General Electric Company
Pittsfield, Massachusetts

Field Sampling Plan/ Quality Assurance Project Plan

Volume I of III

Originally submitted September 2000
Revised March 2007

Sign-Off Page

Prior to conducting field activities, all personnel involved in work activities subject to this Field Sampling Plan (FSP)/Quality Assurance Project Plan (QAPP) must provide verification by signing below, that they have read and understand the relevant requirements as detailed in this document. After signing, copies of this page shall be sent to the appropriate GE Project Manager and the Overall QA/QC Coordinator.

Name (Print)	**Signature**	**Relevant Sections**	**Date**

Distribution List
Revision #: 04
Date: March 30, 2007

Field Sampling Plan/ Quality Assurance Project Plan

for

General Electric Company
Pittsfield, Massachusetts

APPROVALS:

Dean Tagliaferro/Project Coordinator (EPA) — Date

Susan Steenstrup/Project Coordinator (MDEP) — Date

Andrew T. Silfer/Project Coordinator (GE) — 3/30/07 Date

James M. Nuss or
Stuart D. Messur/Supervising Contractor (ARCADIS BBL) — 3/30/07 Date

Dennis K. Capria/Overall QA/QC Coordinator (ARCADIS BBL) — 3/30/07 Date

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Note:

This title and approval sheet has been prepared in accordance with Section 3.2.1 of the document titled *EPA Requirements for Quality Assurance Project Plan.*

FSP/QAPP Distribution List		
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Note:

1. The above distribution list has been prepared in accordance with Section 3.2.3 of the document titled *EPA Requirements for Quality Assurance Project Plan.*

EPA-NE QAPP Compendium Crosswalk
Project Management and Objectives Elements

EPA QA/R5	Corresponding EPA-NE QAPP Section	Required EPA-NE Elements & Required Information (Numbers in Parenthesis Indicate Worksheet #s Associated with Elements & Required Information	Present (Y/N)	Location of Element in Submitted Document (Section #, Table #, Figure #, etc.)	Comment
A1	1.0	Title & Approval Page	Y	Cover/Approvals	
A2	2.1	Table of Contents	Y	Table of Contents	
	2.2	Document Control Format	Y	Cover and Every Page	
	2.3	Document Control Numbering System	N		Not Applicable
	2.4	EPA-NE QAPP Worksheet #2	N		Not Applicable
A3	3.0	Distribution List (3)	Y	FSP/QAPP Distribution List	
		Project Personnel Sign-off Sheet (4)	Y	Sign-Off Page	
A4 & A8	4.0	Project Organization	Y	Section 2.2	
	4.1	Project Organization Chart(s) (5a)	Y	Figure 2 and Table 2.1	
	4.2	Communication Pathways (5b)	Y	Figure 2	
	4.2.1	Modifications to Approved QAPP	Y	Section 1.2	
	4.3	Personnel Responsibilities & Qualifications Table (6)	Y	Table 2.1 and Figure 2	
		Resumes	N		Not Applicable
	4.4	Special Training Requirements Table (7)	Y	Section 2.3	Requirements presented in Section 2.3, but not in tabular form
A5	5.0	Project Planning/Project Definition	N		See Project-Specific Work Plans
	5.1	Project Planning Meetings	N		Not Applicable
		Project Scoping Meeting Attendance (8)	N		Not Applicable

EPA-NE QAPP Compendium Crosswalk
Project Management and Objectives Elements

EPA QA/R5	Corresponding EPA-NE QAPP Section	Required EPA-NE Elements & Required Information (Numbers in Parenthesis Indicate Worksheet #s Associated with Elements & Required Information	Present (Y/N)	Location of Element in Submitted Document (Section #, Table #, Figure #, etc.)	Comment
A5 (cont'd)	5.2	Problem Definition/Site History & Background (8b)	Y	Section 1.1	Also see Project-Specific Work Plans
		Site Maps (historical & present)	Y	Figure 1	Also see Project-Specific Work Plans
		EPA-NE DQO Summary Form	NA		Not included in Compendium
A6	6.0	Project Description and Schedule	N		See Project-Specific Work Plans
	6.1	Project Overview	Y	Section 1.1	Also see Project-Specific Work Plans
		Project Description (9a)	NA	Section 1.1	Not included in Compendium
		Contaminants of Concern & Other Target Analytes Table (9b)	Y	Table 2 (General) and Table 3	Also see Project-Specific Work Plans
		Field & Quality Control Sample Summary Table (9c)	Y	Table 4	
		Analytical Services Table (9d)	Y	Table 1 and Figure 2	
		System Designs (e.g., Treatment Systems)	N		See Project-Specific Work Plans
	6.2	Project Schedule Timeline Table (10)	N		See Project-Specific Work Plans
A7	7.0	Project Quality Objectives & Measurements Performance Criteria	Y	Sections 5, 7.3, and 7.4	Also see Project-Specific Work Plans
	7.1	Project Quality Objectives	Y	Section 5.2 and Section 7.6	Also see Project-Specific Work Plans
	7.2	Measurement Performance Criteria Table (11)	Y	Section 5.2 and Table 4	Also see Project-Specific Work Plans

EPA-NE QAPP Compendium Crosswalk
Project Management and Objectives Elements

EPA QA/R5	Corresponding EPA-NE QAPP Section	Required EPA-NE Elements & Required Information (Numbers in Parenthesis Indicate Worksheet #s Associated with Elements & Required Information	Present (Y/N)	Location of Element in Submitted Document (Section #, Table #, Figure #, etc.)	Comment
B1	8.0	Sampling Process Design	N		See Project-Specific Work Plans
	8.1	Sampling Design Rationale (12a)	N		See Project-Specific Work Plans
		Sampling Locations, Sample & Analysis Method/SOP Requirements Table (12b)	N		See Project-Specific Work Plans
		Sampling Location Maps	N		See Project-Specific Work Plans
B2, B6, B7	9.0	Sampling Procedures & Requirements	Y	Section 3	Also see Project-Specific Work Plans
	9.1	Sampling Procedures	Y	Section 3.1	
		Sampling SOPs (as attachments to QAPP)	Y	Appendices A through LL	
		Project Sampling SOP Reference Table (13)	Y	Section 3.1 and Table 1	
	9.2	Sampling SOP Modifications	Y	Section 1.2	
	9.3	Cleaning & Decontamination of Equip/Sample Containers	Y	Section 3.2	
		Cleaning & Decontamination SOPs	Y	Appendix W	
	9.4	Field Equipment Calibration	Y	Section 3.5 and Appendix O	
		Field Sampling Equipment Calibration Table (14)	Y	Appendix O	Requirements presented in Appendix O, but not in tabular form
	9.5	Field Equipment Maintenance, Testing & Inspection Requirements	Y	Section 3.5 and Appendix O	
		Field Equipment Maintenance, Testing & Inspection Table (15)	Y	Appendix O	Requirements presented in Appendix O, but not in tabular form
	9.6	Inspection & Acceptance Requirements for Supplies/Samples Containers	Y	Section 3.2	

EPA-NE QAPP Compendium Crosswalk
Project Management and Objectives Elements

EPA QA/R5	Corresponding EPA-NE QAPP Section	Required EPA-NE Elements & Required Information (Numbers in Parenthesis Indicate Worksheet #s Associated with Elements & Required Information	Present (Y/N)	Location of Element in Submitted Document (Section #, Table #, Figure #, etc.)	Comment
B3	10.0	Sample Handling, Tracking & Custody Requirements	Y	Section 3.3	
	10.1	Sample Collection Documentation	Y	Section 3.3	
	10.1.1	Field Notes	Y	Section 3.3.1	
	10.1.2	Field Documentation Management System	Y	Section 3.3.1	
	10.2	Sample Handling & Tracking System	Y	Sections 3.3 and 3.6	
		Sample Container, Volume, & Preservation Table	Y	Table 1	
		Sample Handling Flow Diagram (16)	Y	Appendix L	Requirements presented in Appendix L, but not in the form of a flow diagram
		Samples Container Label/Sample Tag	Y	Appendix L	
	10.3	Sample Custody	Y	Section 3.3 and Appendix L	
		Chain of Custody Documentation	Y	Appendix L	
		Sample Handling, Tracking, and Custody SOPs	Y	Appendix L	
B4, B5, B7, B8	11.0	Field Analytical Method Requirements	Y	Section 3.5	
	11.1	Field Analytical Methods & SOPs	Y	Section 3.5	
		Field Analytical Methods & SOPs (as Attachments to QAPP)	Y	Appendices N through Q	
		Field Analytical Methods/SOP Reference Table (17)	Y	Section 3.5	Requirements presented in Section 3.5, but not in tabular form
	11.2	Field Analytical Methods/SOP Modifications	Y	Section 1.2	

EPA-NE QAPP Compendium Crosswalk
Project Management and Objectives Elements

EPA QA/R5	Corresponding EPA-NE QAPP Section	Required EPA-NE Elements & Required Information (Numbers in Parenthesis Indicate Worksheet #s Associated with Elements & Required Information	Present (Y/N)	Location of Element in Submitted Document (Section #, Table #, Figure #, etc.)	Comment
B4, B5, B7, B8 (cont'd)	11.3	Field Analytical Instrument Calibration	Y	Section 3.5 and Appendix O	
		Field Analytical Instrument Calibration Table (18)	Y	Appendix O	Requirements presented in Appendix O, but not in tabular form
	11.4	Field Analytical Instrument/Equipment Maintenance, Testing & Inspection Requirements	Y	Section 3.5 and Appendix O	
		Field Analytical Instrument/Equipment Maintenance, Testing & Inspection Requirements Table (19)	Y	Appendix O	Requirements presented in Appendix O, but not in tabular form
	11.5	Field Analytical Inspection & Acceptance Requirements for Supplies	Y	Section 3.2 and Appendix W	
	12.0	Fixed Lab Analytical Method Requirements	Y	Section 4	
	12.1	Fixed Lab Analytical Methods & SOP (as attachments to QAPP)	Y	Table 1	USEPA and MDEP methodologies are referenced. Laboratory specific SOPs are maintained by the laboratories.
		Fixed Lab Analytical Methods/SOP Reference Table (20)	Y	Table 1	
	12.2	Fixed Lab Analytical Methods and SOP Modifications	Y	Section 1.2	
	12.3	Fixed Lab Instrument Calibration	Y	Section 4.3 and Table 4	
		Fixed Lab Instrument Maintenance & Calibration Table (21)	Y	Table 4	
	12.4	Fixed Lab Instrument/Equipment Maintenance, Testing & Inspection Requirements	Y	Table 4	
	12.5	Fixed Lab Inspection & Acceptance Requirements for Supplies (audits)	Y	Sections 8.2 and 8.3	

EPA-NE QAPP Compendium Crosswalk
Project Management and Objectives Elements

EPA QA/R5	Corresponding EPA-NE QAPP Section	Required EPA-NE Elements & Required Information (Numbers in Parenthesis Indicate Worksheet #s Associated with Elements & Required Information	Present (Y/N)	Location of Element in Submitted Document (Section #, Table #, Figure #, etc.)	Comment
B5	13.0	Quality Control Requirements	Y	Section 4.3 and Table 4	
	13.1	Sampling Quality Control	Y	Section 3.4	
		Field Sampling QC Table (22a), (22b)	Y	Table 4	
	13.2	Analytical Quality Control	Y	Section 4.3	
	13.2.1	Field Analytical QC (23a), (23b)	Y	Section 3.4 and Table 4	
		Field Screening/Confirmatory Analysis Decision Tree (if applicable)	N		Not Applicable
	13.2.2	Field Fixed Laboratory QC (24a), (24b)	Y	Section 4.3, Table 4	
B9	14.0	Data Acquisition Requirements	N		See Project-Specific Work Plans
		Non-Direct Measurements Criteria & Limitations Table (25)	N		See Project-Specific Work Plans
A9, B10	15.0	Documentation, Records & Data Management	Y	Sections 6 and 7	
		Data Management SOPs (as attachments to QAPP)	NA		Not included in Compendium
	15.1	Project Documentation & Records Table (26)	Y	Sections 6 and 7	Requirements presented in Sections 6 and 7, but not in tabular form
	15.2	Field Analysis Data Package Deliverables	Y	Sections 3.6.3 and 6	
	15.3	Fixed Lab Data Package Deliverables	Y	Section 6	
	15.4	Data Reporting Formats	Y	Section 6	
	15.5	Data Handling and Management	Y	Section 7	
	15.6	Data Tracking and Control	Y	Section 7 and Figure 3	

EPA-NE QAPP Compendium Crosswalk

Assessment/Oversight Elements

EPA QA/R5	Corresponding EPA-NE QAPP Section	Required EPA-NE Elements & Required Information (Numbers in parenthesis indicate worksheet #s associated with Elements & Required Information	Present (Y/N)	Location of Element in Submitted Document (Section #, Table #, Figure #, etc.)	Comment
C1	16.0	Planned Assessments and Response Actions (27a)	Y	Section 8	
	16.1	Planned Assessments	Y	Section 8	
		Project Assessment Table (27b)	Y	Section 8	Requirements presented in Section 8, but not in tabular form
		Project Assessment Plan (27c)	NA		Not included in Compendium
		Audit Checklists	N		Refer to Section 8.3.1
	16.2	Assessment Findings & Corrective Action Responses	Y	Section 8.5	
	16.3	Additional QAPP Non-Conformances	Y	Section 8.4	
C2	17.0	Management Reports	Y	Section 7.8 for Reports to Mgmt Section 8 for Audit Reports	
		QA Management Reports Table (28)	Y	See Above	Requirements presented in above-listed sections, but not in tabular form

EPA-NE QAPP Compendium Crosswalk

Data Validation and Usability Elements

EPA QA/R5	Corresponding EPA-NE QAPP Section	Required EPA-NE Elements & Required Information (Numbers in parenthesis indicate worksheet #s associated with Elements & Required Information	Present (Y/N)	Location of Element in Submitted Document (Section #, Table #, Figure #, etc.)	Comment
D1	18.0	Verification & Validation Requirements	Y	Section 7.5	
		Validation Criteria Documents	Y	Validation Annexes A through F	
D2	19.0	Verification & Validation Procedures	Y	Sections 3, 6, & 7 and Figure 3	
		Data Evaluation Process (9a)	NA		Not included in Compendium
		Data Validation Summary Table (29b)	Y	Validation Annexes A through F	Requirements presented in appendices, but not in tabular form
D3	20.0	Data Usability/Reconciliation w/Project Quality Obj.	Y	Section 7	
		Data Usability Assessment (30)	NA		Not included in Compendium

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Appendices

Volume III - Data Validation Procedures and Laboratory Certifications

Validation Annexes

Attachments

1. Introduction

1.1 General

This *Field Sampling Plan/Quality Assurance Project Plan* (FSP/QAPP) contains procedures related to the collection and analysis of soil, sediment, groundwater, surface water, air, and biota samples at the General Electric Company's (GE's) Pittsfield, Massachusetts facility and at other areas at which materials from the GE facility may have come to be located. Specifically, this FSP/QAPP specifies the various procedures that will be followed by GE and its contractors in performing investigation activities pursuant to several regulatory schemes, as described below.

In October 1999, GE, the United States Environmental Protection Agency (USEPA), the Massachusetts Department of Environmental Protection (MDEP), and several other government agencies executed a Consent Decree (CD), pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and other federal and state laws, to govern (among other things) the performance of response actions and natural resource restoration work in several areas that collectively comprise the GE-Pittsfield/Housatonic River Site (Site). As defined in the CD, that site encompasses GE's Pittsfield facility, the Housatonic River downstream of GE's facility, and a number of other adjacent and nearby areas. The areas of the Site, other than the Housatonic River and its floodplain, are depicted on Figure 1. The CD was lodged in the United States District Court for the District of Massachusetts on October 7, 1999, and was entered by the Court on October 27, 2000.

The CD and its accompanying appendices, including a document entitled *Statement of Work for Removal Actions Outside the River* (SOW) (Appendix E to the CD), require GE to submit for USEPA approval an FSP and QAPP to describe the procedures that GE and its contractors will use in conducting sampling and analysis activities at the CD Site and in implementing the CD. The present document presents those plans, which are part of the *Project Operations Plan* (POP) under the CD and the SOW (see Technical Attachment C to the SOW). The procedures described in this document will also apply to any investigations conducted by GE and its contractors in the Reach of the Housatonic River, known as the Rest of River (as defined in the CD), pursuant to a revised permit issued to GE by the USEPA on July 18, 2000, under the Resource Conservation and Recovery Act (RCRA), effective upon entry of the CD (Reissued RCRA Permit).

In addition, this FSP/QAPP establishes the procedures to be followed by GE and its contractors in conducting sampling and analysis activities at areas and properties outside the CD Site that are related to the GE Pittsfield facility and are regulated by MDEP and/or USEPA (the “Agencies”) pursuant to other regulatory authorities. These include the off-site fill properties that are currently regulated under an Administrative Consent Order (ACO) executed by GE and MDEP effective November 13, 2000, pursuant to the Massachusetts Contingency Plan (MCP).

This FSP/QAPP was originally submitted in September 2000 and approved by the USEPA in a letter dated October 17, 2000. Based on GE’s annual review of this document, this FSP/QAPP was updated and re-submitted in January 2002. The USEPA provided conditional approval of the January 2002 revision by letter dated June 19, 2002. The FSP/QAPP was subsequently revised on June 15, 2004, to incorporate a number of clarifications and modifications on which GE and USEPA agreed. The current version of the FSP/QAPP incorporates additional modifications identified since that time, including those requested by USEPA.

Since this document is intended to cover several program areas subject to independent regulatory authority of the Agencies, GE recognizes that each of the Agencies reserves its right in the future to require changes to the procedures/protocols contained herein as they apply to sites under that Agency’s jurisdiction (regardless of whether such changes would apply to the other Agency’s programs).

1.2 Format of Document

This FSP/QAPP identifies the various procedures, protocols, and methodologies to be employed by GE and its contractors during the performance of environmental investigations associated with the CD Site and the off-site areas described above. The purpose for doing so is to ensure that the various investigations are performed consistently to produce a representative characterization of site conditions and to provide a reliable basis for subsequent evaluations and activities.

Given the number of areas that are subject to investigation and the various site-specific characteristics, specific details of each of the activities involved in conducting an environmental investigation at a given site cannot be provided in a single document. As a result, this FSP/QAPP focuses on the general components of the environmental investigations, including sampling and field procedures for each media, laboratory analytical methods, sample handling and documentation procedures, and quality assurance/quality control (QA/QC) procedures. Details concerning the scope of a particular sampling activity (e.g., specific objectives, type, location, rationale, quantity, frequency, depths, constituents to be analyzed for) will be identified in the appropriate project-specific work plans, with references provided (as appropriate) to this plan. These specific proposals are referred to herein as the project-specific work plans.

The remainder of this FSP/QAPP summarizes the procedures to be implemented for several components of environmental investigations. The text of this document provides general information on sampling and analytical procedures, data management and assessment, and QA/QC, while topic-specific Standard Operating Procedures (SOPs) are provided in a series of appendices. These appendices generally pertain to one or more of the following activities:

- Field Sampling Methods;
- Sample Handling, Packing, and Shipping;
- Analytical Procedures; and
- Field and Laboratory QA/QC and Data Validation.

As required by the CD, QA/QC and chain-of-custody (COC) procedures described in this document incorporate the guidelines set forth in USEPA documents entitled *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5, EPA/240/B-01/003) and *Preparing Perfect Project Plans* (EPA/600/9-88/087). As required by USEPA's April 11, 2000 comments, the contents of this FSP/QAPP were developed to meet the substantive requirements (but not the format) of the *Compendium of Quality Assurance Project Plan Requirements and Guidance* (USEPA-New England, October 1999) (Compendium). At the USEPA's request, this document includes, at the beginning, a crosswalk that cross-references the elements of the Compendium with the locations within this FSP/QAPP where such elements are addressed. As indicated in that crosswalk, this FSP/QAPP contains the substantive elements specified in the Compendium. However, a number of the Compendium's procedural and/or format elements are not applicable to this FSP/QAPP given the many areas and different programs covered by this document, the numerous other documents governing response actions at these sites (e.g., the CD, the SOW, the Reissued RCRA Permit, the MDEP ACOs), and the fact that the specific details concerning investigations at these sites are required to be identified in the project-specific work plans, which will be subject to the Agencies' approval.

Note that the procedures described in this FSP/QAPP, particularly as they relate to field investigation protocols, are intended to be general guidelines and may be subject to certain modifications if deemed appropriate or necessary based on site-specific considerations, provided that such modifications do not compromise the integrity of the data. In addition, as additional information relevant to this document is received (e.g., updates to analytical methodologies), this FSP/QAPP will be modified. The FSP/QAPP will also be reviewed on approximately an annual basis to identify components that may require revision. Prior to incorporation, any revisions (if required) will be submitted to the Agencies for approval. Finally, all sampling and field procedures will be conducted in accordance with the requirements of GE's Health and Safety Plan.

2. Project Organization and Responsibilities

2.1 General

This section identifies the various roles and responsibilities associated with the performance of environmental investigations. In general, all investigations will be conducted by or on behalf of GE, with oversight by the Agencies as appropriate. In turn, GE may utilize several contractors to perform the various sampling and analysis activities.

2.2 Project Organization

The general management of the technical and administrative aspects of the sampling and analysis activities will be performed by GE. In addition, as required by the CD, all work conducted by GE under the CD will be performed under the overall supervision and direction of a Supervising Contractor(s). To date, ARCADIS BBL has been identified as the Supervising Contractor for the CD work, but other Supervising Contractors may be identified and proposed to USEPA for particular aspects of the activities as the work progresses. In addition, an Overall QA/QC Coordinator will help the GE Project Managers and Supervising Contractor(s) to ensure that field and laboratory procedures are implemented in accordance with this FSP/QAPP. Direct management and implementation of the specific tasks will be performed by the selected sampling contractor and environmental laboratory. Table 2.1 provides a list of current Project Managers for both GE and several of the contractors and laboratories that may be utilized for each investigation. Figure 2 presents a project team organizational diagram for the current Project Managers associated with implementation of the procedures presented in this FSP/QAPP. If additional contractors and/or laboratories are to be utilized for a specific project, their appropriate Project Managers will be identified in the project-specific work plans.

The individuals listed on Figure 2 will coordinate/direct other individuals within their organization. General descriptions of personnel qualifications, responsibilities of the personnel performing QA/QC-related aspects of the project, and responsibilities of other field staff and laboratory personnel are presented below.

2.3 General Personnel Qualifications

All personnel engaged in on-site activities are required to have proper health and safety training as required by the Occupational Safety & Health Administration (OSHA) Regulation 29 CFR 1910.120 (HAZWOPER). Field employees also must receive a minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their initial HAZWOPER training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the appropriate time frame relative to their duties. The field supervisor must have completed an additional 8 hours of supervisory training and have a current first-aid/CPR certificate. In addition, all personnel who are potentially exposed to site contaminants must participate in a medical surveillance program as defined by OSHA at 29 CFR 1919.120(f). More detailed personnel qualifications for the performance of certain activities are described in the applicable SOPs included in the appendices.

2.4 General Electric Company

Pursuant to the CD, GE has identified a Project Coordinator and Alternate Project Coordinator for the work to be performed under the CD. The responsibilities of these Project Coordinators include the following:

- Overall supervision and direction of all work conducted under the CD, in conjunction with the Supervising Contractor(s); and
- Communications with the Agencies regarding the CD Work, as required by the CD.

In addition, GE has a specific Project Manager for each particular project. The responsibilities and duties of GE's specific Project Manager include the following:

- Define project objectives;
- Assist in coordination of field activities with sampling contractor and laboratory personnel and work with the Overall QA/QC Coordinator (see Table 2.1) to make sure personnel are aware of task objectives and protocols established in this FSP/QAPP;
- Review and analyze task performance with respect to planned requirements and authorizations; and
- Manage the development of work plans and reports prior to their submission to the Agencies.

2.5 Supervising Contractor(s)

For work conducted under the CD, the Supervising Contractor(s) will have the following responsibilities and duties:

- Conduct overall supervision and direction of all work conducted under the CD; and
- Review or supervise the review of all work plans, reports, and other documents to be submitted to USEPA pursuant to the CD and/or the SOW to ensure compliance with applicable requirements of the CD and the SOW, as well as technical soundness.

2.6 Overall QA/QC Coordinator

Responsibilities and duties of the Overall QA/QC Coordinator and his support staff include the following:

- Ensure field/laboratory personnel have reviewed sections of the FSP/QAPP which are pertinent to their activities;
- Coordinate receipt of analytical data from the laboratory and review of laboratory data packages;
- Perform and/or oversee validation of analytical data;
- Coordinate and oversee entry of the analytical data into the pertinent database (in accordance with the procedures described in Section 7.2);
- Perform or coordinate periodic audits of sampling activities;
- Inform GE Project Managers of laboratory or field non-conformance with the FSP/QAPP; and
- Assist in the development/implementation of corrective measures, as necessary.

2.7 Sampling Contractor

<u>Project Manager/Field Manager</u>

Responsibilities and duties may include the following:

- Provide overall management of their sampling activities;
- Provide QA management of aspects of the project within the responsibility and scope of the sampling contractor;
- Develop, establish, and maintain sampling files;
- Review reductions of data to written records;
- Perform final data review of field data reductions and reports on sampling activities;
- Review sample reports and all other documents;
- Instruct staff performing sampling activities;
- Coordinate field and laboratory schedules;
- Review/approve the type of field equipment used and observe that procedures are followed to obtain the Data Quality Objectives (DQOs);
- Prepare draft field reports, including summary of field activities; and
- Maintain field files of sampling notebooks and any data reduction calculations and transmit originals to the project files.

Field Staff

Responsibilities and duties include the following:

- Comply with provisions of FSP/QAPP;
- Perform field procedures as set forth in the FSP/QAPP and site-specific work plan;
- Perform field analyses and collect samples;
- Calibrate and maintain field equipment;
- Reduce field data to written records;
- Maintain sample custody; and
- Prepare field records and logs.

2.8 Analytical Laboratory

Overall responsibilities and duties include the following:

- Comply with provisions of the FSP/QAPP;
- Perform analytical procedures;
- Supply sampling containers and shipping cartons;
- Maintain laboratory custody;
- Inform GE of any protocol deviations;
- Monitor internal workloads and ensure availability of resources;
- Oversee preparation of analytical reports;
- Supervise the internal group which reviews and inspects all laboratory activities related to the project;
- Conduct internal audits of laboratory activities;
- Review analytical reports for QA/QC program compliance;
- Prepare analytical report narrative; and
- Implement any corrective actions after discussions with GE.

Table 2.1

Affiliation	Title	Name
United States Environmental Protection Agency	Project Coordinator	Dean Tagliaferro
Massachusetts Department of Environmental Protection	Project Coordinator	Susan Steenstrup
General Electric Company	Project Coordinator[1]	Andrew T. Silfer
	Alternate Project Coordinator[1]	Michael T. Carroll
	Project Managers	Richard W. Gates Andrew T. Silfer Kevin G. Mooney
ARCADIS BBL	Supervising Contractor[1]	ARCADIS BBL (James M. Nuss or Stuart D. Messur) (or other Supervising Contractor(s) to be named by GE)

Affiliation	Title	Name
	Project Managers	Corey R. Averill Mark O. Gravelding Nicholas A. Smith Andrew C. Corbin Jill A. Piskorz Jason J. Lannie Elizabeth G. Bremer Michael P. Hassett Todd L. Cridge
	Field Services Manager	Bruce E. Eulian
	Overall QA/QC Oversight	Dennis K. Capria
Spectra Environmental Group, Inc.	Project Manager	John D. Ciampa
Berkshire Environmental Consultants, Inc.	Project Manager	Maura J. Hawkins
Adirondack Environmental Services	Project Manager	Tara M. Daniels
	QA/QC Manager	Christopher M. Hess
Columbia Analytical Services[2]	Project Manager	Mark P. Wilson
	QA/QC Manager	Lisa Reyes
SGS Environmental Services[2]	Project Manager	Christopher T. Couch
	QA/QC Manager	Jeannie Milholland
Severn Trent Laboratories[2]	Project Manager	Veronica Bortot
	QA/QC Manager	Nasreen Derubeis
Northeast Analytical[2]	Project Manager	Robert Wagner
	QA/QC Manager	William A. Kotas
Lancaster Laboratories[2]	Project Manager	Jennifer Good
	QA/QC Manager	Kathy Loewen
Pace Analytical Services, Inc.	Project Manager	Tod Noltemeyer
	QA/QC Manager	Greg Graf
The Academy of Natural Sciences of Philadelphia	Project Manager	James N. McNair

1. Applicable to Consent Decree Activities Only
2. GE Corporate Purchase Agreement Laboratory

3. Field Sampling/Sample Handling Procedures

3.1 General

Soil, sediment, groundwater, surface water, air, and/or biota samples will be collected as described in the appropriate project-specific work plans for each investigation. Such work plans will also set forth the DQOs for other specific investigations in question (see Section 5.2) to the extent necessary to describe the purpose of the investigation and to identify the type, locations, and quality of data to be collected to meet that purpose. As part of these field investigations, several procedures may be performed involving one or more of the SOPs listed below. The field sampling SOPs have been developed with the goal of standardizing methodology to the extent practical to ensure that data are collected utilizing consistent and "best practices" methodology. However, it should be recognized that some deviations to the SOPs may occur depending on site-specific conditions. In those cases, USEPA oversight personnel will be notified when deviations to SOPs are necessary, to allow input on the selection of the best alternative.

Appendix A - Soil Sampling Procedures for Analysis of Volatile Organic Compounds (VOCs)
[Revision #00, dated September 13, 2000]

Appendix B - Soil Sampling Procedures for Analysis of Extractable Petroleum Hydrocarbons (EPH)/Volatile Petroleum Hydrocarbons (VPH)
[Revision #00, dated September 13, 2000]

Appendix C - Soil Boring Installation and Soil Sampling Procedures
[Revision #02, dated December 10, 2002]

Appendix D - Groundwater Purging and Sampling Procedures for Monitoring Wells
[Revision #04, dated March 30, 2007]

Appendix E - Surface Water Sampling Procedures
[Revision #00, dated September 13, 2000]

Appendix F - Sediment Sampling Procedures
[Revision #00, dated September 13, 2000]

Appendix G - Dense Non-Aqueous Phase Liquid (DNAPL)/Light Non-Aqueous Phase Liquid (LNAPL) Sampling Procedures
[Revision #00, dated September 13, 2000]

Appendix H - Biota Sampling Procedures
[Revision #03, dated June 15, 2004]

Appendix I - Soil Gas Sampling Procedures
[Revision #00, dated September 13, 2000]

Appendix J - Air Monitoring Procedures
[Revision #04, dated March 30, 2007]

Appendix K - Radioisotope Analysis of Cesium-137 and Beryllium-7 in Sediments
[Revision #00, dated September 13, 2000]

Appendix L - Handling, Packaging, and Shipping Procedures (Including Chain-of-Custody Procedures)
[Revision #00, dated September 13, 2000]

Appendix M - Hazardous Materials Handling Procedures
[Revision #00, dated September 13, 2000]

Appendix N - Photoionization Detector Field Screening Procedures
[Revision #00, dated September 13, 2000]

Appendix O - Temperature, Conductivity, pH, and Dissolved Oxygen Field Measurement Procedures
[Revision #00, dated September 13, 2000]

Appendix P - In-Situ Hydraulic Conductivity Test Procedures
[Revision #00, dated September 13, 2000]

Appendix Q - Water Level/Oil Thickness Measurement Procedures
[Revision #00, dated September 13, 2000]

Appendix R - NAPL Recovery Procedures
[Revision #03, dated June 15, 2004]

Appendix S - Monitoring Well Installation and Development Procedures
[Revision #04, dated March 30, 2007]

Appendix T - Magnetometer Survey Procedures
[Revision #04, dated March 30, 2007]

Appendix U - Seismic Refraction Survey Procedures
[Revision #00, dated September 13, 2000]

Appendix V - Ground Penetrating Radar (GPR) Procedures
[Revision #04, dated March 30, 2007]

Appendix W - Standard Operating Procedures for Equipment Cleaning
[Revision #00, dated September 13, 2000]

Appendix X - Building Material Sampling Procedures
[Revision #01, dated January 8, 2002]

Appendix Y - Selection of Drilling Methods
[Revision #01, dated December 27, 2001]

Appendix Z - Monitoring Well Inventory Procedures
[Revision #02, dated December 10, 2002]

Appendix AA - Groundwater Sampling Procedures Using Passive Diffusion Bags
[Revision #01, dated January 8, 2002]

Appendix BB - Soil/Water Shake Test Procedures
[Revision #01, dated December 27, 2001]

Appendix CC - Basement Sump Sediment/Water Sampling Procedures
[Revision #01, dated December 27, 2001]

Appendix DD - Manhole/Catch Basin Sediment/Water/NAPL Sampling Procedures
[Revision #02, dated December 10, 2002]

Appendix EE - Electromagnetic Survey Procedures
[Revision #04, dated March 30, 2007]

Appendix FF - Test Pit Excavation Procedures
[Revision #02, dated December 10, 2002]

Appendix GG - Monitoring Well Decommissioning Procedures
[Revision #02, dated December 10, 2002]

Appendix HH - Procedure for Determination of Total Organic Carbon in Solid Samples
[Revision #01, dated October 22, 2001]

Appendix II - Vibracore Sediment Collection Procedures
[Revision #03, dated June 15, 2004]

Appendix JJ - Pore Water Sample Collection Procedures
[Revision #03, dated June 15, 2004]

Appendix KK - Sequential Batch Leach Test Procedures
[Revision #03, dated June 15, 2004]

Appendix LL - Seepage Meter Usage Procedures
[Revision #03, dated June 15, 2004]

The remainder of this section presents a summary of the sample container requirements, sample and document custody procedures, and field-generated QC sample requirements.

