GENERIC
QUALITY ASSURANCE PROJECT PLAN (QAPP)

for the

SUPERFUND SITE ASSESSMENT
AND
TARGETED BROWNFIELDS ASSESSMENT PROGRAMS

ENVIRONMENTAL PROTECTION AGENCY
REGION 7
SUPERFUND DIVISION

11201 Renner Boulevard
Lenexa, Kansas 66219

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Title and Approval Page

Generic Quality Assurance Project Plan

for the

ENVIRONMENTAL PROTECTION AGENCY
REGION 7
SUPERFUND DIVISION

Superfund Site Assessment and Targeted Brownfields Assessment Programs

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DISTRIBUTION LIST

Generic Quality Assurance Project Plan
for
Superfund Site Assessment and
Targeted Brownfields Assessment Programs

The following individuals are designated to receive copies of the *Generic Quality Assurance Project Plan for the Superfund Site Assessment and Targeted Brownfields Assessment Programs* (Generic QAPP) and any future revisions:

EPA Region VII:	Stanley Walker, Chief, STAR Scott Hayes, Chief, ERSB Kenneth Buchholz, Chief, ERNB Superfund Remedial Branch Managers National Priority List Coordinator Superfund Site Assessment Coordinators Targeted Brownfield Assessment Coordinator Brownfields State Coordinators Site Assessment Managers On-Scene Coordinators Diane Harris, Regional Quality Assurance Manager
Contractor:	Program Manager Quality Assurance Officer (Contractor will distribute copies within their organization)

1.0 INTRODUCTION

The ultimate success of an environmental data collection effort depends on the quality of the data collected and used to make decisions. The Quality Assurance Project Plan (QAPP) is a critical planning document for site assessment/evaluation activities that requires the collection and/or use of environmental data. Thus, the U.S. Environmental Protection Agency's (EPA) policy requires that all environmental data used in decision-making be supported by an Agency-approved QAPP developed from a systematic planning process. The QAPP documents how environmental data collection operations are planned and implemented and how the results are assessed. In addition, the QAPP defines the specific quality assurance (QA) and quality control (QC) activities that will be applied to ensure that the environmental data collected are of the type and quality needed for a specific decision or use.

Current EPA requirements for QAPPs are presented in *EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5)* (EPA 2001a). That guidance document identifies 24 elements, grouped into the following four major areas that must be addressed in a QAPP:

- Project Management – These elements address the project history and objectives, and the roles and responsibilities of the participants. These elements ensure that the project goals and approach are clearly understood and that project planning is documented. The nine project management elements include the QAPP title and approval sheet, the table of contents, the distribution list, and six additional elements included in Section 2.0 of this document.

- Data Generation and Acquisition – These elements describe the measurement system design and implementation and document sampling, analysis, data handling, and QC methods that will be used. These 10 elements are included in Section 3.0 of this document.

- Assessment and Oversight – These elements identify activities for assessing the effectiveness of project implementation and the associated QA and QC efforts. As such, these elements ensure that the QAPP is implemented as prescribed. Section 4.0 of this document addresses the two assessment and response elements.

- Data Validation and Usability – These elements describe QA activities that occur after data collection or generation. These elements ensure that the data collected conforms to stated acceptance criteria and achieves data quality objectives (DQO). These three elements are included in Section 5.0 of this document.

This Generic QAPP is not intended to override or replace applicable guidance and reference documents that provide details of the procedures and requirements needed to accomplish the environmental site investigation, assessment, and evaluation projects that are to be accomplished under the Superfund Site Assessment and Targeted Brownfields Assessment Programs. Where necessary, applicable guidance and other reference documents are mentioned by name with only limited amounts of detailed procedural discussions provided. To avoid possible confusion with the use of a few terms that are used throughout this document, the following clarifications are provided:

- Project Work Plans - For projects requiring sampling activities, project work plans include Sampling and Analysis Plans (SAPs) that describe sampling and analysis activities and QAPPs that describe QA/QC procedures.

- Site-Specific QAPP Addendum/Addenda - Throughout this QAPP, the term "site-specific" is only used in conjunction with QAPP Addenda. The Site-Specific QAPP Addendum Form is used to provide site-specific project management and other QA/QC information that is needed to supplement this Generic QAPP for a Superfund or Targeted Brownfields Assessment project involving sampling.

- Project-Specific QAPP - A stand-alone QAPP required for a particular project, which is independent of this Generic QAPP.

- QAPP - The term QAPP is often used to indicate QAPP requirements and documents, in general. Throughout this document, the term QAPP will mean either a Site-Specific QAPP Addendum or project-specific QAPP.

Guidance for QAPP preparation is available within (1) *Guidance for Quality Assurance Project Plans* (EPA QA/G-5) (EPA 2002a) and (2) *Guidance on Choosing a Sampling Design for Environmental Data Collection for Use in Developing a Quality Assurance Project Plan* (EPA QA/G-5S) (EPA 2002b).

1.1 Revision History of Generic QAPP

In November 1998, the EPA Region 7 prepared the initial version of this Generic QAPP. In July 2005, the Generic QAPP was modified in response to current EPA requirements for the development of QAPPs and to include performing Targeted Brownfields Assessment under the Superfund Pre-Remedial Program. In July 2007, the QAPP was modified in response to reflect some updates to references, Brownfields standards, and general language revision. The Generic QAPP is organized in accordance with the 24 QAPP elements specified in EPA QA/R-5 (EPA, 2001a). This revision is intended to:

- Update the Generic QAPP to reflect key personnel changes,
- Provide clarification on the use of a few terms that are used throughout the document,
- Updating information related to some of the applicable guidance documents referenced, and
- Where possible, streamlining the document by retaining references to particular guidance documents while reducing the amount of procedural details presented.

1.2 Purpose

The intent of this Generic QAPP is to provide a framework of procedures for all environmental data collection activities that might occur (1) in accomplishing Superfund site assessment (SA) including integrated site assessment (ISA) activities under authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and/or (2) performing Targeted Brownfields Assessment (TBA) program objectives and projects under the Small Business Liability Relief and Brownfields Revitalization Act in Region 7.

The Generic QAPP emphasizes the use of proven, validated, and EPA-approved sampling methods and analytical methods such as those in the *EPA Contract Laboratory Program Statements of Work* (EPA, 2004) and the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, (EPA Publication SW-846), or region specific methods in the *Region 7Standard Operating Procedures and Governing Documents*. These and other sampling and analytical methods are identified in appropriate sections of this Generic QAPP and will be followed whenever they are sufficient to meet environmental data collection requirements and DQOs.

The Generic QAPP was developed for the Superfund Program and for the Brownfields Programs for the collection of environmental data. For the Superfund Program this Generic QAPP is used for the Site Assessment (SA) activities (i.e., Pre-CERCLIS Screening Assessment, Preliminary Assessment, Site Inspection, Expanded Site Investigation, Site Reassessment and Integrated Site Assessment). For the Brownfields Assessment Program this Generic QAPP is used for the Targeted Brownfield Assessments (TBA) conducted by the Superfund pre-remedial program.

1.3 Site-Specific QAPP Addendum

Task Orders and Procurement Requests are issued to EPA's contractors under environmental services contracts to accomplish Superfund SA and TBA projects. In most instances, the QAPP and the SAP requirements for a project will be specified within the project work plan, along with completing a Site-Specific QAPP Addendum (form) to this generic QAPP.

Appendix A has a blank Site-Specific QAPP Addendum form that can be used to develop a QAPP Addendum. The Site-Specific QAPP Addendum form must be supplemented with appropriate site and sampling location maps and should include a sample summary table or tables that list the sample types (i.e., media and/or purpose), the collection methods, and the analytical methods to be utilized. These supplemental items are typically included within the sampling and analytical segments of the project work plan. Many of the sampling and analytical Standard Operating Procedures (SOPs) that are described in *Region 7 Standard Operating Procedures and Governing Documents* will be broadly applicable and can be referenced in the project work plan and/or Site-Specific QAPP Addendum. Additionally, common procedures such as sample handling, chain of custody, data validation, and corrective action should be included by reference only.

The completed Site-Specific QAPP Addendum (form) should be included with the project work plan as an attachment or appendix. The Site-Specific QAPP Addendum is not considered approved until all of the appropriate approval signatures have been accomplished. If the Site-Specific QAPP Addendum is revised, new approval signatures are required.

1.4 Project-Specific QAPP

There will occasionally be large-scale and/or special projects or pilot studies that may require a project-specific QAPP that is independent of this generic QAPP. The requirement to prepare a project-specific QAPP should be initially identified in the project scope of work and incorporated into the project work plan. Project-specific QAPPs will be formatted similar to this generic QAPP. If necessary, describe any modifications to the *Region 7 Standard Operating Procedures and Governing Documents* sampling and analytical methods and/or specify any additional data collection procedures that are required to meet project-specific objectives.

For project-specific QAPPs, some of the sampling and analytical SOPs that are described in detail within the *Region 7 Standard Operating Procedures and Governing Documents*, may be broadly applicable and can be referenced. To the extent possible, common procedures such as sample handling, chain of custody, data validation, and corrective action should be included by reference only.

2.0 PROJECT MANAGEMENT

2.1 Project and Task Organization

Many of the specific responsibilities of the individuals directly involved with the Superfund Site Assessment (SA) and Targeted Brownfields Assessment (TBA) Programs are outlined below:

2.1.1 EPA Project Managers

EPA Project Managers (i.e., Site Assessment Managers (SAMs) and On-Scene Coordinators (OSCs)) will serve as the project managers for the SA and TBA activities. EPA Project Managers will determine project requirements and ensure that the general scope of work necessary to accomplish the project is provided on the project Task Order (TO) form or Procurement Request (PR) form and/or otherwise communicated to the contractors. The EPA Project Managers will help resolve problems and provide details when necessary to help contractor develop and/or select options for the technical approach and methods to be employed for a project and to develop sampling strategies.

The EPA Project Managers will review work plans and cost estimates, and make recommendations to their Branch Chief for any approval/modifications. The EPA Project Managers will perform project oversight by conducting document reviews, audits, site visits, or field oversight activities. The EPA Project Managers will also provide periodic updates to EPA management and/or to EPA Region 7 personnel concerning project status/progress as required.

The EPA Project Manager will oversee all elements associated with the project and will coordinate field activities and other site-related operations with the contractor's Project Manager. The R7 QAPP Form shall be reviewed and approved by the EPA Regional Quality Assurance Manager prior to the start of field work.

The EPA Project Manager will ensure that accomplishment information, particularly regarding Government Performance and Results Act targets, is appropriately recorded in EPA databases (e.g., CERCLIS).

2.1.2 EPA Regional Quality Assurance Manager

The EPA Regional Quality Assurance Manager is required to review and approve this Generic QAPP and provide general guidance and/or specific instructions to ensure that the Generic QAPP is in compliance with EPA guidance documents and policy. Once the Generic QAPP is revised to meet the standard requirements, it can be coordinated for approval by the EPA Regional Quality Assurance Manager or her designated representative.

2.1.3 EPA Environmental Services Division

EPA Region VII Environmental Services (ENSV) Division personnel will generally provide analytical support (either in-house or through contractor support) for all samples collected during the project. The ENSV will subsequently review the analytical results for method precision and accuracy based on internal quality control measures and report analytical results to the EPA Project Manager. Whenever it is not feasible to submit samples to ENSV for analysis (e.g., excessive workload, equipment under repair, etc.), the contractor may (depending on the contract) procure the required analytical services through a subcontract, while ensuring that EPA-approved methodologies and procedures are followed.

2.1.4 EPA Superfund Branch Chiefs

The EPA Superfund Branch Chiefs will provide overall program management and are the primary decision makers in cooperation with the EPA Region 7 program and/or Project Managers/coordinators. The Branch Chief or his/her designated representative will provide the contractor with the general project scope and objectives and request contractors provide work plans that include site-specific SAP and site-specific QAPP Addendum or project-specific QAPPs. The Branch Chief(s) or an appropriate designee will approve recommendations from EPA Project Managers for project work plans and budgets, direct modifications/revisions if required, and ensure that the proper level of management authorization is obtained to approve the project work plan and associated costs (i.e., the project budget). Copies of TO or PR forms, work plans (including cost proposals and SAPs) will be provided to the appropriate EPA Region 7 personnel upon request.

2.1.5 EPA Targeted Brownfield Assessment Coordinator

The EPA Targeted Brownfield Assessment Coordinator (TBAC), will provide guidance and requirements for Targeted Brownfield Assessments being conducted by EPA Project Managers (i.e., SAMs and OSCs) and their contractors, and work with the EPA Project Managers to address any QA/QC issues and other Brownfields program and/or policy concerns. The EPA TBAC will review this QAPP and/or provide guidance on project-specific QAPPs or site-specific QAPP Addendum any additional investigation needed, and/or analyses of cleanup alternatives developed from data collected under this QAPP, as necessary, to implement TBA projects in the Region.

For EPA TBAs, the TBAC will ensure that accomplishment information, particularly regarding Government Performance and Results Act targets, is appropriately recorded in EPA databases (e.g., ACRES).

2.1.6 EPA Superfund Site Assessment Coordinator

The EPA Region 7 Superfund Site Assessment Coordinator monitors the progress of the site assessment projects as well as provides oversight of the Cooperative Agreements funding those projects under CERCLA authority. The EPA Region 7 Superfund Site Assessment Coordinator will review this Generic QAPP and will coordinate necessary revisions between the appropriate EPA Superfund and Brownfields personnel in order to implement the requirements mandated by the Generic QAPP and other QA/QC policy and guidance documents and/or program initiatives.

2.1.7 Contractor Quality Assurance Manager

The Contractor's Quality Assurance (QA) Manager for the contract/site-specific project is responsible for monitoring the quality of technical documents generated by the contractor and its subcontractor. He/she will provide direction and guidance to contractor personnel and, through subcontractor's QA/project manager(s), to subcontractor personnel performing activities under the contract. The contractor's QA manager will maintain a comprehensive quality program based (1) their Quality Management Plan developed under contract and (2) this Generic QAPP, and will issue recommendations about quality to technical staff and management at EPA, and within the contractor's organization. Specific QA manager responsibilities include the following:

- Meeting regularly with the contractor's Project Manager and/or the Contract Administrator to review, discuss, and resolve any quality issues and concerns.

- Reviewing, approving, and/or providing guidance to contractor project managers and/or technical staff for developing QAPPs.

- Interacting with EPA representatives and/or EPA QA personnel, if necessary, to evaluate the acceptability and qualifications of laboratory and technical subcontractors.

- Conducting field and laboratory audits, identifying nonconformance situations resulting from audits or other QA/QC review activities and notifying the appropriate EPA personnel, contractor's project manager(s), the contractor's Contract Administrator and/or regional office manager, and/or subcontractor personnel.

- Providing recommendations and orders for corrective action for all aspects of work that do not meet program standards.

- Facilitating QA problem identification and resolution at both the project- and contract-levels.

- Managing and overseeing all aspects of laboratory procurement and management, data management, data validation, and document generation and review/revision

2.1.8 Contractor Contract Administrator

The Contractor's Contract Administrator will serve as the primary EPA point of contact for all activities under the particular EPA Environmental Services contract to perform SA or TBA projects. The Contract Administrator is ultimately responsible for all field data collection and reporting activities performed in accordance with the QAPP and should ensure that contractor project managers are qualified and provided adequate staff and equipment support to achieve the project requirements. Specific responsibilities of the Contract Administrator shall include, but may not be limited to the following:

- Receiving, acknowledging, and implementing all TO or PR forms and the resulting approved work plans and other project requirements.

- Designating a Project Manager for each TO or PR.

- Ensuring the project work plans (including scheduling of work) and any cost estimates are submitted to EPA for approval for each TO or PR and ensuring the proper implementation of those approved work plans.

- Providing overall supervision and support to the Projects Manager including providing all the support staff, facilities, administrative capabilities, clerical support and all other resources needed to ensure the successful and efficient accomplishment of TOs or PRs issued under the contract.

- Reporting and correcting all problems encountered in performing work pursuant to TOs or PRs or in the administration of the contract whether noted by the contractor or noted by representatives of the EPA.

- Preparing and submitting all reports, data, or other deliverables required in the TO or PR and ensuring that all deliverables are in compliance with the QA/QC requirements described in the work plan, this Generic QAPP, and other required QAPP documents.

- Ensuring, with a reasonable amount of assistance from contractor project managers that all technical staff members assigned to a project are experienced professionals, who possess the degree of specialization and technical expertise required to effectively and efficiently perform their duties and responsibilities, necessary to complete the required work/tasks for all TOs or PRs/projects issued under contract.

2.1.9 Contractor Project Managers

The Contractor project managers are responsible for implementing all activities identified in the TOs or PRs issued by EPA. Project managers have the authority to commit the resources necessary to meet the technical, financial, and scheduling objectives for the project. Project managers will report directly to the contractor Contract Administrator and will serve as or provide access information for the major point of contact(s) and control(s) for project-related activities and/or issues. Specific responsibilities of contractor project managers include the following:

- Preparing project work plans with SAP components, and QAPP documents, as necessary, for work involving the collection of environmental data.

- Verifying that the project team consisting of contractor and/or subcontractor personnel, perform contract work and generate contract-related documents and deliverables that comply with all QA requirements in this Generic QAPP.

- Monitoring and directing field activities and verifying that appropriate field measurement, field testing, and other field procedures are followed and that appropriate QC checks are conducted.

- Working with the contractor's QA manager and the contractor Contract Administrator to identify QA problems and to implement effective corrective actions.

On large field investigations such as ESIs the contractor project manager may be supported by a field team leader (FTL). The FTL is responsible for directing day-to-day field operations and reporting to the contractor project manager on a daily basis. The FTL will monitor field measurement and sampling procedures to verify the requirements of the project work plan and QAPP requirements are followed. The FTL will also ensure that proper chain-of-custody procedures for sample handling and shipment are utilized. Other specific responsibilities of the FTL include the following:

- Supervising staffing and mobilization activities for field work.

- Overseeing sample collection and field measurements and maintaining field logbook(s).

- Overseeing the activities of all project personnel in the field, including subcontractor personnel.

- Providing the contractor project manager with the required planning, cost and schedule control, records documentation, and data management information related to field activities.

- Facilitating project-level QA/QC problem identification and resolution.

2.1.10 Contractor Technical Staff

The Contractor's technical staff will conduct field activities, gather and analyze data, and prepare various project reports and support materials. The technical staff will be required to follow procedures and requirements that are specified in the TO or PR, approved project work plans, QAPPs, and other guidance and/or instructions provided by appropriate contractor and/or EPA project/contract management personnel. The contractor's technical staff members assigned to a project should be experienced professionals, who possess the degree of specialization and technical expertise required to effectively and efficiently perform their duties and responsibilities, necessary to complete the required work/tasks for all TOs or PRs/projects issued under contract.

2.1.11 Subcontractor Project Managers and Staff

Subcontractors may be assigned responsibility for completing all or part of TOs or PRs issued under a contract. On projects with subcontractors having primary involvement, the subcontractor project manager(s) are responsible for the planning, scheduling, budgeting, and reporting related to subcontractor activities. On projects where subcontractors play a supporting role, the subcontractor project manager(s) will coordinate their activities through the prime Contractor project manager. Subcontractor project managers will provide technical review of all work conducted by their staff. They will also verify that all work is conducted in compliance with Contractor's overall quality requirements for the EPA contract and with the quality requirements of any applicable project work plans and QAPPs.

