Final
Quality Assurance Project Plan Addendum
for
Occidental Chemical Corporation Property and Wastewater Treatment Plant Data Gap 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 2011

Prepared for

U.S. Army Corps of Engineers
Baltimore District

Contract W912DR-06-D-0002
Delivery Order 0009 Modification 03

Prepared by

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21 August 2011

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Date

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9 July 2011

Peter Li, PhD
Program Manager

Date

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]

19 August 2011

Sandy Staigerwald (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 August 2011

Thomas Bachovchin 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
IDW	Investigation Derived 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

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1.0 INTRODUCTION

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 and Wastewater Treatment Plant Data Gap 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 (June 2010).*

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:

- confirm or deny the presence of low-level PAH constituents in groundwater at the former LOOW wastewater treatment plant (WWTP); and
- identify chemicals of potential concern (COPC), and identify impacted areas associated with historic soil disturbances at the Occidental Chemical Corporation Property (OCCP).

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

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2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Earth Resources Technology, Inc. (ERT) is the primary party responsible for all data collection, analysis and reporting. ERT will be performing these tasks under supervision of the USACE, Baltimore and Buffalo districts. ERT is also responsible for managing all subcontractors including the contract laboratory, and a third-party data validation contractor. ERT will coordinate and manage the RI sampling and analysis program, data reduction, QA/QC, data validation, analysis, and reporting.

2.1 Internal Technical Review

Thomas Bachovchin, who performs ERT's independent technical review (ITR), will insure that the QA/QC plan is implemented and will oversee data validation. Mr. Bachovchin 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

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

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. Veronica Bortot will serve as the laboratory Project Manager and will oversee all analytical activities associated with this project.

2.3.1 Laboratory Project Manager

Functionally, reporting to the Project Chemist shall be the Laboratory Services Project Manager (LSPM). The LSPM, or designee, shall perform a final review of the data to determine if all analytical results of the samples are consistent. Correlation of results for different parameters of a sample is evaluated at this time before the data are presented in a final report to the client. If discrepancies or deficiencies exist in the analytical results, then corrective action is taken. The LSPM shall verify that all environmental samples are analyzed for requested parameters, notify the Project Chemist of any laboratory non-conformances and provide laboratory results to ERT for the inclusion of data in project reports.

2.3.2 Laboratory Quality Assurance Manager

The Laboratory QA Manager shall be responsible for maintaining the laboratory quality system and overseeing the QA aspects of the data. The QA Manager shall develop, coordinate, and implement QA plans and procedures in support of the laboratory's projects. The QA Manager shall also be responsible for monitoring the laboratory's activities for complying with this QAPP's policies and procedures, adhering to the contract scope of work, and implementing corrective actions for any QA/QC deficiencies.

The QA manager works independently of the LSPM and has "stop work" authority over all laboratory analyses. Additionally, the QA Manager will certify that the data is in compliance with the terms and conditions of the ERT contract scope of work, both technically and for completeness as required by the project. The QA Manager will also authorize the release of the data contained in the hardcopy data package and in computer-readable data.

2.3.3 Laboratory Analysts

The laboratory analyst generates the data (i.e., logs in, prepares and/or runs the samples) and is responsible for primary review of those data. The primary review is often referred to as a "bench-level" review. One of the most important aspects of primary review is to make sure that the test instructions are clear, and that all project-specific requirements have been understood and followed. Once the analysis is complete, the primary reviewer ensures that sample preparation information is complete, accurate, and documented; calculations have been performed correctly; quantitation has been performed accurately; qualitative identifications are accurate; client-specific requirements have been followed; method and process standard operation procedures (SOPs) have been followed; method QC criteria have been met; QC samples are within established limits; dilution factors are correctly recorded and applied; nonconformances and/or anomalous data have been properly documented and appropriately communicated; and chain-of-custody procedures have been followed. If the instrument calibration and recoveries of all QC samples are within specified tolerances, then the data are presented for secondary review. If instrument calibration or the recoveries of any QC samples exceed specified tolerances, then affected sample results are evaluated and generally the samples are submitted for reanalysis. Any manual integration that occurs is dated and signed and, if appropriate, noted in the case narrative.

2.4 Data Validation

HSW Engineering, Inc. (HSW) will be performing third party independent data review for all laboratory analyzed samples collected during this investigation, with the exception of those samples collected for characterization of investigation derived waste (IDW).

3.0 QA OBJECTIVES FOR DATA MANAGEMENT

The purpose of the QAPP is to define data quality objectives (DQOs) that ensure the quality and integrity of samples, accuracy and precision of analyses, representativeness, comparability, and completeness of results to meet the project objectives.

DQOs are intended to classify the quality of data and documentation required to provide sound, scientific support to conclusions presented within various phases of data collection. The DQOs are dependent on the data users of the collected data and can also be expressed in terms of objectives for precision, accuracy, representativeness, completeness, and comparability.