3.2 Sample Containers

The samples for each analytical parameter will be collected and preserved in the appropriate sample containers as presented in Table 1. The sample containers provided by the analytical laboratories will be new, pre-cleaned, and certified by the manufacturer. Sample container certifications will be maintained by the analytical laboratories in a manner that will allow each bottle order to be traced to its respective certification. At a minimum, the sample containers supplied by the laboratory will meet USEPA's *Specifications and Guidance for Contaminant Free Sample Containers* (EPA 540/R-931051, December 1992).

3.3 Sample and Document Custody

The information presented below is intended to provide specific information regarding sample and document custody procedures. The objective of field custody is to assure the samples are not tampered with from the time of collection through time of transport to the analytical laboratory. Field custody documentation consists of both field notebooks and field COC forms as discussed below, while Appendix L provides additional information relevant to this topic.

3.3.1 Field Notebooks

Field notebooks provide the means of recording sample collection activities. As such, entries will be described in as much detail as possible so that individuals returning to the site in question or reviewing the analytical data can reconstruct a particular situation. Entries will include the following basic field information:

- location sketch;
- weather;
- visitors; and
- site conditions.

Field notebooks will be labeled with the project name, site location, and the dates of use. Additional notebooks, as needed, will be labeled with their dates of application from start to finish (e.g., January 1, 2000 to May 5, 2000).

Field notebooks will be stored in a secure location when not in use. Entries into the notebooks will be made in indelible ink and will contain a variety of information. A unique identification number will be assigned to each sample prior to collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, and volume and number of containers.

3.3.2 Field Chain-of-Custody

The SOP for COC for all samples collected in the field is set forth in Appendix L. (The SOP for COC for samples in the laboratory shall be established by the laboratory handling the sample.) As described in Appendix L, completed COC forms will be required for samples to be analyzed. COC forms will be initiated by the sampling crew in the field and will be completed in indelible ink. The COC forms will contain the sample's unique identification number, sample date and time, sample description, sample type, preservation (if any), and analyses required. The original COC form will accompany the samples to the laboratory. Copies of the COC will be made prior to shipment (or multiple copy forms used) for field documentation. The COC forms will remain with the samples at all times. The samples and signed COC forms will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g., Federal Express), hand delivered to the laboratory or their courier, or placed in secure storage.

Sample labels will be completed for each sample using indelible ink. The labels shall include sample information including sample number and location, type of sample, date and time of sampling, sampler's name (or initials), preservation method, and analyses to be performed. The completed sample labels will be affixed to each sample container and covered with clear tape.

Whenever samples are split with another party or government agency, a separate Sample Receipt will be prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the other party should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses to sign, this should be noted in the "Received By" space.

3.4 Field Quality Control (QC) Check

Field duplicates will be included to verify the quality of field measurements and collected samples. Reproducibility of each type of meter reading will be evaluated through replicate analyses of at least one sample per sampling event or at a frequency of 10%, whichever is greater. Field accuracy will be maintained through calibration of field meters according to the manufacturer's recommendations.

3.4.1 Field Duplicates

Field duplicates will be collected to check reproducibility or precision of the sampling methods and analytical procedures. Blind field duplicates are defined as two separate samples collected at a single location and labeled with separate identifications so that the laboratory will not be able to identify them as duplicates. Information concerning the source of sample duplicates should be documented in the field notebook and on the copy of the chain-of-custody form that is retained by the sampling team. These documents will be forwarded to the data validator and the data user so that the primary sample and the duplicate sample can be reported together. Specific sampling procedures are provided in the appropriate appendices. The frequencies with which field duplicates will be analyzed for each parameter and medium are presented in Table 4. The control limits that will be utilized to evaluate field duplicate results are presented in Table 5 for the various sample matrices.

3.4.2 Field Equipment Blanks

An equipment blank will be used for samples of solid and liquid matrices. This blank will be prepared by filling a sample container with analyte-free water (supplied by the laboratory) which has been passed over a cleaned sampling and/or mixing device. Field equipment blanks will be collected in the vicinity of the sampling activity while they are on-going (i.e., not at the end of sampling activities for the day) to be representative of sampling conditions. The volume of water used for collection of a field equipment blank will be, at a minimum, of sufficient volume for the type of analysis being conducted (e.g., 1 liter for PCBs). At least one equipment blank will be collected per type of sampling equipment per matrix if non-dedicated sampling equipment is utilized. One equipment blank will be collected for every 20 samples. The equipment blank analytical results will be reviewed to evaluate the effectiveness of the cleaning procedures. It can also be utilized to confirm the cleanliness of sample containers. The parameters that will require equipment blanks to be prepared and submitted for analysis, along with their required frequencies, are specified in Table 4.

3.4.3 Trip Blanks

For samples of water, soil/sediment, and biota, a trip blank will consist of analyte-free water (supplied by the laboratory) filled in containers that remain unopened in the sample coolers throughout the sampling event. The trip blanks will be used to assess potential sample exposure to non-site-related constituents during storage and transport (including cleanliness of sample containers). Trip blanks will only be utilized for water, soil/sediment, and biota samples to be analyzed for VOCs and will be utilized at the frequency specified in Table 4.

For air samples, a trip blank, also known as a field blank, will consist of a PUF cartridge and filter that will be carried to the field and returned in a clean sample holder. This sample will handled as any other sample except that no air will be drawn through the cartridge. The trip blanks for air samples are described further in Appendix J.

3.5 Field Parameters

The measurement of field parameters will be conducted, where specified in the project-specific work plans, following the SOPs presented in Appendices N through Q. Field parameter measurement may include the measurement of monitoring well stabilization parameters (i.e., temperature, conductivity, pH, dissolved oxygen, and turbidity), oxidation-reduction potential testing, in-situ hydraulic conductivity testing, and/or the measurement of water levels and oil layer thickness. At a minimum, the analytical instruments used to conduct field parameter measurements will be calibrated following the procedures presented in USEPA Region I Draft Calibration of Field Instruments (USEPA, Draft, June 3, 1998), which is included as Attachment O-2 to Appendix O.

3.6 Laboratory Custody

Several procedures will be followed by the laboratory upon sample receipt. The laboratory sample custodian will verify the package seal, open the package, and inspect the contents against the COC. The organization that performed the sampling activity will be contacted in the event of any discrepancies between the sample containers and the COC. The sample custodian will log the samples in and assign each a unique laboratory sample identification number, which will be placed on each sample bottle. A laboratory internal COC is then initiated. The project name and code, sampling location, date sampled, date received, analyses required, storage location, and action for final disposal will be recorded in the laboratory information system. The samples will then be placed in secure storage.

3.6.1 Laboratory Sample Storage

The analysts will sign and date the internal COC when removing samples from storage. Laboratory personnel will be responsible for the care and custody of the sample once it is transferred to them. Once an analysis is complete, the unused portion of the sample will be returned to the sample custodian who will then sign and date the COC. In the event that the entire sample is depleted during analysis, a notation of “sample depleted” or “entire sample used” will be made on the COC.

The unused portion of the sample and sample extracts will be held by the laboratory for a minimum of 30 days after the delivery of the final laboratory data package. Samples and sample extracts will be held in secure storage and maintained in accordance with the sample preservation requirements presented in Table 1 until disposal. The sample disposal date will be noted on the COC by the sample custodian. All COC and associated paperwork will be maintained in a separate file for the project. Laboratories will maintain these files until otherwise directed by GE.

3.6.2 Sample Tracking

Identifying information that describes the sample, procedures performed, and results of the testing will be recorded by the analyst. These notes will be dated and will indicate who performed the analysis, the instrument used, and the instrument conditions. Various workbooks, bench sheets, instrument logbooks, and instrument printouts will be used to trace the history of samples through the analytical process and to document and relate important aspects of the work, including the associated QCs. All logbooks, bench sheets, instrument logs, and instrument printouts will be properly maintained and will become part of the permanent laboratory records.

3.6.3 Final Files Custody

Each laboratory will establish a file for all pertinent data generated from the analyses performed for the project. This file will include the items specified in Section 6.2.2 (Data Package Deliverables), as well as items such as raw data, chromatograms, and descriptions of sample preparation, and will be maintained in a secure location for the duration of the laboratory's involvement in the project. At the conclusion of the laboratory's involvement with the project, the files will be continued to be stored at the laboratory or transferred to GE. These files will be retained for the duration of the project and 7 years thereafter. This final evidence file may include the following information:

- Project files;
- Analytical data;
- Field records (including COC forms, photographs, etc.);
- Reports; and
- Other associated information (maps, drawings, articles, etc.).

4. Analytical Procedures

4.1 General

The analyses to be performed for the environmental samples will be as specified in the applicable project-specific work plan. Analyses may be for individual constituents, specific groups of constituents, or all compounds listed in Appendix IX of 40 CFR Part 264, plus three additional constituents (benzidine, 2-chloroethylvinylether, and 1,2-diphenyhydrazine) hereafter referred to as Appendix IX+3. In conducting analyses for constituents other than PCBs, the Appendix IX+3 constituent list set forth in Table 2 will generally be utilized, unless otherwise specified in the project-specific work plan and approved by USEPA or MDEP (as applicable). This list of constituents has been selected for such analyses at the CD Site because it is specified in the CD and the SOW, and will be utilized for off-site investigations because it is the protocol that GE has followed for a considerable time as directed by the Agencies.

The specific analytical protocols to be followed for the various groups of analytes are summarized in Table 1 for air samples, water samples, soil/sediment samples, biota samples, LNAPL/DNAPL samples, and toxicity characteristic leaching procedure (TCLP) samples. A complete list of the Appendix IX+3 and TCLP constituents is presented in Table 2. Analytical services will be provided by the laboratories listed in Section 2.1.1 and Table 2-1, unless otherwise specified in the appropriate work plan.

In general, analytical services will employ the USEPA's SW-846 protocols or other USEPA-approved protocols as specified in Table 1. The method detection limits (MDLs) and practical quantitation limits (PQLs) to be used in these investigations will be those determined by the laboratory. For this purpose, the MDLs are determined by the laboratory based on injecting the chemical directly into the instrument without correcting for specific sample weights, percent solids, or dilution, while the PQLs are determined by the laboratory taking into account those factors. Unless otherwise specified in the project-specific work plan, these limits are expected to be equal to or lower than the laboratory-derived MDLs and PQLs listed in Table 3. (Table 3A lists the laboratory-derived MDLs and PQLs for PCBs and other Appendix IX+3 constituents in water, soil/sediment, and TCLP samples. Table 3B lists the MDLs and PQLs for PCBs in air and biota samples.)

Table 3 also lists the typical reporting limits that will be used for reporting the analytical results from water, soil/sediment, air, and biota samples, as well as TCLP analyses, in investigations conducted at the sites covered by this FSP/QAPP, unless otherwise provided in the project-specific work plan. In most cases, these reporting limits are the same as the PQLs. However, in some cases they are higher than the PQLs, based on the levels that GE's laboratories have in fact been achieving and reporting for investigations at these sites. In general, the reporting limits listed in Table 3 are below applicable or likely Performance Standards. For example, the PCB reporting limits are at or below the lowest applicable Performance Standards for PCBs (described in Section 5.3); the dioxin/furan reporting limits will ensure achievement of the Performance Standards for those compounds (described in Section 5.3), as discussed further in Section 4.2.1; and the reporting limits for other constituents are below the relevant MCP Method 1 standards (which constitute potential Performance Standards under the process described in Section 5.3 for setting cleanup standards for those constituents). However, for a few constituents tabulated below, as GE has discussed with USEPA, the reporting limits in Table 3 for soil samples are higher than the USEPA Region 9 Preliminary Remediation Goals (PRGs) discussed in Section 5.3.1.

Constituents With Reporting Limits Greater Than EPA Region 9 Industrial PRGs	Constituents With Reporting Limits Greater Than EPA Region 9 Residential PRGs
1,2,3-Trichloropropane 3-Methylcholanthrene 7,12-Dimethylbenz(a)anthracene Benzidine N-Nitrosodiethylamine N-Nitrosodimethylamine N-Nitroso-di-n-butylamine N-Nitrosomethylethylamine	1,2,3-Trichloropropane 1,2-Dibromoethane 3,3'-Dimethylbenzidine 3-Methylcholanthrene 7,12-Dimethylbenz(a)anthracene Benzidine Benzo(a)pyrene bis(2-Chloroethyl)ether Dibenzo(a,h)anthracene Hexachlorobenzene N-Nitrosodiethylamine N-Nitrosodimethylamine N-Nitroso-di-n-butylamine N-Nitroso-di-n-propylamine N-Nitrosomethylethylamine N-Nitrosomorpholine N-Nitrosopiperidine N-Nitrosopyrrolidine Arsenic

In some cases (as noted in Table 3), the laboratories will use other reporting limits due to sample matrix interferences. Where technically feasible, these limits will also be lower than the applicable Performance Standards or relevant MCP Method 1 standards.

Additional information on analytical methods is provided in Section 4.2. The laboratory analytical QA/QC requirements are discussed in Section 4.3 and described in greater detail in Section 7.

4.2 Analytical Methods

4.2.1 Soils and Sediments

Analyses of soil and sediment samples will follow USEPA Method 8081 for organochlorine pesticides and Method 8082 for analysis of PCBs. Unless otherwise provided in the applicable work plan, these PCB analyses will be Aroclor-specific. Results will be reported on a dry-weight basis with a reporting limit of 0.05 ppm (0.05 mg/kg), as presented in Table 3. The results will be reported for each Aroclor, as well as a total value. If congener-specific PCB analyses are proposed or required, the methodology to be used will be presented in the project-specific work plan.

Analyses of soil/sediment samples for specific groups of constituents (e.g., volatile organics, 1,2,4-trichlorobenzene, phenols, metals, and/or cyanide, oil and grease, Cesium-137, and Beryllium-7) or for all Appendix IX+3 constituents will follow the methods listed in Table 1. Results will be reported using the reporting limits presented in Table 3.

Unless otherwise provided in the applicable work plan, VOCs will be collected following both the low-level and the medium-level methodologies presented in Table 1. The laboratory will initially analyze the low-level sample and hold the medium-level sample for diluted analyses, if required. If the upper calibration range of the instrument is exceeded for any constituent in the low-level analysis, the medium-level (diluted) analysis will be performed for that constituent. Sediment samples with moisture content greater than 20% that require analysis for medium-level volatile organics will be corrected for the methanol dilution caused by the water present in the sample. For example, a 10-gram sample with a moisture content of 30% contains approximately 3 mL of water and 7 grams of solids. Therefore, the sample results will be corrected for the methanol/water dilution factor and dry-weight by using 13 mLs for the methanol volume and 7 grams for the sample weight.

Analysis of samples for polychlorinated dibenzo-p-dioxins (PCDDs)/polychlorinated dibenzofurans (PCDFs) will be performed using USEPA Method 8280A or Method 8290, as specified in the appropriate work plan. The selection of which method to use will depend on the applicable Performance Standards to be achieved.

Specifically, since Method 8280A has higher MDLs, PQLs, and reporting limits (see Table 3), use of that method may fail to detect exceedances of lower-level Performance Standards [e.g., Toxicity Equivalency Quotient (TEQ) concentrations at and below 5 ppb; see Section 5.3]. Hence, Method 8290, with its substantially lower MDLs, PQLs, and reporting limits, will be used for samples collected to assess achievement of those lower-level Performance Standards. Method 8280A will be used for samples collected to assess achievement of higher-level Performance Standards, where it will be adequate to detect exceedances of the standard level. Results will be reported for both total homologues and 2,3,7,8-substituted congeners. Sample results will be reported on a dry-weight basis with reporting limits consistent with those presented in Table 3.

For PCDD/PCDF compounds, total TEQ concentrations will be calculated using the Toxicity Equivalency Factors (TEFs) derived by the World Health Organization (WHO) and published by van den Berg et al. in *Environmental Health Perspectives* 106(2) (December 1998). In making these calculations, as specified in a USEPA letter to GE dated October 31, 2001, the concentration of the individual PCDD/PCDF compounds that were not detected in a given sample will be represented as one-half the analytical detection limit for such compounds.

The procedures for determining the Total Organic Carbon (TOC) content in soils and sediments will utilize the Lloyd Kahn Method ("Determination of Total Organic Carbon in Sediment," Lloyd Kahn, USEPA Region II, Edison, NJ), as incorporated in a SOP approved by USEPA in fall 2001, a copy of which is provided in Appendix HH hereto.

The procedures to be utilized for analysis of Cesium-137 and Beryllium-7 are provided in Appendix K.

4.2.2 Water

Procedures for analyzing water samples for PCBs (Table 1) are as follows: 1) analyses will follow USEPA Method 8082; 2) both filtered and unfiltered water samples may be analyzed for PCBs; 3) if filtered, a 0.45-micron glass fiber filter (which is the standard size filter used in the industry) will be used; and 4) analyses will be for Aroclor-specific PCBs (unless otherwise specified in the appropriate work plan). The results will be reported for each Aroclor, as well as a total value. Reporting limits for groundwater samples will be no higher than 0.30 µg/L for all Aroclors, but will typically achieve lower limits, with the goal of achieving a limit of 0.065 µg/L. Reporting limits for surface water samples will be 0.022 µg/L for all Aroclors, unless otherwise specified in the project-specific work plan. If congener-specific PCB analyses are proposed or required under the current surface water or baseline groundwater monitoring programs, the methodology to be used will be presented in the project-specific work plan.

In the future, as PCB concentrations in surface water and groundwater diminish, congener-specific analytical methods capable of determining PCB concentrations at lower quantitation limits (such as USEPA Methods HRGC/ECD or HRGC/HRMS) will be considered for analysis of such water samples, when PCB concentrations are expected to be in the range of 0.05 to 0.1 μg/L. For example, for groundwater, such a change will be considered at the conclusion of the current baseline (including the interim) groundwater monitoring programs, for potential use in the subsequent long-term groundwater monitoring activities. A further evaluation and proposal regarding this topic will be included, if appropriate, in a later revision of the FSP/QAPP.

If specified, water samples will also be analyzed for specific groups of constituents (e.g., volatile organics, total suspended solids, and/or volatile suspended solids) or Appendix IX+3 constituents. Inorganics, as with PCBs, groundwater, and surface water samples, may be analyzed in both filtered and unfiltered form. The filtering of groundwater and surface water samples will be performed in the field prior to preservation using a 0.45-micron (industry standard) glass fiber filter or filtered by the laboratory upon receipt. Analyses for non-PCB constituents in water samples will follow the protocols shown in Table 1, with the modification noted in the following paragraph.

For groundwater wells which are sampled for compliance with GW-2 Performance Standards (described in Section 5.3.2 below), two approaches may be utilized depending on whether the well is also sampled for comparison to the GW-3 Performance Standards. If a well is to be sampled for both GW-2 and GW-3 parameter lists (or future variations thereof), no modifications to the analytical procedures are required. However, as approved by USEPA, at wells that are only to be sampled for GW-2 compliance purposes, the groundwater samples will be analyzed for the VOCs listed in Table 2 (by Method 8260B), and also for a number of the semi-volatile organic compounds (SVOCs) listed in Table 2, using the same method used for the VOC analyses (Method 8260B) rather than the analytical method specified in Table 1 for SVOC analyses (Method 8270C). Specifically, the SVOC compounds that will be added to the standard Method 8260B analyte list for these analyses are m-dichlorobenzene, o-dichlorobenzene, p-dichlorobenzene, naphthalene, and 1,2,4-trichlorobenzene.

Analysis of samples for PCDD/PCDFs will be performed using USEPA Method 8280A or Method 8290, as specified in the appropriate work plan, depending on the applicable or likely Performance Standards to be achieved. The procedures for this analysis are shown in Table 1. Results will be reported for both total homologues and 2,3,7,8-substituted isomers. Total TEQ concentrations will be calculated for the PCDD/PCDF compounds using the TEFs and procedures described for soil/sediment samples in Section 4.2.1.

Selected samples may also be analyzed for ammonia, nitrate, nitrite, ortho-phosphate (dissolved), biochemical oxygen demand, chemical oxygen demand, total suspended solids, total dissolved solids, hardness, and TOC (these parameters as a group will be hereafter referred to as conventional parameters) using USEPA methods listed in Table 1.

4.2.3 Biota

The current procedures for sampling and analysis of biota are described in Appendix H (and are subject to the qualification described in the next paragraph). That appendix specifies, in particular, the procedures for sampling and analysis of fish, bullfrogs, and caged mussels. (The procedures for other types of biota, if collected, will be specified in the appropriate work plan or other submittal.) Under such procedures, biota samples collected in Massachusetts will be prepared for analysis by FDA Method 211.13f (or by an MDEP-approved method). For fish, skin-on fillets with the scales removed will be the preferred sample unit. Bullfrog samples will consist of the edible portion of the legs (boneless, skin-off). Caged mussels will be prepared as whole-body composite samples minus the shell. Extraction will be by Soxhlet extraction (Method 3540), with florisil column cleanup as necessary (Method 3620). All biota will be analyzed for lipid content, thus allowing results to be reported on a total or lipid-normalized basis.

In the future, as GE and USEPA have agreed (as documented in GE's clarification letter of July 19, 2002), where such biota samples collected in Massachusetts are to be analyzed for PCBs, the specific analytical technique to be used for PCB analysis, along with sample collection, preservation, and preparation methods, will be proposed in the project-specific work plan for USEPA review and evaluation on a case-by-case basis. Except as otherwise provided in that project-specific work plan, the PCB results will be reported on a wet-weight basis as Aroclor-specific PCBs (using the Aroclor-specific reporting limits specified in Table 3) and a total PCB value will be reported for each sample.

Analysis of such biota samples for PCDD/PCDFs (if proposed or required) will be performed using USEPA Method 8280A or Method 8290, as specified in the project-specific work plan, depending on the planned use of the data and the need to achieve low reporting limits. Results will be reported for both total homologues and 2,3,7,8-substituted congeners. Total TEQ concentrations will be calculated for the PCDD/PCDF compounds using the TEFs and procedures described for soil/sediments samples in Section 4.2.1.

Unless otherwise provided in the project-specific work plan, samples of fish and benthic invertebrates collected from the Connecticut portion of the Housatonic River will be prepared and analyzed by the Academy of Natural Sciences of Philadelphia (ANSP), as requested by the Connecticut DEP, using procedures developed by the ANSP and followed by them for several years. These procedures are described in Attachment H-2 to Appendix H. The analytical procedures used by the ANSP include analyses for PCBs on a total PCB basis and a congener-specific basis, as well as analysis for lipid content. PCB concentrations are reported based on both the total and congener-specific analyses (wet weight) and on a lipid-normalized basis.

4.2.4 LNAPL/DNAPL

Analysis of LNAPL/DNAPL samples for PCBs or other Appendix IX+3 constituents will follow the methods listed in Table 1. Results will be reported using the lowest achievable detection limits based on laboratory MDLs and the dilution factor required to properly quantitate the sample or resolve sample matrix effects. If applicable, specific gravity measurements will be made using ASTM Method D1298 and viscosity measurements will be made using ASTM Method D445, and interfacial tension measurements will be made using ASTM Standards D2285-99 or D971-99a.

Analysis of LNAPL/DNAPL samples for PCDD/PCDFs will be performed using USEPA Method 8280A, unless otherwise specified in the project-specific work plan. Results will be reported for both total homologues and 2,3,7,8-substituted congeners.

4.2.5 Construction and Demolition Waste

Excavated soil and other potential debris may require analysis for one or more of the TCLP parameters listed in Table 1 to provide characterization of the material for disposal purposes. TCLP analyses will be conducted using USEPA Method 1311 for sample preparation and the appropriate USEPA SW-846 analytical methods specified in Tables 1 and 2. Results will be reported using the lowest achievable detection limits based on laboratory MDLs and will be less than the reporting limits specified in Table 3.

Materials requiring TCLP analysis and the individual TCLP parameter analysis requirements will be discussed in the project-specific work plans.

4.2.6 Air Monitoring

Air monitoring for particulates and/or PCBs may be conducted during removal activities as specified in the project-specific work plans. Where required, air monitoring will be conducted following the procedures specified in Appendix J. Sampling locations, project Performance Standards, and DQOs for air monitoring will be presented in the project-specific work plans. As described in Appendix J, the MDL for PCBs in air samples is 0.03 µg/PUF, and the target PCB PQL is 0.1 µg/PUF. The target reporting limit, based on the PQL of 0.1 µg/PUF and a minimum air volume of 325 standard cubic meters, is 0.0003 µg/m^3. Particulate matter (as PM_{10}) will be monitored using an MIE dataRAM Model DR-2000 or 4000 (DR), MIE dataRAM Model pDR-1000 (pDR), Met One E-BAM, or equivalent method for measuring airborne particulate, as specified in Appendix J. The dataRAM has a measurement range of 0.001 to 400 mg/m^3. The E-BAM has a measurement range of 0.0 to 10 mg/m^3. Any results in the measurement range of the monitor will be reported.

The current laboratory SOPs used by GE for air analysis were provided by Northeast Analytical Services, Inc. and are included in Appendix J (Air Monitoring Procedures) as Attachments J-1 and J-2.

4.3 Laboratory Analytical Quality Assurance/Quality Control

QC requirements for the laboratory analytical procedures, including the specifications for collection of matrix spikes and matrix spike duplicates (MS/MSD), field/equipment blanks, trip blanks (also known as field blanks for PCB air samples), and field duplicate samples, are presented in Table 4. Table 4 also presents the QA/QC requirements for analytical method parameters (e.g., calibration, system performance) and corrective action procedures for non-compliance with method criteria. QC accuracy and precision limits for recovery from the MS and surrogate compounds are presented in Table 5. The use of these data quality indicators and requirements in evaluating the quality of the data collected and determining the usability of such data is discussed in Section 7.

5. Data Quality Objectives and Performance Standards

5.1 General

This section discusses DQOs for sampling and analytical data collected under this FSP/QAPP. Given the various different programs and sites to which this FSP/QAPP applies, the specific DQOs for each investigation will be presented in the project-specific work plans. However, a general description of the DQOs and DQO development process and examples of specific DQOs are discussed in Section 5.2. In addition, since the DQOs will generally consist of obtaining the necessary and sufficiently high-quality data to achieve applicable Performance Standards for a given area or response action (as set forth in the CD and the SOW or as determined through the Agencies approval of project-specific work plans), Section 5.3 provides a description of such Performance Standards. From a data quality perspective, the qualitative and quantitative QA objectives for the data collected pursuant to this FSP/QAPP are presented in Section 7.4.

5.2 Data Quality Objectives

In general, DQOs are statements in either qualitative or quantitative terms regarding the appropriate data quality for an investigation. As a general matter, the DQOs for investigations conducted at the sites and areas covered by this FSP/QAPP will include obtaining the necessary data to meet the applicable sampling requirements for the site or area in question (as specified in the CD or SOW or in project-specific work plans approved by the Agencies) and to achieve the applicable Performance Standards for the response actions for such site or area (discussed in Section 5.3). Further, to ensure that sufficiently high-quality analytical data are obtained to meet that objective, the DQOs for these investigations include obtaining data that meet the technical data quality specifications set forth in this FSP/QAPP, including the MDLs, PQLs, and reporting limits presented in Table 3 and the QA/QC objectives and requirements discussed in Section 7.

In addition, project-specific DQOs will be developed and presented in each of the project-specific work plans to the extent necessary or appropriate to describe the purpose of the investigation and to identify the appropriate type, locations, and quality of data to be collected to meet that purpose. Such DQOs may include, but are not limited to, one or more of the following:

- Determine the potential presence or extent of PCBs for characterization and remediation assessment activities. The data collection approach will typically utilize an off-site conventional laboratory unless otherwise specified in the project-specific work plan;

- Determine the potential presence or extent of other Appendix IX+3 constituents;

- Provide data in support of risk assessment activities, if applicable and appropriate;

- Determine extent of remediation needed to meet Performance Standards or other cleanup goals established for the area in question and any additional sampling to determine material disposition;

- Assess biota to determine potential presence of chemical constituents;

- Provide data to evaluate hydrogeologic flow regime, including groundwater gradients, flow direction, hydraulic conductivity, and groundwater depth;

- Characterize groundwater quality at various monitoring wells for comparison to MCP Method 1 GW-2 and/or GW-3 standards or alternate groundwater Performance Standards;

- Provide geotechnical data as necessary to support remedial designs;

- Evaluate extent of NAPL and potential for migration; and

- Perform air monitoring to evaluate dust control measures implemented during remedial activities.

5.3 Performance Standards

This section discusses the Performance Standards for response actions to be conducted by GE at the sites and areas covered by this FSP/QAPP. In general, the Performance Standards for response actions to be implemented under the CD are set forth in the CD and the SOW and/or will be specified in work plans developed and approved by USEPA under the CD or the SOW. For other sites and areas, the Performance Standards are, and will continue to be, generally specified in project-specific work plans as approved or conditionally approved by the Agencies. The description of Performance Standards in this section of the FSP/QAPP is provided solely for informational purposes. In the case of any inconsistency between the description of the Performance Standards in this section and that in the basic documents (i.e., the CD, the SOW and/or Agency-approved project-specific work plans), the latter shall be controlling.

5.3.1 Performance Standards for Soil/Sediment

For the CD Site, the Performance Standards for PCBs in soils and sediments at the areas designated as Removal Action Areas (RAAs) Outside the River are set forth in the CD and the SOW. These Performance Standards are to be applied based on the spatial averaging of PCB concentrations and are summarized in Table 6. It should be noted that the lowest of these Performance Standards (1 ppm) is 20 times greater than the reporting limit shown in Table 3 which, in turn, is over five times greater than the laboratory-derived MDL shown in Table 3.

For non-PCB constituents at such RAAs, the procedural Performance Standards for establishing cleanup standards for soil/sediment are described in Attachment F to the SOW. Those procedures provide for a phased approach to setting substantive cleanup Performance Standards for such constituents, taking into account the extent of response actions to address PCBs. For PCDDs and PCDFs, Attachment F establishes the substantive cleanup Performance Standards, which are to be determined on the basis of total TEQ concentrations, using the TEFs published by the WHO (as discussed in Section 4.2.1). Those standards are: for residential areas, a TEQ concentration of 1 ppb; for recreational areas, TEQ concentrations of 1 ppb in the top foot and 1.5 ppb in the 1- to 3-foot depth interval; and for commercial/industrial areas, TEQ concentrations of 5 ppb in the top foot and 20 ppb in deeper soil. For other non-PCB constituents, the determination of the substantive cleanup Performance Standards will be made through the phased process described in Attachment F to the SOW, which considers USEPA Region 9 Preliminary Remediation Goals, MCP Method 1 soil standards, and (if necessary) site-specific risk evaluations performed by GE subject to USEPA approval.