2.1.12 Subcontractor Quality Assurance Manager

For all portions of the project and data collection activities assigned to the subcontractor component of the team, the team subcontractor QA manager is responsible for ensuring that all technical services provided by the subcontractor comply with overall EPA contract QA/QC requirements and the project-specific QA requirements of any applicable QAPP. Specific QA/QC responsibilities of the team subcontractor's QA manager include the following:

- Reviewing and approving QAPPs under which the subcontractor will provide technical services.
- Monitoring subcontractor performance on the project, including compliance with sample collection, field analysis requirements, sample holding times, sample preparation and analysis methods, required field QC check samples, and data validation if required.
- Maintaining project-specific records of QC data, performance evaluation results, audit comments, and data quality inquiries.
- Applying the subcontractor QA/QC program to the work done on the project, including reviewing all deliverables before they are submitted to the contractor and verifying that they meet the requirements specified in the EPA approved project work plan and QAPP documents.
- Ensuring that corrective action is implemented when required/directed by appropriate representatives of the prime contractor.
- Assisting the prime contactor in resolving any QA/QC issues related to the applicable representatives of the prime contractor.

- Facilitating project-level QA/QC problem identification and resolution.

2.2 Problem Definition and Background

This section provides general background information on the EPA Environmental Services contracts. In addition, the section outlines the information that should be included in the Problem Definition and Background section of any site-specific QAPP Addendum that would be prepared in response to a TO or PR issued under the EPA Environmental Services contract.

2.2.1 EPA Environmental Services Contract Background

The EPA utilizes contractors to conduct site assessment work at sites that are either part of, or considered, potential candidates for Superfund program examination. In addition to Superfund site assessment and TBA projects involving field activities, other functions may be required to achieve project requirements such as groundwater monitoring evaluation/inspections, technical document reviews and data management activities. All Superfund site assessment projects are done in accordance with the CERCLA/Superfund pre-remedial process. TBA-related field activities must be accomplished in accordance with applicable EPA Brownfields guidance and practices outlined by the American Society for Testing and Materials (ASTM). In general, the objectives are to evaluate known or suspected releases of hazardous substances to the environment (i.e., air, soil, surface water, and groundwater), and to identify the possible sources of the release and the potential impact on likely receptors. In TBA projects, this data may be used to develop analyses of cleanup alternatives or in other cleanup planning activities.

Technical reviews are performed on documents submitted by responsible parties, facility owners/operators or other governmental agencies related to various site assessment, groundwater monitoring and corrective action activities. The objectives of the reviews are to determine if the documents meet technical and regulatory standards.

The contractor will be required to furnish all personnel, facilities, equipment, materials, and services necessary for the performance of all work described in the Environmental Services contracts. Specific deliverables and due dates will be as specified in each TO or PR.

2.2.2 Project-Specific Problem Definition and Background

Selection of sites for SA activities (i.e., sampling, scoring and reporting) will be based on previous investigations or screening activities conducted by EPA or its contractors, or based on other available information collected through desktop/record search activities. The major category of sites where sampling will be performed includes, but is not limited to former grain storage facilities, public water supply sites, industrial sites, dry cleaners, former agricultural chemical formulator/storage/aerial applicator sites, former manufactured gas plants (FMGP), abandoned railroad sites, discarded/abandoned or buried drum/hazardous material container sites, groundwater contamination sites, lead mining and smelter sites, deferred Resource Conservation and Recovery Act (RCRA) sites, and Formerly Used Defense Sites (FUDS).

A TBA conducted under the Brownfields program must meet good commercial and customary standards and practices for Phase I and/or Phase II Environmental Site Assessments (ESA) and satisfy the requirements set forth in the Small Business Liability Relief and Brownfields Revitalization Act, necessary to carry out all appropriate inquiry (AAI). A Phase I ESA investigation should be conducted in accordance with ASTM Standard E 1527-05, *Standard Practice for Environmental Site Assessments:*

Phase I Environmental Site Assessment Process, (ASTM, 2005), or equivalent (e.g., for asbestos or lead-based paint investigations). A Phase II ESA investigation should be conducted in accordance with ASTM Standard E 1903-97, *Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process* (ASTM, 2002). ASTM standards are subject to revision, and the latest standard should be referenced for guidance. The ASTM standards generally differ from the Superfund investigative process by requiring more information on the site history and nearby properties that could present a recognized environmental condition (REC) on the site. The ASTM standards define a process for determining whether hazardous substances or petroleum products have been disposed or released at the sites, with the intent of satisfying one element of the innocent property purchaser/owner defense to CERCLA liability (ASTM, 2005). Petroleum products, typically excluded under CERCLA regulation, are eligible Brownfield contaminants under the Small Business Liability Relief and Brownfields Revitalization Act which amends CERCLA. Where necessary, the ESA may require additional scope of work activities, above and beyond the standard ASTM Phase I and Phase II ESA requirements, for example, nearby well sampling, reviewing aerial photos/regulatory files or other records of adjacent properties, and conducting other evaluations/sampling activities based on adjacent off-site history or current conditions, and further site characterization in preparation for cleanup planning.

2.3 Project and Task Description

This is a Generic QAPP for TBA (Phase I or Phase II ESAs) and SA (i.e., PCSA, APA, PA, SI, ESI, SR and ISA) sampling that will be performed at sites throughout the four-state region by EPA and/or its contractors. EPA expects to maintain contracts with firms that provide a wide range of environmental services and who can obtain other specialty environmental-related contract services. Once a site is selected for site assessment or some other type of environmental sampling, one of the contractors will be assigned to the project. The environmental sampling activities will be initiated by requesting the contractor to develop a project work plan and cost estimate. The project work plan must contain elements of a SAP, with a site-specific QAPP Addendum or a project-specific QAPP, which together, must clearly identify the proposed sampling, HRS scoring or evaluation criteria (if applicable) and reporting requirements. The actual site-specific number (if applicable), location and type of samples will be described in the project work plan and/or QAPP. Reference to the EPA Generic QAPP requirements will be incorporated, where appropriate, in those documents.

2.3.1 Superfund Site Assessment Objectives

The general objectives of Superfund site assessment sampling are:

- To identify and sample potential source(s) of contamination to demonstrate whether a release of hazardous substance has occurred;
- To sample media that is directly or indirectly exposed/accessible to potential human and/or ecological receptors/targets that may have been impacted or is potentially threatened;
- To estimate the area of contamination and to determine whether the contamination may be attributed to particular actual/potential source area(s); and
- To determine whether any Maximum Contaminant Levels (MCLs) or health-based benchmarks/action levels exist, that poses a threat to human health or the environment.

Soil-gas, soil, and groundwater samples will be collected at potential source areas and along suspected migration pathways using direct push sampling probes or conventional drilling when direct push technology will not be able to reach the desired sampling depths. Sediment and surface water samples may also be collected using conventional sampling procedures. Potential targets such as nearby (generally within a mile) private wells and public water supply wells (systems within four miles) may also be sampled. In addition, vapor intrusion sampling activities may be appropriate for structures onsite and/or on adjacent properties. For all contaminants of concern (COC) to be analyzed and for each environmental media to be tested, a sampling strategy must include collecting samples that are representative of local and/or regional background conditions in order to establish reliable background concentrations. For the groundwater pathway it is important to determine geological and hydrogeological conditions in the vicinity of the site including local and regional ground water flow directions.

Depending on the types of contaminants involved, and the intended use of the analytical data to be obtained, sample analysis will be conducted by either an onsite mobile laboratory or a fixed, EPA Contract Laboratory. Should a mobile laboratory be utilized, selected (based on field analyses and the intended use of data) soil, surface water and/or groundwater samples will be sent to the EPA Contract Laboratory for confirmatory analysis. Soil-gas sampling is typically performed at various depth intervals to accomplish vertical profile screening in order to help identify source areas and potential hot spots. Indoor-air vapor intrusion sampling typically involves collecting samples in canisters to be sent to an off-site laboratory. All drinking water supply well samples will require fixed laboratory confirmation. In general, fixed laboratory analysis will be performed for all critical samples needed to establish primary targets, support attribution, and/or otherwise used for site HRS scoring. At a minimum, 10 percent of the analytical results for each media sampled by the mobile laboratory are confirmed by fixed laboratory analysis.

Data collected during the site assessment activities will be used to document a release of hazardous substances as appropriate and for site scoring and reporting to evaluate whether or not further regulatory action(s) will be needed at the site. The contractor and/or subcontractors will provide all site assessment sampling supplies and equipment, unless supplied by EPA.

In general, an initial screening of the site will be performed to determine the site's eligibility for response under CERCLA, assess the need for emergency response activities, determine the potential for non-CERCLA response actions, and ascertain the need to obtain additional information pertaining to the site. A file search may also be performed to gather historical information related to the site. A site reconnaissance with limited sampling will typically follow, where waste characteristics/quantities, exposure pathways, potential targets, and NCP removal action criteria will be initially assessed. If only limited information on site contamination is known, samples are typically analyzed for the compounds contained in the Contract Laboratory Program (CLP) Target Analyte List. When information is obtained the analyte list will be tailored to the site. When environmental sampling is planned, the R7 QAPP Addendum Form will be prepared. The R7 QAPP Addendum Form will be completed in accordance with EPA Region VII and national program guidance and will encompass the data quality objectives (DQOs) outlined in this Generic QAPP, sampling network design, data collection procedures (including assessment of quality control parameters), special personnel and equipment requirements. The R7 QAPP Addendum Form shall be reviewed and approved by the Regional QA Manager prior to the start of field work. The specific data to be assessed and obtained during the site assessment activities are summarized in Tables 2.1, 2.2, 2.3 and 2.4.

An assessment of the site history, reconnaissance observations, and the analytical data will be performed by the EPA Project Manager to determine the appropriate course of action for the site. Both removal and pre-remedial criteria will be evaluated before the final decision is made. The specific data to be assessed and obtained for site assessment and integrated site assessment activities are summarized in Table 2.4.

2.3.2 Superfund Integrated Site Assessment Objectives

The general objectives of Superfund integrated site assessment sampling are to evaluate the eight removal factors listed in the National Contingency Plan [NCP §300.415(b)(2)] to define the problem and therefore determine the action to be taken. These eight factors are listed below:

- Actual or potential exposure of nearby human populations, animals, or the food chain;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems;
- Existence of hazardous substances in containers that pose a threat of release;
- Existence of highly contaminated surface soils that could migrate;
- Weather conditions that could cause hazardous substances to be released or migrate;
- Threat of fire or explosion;
- Availability of other response or enforcement mechanisms; or
- Other situations or factors that may pose a threat.

For Integrated Site Assessments, different types (and typically greater quantities) of data are necessary than are required for a removal assessment alone. For example, in a site inspection and removal site evaluation, a background sample must be taken for each matrix to be analyzed, a VOC trip blank should be used, and composite sampling gives more information economically. Additional attention is paid to pathways and possible receptors, since scoring for a site is accomplished with this data. A concerted effort is made to connect the contamination with the site sources, and therefore possible potential responsible parties (PRPs).

Table 2.1 Site Assessment - Surface Water and Groundwater		
Samples	**Approach**	**Rationale**
Municipal wells	**Sample drinking water prior to treatment; sample to document contamination, identify hazardous substances, and determine levels of contamination.**	**Determining municipal well contamination is critical to protecting public health and to the site screening decision. Also documents Level I or Level II targets for HRS. Compare results to SCDM* tables.**
Domestic wells	**Sample nearest domestic wells suspected to be exposed to actual contamination.**	**Determining domestic well contamination is critical to protecting public health and to the site screening decision. Also documents Level I or Level II targets for HRS. Compare results to SCDM* tables.**
Surface water target locations	**Sample sediments, fish tissue if appropriate, and surface waters to confirm contamination of surface water targets, levels of actual contamination, linear frontage of wetlands exposed to actual contamination, and attribution to the site. For HRS, samples must be taken both up gradient and down gradient of the site to show a release from the site.**	**Human food chain or sensitive environment contamination is vital to the screening decision.** **Documents a release from the site.**
Background samples: Upgradient	**One for each matrix (be sure to match matrices - a duck is not a background sample for a fish).**	**Sample to determine relative concentrations of hazardous substances in ambient conditions.** **For HRS, to show contamination is attributable to the site and if there has been a release.**
Downgradient	**Identify offsite migration of contamination.**	**May connect offsite contamination with source(s).**
QC Samples	**1 trip blank for VOAs** **1 field blank** **Rinsate samples:** **1 for groundwater equipment** **1 for surface water equipment**	**To monitor collection and decontamination procedures.**

*Superfund Chemical Data Matrix

Table 2.2 Site Assessment - Soil		
Samples	**Approach**	**Rationale**
Residential soil samples	**Sample to determine if nearby target receptors are exposed to surficial contamination.**	**Documents a potential direct contact threat.** **For removals, soil samples taken 0"-2".** **For site assessment, within 2' of the surface. Used to calculate the area or volume numbers for HRS scoring.** **For HRS, a release is not documented unless the concentration is ≥ 3x background.**
Background samples	**Sample unimpacted areas; document contamination attributable to site. (May not be necessary for some organics if they are not anthropogenic.**	**Sample to determine relative concentrations of hazardous substances in ambient conditions. Used to compare site data to determine if a release has occurred, and if it can be attributable to the site.**
Sources	**Identify hazardous substances present at site through composite samples (for large areas) or discrete samples.**	**Identifies contamination exists. Source identification allows for comparison with any offsite contamination.**
QC Samples	**Rinsate samples for decontamination procedures: check the trip blank for VOAs**	

Table 2.3 Site Assessment – Air and Vapor Intrusion		
Samples	**Approach**	**Rationale**
Release and Air Targets	**Sample to test if contamination is present and determine level of actual contamination.** **Monitor wind speed, direction, and other atmospheric conditions.**	**Determine whether the 0.25-mile target distance category is exposed to actual air contamination. This is vital for investigating the public health impacts and listing decisions.**
Support for Release and Air Targets	**Sample to test if other sources of air contamination exist in the site vicinity, or if wind direction changes during the sampling event; establish cross-wind sample stations.**	**Support determining whether the 0.25-mile target distance category is exposed to actual air contamination.**
Vapor Intrusion	**Sample to test if contamination is present and determine level of actual contamination.**	**Sample to determine relative levels of particulate hazardous substances in ambient conditions.**
Background	**Sample to collect background levels of ambient air concentrations.** **Sample to determine background soil levels.**	**Sample to determine relative levels of particulate hazardous substances in ambient conditions.** **Ensure sufficient background samples for listing purposes.**
Sources	**Identify hazardous substances present at the site through surficial soil samples and tailing samples.**	**For documenting the source of airborne releases.**
QC Samples	**Rinsate samples for decontamination procedures check; trip blank for VOAs; field blank.**	**Ensure sufficient QC samples for listing purposes.**

Decisions using the resulting data may also include professional judgment, regional precedents, management priorities, available guidance and program directives.

Table 2.4 Site Assessment - Integrated Site Assessment		
Requirements for Pre-Remedial Program	**Requirements for Removal Program**	**Requirements for Both Programs**
Ground Water Exposure Pathway (e.g., population using ground water from 0 to 4 miles, depth to the aquifer of concern, subsurface stratigraphy, annual precipitation, etc.)	Quantify and qualify the presence of hazardous substances (e.g., limited samples will be collected from obvious sources or stained soil for analysis). Screening may be conducted.	CERCLA eligibility determination (e.g., CERCLIS, RCRA TSDF, Federal facilities, petroleum exclusion, FIFRA, AEA/UMTRCA and Brownfields.
Surface Water Exposure Pathway (e.g., overland flow/flood and ground water to surface water migration routes, location and distance of PPE to the site, surface water uses to 15 miles down, runoff factor, flood frequency, likelihood of release to ground water, etc.)	Determine whether an emergency response is warranted (e.g., field observations and review of screening or analytical results, etc.).	Owner/Operator history/Site Background/Operations
Air and Soil Pathways (e.g., demographic information within 4 miles, etc.)	Determine whether an enforcement action is required (e.g., criminal investigation, etc)	Site regulatory history
	Determine whether removal criteria set forth in NCP 40 CFR 300.415 (b) (2) are met (e.g., actual or potential exposure of human populations, animals, or food chain to hazardous substances; actual or potential contamination of drinking water supplies/sensitive ecosystems; threat of release by hazardous substances in drums, tanks, etc.; high levels of hazardous substances in soils at or near surface that may migrate; weather conditions pose a threat of release by hazardous substances; fire and explosion threats; existence of other appropriate federal or state response mechanisms; other situations that may pose threat to public health, welfare or the environment.	Prominent land uses/site setting (e.g., residential, commercial, industrial, schools, day care centers, etc.)
	Evaluate needs for sampling to define the extent of contamination (e.g., DQOs, sampling strategy, required analytical parameters, etc.)	Identification of potential sources, including types and approximate quantities of hazardous substances present on site (e.g., location, chemical name, trade name, label, containment, size, condition, quantity, etc.)
	Conduct PRP search (e.g., title search, past operations, etc.)	Evidence of current/past releases or potential releases (e.g., stained soil, spillage, seepage, airborne particulate, readings of air monitoring instruments, odors, etc.)
	Evaluate treatment alternatives for identified sources	Distance to the nearest residence/day care center
		Distance to nearest drinking water wells
		Drainage patterns on site (e.g., sump, ditch, runoff pathways, etc.)
		Distance to nearest surface water body
		Flood plain information
		Nearby sensitive environments (e.g., wet lands, endangerment/threatened species, etc.)
		Public accessibility to site (e.g., fence, etc.)
		Documentation of site conditions (e.g., log book, photographic records, etc.)
		Site maps (e.g., sketch, aerial photos, plat maps, etc.)

2.3.3 Targeted Brownfields Assessment (TBA) Objectives

The overall objectives of a TBA are:

- To survey and inventory properties that may have environmental impacts;
- To identify actual and/or potential recognized environmental conditions at eligible Brownfields sites;
- To identify and sample potential source(s) of contamination and thus demonstrate whether a release of hazardous substance has occurred or not; and
- To determine if there will be a need to conduct any response actions before the property may be reused for industrial/commercial purposes or redeveloped for some other category of use.

Sampling at eligible TBA properties focuses on considering or preparing the property for reuse and redevelopment, rather than attempting to achieve formal HRS site scoring/evaluation. TBA investigations include assessment for petroleum products (excluded under CERCLA), and require review of nearby properties that may have impacted or potentially could impact the site. These site investigations could include sampling for asbestos and lead-based paint, vapor intrusion, and environmental hazards produced from known or suspected chemical contaminants or biological substances such as toxic molds or bird droppings.

Assessment and sampling activities will be accomplished to determine whether release of hazardous substances have occurred, and to determine the nature of contamination at each site. To the degree possible, the sampling will also evaluate the extent of the contamination; however, delineation of the full extent of contamination may be beyond the scope of the Phase II ESA for certain sites. But a TBA may be used to help fill data gaps or to examine possible contaminant migration pathways, where appropriate. Sampling activities will focus on suspected contamination source areas and locations expected to pose the greatest potential risks during one or more future use or redevelopment scenarios.