3.1 DQO Process

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 one water body on the undeveloped portion of the OCCP. In addition, confirm previously detected groundwater constituents at the former WWTP.

Step 2. "Identify the Goals of the Study" – The results of these investigations will be combined with previously collected data to determine if COPC are present and represent a risk to human health or the environment at the OCCP property, and to facilitate the development of the feasibility study for the former WWTP.

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, surface water, sediment, and, groundwater. 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 OCCP Data Gap and WWTP Data Gap Investigation are confined as follows:

The Occidental Chemical Corporation Data Gap Investigation is intended to identify if previous DOD operations at various locations resulted in potential impacts. The investigation activities are confined to the collection of surface water, sediment, surface soil and subsurface soil samples from four locations previously identified in historical reports and confirmed as locations of interest during recent site reconnaissance conducted by USACE. This data will be combined with previously collected data to complete a site-specific RI for the OCCP.

The WWTP activity is intended to confirm or deny previously observed low-level PAH detections in groundwater identified during the first round of groundwater sampling at the WWTP associated with the Phase IV RI. The activities are confined to the collection of groundwater samples from three existing groundwater monitoring wells. This data combined with previously collected data to will be used to support development of the Feasibility Study for the WWTP.

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 (Section 3.3.1), accuracy (Section 3.3.2), completeness (Section 3.3.4) and sensitivity (Section 3.3.5) 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. 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

Precision is the agreement among a set of replicate measurements without consideration of the "true" or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

The effect of sampling methodology on precision will be assessed through the collection and measurement of field duplicates samples. Field duplicates will be collected at a frequency of one per ten investigative samples per matrix per analytical parameter, with the exception of the Toxicity Characteristic Leaching Procedure (TCLP) parameters and parameters associated with waste characterization/disposal. Precision will be measured through the calculation of relative percent differences (RPDs). The resulting information will be used to assess sampling and analytical variability.

- Field duplicate RPDs must be less than75% for solid and aqueous samples.
- Laboratory duplicate RPDs must be less than 30% for solid samples and less than 30 for aqueous samples if the sample and/or duplicate results are greater than 5x the quantitation limit
- If both solid and aqueous sample and/or duplicate results are less than 5x the quantitation limit, the criterion will be doubled.

- Laboratory RPDs must be less than 20% for metals constituents in aqueous and solid samples.

Additionally, precision in the laboratory will be assessed through the calculation of RPD for duplicate samples. For organic analyses, laboratory precision will be assessed through the analysis of Matrix spike/matrix spike duplicate (MS/MSD) samples and field duplicates. For the inorganic analyses, laboratory precision will be assessed through the analysis of matrix duplicates and field duplicates. MS/MSD samples will be performed at a frequency of one per 20 investigative samples per matrix per parameter. Table 3-4 summarizes the laboratory precision.

3.3.2 Accuracy

Accuracy is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

Accuracy will be ensured through the adherence to all field instrument calibration procedures; sample handling, preservation, and holding time requirements; and through the collection of equipment rinsate blanks prior to the collection of samples for each type of equipment being used (e.g., split spoons, groundwater sampling pumps).

The laboratory will assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards," materials of accepted reference value. Accuracy may vary from analysis to analysis because of individual sample and matrix effects. Laboratory accuracy requirements are presented in Table 3-4. Accuracy within each individual analysis will be measured in terms of blank results, the percent recovery (%R) of surrogate compounds in organic analyses, or %R of spiked compounds in MSs, MSDs and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spike or surrogate compounds.

3.3.3 Comparability

Comparability expresses the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed. Comparability with historic data sets will be attained because the sampling design and field protocols are consistent with those previously used.

Comparability is dependent on the use of recognized EPA or equivalent analytical methods and the reporting of data in standardized units. Laboratory procedures are consistent with those used for previous sampling efforts. Data will be reported in consistent dry weight units for solid samples (i.e., microgram (µg) per kilogram (kg) and/or milligram (mg) per kg, and µg per liter (L) or mg/L for aqueous samples.

3.3.4 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan was implemented as planned.

Completeness is a measure of the amount of valid measurements obtained from all the measurements proposed in the project, The field completeness objective is greater than 90 percent. The laboratory completeness objective is greater than 95 percent.

3.3.5 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which data accurately and precisely represents either a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. To ensure representativeness, the sampling locations have been selected to provide coverage over a wide area and to highlight potential trends in the data.

Representativeness is dependent upon proper design of the sampling plan and ensuring that the Work Plan and QAPP are followed. This will be represented by methodology that includes proper sampling technique, sample management, and sample preservation techniques.

Representativeness in the laboratory is ensured by proper analytical procedure, appropriate methodology, and meeting sample holding times. Sample holding times for each sample media/parameter are presented in Table 3-5.