For the Upper ½ Mile Reach of the Housatonic River (as defined in the CD), the Performance Standards for bank soils and sediments were set forth in the USEPA-approved *Upper ½ Mile Reach Removal Action Work Plan* (August 1999). For the Rest of the River (as defined in the CD), the Performance Standards for soil and sediments will be set forth in a final modification to the Reissued RCRA Permit and a Rest of River SOW, which will be developed through the process described in Paragraph 22 of the CD.

For properties outside the CD Site, the Performance Standard for PCBs in soil at residential properties is generally a spatial average PCB concentration of 2 ppm. For non-PCB constituents at such properties, and for both PCBs and other constituents at non-residential properties, the applicable Performance Standards for soil/sediment will be determined through the process of GE's submittal and MDEP's approval of project-specific work plans.

5.3.2 Performance Standards for Groundwater

For the CD Site, the Performance Standards for groundwater quality, as well as for non-aqueous-phase liquid (NAPL), are specified in Section 2.7 and Attachment H to the SOW. The NAPL Performance Standards are based on factors other than numerical laboratory analytical results, such as measurements of NAPL presence and thickness, the reduction of the amount of measurable NAPL to levels which eliminate the potential for NAPL migration toward surface water discharge areas or beyond GMA boundaries, and prevention of NAPL migration around physical containment barriers. By contrast, the groundwater quality Performance Standards require achievement of specific numerical values based on the analytical results of groundwater samples from monitoring wells. Those Performance Standards provide initially for use of the Method 1 GW-2 and GW-3 standards specified in the MCP, which are listed in Table 7. However, these Performance Standards allow for the future development of alternative GW-2 and GW-3 groundwater standards, subject to USEPA approval.

For areas outside the CD Site, the Performance Standards for groundwater will be determined through the process of GE's submittal and MDEP's approval of project-specific work plans.

5.3.3 Performance Standards for Air Quality

Performance Standards for PCBs and particulate matter in ambient air will be developed on a project-specific basis for projects (both at the CD Site and at non-CD sites) where air monitoring will be performed during response activities. For particulate matter, as specified in Appendix J, a notification level of a 10-hour average of 120 $\mu g/m^3$ of PM_{10} (which represents 80% of the 24-hour National Ambient Air Quality Standard of 150 $\mu g/m^3$ for PM_{10}) will be used unless otherwise provided in the project-specific work plan. For PCBs, the Performance Standards will be specified in the project-specific work plans. The criteria used to date at projects subject to this FSP/QAPP consist of a PCB notification level of 0.05 $\mu g/m^3$ (24-hour average) and an action level of 0.1 $\mu g/m^3$ (24-hour average) (except at the monitors around the On-Plant Consolidation Areas, where the PCB action level was revised in late 2005 to 0.05 $\mu g/m^3$, equivalent to the notification level).

5.3.4 Performance Standards for Other Media

For other media (e.g., surface water, biota) and media analytes, Performance Standards have not been developed. If relevant, such Performance Standards will be developed through the process of project-specific submittals, subject to review and approval by USEPA or MDEP. Tables 3 and 6 of this FSP/QAPP will be revised (as necessary) on an annual basis when additional Performance Standards are developed and approved.

6. Laboratory Data Reduction and Reporting

6.1 General

This section presents the data reduction and reporting requirements for final data packages and electronic data deliverables (EDDs) to be provided by the analytical laboratories for investigations conducted in accordance with this FSP/QAPP.

6.2 Laboratory Data

Where calculations must be used for laboratory data reduction, the calculations will be those specified in the pertinent analytical method, as referenced previously. Whenever possible, analytical data will be transferred directly from the instrument to a computerized data system. Non-computerized raw data will be entered into laboratory notebooks. The data entered will document the factors used to arrive at the reported value. Concentration calculations for chromatographic analyses (i.e., PCBs, volatiles, semi-volatiles) are based on response factors. Quantitation is performed using either internal or external standards. Inorganic analyses are based on regression analysis. Regression analysis is used to fit a curve through the calibration standard data. Concentrations are calculated using the resulting regression equation.

Soil and sediment values will be reported on a dry-weight basis. Unless otherwise specified, all values will be reported uncorrected for blank contamination.

6.2.1 Data Review

Raw laboratory data will be examined by the laboratory to assess compliance with QC guidelines. Surrogate, MS, and laboratory control sample recoveries will be checked. Samples will be checked for possible contamination or interferences. Concentrations will be checked to ensure the systems are not saturated. Dilutions will be performed as necessary. Any deviations from guidelines will call for corrective action. Those deviations that are determined to be caused by factors outside the laboratory's control, such as matrix interference, will be noted with an explanation in the report narrative. Calculations will be checked and the report reviewed for errors and oversights. All reports will be subjected to internal laboratory QC review prior to release.

6.2.2 Data Package Deliverables

A Contract Lab Protocol (CLP) equivalent data package that includes a Sample Delivery Group (SDG) Narrative containing: laboratory name; SDG number; sample numbers in the SDG; differentiating between initial analyses and re-analyses; and detailed documentation of any QC, sample shipment, and/or analytical problems encountered in processing the samples will be prepared by the analytical laboratory. The laboratory must explain the conditions of each re-analysis and include any problems encountered, both technical and administrative.

The laboratory will identify all samples, including dilutions, re-analyses, field duplicates, and MS/MSD with a GE field sample designation. For field samples and MS/MSD, the GE field sample number is the unique identifying number provided to the laboratory on the COC that accompanies the samples. In order to facilitate data assessment, the laboratory will use the following sample suffixes:

XXXXX	=	GE field sample number
XXXXXMS	=	MS sample
XXXXXMSD	=	MSD sample
XXXXXRE	=	Re-extracted and re-analyzed sample
XXXXXDL	=	The suffix DL is appended to the GE field sample number to indicate that the analytical results are a result of a dilution of the original analysis
XXXXDUP	=	Field duplicate

The laboratory will provide the data using the following laboratory data qualifiers where applicable.

Organic Data:

U This flag indicates that the compound was analyzed for, but not detected (often also reported as ND).

J This flag indicates an estimated value. This flag is typically used when the compound is positively identified and the quantitation of the compound is less than the PQL but greater than the MDL.

B This flag is used when the compound is detected in the associated method blank as well as in the sample. Note: The “B” qualifier is only used when blank contaminants are detected in the sample.

E This flag identifies a compound whose concentration exceeds the upper calibration range of the instrument.

D This flag identifies compounds which were diluted into the calibration range. The "D" qualifier applies to only sample results that were flagged with the "E" qualifier due to being greater than the calibration range.

P This flag is used for pesticide/Aroclor target compounds when there is a greater than 25% difference for detected concentration between the GC columns.

C This flag applies to pesticide results where the identification has been confirmed by GCMS.

X,Y,Z Other specific flags may be needed to properly define the results. If used (X,Y,Z), the flags will be fully described with the definition included in the case narrative of the sample data package and the EDD in the laboratory comments field.

The complete data package consists of two parts: 1) the sample data summary package; and 2) the sample data package.

The typical sample data summary package shall contain data for one SDG, as follows:

Sample Data Summary Package

- SDG Narrative;
- COC Records;
- By Analytical Method and by Sample within Each Method - tabulated target compound/ target analyte results (FORM 1);
- By Analytical Method - Surrogate Spike Analysis Results (FORM 2);
- By Analytical Method - MS/MSD Results (FORM 3 - ORG or FORM 4-IN and FORM 6-IN);
- By Analytical Method - Blank Summary Forms (FORM 4-ORG) and Tabulated Results (FORM 1-ORG or FORM 3-IN); and
- By Analytical Method - Internal Standard Data (FORM 8).

The Sample Data Package requirements vary by fraction; however, all packages must begin with a copy of the SDG Narrative followed by copies of both the field and internal chains of custody. Following the Narrative and chains of custody are the following, in their entirety, by fraction:

Volatile/Semi-Volatile Analysis

1. QC Summary

- Surrogate Recovery Summary (FORM 2);
- MS/MSD Summary (FORM 3);
- Method Blank Summary (FORM 4);
- System Performance Evaluation Summary (FORM 5);
- Internal Standard Summary (FORM 8); and
- Laboratory Control Standard Recovery Summary.

2. Sample Data

Sample data shall be arranged in packets with the analysis data summary sheet (FORM 1) followed by raw data. These sample packets should be placed in order of increasing sample number, considering both letters and numbers in ordering samples. The raw data shall consist of the quantitation reports followed by Reconstructed Total Ion Chromatograms (RICs) for each sample. The RIC should be normalized to the largest non-solvent component and contain the following information:

- Sample ID;
- Date and time of analysis;
- Instrument ID;
- Lab file ID; and
- Positively identified compounds must be labeled with the names of compounds, either directly out from the peak, or in printout of retention times if retention times are printed over the peak (PCBs only).

For each sample, by each compound identified, copies of raw spectra and copies of background-subtracted mass spectra of target compounds must be included. In cases where the data system report has been edited, or where manual integration or quantitation has been performed, the analyst must identify such edits or manual procedures by initialing and dating the changes made to the report.

3. Standard Data

- Initial Calibration Data - in order, by instrument Initial Calibration Summary (FORM 6) and associated standards RICs and quantitation reports (spectra are not required); and
- Continuing Calibration Data - in order, by instrument Continuing Calibration Summary (FORM 7) and associated standards RICs and quantitation reports (spectra are not required).

4. Raw Data

- Performance Evaluation Summary (FORM 5) in order, by instrument along with the associated standard spectrum, mass listing and RIC.
- Blank Data, in chronological order
  - Tabulated Results (FORM 1)
  - RIC
  - Quantitation Report
  - Spectra
- MS Data
  - Tabulated Results (FORM 1)
  - RIC
  - Quantitation Report
  - No spectra are required
- MSD Data
  - Tabulated Results (FORM 1)
  - RIC
  - Quantitation Report
- - No spectra are required Laboratory Control Sample Data
  - Tabulated Results (FORM 1)
  - RIC
- Instrument Logs - Copies of the instrument run logs for all days on which samples and/or standards included in the SDG were analyzed are required.

- Extraction Logs - The Extraction Logs must include: 1) date; 2) sample weights and volumes; 3) sufficient information to unequivocally identify which QC samples correspond to each batch extracted; 4) comments describing any significant sample changes or reactions which occur during preparation; and 5) final volumes.

PCB/Pesticides, Herbicides, and VPH/EPH Data

1. QC Summary

- Surrogate Recovery Summary (FORM 2);
- MS/MMSD Summary (FORM 3);
- Method Blank Summary (FORM 4); and
- Laboratory Control Sample Results.

2. Sample Data

Sample data shall be arranged in packets with the sample analysis data sheets (FORM 1), followed by raw data. These sample packets should be placed in order of increasing sample number, considering both letters and numbers in ordering samples.

The raw data shall consist of the quantitation reports followed by RICs for each sample. The RIC should be normalized to the largest non-solvent component and contain the following information:

- Sample ID;
- Date and time of analysis;
- Instrument ID;
- Lab file ID;
- Gas chromatograph column identification (by stationary phase and internal diameter); and
- Positively identified compounds must be labeled with the names of the compounds, either directly out from the peak, or in a printout of retention times if retention times are printed over the peak. Raw data for both the primary and confirmation analysis must be included in the data package.

3. Standard Data

- Initial Calibration Summary - all columns, all instruments, in chronological order by instrument and column;
- Continuing Calibration Verification Summary - all columns, all instruments, in chronological order by instrument and column;
- Analytical Sequence Summary - all columns, all instruments, in chronological order by instrument and column;
- Florisil Cartridge Check Summary - for all lots of cartridges used to process samples;
- Gel Permeation Chromatography (GPC) Calibration Summary - for all GPC columns, in chronological order, by calibration date;
- Initial Calibration Standard Chromatograms and Integration Reports - all columns, all instruments, in chronological order by instrument and column;
- Continuing Calibration Standard Chromatograms and Integration Reports - all columns, all instruments in chronological order by instrument and column; and
- GPC Calibration Data - ultraviolet (UV) detector traces must be labeled with GPC column identifier and date of calibration.

4. Raw Data

- Blank Data - in chronological order,
  - Tabulated Results (FORM 1)
  - Chromatogram
  - Integration Report
- MS Data
  - Tabulated Results (FORM 1)
  - Chromatogram
  - Integration Report
  - MSD Data
  - Tabulated Results (FORM 1)
  - Chromatogram
  - Integration Report

- Laboratory Control Sample Data
  - Tabulated Results (FORM 1)
  - Chromatogram
  - Integration Report
- Extraction Logs - The extraction logs must include: 1) date; 2) sample weights and volumes; 3) sufficient information to unequivocally identify which QC samples correspond to each batch extracted; 4) comments describing any significant sample changes or reactions which occur during preparation; 5) final extract volumes; and 6) indication of which, if any, cleanups were performed.

Inorganics Analysis

1. QC Summary:

- Inorganic Analyses Data Sheets (FORM 1);
- Initial and Continuing Calibration Verification (FORM 2A);
- Contract Required Detection Limit (CRDL) standards for Atomic Absorption (AA) and Inductively Coupled Plasma (ICP) (FORM 2B);
- Method Blanks Summary (FORM 3);
- ICP Interference Check Sample Analysis (FORM 4);
- MS Sample Recovery (FORM 5);
- Duplicates (FORM 6);
- Laboratory Control Samples (FORM 7);
- Method of Standard Additions Summary (FORM 8);
- ICP Serial Dilution Analysis (FORM 9);
- Instrument Detection Limits (FORM 10);
- ICP Interelement Correction Factors (FORM 11A and FORM 11B);
- ICP Linear Ranges (FORM 12);
- Sample Preparation Log (FORM 13); and
- Analyses Run Log (FORM 14).

2. Sample Data

Sample data shall be arranged in packets with the analysis data summary sheets and QA/QC summary forms preceding the raw data. The raw data should be grouped by analysis type (i.e., ICP, furnace AA, or cold vapor), instrument number, run number, and parameter. For each instrument and parameter, the analytical data should be ordered in a manner that is consistent with the instrument run log. The final sections of the supporting documentation should include the sample and standards preparation logs, the percent solids determination bench sheets (solids only), and instrument run logs.

Conventional Analysis

1. QC Summary

- Analyses Data Sheets (FORM 1);
- Initial and Continuing Calibration Verification (FORM 2A);
- Method Blanks Summary (FORM 3);
- MS Sample Recovery (FORM 5);
- Duplicates (FORM 6) (triplicates for TOC);
- Laboratory Control Samples (FORM 7);
- Sample Preparation Log (FORM 13); and
- Analyses Run Log (FORM 14).

2. Sample Data

Sample data shall be arranged in packets with the analysis data summary sheets and QA/QC summary forms preceding the raw data. The raw data should be grouped by parameter (e.g., cyanide, sulfide, TOC, etc.), instrument number, and run number. For each instrument and parameter, the analytical data should be ordered in a manner that is consistent with the instrument run log. The final sections of the supporting documentation should include the sample and standards preparation logs, the percent solids determination bench sheets (solids only), and instrument run logs.

PCDDs/PCDFs Analyses

1. QC Summary

- Surrogate Recovery Summary (FORM 2);
- MS/MSD Summary (FORM 3);
- Method Blank Summary (FORM 4);
- System Performance Evaluation Summary (FORM 5);
- Internal Standard Summary (FORM 8); and
- Laboratory Control Standard Recovery Summary.

2. Sample Data

Sample data shall be arranged in packets with the analysis data summary sheet (FORM 1) followed by raw data. These sample packets should be placed in order of increasing sample number, considering both letters and numbers in ordering samples. The raw data shall consist of the quantitation reports followed by RICs for each sample. The RIC should be normalized to the largest non-solvent component and contain the following information:

- Sample ID;
- Date and time of analysis;
- Instrument ID;
- Lab file ID; and
- Positively identified compounds must be labeled with the names of compounds, either directly out from the peak, or in printout of retention times if retention times are printed over the peak (PCBs only).

For each sample, by each compound identified, copies of raw spectra and copies of background-subtracted mass spectra of target compounds must be included. In cases where the data system report has been edited, or where manual integration or quantitation has been performed, the analyst must identify such edits or manual procedures by initialing and dating the changes made to the report.

3. Standard Data

- Initial Calibration Data - in order, by instrument Initial Calibration Summary (FORM 6) and associated standards RICs and quantitation reports (spectra are not required).
- Continuing Calibration Data - in order, by instrument Continuing Calibration Summary (FORM 7) and associated standards RICs and quantitation reports (spectra are not required).

4. Raw Data

- Performance Evaluation Summary (FORM 5) in order, by instrument along with the associated standard spectrum, mass listing and RIC.
- Blank Data, in chronological order
  - Tabulated Results (FORM 1)
  - RIC
  - Quantitation Report
  - Spectra
- MS Data
  - Tabulated Results (FORM 1)
  - RIC
  - Quantitation Report
  - No spectra are required
- MSD Data
  - Tabulated Results (FORM 1)
  - RIC
  - Quantitation Report
  - No spectra are required
- Laboratory Control Sample Data
  - Tabulated Results (FORM 1)
  - RIC
- Instrument Logs - Copies of the instrument run logs for all days on which samples and/or standards included in the SDG were analyzed are required.

- Extraction Logs - The Extraction Logs must include: 1) date; 2) sample weights and volumes; 3) sufficient information to unequivocally identify which QC samples correspond to each batch extracted; 4) comments describing any significant sample changes or reactions which occur during preparation; and 5) final volumes.

6.3 Electronic Data Deliverables

For each SDG, an EDD will typically be submitted with the final analytical data package that presents the analytical data in an electronic format that is consistent with the data file structure presented below. The EDDs must only present information for samples and analyses that are complete (i.e., there should be no blank fields for sample results). Additionally, once results have been provided by EDD for a specific sample and parameter, the information for those samples must not be presented on subsequent EDD submissions.

The EDDs must be presented in a Microsoft Excel (Version 5.0) or compatible format that includes the field information presented below as an example. The field sample identifications present in the EDD must match the COC records; no abbreviation or truncation of this information is permitted.

Electronic Data File Definition

FIELD NAME	REQUIRED	DATA TYPE	MAXIMUM LENGTH	NOTES
SDG No	Yes	Text	50	
Lab Sample ID	Yes	Text	100	Rerun samples should end in RE; Dilutions should end in DL; Matrix Spikes and Duplicates should end in MS, MD, S or D.
Field Sample ID	Yes	Text	100	Use the sample ID from the chain of custody, but do not include depths here. Put the depth information in the appropriate fields.
Date Collected	Yes	Date	---	mm/dd/yyyy format
Depth Interval - Start	Yes	Number	---	all depth units in feet
Depth Interval - End	Yes	Number	---	all depth units in feet
Depth Units	Yes	Text	24	all depth units in feet
Property/Site Name	No	Text	50	As provided on COC form
Analytical Method	Yes	Text	60	
Dilution	Yes	Number	---	

FIELD NAME	REQUIRED	DATA TYPE	MAXIMUM LENGTH	NOTES
CAS No.	Yes	Text	30	Leave blank for any analyte without a CAS number (e.g., m,p-Xylene).
Analyte	Yes	Text	200	
Result	Yes	Number	---	
Conc. Units	Yes	Text	20	All units in mg/Kg, mg/L or %
Lab Flags	Yes	Text	12	U, J, E, D, B, etc.
Laboratory Comments	No	Text	200	

Data should be formatted to the correct significant figures as presented on the corresponding FORM I, or laboratory equivalent. Only field sample data, including field QA/QC samples (field duplicates, field blanks, and trip blanks), should be included in the electronic file. Laboratory generated QA/QC samples (including laboratory duplicates, MS/MSD samples, laboratory blanks, or other laboratory generated QA/QC samples) should be excluded from the EDD.

7. Data Management, Validation, Usability, and Reporting

7.1 General

Analytical project data will be reviewed for compliance with project DQOs by generally following the data assessment process presented on Figure 3. This process involves an initial review of the analytical data to determine analytical method compliance followed by validation of the data as specified in Section 7.5 and Validation Annexes A through F. After completion of the data review procedures, a data validation summary report will be generated to address any data usability limitations that may have been identified. Any data usability limitations will be addressed and/or incorporated into the project database and any subsequent project-specific documents, as required. As part of the overall data evaluation process, a comparison will be made of proposed sampling locations and depths with actual sampling locations and depths, and any differences will be noted and explained.

7.2 Data Management

Data management will be performed through the development of a sample tracking database and an analytical data database. The sample tracking database will be developed using commercially available software (i.e., Microsoft Access or equivalent) following the data file structure presented below.

Tracking Database Definition

FIELD NAME	REQUIRED	DATA TYPE	MAXIMUM LENGTH	NOTES
Site Name	Yes	Text	225	As defined in the Consent Decree or under MDEP off-site program.
Sample-ID	Yes	Text	100	As provided on COC form.
Depth Range	No	Text	20	Starting and ending depth intervals in feet separated by a hyphen.
Sample Date	Yes	Date/Time	8	mm/dd/yyyy format
Laboratory Name	Yes	Text	50	As provided on COC form.2

FIELD NAME	REQUIRED	DATA TYPE	MAXIMUM LENGTH	NOTES
TAT Time	Yes	Long Integer	10	As provided on COC form.
Analyses	Yes	Text	100	As provided on COC form. [2]
Date Expected	Yes	Date/Time	8	mm/dd/yyyy format; Calculated from "TAT Time."
Date Received	No	Date/Time	8	mm/dd/yyyy format; Update upon receipt of fax data.
Internal Storage Box Number	No	Text	50	Update when final data packages are shipped offsite.
External Storage (e.g., Iron Mountain) Box Number	No	Text	50	Update when final data packages are shipped offsite.
Notes	Yes	Text	255	Document all sampling/analysis anomalies.
Project Name [1]	Yes	Test	100	As provided on COC form.
Matrix [1]	Yes	Text	30	As provided on COC form.[2]
Project Number [1]	Yes	Text	12	As provided on COC form.
Tabulated [1]	No	Yes/No	1	Update to "Yes" after data has been tabulated for monthly report.

Notes:

1. Field used only for GE-Pittsfield/Housatonic River Site, as defined in the Consent Decree; not used for Off-Site Properties.
2. Abbreviate information from COC following existing conventions in the database (e.g. Columbia Analytical Services, Inc = CAS).

The sample tracking database will be populated by entering COC information after collection of samples. This information will be obtained by the Overall QA/QC Coordinator and/or his designee by facsimile or overnight courier. After entering COC information, the sample tracking database will be used to evaluate laboratory turn-around-time (TAT) performance, verify laboratory invoicing, and evaluate laboratory EDDs for completeness.

The analytical data database will be prepared from the laboratory supplied EDDs using commercially available software (i.e., Microsoft Access or equivalent). Data will initially be incorporated into the database when received and reported to the Agencies in the next monthly report as preliminary. Analytical data will be noted as final in the database after data validation review has been completed. The analytical data database will be developed and maintained by the Overall QA/QC Coordinator and/or his designee. This database will be prepared in accordance to the data file structure presented below.

Laboratory Data Database Definition

FIELD NAME	REQUIRED	DATA TYPE	MAXIMUM LENGTH	NOTES
Field Sample ID	Yes	Text	100	
Date Collected	Yes	Date/Time	8	mm/dd/yyyy format.
Property/Site Name	Yes	Text	50	As defined in the Consent Decree or under MDEP off-site program.
Depth Interval - Start	Yes	Number	4	For samples without a Depth Interval - Start (i.e., water samples, composition samples, etc.) default 0.
Depth Interval - End	Yes	Number	4	For samples without a Depth Interval - End (i.e., water samples, composition samples, etc.) default 0.
Depth Units	Yes	Text	24	All depth units in feet.
SDG No.	Yes	Text	40	Provided by the laboratory.
Lab Sample ID	Yes	Text	100	Rerun samples should end in RE; Dilutions should end in DL; Matrix Spikes and Duplicates should end in MS, MD, S or D.
Analytical Method	Yes	Text	60	As presented in Table 1.
Dilution	Yes	Number	8	For parameters without a Dilution (i.e., percent solids, pH, etc.) default [1].
Analyte	Yes	Text	200	As presented in Table 2.
CAS No.	Yes	Text	30	As presented in Table 2.
Text Result	Yes	Text	200	Concentration of Result, Lab Flags, and Lab QC Flags formatted to appropriate significant figures (e.g., ND(4.0), 0.041 J, 10,000 N, etc.).
Result		Number	8	As presented by the laboratory.
Conc. Units	Yes	Text	20	All units in mg/Kg, mg/L or %.
Lab Flags	No	Text	12	U, J, E, D, B, etc.
Duplicate Of		Text	50	Will identify original sample location.
Validation Qualifiers	No	Text	50	See Validation Annexes A through F.
Laboratory Comments	No	Text	255	
Validation Comments	No	Text	255	See Validation Annexes A through F.
Laboratory	Yes	Text	50	

7.3 Laboratory Quality Assurance

Laboratory QA samples will include the analysis of MS/MSD, laboratory blanks, QC samples, surrogates, and calibration standards. The required frequency of analysis for these samples is presented in Table 4. The control limits for the analysis of these samples and the corrective actions required when the control limits are not met are also presented in Table 4. Table 5 presents the MS and surrogate compound recovery limits for the individual laboratory control sample analytes. The types of QA samples are described below.

7.3.1 Laboratory Blanks

Laboratory blanks will be used to measure solvent or reagent quality, glassware cleaning effectiveness, and instrument background. Laboratory blanks will be prepared at a frequency specified in Table 4. Laboratory blanks will be required to meet the criteria specified in Table 4 prior to the initiation of sample analysis. Method blanks exceeding acceptance criteria will be subject to one or more of the corrective actions specified in Table 4 prior to the initiation of sample analysis. The requirements relating to laboratory and other process blanks for analysis of ambient air samples are further discussed in Appendix J (Section 10).

Laboratory blank contamination will be evaluated following the procedures presented in Section 7.5 and Validation Annexes A through F. As a component of the data validation review, detected sample results will be compared to detected laboratory blank results to determine if any sample results exhibit positive bias. Sample result bias, if identified, will be discussed in the data validation summary reports and will be considered when comparing sample results to applicable Performance Standards.

7.3.2 Matrix Spikes/Matrix Spike Duplicates

The frequency of MS/MSD analyses for each medium to be analyzed is outlined in Table 4. MSs will be analyzed in duplicate for organic analyses. Samples will be spiked according to protocols specified in the analytical method. MS/MSDs for PCBs will be spiked with either Aroclor 1242, 1254, or 1260. Recoveries for MS/MSD samples will be expected to follow the control limits presented in Table 5. Results outside of the specified range will require review and, if determined necessary, the corrective actions specified in Table 4 will be initiated.

MS/MSD samples that do not meet the performance criteria specified in Tables 4 and 5 will be evaluated following the procedures presented in Section 7.5 and Validation Annexes A through F. Sample results associated with MS/MSD recoveries that are outside of the control limits presented in Table 5 will be noted. If the sample results are associated with an MS/MSD recovery that is less than the lower control limits presented in Table 5, such results will be qualified as estimated and one of the following steps will be undertaken: (a) collecting and analyzing a new sample from the location in question; (b) reanalyzing the existing sample; (c) bias-correcting the result to 100% recovery; or (d) if the result would have no significant effect on achievement of the applicable Performance Standard, simply maintaining the qualifier in the database. Sample results associated with an MS/MSD recovery that is greater than the upper control limits presented in Table 5 will not be reanalyzed or bias-corrected and will be used as presented by the laboratory with any appropriate qualifications, as required by the data validation review. The data validation summary report will present the final results as qualified during the data validation review, as well as any bias-corrected results, for comparison to applicable Performance Standards.

7.3.3 Laboratory Control Samples

Analytical methods listed in Table 1 will be utilized for guidance on the use of laboratory control samples. At a minimum, laboratory control samples will be analyzed at the frequency specified in Table 4. The acceptance criteria and the corrective actions to be initiated when the acceptance criteria are exceeded are also specified in Table 4.

Sample results associated with laboratory control sample recoveries that are outside of the control limits presented in Table 5 will be noted. If sample results are associated with a laboratory control sample recovery that is less than the lower control limits presented in Table 5, such results will be qualified as estimated and one of the following steps will be undertaken: (a) collecting and analyzing a new sample from the location in question; (b) reanalyzing the existing sample; (c) bias-correcting the result to 100% recovery; or (d) if the result would have no significant effect on achievement of the applicable Performance Standard, simply maintaining the qualifier in the database. Sample results associated with a laboratory control sample recovery that is greater than the upper control limits presented in Table 5 will not be reanalyzed or bias-corrected and will be used as presented by the laboratory with any appropriate qualifications, as required by the data validation review. The data validation summary report will present the final results as qualified during the data validation review, as well as any bias-corrected results, for comparison to applicable Performance Standards.

7.3.4 Surrogate Spikes

Surrogate spike samples are primarily used in gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS) analyses. Surrogates are compounds unlikely to be found in nature that have properties similar to the analytes of interest. Surrogates are added to the individual samples prior to extraction to provide broader insight into the efficiency of an analytical method on a sample-specific basis. If surrogate spike recoveries are outside of specified limits, then the analytical results need to be evaluated thoroughly in conjunction with other control measures. In the absence of other control measures, the integrity of the data cannot be verified. Re-analysis of the sample with additional controls or different analytical methodologies may be necessary. The analytical methods listed in Table 1 will be utilized for guidance on the use of surrogate samples.

Sample results associated with surrogate spike recoveries that are outside of the control limits presented in Table 5 will be noted. If the sample results are associated with a surrogate spike recovery that is less than the lower control limits presented in Table 5, such results will be qualified as estimated and one of the following steps will be undertaken: (a) collecting and analyzing a new sample from the location in question; (b) reanalyzing the existing sample; or (c) if the result would have no significant effect on achievement of the applicable Performance Standard, simply maintaining the qualifier in the database. Sample results associated with a surrogate spike recovery that is greater than the upper control limits presented in Table 5 will not be reanalyzed and will be used as presented by the laboratory with any appropriate qualifications, as required by the data validation review. The data validation summary report will present the final results as qualified during the data validation review, for comparison to applicable Performance Standards.

7.3.5 Calibration Standards

Calibration check standards analyzed within a particular analytical series give insight into the instrument's stability. An initial calibration will be run following method-specified guidelines. Continuing calibration check standards will be run throughout the analytical sequence as specified in the method and summarized in Table 4.

Calibration check standards will be evaluated following the procedures presented in Section 7.5 and Validation Annexes A through F. Calibration check standards will be used to determine if additional data qualification is required, but will not be utilized to determine the bias of the analytical program. Calibration check standard information will be utilized to qualify the associated analytical data, if required, following the data validation review procedures specified in Section 7.5 and Validation Annexes A through F.

7.4 Data Quality Indicators and Quality Assurance Objectives

Data Quality Indicators (DQIs) will be used to monitor data integrity. DQIs will include analysis of MS/MSDs, QC samples, surrogates, and calibration standards. These quality control samples will be utilized during the data validation review described in Section 7.5 to determine data usability and sample result bias. The DQIs, as well as additional QC objectives, are described below.

7.4.1 Evaluation of Data Quality Indicators

Based on the tiered data validation procedures described in Section 7.5, DQIs will be assessed for compliance with the precision, accuracy, completeness and sensitivity requirements presented below, using the QA criteria presented in Tables 4 and 5.

- <u>Precision</u>: Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. For investigations conducted in accordance with this FSP/QAPP, precision will be defined as the relative percent difference (RPD) between duplicate sample results. The RPD can be calculated for each pair of duplicate analyses using the equation below:

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

Where:

S = First sample value (initial or MS value)
D = Second sample value (duplicate or MSD value)

The duplicate samples that will be utilized to evaluate precision include; laboratory duplicates, field duplicates, and MS/MSD samples. For each analytical program, the percentage of data qualified for MS/MSD, laboratory duplicate, and field duplicate RPD deviations will be summarized in the appropriate data validation report, as discussed in Validation Annexes A through F. The precision goal for analytical programs conducted in accordance with this FSP/QAPP is qualification of less than 25% of the data for an individual program due to precision related parameter deviations.