When appropriate, sampling and analysis deemed may be conducted in accordance with the objectives presented in the *Triad* Approach developed by the EPA Office of Solid Waste and Emergency Response EPA (2001b). The *Triad* Approach requires preparation of a site-specific QAPP. The three components of the *Triad* Approach are: systematic planning, dynamic work plans, and real-time analysis of data to facilitate flexible decision-making and help optimize sampling events.

Where it is determined, based on recognized environmental conditions, more extensive on- or adjacent off-site environmental sampling and analyses may be conducted to address concerns with contamination that poses a threat to human health or the environment.

2.4 Quality Objectives and Criteria for Measurement Data

EPA's data quality objective (DQO) process is a systematic planning tool designed to ensure that the type, quantity, and quality of measurement data collected are the most appropriate for supporting decisions that will be based on that data. The DQO process will be used, either formally or informally, for all data collection activities conducted, under the EPA Environmental Services contract, to provide the most cost-effective use of program resources. This section describes how the contractor will apply EPA's DQO process to determine the type of data required and presents specific QA objectives for measurement data.

2.4.1 Data Quality Objectives Process

The DQO process is used to develop performance and acceptance criteria (or data quality objectives) that clarify study objective, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. The EPA document, *Guidance on Systematic Planning Using the Data Quality Objectives Process,* EPA QA/G-4 (EPA, 2006a), provides a standard working tool for project managers and planners to develop DQO for determining the type, quantity, and quality of data needed to reach defensible decisions or make credible estimates.

The EPA document, *Systematic Planning: A Case Study for Hazardous Waste Investigations,* EPA QA/CS-1 (EPA, 2006b) shows the use of the DQO process in the form of a case study. For projects that require data collection, the contractor will follow EPA's DQO process as described in the above guidance documents.

For each project with sampling requirements prepared for the EPA contract, the contractor will use the DQO process to (1) clarify study objectives and decisions to be made based on the data collected; (2) define the most appropriate type of data to collect; (3) determine the most appropriate conditions for collecting the data; and (4) specify acceptable decision error limits which will be used as the basis for establishing the quantity and quality of data needed to support the decision. The DQO process consists of the following seven steps:

Step 1 — State the Problem
Step 2 — Identify the Goal of the Study
Step 3 — Identify Information Inputs
Step 4 — Define the Boundaries of the Study
Step 5 — Develop the Analytic Approach
Step 6 — Specify Performance or Acceptance Criteria
Step 7 — Develop the Plan for Obtaining Data

All seven steps of the DQO process may not be applicable to all environmental data collection activities. Examples include activities where specific decisions cannot be identified or studies that are exploratory in nature. In these situations, Contractor will use the steps of the DQO process that are applicable to help plan the data collection effort.

The DQO process may include a final evaluation, after sample collection and analysis has been completed, of whether DQOs were met. That evaluation, called data quality assessment (DQA), is described in Section 5.3 of this Generic QAPP.

2.4.2 Quality Assurance Objectives for Measurement Data

The project data quality objective is to provide valid data of known and documented quality to determine the levels of compounds of concern for comparison to benchmarks. Quality assurance objectives are usually discussed in terms of accuracy, precision, sensitivity, completeness, representativeness and comparability. Sample collection and field measurement activities will be performed based on SOPs discussed throughout Section 3.0. Analytical results for laboratory blanks, duplicates and QC samples, as well as field blanks and field duplicates will be evaluated to determine bias and representativeness.

The overall QA objective for the EPA contract is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and data reporting that will provide results that will

facilitate sound decision-making to protect human health and the environment, support regulatory findings, and that are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this Generic QAPP. The purpose of this section is to address the level of QC effort and the specific QA objectives for sensitivity, accuracy, precision, representativeness, completeness, and comparability of data.

Because of the general nature of this Generic QAPP, it is not possible to provide specific quantitative QA objectives for each environmental measurement and each type of sample matrix. In addition, these QA objectives will depend on the results of the DQO process. However, each QAPP will identify the matrices to be sampled, the numbers of samples that will be collected, and the types of field and laboratory measurements that will be applied to the samples. For each sample matrix and environmental measurement type, the QAPP will specify QA objectives in terms of the following information: types of QC samples and measurements involved, frequency of collection and analysis of QC samples and measurements, how the QA objective is measured, the acceptance criteria or QC limits for that measurement, and corrective action to be taken when a QC limit is not met. For example, for soil samples analyzed for semi-volatile organic compounds (SVOC) by SW-846 Method 8270C, a QAPP might specify that the precision will be measured as the relative percent difference (RPD) between the results of matrix spike (MS) and matrix spike duplicate (MSD) samples. The QAPP may further specify that MS/MSD samples will be collected at a frequency of one MS/MSD sample for every 20 environmental samples, and that the QC limit for RPD is 20 percent for all spiking compounds. The types and concentrations of all spiking compounds will also be specified in the QAPP.

All analytical data will be evaluated for compliance with QC limits. Typically, when analytical data do not meet the QC limits, corrective action might be initiated and the data might be qualified or rejected. Corrective action may include stopping the analysis; examining instrument performance, sample preparation, and analysis information; recalibrating instruments; re-preparing and reanalyzing samples; and informing the Contractor Contract Administrator, Contractor QA manager, and the Contractor project manager of the problem.

The following subsections address the level of QC effort and general objectives for sensitivity; accuracy and precision; and representativeness, completeness, and comparability of data.

2.4.2.1 Sensitivity

Sensitivity is based on the minimum concentration that a substance can be measured and reported with 99% confidence that the concentration is greater than zero. This is generally expressed in the form of the method detection limit (MDL) or quantitation limit for the analytical method selected. The equation used to calculate MDL is presented in Section 3.5.

The lowest concentration that can be reliably achieved within the specified limits of precision and accuracy during routine laboratory operating conditions is termed estimated quantitation limit (EQL). The EQL is generally 3 to 5 times greater than the MDL. The sample quantitation limit (SQL) is the quantity based on sample dilution where the EQL is multiplied by a dilution factor. If the SQL is higher than the EQL for any analysis resulting from causes other than high analyte concentrations, the project manager will discuss corrective actions with the laboratory manager and quality control officer.

Each QAPP prepared under contract will provide the concentrations of concern for contaminants known or suspected to be present at the sampling location. This information should be provided in

Section 2.2 - Problem Definition and Background. The concentrations of concern will be based on risk-based criteria, regulatory limits, and other similar guidelines. The QAPP will also provide the required detection limits and quantitation limits for these analytes in various matrices based upon their concentrations of concern. Quantitation limits reflect the influences of the sample matrix on method sensitivity and are typically higher than detection limits. Quantitation limits provide a more reliable indication of the amount of material needed to produce an instrument response that can be routinely identified and reliably quantified when applying a particular analytical method to real environmental samples.

For all sampling and analysis work conducted under the EPA Environmental Services contract, the contractor will select analytical methods with sensitivities appropriate to the intended data use. Whenever possible, analytical methods will be specified such that matrix-specific reporting limits are lower than any contaminant concentrations of concern.

2.4.2.2 Precision

Precision is a measure of the variability of a measurement system. Precision is typically estimated by means of duplicate and replicate measurements and is expressed in terms of relative percent difference (RPD). Equations for calculating RPD are presented in Section 3.5 of this Generic QAPP. For field sampling, precision is increased by following SOPs and by collecting all samples using the same sampling procedures. Field QC samples that are collected to measure precision include field duplicate samples and collocated samples. Field measurement precision is increased through proper operation and maintenance of field equipment.

Precision for laboratory analyses will be measured by collecting and analyzing the following types of samples: field split samples, MS/MSD samples for organic and inorganic analyses, matrix duplicate samples for inorganic analyses, and laboratory control samples (LCS) and LCS duplicate samples.

Because field and laboratory measurements and sample matrices will vary with each investigation, the specific QA objectives for precision and accuracy will be provided in the QAPP. This information is presented most clearly in a table or a series of tables.

Precision for VOCs is evaluated using the relative percent difference (RPD) between the results of the matrix spike (MS) and the matrix spike duplicate (MSD) samples. This precision evaluation can also be performed using the RPD between a blank spike (BS) and blank spike duplicate (BSD). The spiked samples are laboratory samples that have been fortified. Precision for the fieldwork is evaluated by using the RPD between the results for the field duplicate samples. A RPD goal of +/-25% (i.e. 75% to 125%) will be used for both field and lab analyses and will be included in the task assignment. Precision determined using RPD would be calculated as follows:

$$RPD = \left[\frac{2x(X_1 - X_2)}{(X_1 + X_2)} \right] \times 100$$

where:

X_1 = analyze concentration in the sample
X_2 = analyze concentration in the duplicate

2.4.2.3 Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy is typically expressed as percent recovery (%R) from spiked samples or bias with respect to a reference standard. The use of spiked samples permits a constant check on method accuracy and provides an indication of the degree of matrix effect. Equations to calculate accuracy in terms of %R are presented in Section 3.5 of this Generic QAPP.

Accuracy for field sampling will be increased by establishing a sound sampling strategy and following appropriate SOPs. Field QC samples are collected to measure accuracy include trip blanks, field blanks, and equipment rinsate blanks. In general, the accuracy of field measurements will be increased by following appropriate SOPs and through proper calibration and maintenance of equipment. QC measures used to monitor the accuracy of field measurements include checking instrument responses against calibration standards.

Accuracy for laboratory analyses will be assessed by collecting and analyzing the following types of QC samples: MS/MSD samples for organic analyses, MS/MSD and matrix duplicate samples for inorganic analyses, and laboratory QC check samples. MS/MSD samples and matrix duplicate samples are collected in the field. Other QC check samples used to assess accuracy are prepared in the laboratory. These laboratory check samples may include blank spikes, surrogate spikes, method blanks, reagent blanks, instrument blanks, calibration blanks, laboratory control samples, standard reference materials, and independent check standards.

Accuracy is evaluated by using the %R of the MS/MSDs, surrogate compounds (Volatile Organic Compounds) and laboratory blank spike samples (BS/BSDs). An accuracy goal of +/- 20% of recovery (i.e. 80% to 120%) will be used. Accuracy as determined by the %R would be calculated as follows:

$$\%R = \left[\frac{X_4 - X_u}{K}\right] \times 100$$

where:

X_4 = measured value of spiked sample or blank
X_U = measured value of unspoiled sample or blank
K = known amount of the spike in the sample or blank

2.4.2.4 Representativeness

Representativeness refers to the extent that the sample data precisely and accurately represent the characteristics of a group of samples, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that depends on the proper design of the sampling program and proper laboratory protocol. The sampling network for each investigation will be designed to provide data representative of environmental conditions. During development of the sampling network, consideration will be given to past waste disposal practices, existing analytical data, current and former on-site physical setting and processes, and other relevant information. This QA parameter is a measure of the design of the sampling program and use of appropriate sampling techniques, and is evaluated using the field duplicates, trip blanks, method blanks and laboratory confirmation results.

Field duplicates provide a measure of assurance that the samples are representative of the sampling point. The effects of shipping and transporting on VOC samples are assessed with trip and field blanks. Method blanks are used to determine if cross contamination has taken place in the laboratory.

Representativeness can also be affected by the time, place, and manner by which the samples are collected. In many cases, project planners account for the difficulty in knowing when, where, and how to collect representative samples by developing statistical or random sampling networks; collecting more samples than would otherwise be needed; collecting samples at several different phases of natural or anthropogenic cycles; sampling at different locations within the project area; collecting composite samples as opposed to grab samples; and verifying and validating the sampling techniques in separate studies. The project-specific study will identify specific methods for achieving and demonstrating the representativeness of the samples to be collected.

Representativeness will also be satisfied by ensuring that QAPPs are followed, samples are collected accordance with appropriate SOPs or by proper sampling techniques when SOPs are not available, proper analytical procedures are followed, and holding times of the samples are not exceeded in the laboratory.

2.4.2.5 Comparability

This QA parameter is qualitative in signifying the confidence with which one data set can be compared with another. The sample data should be comparable to other measurement data for similar samples and sampling conditions. This parameter is achieved through standard sample collection techniques, analyses, and reporting the analytical results in appropriate units.

Generally, comparability will be attained by achieving the QA objectives for sensitivity, accuracy, precision, completeness, and representativeness given in the QAPP. Following field and laboratory procedures consistently for individual investigations and for this contract will also achieve comparability of data. EPA-approved standard field procedures such as those discussed in Section 3.2 of this Generic QAPP will be used to the extent possible. EPA-approved laboratory methods such as those listed in the Contract Laboratory Program Statements of Work and in SW-846 will be used to increase the comparability of laboratory analytical data generated under this contract.

2.4.2.6 Completeness

Completeness is a measure of sample collection usability and whether the data quality has been met. Completeness is a measure of the amount of valid data obtained from a measurement system compared to the total number of measurements necessary to achieve a specified level of confidence in decision-making. Completeness of sample collection is the ratio of the samples actually collected to the number of samples planned to be collected. The typical goal for most sample collection events is 95%. The completeness of usable data is the ratio of data that is not rejected to the total number of data points. The completeness of quality data is the ratio of data that is qualified to the total number of data points. The goals for these components are 95% and 80%, respectively. The EPA project manager, in consultation with their Superfund Branch Chief, will determine if the completeness goals have been met for the field and lab data. This determination will be documented in the Site Assessment report or the TBA report. If changes to the QAPP are necessary, these will be documented in a QAPP revision for review and approval.

Following completion of analytical testing, the percent completeness will be calculated according to the equation presented in Section 3.5 of this Generic QAPP. All QA objectives for completeness will be documented and explained in contractor prepared QAPPs.

2.5 Special Training Requirements or Certification

The primary training requirements for Contractor personnel engaged in field activities are the emergency response and hazardous waste operations training requirements defined in 29 CFR 1910.120. However, specialized training or certification related to environmental data collection might be required if (1) specifically called for in a Task Order (TO) or Procurement Request (PR), or (2) identified as necessary by contractor in responding to a TO or PR. In these situations, the contractor will address training and certification needs in the QAPP. The QAPP will identify contractor personnel that meet the special training or certification requirements; provide documentation of the training or certification; and describe how these personnel will be assigned to the project. If contractor personnel do not meet special training or certification requirements, the QAPP will briefly describe how the necessary skills will be acquired and applied to the project.

All site personnel are required to complete the 40-hour health and safety training course (Hazardous Waste Operations and Emergency Response (HAZWOPER) and to take annual 8-hour HAZWOPER refresher classes.

2.6 Documentation and Records

This section describes the requirements for data reporting that are expected of Contractor field personnel and laboratories that submit field and laboratory measurement data under the EPA Environmental Services contract. It is the responsibility of the Regional Quality Assurance Manager to ensure that the latest version of the approved Generic QAPP is used. Requirements for data validation reports, data quality assessment reports, or other QC reports that are prepared or compiled by the Contractor are not covered here but are described in Sections 4.1, 4.2, 5.1, and 5.2.

A QAPP will provide the data reporting requirements for each physical or chemical field and laboratory method that is conducted during the investigation. Data reporting requirements for each field and laboratory method will depend on the DQOs and on the intended uses of the resulting data (see Sections 2.4 and 5.3). Reporting requirements must be clearly specified as part of any request for analytical services (see Section 3.4) and are closely linked to data validation requirements (see Sections 5.1 and 5.2). For example, for most inorganic analytical methods, and for metals in particular, no adequate degree of data validation can be performed without the raw data. Each QAPP will clearly specify the data that must be reported such that (1) data validation requirements can be satisfied and (2) attainment of DQOs can be verified.

2.6.1 Laboratory Documentation

The types of data deliverables that are often required for data produced by analytical methods include the following:

- Case narrative, including a statement of samples received, a description of any deviations from the specified analytical method, explanations of data qualifiers applied to the data, and any other significant problems encountered during analysis. The narrative will describe all QC nonconformance experienced during sample analysis, along with the corrective actions taken.

- A table that cross-references field and laboratory sample numbers.

- The chain-of-custody forms pertaining to each sample delivery group or sample batch analyzed.

- Laboratory report showing traceability to the sample analyzed and containing the following information: project identification; field sample number; laboratory sample number; sample matrix description; dates and times of sample collection, receipt at the laboratory, sample preparation, and analysis; analytical method description and reference citation; individual parameter results with concentration units (including second column results or second detector results, or other confirmatory results, where appropriate); quantitation limits achieved; and dilution or concentration factors.

- Data summary forms and QC summary forms for sample results, surrogate results, blank results, field QC sample results, MS/MSD results, MS results, initial and continuing calibration results, confirmatory results, LCS/LCSD results, and other QC sample results.

- Laboratory control charts.

- Raw data such as chromatograms, peak areas, retention times for gas chromatography (GC) and high performance liquid chromatography (HPLC) analyses, mass spectra for GC/MS analyses, and laboratory bench sheets.

- Method detection limits and instrument detection limit results.

Additional data deliverables may also be required depending on project-specific DQOs or on the particular field or laboratory method of concern.

Contractor project managers, in conjunction with the Contractor QA manager, have the primary responsibility for defining project-specific data reporting requirements. These requirements, the turnaround time for receipt of the data deliverables specified, and any project-specific requirements for retention of samples and laboratory records, should be clearly defined in requests for analytical services (see Section 3.4). The subcontractor's laboratory QA managers are responsible for ensuring that all laboratory data reporting requirements in the QAPPs are met.

The Contractor will retain all project documents for a time period specified by EPA or until EPA requests transfer or disposition of the documents.

2.6.2 Field Log Books and Photographic Documentation

A field logbook (prepared by the Contractor Project Manager, Team Subcontractor Project Manager, or Field Team Leader) will be maintained to record all pertinent activities associated with the sampling event. Entries into the logbook will, at a minimum, be made on a daily basis. The observations and data will be recorded with waterproof ink and kept in a bound, weatherproof field logbook with consecutively numbered pages. Specific sampling information will be recorded on field sampling data sheets (an example is shown in Appendix B). Each entry into the field logbook will record the following information:

- Names of personnel present during sampling activities.

- Date, time and weather conditions.

- Name, address, and telephone number of the property owner, including private well and municipal well owners/agents.

- Equipment calibration.

- Number, types, location, sampling depth, well depth and screened interval, if available, of the wells sampled.

- Analyses performed in the field and in fixed laboratories.

- QA/QC samples collected.

- Photo log with the number (according to the roll and frame count) or file name if digital camera is used, time and a detailed description of each photo taken to record site conditions during the sampling event.

Changes or deletions in the field logbook or sample collection field sheets will be lined out with a single strike mark and remain legible. Sufficient information will be recorded to allow the sampling event to be reconstructed without relying on the collector's memory. Each day, the person making entries in the field logbook, will sign each page with recorded information, at the end of the day. Anyone making entries in another person's field book will sign and date those entries.

Daily quality control reports (DQCRs) will be completed for each day of sampling activity by the contractor or subcontractor to supplement the information recorded in the field logbook. The DQCRs will be signed and dated by individuals making entries. A copy of the respective daily calibration logbook pages(s) will be attached to each day's DQCR. An example of DQCR is included in Appendix C. The DQCR will be provided to the EPA Project Manager and included in site assessment and TBA reports.

2.6.3 Chain-of-Custody Documentation

All samples collected for shipment to the fixed laboratory during the field activities, will be tracked from the time the samples are collected until laboratory data are issued. Information on the custody, handling, transfer, and transport of samples to the off-site laboratory will be recorded on a chain-of-custody (COC) form as shown in Appendix D. The sampler will be responsible for filling out the COC form. The sampler will sign the COC when relinquishing the samples to anyone else.