3.3.6 Sensitivity

Sensitivity is evaluated by comparing the contract laboratory method detection limits (MDLs) or quantitation limits (QLs)/RLs to DQLs, which are reporting limits required to meet the goals of the program [i.e., project remedial goals (PRGs), site cleanup objectives (SCOs), etc.]. For the Phase IV RI, the USEPA Regional SLs represent the required DQLs. Contract requirements for sensitivity should be achievable for the batch QC samples within a reagent water/purified solid matrix (method blanks and LCSs), and compliance should be verified through the data assessment process.

The contracted analytical laboratory will report results down to the MDL, with a "j" flag on all organic and metals analyses in which results are reported below the RL. The "j" flag indicates that due to a reported analyte concentration below the RL, the reported value is assumed to be an estimated value. If groundwater sampling is required, low-level analysis for some analytes may be requested of the analytical laboratory dependent on the COPC(s), in order to increase sensitivity of the analytical method and to achieve a higher percentage of project DQLs.

3.4 Internal Quality Control

The subcontracting laboratory LQAPP (Appendix B) identifies the internal analytical quality control procedures to be used. At a minimum, this includes:

- Matrix spike and/or matrix spike duplicate samples
- Matrix duplicate analyses
- Laboratory control spike samples
- Instrument calibrations

- Instrument tunes for SW-846 8260B and 8270C analyses
- Method and/or instrument blanks
- Surrogate spikes for organic analyses
- Internal standard spikes for SW-846 8260B and 8270C analyses
- Reporting limit determination and confirmation by analysis of low-level calibration standard

Table 3-5 summarizes analytical methods, sample holding times, bottle types, and preservation. Field QC samples will be collected as defined in Table 3-5, and include equipment blanks, field duplicate, trip blanks, QA split samples and MS/MSD samples. The Field Sampling Plan (FSP) provides an explanation for each of these field QC samples as wells as the frequency for which these samples will be collected and analyzed. Documentation of proper internal QC in the field will be recorded on chain of custody (COC) forms.

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	870,000[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	34
1,2-Dichlorobenzene	5	0.80	190,000[2]
1,2-Dichloroethane	5	0.96	430
1,2-Dichloropropane	5	0.54	940
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]
2-Hexanone	5	0.57	21,000[2]
4-Chlorotoluene	5	0.85	160,000[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	62,000
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	12,000 [2]
cis-1,2-Dichloroethene	5	0.70	16,000[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	10	1.5	59,000[2]
p-Xylene	10	1.5	60,000[2]
o-Xylene	5	0.78	69,000[2]

Table 3-1. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Solid Matrices			
Parameter	**RL**	**MDL**	**DQL[1]**
	Test America, Inc.		
Styrene	5	0.53	630,000[2]
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	630,000[2]
2-Chlorophenol	330	27	39,000[2]
2-Methylnaphthalene	67	6.0	31,000[2]
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	150
Benzo(a)pyrene	67	6.7	**15**

Table 3-1. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Solid Matrices			
Parameter	**RL**	**MDL**	**DQL[1]**
	Test America, Inc.		
Benzo(b)fluoranthene	67	10	150
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	890
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	7.0
Calcium	60	2.5	NS

Table 3-1. Analytical Parameters, Reporting Limits and Data Quality Limits Specific to Solid Matrices			
Parameter	**RL**	**MDL**	**DQL[1]**
	Test America, Inc.		
Chromium	1.9	0.30	**0.29[3]**
Cobalt	0.2	0.04	2.3[2]
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	1[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	**0.078[2]**
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

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

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
HMX	250	39	380,000[2]
Nitrobenzene	250	43	4,800[2]
RDX	250	28	5,600
Tetryl	250	27	24,000[2]

[1] *DQL based on USEPA Residential Soil Screening Levels (USEPA, 2011) unless otherwise specified*
[2] *DQL based on 1/10th non-carcinogenic value from USEPA Residential Soil Screening Levels (USEPA, 2011)*
[3] *DQL for hexavalent chromium*
RL *Reporting Limit*
MDL *Method Detection Limit*
DQL *Data Quality Limit*
NS *None specified*
Bold *RL>DQL*
Bold and Shaded *MDL>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	**0.00032**
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	73[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	7.3[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	12[2]
Methylene chloride	5	1.1	**4.8**
m-Xylene	10	1.23	20[2]
p-Xylene	10	1.23	20[2]

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

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
o-Xylene	5	0.73	20[2]
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	20[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]

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

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
Acenaphthylene	2	0.15	NS
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	**0.17**
Phenanthrene	2	0.43	NS
Phenol	2	0.58	1,100[2]
Pyrene	2	0.16	110[2]
Semivolatile Organic Compounds (SVOCs) (µg/L) –PAHs	**Extraction Method:** SW3520C **Determinative Method:** SW8270 – Low Level		
Acenaphthene	0.2	0.0144	220[2]
Acenaphthylene	0.2	0.0152	NS
Anthracene	0.2	0.0154	1,100[2]
Benzo[a]anthracene	0.2	0.0147	**0.029**