- <u>Accuracy</u>: Accuracy measures the bias in an analytical system, or the degree of agreement of a measurement with a known reference value. For investigations conducted in accordance with this FSP/QAPP, accuracy will be defined as the percent recovery (%R) of QA/QC samples that are spiked with a known concentration of an analyte of interest. The %R of those samples can be calculated using the equation below:

$$\%R = \frac{A - B}{C} \times 100$$

Where:

A = The analyte concentration determined experimentally from the spiked sample
B = The background level determined by a separate analysis of the unspiked sample.
C = The amount of the spike added.

The QA/QC samples used to evaluate analytical accuracy include; instrument calibration, internal standards, ICP serial dilution analysis, laboratory control samples, MS/MSD samples, and surrogate compound recoveries. For each analytical program, the percentage of data qualified for MS/MSD recovery deviations, ICP serial dilution analysis deviations, surrogate recovery deviations, and calibration deviations will be summarized in the appropriate data validation report, as discussed in Validation Annexes A through F. The accuracy goal for analytical programs conducted in accordance with this FSP/QAPP is qualification of less than 25% of the data for an individual program due to accuracy-related parameter deviations.

- Completeness: Completeness is defined as the percentage of measurements made that are judged to be valid or usable to meet the prescribed DQOs. The completeness of analytical results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using the equation below:

$$\text{Completeness} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100$$

The completeness goal for analytical programs conducted in accordance with this FSP/QAPP is rejection of less than 10% of the data for an individual program due to accuracy-related parameter deviations.

- Sensitivity: The achievement of MDLs depends on instrument sensitivity and matrix effects. Therefore, it is important to monitor the instrument sensitivity to ensure data quality through constant checks on instrument performance. The MDL is defined as the minimum concentration of a substance that can be measured with 99% confidence that the concentration is above zero. The MDL is calculated as follows:

$$MDL = s \times t_{(n-1,\ 1-a=0.99)}$$

Where:

s = standard deviation of replicate analyses

$t_{(n-1,\ 1-a=0.99)}$ = student's t-value for a one-sided 99% confidence level and a standard deviation estimate with n-1 degrees of freedom

The sensitivity goal for analytical programs conducted in accordance with this FSP/QAPP will be developed based on the target MDLs presented in Table 3 and the project-specific DQOs, and will be presented in the appropriate project-specific reports.

7.4.2 Qualitative Quality Assurance Objectives

7.4.2.1 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that pertains to the proper design of the sampling program. The representativeness criterion is best satisfied by making certain that sampling locations are selected properly and a sufficient number of samples are collected. This parameter will be addressed in the project-specific work plans by collecting samples at locations specified in such work plans, and by following the procedures for sample collection/analyses that are described in this FSP/QAPP. Additionally, analytical programs will utilize procedures, as specified in Table 1, consistent with USEPA-approved analytical methodology. QA/QC parameters that are utilized to aid representativeness of environmental samples are holding time and sample preservation. The holding time and sample preservation requirements presented in Table 1 will be used for projects conducted in accordance with this FSP/QAPP to ensure that the environmental samples submitted to the laboratories remain representative of site conditions.

7.4.2.2 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. This goal will be achieved through the use of the standardized techniques for sample collection and analysis presented in this FSP/QAPP. USEPA-approved analytical methods presented in Table 1 are updated on occasion by the USEPA to benefit from recent technological advancements in analytical chemistry and instrumentation. In most cases, the method upgrades include the incorporation of new technology that improves the sensitivity and stability of the instrumentation or allows the laboratory to increase throughput without hindering accuracy and precision. The overall goal for analytical programs conducted in accordance with this FSP/QAPP is to provide comparable analytical data over time through the use of approved analytical techniques that remain consistent in their general approach and continued use of the basic analytical techniques (i.e., sample extraction/preparation, instrument calibration, QA/QC procedures, etc.). Through this use of consistent base analytical procedures and by requiring that updated procedures meet the QA/QC criteria specified in this FSP/QAPP, the analytical data from past, present, and future sampling events should be comparable to allow for qualitative and quantitative assessment of site conditions.

Upon the request of the Agencies, split samples can be provided for independent analyses. Comparability of analytical data obtained from split samples will vary among laboratories and will have to be assessed on a case-by-case basis.

7.4.3 Quantitative Quality Assurance Objectives

7.4.3.1 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event or investigation compared to the total data planned. Completeness of laboratory tests is expected to be 90% or better for investigations conducted in accordance with this FSP/QAPP. The reasons for any variances from 100% completeness will be identified and addressed, as required, in the appropriate data validation report (Section 7.5).

7.4.3.2 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. For investigations conducted in accordance with this FSP/QAPP, precision is defined as the RPD between duplicate sample results. The duplicate samples utilized to evaluate precision include laboratory duplicates, field duplicates, and MS/MSD samples. The goal is to maintain a level of analytical precision consistent with the objectives of the sampling event. To maximize precision, consistent sampling and analytical procedures will be followed as presented in this plan. Control limits for laboratory duplicate, field duplicate, and MS/MSD sample analyses are presented in Tables 4 and 5.

7.4.3.3 Accuracy

Accuracy measures the bias in an analytical system, or the degree of agreement of a measurement with a known reference value. For investigations conducted in accordance with this FSP/QAPP, accuracy is defined as the percent recovery of QA/QC samples that are spiked with a known concentration of an analyte of interest. The

QA/QC samples used to evaluate analytical accuracy include instrument calibration, internal standards, ICP serial dilution analysis, laboratory control samples, MS/MSD samples, and surrogate compound recoveries. Control limits for instrument calibration, internal standards, ICP serial dilution analysis, laboratory control samples, MS/MSD samples, and surrogate compound recoveries are provided in Tables 4 and 5.

7.4.3.4 Sensitivity

The fundamental QA objective with respect to sensitivity of the laboratory analytical data is to achieve the QC acceptance criteria specified in Tables 4 and 5. Additionally, in accordance with USEPA's request, the laboratories will run calibration verification standards and/or calibration standards interspersed within the samples during each 12-hour shift, using low, middle, and high concentration calibration standards on an alternating basis when analytically practical. Further, the laboratories will run a laboratory fortified blank (LFB) at the lowest calibration point concentration every 24-hour period. The sensitivity of analyses is also defined by the MDLs. Unless otherwise specified in the project-specific work plan, the MDLs presented in Table 3 will be utilized to ensure that the laboratory-specific MDLs are sufficient to meet the project-specific DQOs.

7.5 Data Validation

The data produced by the laboratory will be reported to GE and/or the appropriate consultant. The analytical data, including QC data (calibrations, standards, blanks, duplicates) and documentation, will then undergo data validation review by the Overall QA/QC Coordinator and/or his designee following the data validation SOPs presented in Validation Annexes A through F (attached to Volume III of this FSP/QAPP).

All analytical data will be validated to a Tier I level following the procedures presented in the Region I, USEPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses (July 1996, revised December 1996) and the Region I Tiered Organic and Inorganic Data Validation Guidelines (USEPA guidelines). A Tier I review consists of a completeness evidence audit to ensure that all laboratory data and documentation are present. Additionally, for projects subject to this FSP/QAPP, the Tier I review will be modified and expanded to include a number of elements of Tier II review, including review of the data package case narrative, QA/QC Summary forms, and reporting forms for identification of QA/QC deviations that may require qualification of data.

For all analytical data, with the exception of analytical data for PCBs in ambient air samples collected from around GE's On-Plant Consolidation Areas (OPCAs) at the GE facility, a subset of the data will be identified for additional Tier II review. If QA/QC deviations are identified during the modified Tier I review, those deviations will be addressed in the Tier II review. Otherwise, a minimum of 25% of the data will be chosen at random to be subjected to a Tier II review, which will consist of the Tier I completeness evidence audit and review of all data package summary forms for identification of QA/QC parameter deviations. However, for the ambient air PCB data collected from the OPCA air monitors, 100% of the data will be subject to full Tier II review. The Tier II data review will be used to identify and evaluate systematic QA/QC deficiencies that may affect any or all of the sample data presented in a specific data package. The Tier II data validation also includes an evaluation of field duplicate RPD compliance. Additional Tier II review and Tier III review (recalculation of sample results) may also be performed for a larger portion of the data set (i.e., greater than 25% of the data), if required, to fully resolve data usability limitations identified during the modified Tier I data review and/or initial Tier II review for 25% of the data chosen at random.

The tiered data validation procedures consisting of modified Tier I review for all data, Tier II review of a minimum of 25% of the data (or 100% of the ambient air PCB data from the OPCA air monitors), and additional Tier II and Tier III review, as required, will be used to evaluate compliance of each data set with the project-specific DQOs. The procedures presented in Validation Annexes A through F will be used to perform the modified Tier I, Tier II, and Tier III data validation reviews. Following this approach, all data associated with a systematic QA/QC deviation (e.g., low calibration response factors, holding times exceedances, blank contamination, etc.) will be evaluated and qualified, if required, following the procedures presented in Validation Annexes A through F.

7.6 Data Usability and Reconciliation with Data Quality Objectives

Analytical data will be reviewed by GE and consultant Project Managers for compliance with project DQOs, comparability with historical data sets (if available), representativeness of site conditions, and overall data usability for environmental decision-making by following the data assessment process presented on Figure 3. This process involves an initial review of the analytical data to determine analytical method compliance followed by validation of the data as specified in Section 7.5 and Validation Annexes A through F. After completion of the data review procedures, the data validation summary report will be generated to document any data usability limitations that may have been identified. That report will present and describe the qualification of data, if required, and will characterize the overall data usability in terms of the qualitative and quantitative QA objectives described in Sections 7.4.2 and 7.4.3.

Any data usability limitations will be addressed and/or incorporated into the project database and any subsequent project-specific documents, as required. These documents will include a project-specific report that contains the sampling data and sampling locations presented in summary tables and site maps. The sample locations and depths will be compared to approved project-specific work plans to ensure that all proposed samples were collected; if not, any deviations will be noted.

7.7 Assessment of Prior Analytical Data

In addition to new samples, analytical data collected prior to the CD may be utilized to support future remedial design/remedial action (RD/RA) activities or other required activities at areas and properties within or outside the CD Site. Two types of evaluations will typically be made to determine the usability of pre-CD soil data to support RD/RA activities: (1) an evaluation of whether such data reflect the appropriate locations and depth increments necessary to meet the pertinent soil sampling requirements and to apply the applicable Performance Standards; and (2) an assessment of the quality of such data in terms of QA/QC. Thus, pre-CD soil analytical data will first be reviewed to determine whether and to what extent they meet the spatial- and depth-related sampling requirements (i.e., their location and depth increments relative to any project-specific requirements). The data that do so will then be qualitatively assessed for overall analytical quality by reviewing the available documentation. Available laboratory data packages will be reviewed for completeness, the analytical techniques used, and the identification of any apparent method or analytical discrepancies or other significant data quality issues noted in the data packages that could render the data unusable. Based on these reviews, the data may be considered usable to satisfy pre-design investigation requirements (if the requisite locational criteria are met), usable only as "supplemental" data in future RD/RA activities, or not usable at all for RD/RA purposes.

For sample results where only a standard laboratory reporting form or other partial documentation is available, the information included in the available documentation will be reviewed to determine if it is sufficient to identify the analytical methods that were utilized and the associated detection limits. The data in this category may be considered usable to satisfy investigation requirements and for future RD/RA activities if the following conditions are met:

(1) the reporting form confirms the date of sample analyses and thus the analytical methodologies being used at that time;
(2) those analytical methodologies are generally consistent with current procedures;
(3) the reporting form is a laboratory-generated document and thus incorporates certain inherent QA checks performed by the laboratory concerning data quality; and
(4) review of other data collected during the same period and analyzed by the same method for which full laboratory data packages are available indicates that those data are usable, thus suggesting that the analyses from this time period and using the same method are generally of sufficient quality for use.

For other pre-CD data – including (a) PCB data analyzed by earlier methodologies somewhat different from current procedures and/or (b) data for which the only documentation found consists of data summary tables included in prior investigation reports and no form of laboratory documentation can be located -- GE may nevertheless propose to use the sample results in future RD/RA evaluations if, based on other sample results from the Site for which laboratory documentation is available, there is no reason to believe that these data would not be generally comparable to current data or would not otherwise be suitable for use in RD/RA evaluations. However, as a conservative measure, GE will only utilize these results as supplemental data in such evaluations, and will not use these data to satisfy specific investigation requirements (e.g., grid-based sample nodes).

In terms of evaluating the extent to which usable pre-CD PCB data can satisfy grid-based soil sampling requirements, it will be assumed that:

(1) An existing sample location can represent a sample grid node if it is located no more than one-half of the grid node spacing from the sample node in question (e.g., for a 100-foot sample grid pattern, an existing sample location that is within 50 feet of a grid node may be used to represent that grid node); and

(2) Existing sample depths will satisfy a depth interval requirement if the existing depth(s) constitute 50% or more (up to 100%) of the depth requirement.

7.8 Reports to Management

In accordance with Paragraph 67 of the CD, GE will submit monthly progress reports to EPA and MDEP which summarize the status of activities conducted by GE at the portions of the GE Pittsfield/Housatonic River Site subject to the CD. Copies of the reports will also be provided to designated personnel from the National Oceanic and Atmospheric Administration, the U.S. Department of the Interior, the Massachusetts Executive Office of Environmental Affairs, the Connecticut Department of Environmental Protection, the Pittsfield Economic Development Authority, and the City of Pittsfield at a minimum, along with other recipients designated by the aforementioned (e.g., counsel, consultants, or other interested parties). These reports will:

- Describe the actions which have been taken toward achieving compliance with the CD during the previous month;
- Include a summary, including electronic transmission of data to EPA and MDEP, of all results of sampling and tests and all other data received or generated by GE or its contractors relating to the Site under the CD during the previous month;
- Identify all work plans, reports, and other deliverables required under the CD that were completed and submitted during the previous month;
- Describe relevant activities to be taken by GE or its contractors, including, but not limited to data collection and implementation of work plans, which are scheduled to be conducted over the next six weeks;
- Provide information relating to the general progress of activities being undertaken, including unresolved delays encountered or anticipated that may affect future schedules (and a description of efforts made to mitigate such delays); and
- A summary of any modifications to work plans or other schedules that have been proposed by GE and/or approved by EPA.

In addition, GE will submit separate monthly status reports to MDEP which summarize the status of activities conducted by GE at off-site “fill” properties outside of the CD Site that are regulated under the November 13, 2000 ACO executed by GE and MDEP. Copies of these reports will also be provided to EPA, the City of Pittsfield, the Pittsfield Department of Health, and the Pittsfield Conservation Commission, along with other designated recipients. These reports will:

- Describe all tasks that have been completed during the previous month;
- Describe all tasks that have been scheduled but not completed during the previous month and explain the reason why;
- Include a listing of all samples collected and test results received during the previous month;
- Identify all work plans, reports, and other deliverables required under the ACO that were completed and submitted during the previous month;
- Describe activities to be performed by GE or its contractors during the next month;
- Provide information relating to any problems encountered (actual or anticipated) during performance of the activities described in the report.

The CD monthly progress reports and the ACO monthly status reports will be submitted to EPA and MDEP, respectively, by the tenth day of each month.

Generally, the analytical data presented in the CD monthly progress reports will consist of preliminary analytical results provided by GE's laboratories. After completion of the data review procedures discussed in Sections 7.4 through 7.6 above, data validation summary reports will be generated to document any data usability limitations that may have been identified. Those reports are provided as an attachment or addendum to the project reports (e.g., pre-design investigation reports, routine monitoring reports, or RD/RA work plans) submitted to EPA under project-specific schedules identified in EPA-approved work plans or proposals. Those project reports will also discuss any quality assurance problems identified during the evaluation process and, if necessary, propose additional activities to address such issues.

Analytical data are typically not included in the ACO monthly status reports; only a listing of samples collected and analyzed is provided (unless otherwise required by MDEP for specific data). Analytical results from the off-site fill areas are provided to MDEP in project reports submitted in accordance with schedules approved by MDEP, and data validation/evaluation reports are provided as attachments to pertinent submittals.

8. Performance Audits and Corrective Actions

8.1 General

Laboratory and field performance audits will be performed to evaluate and maintain analytical program compliance with the requirements set forth in the FSP/QAPP. Specific corrective action procedures are also required to document and correct QA/QC program deficiencies identified during performance audits. Laboratory audit, field audit, and corrective action procedures are summarized in the following sections.

8.2 Internal Laboratory Audits

A comprehensive QA/QC program will be coordinated by the laboratory. The laboratory will review, approve, and distribute technical and administrative methods and procedures used in project and assay work. These written methods and SOPs, including an updated project file, will be part of the official records.

The internal QC program for the laboratory will consist of two key segments:

- Documented procedures for daily operation of the laboratory; and
- Inspection and review of laboratory procedures by the laboratory Quality Assurance Manager (QAM).

As part of the laboratory inspections, the following items should be reviewed:

- Sample handling;
- Chemical assay procedures and validation;
- Reagent preparation and labeling;
- Analytical controls and standards;
- Instrument calibration and maintenance;
- Results of analyses;
- Data recording and analysis;
- Data archiving procedures;
- Preventative maintenance procedures for laboratory instruments;

- Training, documentation, and personal qualifications; and
- Periodic internal inspections by the laboratory shall be documented by written record.

8.3 Independent Laboratory Audits

GE's Corporate Environmental Programs (CEP) has developed a Corporate Purchasing Agreement (CPA) program for environmental laboratory services. The laboratory CPA was initiated in 1997. The program consists of quality monitoring of each participating laboratory by performing bi-annual audits and annual performance evaluation (PE) studies. Laboratories participating in the program and working on Pittsfield/Housatonic projects must successfully complete an independent audit and maintain MDEP certification that includes annual audits and PE sample analysis. Additionally, technical and QA/QC specifications that define requirements for the laboratory analysis and data package deliverables are incorporated into the laboratory's contract agreement. GE has contracted with a third party QA consultant to assist in administering the CPA, as described below.

GE's CPA program for environmental laboratory services includes the performance of annual audits by a third party QA consultant. The third party QA consultant typically employs audit personnel with a minimum of three to five years experience with environmental laboratory operations and data validation following USEPA-approved methodologies.

Laboratory audits are a requirement of the GE CPA program. Laboratories that participate in the GE CPA program are audited on a bi-annual basis. Each on-site audit is conducted by experienced audit personnel and consists of interviewing laboratory personnel and evaluating laboratory analysis, QA/QC, and documentation practices. The laboratory Quality Assurance Plan (QAP) and SOPs are obtained and reviewed prior to conducting each on-site audit.

The following general areas are evaluated during the laboratory audits:

- Organization and Personnel;
- Personnel Training;
- Laboratory Information Management Systems;

- Sample Bottleware Preparation;
- Sample Receipt and Storage;
- Waste Disposal Procedures;
- Sample Preparation (Organic and Inorganic);
- Sample Analysis Instrumentation and Procedures (Organic, Inorganic, and Wet Chemistry Parameters);
- Documentation;
- Data Package Preparation;
- Overall QC Procedures SOPs; and
- Data Handling and Reporting.

Audit personnel use comprehensive checklists that are proprietary to the QA consultant to assist in conducting the audit and to ensure consistency. In addition to the on-site audit, the latest scores from USEPA and/or State Agencies' Performance Evaluation (PE) samples are evaluated. Building security (fire and break-in protection) is reviewed. The procedures outlined in the SOPs and the QAP are compared to the laboratory personnel responses provided during the on-site audit and to the documentation reviewed prior to and/or during the audit. Discrepancies among these areas are noted.

After completing the on-site audit, a confidential detailed report of the findings of the audit is prepared. The confidential audit report is owned by the laboratory, but made available to GE as a requirement of the CPA program.

Laboratories that do not participate in the GE CPA program that may be selected to provide analytical services as identified in the project-specific SOW documents will not be audited as part of GE's CPA program. Non-CPA program laboratories chosen for project-specific activities will be audited by their State-certifying agency as a requirement of their annual certification program. These laboratories will provide to GE and/or a third party QA consultant, the results and subsequent response to audit findings from their most recent certifying agency audit prior to providing analytical services.

Laboratories participating in the GE CPA program are required to analyze single blind PE samples on an annual basis. The annual PE study is administered and evaluated by a third party QA consultant. The PE samples submitted to the laboratories are generated or obtained by the third party QA consultant. These samples contain chemical constituents that are representative of each major analytical methodology (e.g., PCBs, metals, volatiles, etc.). The results of the PE study are summarized by the third party QA consultant and are provided to the laboratories and/or GE.

8.4 Field Performance Audits

Field performance will be periodically monitored by the sampling team Field Manager and/or Overall QA/QC Coordinator. Field performance audit summaries will be included in field reports during periods of field activity and will contain an evaluation of field measurements and field meter calibrations to verify that measurements are taken according to established protocols. All field reports and the equipment and trip blank data will be reviewed to identify potential deficiencies in field sampling and cleaning procedures.

The Overall QA/QC Coordinator will ensure that field personnel have read appropriate sections of the FSP/QAPP prior to beginning field activities. Prior to beginning any new sampling activity (i.e., one not previously performed by the sampling contractor), the Overall QA/QC Coordinator or his designee will conduct an on-site meeting at the onset of sampling. Periodic audits will also be made of routine sampling activities to determine field activity compliance with the procedures presented in the applicable SOPs contained in Volume II of this FSP/QAPP.

8.5 Corrective Actions

Corrective actions are procedures followed to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected. When a significant condition potentially adverse to quality is noted in the field, the cause of the condition will be determined and corrective action will be taken to preclude repeating the same condition. Condition identification and cause, along with the corrective action(s) to be taken, will be communicated to the GE Project Manager. Implementations of corrective action will be verified by the GE Project Manager and/or the Overall QA/QC Coordinator.

Corrective actions may be initiated, at a minimum, under the following conditions:

- Predetermined data acceptance standards are not attained;
- Procedures are performed incorrectly;
- Equipment or instrumentation is not in proper calibration or is not functioning properly;
- Samples and test results are not completely traceable;
- QA/QC requirements have not been met;
- New issues are discovered during system and performance audits; and
- Follow-up audits will confirm the continued implementation of the corrective action.

8.5.1 Sample Collection/Field Measurements

All project personnel will be responsible for identifying technical or QA non-conformance. If a potential problem is identified, a decision will be made based on the potential for the situation to impact the quality of the data and the need for corrective action.

The Overall QA/QC Coordinator and Field Manager, in consultation with the GE Project Manager (and, for CD work, the Supervising Contractor), will be responsible for ensuring that corrective action (if necessary) for non-conformance is initiated.

Corrective action for field measurements may include the following:

- Evaluating all reported non-conformance;
- Controlling additional work on non-conforming items;
- Determining disposition or action to be taken;
- Ensuring that non-conformance reports are included in the final site documentation in project files;
- Repeat the measurement to check the error;
- Check for proper adjustments and/or calibration; or
- Replace the defective field equipment, if necessary.

8.5.2 Laboratory Analyses

The need for corrective actions will be evaluated whenever an "out-of-limits" event is noted. The investigative action taken is dependent on the analysis and the event. Laboratory personnel will be alerted that corrective actions may be necessary if:

- QC data are outside acceptable windows for precision and accuracy;
- Blanks contain target analytes above acceptable levels as prescribed in the analytical method;
- Undesirable trends are detected in spike recoveries or RPD between duplicates;
- There are unusual changes in detection limits;
- Deficiencies are detected during internal or external audits or from the results of performance evaluation samples; or
- Inquiries concerning data quality are received.

Corrective action procedures are often handled by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, etc. If the problem persists or cannot be identified, the matter should be referred to the laboratory supervisor, manager, and/or QA department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with the QA Department. Corrective action may include:

- Reanalyzing the samples, if holding time criteria permits;
- Resampling and analyzing;
- Evaluating and amending sampling procedures;
- Evaluating and amending analytical procedures; or
- Accepting data and acknowledging the level of uncertainty.

8.6 Preventative Maintenance

8.6.1 Field Instruments and Equipment

Prior to field sampling, each piece of field equipment will be inspected to assure that it is operational. If the equipment is not fully operational it will be serviced prior to use. Meters which require recharging or batteries will be fully charged or have fresh batteries installed. If instrument servicing is required, it is the responsibility of the appropriate task manager to follow the maintenance schedule and arrange for prompt service.

A logbook will be maintained for field equipment. The logbook contains records of operation, maintenance, and calibration.

Field equipment returned from the site will be inspected to confirm that it is in working order. This inspection will be recorded in the logbook. It is the obligation of the last user to record any equipment problems in the logbook.

Non-operational field equipment will be either repaired or replaced. Appropriate spare parts will be maintained for field meters. Details regarding field equipment maintenance, operation, and calibration are provided in Appendix O of this plan.

8.6.2 Laboratory Instruments and Equipment

Laboratory instrument and equipment documentation procedures are provided in the laboratory SOPs. Documentation will include details of any observed problem(s), measures taken to correct the problem(s), routine maintenance, and instrument repair (which will include information regarding the repair and the individual who performed the repair).

Preventative maintenance of laboratory equipment generally will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call from the manufacturer.

References

APHA, AWWA, WPCF, *Standard Methods for the Examination of Water and Waste Water*, 19th edition. American Public Health Association (Washington, DC, 1995).

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USEPA, New England, *Compendium of Quality Assurance Project Plan Guidance*, Draft, September 1998.

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USEPA, Office of Environmental Measurement and Evaluation, Region I, *EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analysis*, July 1996 (Revised December 1996).

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USEPA, Office of Environmental Measurement and Evaluation, *Region I, Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, June 13, 1988 (Modified February, 1989).

USEPA, Office of Enforcement and Compliance Monitoring, *NEIC Policies and Procedures*, EPA 330/9-78-001-R, (Washington, DC, 1978, revised 1986).

USEPA, EMSL-Cincinnati, *Method for Chemical Analysis of Waters and Wastes*, EPA-600/4-79-020 (Cincinnati, OH, 1983).

Tables

TABLE 1
ANALYTICAL METHODS, SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Parameter	Analytical Method	Extraction Method	Cleanup Method	Sample Container[1]	Sample Volume	Preservation[2]	Maximum Holding Time[3]
AIR SAMPLES							
Particulates as PM_{10}	See Appendix J	-	-	-	-	-	-
PCBs (Aroclor-specific)	USEPA TO-4A (See Appendix J) Laboratory SOP (J-2 NE148_05)	Laboratory SOP (J-1 NE151_04)	USEPA TO-4A	Polyurethane foam (PUF) cartridge	23-25 hour composite at 0.20-0.28 m^3/minute with a sample volume between 276 m^3 and 420 m^3	Cool to 4ºC	Extract within 7 days, analyze within 40 days following extraction
WATER SAMPLES							
Volatile Organics	SW-846 Method 8260B	5035 A Purge & Trap	--	2-EnCore™ samplers	-	Cool to 4ºC	48 hours to preservation, 14 days to analysis
Semi-Volatile Organics	SW-846 Method 8270C	3510C-Sep Funnel or 3520C-Continuous	3640-GPC 3660-Sulfur	Amber glass with Teflon-lined cap	(2) 1 liter	Cool to 4ºC	Extract within 7 days, analyze within 40 days following extraction
PCBs (Aroclor-specific)	SW-846 Method 8082	3510C-Sep Funnel or 3520C-Continuous	3620-Florisil 3665-Sulfuric Acid 3660-Sulfur	Amber glass with Teflon-lined cap	(2) 1 liter	Cool to 4ºC	Extract within 7 days, analyze within 40 days following extraction
PCBs (Congener-specific)	NEA-608 CAP[4]	3510C-Sep Funnel or 3520C-Continuous	3620-Florisil 3665-Sulfuric Acid 3660-Sulfur	Amber glass with Teflon-lined cap	(2) 1 liter	Cool to 4ºC	Extract within 7 days, analyze within 40 days following extraction
Organochlorine Pesticides	SW-846 Method 8081A	3510C-Sep Funnel or 3520C-Continuous	3620-Florisil 3640-GPC 3660-Sulfur	Amber glass with Teflon-lined cap	(2) 1 liter	Cool to 4ºC	Extract within 7 days, analyze within 40 days following extraction
Organophosphorous Pesticides	SW-846 Method 8141A	3510C-Sep Funnel or 3520C-Continuous	3620-Florisil	Amber glass with Teflon-lined cap	(2) 1 liter	Cool to 4ºC	Extract within 7 days, analyze within 40 days following extraction
Chlorinated Herbicides	SW-846 Method 8151A	8151A-Sep Funnel or Wrist Shaker	8151A Potassium Hydroxide	Amber glass with Teflon-lined cap	(2) 1 liter	Cool to 4ºC	Extract within 7 days, analyze within 40 days following extraction
Dioxins/Furans	SW-846 Method 8290 or 8280A	8290 or 8280A Sep Funnel	Acid/Base Silica Gel Alumina Carbon	Amber glass with Teflon-lined cap	(2) 1 liter	Cool to 4ºC	Extract within 30 days, analyze within 45 days following extraction
Metals - except mercury	SW-846 Method 6010B/7000A	3005A or 3015 Acid Digestion	--	Plastic	1 liter	adjust to pH <2 with Nitric Acid	6 months
Mercury	SW-846 Method 7470A	7470A Acid Digestion	--	Plastic or glass	Analyze from metals bottle	adjust to pH <2 with Nitric Acid	28 days
Volatile Petroleum Hydrocarbons (VPH)	MDEP-VPH-2004-May	MDEP-VPH-2004-May Purge & Trap	--	Glass, Teflon-lined, septum-sealed screw cap	(2) 40 mL	4 drops Hydrochloric Acid, Cool to 4ºC	14 days
Extractable Petroleum Hydrocarbons (EPH)	MDEP-EPH-2004-May	MDEP-EPH-2004-May Sep Funnel	MDEP-EPH-204-May Silica Gel SPE[5]	Amber glass with Teflon-lined cap	(1) 1 liter	5mL 1:1 Hydrochloric Acid, Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction

TABLE 1
ANALYTICAL METHODS, SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Parameter	Analytical Method	Extraction Method	Cleanup Method	Sample Container[1]	Sample Volume	Preservation[2]	Maximum Holding Time[3]
WATER SAMPLES - CONTINUED							
Cyanide	SW-846 Method 9014	9010B-Distillation	--	Plastic or glass	(1) 1 liter	Adjust to pH>12 with NaOH, cool to 4ºC	14 days
Physiologically Available Cyanide (PAC)	SW-846 Method 9014 and MDEP PAC Protocol	9010B-Distillation and MDEP PAC Protocol	--	Plastic or glass	(1) 1 liter	Adjust to pH>12 with NaOH, cool to 4ºC	14 days
Sulfide	SW-846 Method 9034	9030B-Distillation	--	Plastic or glass	(1) 1 liter	4 drops 2N Zinc Acetate/100mL sample, adjust to pH>9 with NaOH, cool to 4ºC	7 days
TSS/VSS	Standard Method 2540	--	--	Plastic or glass	500 mL	Cool to 4ºC	Begin analysis as soon as possible
Turbidity	Standard Method 2130	--	--	Plastic or glass, amber color preferred	100 mL	Light sensitive, store in dark, cool to 4ºC	Begin analysis as soon as possible
Ammonia	EPA Method 350.1	--	--	Plastic or glass	500 mL	Adjust to pH<2 with H_2SO_4, cool to 4ºC	28 days
Nitrate	EPA Method 353.1 or 300.0	--	--	Plastic or glass	100 mL	Adjust to pH<2 with H_2SO_4, cool to 4ºC	48 hours
Nitrite	EPA Method 354.1 or 300.0	--	--	Plastic or glass	100 mL	Cool to 4ºC	48 hours
Total Kjeldahl Nitrogen	EPA Method 351.3	--	--	Plastic or glass	1 liter	Adjust to pH<2 with H_2SO_4, cool to 4ºC	28 days
Ortho-phosphate (dissolved)	EPA Method 365.2	--	--	Plastic or glass	100 mL	-	48 hours
BOD	EPA Method 405.1	--	--	Plastic or glass	1 liter	Cool to 4ºC	48 hours
COD	EPA Method 410.2	--	--	Plastic or glass	250 mL	Adjust to pH<2 with H_2SO_4, cool to 4ºC	28 days
TSS	EPA Method 160.2	--	--	Plastic or glass	1 liter	Cool to 4ºC	7 days
TDS	EPA Method 160.1	--	--	Plastic or glass	100 mL	Cool to 4ºC	7 days
Hardness	EPA Method 130.2	--	--	Plastic or glass	250 mL	Adjust to pH<2 with HNO_3, cool to 4ºC	180 days
TOC	EPA Method 415.1	--	--	Plastic or glass	100 mL	Adjust to pH<2 with HCL	28 days
SOIL/SEDIMENT SAMPLES							
Volatile Organics - low level	SW-846 Method 8260B	5035	--	Glass, Teflon-lined, septum-sealed screw cap	40 mL	In-field preservation with 0.2g sodium bisulfate per gram of sample, 5 mL organic free reagent water, cool to 4ºC	14 days
				Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Field preservation - Cool to 4ºC. Upon receipt, laboratory to preserve with 1.0mL methanol per gram of sample	Ship to laboratory within 48 hours, analyze within 14 days
				EnCore™ Sampler, SoilCore™ Sampler, or equivalent	3 (5 gram)		