A COC form will be completed daily for each set of samples collected, and will contain the following information:

- Sampler's signature and affiliation
- Project name
- Sample identification numbers
- Date and time of collection
- Sample type
- Analyses requested
- Number, size and type of containers
- Preservation method
- Signature of persons relinquishing custody, including date, and time
- Signature of persons accepting custody, including date and time
- Method of shipment

The above elements are included in the latest version of EPA SOP Nos. 2420.04 "Field Chain of Custody for Environmental Samples" and 2420.05 "Identification, Documentation and Tracking of Samples". Laboratory QA/QC records and sample results will be included in the required site assessment report, perhaps in an appendix. All documents will be kept in the EPA individual site files (hard copy) and available as a public record. All public record files are subject to the EPA Records Retention Plan as outlined in the EPA Quality Management Plan (QMP).

The site-specific task assignments and/or discussions during scope-of-work/sampling strategy meetings will allow EPA to specify the format and content for the data package as well as the desired reporting format.

2.6.4 Assessment Documentation

Superfund site assessment, conducted under CERCLA authority must be accomplished in accordance with applicable EPA guidance and HRS requirements. Documentation requirements are essential to attaining project objectives and for ensuring that the data collected is legally defensible.

Documentation requirements for TBA assessment must, at a minimum, meet the requirements stated in the most recent ASTM standards for conducting Phase I or Phase II Environmental Site Assessment (ESA) investigations.

Specific requirements for the Phase I ESA report are:

- Records Review: Database searches for appropriate minimum distances as defined in ASTM standard Section 7.0.
- Site Reconnaissance including descriptions of interior and exterior features, methodology, and limitations. Specific features identified in Section 8.4 "Uses and Conditions" of the ASTM Phase I standard should be discussed.
- Interviews with owner, occupant, key site manager, and local government officials and others as applicable.
- Historical use information for the property back to first obvious developed use or 1940, whichever is earliest.
- Current use of adjoining properties.
- Previous Environmental Reports.

A Phase II ESA is conducted to evaluate the recognized environmental conditions (RECs) identified in the Phase I ESA. As part of the Phase II ESA, additional data sources may be reviewed and/or samples may be collected from the site or nearby properties. Sampling protocols should follow standard Superfund sampling protocols. Report documentation requirements for the Phase II report are generally the same as for a Superfund investigation; however, findings and conclusions should address RECs at the property rather than HRS scoring.

3.0 DATA GENERATION AND ACQUISITION

This section of the Generic QAPP includes the 10 QAPP elements required by EPA QA/R-5 to address all aspects of data generation and acquisition. These QAPP elements ensure that appropriate methods for sampling, analysis, measurement and analysis, data collection or generation, data handling, and QC are identified and followed. The 10 QAPP elements related to measurement and data acquisition are:

- Sampling process design (Section 3.1)
- Sampling methods requirements (Section 3.2)
- Sample handling and custody requirements (Section 3.3)
- Analytical methods requirements (Section 3.4)
- Quality control requirements (Section 3.5)
- Inspection and equipment testing, inspection, and maintenance requirements (Section 3.6)
- Instrument and equipment calibration and frequency (Section 3.7)
- Inspection and acceptance requirements for supplies and consumables (Section 3.8)
- Non-direct measurements (data acquisition) requirements (Section 3.9)
- Data management requirements (Section 3.10)

3.1 Sampling Process Design

Sampling activities for each project will be outlined in QAPP documents. The QAPP will summarize the sample network design and rationale, including: the numbers and types of samples to be collected, sampling locations, sampling frequencies, sample matrices, and measurement parameters. Key factors to be evaluated in the sampling process design include:

- Project objectives and decisions to be made.
- Information needed for the decisions and how the information will be used.
- Time and resource constraints.
- Statistical validity and legal defensibility of the data.

Evaluation of the sampling process design will (1) helps to ensure that the analytical results obtained fully support the decisions to be made by data users and (2) maximizes the probability of making a correct decision based on the results.

The sampling network design and rationale will be coordinated with the DQO process described in Section 2.4 of this Generic QAPP. The ultimate use of the data, as defined by the DQO process, will help determine whether grab or composite samples should be collected or whether a probability-based (statistical) data collection design or a nonrandom (judgmental) data collection design should be used.

This section also distinguishes between screening data used for information purposes only (non-critical measurements) and definitive data used to meet project objectives (critical measurements). If field-screening techniques will be used to identify samples for confirmative laboratory analysis, a QAPP must indicate what techniques will be used and the frequency of confirmative sampling.

For completion of this element (especially for large-scale projects), the QAPP will include a schedule table showing the anticipated start and completion dates of all major milestones, including field sampling events, laboratory analyses, data validation, and report preparation and submittal.

For certain types of routine investigations, where public water supplies may be impacted by releases of contaminants, a generic sampling scheme may be used to:

- Identify and evaluate potential source(s);
- Document whether a release of hazardous substance has occurred;
- Estimate the area of contamination;
- Sample potential targets that may be impacted; and
- Determine whether the contamination can be attributed to the source area(s).

As an example, a generic sampling scheme, indicating an estimate of sample type, location and number of samples is shown in Table 3-1. The actual site-specific number, location and type of samples will be described in the QAPP.

Table 3-1 EPA Generic Sampling Scheme and Parameter Analysis Schedule				
Location	**Parameter**	**Matrix**	**Number of Samples**	**Comments**
Source area vertical profiles	VOCs	Soil-gas	2-8 per vertical profile location	Direct push sample, analyzed at mobile lab.
Source area	COC	Soil/ Groundwater	3-6 (each area)	Direct push sample, analyzed at mobile lab.
Outward from source area and along migration pathway	COC	Soil-gas/Soil/ Sediment/ Surface Water/ Groundwater	4-8	Direct push sample, analyzed at mobile lab.
Background, source area and along migration pathway	COC	Soil/Sediment/ Surface Water/ Groundwater	2-4	Direct push sample, analyzed at mobile lab (may require fixed lab verification split sample).
Public water supply well	COC	Water	1-3	From wells near the source, analyzed at fixed off-site lab.
Private water supply well	COC	Water	2-4	From wells near the source, analyzed at fixed off-site lab.
Field duplicate	COC	Groundwater	1/10 samples*	Direct push microwell sample analyzed at fixed off-site lab.
Rinsate of direct push sampling probe or other reusable equipment	COC	Water	1 per use / equipment/day	VOCs analyzed at mobile lab. Fix lab analyses may be necessary for other types of COCs.
Trip blank	VOCs	Water	Minimum 1 per container with VOCs	Analyzed at fixed off-site lab.
Field blank	VOCs	Water	Minimum of 1 per 10 liquid samples	Analyzed at fixed off-site lab.

COC = Contaminants of Concern
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds

*Unless EPA Project Manager decision is that field duplicates are not required

Sampling will follow a biased design in that sampling locations will be from areas deemed most likely to be contaminated. Physical features such as buildings, fences, utilities, roads, lagoons, ponds, surface impoundments, etc. and access to property also will influence selection of sampling locations (based on site reconnaissance prior to sampling).

3.1.1 Soil-gas Vertical Profile and Possible Additional Samples

At the potential source area (may be more than one) a vertical profile soil-gas sampling will be performed. This will provide information to optimize depth of sampling for additional soil gas, soil, and groundwater samples. Number of samples for the vertical profile will vary depending on the depth to groundwater and generally range from two to eight soil-gas vertical profile sampling points. The depth and number of vertical samples will be estimated in the project work plan and finalized on a site-specific basis by field personnel in consultation with the EPA Project Manager.

Generally, soil-gas samples will be taken at targeted locations to evaluate each of the potential source areas. Based on the on-site analytical results of these initial soil-gas samples, the soil-gas survey will expand outward from the source area to determine the extent of contamination and migration direction. A soil-gas grid will be established using the initial soil-gas locations as reference points. The distance between the soil-gas points will be influenced by the concentration of contaminants and determined on a site-specific basis by field personnel in consultation with the EPA Project Manager.

3.1.2 Soil Sample Collection

The soil samples will be taken primarily at the source area. Results of the soil-gas sampling will be used to determine the locations for collection of the soil samples (generally the areas and the depths with the highest soil-gas concentrations) to quantitatively confirm a source area. Typically, three to six soil samples will be taken to characterize each source area. Each soil sample will be divided into two by cutting the sampling tube into two pieces. One of these two halves will be capped and preserved immediately in a cooler, cooled at 4°C, and the other will be analyzed at the on-site lab. Duplicates of the soil samples that are determined to be contaminated during on-site analysis will be sent to a fixed lab for confirmation as needed for HRS scoring criteria or to meet other site assessment objectives.

3.1.3 Groundwater Sample Collection

Groundwater samples at the source area and along the potential migration direction will be taken using direct push probe, where applicable. If direct push technology is not practicable because the depth to groundwater exceeds its capacity or because of other adverse subsurface site conditions, than conventional drilling may be necessary to install monitoring wells at the site. The number of groundwater samples will be based on the extent of contamination and other site assessment objectives.

3.1.4 Background Samples

Background samples are usually required to compare site conditions to regional or upgradient conditions. Background samples are environmental media samples and not considered "QC samples." Criteria for utilizing background samples vary between regulatory programs. Therefore, background sampling requirements will be specified in the QAPP documents.

3.1.5 Site Security

The contractor will provide security at the site to protect the public and the work effort. The security level shall be sufficient to reasonably protect personal property and persons from harm or damage.

3.1.6 Disposal of Contaminated Materials

Investigation derived waste (IDW) may consist of decontamination fluids, drill cuttings, purge/development water, excess sampled media (e.g., soil, sediment, water, etc.), disposable sampling supplies, and personal protective equipment (e.g., Tyvek/Saranex coveralls, gloves, booties, etc.). Handling of IDW will be performed according to procedures described in Management of Investigation Derived Wastes during Site Inspections, May 1991 (EPA, 1991a). Attempts will be made to achieve the following goals pertaining to IDW management:

- Leave the site in no worse condition than it existed prior to site activity.
- Remove wastes that pose an immediate threat to human health or the environment.
- Leave wastes on site that do not require off-site disposal or extended containerization.
- Comply with state and federal requirements.
- Minimize the quantity of wastes generated.

Waste disposal for IDW will be dependent upon classification of the waste as either RCRA hazardous or RCRA nonhazardous.

Decontamination of personnel and equipment will be conducted in accordance with the site-specific health and safety plan and EPA Region VII guidelines.

3.1.7 Site Restoration

The contractor will repair or replace material damaged during site assessment activities and restore as near as possible the damaged environment to pre-assessment conditions. At a minimum, the contractor will perform the following:

- Regrading of surfaces
- Replacement of soil
- Replacement of damaged concrete, asphalt or other surface cover
- Reseed or replant vegetation
- Repair/replace any damaged utilities
- Repair damaged private property, including fences, if warranted

3.2 Sampling Methods Requirements

Sampling procedures will vary with each project and will be specified in the QAPP. This section presents information concerning the selection of sampling methods; project-specific sampling metho requirements; and requirements for containers, volumes, preservation methods, and holding times for samples that might be commonly required under the contract. Requirements for collecting QC samples are discussed in Section 3.5.

3.2.1 Sampling Methods

Sampling methods and equipment will be selected to meet project objectives. Affected media may include groundwater, surface water, sediments, surface and subsurface soils, wastes, process materials, and air. Field parameters (such as pH, specific conductance, oxidation-reduction potential, temperature,

dissolved oxygen content, meteorological parameters, and water elevation) may also be measured to assist in carrying out sampling procedures effectively.

To the extent possible, the Contractor will rely on EPA-approved methods for sample collection and field measurements. EPA-approved sampling methods that are selected for use will be referenced in the QAPP. Guidance documents containing EPA-approved sampling SOPs include the following:

- OSWER Publication 9360.4-02, "Compendium of ERT Soil Sampling and Surface Geophysics Procedures," EPA/540/P-91/006, PB91-921273 (EPA 1991b).

- OSWER Publication 9360.4-03, "Compendium of ERT Surface Water and Sediment Sampling Procedures," EPA/540/P-91/005, PB91-921274 (EPA 1991c).

- OSWER Publication 9360.4-05, "Compendium of ERT Air Sampling Procedures," PB92-963406 (EPA 1992a).

- OSWER Publication 9360.4-06, "Compendium of ERT Ground Water Sampling Procedures," EPA/540/P-91/007, PB91-921273 (EPA 1991d).

- OSWER Publication 9360.4-07, "Compendium of ERT Waste Sampling Procedures," EPA/540/P-91/008, PB91-921276 (EPA 1991e).

- OSWER Directive 9360.4-10, "Removal Program Representative Sampling Guidance – Volume 1: Soil, Interim Final," EPA, November 1991. (EPA 1991f)

- OSWER Directive 9360.4-04, "Compendium of ERT Field Analytical Procedures," EPA, May 1992. (EPA, 1992c)

- Soil Sampling, ERT #2012 SOP No. 4231.2012

- Sampling Soil for Determination of Volatile Organic Compounds, EPA Region VII SOP No. 4230.03.

- Groundwater Well Sampling, ERT #2007 SOP No. 4231.2007.

- Surface Water Sampling, ERT #2013 SOP No. 4232.2013.

- Sediment Sampling, ERT #2016 SOP No. 4232.2016.

- Collecting Drinking Water Samples for Determinations of Volatile Organic Compounds, EPA Region VII SOP No. 4230.10.

- Sludge Sample Collection, EPA Region VII SOP No. 2334.04.

- Soil Gas Sampling, ERT #2042 SOP 4231.2042.

- Model 5400 Geoprobe™ Operation, ERT #2950 SOP No. 4232.2050.

- Geoprobe Operation, EPA Region VII SOP No. 4230.07.

- Portable XRF Analyzer, EPA Region VII SOP No. 4231.1707.

In addition, sampling methods referenced in the *Region 7 Standard Operating Procedures and Governing Documents* will be used. If an EPA-approved sampling method is not available, or a non-standard sampling method is required, the QAPP will include a procedure for the method.

Collection of groundwater samples from public and private water supply wells will follow the latest version of EPA Region 7 SOP No. 4230.10: "Collecting Drinking Water Samples for Determinations of Volatile Organic Compounds", or equivalent SOPs supplied by the contractor. SOPs provided by the manufacturer for the direct push sampling probe will be followed by field personnel for soil-gas, soil and groundwater sampling.

Any boreholes created by the direct push probe will be backfilled with bentonite (or equivalent) to the surface to assure that a conduit for contaminated vapors and groundwater is not created at the site.

3.2.2 Project-Specific Sampling Methods Requirements

Because of the general nature of this Generic QAPP, project-specific sampling method requirements cannot be described. However, the following items related to sampling methods and requirements will be identified or referenced in the QAPP.

- Methods used to select sample locations for all sample matrices.
- Sampling equipment for all sample matrix types and all sampling locations.
- Support facilities with capabilities commensurate with the requirements of the sampling plan.
- Decontamination procedures for all sampling equipment (including drilling equipment). At a minimum, decontamination performed between each sampling point will involve:
  - Rinse sampling equipment with a Trisodium Phosphate or equivalent soap solution.
  - Follow with a potable water rinse.
  - Additional rinse, if required, with potable water or dionized water.
- Procedures for handling and disposing of investigation-derived wastes such as well construction wastes, decontamination fluids, disposable sampling equipment, and so forth, should follow EPA guidance document for Investigation Derived Wastes.
- Procedures for providing unique sample identification numbers that will enable personnel to accurately correlate analytical results and field information with sampling locations and field monitoring stations.

The QAPP will also identify personnel responsible for corrective action in cases where failures in the sampling or measurement systems occur. In general, corrective actions for field sampling and measurement failures include instrument recalibration, replacement of malfunctioning measurement instruments or sampling equipment, and recollection of samples or repeating measurements.

3.2.3 Sample Container, Volume, Preservation, and Holding Time Requirements

When appropriate, each QAPP will specify the required sample volume, container type, preservation technique, and holding time for each analysis to be conducted on each sample matrix. This information will most likely be presented in tabular form. Table 3.2, which describes the required sample volumes,

containers, preservation techniques, and holding times for samples to be analyzed by SW-846 methods, is provided as an example of the level of detail that the site-specific tables will contain.

The table covers aqueous, oil, and solid sample matrices and includes information for both organic and inorganic parameters in each matrix. Required containers, preservation techniques, and holding times for field QC samples (such as duplicates, field blanks, trip blanks, and MS/MSD samples) will typically be the same as for investigative samples. Special sampling for radon, asbestos, or lead-based paint that may be required for certain TBA sites will be discussed in the project-specific QAPP.

3.3 Sample Handling and Custody Requirements

Each sample collected by the contractor under this contract must be traceable from the point of collection through analysis and final disposition to ensure sample integrity. Sample integrity helps ensure the legal defensibility of the analytical data and subsequent conclusions. The sampling team will use standard EPA procedures to identify, track, monitor, and maintain chain-of-custody for all samples. Chain-of-custody records will establish the documentation necessary to trace sample possession from collection through final disposition. Everyone retaining custody at any time throughout the sample history is held responsible for maintaining proper documentation and control measures. A sample is under a person's custody if it:

- Is in that person's possession.
- Is in that person's view after being in his or her possession.
- Is in that person's possession and he or she places it in a secured location.
- Is placed by that person in a designated secure area.

Field and laboratory chain-of-custody procedures are discussed in the next section.