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

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
Benzo[a]pyrene	0.2	0.0134	**0.0029**
Benzo[b]fluoranthene	0.2	0.0157	**0.029**
Benzo[g,h,i]perylene	0.2	0.0151	NS
Benzo[k]fluoranthene	0.2	0.0547	0.29
Chrysene	0.2	0.0140	2.9
Dibenz(a,h)anthracene	0.2	0.0155	**0.0029**
Fluoranthene	0.2	0.0162	150[2]
Fluorene	0.2	0.0216	150[2]
Indeno[1,2,3-cd]pyrene	0.2	0.0199	**0.029**
2-Methylnaphthalene	0.2	0.0122	15[2]
Naphthalene	0.2	0.0140	**0.14**
Phenanthrene	0.2	0.0427	NS
Pyrene	0.2	0.0157	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]
Boron	54	7.5	730[2]
Cadmium	0.5	0.06	1.8[2]
Calcium	100	49	NS
Chromium	10	3.3	**0.043[4]**
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	**0.063[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	**0.037[2]**
Vanadium	10	2.4	18[2]
Zinc	12	3.7	1,100[2]

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

Parameter	RL	MDL	DQL[1]
	Test America, Inc.		
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]
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, 2011) unless otherwise specified
[2] DQL based on 1/10th non-carcinogenic value from USEPA Regional Tapwater Screening Levels (USEPA, 2011)
[3] DQL based on NYSDEC Groundwater TOGS Value
[4] DQL for hexavalent chromium
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	DQL[1]
	Test America, Inc.	
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
Semivolatile Organic Compounds (SW-846 Method 8270C)								

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
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
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

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-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
Hexachlorobenzene	118-74-1	LCS/MS	30	30	50	110	45	120
Hexachlorobutadiene	87-68-3	LCS/MS	30	30	25	105	40	115

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
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
Semivolatile Organic Compounds (SW-846 Method 8270C – Low Level)								
Acenaphthene	83-32-9	LCS/MS	30	NA	45	110	NA	NA
Acenaphthylene	208-96-8	LCS/MS	30	NA	50	105	NA	NA
Anthracene	120-12-7	LCS/MS	30	NA	55	110	NA	NA
Benzo[a]anthracene	56-55-3	LCS/MS	30	NA	55	110	NA	NA
Benzo[a]pyrene	50-32-8	LCS/MS	30	NA	55	110	NA	NA
Benzo[b]fluoranthene	205-99-2	LCS/MS	30	NA	45	120	NA	NA
Benzo[g,h,i]perylene	191-24-2	LCS/MS	30	NA	40	125	NA	NA
Benzo[k]fluoranthene	207-08-9	LCS/MS	30	NA	45	125	NA	NA
Chrysene	218-01-9	LCS/MS	30	NA	55	110	NA	NA
Dibenz(a,h)anthracene	53-70-3	LCS/MS	30	NA	40	125	NA	NA
Fluoranthene	206-44-0	LCS/MS	30	NA	55	115	NA	NA
Fluorene	86-73-7	LCS/MS	30	NA	50	110	NA	NA
Indeno[1,2,3-cd]pyrene	193-39-5	LCS/MS	30	NA	45	125	NA	NA

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
2-Methylnaphthalene	91-57-6	LCS/MS	30	NA	45	105	NA	NA
Naphthalene	91-20-3	LCS/MS	30	NA	40	100	NA	NA
Phenanthrene	85-01-8	LCS/MS	30	NA	50	115	NA	NA
Pyrene	129-00-0	LCS/MS	30	NA	50	130	NA	NA
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
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

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
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
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

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
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
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	SVOCs (PAHs)	SW-846 Method 8270CSIM	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

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 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
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

All equipment rented from vendors will be maintained by the vendor. Vendor management is responsible for documenting the maintenance program implemented and upon request, provides applicable preventative maintenance schedules and quality assurance records.

Field instruments will be calibrated according to manufacturers' specifications. Calibration procedures performed will be documented in the field logbook by the field personnel conducting the calibration procedures, and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings. At a minimum, field equipment will be calibrated at the start of each work day or more frequently if required by the manufacturers' instructions. Appendix C includes the manufacturers' operating manuals for anticipated field equipment. Anticipated field equipment includes:

- Bladder Pump (including pump, compressor and controller)
- Grundfos pump (or similar)
- Heron Depth-to-Water Meter (or similar)
- Horiba U-22 (or similar)
- MiniRAE 2000 PID (or similar)
- Photovac 202 PID (or similar)
- ProActive Mini-Monsoon (or similar)
- Proactive SS Monsoon (or similar)
- Radiological Survey Equipment (as detailed in the RSP Addendum (USACE/ERT, 2009).

4.2 Laboratory Instruments

Regular preventative maintenance is performed on all laboratory equipment and field equipment to be used during RI activities. All maintenance is documented by laboratory management responsible for each instrument. Laboratory management is responsible for the preparation and documentation of the established preventative maintenance program. Within each operational group, the established preventative maintenance program includes a list of all instruments and equipment, the maintenance schedule provided by the manufacturer for each instrument, and an inventory of all spare parts maintained by the lab, service contracts and manufactures operating procedures.