TABLE 1
ANALYTICAL METHODS, SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Parameter	Analytical Method	Extraction Method	Cleanup Method	Sample Container[1]	Sample Volume	Preservation[2]	Maximum Holding Time[3]
SOIL/SEDIMENT SAMPLES - CONTINUED							
Volatile Organics - high level	SW-846 Method 8260B	5035	--	Glass, Teflon-lined, septum-sealed screw cap	40 mL	1 mL methanol per gram of sample, cool to 4ºC	14 days
				Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Field preservation - Cool to 4ºC. Upon receipt, laboratory to preserve with 1.0mL methanol per gram of sample	Ship to laboratory within 48 hours, analyze within 14 days
				EnCore™ Sampler, SoilCore™ Sampler, or equivalent	5 gram		
Semi-Volatile Organics	SW-846 Method 8270C	3550-Sonication or 3540-Soxhlet	3640-GPC 3660-Sulfur	Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
PCBs (Aroclor-specific)	SW-846 Method 8082	3550-Sonication or 3540-Soxhlet	3620-Florisil 3665-Sulfuric Acid 3660-Sulfur	Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
PCBs (Congener-specific)	NEA-608 CAP[4]	3550-Sonication or 3540-Soxhlet	3620-Florisil 3665-Sulfuric Acid 3660-Sulfur	Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
Organochlorine Pesticides	SW-846 Method 8081A	3550-Sonication or 3540-Soxhlet	3620-Florisil 3640-GPC 3660-Sulfur	Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
Organophosphorous Pesticides	SW-846 Method 8141A	3550-Sonication or 3540-Soxhlet	3620-Florisil	Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
Chlorinated Herbicides	SW-846 Method 8151A	8151A Sonication or Shaker	8151A Potassium Hydroxide	Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
Dioxins/Furans	SW-846 Method 8290 or 8280A	8290 or 8280 Soxhlet/Dean Stark	Acid/Base Silica Gel Alumina Carbon	Wide-mouth amber glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 30 days, analyze within 45 days following extraction
Metals - except mercury	SW-846 Method 6010B/7000A	3050B or 3051	--	Plastic	500 mL (16 oz.)	Cool to 4ºC	6 months
Mercury	SW-846 Method 7471A	SW-846 Method 7471A	--	Glass or plastic	Analyze from metals jar	Cool to 4ºC	28 days
Volatile Petroleum Hydrocarbons (VPH)	MDEP-VPH-98-1	MDEP-VPH-98-1 Purge & Trap	--	Glass, Teflon-lined, septum-sealed screw cap	2 (40 mL)	1 mL methanol per gram of soil, cool to 4°C	28 days
				EnCore™ Sampler, SoilCore™ Sampler, or equivalent	15 gram	Cool to 4ºC	Ship to laboratory within 48 hours, analyze within 28 days
Extractable Petroleum Hydrocarbons (EPH)	MDEP-EPH-98-1	MDEP-EPH-98-1 Sonication Soxhlet Soxtec	MDEP-EPH-98-1 Silica Gel SPE[5]	Wide-mouth amber glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 7 days, analyze within 40 days of extraction
Cyanide	SW-846 Method 9014 or 9012	9013-NaOH, 9010B-Distillation, or 9012-Distillation	--	Plastic or glass	Analyze from metals jar	Cool to 4ºC	14 days

TABLE 1
ANALYTICAL METHODS, SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Parameter	Analytical Method	Extraction Method	Cleanup Method	Sample Container[1]	Sample Volume	Preservation[2]	Maximum Holding Time[3]
SOIL/SEDIMENT SAMPLES - CONTINUED							
Sulfide	SW-846 Method 9034	9030B-Distillation	--	Plastic or glass	500 mL (16 oz.)	Fill surface with 2N Zinc Acetate till moistened, cool to 4ºC, store headspace free	14 days
Oil and Grease	SW-846 Method 9071A	9071A-Soxhlet	--	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	28 days
Total Organic Carbon	Lloyd Kahn	--	--	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	14 days
Cesium-137/Beryllium-7	SOP Appendix Y	--	--	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	N/A
BIOTA SAMPLES							
PCBs (Aroclor-specific)[6]	SW-846 Method 8082	3540-Soxhlet	3620-Florisil 3665-Sulfuric Acid 3660-Sulfur	Wrap with aluminum foil and freezer paper	20 grams	Cool to 4ºC, store at laboratory at -20^{o}C	6 months
PCBs (Congener-specific)	SOP Appendix I (Attachment I-1)	3540-Soxhlet	3620-Florisil 3665-Sulfuric Acid 3660-Sulfur	Wrap with aluminum foil and freezer paper	20 grams	Cool to 4ºC, store at laboratory at -20^{o}C	6 months
Dioxins/Furans	SW-846 Method 8290 or 8280A	8290 or 8280A Soxhlet/Dean Stark	Acid/Base Silica Gel Alumina Carbon	Wrap with aluminum foil and freezer paper	50 grams	Cool to 4ºC, store at laboratory at -20^{o}C	Extract within 30 days, analyze within 45 days of collection
Lipid Content	SOP Appendix I (Attachment I-1)	--	--	Wrap with aluminum foil and freezer paper	20 grams	Cool to 4ºC, store at laboratory at -20^{o}C	6 months
LNAPL/DNAPL SAMPLES							
Volatile Organics	SW-846 Method 8260B	5030B Purge & Trap	--	Wide-mouth glass jar with Teflon liner	40 mL	Cool to 4ºC	14 days
Semi-Volatile Organics	SW-846 Method 8270C	3580A Waste Dilution	--	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
PCBs (Aroclor-specific)	SW-846 Method 8082	3580A Waste Dilution	3620-Florisil 3665-Sulfuric Acid 3660-Sulfur	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
PCBs (Congener-specific)	NEA-608 CAP[4]	3580A Waste Dilution	3620-Florisil 3665-Sulfuric Acid 3660-Sulfur	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
Organochlorine Pesticides	SW-846 Method 8081	3580A Waste Dilution	3620-Florisil 3640-GPC 3660-Sulfur	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
Organophosphorous Pesticides	SW-846 Method 8141A	3580A Waste Dilution	3620-Florisil	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction

TABLE 1
ANALYTICAL METHODS, SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Parameter	Analytical Method	Extraction Method	Cleanup Method	Sample Container[1]	Sample Volume	Preservation[2]	Maximum Holding Time[3]
LNAPL/DNAPL SAMPLES - CONTINUED							
Chlorinated Herbicides	SW-846 Method 8151A	8151A-Sep Funnel or Wrist Shaker	8151A Potassium Hydroxide	Wide-mouth glass jar with Teflon liner	125 mL (4 oz.)	Cool to 4ºC	Extract within 14 days, analyze within 40 days following extraction
Dioxins/Furans	SW-846 Method 8280A	8280A Sep Funnel	Acid/Base Silica Gel Alumina Carbon	Wide-mouth amber glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	Extract within 30 days, analyze within 45 days following extraction
Metals - except mercury	SW-846 Method 6010B/7000A	3050B Acid Digestion	--	Plastic	125 mL (4 oz.)	Cool to 4ºC	6 months
Mercury	SW-846 Method 7471A	7471A Acid Digestion	--	Plastic or glass	Analyze from metals jar	Cool to 4ºC	28 days
Cyanide	SW-846 Method 9014	9010B-Distillation	--	Plastic or glass	Analyze from metals jar	Cool to 4ºC	14 days
Sulfide	SW-846 Method 9034	9030B-Distillation	--	Plastic or glass	125 mL (4 oz.)	Cool to 4ºC	7 days
Specific Gravity	ASTM Method D1298	--	--	Plastic or glass	50 mL	Cool to 4ºC	Not Applicable
Viscosity	ASTM Method D445	--	--	Plastic or glass	100 mL	Cool to 4ºC	Not Applicable
Interfacial Tension	ASTM Method D2285-99 or D971-99a	--	--	Plastic or glass	400 mL	Cool to 4ºC	Not Applicable
TCLP SOIL							
Volatile Organics	SW-846 Method 8260B	TCLP Method 1311 followed by 5030B Purge & Trap	--	Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	TCLP Method 1311 within 14 days, analyze within 14 days following Method 1311
Semi-Volatile Organics	SW-846 Method 8270C	TCLP Method 1311 followed by 3510C-Sep Funnel or 3520C-Continuous	3640-GPC 3660-Sulfur	Wide-mouth glass jar with Teflon-lined screw cap	125 mL (4 oz.)	Cool to 4ºC	TCLP Method 1311 within 14 days, preparative extraction within 7 days following Method 1311, analyze within 40 days following preparative extraction
Metals - except mercury	SW-846 Method 6010B/7000A	TCLP Method 1311 followed by 3005A or 3015 Acid Digestion	--	Plastic	500 mL (16 oz.)	Cool to 4ºC	TCLP Method 1311 within 6 months, analyze within 6 months following Method 1311
Mercury	SW-846 Method 7470A	TCLP Method 1311 followed by 7470A Acid Digestion	--	Glass or plastic	Analyze from metals jar	Cool to 4ºC	TCLP Method 1311 within 28 days, analyze within 28 days following Method 1311

References:

USEPA (January, 1996) Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Rev. 3.
APHA, AWWA, WPCF (1985). Standard Methods for the Examination of Water and Wastewater, 18th ed.
USEPA (1983). Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020.
MDEP, Method for the Determination of Volatile Petroleum Hydrocarbons (VPH), January 1998
MDEP, Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), January 1998

Notes:
1 Sample container will be new, pre-cleaned, and certified by manufacturer.
2 Whenever possible, pre-preserved bottles will be used.
3 Holding time measured from date of collection, unless noted.
4 Proprietary method of Northeast Analytical, Inc. (refer to SOP Appendix I, Attachment I-1).
5 Silica Gel Solid Phase Extraction/Fractionization cartridge.
6 Per agreement with EPA as documented in GE's clarification letter of July 19, 2002, the specific analytical technique and handling procedures for these biota samples will be proposed in the project-specific work plan for EPA review and evaluation on a case-by-case basis.

TABLE 2

LISTING OF APPENDIX IX+3 AND TCLP CONSTITUENTS

APPENDIX IX + 3 ANALYTES

SEMIVOLATILE COMPOUNDS BY 8270C

Analyte	CAS No.	Analyte	CAS No.
Acenaphthene	83-32-9	Fluoranthene	206-44-0
Acenaphthylene	208-96-8	Fluorene	86-73-7
Acetophenone	98-86-2	Hexachlorobenzene	118-74-1
2-Acetylaminofluorene	53-96-3	Hexachlorobutadiene	87-68-3
4-Aminobiphenyl	92-67-1	Hexachlorocyclopentadiene	77-47-4
Aniline	62-53-3	Hexachloroethane	67-72-1
Anthracene	120-12-7	Hexachlorophene	70-30-4
Aramite	140-57-8	Hexachloropropene	1888-71-7
Benzidine	92-87-5	Indeno(1,2,3-cd)pyrene	193-39-5
Benzo(a)anthracene	56-55-3	Isodrin	465-73-6
Benzo(a)pyrene	50-32-8	Isophorone	78-59-1
Benzo(b)fluoranthene	205-99-2	Isosafrole	120-58-1
Benzo(g,h,i)perylene	191-24-2	Methapyrilene	91-80-5
Benzo(k)fluoranthene	207-08-9	Methyl methanesulfonate	66-27-3
Benzyl Alcohol	100-51-6	3-Methylcholanthrene	56-49-5
bis(2-chloro-1-methylethyl)ether	108-60-1	2-Methylnaphthalene	91-57-6
bis(2-chloroethoxy)methane	111-91-1	Naphthalene	91-20-3
bis(2-chloroethyl)ether	111-44-4	1,4-Naphthoquinone	130-15-4
bis(2-ethylhexyl)phthalate	117-81-7	1-Naphthylamine	134-32-7
4-Bromophenyl phenyl ether	101-55-3	2-Naphthylamine	91-59-8
Butyl benzyl phthalate	85-68-7	5-Nitro-o-toluidine	99-55-8
p-Chloro-m-cresol	59-50-7	m-Nitroaniline	99-09-2
p-Chloroaniline	106-47-8	o-Nitroaniline	88-74-4
Chlorobenzilate	510-15-6	p-Nitroaniline	100-01-6
2-Chloronaphthalene	91-58-7	Nitrobenzene	98-95-3
2-Chlorophenol	95-57-8	o-Nitrophenol	88-75-5
4-Chlorophenyl-phenylether	7005-72-3	p-Nitrophenol	100-02-7
Chrysene	218-01-9	4-Nitroquinoline-1-oxide	56-57-5
m-Cresol	108-39-4	N-Nitrosodi-n-butylamine	924-16-3
o-Cresol	95-48-7	N-Nitrosodi-n-propylamine	621-64-7
p-Cresol	106-44-5	N-Nitrosodiethylamine	55-18-5
Di-n-butylphthalate	84-74-2	N-Nitrosodimethylamine	62-75-9
Di-n-octylphthalate	117-84-0	N-Nitrosodiphenylamine	86-30-6
Diallate	2303-16-4	N-Nitrosomethylethylamine	10595-95-6
Dibenz(a,h)anthracene	53-70-3	N-Nitrosomorpholine	59-89-2
Dibenzofuran	132-64-9	N-Nitrosopiperidine	100-75-4
m-Dichlorobenzene	541-73-1	N-Nitrosopyrrolidine	930-55-2
o-Dichlorobenzene	95-50-1	Pentachlorobenzene	608-93-5
p-Dichlorobenzene	106-46-7	Pentachloroethane	76-01-7
3,3'-Dichlorobenzidine	91-94-1	Pentachloronitrobenzene	82-68-8
2,4-Dichlorophenol	120-83-2	Pentachlorophenol	87-86-5
2,6-Dichlorophenol	87-65-0	Phenacetin	62-44-2
Diethyl phthalate	84-66-2	Phenanthrene	85-01-8
O,O-Diethyl-O-2-pyrazinyl phosphorothioate	297-97-2	Phenol	108-95-2
Dimethyl phthalate	131-11-3	p-Phenylenediamine	106-50-3
p-(Dimethylamino)azobenzene	60-11-7	2-Picoline	109-06-8
7,12-Dimethylbenz(a)anthracene	57-97-6	Pronamide	23950-58-5
3,3'-Dimethylbenzidine	119-93-7	Pyrene	129-00-0
a,a-Dimethylphenethylamine	122-09-8	Pyridine	110-86-1
2,4-Dimethylphenol	105-67-9	Safrole	94-59-7
4,6-Dinitro-o-cresol	534-52-1	1,2,4,5-Tetrachlorobenzene	95-94-3
m-Dinitrobenzene	99-65-0	2,3,4,6-Tetrachlorophenol	58-90-2
2,4-Dinitrophenol	51-28-5	o-Toluidine	95-53-4
2,4-Dinitrotoluene	121-14-2	1,2,4-Trichlorobenzene	120-82-1

TABLE 2

LISTING OF APPENDIX IX+3 AND TCLP CONSTITUENTS

APPENDIX IX + 3 ANALYTES

SEMIVOLATILE COMPOUNDS BY 8270C (continued)

2,6-Dinitrotoluene	606-20-2	2,4,5-Trichlorophenol	95-95-4
Diphenylamine	122-39-4	2,4,6-Trichlorophenol	88-06-2
1,2-Diphenylhydrazine	122-66-7	o,o,o-Triethyl phosphorothioate	126-68-1
Ethyl Methanesulfonate	62-50-0	sym-Trinitrobenzene	99-35-4

VOLATILE COMPOUNDS BY 8260B

Analyte	CAS No.	Analyte	CAS No.
Acetone	67-64-1	Ethyl Methacrylate	97-63-2
Acetonitrile	75-05-8	Ethylbenzene	100-41-4
Acrolein	107-02-8	2-Hexanone	591-78-6
Acrylonitrile	107-13-1	Isobutyl Alcohol	78-83-1
Allyl Chloride	107-05-1	Methacrylonitrile	126-98-7
Benzene	71-43-2	Methyl Bromide	74-83-9
Bromodichloromethane	75-27-4	Methyl Chloride	74-87-3
Bromoform	75-25-2	Methyl Ethyl Ketone	78-93-3
Carbon Disulfide	75-15-0	Methyl Iodide	74-88-4
Carbon Tetrachloride	56-23-5	Methyl Methacrylate	80-62-6
Chlorobenzene	108-90-7	4-Methyl-2-pentanone	108-10-1
Chloroethane	75-00-3	Methylene Bromide	74-95-3
2-Chloroethylvinylether	110-75-8	Methylene Chloride	75-09-2
Chloroform	67-66-3	Propionitrile	107-12-0
Chloroprene	126-99-8	Styrene	100-42-5
1,2-Dibromo-3-chloropropane	96-12-8	1,1,1,2-Tetrachloroethane	630-20-6
Dibromochloromethane	124-48-1	1,1,2,2-Tetrachloroethane	79-34-5
1,2-Dibromoethane	106-93-4	Tetrachloroethene	127-18-4
trans-1,4-Dichloro-2-butene	110-57-6	Toluene	108-88-3
Dichlorodifluoromethane	75-71-8	1,1,1-Trichloroethane	71-55-6
1,1-Dichloroethane	75-34-3	1,1,2-Trichloroethane	79-00-5
1,2-Dichloroethane	107-06-2	Trichloroethene	79-01-6
1,1-Dichloroethene	75-35-4	Trichlorofluoromethane	75-69-4
trans-1,2-Dichloroethene	156-60-5	1,2,3-Trichloropropane	96-18-4
1,2-Dichloropropane	78-87-5	Vinyl Acetate	108-05-4
cis-1,3-Dichloropropene	10061-01-5	Vinyl Chloride	75-01-4
trans-1,3-Dichloropropene	10061-02-6	Xylene	1330-20-7
1,4-Dioxane	123-91-1		

ORGANOCHLORINE PESTICIDES BY 8081A

Analyte	CAS No.	Analyte	CAS No.
Aldrin	309-00-2	Endosulfan I	959-98-8
Alpha-BHC	319-84-6	Endosulfan II	33213-65-9
Beta-BHC	319-85-7	Endosulfan sulfate	1031-07-8
Delta-BHC	319-86-8	Endrin	72-20-8
Gamma-BHC (Lindane)	58-89-9	Endrin aldehyde	7421-93-4
Chlordane	57-74-9	Endrin ketone	53494-70-5
Alpha-chlordane	5103-71-9	Heptachlor	76-44-8
Gamma-chlordane	5103-74-2	Heptachlor epoxide	1024-57-3
4,4'-DDD	72-54-8	Kepone	143-50-0
4,4'-DDE	72-55-9	Methoxychlor	72-43-5
4,4'-DDT	50-29-3	Toxaphene	8001-35-2
Dieldrin	60-57-1		

TABLE 2

LISTING OF APPENDIX IX+3 AND TCLP CONSTITUENTS

APPENDIX IX + 3 ANALYTES

AROCLORS BY 8082

Analyte	CAS No.	Analyte	CAS No.
Aroclor-1016	12674-11-2	Aroclor-1248	12672-29-6
Aroclor-1221	11104-28-2	Aroclor-1254	11097-69-1
Aroclor-1232	11141-16-5	Aroclor-1260	11096-82-5
Aroclor-1242	53469-21-9		

HERBICIDES BY 8151A

Analyte	CAS No.	Analyte	CAS No.
2,4-D	94-75-4	2,4,5-T	93-76-5
Dinoseb	88-85-7	2,4,5-TP (Silvex)	93-72-1

ORGANOPHOSPHATE PESTICIDES BY 8141A OR 8270

Analyte	CAS No.	Analyte	CAS No.
Dimethoate	60-51-5	Parathion	56-38-2
Disulfoton	298-04-4	Phorate	298-02-2
Famphur	52-85-7	Sulfotepp	3689-24-5
Methyl Parathion	298-00-0		

INORGANICS BY 6010B/7000A, 9010B, 9030B

Analyte	CAS No.	Analyte	CAS No.
Antimony	7440-36-0	Mercury	7439-97-6
Arsenic	7440-38-2	Nickel	7440-02-0
Barium	7440-39-3	Selenium	7782-49-2
Beryllium	7440-41-7	Silver	7440-22-4
Cadmium	7440-43-9	Sulfide	18496-25-8
Chromium	7440-47-3	Thallium	7440-28-0
Cobalt	7440-48-4	Tin	7440-31-5
Copper	7440-50-8	Vanadium	7440-62-2
Cyanide	57-12-5	Zinc	7440-66-6
Lead	7439-92-1		

DIOXIN/FURANS BY 8280A OR 8290

Analyte	CAS No.	Analyte	CAS No.
1,2,3,4,6,7,8-HpCDD	35822-46-9	HxCDFs (total)	55684-94-1
HpCDDs (total)	37871-00-4	1,2,3,7,8-PeCDD	40321-76-4
1,2,3,4,7,8,9-HpCDF	55673-89-7	PeCDDs (total)	36088-22-9
1,2,3,4,6,7,8-HpCDF	67562-39-4	1,2,3,7,8-PeCDF	57117-41-6
HpCDFs (total)	38998-75-3	2,3,4,7,8-PeCDF	57117-31-4
1,2,3,4,7,8-HxCDD	39227-28-6	PeCDFs (total)	30402-15-4
1,2,3,6,7,8-HxCDD	57653-85-7	2,3,7,8-TCDD	1746-01-6
1,2,3,7,8,9-HxCDD	19408-74-3	TCDDs (total)	41903-57-5
HxCDDs (total)	34465-46-8	2,3,7,8-TCDF	51207-31-9
1,2,3,4,7,8-HxCDF	70648-26-9	TCDFs (total)	55722-27-5
1,2,3,6,7,8-HxCDF	57117-44-9	OCDD	3268-87-9
1,2,3,7,8,9-HxCDF	72918-21-9	OCDF	39001-02-0
2,3,4,6,7,8-HxCDF	60851-34-5		

TABLE 2

LISTING OF APPENDIX IX+3 AND TCLP CONSTITUENTS

TCLP ANALYTES

SEMIVOLATILE COMPOUNDS BY 8270C - TCLP

Analyte	CAS No.	Analyte	CAS No.
m-Cresol	108-39-4	Hexachloroethane	67-72-1
o-Cresol	95-48-7	Nitrobenzene	98-95-3
p-Cresol	106-44-5	Pentachlorophenol	87-86-5
2,4-Dinitrotoluene	121-14-2	Pyridine	110-86-1
Hexachlorobenzene	118-74-1	2,4,5-Trichlorophenol	95-95-4
Hexachlorobutadiene	87-68-3	2,4,6-Trichlorophenol	88-06-2

VOLATILE COMPOUNDS BY 8260B - TCLP

Analyte	CAS No.	Analyte	CAS No.
Benzene	71-43-2	1,1-Dichloroethene	75-35-4
Carbon Tetrachloride	56-23-5	Methyl Ethyl Ketone	78-93-3
Chlorobenzene	108-90-7	Tetrachloroethene	127-18-4
Chloroform	67-66-3	Trichloroethene	79-01-6
p-Dichlorobenzene	106-46-7	Vinyl Chloride	75-01-4
1,2-Dichloroethane	107-06-2		

ORGANOCHLORINE PESTICIDES BY 8081A - TCLP

Analyte	CAS No.	Analyte	CAS No.
Gamma-BHC (Lindane)	58-89-9	Heptachlor epoxide	1024-57-3
Chlordane	57-74-9	Methoxychlor	72-43-5
Endrin	72-20-8	Toxaphene	8001-35-2
Heptachlor	76-44-8		

HERBICIDES BY 8151A - TCLP

Analyte	CAS No.	Analyte	CAS No.
2,4-D	94-75-4	2,4,5-TP (Silvex)	93-72-1

INORGANICS BY 6010B/7000A, 9010B, 9030B - TCLP

Analyte	CAS No.	Analyte	CAS No.
Arsenic	7440-38-2	Lead	7439-92-1
Barium	7440-39-3	Mercury	7439-97-6
Cadmium	7440-43-9	Selenium	7782-49-2
Chromium	7440-47-3	Silver	7440-22-4

Notes:

1) This list summarizes the compounds by fraction which are analyzed in accordance with Appendix IX of 40 CFR Part 264, plus three additional constituents (benzidine, 2-Chloroethylvinylether, and 1,2-diphenylhydrazine), hereafter referred to as Appendix IX+3.

2) Laboratories may be subject to instrumentation limitations that will preclude their ability to analyze select compounds from the Appendix IX+3 list. Therefore, individual laboratories may be unable to report results for all constituents presented above.

TABLE 3-A

TYPICAL REPORTING LIMITS, METHOD DETECTION LIMITS (MDLs), AND PRACTICAL QUANTITATION LIMITS (PQLs) FOR WATER, SOIL/SEDIMENT, AND TCLP SAMPLES

Spike/Surrogate Compound	Water (ug/L)				Soil/Sediment (ug/Kg)[1]			TCLP (ug/L)[2]
	Water Type	RL[3]	MDL	PQL	RL[3]	MDL	PQL	RL[3]
Volatiles								
Acetone	All	10	0.39	10	20 / 2000	5.5/395	20 / 2000	NA
Acetonitrile	All	100	5.33	100	100 / 10000	87/2300	100 / 10000	NA
Acrolein	All	100	8.58	100	100 / 10000	16/1200	100 / 10000	NA
Acrylonitrile	All	5.0	1.72	5.0	5.0 / 500	3.0/1100	5.0 / 500	NA
Benzene	All	5.0	0.14	5.0	5.0 / 500	0.80/53.1	5.0 / 500	500
Bromodichloromethane	All	5.0	0.28	5.0	5.0 / 500	0.50/41	5.0 / 500	NA
Bromoform	All	5.0	0.28	5.0	5.0 / 500	0.80/59	5.0 / 500	NA
Bromomethane	All	2.0	0.22	2.0	5.0 / 500	0.80/86	5.0 / 500	NA
Carbon Disulfide	All	5.0	0.50	5.0	5.0 / 500	1.1/64	5.0 / 500	NA
Carbon Tetrachloride	All	5.0	0.33	5.0	5.0 / 500	0.40/48	5.0 / 500	500
Chlorobenzene	All	5.0	0.21	5.0	5.0 / 500	0.90/46	5.0 / 500	100000
Chloroethane	All	5.0	0.68	5.0	5.0 / 500	1.5/240	5.0 / 500	NA
Chloroform	All	5.0	0.27	5.0	5.0 / 500	0.60/53	5.0 / 500	6000
Chloromethane	All	5.0	0.39	5.0	5.0 / 500	0.80/67	5.0 / 500	NA
cis-1,3-Dichloropropene	All	5.0	0.25	5.0	5.0 / 500	0.50/36	5.0 / 500	NA
Dibromochloromethane	All	5.0	0.25	5.0	5.0 / 500	0.90/59	5.0 / 500	NA
Dibromomethane	All	5.0	0.30	5.0	5.0 / 500	0.80/64	5.0 / 500	NA
Dichlorodifluoromethane	All	5.0	0.37	5.0	5.0 / 500	1.2/94	5.0 / 500	NA
Ethyl Methacrylate	All	5.0	0.31	5.0	5.0 / 500	1.1/49	5.0 / 500	NA
Ethylbenzene	All	5.0	0.24	5.0	5.0 / 500	1.5/84	5.0 / 500	NA
Iodomethane	All	5.0	0.28	5.0	5.0 / 500	1.0/61	5.0 / 500	NA
Isobutanol	All	100	25	100	100 / 10000	58/1400	100 / 10000	NA
Methacrylonitrile	All	5.0	0.87	5.0	5.0 / 500	1.0/140	5.0 / 500	NA
Methyl Methacrylate	All	5.0	0.32	5.0	5.0 / 500	1.0/92	5.0 / 500	NA
Methylene Chloride	All	5.0	0.36	5.0	5.0 / 500	1.0/68	5.0 / 500	NA
Propionitrile	All	10	3.89	10	10 / 1000	7.6/950	10 / 1000	NA
Styrene	All	5.0	0.13	5.0	5.0 / 500	0.80/100	5.0 / 500	NA
Tetrachloroethene	All	2.0	0.28	2.0	5.0 / 500	0.70/72	5.0 / 500	NA
Toluene	All	5.0	0.25	5.0	5.0 / 500	0.70/79	5.0 / 500	NA
trans-1,2-Dichloroethene	All	5.0	0.21	5.0	5.0 / 500	1.4/120	5.0 / 500	NA
trans-1,3-Dichloropropene	All	5.0	0.27	5.0	5.0 / 500	1.0/44	5.0 / 500	NA
trans-1,4-Dichloro-2-butene	All	5.0	1.65	5.0	5.0 / 500	1.0/170	5.0 / 500	NA
Trichloroethene	All	5.0	0.27	5.0	5.0 / 500	1.0/45	5.0 / 500	500
Trichlorofluoromethane	All	5.0	0.37	5.0	5.0 / 500	0.50/56	5.0 / 500	NA
Vinyl Acetate	All	5.0	0.81	5.0	5.0 / 500	0.60/63	5.0 / 500	NA
Vinyl Chloride	All	2.0	0.35	2.0	5.0 / 1000	1.1/90	5.0 / 1000	200
Xylenes (total)	All	5.0	0.53	5.0	5.0 / 500	5.8/270	5.0 / 500	NA
1,1,1,2-Tetrachloroethane	All	5.0	0.26	5.0	5.0 / 500	0.60/49	5.0 / 500	NA
1,1,1-Trichloroethane	All	5.0	0.40	5.0	5.0 / 500	0.60/79	5.0 / 500	NA
1,1,2,2-Tetrachloroethane	All	5.0	0.25	5.0	5.0 / 500	0.80/120	5.0 / 500	NA
1,1,2-Trichloroethane	All	5.0	0.35	5.0	5.0 / 500	0.90/63	5.0 / 500	NA
1,1-Dichloroethane	All	5.0	0.21	5.0	5.0 / 500	0.90/55	5.0 / 500	NA
1,1-Dichloroethene	All	5.0	0.41	5.0	5.0 / 500	1.3/120	5.0 / 500	700
1,2,3-Trichloropropane	All	5.0	0.52	5.0	5.0 / 500	0.90/64	5.0 / 500	NA
1,2-Dibromo-3-chloropropane	All	5.0	0.60	5.0	5.0 / 500	3.3/270	5.0 / 500	NA
1,2-Dibromoethane	All	1.0	0.46	1.0	5.0 / 500	1.0/38	5.0 / 500	NA
1,2-Dichloroethane	All	5.0	0.38	5.0	5.0 / 500	0.80/63	5.0 / 500	500
1,2-Dichloropropane	All	5.0	0.26	5.0	5.0 / 500	0.60/58	5.0 / 500	NA
1,4-Dioxane	All	200	8.46	200	100 / 10000	92/1600	100 / 10000	NA
2-Butanone	All	10	0.50	10	10 / 1000	3.7/68	10 / 1000	200000
2-Chloro-1,3-butadiene	All	5.0	1.72	5.0	5.0 / 500	6.0/420	5.0 / 500	NA
2-Chloroethylvinylether	All	5.0	0.45	5.0	5.0 / 500	1.2/58	5.0 / 500	NA
2-Hexanone	All	10	0.39	10	10 / 1000	0.50/130	10 / 1000	NA
3-Chloropropene	All	5.0	0.59	5.0	5.0 / 500	1.3/200	5.0 / 500	NA
4-Methyl-2-pentanone	All	10	0.19	10	10 / 1000	0.90/62	10 / 1000	NA