Table 3.2
Required Sample Volumes, Containers,
Preservation Techniques, and Holding Times

Matrix	Parameter	SW 846 Analysis	Volume and Container	Preservation Techniques	Holding Time[a] (Extraction/Analysis)
Aqueous	Volatile organic compounds (VOC)	8015B, 8021B, 8260B	Three 40-ml glass vials with Teflon®-lined septum caps	To pH < 2 with hydrochloric acid (HCl); sodium thiosulfate if residual chlorine; store at 4°C	NA[b]/14 days
Aqueous	Semivolatile organic compounds (SVOC)	8270C	Two 1,000-ml amber glass bottles with Teflon®-lined caps	Sodium thiosulfate if residual chlorine present; store at 4°C	7 days/40 days
Aqueous	Pesticides and herbicides	8081A, 8151A	Two 1,000-ml amber glass bottle with Teflon®-lined caps	Sodium thiosulfate if residual chlorine present; store at 4°C	7 days/40 days
Aqueous	Polychlorinated biphenyls (PCB)	8082	Two 1,000-ml amber glass bottle with Teflon®-lined caps	Sodium thiosulfate if residual chlorine present; store at 4°C	7 days/40 days
Aqueous	Dioxins and furans	8280A	One 1,000-ml amber glass bottle with Teflon®-lined cap	Store at 4°C	30 days/45 days
Aqueous	Explosives	8330	One 1,000-ml amber glass bottle with Teflon®-lined cap	Sodium thiosulfate if residual chlorine present; store at 4°C	7 days/40 days
Aqueous	Metals (except mercury, arsenic, lead, and selenium)	6010B	One 1,000-ml glass or polyethylene bottle	To pH < 2 with nitric acid (HNO_3); store at 4°C	NA/180 days
Aqueous	Mercury	7470A	One 1,000-ml glass or polyethylene bottle	To pH < 2 with HNO_3; store at 4°C	NA/28 days

Table 3.2
Required Sample Volumes, Containers,
Preservation Techniques, and Holding Times

Matrix	Parameter	SW 846 Analysis	Volume and Container	Preservation Techniques	Holding Time[a] (Extraction/Analysis)
Aqueous	Lead	7421	One 1,000-ml polyethylene bottle	To pH < 2 with HNO_3; store at 4°C	NA/180 days
Aqueous	Arsenic	7060A	One 1,000-ml polyethylene bottle	To pH < 2 with HNO_3; store at 4°C	NA/180 days
Aqueous	Selenium	7740	One 1,000-ml polyethylene bottle	To pH < 2 with HNO_3; store at 4°C	NA/180 days
Aqueous	Toxicity characteristic leaching procedure (TCLP) VOCs	1311	Four 1,000-ml amber glass bottles with Teflon®-lined caps	Store at 4°C	14 days/14 days
Aqueous	TCLP SVOCs	1311	Four 1,000-ml amber glass bottles with Teflon®-lined caps	Store at 4°C	14 days/7 days/40 days[d]
Aqueous	TCLP Metals	1311	Four 1,000-ml amber glass bottles with Teflon®-lined caps	Store at 4°C	180 days/180 days 28 days/28 days for mercury
Oil	VOCs	8260B	Two 4-ounce glass jars with Teflon®-lined caps; or, two pre-labeled, pre-weighed 40-mL glass vials with Teflon®-lined septum caps, containing methanol or polyethylene glycol, as appropriate, with one 4-ounce glass jar with Teflon®-lined cap	Store at 4°C	NA/14 days
Oil	SVOCs	8270C	One 4-ounce glass jar with Teflon®-lined cap	Store at 4°C	14 days/40 days
Oil	Metals	6010B and 7000A series	One 4-ounce glass jar with Teflon®-lined cap	Store at 4°C	NA/180 days

Table 3.2
Required Sample Volumes, Containers,
Preservation Techniques, and Holding Times

Matrix	Parameter	SW 846 Analysis	Volume and Container	Preservation Techniques	Holding Time[a] (Extraction/Analysis)
Oil	Mercury	7470A	One 4-ounce glass jar with Teflon®-lined cap	Store at 4°C	NA/28 days
Oil	TCLP VOCs	1311	Two 1,000-ml amber glass bottles with Teflon®-lined caps	Store at 4°C	14 days/14 days
Oil	TCLP SVOCs	1311	Two 1,000-ml amber glass bottles with Teflon®-lined caps	Store at 4°C	14 days/7 days/40 days[d]
Oil	TCLP Metals	1311	Two 1,000-ml amber glass bottles with Teflon®-lined caps	Store at 4°C	180 days/180 days 28 days/28 days for mercury
Solid	VOCs	8015B, 8021B, 8260B	Two 40-mL glass vials with Teflon®-lined caps; or 2 pre-labeled, pre-weighed 40-ml glass vials with Teflon®-lined septum caps, containing stirring bars, sodium bisulfate solution, 5 grams of sample collected using disposable plastic syringes with the ends cut off, with 1 40-mL Teflon®-lined cap	Store at 4°C	NA/14 days[c];
Solid	SVOCs	8270C	One 8-ounce glass jar with Teflon®-lined cap	Store at 4°C	14 days/40 days
Solid	Pesticides, herbicides	8081A, 8151A	One 8-ounce glass jar with Teflon®-lined cap	Store at 4°C	14 days/40 days
Solid	PCBs	8082	One 8-ounce glass jar with Teflon®-lined cap	Store at 4°C	14 days/40 days
Solid	Metals (except mercury)	6010B and 7000 series	One 8-ounce glass jar with Teflon®-lined cap	Store at 4°C	NA/180 days

Table 3.2
Required Sample Volumes, Containers,
Preservation Techniques, and Holding Times

Matrix	Parameter	SW 846 Analysis	Volume and Container	Preservation Techniques	Holding Time[a] (Extraction/Analysis)
Solid	Mercury	7471A	One 8-ounce glass jar with Teflon®-lined cap	Store at 4°C	NA/28 days
Solid	Lead	7421	One 8-ounce glass jar with Teflon®-lined cap	Store at 4°C	NA/180 days
Solid	Arsenic	7060A	One 8-ounce glass jar with Teflon®-lined cap	Store at 4°C	NA/180 days
Solid	Selenium	7740	One 8-ounce glass jar with Teflon®-lined cap	Store at 4°C	NA/180 days
Solid	TCLP VOCs	1311	One 4-ounce glass with Teflon®-lined cap	Store at 4°C	14 days/14 days
Solid	TCLP SVOCs	1311	One 32-ounce glass jar with Teflon®-lined cap	Store at 4°C	14 days/7 days/14 days[d]

Notes:

[a] Holding time is measured from the time of sample collection to the time of sample extraction and analysis.
[b] NA = Not applicable.
[c] Preservation and holding time requirements are for samples that are not strongly alkaline or highly calcareous. For samples suspected to be strongly alkaline or highly calcareous, additional steps may be required to preserve and handle the samples. For details refer to SW 846 Method 5035, Section 6.4.3.
[d] SVOC holding times for Method 1311 include time to TCLP extraction/preparative extraction/analysis of sample.

3.3.1 Field Chain-of-Custody Procedures

All projects conducted by the contractor under this contract will follow sample and document control procedures, sample and evidence identification procedures, field records requirements and procedures, and chain-of-custody procedures outlined in the latest version of EPA Region 7 SOPs 2420.04 and 2420.05. Samples will be packaged and labeled for shipment in compliance with current U.S. Department of Transportation (DOT) and International Air Transport Association (IATA) dangerous goods regulations. Any additional requirements stipulated by the overnight shipping firm will be followed.

3.3.1.1 Field Procedures

The sample packaging and shipment procedures summarized below will ensure that the samples arrive at the laboratory with the chain-of-custody handling requirements and documentation intact.

All chain-of-custody forms should be filled out in ink. Certain information required on the chain-of-custody form such as names of samplers, and date and time of sample collection are self-explanatory. The following additional information will be entered on the chain-of-custody form:

- The Contractor task order number will be entered in the space entitled "project number."
- A description of where the sample was taken will be included in the space entitled "station location" (for example, southwest corner of drum storage area).
- The target parameters and analytical method will be entered in the space entitled "analysis required" (for example, SVOCs, SW846 Method 8270C).

The contractor will use the latest version of EPA Region 7 SOP No. 2420.06, "Sample Container Selection, Preservation, and Holding Times", or equivalent SOPs. The contractor field personnel will follow the steps outlined below to prepare the samples and custody documents:

- Immediately after sample collection, sample containers will be labeled with the appropriate identifiers, and clear tape will be placed over the labels to preserve label integrity.
- The samples will be placed in Ziploc™ plastic bags and which will then be immediately placed on ice in cooler containing double-sealed bags of ice and maintained at 4° C.
- Glass containers will be wrapped in bubble pack and placed in Ziploc™ plastic bags. Samples will be transported or shipped to the laboratory in time so that the analysis can be performed before the holding times are exceeded.
- Prior to shipping, the chain-of-custody forms, airbills, and all other relevant documents will be completed.
- Chain-of-custody forms will be sealed in plastic bags and taped to the inside of the cooler lid.
- Cushioning material, consisting of bubble-wrap, will be placed in the cooler.
- A temperature blank consisting of a jar or vial containing water will be included in every cooler to be used by the laboratory to determine the cooler temperature at the time of sample receipt.

- The shipping cooler will then be sealed with tape and custody seals in a manner that will indicate whether the cooler was opened. The preferred procedure includes placement of custody seals at diagonally opposite corners of the cooler. The custody seals will be covered with clear plastic tape or strapping tape.
- Coolers will remain in a secured area or in view of the sampler until it is properly sealed for shipment to the laboratory.

Traceability of the sample must be maintained from the time the samples are collected until laboratory data are issued. Information on the custody, transfer, handling, and shipping of samples to the off-site laboratory will be recorded on a chain-of-custody (COC) form. Details of the chain of custody requirements are discussed in Section 2.7.3.

Contractor will utilize the following the latest version of EPA Region 7 SOPs, or similar and equivalent SOPs for handling and tracking samples:

- 2420.04, "Field Chain-of-Custody for Environmental Samples."
- 2420.05, "Identification, Documentation and Tracking of Samples."
- 2420.07, "Procedures for Sample Shipping To Contract Laboratories."
- 2420.11, "Preparation of Aqueous and Soil Trip Blanks."
- 2420.12, "Preparation of Chemical Preservatives Solutions for Aqueous Samples."

The field sampler is personally responsible for the care and custody of the samples until they are transferred to other contractor personnel or properly dispatched to an overnight carrier or directly to a laboratory. As few people as possible should handle the samples to prevent loss, breakage, or potential contamination. When transferring possession of the samples, the individuals relinquishing and receiving the samples sign, date, and note the time of transfer on the chain-of-custody form. Commercial carriers are not required to sign off on the chain-of-custody form as long as the form is sealed inside the sample cooler and the custody seals remain intact.

3.3.1.2 Field Logbooks

Field logbooks provide the means of recording all data collection activities performed. Logbook entries will be described in as much detail as possible so that a particular situation can be reconstructed without relying on memory. Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel but will be stored in the secure location when not in use. Each logbook will be identified by a project-specific document number. The title page of each logbook will contain the following information:

- Person to whom the logbook is assigned.
- Logbook number.
- Project name.
- Project start and end dates.

All logbook entries will be made in ink and no erasures will be made. If an incorrect entry is made, the incorrect information will be crossed out with a single strike mark that will be initialed and dated by the person making the correction.

Logbook entries will contain a variety of information. The beginning of each entry will note the date, start time, weather, names of all team members' present, facility visitors present and the purpose of their visit, level of personal protection used, and signature of the person making the entry.
Whenever a sample is collected or a measurement is taken, a detailed description of the sampling or measurement location, which may include compass and distance measurements, or global positioning system (GPS) coordinates, will be recorded in the logbook. The number and description of any photographs taken of the location will also be noted.

All equipment used to take measurements will be identified along with the date of equipment calibration. The equipment used to collect samples will be noted along with the time of sampling, sample description, depth at which the sample was collected, sample volume, number of containers, and sample preservation method. The number, type, and location of QC samples will also be noted in the logbook.

3.3.2 Laboratory Chain-of-Custody Procedures

Custody procedures must be followed in the laboratory from sample receipt until the sample is discarded. The procedures required for this contract must be at least as stringent as those required by the EPA Contract Laboratory Program (CLP) Statements of Work (SOW). These procedures are described in this section.

The laboratory should designate a specific person as the sample custodian, with an alternate designated to act in the custodian's absence. The custodian will receive all incoming samples and indicate receipt by signing the accompanying custody forms and retaining copies of the signed forms as permanent records. Once the sample transfer process is complete, the laboratory is responsible for maintaining internal logbooks, lab tracking reports, and other records necessary to maintain custody throughout sample preparation and analysis.

The laboratory sample custodian will record all pertinent information concerning the sample, including the persons delivering and receiving the sample, the date and time received, the method by which the sample was transmitted to the laboratory, sample condition at the time of receipt (sealed, unsealed, or broken container; temperature; or other relevant remarks), the sample identification number, and any unique laboratory identification number associated with the sample.

The laboratory must provide a secure storage area, restricted to authorized personnel, for all samples. The custodian will ensure that samples that are heat- or light-sensitive, radioactive, have other unusual physical characteristics, or require special handling are properly stored and maintained prior to analysis. Only the custodian can distribute samples to laboratory personnel authorized to conduct the required analyses. Laboratory analytical personnel are responsible for the care and custody of the sample upon receipt. These personnel must be prepared to testify that the sample was in their custody at all times from the moment they received it from the custodian until the time that the analyses were completed.

At the completion of sample analysis, any unused portion of the sample, together with all identifying labels, must be returned to the custodian. The returned tagged sample should be retained in secure storage until the custodian receives permission to dispose of the sample. Sample disposal will occur only on the order of the laboratory director, in consultation with EPA or Contractor, or when it is certain that the information is no longer required or the samples have deteriorated. Likewise, tags and laboratory records will be maintained until the information is no longer required and final disposition is ordered by the laboratory director, in consultation with EPA or the contractor.

3.4 Analytical Methods Requirements

The source of analytical services to be provided will in part be determined by DQOs, the intended use of the resulting data, and Task Order-specific requirements and constraints such as quick turnaround of data. The QAPP will identify the specific laboratory that has been selected to provide analytical services.

This section of the Generic QAPP outlines the procedures that the contractor will use to identify and select field and laboratory analytical methods that are consistent with DQOs.

3.4.1 Field Analytical Methods

Whenever possible, the contractor will use EPA-approved methods for field measurements and analyses. For example, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", or SW-846 may be used to determine field parameters such as pH, specific conductance, dissolved oxygen, and temperature. For situations where an EPA-approved or standard method does not exist, or where a modification of an EPA-approved method is used, the contractor will include appropriate SOPs in the QAPP. The SOPs must contain method performance study information to confirm the performance of the method for each applicable matrix. If previous performance studies are not available, they must be developed during the project and included as a part of the project results.

3.4.2 Laboratory Analytical Methods

To select appropriate methods for sample preparation, cleanup, and analysis, the contractor will consider the specific parameters of interest, sample matrices, and minimum detectable concentrations needed to accomplish project DQOs. Whenever possible, the contractor will select methods from SW-846, Final Update IV, dated January 3, 2008 (EPA 2008a), or from the Contract Laboratory Program Statements of Work for Organics and Inorganics Analyses. If these sources do not include an analytical method consistent with DQOs, the contractor will review other EPA-approved methods such as those specified in "Methods for Chemical Analysis of Water and Wastes" (EPA 1983). Table 3.2 includes a listing of some of the more commonly used analytical methods found in the SW-846 compendium of methods (EPA 2008).

When EPA-approved methods are not available or appropriate for project-specific requirements, other recognized standard analytical methods, such as those published by the ASTM or the National Institute for Occupational Safety and Health (NIOSH), may be used. Guidance documents containing these analytical methods include:

- American Public Health Association (APHA), American Water Works Association, Water Environment Federation. 2012. "Standard Methods for the Examination of Water and Waste Water." 22th Edition.
- ASTM. (Updated yearly). "Annual Book of ASTM Standards."
- NIOSH. 1994. NIOSH Manual of Analytical Methods, Fourth Edition. Publication No. 94-113 (August 1994).

The published methods mentioned are updated at various time intervals. Hence, both old and new versions of these published methods exist, and future updates of these published methods will also be produced. Unless otherwise stated, laboratories conducting work under the EPA Environmental Services contract will use the most current version of any specified analytical method.

The EPA Analytical Service Request (ASR) form will be used for laboratory services that are subcontracted by the contractor under this contract. This form will contain certain basic information, modified as needed to meet project-specific requirements. The form will include the following information:

- General description of analytical service requested.
- Number and types of samples to be collected.

Purpose of analysis

- Estimated dates of sample collection.
- Dates and methods of sample shipment.

Holding time requirements

- Analytical protocols required, including method required, required detection limits, reporting limits, precision, and accuracy.
- Special technical instructions, if outside the scope of analytical protocol.
- Required data deliverables and number of days after sample receipt that the data will be required.

Other additional requirements

- Sampling and shipping contact information.
- Project-specific data reduction or validation criteria.
- Laboratory turnaround time if different from standard turnaround time and reason(s) for the quicker deliverable of data results.

Laboratory analytical methods will vary with each investigation conducted under the contract and should be identified in the QAPP. When laboratory analyses will be conducted exactly according to the most recent EPA-approved methods listed above, the QAPP will reference the appropriate method. However, for some EPA-approved methods, it may be necessary to include additional information in the QAPP. For example, some methods found in SW-846 allow the user to specify extraction methods for soil samples. The specific options selected will be included in the Analytical Service Request form and in the QAPP.

On rare occasions, project-specific conditions might require the use of an analytical method that is either a modification of an EPA-approved method or is not an EPA-approved or standard method. These methods will typically be provided by the laboratory performing the method and will include a detailed description of sample preparation, instrument calibration, sample analyses, method sensitivity, associated QA/QC requirements, and acceptance criteria. The laboratory or method developer must provide method performance study information to confirm the performance of the method for each applicable matrix; if previous performance studies are not available, they must be developed during the project and included as part of the project results.

If an analytical system fails, the Contractor QA manager will be notified and corrective action will be taken. In general, corrective actions will include stopping the analysis, examining instrument performance and sample preparation information, and determining whether instrument recalibration and re-preparation and reanalysis of samples are warranted.

3.5 Quality Control Requirements

Quality Assurance/Quality Control (QA/QC) samples will be collected to evaluate the precision and accuracy of the mobile and fixed laboratory analysis.
Various kinds of field and laboratory QC samples and measurements will be used to verify that analytical data meet project-specific QA objectives. Field QC samples and measurements will be used to assess how the sampling activities and measurements influence data quality. Similarly, laboratory QC samples will be used to assess how a laboratory's analytical program influences data quality. The QAPP will provide a description (usually in table format) of the QC samples to be analyzed during the investigation for (1) each field and laboratory environmental measurement method and (2) each sample matrix type.

This section of the Generic QAPP provides definitions and typical collection and analysis frequencies for common field and laboratory QC samples and measurements. In addition, this section outlines the procedures used to assess field measurements, laboratory data, and common data quality indicators.

3.5.1 Field Quality Control Requirements

Field QC samples will be collected and analyzed to assess the quality of data generated from sampling activities. These samples may include trip blanks, field blanks (1/10 samples-unless specified by EPA Project Manager), equipment rinsate blanks, field duplicates, field split samples, matrix spike (MS) samples, matrix spike duplicate (MSD) samples, and matrix duplicate samples. Field QC measurements may include field replicate measurements and checks of instrument responses against QC standards.

Trip blanks, field blanks, and equipment blanks should be free of contaminants. If contaminants are detected, the data from the environmental samples may be qualified as per data validation procedures discussed in Section 5.

Trip blanks are used to assess the potential for sample contamination during handling, shipment, and storage. Trip blanks will consist of VOC analysis vials filled with ASTM Type II water at the laboratory. The trip blanks are sealed and transported to the field; kept with empty sample bottles and then with the investigative samples throughout the field effort; and returned to the laboratory for analysis with the investigative samples. Trip blanks are never opened in the field. One trip blank will be included within every shipping cooler of liquid samples to and from the field to be analyzed for VOCs to detect any cross-contamination during handling and transport.

Field blanks are samples of the same or similar matrix as the actual investigative samples that are exposed to the sampling environment or equipment at the time of sampling. They are used to assess contamination resulting from ambient conditions. Field blanks are required for liquid matrices. For aqueous samples, field blanks consist of analyte-free water such as degasified organic-free water for VOC analysis, high performance liquid chromatography (HPLC) water for semi-volatile organic compounds (SVOC) analysis, and deionized or demineralized water for inorganic analyses. Field blanks are generally not required for solid matrices but may be collected on a case-by-case basis. Typically, one field blank is collected for every 10 or fewer liquid investigative samples.

