratory QC Samples

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

4.3.2 Field QC Samples

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

5.0 LABORATORY OPERATIONAL RECORDS

5.1 Sample Management Records

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

5.2 Data Reporting

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

5.3 Electronic Data Deliverable

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

5.4 Staged Electronic Data Deliverable

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

6.0 CORRECTIVE ACTION

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

7.0 DATA REDUCTION, VALIDATION, AND REPORTING

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

7.1 Data Evaluation/Validation

7.1.1 Field Data Evaluation

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

7.1.2 Analytical Data Validation

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) is hereby replaced in its entirety by the following.

ERT will be responsible for performing an independent validation of the analytical data. MCGI, Inc has been contracted by ERT to perform the independent validation of all analytical data. Project-specific procedures will be used to validate analytical laboratory data. The basis for the validation will be the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review (October 1999) and the USEPA CLP National Functional Guidelines for Inorganic Data Review (July 2002), modified to accommodate the criteria in the analytical methods used in this program, and Region II SOPs for data validation, including:

- VOCs - USEPA Region II SOP HW-24, Revision 2, August 2008: Validating Volatile Organic Compounds by SW-846 Method 8260B (USEPA, 2008)
- SVOCs - USEPA Region II SOP No. HW-22, Revision 4, August 2009: Validating Semivolatile Organic Compounds by SW846 Method 8270 (USEPA, 2009)
- Metals - USEPA Region II SOP No. HW-2, Revision 13, September 2006, Evaluation of Metals Data for the CLP Program (USEPA, 2006b)
- Explosives - USEPA Region II SOP No. HW-16, Revision 2, September 2006: Nitroaromatics and Nitroamines by HPLC (USEPA, 2006c)
- PCB - USEPA Region II SOP No. HW-45, Revision 1, October 2006: Data Validation SOP of Organic Analysis of PCBs by Gas Chromatography SW-846 Method 8082A (USEPA, 2006d)

Tables 3-1, 3-2, 3-3, 3-4 and 3-5 highlight the QC criteria and holding time requirements for all analyses conducted under this program. These criteria will be used to evaluate and qualify the data during validation.

MCGI will validate all soil samples collected for characterizing the subsurface and/or delineating impacted areas to ensure that verifiable data are used to support decision-making and endpoint documentation. Samples collected for waste classification or New York State discharge parameters will not be validated. Validation will include all technical holding times, as well as QC sample results (blanks, surrogate spikes, laboratory duplicates, MS/MSDs, and LCSs), tunes, internal standards, calibrations, target compound identification, and results calculations.

The overall completeness of the data package will also be evaluated by the data validator. Completeness checks will be administered on all data to determine whether full data deliverables were provided. The reviewer will determine whether all required items are present and request copies of missing deliverables.

Upon completion of the validation, a report will be prepared summarizing the samples reviewed, elements reviewed, any nonconformance with the established criteria, and validation actions, including data qualifiers. Data qualifiers will be consistent with USEPA National Functional Guidelines. This hard copy data report and validated electronic data deliverable with validated qualifiers, will include sample ID, analyte, result, qualifier, QC data and analytical method, and made available for inclusion into the established project sample database.

7.2 Identification and Treatment of Outliers

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

7.3 DQO Reconciliation

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

7.4 Project Completeness

This section of the original Phase IV RI QAPP Addendum (USACE/ERT, 2009) has not been amended.

8.0 REFERENCES

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APPENDIX A
TA DOD-ELAP Certification

APPENDIX B
TA Quality Assurance Manual

APENNDIX C
Manufacturers' Operating Manuals for Field Equipment