TABLE 3-A

TYPICAL REPORTING LIMITS, METHOD DETECTION LIMITS (MDLs),
AND PRACTICAL QUANTITATION LIMITS (PQLs)
FOR WATER, SOIL/SEDIMENT, AND TCLP SAMPLES

Spike/Surrogate Compound	Water (ug/L)				Soil/Sediment (ug/Kg)[1]			TCLP (ug/L)[2]
	Water Type	RL[3]	MDL	PQL	RL[3]	MDL	PQL	RL[3]
Volatiles								
1,2-Dichlorobenzene[4]	GW	1.0	0.19	1.0	--	--	--	--
1,3-Dichlorobenzene[4]	GW	1.0	0.23	1.0	--	--	--	--
1,4-Dichlorobenzene[4]	GW	1.0	0.18	1.0	--	--	--	--
Naphthalene[4]	GW	1.0	0.28	1.0	--	--	--	--
1,2,4-Trichlorobenzene[4]	GW	1.0	0.24	1.0	--	--	--	--
Semivolatiles								
a,a'-Dimethylphenethylamine	All	10	3.9	10	670	68	670	NA
Acenaphthene	All	10	1.5	10	330	95	330	NA
Acenaphthylene	All	10	1.2	10	330	32	330	NA
Acetophenone	All	10	1.8	10	330	140	330	NA
Aniline	All	10	1.8	10	330	53	330	NA
Anthracene	All	10	1.1	10	330	63	330	NA
Aramite	All	10	2.2	10	670	280	670	NA
Benzidine	All	20	1.9	20	670	32	670	NA
Benzo(a)anthracene	All	10	1.4	10	330	39	330	NA
Benzo(a)pyrene	All	10	5.1	10	330	37	330	NA
Benzo(b)fluoranthene	All	10	1.8	10	330	79	330	NA
Benzo(g,h,i)perylene	All	10	3.2	10	330	140	330	NA
Benzo(k)fluoranthene	All	10	2.1	10	330	110	330	NA
Benzyl Alcohol	All	20	3.6	20	670	74	670	NA
bis(2-Chloroethoxy)methane	All	10	1.2	10	330	64	330	NA
bis(2-Chloroethyl)ether	All	10	1.7	10	330	62	330	NA
bis(2-Chloroisopropyl)ether	All	10	1.7	10	330	13	330	NA
bis(2-Ethylhexyl)phthalate	All	6.0	1.1	6.0	330	38	330	NA
Butylbenzylphthalate	All	10	2.1	10	330	25	330	NA
Chrysene	All	10	1.3	10	330	35	330	NA
Diallate	All	10	2.8	10	670	95	670	NA
Dibenzo(a,h)anthracene	All	10	0.7	10	330	70	330	NA
Dibenzofuran	All	10	0.9	10	330	60	330	NA
Diethylphthalate	All	10	1.3	10	330	84	330	NA
Dimethylphthalate	All	10	0.8	10	330	56	330	NA
Di-n-Butylphthalate	All	10	2.4	10	330	81	330	NA
Di-n-Octylphthalate	All	10	1.6	10	330	81	330	NA
Diphenylamine	All	10	2.4	10	330	62	330	NA
Ethyl Methanesulfonate	All	10	1.4	10	330	320	330	NA
Fluoranthene	All	10	1.6	10	330	75	330	NA
Fluorene	All	10	1.6	10	330	40	330	NA
Hexachlorobenzene	All	10	2.1	10	330	43	330	130
Hexachlorobutadiene	All	10	3.5	10	330	86	330	500
Hexachlorocyclopentadiene	All	10	3.0	10	330	61	330	NA
Hexachloroethane	All	10	1.6	10	330	110	330	3000
Hexachlorophene	All	10	3.7	10	670	58	670	NA
Hexachloropropene	All	10	1.7	10	330	36	330	NA
Indeno(1,2,3-cd)pyrene	All	10	3.6	10	330	100	330	NA
Isodrin	All	10	1.3	10	330	110	330	NA
Isophorone	All	10	1.6	10	330	54	330	NA
Isosafrole	All	10	2.8	10	670	70	670	NA
Methapyrilene	All	10	3.6	10	670	50	670	NA
Methyl Methanesulfonate	All	10	2.0	10	330	240	330	NA
Naphthalene	All	10	2.3	10	330	44	330	NA
Nitrobenzene	All	10	2.9	10	330	64	330	2000
N-Nitrosodiethylamine	All	10	2.2	10	330	200	330	NA
N-Nitrosodimethylamine	All	10	3.8	10	330	72	330	NA

TABLE 3-A

TYPICAL REPORTING LIMITS, METHOD DETECTION LIMITS (MDLs), AND PRACTICAL QUANTITATION LIMITS (PQLs) FOR WATER, SOIL/SEDIMENT, AND TCLP SAMPLES

Spike/Surrogate Compound	Water (ug/L)				Soil/Sediment (ug/Kg)[1]			TCLP (ug/L)[2]
	Water Type	RL[3]	MDL	PQL	RL[3]	MDL	PQL	RL[3]
Semivolatiles								
N-Nitroso-di-n-butylamine	All	10	2.5	10	670	51	670	NA
N-Nitroso-di-n-propylamine	All	10	2.4	10	330	40	330	NA
N-Nitrosodiphenylamine	All	10	2.4	10	330	69	330	NA
N-Nitrosomethylethylamine	All	10	2.4	10	670	340	670	NA
N-Nitrosomorpholine	All	10	6.2	10	330	150	330	NA
N-Nitrosopiperidine	All	10	2.6	10	330	96	330	NA
N-Nitrosopyrrolidine	All	10	1.7	10	670	100	670	NA
o,o,o-Triethylphosphorothioate	All	10	2.7	10	330	72	330	NA
o-Toluidine	All	10	2.2	10	330	69	330	NA
p-Dimethylaminoazobenzene	All	10	4.2	10	670	140	670	NA
Pentachlorobenzene	All	10	0.8	10	330	63	330	NA
Pentachloroethane	All	10	1.7	10	330	130	330	NA
Pentachloronitrobenzene	All	10	4.9	10	670	120	670	NA
Pentachlorophenol	All	50	6.5	50	1700	58	1700	100000
Phenacetin	All	10	3.9	10	670	270	670	NA
Phenanthrene	All	10	1.6	10	330	38	330	NA
Phenol	All	10	0.8	10	330	67	330	NA
Pronamide	All	10	2.1	10	330	43	330	NA
Pyrene	All	10	2.9	10	330	39	330	NA
Pyridine	All	10	2.2	10	330	150	330	5000
Safrole	All	10	2.9	10	330	92	330	NA
Thionazin	All	10	3.7	10	330	67	330	NA
1,2,4,5-Tetrachlorobenzene	All	10	1.1	10	330	77	330	NA
1,2,4-Trichlorobenzene	All	10	2.1	10	330	82	330	NA
1,2-Dichlorobenzene	All	10	1.5	10	330	61	330	NA
1,2-Diphenylhydrazine	All	10	0.5	10	330	40	330	NA
1,3,5-Trinitrobenzene	All	10	2.6	10	330	78	330	NA
1,3-Dichlorobenzene	All	10	2.1	10	330	69	330	NA
1,3-Dinitrobenzene	All	10	1.5	10	670	64	670	NA
1,4-Dichlorobenzene	All	10	2.8	10	330	100	330	7500
1,4-Naphthoquinone	All	10	0.5	10	670	46	670	NA
1-Naphthylamine	All	10	2.5	10	670	57	670	NA
2,3,4,6-Tetrachlorophenol	All	10	2.0	10	330	87	330	NA
2,4,5-Trichlorophenol	All	10	2.2	10	330	100	330	400000
2,4,6-Trichlorophenol	All	10	2.3	10	330	120	330	2000
2,4-Dichlorophenol	All	10	2.3	10	330	45	330	NA
2,4-Dimethylphenol	All	10	1.6	10	330	51	330	NA
2,4-Dinitrophenol	All	50	2.9	50	1700	110	1700	NA
2,4-Dinitrotoluene	All	10	1.4	10	330	52	330	130
2,6-Dichlorophenol	All	10	1.4	10	330	110	330	NA
2,6-Dinitrotoluene	All	10	3.1	10	330	58	330	NA
2-Acetylaminofluorene	All	10	8.2	10	670	67	670	NA
2-Chloronaphthalene	All	10	0.85	10	330	49	330	NA
2-Chlorophenol	All	10	1.3	10	330	71	330	NA
2-Methylnaphthalene	All	10	0.99	10	330	45	330	NA
2-Methylphenol	All	10	3.0	10	330	100	330	200000
2-Naphthylamine	All	10	2.1	10	670	50	670	NA
2-Nitroaniline	All	50	1.3	50	1700	59	1700	NA
2-Nitrophenol	All	10	1.7	10	670	85	670	NA
2-Picoline	All	10	1.8	10	330	110	330	NA
3,3'-Dichlorobenzidine	All	20	5.3	20	670	29	670	NA
3,3'-Dimethylbenzidine	All	10	2.4	10	330	29	330	NA
3-Methylcholanthrene	All	10	0.68	10	670	56	670	NA
3-Methylphenol	All	10	3.1	10	670	62	670	200000

TABLE 3-A

TYPICAL REPORTING LIMITS, METHOD DETECTION LIMITS (MDLs), AND PRACTICAL QUANTITATION LIMITS (PQLs) FOR WATER, SOIL/SEDIMENT, AND TCLP SAMPLES

Spike/Surrogate Compound	Water (ug/L)				Soil/Sediment (ug/Kg)[1]			TCLP (ug/L)[2]
	Water Type	RL[3]	MDL	PQL	RL[3]	MDL	PQL	RL[3]
Semivolatiles								
3-Nitroaniline	All	50	1.3	50	1700	70	1700	NA
4,6-Dinitro-2-methylphenol	All	50	2.5	50	330	50	330	NA
4-Aminobiphenyl	All	10	2.5	10	670	35	670	NA
4-Bromophenyl-phenylether	All	10	2.0	10	330	79	330	NA
4-Chloro-3-Methylphenol	All	10	6.2	10	330	150	330	NA
4-Chloroaniline	All	10	2.3	10	330	66	330	NA
4-Chlorobenzilate	All	10	3.0	10	670	82	670	NA
4-Chlorophenyl-phenylether	All	10	1.5	10	330	58	330	NA
4-Methylphenol	All	10	3.1	10	670	62	670	200000
4-Nitroaniline	All	50	2.6	50	1700	78	1700	NA
4-Nitrophenol	All	50	1.2	50	1700	140	1700	NA
4-Nitroquinoline-1-oxide	All	10	4.3	10	670	53	670	NA
4-Phenylenediamine	All	10	2.3	10	670	89	670	NA
5-Nitro-o-toluidine	All	10	2.7	10	670	140	670	NA
7,12-Dimethylbenz(a)anthracene	All	10	0.47	10	670	210	670	NA
PCBs (Aroclor-Specific)								
Aroclor-1016	SW	0.022[5]	0.0075[7]	0.022	50	8.9	33	NA
	GW	0.30[6]	0.0417[7]	0.065				
Aroclor-1221	SW	0.022[5]	0.0113[7]	0.022	50	8.9	33	NA
	GW	0.30[6]	0.1480[7]	0.065				
Aroclor-1232	SW	0.022[5]	0.0080[7]	0.022	50	8.9	33	NA
	GW	0.30[6]	0.0210[7]	0.065				
Aroclor-1242	SW	0.022[5]	0.0072[7]	0.022	50	8.9	33	NA
	GW	0.30[6]	0.0470[7]	0.065				
Aroclor-1248	SW	0.022[5]	0.0077[7]	0.022	50	8.9	33	NA
	GW	0.30[6]	0.0065[7]	0.065				
Aroclor-1254	SW	0.022[5]	0.0101[7]	0.022	50	8.9	33	NA
	GW	0.30[6]	0.0306[7]	0.065				
Aroclor-1260	SW	0.022[5]	0.0069[7]	0.022	50	8.9	33	NA
	GW	0.30[6]	0.0158[7]	0.065				
Dioxins/Furans by 8280A								
TCDD	All	0.010	0.0010	0.010	1.0	0.089	1.0	NA
PeCDD	All	0.025	0.0065	0.025	2.5	0.72	2.5	NA
HxCDD	All	0.05	0.0083	0.05	2.5	0.53	2.5	NA
HpCDD	All	0.025	0.0060	0.025	2.5	0.60	2.5	NA
OCDD	All	0.05	0.015	0.05	5.0	0.85	5.0	NA
TCDF	All	0.01	0.0012	0.01	1.0	0.10	1.0	NA
PeCDF	All	0.025	0.0072	0.025	2.5	0.72	2.5	NA
HxCDF	All	0.025	0.0083	0.025	2.5	0.46	2.5	NA
HpCDF	All	0.025	0.0064	0.025	2.5	0.45	2.5	NA
OCDF	All	0.10	0.016	0.10	10	0.75	10	NA
Dioxins/Furans by 8290								
TCDD	All	0.000010	0.0000011	0.000010	0.0010	0.00010	0.0010	NA
PeCDD	All	0.000050	0.0000016	0.000050	0.0050	0.00034	0.0050	NA
HxCDD	All	0.000050	0.0000049	0.000050	0.0050	0.00061	0.0050	NA
HpCDD	All	0.000050	0.0000058	0.000050	0.0050	0.00043	0.0050	NA
OCDD	All	0.00010	0.000038	0.00010	0.010	0.0011	0.010	NA
TCDF	All	0.000010	0.0000009	0.000010	0.0010	0.000094	0.0010	NA
PeCDF	All	0.000050	0.0000057	0.000050	0.0050	0.00031	0.0050	NA
HxCDF	All	0.000050	0.0000072	0.000050	0.0050	0.00044	0.0050	NA
HpCDF	All	0.000050	0.000011	0.000050	0.0050	0.00032	0.0050	NA
OCDF	All	0.00010	0.0000039	0.00010	0.010	0.00066	0.010	NA

TABLE 3-A

TYPICAL REPORTING LIMITS, METHOD DETECTION LIMITS (MDLs), AND PRACTICAL QUANTITATION LIMITS (PQLs) FOR WATER, SOIL/SEDIMENT, AND TCLP SAMPLES

Spike/Surrogate Compound	Water (ug/L)				Soil/Sediment (ug/Kg)[1]			TCLP (ug/L)[2]
	Water Type	RL[3]	MDL	PQL	RL[3]	MDL	PQL	RL[3]
Metals								
Antimony	All	60	8.0	60	6000	800	6000	NA
Arsenic	All	10	4.0	10	1000	400	1000	5000
Barium	All	200	0.70	200	20000	70	20000	100000
Beryllium	All	5.0	0.50	1.0	500	50	150	NA
Cadmium	All	5.0	0.80	5.0	500	80	500	1000
Chromium	All	10	2.5	10	1000	250	1000	5000
Cobalt	All	50	2.5	50	5000	250	5000	NA
Copper	All	25	4.0	25	2500	400	2500	NA
Cyanide	All	10	2.1	10	100	11	100	NA
Lead	All	3.0	2.4	3.0	750	400	750	5000
Mercury	All	0.20	0.15	0.20	100	25	100	200
Nickel	All	40	4.0	40	4000	400	4000	NA
Selenium	All	5.0	4.6	5.0	1000	460	750	1000
Silver	All	7.0	3.0	5.0	1000	300	750	5000
Sulfide	All	1000	5000	1000	5000	5000	5000	NA
Thallium	All	10	8.0	10	1000	800	1000	NA
Tin	All	100	29	30	10000	2900	10000	NA
Vanadium	All	50	3.5	50	5000	350	5000	NA
Zinc	All	20	5.0	20	2000	500	2000	NA
Chlorinated Pesticides								
4,4'-DDD	All	0.10	0.02	0.030	16	0.21	3.3	NA
4,4'-DDE	All	0.10	0.02	0.030	16	0.58	3.3	NA
4,4'-DDT	All	0.10	0.02	0.030	16	0.11	3.3	NA
Aldrin	All	0.05	0.02	0.015	8.0	0.060	1.7	NA
Alpha-BHC	All	0.05	0.01	0.015	8.0	0.090	1.7	NA
Alpha-chlordane	All	0.05	0.01	0.015	8.0	0.070	1.7	30
Beta-BHC	All	0.05	0.01	0.015	8.0	0.17	1.7	NA
Delta-BHC	All	0.05	0.01	0.015	8.0	0.090	1.7	NA
Dieldrin	All	0.10	0.02	0.030	16	0.10	3.3	NA
Endosulfan I	All	0.10	0.01	0.015	16	0.15	3.3	NA
Endosulfan II	All	0.10	0.02	0.030	16	0.21	3.3	NA
Endosulfan sulfate	All	0.10	0.02	0.030	16	0.27	3.3	NA
Endrin	All	0.10	0.03	0.030	16	0.60	3.3	20
Endrin aldehyde	All	0.10	0.02	0.030	16	0.12	3.3	NA
Endrin ketone	All	0.10	0.02	0.030	16	0.060	3.3	NA
Gamma-BHC (Lindane)	All	0.05	0.01	0.015	8.0	0.16	1.7	400
Gamma-chlordane	All	0.05	0.01	0.015	8.0	0.070	1.7	30
Heptachlor	All	0.05	0.04	0.015	8.0	0.080	1.7	8
Heptachlor epoxide	All	0.05	0.04	0.015	8.0	0.060	1.7	8
Methoxychlor	All	0.5	0.15	0.15	80	11.36	17	10000
Technical chlordane	All	0.5	0.02	0.15	80	0.92	1.7	NA
Toxaphene	All	1.0	0.02	0.15	160	5.41	160	500
Chlorinated Herbicides								
2,4-D	All	10	0.03	0.055	800	4.45	500	10000
Dinoseb	All	1.0	0.01	0.055	160	NA	160	NA
2,4,5-T	All	2.0	0.07	0.055	320	15.36	320	NA
2,4,5-TP	All	2.0	0.04	0.055	320	10.19	320	1000
Organophosphate Pesticides								
Dimethoate	All	50	0.85	50	1700	58.2	1700	NA
Disulfoton	All	10	1.8	10	670	57.7	330	NA
Famphur	All	NS	2.7	1.0	NS	130	33	NA
Methyl Parathion	All	10	1.1	10	670	120	330	NA
Parathion	All	10	1.8	10	670	150	330	NA
Phorate	All	10	1.5	10	670	51	330	NA
Sulfotepp	All	10	2.0	10	670	71	330	NA

TABLE 3-A

TYPICAL REPORTING LIMITS, METHOD DETECTION LIMITS (MDLs), AND PRACTICAL QUANTITATION LIMITS (PQLs) FOR WATER, SOIL/SEDIMENT, AND TCLP SAMPLES

Spike/Surrogate Compound	Water (ug/L)				Soil/Sediment (ug/Kg)[1]			TCLP (ug/L)[2]
	Water Type	RL[3]	MDL	PQL	RL[3]	MDL	PQL	RL[3]
Other								
Ammonia	All	0.5	0.34	0.5	5	5	5	NA
Nitrate	All	0.05	0.00	0.05	0.5	0.5	0.5	NA
Nitrite	All	0.05	0.01	0.05	0.5	0.5	0.5	NA
Total Kjeldahl Nitrogen	All	0.5	0.20	0.5	5	5	5	NA
Ortho-phosphate	All	0.02	0.01	0.02	NS	NA	NA	NA
BOD	All	2	1.1	2	NS	NA	NA	NA
COD	All	10	2.3	10	NS	NA	NA	NA
TOC	All	1	0.06	1	0.1%	0.04%	0.1%	NA
TSS	All	5	5.0	5	NS	NA	NA	NA
TDS	All	5	2.2	5	NS	NA	NA	NA
Hardness	All	8	2.7	8	NS	NA	NA	NA
Oil and Grease	All	5	4.2	5	10	10	10	NA
Cesium-137	All	NS	NA	NA	0.1pCi/g	NA	NA	NA

TABLE 3-A

TYPICAL REPORTING LIMITS, METHOD DETECTION LIMITS (MDLs), AND PRACTICAL QUANTITATION LIMITS (PQLs) FOR WATER, SOIL/SEDIMENT, AND TCLP SAMPLES

Notes:

NS Not specified in the analytical method. Laboratory derived MDLs (adjusted for dilution and percent solids) will be used.

NA Not Applicable

[1] Soil/Sediment reporting limits for VOCs are presented for both the low and medium-level analyses.

[2] TCLP Regulatory Limits - Individual sample reporting limits must be at or below these regulatory limits regardless of dilution level and/or matrix interference.

[3] In some cases, due to sample matrix interferences, the laboratories will use other reporting limits. Where technically feasible, these limits will be less than the lowest applicable Performance Standards or relevant MCP Method 1 Standards.

[4] As discussed in 4.2.2 of the FSP/QAPP, these semi-volatile organic compounds (which are also listed below as semi-volatiles) are analyzed for in certain groundwater monitoring that are sampled for GW-2 compliance purposes using the same method used for analysis of volatile organic compounds (Method 8260B).
As such, they have been listed here under volatiles for such groundwater sampling purposes only.

[5] Reporting limits for surface water (SW) samples will be 0.022 ug/L, or will be based on project-specific criteria as specified in the appropriate work plan.

[6] Reporting limits for groundwater (GW) samples will be no higher than 0.30 ug/L, with a goal of achieving a reporting limit of 0.065 ug/L, or will be based on project-specific criteria as specified in the appropriate work plan.

[7] These MDLs have been statistically derived by the laboratories based on MDL studies conducted by the laboratories using laboratory water. They are not specific to this site and may not be achieved in site-specific water samples.

TABLE 3-B

TYPICAL REPORTING LIMITS, METHOD DETECTION LIMITS (MDLs), AND PRACTICAL QUANTITATION LIMITS (PQLs) FOR AIR AND BIOTA SAMPLES

Spike/Surrogate Compound	Air			Biota		
	RL (ug/M^3)	MDL (ug/PUF)	PQL (ug/PUF)	RL[1] (ug/Kg)	MDL (ug/Kg)	PQL (ug/Kg)
PCBs (Aroclor-Specific)						
Aroclor-1016	0.0003[2]	--	0.1 [3]	16	12	50
Aroclor-1221	0.0003[2]	--	0.1 [3]	NS	12	50
Aroclor-1232	0.0003[2]	--	0.1 [3]	NS	12	50
Aroclor-1242	0.0003[2]	--	0.1 [3]	12	12	50
Aroclor-1248	0.0003[2]	--	0.1 [3]	NS	12	50
Aroclor-1254	0.0003[2]	0.03 [3]	0.1 [3]	27	12	50
Aroclor-1260	0.0003[2]	--	0.1 [3]	10	12	50

Notes:

NS Not specified in the analytical method. Laboratory derived MDLs (adjusted for dilution) will be used.

1 In some cases, due to sample matrix interferences, the laboratories will use other reporting limits. Where technically feasible, these limits will be less than the lowest applicable Performance Standards.

2 A total flow volume of 324 m^3/air sample is assumed to achieve the documented RL.

3 Based on a minimum flow volume of 276 m^3/air sample, a MDL of 0.00009 ug/M^3 and a PQL of 0.0003 ug/M^3 are achievable.

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8082	PCB	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils, and Biota	RPD<50% when both detects are greater than 5 times the PQL	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Equipment Blank	1/20 samples	Waters, Soils/Sediments, Oils and Biota	<½ PQL	NA
		Laboratory	Accuracy/bias	Matrix Spike and Matrix Spike Duplicate	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate Batch (Narrate)
			Accuracy/bias	Initial Calibration	Five-point for 1016/1260 mix. Five other aroclors at midpoint concentration analyzed before and after 5 pt.	Waters, Soils/Sediments, Oils and Biota	Linear mean RSD for 1016/1260 mix <20% or linear regression ³0.995	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy/bias	Second Source Calibration Verification	Once per five-point initial calibration for 1016/1260 mix	Waters, Soils/Sediments, Oils and Biota	Mix within ±15% of expected value	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy	Retention Time Window	Each initial calibration and calibration verification for 1016/1260 mix	Waters, Soils/Sediments, Oils and Biota	±3 STD deviations for each analyte retention time in 72-hour period	1. Evaluate 2. Reanalyze all samples analyzed since the last retention time check
			Accuracy/bias	Initial Calibration Verification	Daily before sample analysis for all Aroclors at mid-point	Waters, Soils/Sediments, Oils and Biota	1016/1260 mix within ±15% of expected value	1. Evaluate 2. Recalibrate when QC criteria is not met

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8082	PCB	Laboratory (continued)	Accuracy/bias	Calibration Verification and Pattern Recognition Standards	After every 10 samples for 1016/1260 mix and at end of analysis sequence for 1016/1260 and/or all detected Aroclors	Waters, Soils/Sediments, Oils and Biota	1016/1260 mix within ±15% of expected value	1. Evaluate 2. Clean system 3. Reanalyze calibration verification and all samples since the last acceptable calibration verification
			Accuracy/bias Contamination	Cleanup Blank	1/batch or 1/20 samples per cleanup procedure performed	Waters, Soils/Sediments, Oils and Biota	<½ PQL	1. Evaluate 2. Clean system 2. Reanalyze when QC criteria is not met
			Accuracy/bias	Surrogate	Every sample	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Re-extract as necessary (Narrate)
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½ PQL	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
			Precision-Laboratory (bias)	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
TO-4A	PCB	Field Sampling	Precision-Overall	Field Duplicate (co-located samples)	1 per sampling event	Air	RPD<50% when both detects are greater than 5 times the PQL	NA
			Accuracy/bias Contamination	Trip (Field) Blank	1 per sampling event	Air	<PQL	NA
		Laboratory	Accuracy/bias	Initial Calibration	Five-point for 1016/1260 mix. Five other aroclors at midpoint concentration analyzed before and after 5 pt.	Air	Linear mean RSD for 1016/1260 mix </=20% or linear regression ^{3}0.995	1. Evaluate 2. Recalibrate when QC criteria is not met

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
TO-4A	PCB	Laboratory (continued)	Accuracy/bias	Second Source Calibration Verification	Once per five-point initial calibration for 1016/1260 mix	Air	Mix within ±15% of expected value	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy	Retention Time Window	Each initial calibration and calibration verification for 1016/1260 mix	Air	±3 STD deviations for each analyte retention time in 72-hour period	1. Evaluate 2. Reanalyze all samples analyzed since the last retention time check
			Accuracy/bias	Initial Calibration Verification	Daily before sample analysis for all aroclors at mid-point	Air	1016/1260 mix within ±15% of expected value	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy/bias	Calibration Verification and Pattern Recognition Standards	After every 10 samples for 1016/1260 mix and at end of analysis sequence for 1016/1260 and all detected Aroclors	Air	1016/1260 mix within ±15% of expected value	1. Evaluate 2. Clean system 3. Reanalyze calibration verification and all samples since the last acceptable calibration verification
			Accuracy/bias Contamination	Solvent Blank	1/batch or 1/20 samples per cleanup procedure performed	Air	<PQL	1. Evaluate 2. Clean system 2. Reanalyze when QC criteria is not met
			Accuracy/bias	Surrogate	Every sample	Air	Per Table 5	1. Rerun 2. Re-extract as necessary (Narrate)
			Accuracy/bias Contamination	Laboratory Blank	1/batch or 1/20 samples, whichever more frequent	Air	<PQL	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
			Precision-Laboratory (bias)	Laboratory Control Sample (Matrix Spike Blank)	1/batch or 1/20 samples whichever more frequent	Air	Per Table 5	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8081A 8150B 8141A	Organo-chlorine Pesticides, Herbicides, OP Pesticides	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Equipment Rinsate	1/20 samples	Waters, Soils/Sediments, Oils and Biota	<½ PQL	NA
		Laboratory	Accuracy/bias	Matrix Spike and Matrix Spike Duplicate	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch (Narrate)
			Accuracy/bias	Initial Calibration	Five-point calibration for all analytes prior to sample analysis	Waters, Soils/Sediments, Oils and Biota	Linear mean RSD for all analytes <20%	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy/bias	Second Source Calibration Verification	Once per five-point initial calibration for all analytes	Waters, Soils/Sediments, Oils and Biota	All analytes within ±15% of expected value	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy	Retention Time Window	Each initial calibration and calibration verification	Waters, Soils/Sediments, Oils and Biota	±3 STD deviations for each analyte retention time in 72-hour period	1. Evaluate 2. Reanalyze all samples analyzed since the last retention time check
			Accuracy/bias	Initial Calibration Verification	Daily before sample analysis	Waters, Soils/Sediments, Oils and Biota	All analytes within ±15% of expected value or average of all analytes within ±15%	1. Evaluate 2. Repeat initial calibration
				Calibration Verification	After every 10 samples and at end of sequence			1. Evaluate 2. Clean system 3. Reanalyze calibration verification and all samples since last successful calibration verification
			Accuracy	Second Column Confirmation	100% for all positive results (excluding toxaphene and chlordane)	Waters, Soils/Sediments, Oils and Biota	Same as initial column analyses	1. Same as initial column analyses

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8081A 8150B 8141A	Organo-chlorine Pesticides, Herbicides, OP Pesticides	Laboratory (continued)	Accuracy/bias Contamination	Cleanup Blank	1/batch or 1/20 samples per cleanup procedure performed	Waters, Soils/Sediments, Oils and Biota	<½ PQL	1. Evaluate 2. Clean system 3. Reanalyze as necessary
			Accuracy/bias	Surrogate	Every sample	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Re-extract as necessary (Narrate)
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½PQL	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
			Precision-Laboratory (bias)	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
SW-846 8290	Polychlorinated dibenzo-p-dioxins/ polychlorinated dibenzofurans (PCDD/PCDF) Compounds	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL.	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL.	
			Accuracy/bias Contamination	Equipment Rinsate	1/20 samples	Waters, Soils/Sediments, Oils and Biota	<½PQL	NA
		Laboratory	Accuracy/bias	Matrix Spike and Matrix Spike Duplicate	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch (Narrate)
			Accuracy	Mass Spectrometer Tune	As per SW-8290 Section 7.6.2	Waters, Soils/Sediments, Oils and Biota	As per SW-8290 Section 7.6.2	1. Evaluate 2. Retune instrument, verify
			Accuracy	Chromatographic Resolution	As per SW-8290 Section 8.2.1.2	Waters, Soils/Sediments, Oils and Biota	^{3}75%	1. Evaluate 2. Rerun as necessary
			Accuracy/bias	Initial and Continuing Calibrations	As per SW-8290 Section 7.7	Waters, Soils/Sediments, Oils and Biota	As per SW-8290 Section 7.7	1. Evaluate 2. Recalibrate when QC criteria is not met