Equipment rinsate blanks are collected when sampling equipment is used. These blanks assess the cleanliness of sampling equipment and the effectiveness of equipment decontamination. Equipment rinsate blanks are collected by pouring analyte-free water over surfaces of cleaned sampling equipment that contact sample media. Equipment rinsate blanks are collected after sampling equipment has been decontaminated but prior to being reused for sampling. Equipment rinsate blanks are typically collected for each type of decontaminated sampling equipment. A rinse of the sampling probe will be analyzed at

the onsite lab (normally for VOCs) to determine the effectiveness of the decontamination of the probe between sampling. This rinsate sampling analysis will be accomplished in a manner that will not interfere with the procedures and method requirements of the ongoing field-sampling program.

Field duplicate samples are independent samples collected as close as possible in space and time to the original investigative sample. Immediately following collection of the original sample, the field duplicate sample is collected using the same collection method. Care should be taken to collect the field duplicate sample as close to the location of the original sample as possible. Field duplicate samples can measure how sampling and field procedures influence the precision of an environmental measurement. They can also provide information on the heterogeneity of a sampling location. One field duplicate groundwater sample per site will be collected (sequentially) at a frequency of one for every 10 investigative samples of the same matrix type. A minimum of one field duplicate sample should be taken for each matrix sampled, even if less than 10 samples are collected for the applicable matrix. Field duplicates will be analyzed at the fixed laboratory for the same parameter as the primary sample analyzed at the on-site lab. A duplicate soil sample per site will be collected from the same sampling spoon as the primary sample. These results will be used to evaluate the representativeness of the sample.

Field split samples are usually a set of two or more samples taken from a larger homogenized sample. The larger sample is usually collected from a single sampling location, but can also be a composite sample. Field split samples can be sent to two or more laboratories and are used to provide comparison data between the laboratories. Regulatory agencies involved in a project may request that field split samples be collected to monitor how closely laboratories are meeting project-specific QA objectives.

MS/MSD samples are typically collected for analysis by organic methods, and also often for analysis by inorganic methods. Solid MS/MSDs usually require no extra volume. Each liquid MS/MSD sample is a single sample, usually collected from a single sampling location at triple the normal sample volume. MS and matrix duplicate samples are typically collected for inorganic analysis. The MS sample and matrix duplicate sample are each a single sample, usually collected from a single location at double the normal sample volume. In the laboratory, MS/MSD samples and MS samples are spiked with known amounts of analytes. Matrix duplicate samples are not spiked. Analytical results of MS/MSDs are used to measure the precision and accuracy of the laboratory organic (or inorganic) analytical program and MSs are used to measure the accuracy of the inorganic analytical program. Matrix duplicate sample are used to measure the precision of the inorganic analytical program. Each of these QC samples is typically collected and analyzed at a frequency of one for every 20 investigative samples per matrix.

QC checks for field measurements will consist primarily of initial and continuing calibration checks of field equipment. When applicable, QC check standards independent of the calibration standards will be used to check equipment performance. For example, when checking the accuracy of field equipment such as pH meters, a standard buffer solution independent of the calibration standards may be used. Precision of field measurements will usually be checked by taking replicate measurements. To the extent possible, the Contractor will use EPA-approved field methods. If approved methods are not available, Contractor SOPs will be referenced in the QAPP. The types and frequencies of field QC measurements and the QC limits for these measurements will be specified in the QAPP.

3.5.2 Laboratory Quality Control Requirements

The laboratory QA/QC elements including laboratory spikes and blanks will be performed in accordance with the latest versions for EPA analytical methods SOPs and EPA Region 7 SOP No. 2430.12H, "Regional Laboratory Quality Control Policy", or equivalent SOP supplied by contractor. The EPA Project Manager will be responsible for verifying that copies of the referenced SOPs are available and

that the SOPs are being followed by conducting periodic site visits to the field, mobile lab and fixed laboratory.

When the contractor has identified the subcontractor for the mobile and fixed laboratory, copies of the laboratory's SOPs will be acquired and added as an addendum to the QAPP.

All drinking water supply well samples will require fixed laboratory confirmation. In general, fixed laboratory analysis will be performed for all critical samples needed to establish primary targets, support attribution, and/or otherwise used for site scoring. At a minimum, 10 percent of the analytical results for both soil and groundwater media samples must be confirmed by fixed laboratory analysis.

All laboratories that perform analytical work under this EPA environmental services contract must adhere to a QA program that is used to monitor and control all laboratory QC activities. Each laboratory must have a written QA manual that describes the QA program in detail. The laboratory QA manager is responsible for ensuring that all laboratory internal QC checks are conducted according to the laboratory's QA manual, the requirements of this Generic QAPP, and any additional requirements included within a QAPP.

Many of the laboratory QC procedures and requirements are described in EPA-approved analytical methods, laboratory method SOPs, and method guidance documents. However, if laboratory QC requirements are not specified in an analytical method, or if additional requirements beyond those included in an analytical method are necessary to ensure that project QA objectives and DQOs are met, the QAPP will identify the additional laboratory QC checks that must be performed. The following types of information should be included:

- Laboratory analytical methods to which the internal QC checks applies.
- Complete procedures for conducting the internal QC check.
- QC samples and QC measurements involved in the internal QC check.
- Complete collection and preparation procedures for the QC samples.
- Spiking analytes and concentrations.
- Control limits for the internal QC check.
- Corrective action procedures to be followed if the internal QC checks are not done properly or results are outside control limits.

Laboratory QC procedures and requirements may include the preparation and analysis of laboratory control samples (LCS), method blanks, MS and MSD samples, surrogate spikes, and standard reference materials or independent check standards. QC checks that are most frequently required are discussed in the following sections.

3.5.2.1 Laboratory Control Samples

Laboratory control samples (LCS) are well-characterized, laboratory-generated samples that will be used to monitor the laboratory's day-to-day performance of analytical methods. LCSs can include laboratory duplicate samples, laboratory spike samples, or method blanks. The results of LCS analyses are compared to well-defined laboratory control limits to determine whether the laboratory system is in control for the particular method. If the system is not in control, corrective action is implemented.

Corrective action can include stopping the analysis; examining instrument performance or sample preparation and analysis information; and determining whether re-preparation or reanalysis is warranted.

3.5.2.2 Method Blanks

Method blanks, also known as analytical process or preparation blanks, are analyzed to assess the level of background interference or contamination that exists in the analytical system and that may lead to the reporting of elevated concentration levels or false-positive or false-negative data. One method blank is typically analyzed for every 20 samples processed by the analytical system. For batches smaller than 20 samples, one method blank is analyzed with every batch of samples processed.

A method blank consists of reagents specific to the analytical method that are carried through every aspect of the analytical procedure, including sample preparation, cleanup, and analysis. Results of the method blank analysis are evaluated in conjunction with other QC information to determine the acceptability of the data generated for that batch of samples. Ideally, the concentration of target analytes in the method blank should be below the method or instrument detection limit for that analyte. For some common laboratory contaminants, detection of a higher concentration may be allowed.

If the blank for any analysis is not within control limits, the source of contamination must be investigated, and appropriate corrective action must be taken and documented. Investigation includes an evaluation of the data to determine the extent and effect of the contamination on sample results. If a method blank indicates analytes above the method or instrument detection limits, an investigation should be conducted to determine whether any corrective action could eliminate an ongoing source of target analytes.

Refer to the individual analytical methods and the appropriate data validation guidance documents for detailed information regarding blank frequencies of analyses, acceptance criteria for blanks, and corrective actions for out-of-compliance blank results (see Section 5.2).

3.5.2.3 Matrix Spikes, Matrix Spike Duplicates, and Matrix Duplicates

A matrix spike (MS) is an environmental sample to which known concentrations of target analytes have been added. The MS is used to evaluate the effect of the sample matrix on the accuracy of the analysis. If the number of target analytes is large, target analytes are divided into two to three spike standard solutions. Each spike standard solution must be alternately used. The MS, in addition to an unspiked aliquot, is taken through the entire analytical procedure, and the recovery of the analytes is calculated. Results are expressed as percent recovery (%R). One MS is typically analyzed for every 20 investigative samples prepared in one batch for inorganic analyses.

A matrix spike/matrix spike duplicate (MS/MSD) is an environmental sample divided into two separate aliquots, each of which is spiked with known concentrations of target analytes. The two spiked aliquots, in addition to an unspiked sample aliquot, are analyzed separately, and the results are compared to determine the effects of the matrix on the precision and accuracy of the analysis. Results are expressed as relative percent difference (RPD) and percent recovery (%R) and are compared to control limits that have been established for each analyte. If results fall outside control limits, corrective action must be performed. One MS/MSD is typically analyzed for every 20 investigative samples prepared in one batch for organic or inorganic analyses.

A matrix duplicate sample is an environmental sample divided into two separate aliquots that are analyzed separately. The results are compared to determine the effects of the matrix on analytical

precision. Results are expressed as RPD and are compared to control limits established for each analyte. If results fall outside control limits, corrective action must be performed. One matrix duplicate sample is typically analyzed for every 20 investigative samples prepared in one batch for inorganic analyses.

3.5.2.4 Surrogate Spikes

Surrogates are organic compounds similar to the analytes of interest in chemical behavior but that are not normally found in environmental samples. Surrogates are added to samples prior to being extracted to assess the efficiency of the extraction procedure and bias introduced by the sample matrix. Results are reported in terms of %R. Individual analytical methods may dictate sample reanalysis based on surrogate criteria.

Surrogate recoveries will primarily be used by the laboratory to assess the overall efficiency in implementing the analytical method. Obvious problems with sample preparation and analysis (such as evaporation to dryness, a leaking septum, or other problems) that can lead to poor surrogate spike recoveries must be ruled out prior to attributing low surrogate recoveries to matrix effects.

3.5.2.5 Standard Reference Materials and Independent Check Standards

Standard reference materials and independent check standards can be used to evaluate the accuracy of an analytical system. The source, traceability, certification of purity, and concentration of these materials and standards must be documented. The "true" known concentrations of standard reference materials and independent check standards is then compared to results obtained from the analytical system to evaluate the accuracy of the system.

3.5.3 Common Data Quality Indicators

This section describes how QA objectives for precision, accuracy, completeness, and sensitivity are measured, calculated, and reported. For some investigations, additional equations might also be needed (for example, equations for calculating mass balances, emission rates, and confidence ranges).

3.5.3.1 Precision

Precision of many analyses is assessed by comparing analytical results of MS/MSD sample pairs for organic and inorganic analyses, field duplicate samples, field split samples, laboratory matrix duplicate samples, and replicate measurements. If calculated from two measurements, precision is normally measured as RPD:

$$RPD = \left[\frac{2\,x\,(C_1 - C_2)}{(C_1 + C_2)} \right] \times 100$$

where:

RPD = Relative percent difference
C_1 = Larger of the two observed measurement values
C_2 = Smaller of the two observed measurement values

For field measurements such as pH, where the absolute variation is more appropriate, precision is often reported as the absolute range (D) of duplicate measurements:

$$\%D = |m_1 - m_2|$$

where:

D = Absolute range
m_1 = First measurement value
m_2 = Second measurement value

3.5.3.2 Accuracy

The accuracy of many analytical methods is assessed using the results of MS/MSD samples for organic and inorganic analyses, MS samples for inorganic analyses, surrogate spike samples, laboratory control samples, standard reference materials, independent check standards, and measurements of instrument responses against zero and span gases. For measurements where spikes are used, %R is often calculated as a measure of accuracy:

$$\%R = 100 \times \left[\frac{(S - U)}{C_{sa}} \right]$$

where:

$\%R$ = Percent recovery
S = Measured concentration in spiked aliquot
U = Measured concentration in unspiked aliquot (usually equals zero for surrogate spikes)
C_{sa} = Actual concentration of spike added

When a standard reference material (SRM) is used, the following equation is often used to calculate %R:

$$\%R = 100 \times \left[\frac{C_m}{C_{srm}} \right]$$

where:

$\%R$ = Percent recovery
C_m = Measured concentration of SRM
C_{srm} = Actual concentration of SRM

For field measurements such as pH, accuracy is often expressed in terms of bias (B) and is calculated as follows:

$$B = M - A$$

where:

M = Measured value of SRM
A = Actual value of SRM

3.5.3.3 Completeness

Completeness is defined as follows for most measurements:

$$\%C = 100 \times \left[\frac{V}{n}\right]$$

where:

$\%C$ = Percent completeness
V = Actual number of measurements judged valid (the validity of a measurement result is determined by judging its suitability for its intended use)
n = Total number of measurements planned to achieve a specified level of confidence in decision making

3.5.3.4 Sensitivity

The achievement of method detection limits (MDL) depends on instrument sensitivity and matrix effects. Therefore, it is important to monitor the instrument sensitivity to ensure data quality and to ensure that analyses meet the QA objectives for sensitivity stated in the QAPP. Method sensitivity is typically evaluated in terms of the MDL and is defined as follows for many measurements:

$$MDL = t(n-1,1-x=0.99)s$$

where:

MDL = Method detection limit
s = Standard deviation of the replicate analyses
$t_{(n-1,1-=0.99)}$ = Student's t-value for a one-sided 99 percent confidence level and a standard deviation estimate with n-1 degrees of freedom
n = Number of measure
x = Statistical significance level

3.6 Instrument and Equipment Testing, Inspection, and Maintenance Requirements

This section outlines testing, inspection, and maintenance procedures for field equipment and instruments and for laboratory instruments. This section includes general requirements applicable to both field and laboratory equipment as well as field-specific and laboratory-specific requirements.

3.6.1 General Requirements

General requirements for testing, inspection, and maintenance procedures for the Environmental Services contract are as follows. Testing, inspection, and maintenance methods and frequency will be based on the type of instrument; its stability characteristics; the required accuracy, sensitivity, and precision; it's intended use, considering project-specific DQOs; manufacturer's recommendations; and other conditions affecting measurement or operational control. For most instruments, preventive maintenance is performed according to procedures and schedules recommended in (1) the instrument manufacturer's literature or operating manual or (2) SOPs associated with particular applications of the instrument. In such cases, the QAPPs will reference these documents for the testing, inspection, and maintenance procedures and schedules to be used. The QAPP will also reference these documents and/or will provide in the body of the QAPP, how the availability of critical spare parts will be assured and maintained for all instruments and applications used for the project.

In some cases, testing, inspection, and maintenance procedures and schedules may differ from the manufacturer's specifications or SOPs. This can occur when a field instrument is used to make critical measurements or when the analytical methods associated with a laboratory instrument require more frequent testing, inspection, and maintenance. In these situations, any special testing, inspection, and maintenance procedures and schedules will be outlined in the QAPP.
Any field or laboratory instrument that is in disrepair or is out of calibration must be segregated, clearly marked, and not used until it is repaired and recalibrated. If an instrument is repeatedly broken or out of calibration, the instrument must be replaced or repaired so that it is in good working order. When the condition of an instrument is suspect, unscheduled testing, inspection, and maintenance must always be conducted. Adherence to these field and laboratory preventive maintenance practices is subject to verification during performance and system audits.

3.6.2 Field Equipment and Instruments

The contractor is responsible for (1) thoroughly checking and calibrating each instrument before shipment to the field and (2) including instructions for field calibration, testing, and maintenance of each instrument shipped. Once in the field, the contractor field team leaders assume responsibility for testing, inspection, and maintenance of field instruments and equipment.

Field equipment and instruments will be inspected for damage after arrival in the field. Damaged equipment and instruments will be immediately replaced or repaired. Battery-operated equipment is checked to assure full operating capacity; if needed, batteries are recharged or replaced. Critical spare parts such as tape, paper, pH probes, electrodes, batteries, and battery chargers will be kept on site to minimize equipment downtime. Backup instruments, equipment, and additional spare parts will be available on site or within a 1-day shipping period to avoid delays in the field schedule.

Following use, field equipment will be properly decontaminated prior to being returned to its source. When the equipment is returned, copies of any field notes regarding equipment problems will be included so that problems are not overlooked and any necessary equipment repairs are carried out.

3.6.3 Laboratory Instruments

All laboratories conducting analyses of samples collected under the contract are required to have a preventative maintenance program covering testing, inspection, and maintenance procedures and schedule for each measurement system and required support activity. This program is usually documented in the form of SOPs for each analytical instrument to be used. The basic requirements and components of such a program include the following:

- Each laboratory will have, as a part of its QA/QC program, a routine preventive maintenance program conducted to minimize the occurrence of instrument failure and other system malfunction.
- Service and repair of instruments, equipment, tools, gauges, and so forth will be performed by an internal group of qualified personnel. Alternatively, scheduled instrument maintenance and emergency repair may be provided by manufacturers' representatives under a repair and maintenance contract.
- Instrument maintenance will be carried out by the laboratory on a regularly scheduled basis. The servicing of critical items should be scheduled to minimize the downtime of the measurement system. A list of critical spare parts for each instrument will be identified by the laboratory and requested from the manufacturer. These spare parts will be stored at the laboratory for

availability and use to reduce downtime. The availability of spare parts will be monitored periodically.

- Testing, inspection, and maintenance procedures described in laboratory SOPs will be in accordance with manufacturer's specifications and with the requirements of the specific analytical methods employed.
- All maintenance and service must be documented in service logbooks to provide a history of maintenance records. A separate service logbook should be kept for each instrument. All maintenance records will be traceable to the specific instrument, equipment, tool, or gauge.
- Records produced as a result of testing, inspection, or maintenance of laboratory instruments will be maintained and filed at the laboratory. These records will be available for review by internal and external laboratory system audits under the contract.

3.7 Instrument and Equipment Calibration and Frequency

Instruments will be calibrated according to manufactures specifications. Field instruments will be calibrated prior to each sampling event or as instructed by the manufacturer. Field instruments include but not limited to temperature, pH and conductivity meter, and photo ionization detector.

This section describes the procedures for maintaining the accuracy of field equipment and laboratory instruments used for field tests and laboratory analyses. The equipment and instruments should be calibrated before each use or on a scheduled, periodic basis when not in use.

3.7.1 Field Equipment

Equipment used to collect field samples or take field measurements under the contract will be maintained and calibrated with sufficient frequency and in such a manner that the accuracy and reproducibility of results are consistent with the manufacturer's specifications and with project-specific DQOs.

The contractor field team leader is to verify that field sampling and measurement equipment is in good working condition. The manufacturer's operating manual and instructions that accompany the equipment will be consulted to ensure that all calibration procedures are followed.

Field measurements will vary according to project requirements. QAPPs will identify the types of field equipment to be used, identify the equipment requiring calibration, and include SOPs covering equipment calibration procedures, requirements for calibration standards and apparatus, calibration frequencies, and requirements for maintaining calibration records and traceability. The QAPP will also discuss any unique, project-specific calibration requirements.

3.7.2 Laboratory Instruments

All laboratory equipment used to analyze samples collected under the contract will be calibrated based upon written SOPs maintained by the laboratory. Calibration records (including the dates and times calibration and the names of the personnel performing the calibration) will be filed at the location where the analytical work is performed and maintained by the laboratory personnel performing QC activities. Calibration records will be subject to QA audits. Most laboratory work under the contract will be conducted by subcontractor laboratories. In all cases, the laboratory subcontractor QA manager is responsible for ensuring that all laboratory instruments are calibrated in accordance with the requirements in this Generic QAPP.

Because laboratory analytical methods will vary with each project, specific calibration procedures cannot be addressed in this Generic QAPP. However, the QAPP will reference the method's calibration procedures and requirements for all laboratory measurements. Calibration procedures and requirements will also be provided as appropriate for laboratory support equipment such as balances, mercury thermometers, pH meters, and other equipment used to make chemical and physical measurements.