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for specific laboratory instrumentation are included in the laboratory's LQAPP provided in Appendix B, which describes the calibration procedures, their frequency,

acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies. The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the reporting limit.

4.3 Laboratory QC Procedures

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, 2010).

4.3.1 Laboratory QC Samples

Method blank samples are used to monitor laboratory contamination. Method blanks consist of laboratory reagent water or solid blank matrix treated with reagents in the same manner as a field sample. One method blank is prepared and analyzed for each batch of field samples. QC requirements state that the method blank must contain less than one half the RL concentration of the particular compound of interest. If the method blank falls outside of these limits, the analysis process will be halted, corrective action taken, and all samples processed with the QC exceedance will be reprocessed and reanalyzed. Laboratory control samples are treated with all target analytes for the particular analysis method. Normally, LCSs are analyzed with each batch of 20 or fewer samples. These samples generally consist of laboratory reagent-grade water fortified with the analytes of interest for single-analyte methods and selected analytes for multi-analyte methods according to the appropriate analytical method. The LCS will contain all target analytes for the method. They are prepared and analyzed with the associated sample batch. The analyte recovery from each is used to monitor analytical accuracy and the standard deviation of the mean recoveries is used to assess precision. DQOs for precision and accuracy are provided in Table 3-4.

4.3.2 Field QC Samples

Field QC samples consist of equipment rinsate blanks, trip blanks, field duplicates and QA split samples. These particular samples are detailed in the FSP and summarized below.

- Equipment rinsate samples monitor the efficiency of field decontamination procedures
- Trip blank samples monitor potential contamination associated with the residence of samples during collection, transport and laboratory management.
- Field duplicate samples monitor the accuracy and precision of field sampling, field analytical technique and laboratory analytical techniques.
- QA split samples assess the precision and comparability of the contracted laboratory to other laboratories.

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5.0 LABORATORY OPERATIONAL RECORDS

5.1 Sample Management Records

All sample management records will be maintained in a laboratory project file and submitted with the laboratory report. The laboratory will retain original raw data, in hard copy and electronic form, in a secure, limited-access area for a minimum of 5 years, under custody of the LSPM. ERT will also maintain these records for a minimum of 5 years.

5.2 Data Reporting

Once a data package has been reviewed by the appropriate personnel, the Reports Generation Group will assemble the final data report by incorporating each data package associated with the reported samples and other related information into a final deliverable. The final deliverable will include all final results, analytical methods used, detection limits, surrogate recovery data, method blank data and QC sample results. Significant figures will be consistent with the limits of uncertainty inherent of a particular analytical method. The final deliverable will be submitted in both hard copy form and as a fully validatable, searchable Acrobat Portable Document Format (PDF) file.

After a QC review of the deliverable, the report will be forwarded to the ERT Technical Manager who will conduct an independent review for completeness and accuracy. Once reviewed, the data will be submitted for data validation.

5.3 Electronic Data Deliverable

In addition to the final PDF file and hard copy deliverable, a basic electronic data deliverable (EDD), such as Microsoft Access or Excel compatible files will be provided. The EDD will at a minimum include for each sample the chemical name, Chemical Abstracts Service (CAS) number, analytical method, sample date, preparation date, analysis date, client sample designation, laboratory sample designation, analytical batching information, results, laboratory qualifier, and units.

EDD will be available for review within 21 days of sample receipt.

5.4 Staged Electronic Data Deliverable

In addition to the basic EDD requirements, deliverables will be submitted in the USEPA Staged Electronic Data Deliverable (SEDD) Stage 2b format. The SEDD is a cooperative effort by USEPA and Federal Agencies to have electronic data submissions standardized. Utilizing the standard formatting, Phase IV RI data will be incorporated into the existing project database which contains data from the Phase I, Phase II and Phase III RI activities. SEDD Stage1 deliverables contain sample results only to the data user. SEDD Stage 2a and 2b deliverables, in addition, include method and QC data, respectively. SEDD Stage 3 deliverables, in addition, include measurement data allowing for independent recalculation of the reported results. SEDD Stage 4 deliverables, in addition, include all raw data files. Analytical data collected for waste/disposal characteristics that may be requested by off-site soil, on-site soil or off-site wastewater disposal facilities will be provided in the format that the particular facility has requested.

The SEDD, an extensible markup language (XML) file, will be uploaded into the ADR compliance-check program (version 8.1), previous utilized for Site data during the Phase III RI. The resulting

data will be separated into two tables, an analytical table and a sample analysis table. The SEDD Stage 2b file and ADR compliance screen for the data will be performed by the laboratory and all non-compliance issues reported in an error log. If corrections to the EDD are made, the corrections will be noted in the file and hard copy report. All non-conformance issues will be resolved as described in Section 7.0. The SEDD Stage 2b will be 100% validated by a third party independent validator and be submitted as suitable for use in the USACE ADR Program.