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8290	Polychlorinated dibenzo-p-dioxins/ polychlorinated dibenzofurans (PCDD/PCDF) Compounds	Laboratory (continued)	Accuracy	Identification/ Retention Times/Ion Ratios/Signal to Noise/ Interferences	As per SW-8290 Section 7.8.4	Waters, Soils/Sediments, Oils and Biota	As per SW-8290 Section 7.8.4 S/N exceeds 10:1 for all ions Ion abundance ratio ±15%	1. Evaluate 2. Rerun as necessary
				System Performance Check	As per SW-8290 Section 8.2	Waters, Soils/Sediments, Oils and Biota	As per SW-8290 Section 8.2	1. Evaluate 2. Rerun as necessary
			Accuracy	Quality Control Checks	As per SW-8290 Section 8.3	Waters, Soils/Sediments, Oils and Biota	As per SW-8290 Section 8.3	1. Evaluate 2. Rerun as necessary
			Accuracy/bias	Internal Standards	As per SW-8290 Section 8.4	Waters, Soils/Sediments, Oils and Biota	As per SW-8290 Section 8.4 %R= 40% to 135%	1. Evaluate 2. Rerun as necessary
			Accuracy/bias	Surrogate	Every sample	Waters, Soils/Sediments, Oils, and Biota	Per Table 5	1. Rerun 2. Re-extract as necessary (Narrate)
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½PQL	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
			Precision-Laboratory (bias)	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils, and Biota	Per Table 5	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
SW-846 8280A	Polychlorinated dibenzo-p-dioxins/ polychlorinated dibenzofurans (PCDD/PCDF) Compounds	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Equipment Rinsate	1/20 samples	Waters, Soils/Sediments, Oils and Biota	<½PQL	NA
		Laboratory	Accuracy/bias	Matrix Spike and Matrix Spike Duplicate	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch (Narrate)
			Accuracy	Mass Spectrometer Tune	As per SW-8280A Section 7.13.1	Waters, Soils/Sediments, Oils and Biota	As per SW-8280A Section 7.13.1	1. Evaluate 2. Retune instrument, verify
			Accuracy	Chromatographic Resolution	As per SW-8280A Section 7.12.2	Waters, Soils/Sediments, Oils and Biota	^{3}75%	1. Evaluate 2. Rerun as necessary

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8280A	Polychlorinated dibenzo-p-dioxins/ (PCDD/PCDF) Compounds	Laboratory (continued)	Accuracy/bias	Initial and Continuing Calibrations/Ion Abundance/Resolution	As per SW-8280A Section 7.13.3	Waters, Soils/Sediments, Oils and Biota	As per SW-8280A Section 7.13.1	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy	Retention Time Window	As per SW-8280A Section 7.13.2	Waters, Soils/Sediments, Oils and Biota	As per SW-8280A Section 7.13.2	1. Evaluate 2. Rerun as necessary
				Identification	As per SW-8280A Section 7.14.5		As per SW-8280A Section 7.14.5	1. Evaluate 2. Rerun as necessary
			Accuracy	Quality Control Checks	As per SW-8280A Section 8.2	Waters, Soils/Sediments, Oils and Biota	As per SW-8280A Section 8.2	1. Evaluate 2. Rerun as necessary
			Accuracy/bias	Internal Standards	Every sample	Waters, Soils/Sediments, Oils and Biota	Recovery in undiluted extract 25% to 150%	1. Rerun 2. Re-extract as necessary (Narrate)
				Surrogate	Every sample		Per Table 5	1. Rerun 2. Re-extract as necessary (Narrate)
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½PQL	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
			Accuracy/bias	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Evaluate batch (Narrate) 3. Re-extract as necessary
SW-846 6010B	Metal Analytes	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Equipment Rinsate	See Subsection 8.1.3	Waters, Soils/Sediments, Oils and Biota	<½ PQL	NA
		Laboratory	Accuracy/bias	Matrix Spike	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch 2. Redigest as necessary (Narrate)
			Precision-Laboratory (bias)	Laboratory Duplicate	1/20 samples/matrix	Waters	RPD<20% when both detects are greater than 5 times the PQL	1. Rerun 2. Evaluate batch 3. Redigest as necessary (Narrate)
						Soils/Sediments, Oils and Biota	RPD<35% when both detects are greater than 5 times the PQL	

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 6010B	Metal Analytes	Laboratory (continued)	Accuracy/bias	Initial Calibration	Daily prior to sample analysis (min. 1 standard and a blank)	Waters, Soils/Sediments, Oils and Biota	NA	NA
				Initial Calibration Verification	Daily after initial calibration		All analytes within ±10% of expected value	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy/bias Contamination	Calibration Blank (ICB/CCB)	After every calibration/ verification	Waters, Soils/Sediments, Oils and Biota	No analytes detected £½ PQL	1. Evaluate 2. Reanalyze calibration blank and previous 10 samples
			Accuracy/bias	Calibration Verification (Instrument Check Standard)	After every 10 samples and at the end of the analysis sequence	Waters, Soils/Sediments, Oils and Biota	All analytes within ±10% of expected value and RSD of replicate integrations <5%	1. Evaluate 2. Reanalyze calibration and all samples since last successful calibration
			Accuracy	Interference Check Solution	At beginning of analytical run	Waters, Soils/Sediments, Oils and Biota	Within ±20% of expected value	1. Terminate analysis 2. Evaluate 3. Reanalyze ICS and affected samples
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½ PQL	1. Rerun 2. Evaluate batch 3. Redigest as necessary (Narrate)
			Accuracy/bias	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters	75% to125%	1. Rerun 2. Evaluate batch 3. Redigest as necessary (Narrate)
						Soils/Sediments, Oils and Biota	Within vendor supplied limits	
SW-846 9010B	Cyanide	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Equipment Rinsate	1/20 samples	Waters, Soils/Sediments, Oils and Biota	<½ PQL	NA
		Laboratory	Accuracy/bias	Matrix Spike	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch 2. Redigest as necessary (Narrate)

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 9010B	Cyanide	Laboratory (continued)	Precision-Laboratory (bias)	Laboratory Duplicate	1/20 samples/matrix	Waters	RPD<20% when both detects are greater than 5 times the PQL	1. Rerun 2. Evaluate batch 3. Redigest as necessary (Narrate)
						Soils/Sediments, Oils and Biota	RPD<35% when both detects are greater than 5 times the PQL	
			Accuracy/bias	Multipoint Calibration Curve	Daily prior to sample analysis	Waters, Soils/Sediments, Oils and Biota	Correlation coefficient ^{3}0.995 for linear regression	1. Evaluate system 2. Recalibrate when QC criteria is not met
				Distilled Standards	Once per multipoint calibration		Cyanide within ±10% of true value	1. Evaluate 2. Repeat standards
				Second Source Calibration Verification	Once per stock standard preparation		Cyanide within ±15% of expected value	1. Evaluate 2. Recalibrate initial calib.
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½ PQL	1. Rerun 2. Evaluate batch 3. Redigest as necessary (Narrate)
			Accuracy/bias	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	75% to 125%	1. Rerun 2. Evaluate batch 3. Redigest as necessary (Narrate)
Misc. EPA	Conventional Parameters (as defined in Section 4.2.2 of the FSP/QAPP)[a]	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL.	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL.	
			Accuracy/bias Contamination	Equipment Rinsate	1/20 samples	Waters, Soils/Sediments, Oils and Biota	<½ PQL	NA
		Laboratory	Accuracy/bias	Matrix Spike	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch 2. Re-prep/analyze as necessary (Narrate)
				Calibration Curve (where applicable)	Beginning of Analytical Sequence		Per SW-846 Correlation coefficient ^{3}0.995 for linear regression	1. Evaluate system 2. Recalibrate when QC criteria is not met

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
Misc. EPA	Conventional Parameters	Laboratory (continued)	Accuracy/bias Contamination	Initial Calibration Blank (where applicable)	After Initial Calibration Curve	Waters, Soils/Sediments, Oils and Biota	Per SW-846	1. Rerun 2. Clean system 3. Reanalyze affected samples
			Accuracy/bias	Continuing Calibration (where applicable)	Every 2 hrs or 1/10 samples	Waters, Soils/Sediments, Oils and Biota	90% to 110% of true value	1. Evaluate System 2. Repeat calibration check 3. Recalibrate/restandardize when QC criteria is not met
			Precision-Laboratory (bias)	Laboratory Duplicate	1/20 samples/matrix	Waters	RPD<20% when both detects are greater than 5 times the PQL	1. Evaluate System 2. Repeat calibration check 3. Recalibrate/restandardize when QC criteria is not met
						Soils/Sediments, Oils and Biota	RPD<35% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½ PQL	1. Rerun 2. Evaluate batch 3. Re-prep/analyze as necessary (Narrate)
			Accuracy/bias	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Evaluate batch 3. Re-prep/analyze as necessary (Narrate)
SW-846 7470A 7471A	Mercury	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Equipment Rinsate	See Subsection 8.1.3	Waters, Soils/Sediments, Oils and Biota	<½ PQL	NA
		Laboratory	Accuracy/bias	Matrix Spike	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch 2. Redigest as necessary (Narrate)

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 7470A 7471A	Mercury	Laboratory (continued)	Precision-Laboratory (bias)	Laboratory Duplicate (Replicate)	1/20 samples/matrix	Waters	RPD<20% when both detects are greater than 5 times the PQL	1. Evaluate system 2. Repeat calibration check 3. Recalibrate/ restandardize when QC criteria is not met
						Soils/Sediments, Oils and Biota	RPD<35% when both detects are greater than 5 times the PQL	
			Accuracy/bias	Initial Calibration	Daily prior to analysis	Waters, Soils/Sediments, Oils and Biota	Correlation coefficient ^{3}0.995 for linear regression	1. Evaluate 2. Recalibrate when QC criteria is not met
				Second Source Calibration Check Standard	Once per initial daily multipoint calibration		Analyte within ±10% of expected value	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy/bias Contamination	Calibration Blank	One per initial daily multipoint calibration	Waters, Soils/Sediments, Oils and Biota	No analyte detected ^{3}PQL	1. Evaluate 2. Reanalyze blank and all samples associated with blank
			Accuracy/bias	Calibration Verification	After every 10 samples and at end of the analysis sequence	Waters, Soils/Sediments, Oils and Biota	Analyte within ±20% of expected value	1. Evaluate 2.Recalibrate and reanalyze all samples since last successful calibration
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½ PQL	1. Rerun 2. Evaluate batch 3. Redigest as necessary (Narrate)
			Accuracy/bias	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	75% to 125%	1. Rerun 2. Evaluate batch 3. Redigest as necessary (Narrate)
SW-846 8260B	Volatile Organic Compounds	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Trip Blank (VOC only)	1 per cooler	Waters, Soils/Sediments, Oils and Biota	<½ PQL[b]	NA
				Equipment Rinsate	1/20 samples		<½ PQL[b]	NA

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8260B	Volatile Organic Compounds	Laboratory	Accuracy/bias	Matrix Spike/Matrix Spike Duplicate	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch (Narrate)
				Initial Calibration	Five-point calibration for all analytes prior to sample analysis		SPCCs average RF³0.1 or 0.3, as specified in method. mean RSD of all analytes <15% with no CCCs %RSD >30%	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy/bias	Second Source Calibration Verification	Once per five-point initial calibration	Waters, Soils/Sediments, Oils and Biota	All analytes within ±25% of expected value	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy	Retention Time Window	Each sample for each analyte	Waters, Soils/Sediments, Oils and Biota	Relative retention time (RRT) of the analyte within ±0.06 RRT units of the RRT	1. Evaluate 2. Reanalyze all samples analyzed since the last retention time check
			Accuracy/bias	Calibration Verification	Daily, before sample analysis and every 12 hours of analysis time	Waters, Soils/Sediments, Oils and Biota	SPCCs average RF ³0.30 and CCCs£20% difference	1. Evaluate 2. Repeat initial calibration when QC criteria is not met
			Accuracy/bias	Internal Standards	Every sample	Waters, Soils/Sediments, Oils and Biota	Retention time ±30 seconds from RT of the midpoint standard in the initial calibration EICP area within -50% to +100% of initial calib. midpoint standard	1. Evaluate 2. Inspect for malfunctions 3. Reanalyze samples as necessary
			Accuracy	Instrument Performance Check	Prior to initial and calibration verification BFB	Waters, Soils/Sediments, Oils and Biota	Refer to SW-846	1. Evaluate 2. Retune instrument, verify
			Accuracy/bias	Surrogate	Every sample	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Reanalyze as necessary (Narrate)

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8260B	Volatile Organic Compounds	Laboratory (continued)	Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent and, at a minimum, additional blanks should be run when analytes are detected at >100 times the linear range to evaluate possible system contamination	Waters, Soils/Sediments, Oils and Biota	<½ PQL[b]	1. Rerun 2. Evaluate batch (Narrate) 3. Reanalyze as necessary
			Accuracy/bias	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Evaluate batch (Narrate) 3. Reanalyze as necessary
SW-846 8270C	Semivolatile Organic Compounds	Field Sampling	Precision-Overall	Field Duplicate	1/20 samples	Soils/Sediments, Oils and Biota	RPD<50% when both detects are greater than 5 times the PQL	NA
						Waters	RPD<30% when both detects are greater than 5 times the PQL	
			Accuracy/bias Contamination	Equipment Rinsate	1/20 samples	Waters, Soils/Sediments, Oils and Biota	<½ PQL[c]	NA
		Laboratory	Accuracy/bias	Matrix Spike/Matrix Spike Duplicate	Per Field Team Submission or 1/20 samples	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Evaluate batch (Narrate)
				Initial Calibration	Five-point calibration for all analytes prior to sample analysis		SPCCs average RF³0.050, %RSD for RFs for CCCs £30%, and mean RSD of all analytes £15% with no CCCs RSD >30%	1. Evaluate 2. Recalibrate when QC criteria is not met
			Accuracy	Retention Time Window	Each sample for each analyte	Waters, Soils/Sediments, Oils and Biota	Relative retention time (RRT) of the analyte within ±0.06 RRT units of the RRT	1. Evaluate 2. Reanalyze all samples analyzed since the last retention time check

TABLE 4

ANALYTICAL QUALITY CONTROL REQUIREMENTS

Analysis Method	Parameter	Field/Lab Requirement	Data Quality Indicators (DQIs)	Quality Control Check	Frequency	Matrix	Acceptance Criteria	Corrective Action
SW-846 8270C	Semivolatile Organic Compounds	Laboratory (continued)	Accuracy/bias	Calibration Verification	Daily, before sample analysis and every 12 hours of analysis time	Waters, Soils/Sediments, Oils and Biota	SPCCs average RF ³0.05 and CCCs£20% difference, all calibration analytes within ±20% of expected value	1. Evaluate 2. Repeat initial calibration when QC criteria is not met
				Internal Standards	Every sample		Retention time ±30 seconds from RT of the midpoint standard in the initial calibration EICP area within -50% to +100% of initial calib. midpoint standard	1. Evaluate 2. Inspect for malfunctions 3. Reanalyze samples as necessary
			Accuracy	Instrument Performance Check	Prior to initial and calibration verification DFTPP	Waters, Soils/Sediments, Oils and Biota	Refer to SW-846	1. Evaluate 2. Retune instrument, verify
			Accuracy/bias	Surrogate	Every sample	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Re-extract and reanalyze as necessary (Narrate)[d]
			Accuracy/bias Contamination	Method Blank	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	<½ PQL[c]	1. Rerun 2. Evaluate batch (Narrate) 3. Reanalyze as necessary
			Accuracy/bias	Laboratory Control Sample (Matrix Spike Blank)	1/batch/matrix or 1/20 samples, whichever more frequent	Waters, Soils/Sediments, Oils and Biota	Per Table 5	1. Rerun 2. Evaluate batch (Narrate) 3. Reanalyze as necessary

[a] - This listed QA requirements may not apply to all conventional parameters. For example, for total solids analysis, matrix spike criteria do not apply.

[b] - For target analytes. Blank criteria for common 8260 laboratory contaminants;

DCM	< 2.5X PQL
Acetone	< 5X PQL
2-Butanone	< 5X PQL

[c] - For target analytes. Blank criteria for common 8270 laboratory contaminants (i.e. phthalate esters) = 5X PQL

[d] - When more than one base/neutral and or more than one acid surrogate fails the criteria in Table 5.

TABLE 5

QUALITY CONTROL ACCURACY AND PRECISION LIMITS

Fraction	Spike/Surrogate Compound	Water		Soil/Sediment/Biota		Air	
		Percent Recovery	RPD	Percent Recovery	RPD	Percent Recovery	RPD
Volatiles	1,1-Dichloroethane	61 - 145	14	59 - 172	22	-	-
	Trichloroethene	71 - 120	14	62 - 137	24	-	-
	Chlorobenzene	75 - 130	13	60 - 133	21	-	-
	Toluene	76 - 125	13	59 - 139	21	-	-
	Benzene	76 - 127	11	66 - 142	21	-	-
	Toluene-d_8 (Surr)	88 - 110	-	84 - 138	-	-	-
	4-Bromofluorobenzene (Surr)	86 - 115	-	59 - 113	-	-	-
	1,2-Dichloroethane-d4 (Surr)	76 - 114	-	70 - 121	-	-	-
	Dibromofluoromethane	86 - 118	-	80 - 120	-	-	-
Semi-Volatiles (Base/Neutrals)	1,2,4-Trichlorobenzene	39 - 98	28	38 - 107	23	-	-
	Acenaphthene	46 - 118	31	31 - 137	19	-	-
	2,4-Dinitrotoluene	24 - 96	38	28 - 89	47	-	-
	Pyrene	26 - 117	31	35 - 142	36	-	-
	N-Nitrous-di-n-propylamine	41 - 116	38	41 - 126	38	-	-
	1,4-Dichlorobenzene	36 - 97	28	28 - 104	27	-	-
	Nitrobenzene-d_5 (Surr)	35 - 114	-	23 - 120	-	-	-
	2-Fluorobiphenyl (Surr)	43 - 116	-	30 - 115	-	-	-
	p-Terphenyl-d_{14} (Surr)	33 - 141	-	18 - 137	-	-	-
	1,2-Dichlorobenzene-d_4 (Surr)*	16 - 110	-	20 - 130	-	-	-
Semi-Volatiles (Acids)	Pentachlorophenol	9 - 103	50	17 - 109	47	-	-
	Phenol	12 - 110	42	26 - 90	35	-	-
	2-Chlorophenol	27 - 123	40	25 - 102	50	-	-
	4-Chloro-3-methylphenol	23 - 97	42	26 - 103	33	-	-
	4-Nitrophenol	10 - 80	50	11 - 114	50	-	-
	Phenol-d_5 (Surr)	10 - 110	-	24 - 113	-	-	-
	2-Fluorophenol (Surr)	21 - 110	-	25 - 121	-	-	-
	2,4,6-Tribromophenol (Surr)	10 - 123	-	19 - 122	-	-	-
	2-Chlorophenol-d_4 (Surr)*	33 - 110	-	20 - 130	-	-	-
Chlorinated Pesticides	g-BHC	56 - 123	15	46 - 127	50	-	-
	Heptachlor	40 - 131	20	35 - 130	31	-	-
	Aldrin	40 - 120	22	34 - 132	43	-	-
	Dieldrin	52 - 126	18	31 - 134	38	-	-
	Endrin	56 - 121	21	42 - 139	45	-	-
	4,4'-DDT	38 - 127	27	23 - 134	50	-	-
	Tetrachloro-m-xylene (Surr)	60 - 150	-	60 - 150	-	-	-
	Decachlorobiphenyl (Surr)	60 - 150	-	60 - 150	-	-	-
PCBs	Aroclor-1242	39 - 150	27	39 - 150	50	-	-
	Aroclor-1254	29 - 131	27	29 - 131	50	65-125	40
	Aroclor-1260	8 - 127	27	8 - 127	50	-	-
	Tetrachloro-m-xylene (Surr)	60 - 150	-	60 - 150	-	60-120	-
	Decachlorobiphenyl (Surr)	60 - 150	-	60 - 150	-	60-120	-
Herbicides	2,4-D	50 - 135	50	50 - 135	50	-	-
	2,4,5-TP	50 - 135	50	50 - 135	50	-	-
	2,4,5-T	50 - 135	50	50 - 135	50	-	-
	2,4-DB (Surr) or DCAA (Surr)	20 - 150	-	24 - 154	-	-	-
Organo-Phosphorous Pesticides	Dimethoate	50 - 135	50	50 - 135	50	-	-
	Disulfoton	50 - 135	50	50 - 135	50	-	-
	Methyl Parathion	50 - 135	50	50 - 135	50	-	-
	Parathion	50 - 135	50	50 - 135	50	-	-
	Phorate	50 - 135	50	50 - 135	50	-	-
	Sulfotep	50 - 135	50	50 - 135	50	-	-
	Methidathion (Surr)	60 - 120	-	60 - 120	-	-	-
Dioxins/Furans	Dioxins/Furans (MS/MSD/LCS)	50 - 150	-	50 - 150	-	-	-
	Dioxins/Furans (Surrogate)	25 - 150	-	25 - 150	-	-	-
Inorganics	Inorganics	75 - 125[2]	20[3]	75 - 125[2]	35[4]	-	-

Notes:

[1] All matrices other than water
[2] Except where sample concentration exceeds the spike concentration by a factor of four or more.
[3] For analytes less than 5 times the CRDL, a control limit of ±CRDL is used.
[4] For analytes less than 5 times the CRDL, a control limit of ±2CRDL is used.
* These limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed.

TABLE 6

PERFORMANCE STANDARDS IN CONSENT DECREE FOR PCBS IN SOILS/SEDIMENTS AT REMOVAL ACTION AREAS OUTSIDE RIVER

SPATIAL AVERAGE PCB CONCENTRATIONS

(Values are presented in dry-weight parts per million, ppm)

Area (see note 1)	Spatial Averaging Depth Intervals (see note 2)					
	0' to 1'	0' to 3'	1' to 3'	1' to 6'	0' to 15'	1' to X'
GE Plant Area (see note 3)						
20s Complex (Area 3)	25	--	--	200	100	--
30s Complex (Area 2)	25	--	--	200	100	--
40s Complex (Area 1)	25	--	--	200	100	--
East Street Area 2 - South (Area 4)						
60s Complex	25	--	--	200	100	--
Former Gas Plant / Scrap Yard Area	25	--	--	200	100	--
Potential Future City Recreational Area (see note 4)	--	--	15	--	--	--
200-Foot Wide Industrial Averaging Strip	25	--	--	200	100	--
200-Foot Riparian Removal Zone (see note 5)	10	--	15	--	100	--
East Street Area 2 - North (Area 5)	25	--	--	200	100	--
East Street Area 1 - North (Area 6) (see note 6)	25	--	--	200	100	--
U.S. Generating Company (Area 8)	25	--	--	200	100	--
Hill 78 Area - Remainder (excluding Consolidation Areas) (Area 7)	25	--	--	200	100	--
Unkamet Brook Area (excluding former landfill) (Area 9)						
GE Plastics Area	25	--	--	200	100	--
OP-1/OP-2 Area	25	--	--	200	100	--
Area East of Landfill (excluding Inundated Wetlands)	10	--	15	--	100	--
OP-3 Area (non-GE-owned) (with ERE)	25	--	--	200	100	--
OP-3 Area (non-GE-owned) (without ERE)	25	25	--	200	100	--
Other Non-GE-Owned Commercial Area (with ERE)	25	--	--	200	100	--
Other Non-GE-Owned Commercial Area (without ERE)	25	25	--	200	100	--
Recreational Area Near OP-3 (with ERE)	10	--	15	--	100	--
Recreational Area Near OP-3 (without ERE)	10	10	--	--	100	--
Floodplain Recreational Areas (with EREs)	10	--	15	--	100	--
Floodplain Recreational Areas (without EREs)	10	10	--	--	100	--
East of Landfill - Inundated Wetlands (2 wetland areas)	1	--	--	--	--	--
Unkamet Brook Sediments (3 reaches)	1	--	--	--	--	--
Former Oxbow Areas (Areas 11, 12, 13, 14, 15)						
Residential Properties (see notes 7 and 8)	2	--	--	--	--	2
Commercial/Industrial Properties (with EREs) (see notes 7 and 9)	25	--	--	200	100	--
Commercial/Industrial Properties (without EREs) (see notes 7 and 9)	25	25	--	200	100	--
Recreational Properties (with EREs) (see notes 7 and 9)	10	--	15	--	100	--
Recreational Properties (without EREs) (see notes 7 and 9)	10	10	--	--	100	--
GE-Owned Parking Lots (Lyman and Newell) (see note 5)	10	--	15	--	100	--
GE-Owned Wooded Area (Newell Street II)	10	--	15	--	100	--
GE-Owned Riparian Strip (Newell Street I)	10	--	15	--	100	--
Housatonic River - 1.5-Mile Reach						
Current Residential Properties (see notes 7 and 8)	2	--	--	--	--	2
Current Recreational Properties (with EREs) (see notes 7 and 9)	10	--	15	--	100	--
Current Recreational Properties (without EREs) (see notes 7 and 9)	10	10	--	--	100	--
Current Commercial/Industrial Properties (with EREs) (see notes 7 and 9)	25	--	--	200	100	--
Current Commercial/Industrial Properties (without EREs) (see notes 7 and 9)	25	25	--	200	100	--
Housatonic River - Downstream of Confluence						
Current Residential Properties (see notes 7, 8, and 10)	2	--	--	--	--	2
Silver Lake Bank Areas						
Current Residential Properties (banks only) (see notes 8 and 11)	2	--	--	--	--	2
Current Non-Residential Properties (with EREs) (see note 11)	10	--	15	--	--	--
Current Non-Residential Properties (without EREs) (see note 11)	10	10	--	--	--	--

TABLE 6

PERFORMANCE STANDARDS IN CONSENT DECREE FOR PCBS IN SOILS/SEDIMENTS
AT REMOVAL ACTION AREAS OUTSIDE RIVER

SPATIAL AVERAGE PCB CONCENTRATIONS
(Values are presented in dry-weight parts per million, ppm)

Notes:

1. Figure 1 of this document depicts the general Removal Action Areas (RAAs) at the CD Site (excluding the Housatonic River and its floodplain). Subareas within specific RAAs are depicted in Attachment E to the SOW.
2. -- = Intervals where spatial averaging will not be performed.
3. The designated averaging areas at the GE Plant Area are subject to the conditions and possible modifications described in Section 2.1 of Attachment E to the SOW.
4. For this area, spatial averaging will not be separately performed for depth intervals of 1- to 6-feet or 0- to 15-feet. For such intervals, this area will be included in the former gas plant/scrap yard area.
5. In the 200-foot riparian removal zone and the GE-owned Lyman Street and Newell Street parking lots, GE may forgo installation of a vegetative engineered barrier for discrete areas where (based on spatial averaging) PCBs are below 10 ppm in the top foot, 15 ppm at the 1- to 3-foot depth, and 100 ppm in the top 15 feet.
6. For the non-GE-owned portion of this area, spatial averaging will be performed for the same depth intervals specified below for commercial/industrial properties (depending on whether an ERE is obtained).
7. The specific averaging areas for these properties will be determined as described in Section 2.1 of Attachment E to the SOW.
8. At residential properties, spatial averaging will be performed for the 0- to 1-foot and 1- to X-foot depth intervals, where X equals the maximum depth at which PCBs were detected (up to a maximum depth of 15 feet).
9. If PCB soil data does not exist to 15 feet, the spatial average PCB calculations for the 0- to 15-foot depth increment shall extend to whatever depth sampling data exist.
10. For current residential properties downstream of the confluence, spatial averaging will also be performed for the 0- to 0.5-foot depth interval on the portion of each property that does not constitute an Actual/Potential Lawn, for purposes of applying STM criteria.
11. For these properties, spatial averaging will be separately performed for the bank soils at each residential property subject to the Consent Decree and each commercial property and at the remaining recreational averaging area shown on Figure 2-25 of the SOW.
12. EREs = Environmental Restrictions and Easements.

TABLE 7

MCP METHOD 1 STANDARDS FOR GW-2 AND GW-3 GROUNDWATER

Analyte Identification	CAS Number	Method 1 GW-2 Standard (ppm)	Method 1 GW-3 Standard (ppm)
PCBs			
Aroclor-1016	12674-11-2	-	-
Aroclor-1221	11104-28-2	-	-
Aroclor-1232	11141-16-5	-	-
Aroclor-1242	53469-21-9	-	-
Aroclor-1248	12672-29-6	-	-
Aroclor-1254	11097-69-1	-	-
Aroclor-1260	11096-82-5	-	-
Total PCBs	N/A	-	-
Filtered PCBs	N/A	-	0.0003
Appendix IX+3 Volatiles			
Acetone	67-64-1	50	50
Acetonitrile	75-05-8	-	-
Acrolein	107-02-8	-	-
Acrylonitrile	107-13-1	-	-
Allyl Chloride	107-05-1	-	-
Benzene	71-43-2	2	10
Bromodichloromethane	75-27-4	0.006	50
Bromoform	75-25-2	0.7	50
Carbon Disulfide	75-15-0	-	-
Carbon Tetrachloride	56-23-5	0.002	5
Chlorobenzene	108-90-7	0.2	1
Chloroethane	75-00-3	-	-
2-Chloroethylvinylether	110-75-8	-	-
Chloroform	67-66-3	0.4	10
Chloroprene	126-99-8	-	-
1,2-Dibromo-3-chloropropane	96-12-8	-	-
Dibromochloromethane	124-48-1	0.02	50
1,2-Dibromoethane (Ethylene dibromide)	106-93-4	0.002	50
trans-1,4-Dichloro-2-butene	110-57-6	-	-
Dichlorodifluoromethane	75-71-8	-	-
1,1-Dichloroethane	75-34-3	1	20
1,2-Dichloroethane	107-06-2	0.005	20
1,1-Dichloroethene	75-35-4	0.08	30
trans-1,2-Dichloroethene	156-60-5	0.09	50
1,2-Dichloropropane	78-87-5	0.003	50
cis-1,3-Dichloropropene	10061-01-5	-	-
trans-1,3-Dichloropropene	10061-02-6	-	-
1,4-Dioxane	123-91-1	-	-
Ethyl Methacrylate	97-63-2	-	-
Ethylbenzene	100-41-4	30	4
2-Hexanone	591-78-6	-	-
Isobutyl Alcohol	78-83-1	-	-
Methacrylonitrile	126-98-7	-	-
Methyl Bromide (Bromomethane)	74-83-9	0.002	50
Methyl Chloride	74-87-3	-	-
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	50
Methyl Iodide	74-88-4	-	-
Methyl Methacrylate	80-62-6	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone)	108-10-1	50	50
Methylene Bromide	74-95-3	-	-
Methylene Chloride	75-09-2	10	50
Propionitrile	107-12-0	-	-
Styrene	100-42-5	0.1	6
1,1,1,2-Tetrachloroethane	630-20-6	0.01	50
1,1,2,2-Tetrachloroethane	79-34-5	0.009	50

TABLE 7

MCP METHOD 1 STANDARDS FOR GW-2 AND GW-3 GROUNDWATER

Analyte Identification	CAS Number	Method 1 GW-2 Standard (ppm)	Method 1 GW-3 Standard (ppm)
Appendix IX+3 Volatiles (continued)			
Tetrachloroethene	127-18-4	0.05	30
Toluene	108-88-3	8	4
1,1,1-Trichloroethane	71-55-6	4	20
1,1,2-Trichloroethane	79-00-5	0.9	50
Trichloroethene	79-01-6	0.03	5
Trichlorofluoromethane	75-69-4	-	-
1,2,3-Trichloropropane	96-18-4	-	-
Vinyl Acetate	108-05-4	-	-
Vinyl Chloride	75-01-4	0.002	50
Xylene	1330-20-7	9	0.5
Appendix IX+3 Semi-volatiles			
Acenaphthene	83-32-9	-	5
Acenaphthylene	208-96-8	-	3
Acetophenone	98-86-2	-	-
2-Acetylaminofluorene	53-96-3	-	-
4-Aminobiphenyl	92-67-1	-	-
Aniline	62-53-3	-	-
Anthracene	120-12-7	-	3
Aramite	140-57-8	-	-
Benzidine	92-87-5	-	-
Benzo(a)anthracene	56-55-3	-	1
Benzo(a)pyrene	50-32-8	-	0.5
Benzo(b)fluoranthene	205-99-2	-	0.4
Benzo(g,h,i)perylene	191-24-2	-	3
Benzo(k)fluoranthene	207-08-9	-	0.1
Benzyl Alcohol	100-51-6	-	-
bis(2-chloro-1-methylethyl)ether	108-60-1	-	-
bis(2-chloroethoxy)methane	111-91-1	-	-
bis(2-chloroethyl)ether	111-44-4	0.03	50
bis(2-ethylhexyl)phthalate	117-81-7	50	0.03
4-Bromophenyl phenyl ether	101-55-3	-	-
Butyl benzyl phthalate	85-68-7	-	-
p-Chloro-m-cresol	59-50-7	-	-
p-Chloroaniline	106-47-8	50	0.3
Chlorobenzilate	510-15-6	-	-
2-Chloronaphthalene	91-58-7	-	-
2-Chlorophenol	95-57-8	-	40
4-Chlorophenyl-phenylether	7005-72-3	-	-
Chrysene	218-01-9	-	3
3-Methylphenol (m-cresol)	108-39-4	-	-
2-Methylphenol (o-cresol)	95-48-7	-	-
4-Methylphenol (p-cresol)	106-44-5	-	-
Di-n-butylphthalate	84-74-2	-	-
Di-n-octylphthalate	117-84-0	-	-
Diallate	2303-16-4	-	-
Dibenzo(a,h)anthracene	53-70-3	-	0.04
Dibenzofuran	132-64-9	-	-
m-Dichlorobenzene (1-3 DCB)	541-73-1	2	50
o-Dichlorobenzene (1-2 DCB)	95-50-1	2	2
p-Dichlorobenzene (1-4 DCB)	106-46-7	0.2	8
3,3'-Dichlorobenzidine	91-94-1	-	2
2,4-Dichlorophenol	120-83-2	30	2
2,6-Dichlorophenol	87-65-0	-	-
Diethyl phthalate	84-66-2	50	9
O,O-Diethyl-O-2-pyrazinyl phosphorothioate	297-97-2	-	-