When analyses are conducted in accordance with SW-846 methods, calibration procedures and frequencies specified in the relevant method should be followed as closely as possible. A QAPP should provide any additional calibration requirements (such as equipment requiring calibration, calibration procedures, requirements for calibration standards and apparatus, requirements for maintaining calibration records and traceability, calibration frequency, acceptance criteria, number of calibration points, and internal or external standards) that deviate from or are not specified in the published EPA-approved method. Such deviations will be outlined in the QAPP or in an appendix as part of a laboratory SOP.

For analytical methods that are not EPA-approved, a complete SOP including the calibration procedures for the method will be included as an appendix to the QAPP. Laboratory SOPs describing calibration procedures for such non-standard methods should include the following information:

- Detailed calibration procedure for each instrument used.
- Internal standard or external standard calibration requirements and procedures.
- Calibration requirements for confirmatory results (second column, second detector, mass spectral confirmation, and so forth).
- Frequency of calibration and continuing calibration checks.
- Number of calibration standards used, concentrations, and preparation methods.
- Traceability of calibration standards and continuing calibration check standards.
- Numerical acceptance criteria for initial calibration and continuing calibration checks.
- Corrective action procedures for situations where calibration procedures are not performed properly, or calibration acceptance criteria are not met.
- Instructions for recording calibration information and results, including what information is to be recorded and where it is recorded and stored.

3.8 Inspection and Acceptance Requirements for Supplies and Consumables

Contractor project managers have primary responsibility for identifying the types and quantities of supplies and consumables needed for environmental data collection projects conducted under the contract. Contractor project managers are also responsible for determining acceptance criteria for these items. For example, sample containers must meet EPA's *Specifications and Guidance for Obtaining Contaminant-Free Sampling Containers* (EPA 1992b). Sample containers shall have a Level II Certification from the manufacturer as meeting pre-cleaning criteria. The contractor's Project Manager will ensure that this certification is in place and document this in the field notebook and in the report prepared for EPA.

Supplies and consumables can be received either at a contractor office or at a site. When supplies are received at a contractor office, the contractor project manager or contractor field team leader will sort the

supplies according to vendor, check packing slips against purchase orders, and inspect the condition of all supplies before the supplies are accepted for use on a project. If the supplies do not meet the acceptance criteria, deficiencies will be noted on the packing slip and purchase order. In addition, a form will be completed describing the problem and circumstances in full, and noting the purchase order number for the item. The item will then be returned to the vendor for replacement or repair.

Procedures for receiving supplies and consumables in the field are similar to those described above. Upon receipt, items will be inspected by the Contractor project manager or field team leader against the acceptance criteria. Any deficiencies or problems will be noted in the field logbook, and deficient items will be returned for immediate replacement.

3.9 Non-Direct Measurements (Data Acquisition) Requirements

Previous investigations and sampling data acquired by EPA, State Environmental Agencies, other Federal Agencies or its contractor were all subject to Quality Assurance Project Plans and other quality controls. This information was used to select the sites for the site assessment activities for which this Generic QAPP was prepared. Previously acquired sampling data will be included in the site assessment reports, as well as the source of this data.

Some work conducted under the contract may not involve direct measurement. This includes activities that use data drawn from other sources such as databases, spreadsheets, and literature files. When such data is of critical importance in supporting sampling and analytical measurements, QA requirements for the non-direct measurement will be outlined in the QAPP.

3.9.1 Supporting Documentation for Data Source and Quality

The source and quality of the data, along with potential problems affecting its applicability or limitations, will be documented. Such data will be reviewed for quality and supporting documentation. If supporting documentation does not accompany the data, a records or file search will be conducted to obtain the supporting documentation. Supporting documentation will be used in part to evaluate the quality and usefulness of the data. For example, if historical sampling data are to be used for an activity, the data should be reviewed to determine the QA procedures that were implemented. If such information is not available, the use of the data will be limited. Generally, data that are not supported by documentation of acceptable procedures cannot be used for enforcement purposes but may be useful for preliminary analysis and assessment. In all cases, evaluation and verification procedures for non-direct measurement data should be approved by the Contractor QA manager or his designee.

3.9.2 Independent QC Checks for Large External Data Sets

When a large external data set is used, computer-assisted data screening will be applied to determine the internal consistency of the data set. The goal of such screening is to identify outliers from the overall data set. When data accuracy is primarily an issue of transcription accuracy, such as keying large data sets into a computer file, proof readers will perform checks independent of the computer-assisted data screening.

3.10 Data Management Requirements

The following paragraphs provide general discussion and requirements for managing data under the contract for EPA. Further detail and requirements will be provided as necessary in the QAPP, including requirements for data recording, validation, transformation, transmittal, reduction, analysis, tracking,

storage, and retrieval. If necessary, the QAPP will also provide checklists and standard forms for detecting and correcting errors and preventing the loss of data during data reduction, data reporting, data encoding, and data entry.

Data for the contract will be obtained from a combination of sources, including field measurements and analyses, and subcontractor laboratories. The process of data gathering is a coordination effort and will be conducted by project staff in conjunction with all potential data producers. The data itself will be obtained from the analytical service provider, when appropriate, in the form of an electronic data deliverable in addition to the required hard copy analytical data package.

All analytical data will be submitted electronically by the contractor and subcontractor in a format compatible with the EQuIS environmental data management software. A hardcopy of the data will also be required as part of the site assessment report. The EPA Project Manager will review the data to ensure accuracy prior to placing into the facility file.

Data tracking is imperative to ensure timely, cost-effective, and high-quality results. Data tracking begins with sample chain-of-custody. When the analytical services provider receives the samples into custody, the provider will send a sample acknowledgment to the contractor. The sample acknowledgment will confirm the sample receipt, condition, and the required analyses.

Unless otherwise directed by EPA, the contractor will validate all data generated under the contract as described in Section 5.2 of this Generic QAPP. As a part of the data validation process, the electronic data deliverables will be reviewed against the hard copy deliverables to ensure accurate transfer of data. In addition, the hard copy will be evaluated for errors in calculation of results. As a result of the data validation, qualifiers will be placed on the data to indicate the data usability. These qualifiers will be placed into the electronic data file. Upon approval of the data set with the appropriate data qualifiers, the electronic data will be released to the project leader for reporting. A complete discussion of data validation procedures is contained in Sections 5.1 and 5.2 of this Generic QAPP.

Following data validation and release of data, the contractor project managers will use data to prepare project reports. As a part of the final report quality control review procedures, the data will be further checked by technical reviewers and a quality control coordinator (QCC) to verify its accuracy in the report.

In addition to the final report, all analytical data in the form obtained from the analytical services provider will be archived with the final project file in a secure location. The secure location will house all final project files until they are transferred to EPA.

4.0 ASSESSMENT AND OVERSIGHT

This section of the Generic QAPP includes the two QAPP elements required by EPA QA/R-5 (EPA, 2001a) to assess and evaluate the management of environmental data collection operations. These QAPP elements provide procedures for conducting appropriate audits and reports and implementing corrective actions as necessary to ensure that the quality of data generated by implementation of this Generic QAPP is adequate. The two QAPP elements related to assessment and oversight are:

- Assessment and Response Actions (Section 4.1).
- Reports to Management (Section 4.2).

4.1 Assessment and Response Actions

The EPA Regional QA Manager and Project Managers will evaluate the process and quality of performance on a case-by-case basis. All measured parameters will be observed to ensure that the data meets the QA/QC requirements and other site-specific requirements identified in the TO or PR and/or project work plan documents.

Assessment and response actions pertaining to analytical phases of the project are addressed in the latest version of Region 7 SOP Nos. 2430.6, 2430.11, 2430.14, and 2430.15. This document identifies out-of-control conditions, which are responsible for initiating corrective actions, and what corrective steps should be taken. The Region 7 SOPs are only applicable to the Regional Laboratory and are not exclusive to National Environmental Laboratory Accreditation Program (NELAP) accredited analyses. References to Region 7 SOPs will need to be replaced in QAPP addenda and project-specific QAPPs with equivalent references when a laboratory other that the Regional Laboratory will perform the analyses (whether that laboratory be NELAP accredited or not).

Every attempt will be made to subcontract analytical work to a National Environmental Laboratory Accreditation Program (NELAP) certified laboratory. If a non-NELAP certified commercial laboratory is used, assessment and response of the analytical phases will be in accordance with that laboratory's internal QA procedures. When a non-NELAP laboratory is used, deviations to Region 7 SOPs will be documented in the QAPP. The contractors/subcontractors will provide copies of the SOPs for the mobile and fixed laboratory, as part of the contractual agreements and conditions of this Generic QAPP, before providing any actual site assessment sampling services.

The EPA Project Manager may periodically visit the site to observe the field activities and whether field personnel are following the approved project work plan and QA/QC-related documents including SAPs, QAPPs, and SOPs, and to take corrective action if necessary. This should be documented in the field report as well as the site assessment reports. QAPPs will be revised if necessary, to ensure that program and appropriate QA/QC objectives and requirements are being achieved.

Under the contract, performance and system audits of both field and laboratory activities may be conducted to verify that sampling and analysis are performed in accordance with the procedures and requirements established in this Generic QAPP and any applicable QAPP. Non-conforming items identified during an audit will be addressed by corrective action. This section addresses basic audit and corrective action requirements that apply to all work conducted by the contractor under the contract. If additional project-specific audits are required by a TO or PR, these will be identified in the QAPP.

4.1.1 Performance and System Audits

Both internal performance and system audits may be conducted on the contractor's field operations and subcontractor laboratories under the contract. Performance audits include verification that field sampling activities and measurements and laboratory analyses of performance evaluation samples are being conducted in accordance with the requirements of this Generic QAPP and any applicable QAPP. System audits involve a qualitative examination of all components of an environmental data collection system, including records, personnel, and QA management activities.
This section describes the selection of audit personnel, the scope of field and laboratory audits, audit frequencies, and typical audit reports for internal audits initiated by Contractor QA manager. External performance and system audits initiated by EPA may also be conducted under the contract and would involve similar activities.

4.1.1.1 Audit Personnel

All auditors must be independent of the activities being audited. The contractor QA manager has the lead role in directing all internal audit activities during an investigation. The contractor QA manager will select the appropriate personnel to conduct each internal audit and will assign them responsibilities and deadlines for completing their audits. These personnel may include the contractor QA manager, or other independent auditors. When an audit team is required, the contractor QA manager selects a lead auditor based on relevant technical expertise and audit experience. The lead auditor is responsible for selecting and preparing the audit team; preparing an audit plan; coordinating and scheduling the audit with the project team, subcontractor, or other organization being audited; participating in the audit; coordinating the preparation and issuance of audit reports and corrective action request forms; and evaluating audit responses and resulting corrective actions.

4.1.1.2 Audit Scope of Work

Performance audits of field activities will be conducted to evaluate compliance with the requirements of this Generic QAPP. Field systems audits may include an examination of the following items:

- Sample collection records.
- Sample collection, handling, preservation, packaging, shipping, and custody records.
- Equipment operation, maintenance, and calibration records.

Laboratory performance audits include analysis of blind performance evaluation samples to assess a laboratory's ability to comply with QC control limits. Laboratory systems audits may include evaluation of the following:

- Sample log-in, identification, storage, tracking, and custody procedures.
- Sample and standards preparation procedures.
- Availability of analytical instruments.
- Analytical instrument operation, maintenance, and calibration records.
- Laboratory security procedures.
- Qualifications of analysts.
- Case file organization and data handling procedures.

4.1.1.3 Audit Frequencies

QAPPs will provide a schedule of all planned audits that will be conducted during the investigation. These audits may be required by EPA or planned by the contractor QA manager. Audit frequency will depend on several factors. In selecting projects for auditing, the contractor QA manager will consider projects with a large volume of work or those on which EPA has placed a high level of importance. The contractor QA manager may also randomly select projects for auditing. For laboratory audits, the contractor QA manager will focus on laboratories performing critical measurements (as determined by DQOs) and on subcontractor laboratories performing work for the first time.

Unscheduled follow-up audits may occur if any deficiencies are discovered during an audit or review. Follow-up audits serve to ensure that all necessary corrective actions have been properly implemented to address deficiencies.

4.1.1.4 Audit Reports

Audit reports will be prepared for performance and system audits of field and laboratory activities and all laboratory performance evaluation studies that are conducted under the contract. Reports will be prepared by the lead auditor responsible for coordinating the audit. Audit reports will identify audit participants, describe the activity audited, summarize audit findings, and detail any deficiencies or deviations from protocol that were discovered during the audits, as well as any corrective actions that are proposed. Any field or laboratory analytical data that is generated during the analysis of blind performance evaluation samples must be validated. The validated data will be included with the audit report. Data validation procedures are discussed in Section 5.2.

Audit reports are distributed to the contractor QA manager, contractor administrator, contractor project manager, and the field team leader or the laboratory subcontractor QA manager, as appropriate. The lead auditor has primary responsibility for ensuring that audits are conducted thoroughly and properly. Contractor project managers and team field or laboratory subcontractor's QA manager are responsible for implementing corrective actions that result from an audit. The contractor QA manager is responsible for verifying that recommended corrective actions have been implemented.

4.1.2 Corrective Action

Rapid and thorough correction of QA problems, through an effective corrective action program, minimizes the possibility of questionable data or documentation. The two types of corrective action are immediate and long-term. Immediate corrective actions include correcting procedures, repairing instruments that are working improperly, and correcting errors or deficiencies in documentation. Long-term corrective actions eliminate the sources of problems by correcting systematic errors in sampling and analytical procedures, replacing procedures that produce questionable results, and manipulating similar cause-and-effect relationships.

All QA problems and corrective actions applied are documented to provide a complete record of QA activities. These records assist the contract administrator management team in identifying long-term QA problems and enable application of long-term corrective actions such as personnel training, replacement of instruments, and improvement of sampling and analytical procedures.

The contractor QA manager has the authority to discontinue or limit environmental data measurements that are compromised until corrective action is complete and data quality is no longer questionable. The

contractor QA manager may also order the recollection or reanalysis of samples or remeasurement of field parameters since the last documented evidence that the measurement system was in control.

Specific corrective action procedures for sample collection and field measurements and laboratory analyses are discussed below.

4.1.2.1 Sample Collection and Field Measurements

Technical staff and project personnel involved in sample collection or field measurement activities are responsible for initiating routine corrective actions by reporting all suspected technical or QA nonconformance's and deficiencies to the contractor project manager or his/her designee. Corrective actions for sample collection and field measurements may include, but are not limited to, the following:

- Repeating measurements to check for error.
- Checking that instruments are properly adjusted for ambient conditions such as temperature.
- Checking batteries.
- Checking calibration and recalibrating equipment if necessary.
- Replacing the instrument or measurement devices.
- Collecting additional samples.
- Stopping work (if necessary).

4.1.2.2 Laboratory Analyses

Each laboratory that participates as a subcontractor is required to have written SOPs summarizing procedures for initiating, developing, approving, implementing, and documenting corrective action. The existence of such a program does not exempt the laboratory from following the corrective action requirements outlined in this Generic. When errors, deficiencies, or out-of-control situations arise, systematic corrective actions must be taken to resolve problems and restore proper functioning analytical systems. Laboratory personnel and QA managers are alerted that corrective actions may be necessary if any of the following situations arise:

- Sample volumes are not sufficient to perform required analyses.
- QC data are outside the acceptable limits for precision and accuracy.
- Blanks contain contaminants above acceptable levels.
- Undesirable trends are detected in spike recoveries or in the RPD between duplicates.
- Unusual changes in detection limits arise.
- Deficiencies are detected during internal or external audits or from the results of performance evaluation samples.
- Inquiries concerning data quality are received from clients.

If sample volumes are insufficient to complete the required analyses, the laboratory will notify the contractor project manager. The contractor project manager, contractor QA manager, and laboratory

subcontractor QA manager will contact the EPA project manager to determine if additional samples need to be collected.

Laboratory corrective action procedures are often initiated at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors; checks the instrument calibration; checks the spiking levels, calibration solutions, and standards; and checks instrument sensitivity. If the problem persists or cannot be identified, the matter may be referred to the laboratory supervisor, project manager, or QA manager for further investigation. Every effort must be made to determine the cause of the problem so that a permanent solution can be developed and implemented. Once a problem is resolved, full documentation of the corrective action procedure is filed with the project records.

Investigations initiated by laboratory technical or QA personnel that result in corrective actions must be documented and reported to the contractor QA manager. Documentation of investigations of negative performance on performance evaluation samples and corrective actions taken will be forwarded to the appropriate certifying agencies when required.

4.2 Reports to Management

Data validation reports are generated by analytical laboratories and provided with the raw data to the EPA Contractor for incorporation into site investigation reports. In addition to data validation requirements, the lab provides sample handling, sample holding times, sample preservation, chain-of-custody, data reporting qualifier information, and other laboratory procedural information within their data package / data review summary memos / reports.

If significant deficiencies are identified with validated laboratory data, a report will be prepared by the EPA Contractor to inform the EPA Project Manager of the identified discrepancies; the current status of the project; results of performance evaluations and system audits (if applicable); results of periodic data quality assessments; and significant quality assurance problems and recommended solutions. After corrective actions are completed, the EPA Contractor may have to prepare a final report to document the course of action followed, results achieved, and/or any new developments. If appropriate, the final report would be incorporated into the site assessment report for submission to EPA Region 7.

For Superfund sites, the EPA Contractor will also prepare the HRS scoring and site assessment report. Superfund site assessment reports will be kept in the permanent public file at the EPA Region 7 Superfund records center. The Superfund site assessment report will help determine the disposition of the site and whether the site will advance in the Superfund process. The QA/QC elements will help determine if changes are necessary, if any future generic QAPP amendments are necessary, and will be documented by the appropriate EPA staff.

For TBA reports, a copy of the report will be transmitted by the EPA project manager for approval. Final versions of the TBA reports will be provided to the representative(s) at whose request the TBA was conducted.

4.2.1 Open Communication, Interaction, and Feedback Among All Key Participants

Effective management of environmental data collection operations requires timely assessment and review of measurement activities. Open communication, interaction, and feedback must also occur among all project participants, including contractor's corporate QA manager, the EPA QA manager or a designated representative, contractor contract administrator, contractor project manager, contractor QA manager, technical staff, and team subcontractors.

5.0 DATA VALIDATION AND USABILITY

This section of the Generic QAPP includes the three QAPP elements required by EPA QA/R-5 (2001a) to ensure that data is valid and usable for its intended purpose. The three QAPP elements related to data validation and usability are:

- Data review, verification, and validation requirements (Section 5.1).
- Validation and verification methods (Section 5.2).
- Reconciliation with data quality objectives (Section 5.3).

5.1 Data Review, Verification, and Validation Requirements

Data review and verification will be performed by a qualified laboratory analyst as described in the mobile and fixed laboratory SOPs (as described in Sections 3.0 and 4.0 above). The SOPs from the mobile and fixed laboratories will be added as an addendum to the QAPP. The EPA Project Manager with assistance from the EPA QA manager will be responsible for the validation and final approval of the data (including field notes) in accordance with the stated project purpose and use of the data. Any anomalies will be documented with corrective actions described and included in the site assessment or TBA reports.