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6.0 CORRECTIVE ACTION

The entire sampling program will be under the direction of the ERT Technical Task Manager. The emphasis in this program is on preventing problems by identifying potential errors, discrepancies, and gaps in the data-collection-laboratory-analysis-interpretation process. Any problems identified will be promptly resolved. Likewise, follow-up corrective action is always an option in the event that preventative corrective actions are not totally effective.

The acceptance limits for the sampling and analyses to be conducted in this program will be those stated in the method or defined by other means in the Plan. Corrective actions are likely to be immediate in nature and most often will be implemented by the contracted laboratory analyst or the ERT Project Manager. The corrective action will usually involve re-calculation, re-analysis, or re-sampling.

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Plan), or when sampling procedures and/or field analytical procedures require modification, etc., due to unexpected conditions. The field team may identify the need for corrective action. The Technical Task Manager will approve the corrective action and notify the ERT Project Manager. The ERT ITR will provide final approval for the corrective measure. The Technical Task Manager will ensure that the corrective measure is implemented by the field team.

Corrective actions will be implemented and documented in the field record book. Documentation will include:

- A description of the circumstances that initiated the corrective action
- The action taken in response
- The final resolution
- Any necessary approvals

No staff member will initiate corrective action without prior communication of findings through the proper channels.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, omissions or discrepancies with COC documentation, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If nonconformance causes project objectives not to be achieved, the ERT PM will be notified. The ERT Project Manager will in turn contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to the ERT Project Manager. If the corrective action does not rectify the situation, the laboratory will contact the ERT Project Manager, who will determine the action to be taken and inform the appropriate personnel.

If potential problems are not solved as an immediate corrective action, the contractor will apply formalized long-term corrective action, if necessary.

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7.0 DATA REDUCTION, VALIDATION, AND REPORTING

Appropriate QC measures will be used to ensure the generation of reliable, defensible data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in this project. Complete data packages suitable for data validation to support the generation of a SEDD Stage 2b report based on USEPA requirements will be provided by the analytical laboratory.

For all analyses, the laboratory will report results that are between the sample quantitation limit and the method detection limit; these results will be qualified as estimated (J) by the laboratory. The laboratory may be required to report tentatively identified compounds (TICs) for the VOC and SVOC analyses; this will be requested by ERT on an as-needed basis.

Laboratory data collection and data reduction processes are detailed in the GPL LQAPP (Appendix B). The LQAPP provides a detailed description of the calculations for quantitative data quality indicators as defined in Section 3.3 above.

7.1 Data Evaluation/Validation

7.1.1 Field Data Evaluation

Measurements and sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed and dated by the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Daily reviews of the field records by the Field Team Leader will ensure that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.

- Blank space remaining at the end of logbook sheets and individual log sheets are crossed out, initialed and dated.

- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.

- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the Plan, and that any deviations were documented and approved by the appropriate personnel.

7.1.2 Analytical Data Validation

ERT will be responsible for performing an independent validation of the analytical data. HSW Engineering, 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.

HSW 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

Any data point which deviates markedly from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data set. One or both of the following tests will be used to identify outliers.

Dixon's test for extreme observations is an easily computed procedure for determining whether a single very large or very small value is consistent with the remaining data. The one-tailed t-test for difference may also be used in this case. It should be noted that these tests are designed for testing a single value. If more than one outlier is suspected in the same data set, other statistical sources may be consulted and the most appropriate test of hypothesis will be used and documented, if warranted.

Since an outlier may result from unique circumstances at the time of sample analysis or data collection, those persons involved in the analysis and data reduction will be consulted. This may provide an experimental reason for the outlier. Further statistical analysis may be performed with and without the outlier to determine its effect on the conclusions.

In summary, every effort will be made to include the outlying values in the reported data. If the value is rejected, it will be identified as an outlier, reported with its data set and its omission noted.

7.3 DQO Reconciliation

Once validated, the data will be assessed by the project chemist to determine whether they meet project objectives. Data quality assessment is a scientific and statistical assessment evaluating if the appropriate type, quantity and quality of data was acquired to support a defensible decision or intended use. Non-compliant results will be reviewed to evaluate data usability.

7.4 Project Completeness

An evaluation of the overall project completeness and of achievement of project objectives will be performed. Quantitative evaluation of percent completeness based upon proposed sample results compared to usable sample results will be conducted. Qualitative evaluations of the acquired data to meet data needs for use in the project decision rules and the overall project objectives will be conducted.

Final assessment of project completeness is the responsibility of the Project Manager.

8.0 REFERENCES

Department of Defense (DOD), 2010. *Department of Defense Quality Systems Manual for Environmental Laboratories, Version 4.2*, June.

New York State Department of Environmental Conservation, 2006. *6 NYCRR Part 375, Environmental Remediation Programs Subparts 375-1 to 375-4 & 375-6*. December.