TABLE 7

MCP METHOD 1 STANDARDS FOR GW-2 AND GW-3 GROUNDWATER

Analyte Identification	CAS Number	Method 1 GW-2 Standard (ppm)	Method 1 GW-3 Standard (ppm)
Appendix IX+3 Semi-volatiles (continued)			
Dimethyl phthalate	131-11-3	50	50
p-(Dimethylamino)azobenzene	60-11-7	-	-
7,12-Dimethylbenz(a)anthracene	57-97-6	-	-
3,3'-Dimethylbenzidine	119-93-7	-	-
a,a-Dimethylphenethylamine	122-09-8	-	-
2,4-Dimethylphenol	105-67-9	40	50
4,6-Dinitro-o-cresol	534-52-1	-	-
m-Dinitrobenzene	99-65-0	-	-
2,4-Dinitrophenol	51-28-5	50	20
2,4-Dinitrotoluene	121-14-2	20	50
2,6-Dinitrotoluene	606-20-2	-	-
Diphenylamine	122-39-4	-	-
1,2-Diphenylhydrazine	122-66-7	-	-
Ethyl Methanesulfonate	62-50-0	-	-
Fluoranthene	206-44-0	-	0.2
Fluorene	86-73-7	-	3
Hexachlorobenzene	118-74-1	0.001	6
Hexachlorobutadiene	87-68-3	0.001	3
Hexachlorocyclopentadiene	77-47-4	-	-
Hexachloroethane	67-72-1	0.1	50
Hexachlorophene	70-30-4	-	-
Hexachloropropene	1888-71-7	-	-
Indeno(1,2,3-cd)pyrene	193-39-5	-	0.1
Isodrin	465-73-6	-	-
Isophorone	78-59-1	-	-
Isosafrole	120-58-1	-	-
Methapyrilene	91-80-5	-	-
Methyl methanesulfonate	66-27-3	-	-
3-Methylcholanthrene	56-49-5	-	-
2-Methylnaphthalene	91-57-6	10	3
Naphthalene	91-20-3	1	20
1,4-Naphthoquinone	130-15-4	-	-
1-Naphthylamine	134-32-7	-	-
2-Naphthylamine	91-59-8	-	-
5-Nitro-o-toluidine	99-55-8	-	-
m-Nitroaniline	99-09-2	-	-
o-Nitroaniline	88-74-4	-	-
p-Nitroaniline	100-01-6	-	-
Nitrobenzene	98-95-3	-	-
o-Nitrophenol	88-75-5	-	-
p-Nitrophenol	100-02-7	-	-
4-Nitroquinoline-1-oxide	56-57-5	-	-
N-Nitrosodi-n-butylamine	924-16-3	-	-
N-Nitrosodi-n-propylamine	621-64-7	-	-
N-Nitrosodiethylamine	55-18-5	-	-
N-Nitrosodimethylamine	62-75-9	-	-
N-Nitrosodiphenylamine	86-30-6	-	-
N-Nitrosomethylethylamine	10595-95-6	-	-
N-Nitrosomorpholine	59-89-2	-	-
N-Nitrosopiperidine	100-75-4	-	-
N-Nitrosopyrrolidine	930-55-2	-	-
Pentachlorobenzene	608-93-5	-	-
Pentachloroethane	76-01-7	-	-
Pentachloronitrobenzene	82-68-8	-	-
Pentachlorophenol	87-86-5	-	0.2

TABLE 7

MCP METHOD 1 STANDARDS FOR GW-2 AND GW-3 GROUNDWATER

Analyte Identification	CAS Number	Method 1 GW-2 Standard (ppm)	Method 1 GW-3 Standard (ppm)
Appendix IX+3 Semi-volatiles (continued)			
Phenacetin	62-44-2	-	-
Phenanthrene	85-01-8	-	0.05
Phenol	108-95-2	50	2
p-Phenylenediamine	106-50-3	-	-
2-Picoline	109-06-8	-	-
Pronamide	23950-58-5	-	-
Pyrene	129-00-0	-	0.02
Pyridine	110-86-1	-	-
Safrole	94-59-7	-	-
1,2,4,5-Tetrachlorobenzene	95-94-3	-	-
2,3,4,6-Tetrachlorophenol	58-90-2	-	-
o-Toluidine	95-53-4	-	-
1,2,4-Trichlorobenzene	120-82-1	2	50
2,4,5-Trichlorophenol	95-95-4	50	3
2,4,6-Trichlorophenol	88-06-2	5	0.5
o,o,o-Triethyl phosphorothioate	126-68-1	-	-
sym-Trinitrobenzene	99-35-4	-	-
Appendix IX+3 Pesticides/Herbicides			
ORGANOCHLORINE PESTICIDES			
Aldrin	309-00-2	0.002	0.02
Alpha-BHC	319-84-6	-	-
Beta-BHC	319-85-7	-	-
Delta-BHC	319-86-8	-	-
Gamma-BHC (Lindane)	58-89-9	-	0.0008
Chlordane	57-74-9	-	0.002
Alpha-chlordane	5103-71-9	-	-
Gamma-chlordane	5103-74-2	-	-
4,4'-DDD	72-54-8	-	0.05
4,4'-DDE	72-55-9	-	0.4
4,4'-DDT	50-29-3	-	0.001
Dieldrin	60-57-1	0.008	0.0005
Endosulfan	115-29-7	-	0.002
Endosulfan I	959-98-8	-	-
Endosulfan II	33213-65-9	-	-
Endosulfan sulfate	1031-07-8	-	-
Endrin	72-20-8	-	0.005
Endrin aldehyde	7421-93-4	-	-
Endrin ketone	53494-70-5	-	-
Heptachlor	76-44-8	0.002	0.001
Heptachlor epoxide	1024-57-3	0.007	0.002
Kepone	143-50-0	-	-
Methoxychlor	72-43-5	-	0.01
Toxaphene	8001-35-2	-	-
ORGANOPHOSPHATE PESTICIDES			
Dimethoate	60-51-5	-	-
Disulfoton	298-04-4	-	-
Famphur	52-85-7	-	-
Methyl Parathion	298-00-0	-	-
Parathion	56-38-2	-	-
Phorate	298-02-2	-	-
Sulfotepp	3689-24-5	-	-
HERBICIDES			
2,4-D	94-75-4	-	-
Dinoseb	88-85-7	-	-
2,4,5-T	93-76-5	-	-
2,4,5-TP (Silvex)	93-72-1	-	-

TABLE 7

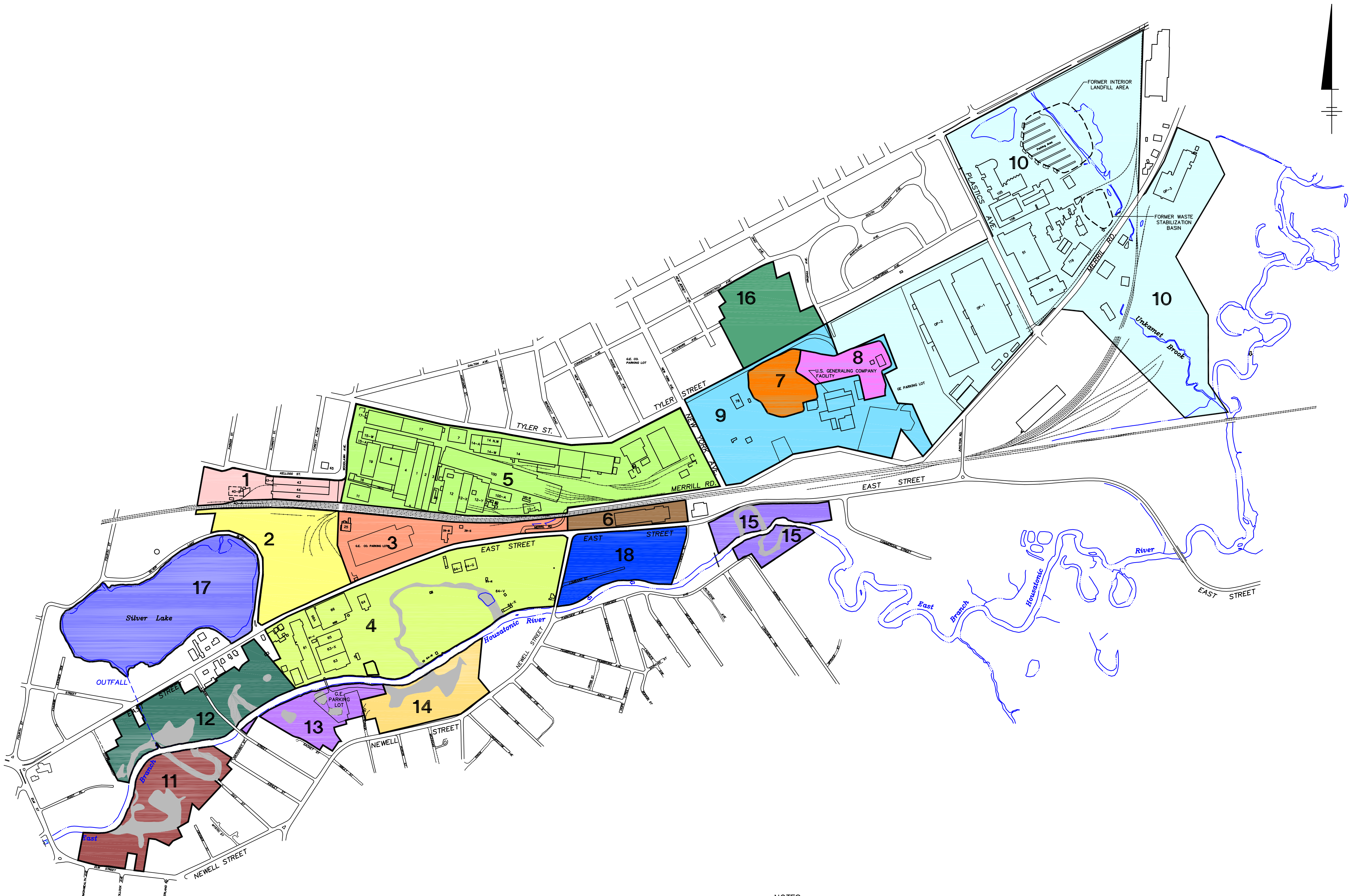
MCP METHOD 1 STANDARDS FOR GW-2 AND GW-3 GROUNDWATER

Analyte Identification	CAS Number	Method 1 GW-2 Standard (ppm)	Method 1 GW-3 Standard (ppm)
Appendix IX+3 Inorganics			
Antimony	7440-36-0	-	8
Arsenic	7440-38-2	-	0.9
Barium	7440-39-3	-	50
Beryllium	7440-41-7	-	0.05
Cadmium	7440-43-9	-	0.004
Chromium	7440-47-3	-	0.3
Cobalt	7440-48-4	-	-
Copper	7440-50-8	-	-
Cyanide (Total or Physiologically Available)	57-12-5	-	0.03
Lead	7439-92-1	-	0.01
Mercury	7439-97-6	-	0.02
Nickel	7440-02-0	-	0.2
Selenium	7782-49-2	-	0.1
Silver	7440-22-4	-	0.007
Sulfide	18496-25-8	-	-
Thallium	7440-28-0	-	3
Tin	7440-31-5	-	-
Vanadium	7440-62-2	-	4
Zinc	7440-66-6	-	0.9
Appendix IX+3 PCDDs and PCDFs			
1,2,3,4,6,7,8-HpCDD	35822-46-9	-	-
HpCDDs (total)	37871-00-4	-	-
1,2,3,4,7,8,9-HpCDF	55673-89-7	-	-
1,2,3,4,6,7,8-HpCDF	67562-39-4	-	-
HpCDFs (total)	38998-75-3	-	-
1,2,3,4,7,8-HxCDD	39227-28-6	-	-
1,2,3,6,7,8-HxCDD	57653-85-7	-	-
1,2,3,7,8,9-HxCDD	19408-74-3	-	-
HxCDDs (total)	34465-46-8	-	-
1,2,3,4,7,8-HxCDF	70648-26-9	-	-
1,2,3,6,7,8-HxCDF	57117-44-9	-	-
1,2,3,7,8,9-HxCDF	72918-21-9	-	-
2,3,4,6,7,8-HxCDF	60851-34-5	-	-
HxCDFs (total)	55684-94-1	-	-
1,2,3,7,8-PeCDD	40321-76-4	-	-
PeCDDs (total)	36088-22-9	-	-
1,2,3,7,8-PeCDF	57117-41-6	-	-
2,3,4,7,8-PeCDF	57117-31-4	-	-
PeCDFs (total)	30402-15-4	-	-
2,3,7,8-TCDD	1746-01-6	-	0.00004
TCDDs (total)	41903-57-5	-	-
2,3,7,8-TCDF	51207-31-9	-	-
TCDFs (total)	55722-27-5	-	-
OCDD	3268-87-9	-	-
OCDF	39001-02-0	-	-

Notes:

1. All standards compiled from 31 CMR 40.0000- The Massachusetts Contingency Plan, dated May 30, 1997, revised April 3, 2006.
2. A Method 1 Standard is not specified for the compound.
3. N/A: A CAS Number is not available.

Figures



GENERAL ELECTRIC PLANT AREA

- 1 40s COMPLEX
- 2 30s COMPLEX
- 3 20s COMPLEX
- 4 EAST STREET AREA 2–SOUTH
- 5 EAST STREET AREA 2–NORTH
- 6 EAST STREET AREA 1– NORTH
- 7 HILL 78 CONSOLIDATION AREA
- 8 BUILDING 71 CONSOLIDATION AREA
- 9 HILL 78 AREA–REMAINDER
- 10 UNKAMET BROOK AREA

FORMER OXBOW AREAS

- 11 FORMER OXBOW AREAS A AND C
- 12 LYMAN STREET AREA
- 13 NEWELL STREET AREA II
- 14 NEWELL STREET AREA I
- 15 FORMER OXBOW AREAS J AND K

OTHER AREAS

- 16 ALLENDALE SCHOOL PROPERTY
- 17 SILVER LAKE AREA
- 18 EAST STREET AREA 1– SOUTH (NAPL/GROUNDWATER ONLY)

0 500' 1000'
APPROXIMATE SCALE

NOTES:

1. MAPPING IS BASED ON AERIAL PHOTOGRAPHS AND PHOTOGRAMMETRIC MAPPING BY LOCKWOOD MAPPING, INC. – FLOWN IN APRIL 1990; DATA PROVIDED BY GENERAL ELECTRIC COMPANY; AND BLASLAND & BOUCK ENGINEERS, P.C. CONSTRUCTION PLANS.
2. NOT ALL PHYSICAL FEATURES SHOWN.
3. SITE BOUNDARIES/LIMITS ARE APPROXIMATE.
4. REFER TO FIGURE 1–2 FOR IDENTIFICATION OF REMOVAL ACTION AREAS RELATED TO THE HOUSATONIC RIVER FLOODPLAIN.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
FIELD SAMPLING PLAN/
QUALITY ASSURANCE PROJECT PLAN

SITE PLAN

ARCADIS BBL
infrastructure, environment, facilities

FIGURE
1

SYR-85-YCC KEW LAF L: ON=*, OFF=REF
G:\CAD\GE-CAD\GE_ACTIVE\N\20457020\20457B08.DWG SAVED:3/23/2007 4:48 PM LAYOUT:Layout1 PAGESETUP:DL2B-PDF PENTABLE:PLTFULL.CTB PRINTED:3/23/2007 4:57 PM BY:LFORAKER
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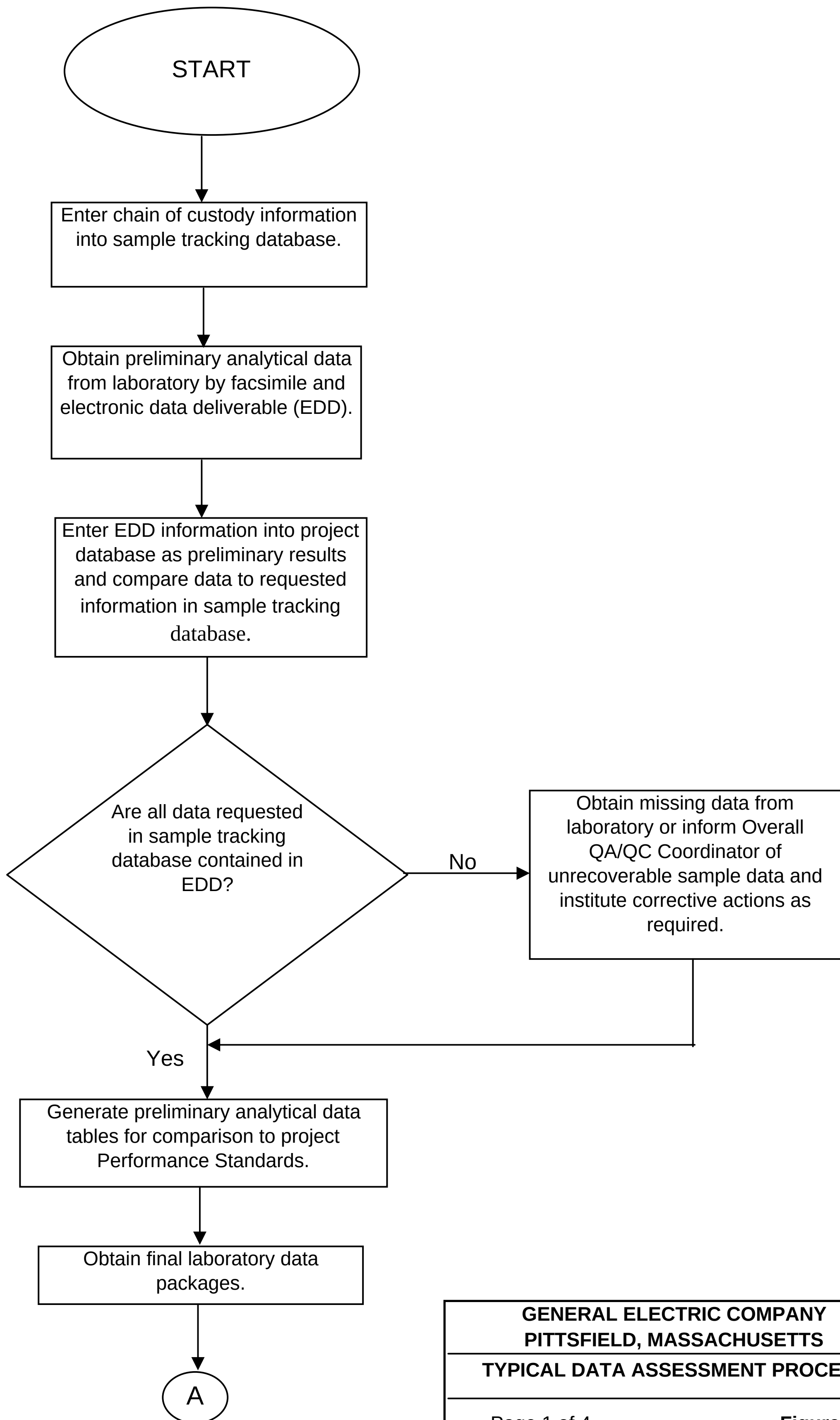
* Applicable for Consent Decree Activities Only

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

PROJECT TEAM

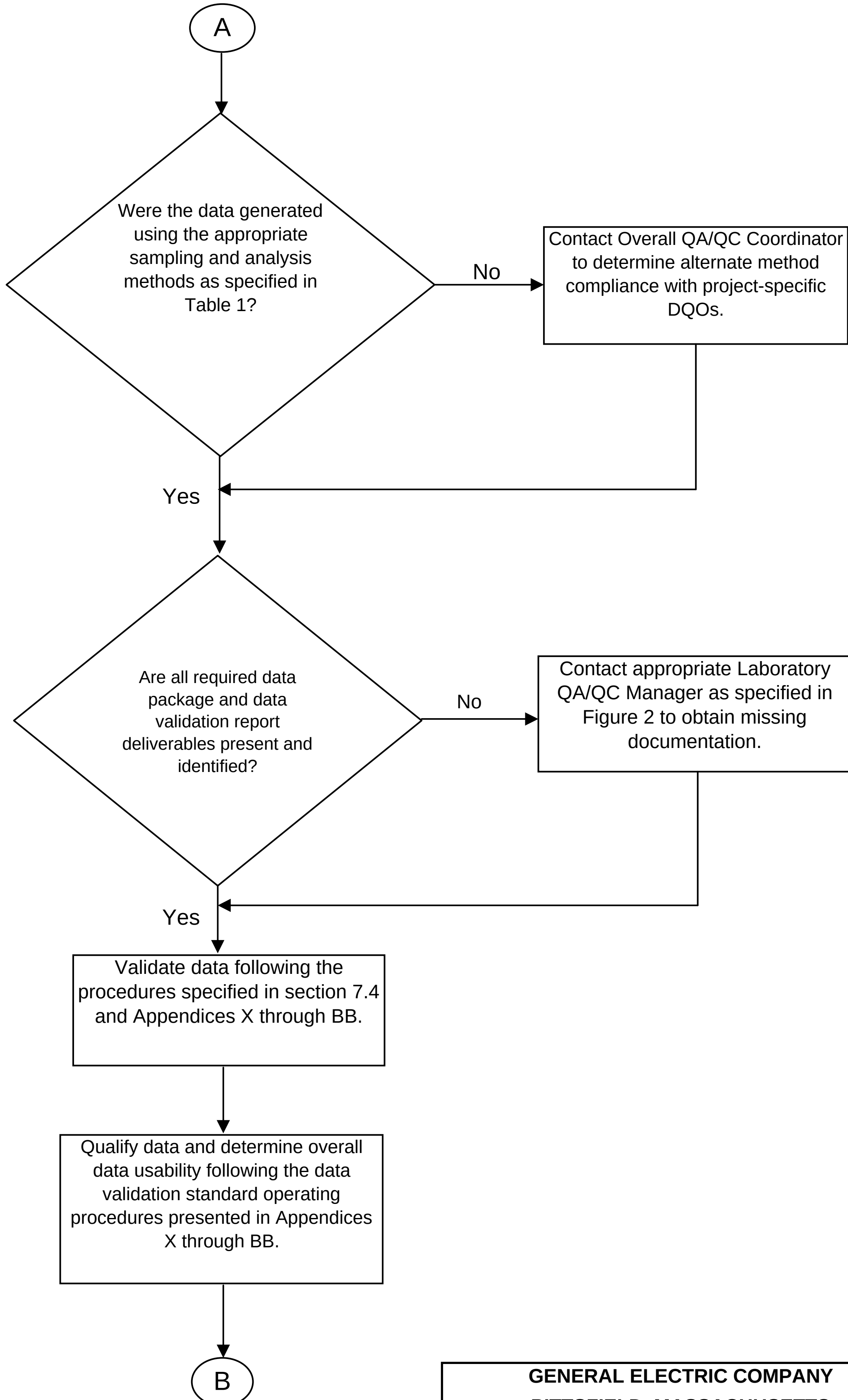
Figure 2



GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

TYPICAL DATA ASSESSMENT PROCESS

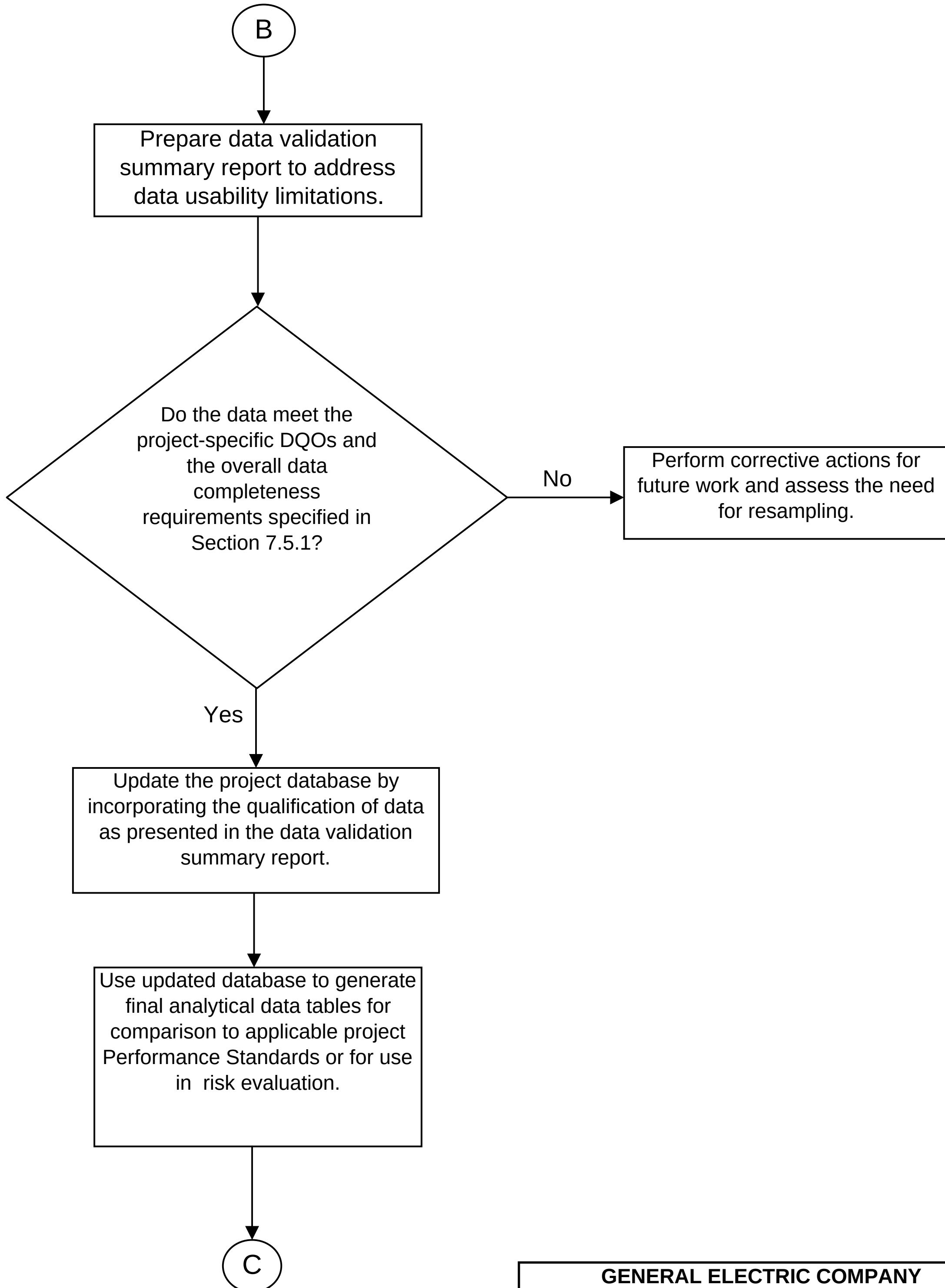
Page 1 of 4 **Figure 3**



GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

TYPICAL DATA ASSESSMENT PROCESS

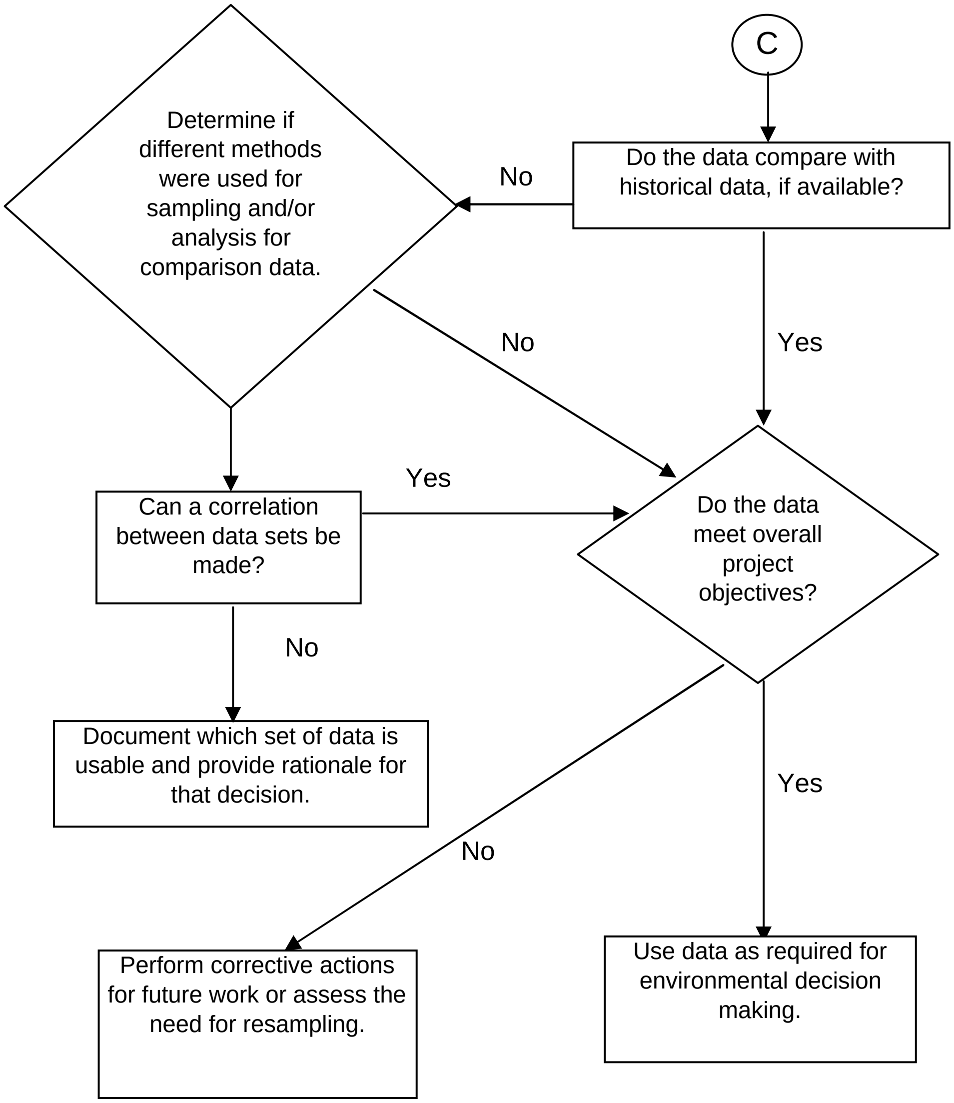
Page 2 of 4 **Figure 3**



GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

TYPICAL DATA ASSESSMENT PROCESS

Page 3 of 4 **Figure 3**



GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

TYPICAL DATA ASSESSMENT PROCESS

Page 4 of 4 **Figure 3**