U.S. Army Corp of Engineers (USACE)/Prepared by ERT, 2009. *Final Quality Assurance Project Plan Addendum for Phase IV Remedial Investigation/Feasibility Studies at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York*. June.

USACE, 2001. *Requirements for the Preparation of Sampling and Analysis Plans (EM 200-1-3).* February.

USACE, 1998. *Chemical Data Quality Managements for Hazardous, Toxic and Radioactive Waste Remedial Activities (EM-1110-1-263).* April.

U.S. Army Corp of Engineers (USACE), 1997. *Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects (EM-200-1-6).* October.

U.S. Environmental Protection Agency (USEPA), 2010. *Regional Screening Levels for Chemical Contaminants at Superfund Sites*. May.

USEPA, 2009. Region II SOP No. HW-22, Revision 2: *Validating Semivolatile Organic Compounds by SW846 Method 8270,* August.

USEPA, 2008. Region II SOP HW-24, Revision 2: *Validating Volatile Organic Compounds by SW-846 Method 8260b,* August.

USEPA, 2006a. *Guidance for the Data Quality Objective Process (EPA QA/G-4),* February.

USEPA, 2006b. Region II SOP No. HW-2, Revision 13: *Evaluation of Metals Data for the CLP Program,* September.

USEPA, 2006c. Region II SOP No. HW-16, Revision 2: *Nitroaromatics and Nitroamines by HPLC*, September

USEPA, 2006d. Region II SOP No. HW45, Revision 1: *Data Validation SOP of Organic Analysis of PCBs by Gas Chromatography SW-846 Method 8082A*, October.

USEPA, 2002. *Guidance for Quality Assurance Project Plans (EPA QA/G-5),* December.

USEPA, 2001. *Requirements for Quality Assurance Project Plans (EPA QA/R-5),* March.

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APPENDIX A
TA DOD-ELAP Certification
(Included on CD)

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CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board/ACLASS
500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Test America - Pittsburgh
301 Alpha Drive
Pittsburgh, PA 15238

has been assessed by ACLASS
and meets the requirements of

DoD-ELAP

while demonstrating technical competence in the field(s) of

TESTING

Refer to the accompanying Scope(s) of Accreditation for information regarding the types of tests to which this accreditation applies.

ADE-1422
Certificate Number

[redacted]

ACLASS Approval

Certificate Valid: 03/12/2010-03/12/2012
Version No. 001

SCOPE OF DoD-ELAP ACCREDITATION

TestAmerica Pittsburgh

301 Alpha Drive, Pittsburgh PA 15238
Nasreen K. DeRubeis Phone: 412-963-7058

TESTING

Valid to: March 12, 2012 Certificate Number: ADE - 1442

I. Environmental

MATRIX	SPECIFIC TEST or ANALYTE GROUP	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water and Solids	Metals	6010B / C	ICP-AES
Water and Solids	Metals	6020 / 6020A	ICP-MS
Water and Solids	Mercury	7470A and 7471A / B	CVAA
Water and Solids	Hexavalent Chromium with Alkaline Digestion	7196A	Spectrophotometer
Water and Solids	Total Cyanide	9012A / B 9010B / C / 9013	
Water and Solids	Anions	9056A	IC
Water and Solids	Oil and Grease	9071B / 9070A EPA 1664A	Gravimetric
Water and Solids	Organochlorine Pesticides	8081A / B	GC
Water and Solids	Organo-Phosphorus Compounds	8141A / B	GC
Water, Solids, and Oil	PCBs	8082 / 8082A	GC
Water and Solids	Chlorinated Herbicides	8151A	GC

MATRIX	SPECIFIC TEST or ANALYTE GROUP	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water and Solids	Volatiles	8260B	GC/MS
Water and Solids	Semi-Volatiles	8270C / D	GC/MS
Water	Total Organic Carbon	9060/9060A	TOC Analyzer
Water	EDB and DBCP	8011	GC
Water and Solids	PAHs	8310	HPLC
Solids	Total Organic Carbon	Lloyd Kahn	TOC Analyzer
Water and Solids	Sulfide	9030B / 9034	Titration
Water	pH	9040B / C	pH Meter
Solids	pH	9045C / D	pH Meter
Water and Solids	Flashpoint	1020B / AST- D3278-96	Setaflash closed tester
Water and Solids	Flashpoint	1010A / AST- D93-08	Pensky-Martens Closed Flash Tester.
Solids	Percent Moisture	SM 2540G	Balance
Water	Acid Digestion	3005A	FLAA / ICP
Water	Acid Digestion	3010A	FLAA / ICP
Solids	Acid Digestion	3050B	
Solids	Alkaline Digestion	3060A	
Water	Purge-and-Trap	5030B	
Solids	Closed-system Purge-and-Trap	5035	
Solids	Waste Dilution	3585	
Solids	Automated Soxhlet Extraction	3541	

MATRIX	SPECIFIC TEST or ANALYTE GROUP	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water	Liquid-Liquid Extraction	3510C	
Water	Continuous Liquid-Liquid Extraction	3520C	
Solids	Ultrasonic Extraction	3550C	
Solids	Waste Dilution	3580A	
Water and Solids	Sulfur Cleanup	3660B	
Water and Solids	Gel Permeation Cleanup	3640A	
Water and Solids	TCLP Toxicity Leaching	1311	

Notes:

1. * *As Applicable*
2. *This scope is part of and must be included with the Certificate of Accreditation No. ADE-1442*

Vice President

CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board/ACLASS
500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045

has been assessed by ACLASS
and meets the requirements of

DoD-ELAP

while demonstrating technical competence in the field(s) of

TESTING

Refer to the accompanying Scope(s) of Accreditation for information regarding the types of tests to which this accreditation applies.

ADE-1430
Certificate Number

[redacted]

ACLASS Approval
Certificate Valid: 01/12/2010-01/12/2012
Version No. 001

ANSI-ASQ National Accreditation Board

SCOPE OF DoD-ELAP ACCREDITATION

TestAmerica St. Louis
13715 Rider Trail North, Earth City, MO 63045
Marti Ward Phone: 314-298-8566

TESTING

Valid to: January 12, 2012 Certificate Number: ADE- 1430

I. Environmental

MATRIX	SPECIFIC TEST or GROUP of ANALYTES	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water/Soil	Volatile Organics	3050B / 5035 / 8260C	GC/MS
Water/Soil	Semi-volatile Organics	3510C / 3550C / 8270D	GC/MS
Water/Soil	PCBs	3510C / 3550C / 3540C/8082A	GC
Water/Soil	Organochlorine Pesticides	3520C / 3550C / 8081B	GC
Water/Soil	Nitroaromatics	3535A / 3550C / 8330A	HPLC
Water/Soil	Nitroaromatics	3535A / 3550C / 8321	LC/MS/MS
Water/Soil	Herbicides	8151A	GC
Water/Soil	PAH	3510C / 3550C / 8310	HPLC
Water/Soil	DRO/~~GRO~~	3510C / 3550C / 8015	GC
Water/Soil	Perchlorates	6850	LC/MS/MS
Water/Soil	Organic Cleanups	3620C / 3660B	-
Water/Soil	Metals	3010 / 3050 / 6010C	ICP
Water/Soil	Metals	3010 / 3050 / 6020A	ICPMS

MATRIX	SPECIFIC TEST or GROUP of ANALYTES	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water/Soil	Mercury	7470A / 7471B	CVAA
Water/Soil	Cyanide	9010C / 9012B	TRAACs
Water/Soil	Anions (Cl,NO2, NO3, F, SO4, I, Br, OPO4)	300.0 / 9056A	Ion Chromatography
Water/Soil	Perchlorates	314.1	Ion Chromatography
Water	Solids	2540B / 2540C / 2540D	Gravimetric
Water/Soil	pH	9040C / 9045D	Probe
Water/Soil	Alkalinity	SM 2320B	Titration
Water/Soil	Sulfide	9030B / 9034	Titration
Water/Soil	Ignitability	1010A	Closed Cup
Water/Soil	Gross alpha/beta	900.0 / 9310	GFPC
Water/Soil	Radium-226	903.0 / 9315	GFPC
Water/Soil	Radium-228	904.0 / 9320	GFPC
Water/Soil	Strontium-90 & Total Strontium	905.0	GFPC
Water/Soil	Tritium	906.0	Liquid Scintillation Counter
Water/Soil	TC-99	Eichrom Technologies TCW01 / TCS01	Liquid Scintillation Counter
Water/Soil	Carbon-14	EERF C-01-C14	Liquid Scintillation Counter
Water/Soil	Gamma Emmitters	901.1 / HASL300 GA-01-R	Gamma Spec

MATRIX	SPECIFIC TEST or GROUP of ANALYTES	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water/Soil	Isotopic Uranium / Thorium / Americium / Neptunium / Plutonium / Curium	HASL300 / A-01-R	Alpha Spec
Water/Soil	Lead-210	Eichrom Technologies OTW01, OTS01	Liquid Scintillation Counter
Water/Soil	Polonium-210	Laboratory SOP	Alpha Spec
Water/Soil	Ra-226	Laboratory SOP	Alpha Spec
Water/Soil	Iron-55	Eichrom Technologies FEW01	Liquid Scintillation Counter
Water/Soil	Nickel-59/63	DOE RP-300	Liquid Scintillation Counter
Water/Soil	Additional Prep	TCLP (1311), SPLP (1312), California Wet	-

Notes:

1. ** = As Applicable*
2. *This scope is part of and must be included with the Certificate of Accreditation No. ADE-1430*

[redacted]

Vice President

APPENDIX B
TA Quality Assurance Manual
(Included on CD)

This document is a confidential company document and is unable to be released.

APPENDIX C
Manufacturers' Operating Manuals for Field Equipment
(Included on CD)

This document is a confidential company document and is unable to be released.