This section focuses on data review and reduction requirements for work conducted under the contract. Data validation and verification requirements are covered in Section 5.2.

Data reduction and review are essential functions for preparing data that can be effectively used to support project decisions and DQOs. These functions must be performed accurately and according to EPA-approved procedures and techniques and region-specific guidelines (*Region 7 Standard Operating Procedures and Governing Documents*). Data reduction includes all computations and data manipulations that produce the final results used during the investigation. Data review includes all procedures conducted by field or laboratory personnel to ensure that measurement results are correct and acceptable relative to QA objectives in this Generic QAPP.

Because the types of field measurements and laboratory measurements used will vary with each site investigation, most data reduction and review procedures and requirements cannot be addressed directly in this Generic QAPP. However, many field and laboratory measurement data reduction and review procedures and requirements are specified in field and laboratory methods, SOPs, and guidance documents. In most cases, data review and reduction procedures can be identified in the QAPP by referencing these sources. However, if data review and reduction are not adequately described in these sources, the QAPP should include the following information:

- Outlined data review and reduction procedures for all phases of sample preparation and analysis (including procedures for data that are reduced and stored on computer).
- Field personnel and laboratory personnel responsible for conducting each phase of data review and reduction.
- All formulas and equations used during data reduction, including all equations used to produce final results.
- The definitions of all terms and parameters.
- The units for all parameters and results.

- Instructions on how the results from QC samples (such as blanks) will be treated and used in calculating the final results.
- Procedures for flagging, qualifying, or marking the data with labels.
- Corrective action procedures for instances when data reduction procedures are not followed correctly or when errors are found during data review.

Field personnel will record all raw data from chemical and physical field measurements in a field logbook. Contractor project managers have primary responsibility for (1) verifying that field measurements were made correctly, (2) confirming that sample collection and handling procedures specified in the QAPP were followed, and (3) ensuring that all field data reduction and review procedures and requirements are followed. They are also responsible for assessing preliminary data quality and for advising the data user of any potential QA/QC problems with field data. When field data are used in a project report, data reduction methods will be fully documented in the report.

Each laboratory subcontractor will complete data reduction for chemical and physical laboratory measurements and will complete an in-house review of all laboratory analytical results. The laboratory subcontractor QA manager is responsible for ensuring that all laboratory data reduction and review procedures and requirements in this Generic QAPP are followed. The laboratory subcontractor QA manager is also responsible for assessing data quality and for advising the contractor QA manager of possible QA/QC problems with laboratory data.

5.2 Verification and Validation Methods

The data will be validated in accordance with the mobile and fixed laboratory SOPs (see above). Field notes will be compared for consistency and the EPA Project Manager will document any anomalies. The EPA Project Manager will inspect the data to provide final review and approval to ensure that the data meets the sampling requirements.

All data that are used to support activities under the contract must be valid for their intended purposes. This section outlines the basic data validation procedures that will be followed for all field and laboratory measurements. The following subsections identify personnel responsible for data validation and the general data validation process and EPA data validation guidance that will be followed.

5.2.1 Data Validation Responsibilities

The contractor's QA manager, or his/her designee, is responsible for validating all field and laboratory data collected under the contract. The laboratory subcontractor will also validate all laboratory data according to their own specific procedures before submitting the data to the contractor. As requested the contractor will validate all laboratory subcontractor data, unless specified otherwise in the work plan or approved by the EPA Project Manager. Data validation will be completed by one or more experienced data reviewers. When applicable, QAPPs will include the names and qualifications of data reviewers assigned to the project.

5.2.2 Data Validation Procedures

The validity of a set of data is determined by comparing the data with a predetermined set of QC limits. For investigations conducted under the contract, these QC limits will be provided or referenced in each

project-specific study. Contractor data reviewers will conduct a systematic review of the data for compliance with established QC limits (for example, sensitivity, precision, and accuracy) based on spike, duplicate, and blank sample results provided by the laboratory. The data review will identify any out-of-control data points or omissions. Contractor data reviewers will evaluate laboratory data for compliance with the following:

- Method and project-specific analytical service requests.
- Holding times.
- Initial and continuing calibration acceptance criteria.
- Field, trip, and method blank acceptance criteria.
- Surrogate recovery.
- Field duplicates, MS/MSD and matrix duplicate acceptance criteria.
- Other laboratory QC criteria specified by the method and the project-specific analytical service request.
- Compound identification and quantitation.
- Overall assessment of data in accordance with project-specific objectives.

The contractor will follow the most current EPA guidelines for completing data validation:

- *Data Validation Standard Operating Procedures for Contract Laboratory Program Routine Analytical Services*. Revision 2.1. U.S. EPA Region 7. Science and Ecosystem Support Division. Office of Quality Assurance. (EPA, 1999a).
- *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*. Publication 9240.1-48 (EPA, 2008b).
- *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Publication 9240.1-51. (EPA, 2010).

General procedures in the EPA guidelines will be modified as necessary to fit the specific analytical method used to produce the data.

In all cases, data validation requirements will depend on DQO levels, region-specific guidelines, reporting requirements and data deliverables requested from the laboratory. Data validation requirements presented in these sections may be referenced in the QAPP to ensure consistency.

5.3 Reconciliation with User Requirements (Data Quality Objectives)

The EPA Project Manager, for completeness needed to achieve the project's goal, will evaluate data. If the data quality indicators do not meet the project requirements outlined in the QAPP, the data may be discarded and re-sampling may occur. In case of a failure, the project team will evaluate the cause. If the failure is due to laboratory procedures or equipment, necessary corrective measures will be taken by the EPA Quality Assurance Manager and EPA Project Manager. If failure is associated with sampling, field procedures will be re-evaluated with any changes documented by the EPA Project Manager and included in the site assessment or TBA reports.

The primary purpose of a QA system is to define a process for collecting data that is of known quality, is scientifically valid, is legally defensible, and fully supports any decisions that will be based on the data. To achieve this purpose, this Generic QAPP requires that DQOs be fully defined in Section 2.4. All other parts of the QA system must then be planned and implemented in a manner consistent with the DQOs. The QA system components that follow directly from the DQOs include documentation and reporting requirements (Section 2.6); sample network design and sampling methods (Sections 3.1 and 3.2); analytical methods requirements (Section 3.4); QC requirements (Section 3.5); and data reduction, validation, and reporting methods (Sections 5.1 and 5.2).

Once environmental data have been collected, reviewed, and validated, the data must be further evaluated to determine whether the DQOs identified in the QAPP have been met. The contractor will follow EPA's data quality assessment (DQA) process to verify that the type, quality, and quantity of data collected are appropriate for their intended use. The DQA process involves first verifying that the assumptions under which the data collection design and DQOs were developed have been met, or taking appropriate corrective action if the assumptions have not been met. The DQA process then evaluates how well the data collected support the decision that must be made so that scientifically valid and meaningful conclusions can be drawn from the data. To the extent possible, the contractor will follow DQA methods and procedures outlined in EPA documents *Data Quality Assessment: A Reviewer's Guide* QA/G-9R (EPA, 2006c) and *Data Quality Assessment: Statistical Tools for Practitioners* QA/G-9S (EPA, 2006d).

If data quality indicators do not meet the project's requirements as outlined in the QAPP, the data may be discarded and re-sampling and/or re-analysis may be required.

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APPENDICES

Appendix A

Site-Specific QAPP Addendum Form

[Region 7 Superfund Program Addendum for the Generic QAPP for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (October 2012)]

Region 7 Superfund Program
Addendum for the Generic QAPP for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (October 2012)

Project Information:

Site Name:			**City:**	**State:**
EPA Project Manager:			**START Project Manager:**	
Approved By:			**Prepared For:** EPA Region 7 Superfund Division	
Title:	START Project Manager	**Date:**		
Approved By:				
Title:	START Project Manager	**Date:**	**Prepared By:**	
Approved By:			**Date:**	
Title:	START QA Manager	**Date:**		
Approved By:				
Title:	EPA Project Manager	**Date:**	**START Contractor:**	
Approved By:			**START Project Number:**	
Title:	EPA Regional QA Manager	**Date:**		

1.0 Project Management:

1.1 Distribution List

EPA--Region 7: _____ EPA Project Manager

_____ Diane Harris, EPA Regional QA Manager

START: _____ Start Project Manager

1.2 Project/Task Organization

1.3 Problem Definition/Background:

Description: This site-specific Quality Assurance Project Plan form is prepared as an addendum to the **Generic QAPP for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (October 2012))**, and contains site-specific data quality objectives for the sampling activities described herein.

Description attached.

Description in referenced report: _____ **Title** _____ **Date**

1.4 Project/Task Description:

CERCLA PA — CERCLA SI — Brownfields Assessment

Other (description attached): — Pre-CERCLIS Site Screening — Removal Assessment

Schedule: Field work is scheduled for _____

Description in referenced report: _____ **Title** _____ **Date**

1.5 Quality Objectives and Criteria for Measurement Data:

a. Accuracy:	Identified in attached table.
b. Precision:	Identified in attached table
c. Representativeness:	Identified in attached table.
d. Completeness:	Identified in attached table.
e. Comparability:	Identified in attached table.

Other Description:

*A completeness goal of 100 percent has been established for this project. However, if the completeness goal is not met, EPA may still be able to make site Decisions based on any or all of the remaining validated data.

1.6 Special Training/Certification Requirements:

OSHA 1910
Special Equipment/Instrument Operator (describe below):
Other (describe below):

1.7 Documentation and Records:

Field Sheets	Site Log	Trip Report	Site Maps	Video
Chain of Custody	Health and Safety Plan	Letter Report	Photos	

Sample documentation will follow EPA Region 7 SOP 2420.5.

Other: Analytical information will be handled according to procedures identified in Table 2.

2.0 Measurement and Data Acquisition:

2.1 Sampling Process Design:

Random Sampling	Transect Sampling	Biased/Judgmental Sampling	Stratified Random Sampling
Search Sampling	Systematic Grid	Systematic Random Sampling	Definitive Sampling
Screening w/o Definitive Confirmation		Screening w/ Definitive Confirmation	

Sample Map Attached

The proposed sampling scheme for ground water from private wells and Geoprobe™ temporary wells, silo water, surface water/sediment, and soil will be biased/judgmental, with definitive laboratory analysis, in accordance with procedures included in the Guidance for Performing Site Inspections Under CERCLA, OSWER Directive #9345.1-05, September 1992, and Removal Program Representative Sampling Guidance, Volume 1: Soil, OSWER Directive 9360.4-10, November 1991. All samples will be submitted for analysis by the EPA Region 7 laboratory. See Appendices A and B for additional site-specific information and maps. The proposed number of samples is a balance between cost and coverage and represents a reasonable attempt to meet the study objectives while staying within the budget constraints of a typical site investigation.

Sample Summary Location	Matrix	# of Samples*	Analysis

*NOTE: Background/QC samples are not included with these totals. See Table 1 for a complete sample summary.

2.2 Sample Methods Requirements:

Matrix	Sampling Method	EPA SOP(s)/Methods

2.3 Sample Handling and Custody Requirements:

Samples will be packaged and preserved in accordance with procedures defined in Region 7 EPA SOP 2420.6C.
COC will be maintained as directed by Region 7 EPA SOP 2420.4.
Samples will be accepted according to Region 7 EPA SOP 2420.1.
Other (Describe):

2.4 Analytical Methods Requirements:

Identified in attached table.
Identified in attached Analytical Services Request (ASR) Form
Other (Describe):

2.5 Quality Control Requirements:

Not Applicable
Identified in attached table.
In accordance with **the Generic Quality Assurance Project Plan (QAPP) for the Superfund Site Assessment and Targeted Brownfields Assessment (TBA) Programs (October 2012)**

Describe Field QC Samples to be collected:
Other (Describe):

2.6. Instrument/Equipment Testing, Inspection, and Maintenance Requirements :

Not Applicable
In accordance with the **Generic Quality Assurance Project Plan (QAPP) for the Superfund Site Assessment and Targeted Brownfields Assessment (TBA) Programs (October 2012)**
Other (Describe):

2.7 Instrument Calibration and Frequency:

Not Applicable
Inspection/acceptance requirements are in accordance with the **Generic Quality Assurance Project Plan (QAPP) for the Superfund Site Assessment and Targeted Brownfields Assessment (TBA) Programs (October 2012)**
Calibration of laboratory equipment will be performed as described in the previously referenced SOPs and/or manufacturers' recommendations.
Other (Describe):

2.8 Inspection/Acceptance Requirements for Supplies and Consumables:

Not Applicable
In accordance with the **Generic Quality Assurance Project Plan (QAPP) for the Superfund Site Assessment and Targeted Brownfields Assessment (TBA) Programs (October 2012)**
All sample containers will meet EPA criteria for cleaning procedures for low-level chemical analysis. Sample containers will have Level II certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA in *Specifications and Guidelines for Obtaining Contaminant-Free Containers.*
Other (Describe):

2.9 Data Acquisition Requirements:

Not Applicable
In accordance with the **Generic Quality Assurance Project Plan (QAPP) for the Superfund Site Assessment and Targeted Brownfields Assessment (TBA) Programs (October 2012)**
Previous data/information pertaining to the site (including other analytical data, reports, photos, maps, etc., which are referenced in this QAPP) have been compiled by EPA and/or its contractor(s) from other sources. Some of that data has not been verified by EPA and/or its contractor(s); however, the information will not be used for decision-making purposes by EPA without verification by an independent professional qualified to verify such data/information.
Other (Describe):

2.10 Data Management:

All laboratory data acquired will be managed in accordance with Region 7 EPA SOP 2410.1.
Other (Describe):

3.0 Assessment and Oversight:

3.1 Assessment and Response Actions:

Peer Review Management Review Field Audit Lab Audit

Assessment and response actions pertaining to analytical phases of the project are addressed in Region 7 EPA SOPs 2430.5 and 2430.12.

Other (Describe):

3.1A Corrective Action:

Corrective actions will be taken at the discretion of the EPA project manager, whenever there appear to be problems that could adversely affect data quality and/or resulting decisions affecting future response actions pertaining to the site.

Other (Describe):

3.2 Reports to Management:

Audit Report Data Validation Report Project Status Report None Required

A letter report describing the sampling techniques, locations, problems encountered (with resolutions to those problems), and interpretation of analytical results will be prepared by Tetra Tech START and submitted to the EPA.

Other (Describe):

3.2 Reports to Management:

Audit Report | Data Validation Report | Project Status Report | None required

A letter report describing the sampling techniques, locations, problems encountered (with resolutions to those problems), and interpretation of analytical results will be prepared by START and submitted to the EPA.
Reports will be prepared in accordance with the **Generic Quality Assurance Project Plan (QAPP) for the Superfund Site Assessment and Targeted Brownfields Assessment (TBA) Programs (October 2012)**

Other (Describe):

4.0 Data Validation and Usability:

4.1 Data Review, Validation, and Verification Requirements:

Identified in attached table.
Data review and verification will be performed in accordance with the **Generic Quality Assurance Project Plan (QAPP) for the Superfund Site Assessment and Targeted Brownfields Assessment (TBA) Programs (July 2007)**
Data review and verification will be performed by a qualified analyst and the laboratory's section manager as described in Region 7 EPA SOPs 2430.5 and 2430.12.

Other (Describe):

4.2 Validation and Verification Methods:

Identified in attached table.
The data will be validated in accordance with Region 7 EPA SOPs 2430.5 and 2430.12.
The EPA site manager will inspect the data to provide a final review. The EPA site manager will review the data, if applicable, for laboratory spikes and duplicates, laboratory blanks, and the field blank to ensure that they are acceptable. The EPA site manager will also compare the sample descriptions with the field sheets for consistency and will ensure that any anomalies in the data are appropriately documented.
Other (Describe):

4.3 Reconciliation with User Requirements:

Identified in attached table
If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded and re-sampling or re-analysis of the subject samples may be required by the EPA site manager.
Other (Describe):

Table 1: Sample Summary							
Site Name:				**City:**			
START Project Manager:				**Activity/ASR #:**		**Date:**	
No. of Samples	**Matrix**	**Location**	**Purpose**	**Depth or other Descriptor**	**Requested Analysis**	**Sampling Method**	**Analytical Method/SOP**

Table 2: Data Quality Objective Summary								
Site Name:				**City:**				
START Project Manager:				**Activity/ASR #:**				**Date:**
Analysis	**Analytical Method**	**Data Quality Measurements**					**Sample Handling Procedures**	**Data Management Procedures**
		Accuracy	**Precision**	**Representativeness**	**Completeness**	**Comparability**		
WATER (Groundwater, Drinking Water, and Surface Water)								
	see Table 1	per analytical method	per analytical method	Biased/judgemental sampling based on professional judgement of the sampling team	100%; samples from private drinking water wells are considered critical samples	Standardized procedures for sample collection and analysis will be used	See Section 2.3 of QAPP	See Section 2.10 of QAPP form
SOIL/SEDIMENT								
	see Table 1	per analytical method	per analytical method	Biased/judgemental sampling based on professional judgement of the sampling team	100%; soil samples form on-site Geoprobe® borings are critical samples	Standardized procedures for sample collection and analysis will be used	See Section 2.3 of QAPP	See Section 2.10 of QAPP form

Appendix B

Example of Sample Collection Field Sheet

Sample Collection Field Sheet

US EPA Region 7
Kansas City, KS

ASR Number: Sample Number: QC Code: Matrix: Tag ID:

Project ID No.: EPA Project Manager:

Project Desc:

City: State:

Program:

Location Desc:

External Sample Number: _____

Expected Concentration (Circle One): Low Medium High Date:
Time(24hr):

Latitude: ___ ___ ___ Sample Collection: Start ___/___/___ ____:____
Longitude: ___ ___ ___ End ___/___/___ ____:____

Field Measurements:

Parameter	Value	Units
Conductance, Specific	_____	umhos/cm
pH	_____	SU

Laboratory Analyses:

Container Name	Preservative	Holding	Time	Analysis

Sample Comments:

Sample Collected By: _____

Appendix C

Example of a Daily Quality Control Report (DQCR)

DAILY QUALITY CONTROL REPORT

Project Manager: _____

Project: _____

Date: _____

S	M	T	W	TH	F	S

Weather	Bright Sun	Clear	Overcast	Rain	Snow
Temp	To 32	32-50	50-70	70-85	>85
Wind	Still	Moderate	High	Gusty	
Humidity	Dry	Moderate	Humid		

Personnel on Site: _____

_____

Contractors on Site: _____

_____

Visitors on Site: _____

_____

Work Performed: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Sheet 1 of 2

Project: _____ **Date:** _____

Quality Control Activities (including field calibration and duplicate samples collected): _____

Problems Encountered/Corrective Actions Taken: _____

Downtime/Standby: _____

Health and Safety Activities: _____

Special Notes: _____

By: _____ **Date:** _____

Sheet 2 of 2

Appendix D

Example of a Chain-of-Custody (COC) Form

SAMPLE CHAIN OF CUSTODY

Project Name: _____ **Project Location:** _____

Activity Number: _____

Project Manager: _____

Samplers: _____

Sample Date	Time	Sample Identification	Preservative	No. of Containers	Type of Containers	Analysis

Remarks/Additional or Special Analyses: _____

Signatures	Date	Time	Mode of Shipment	Reason for change of custody
Relinquished By:				
Received By:				
Relinquished By:				
Received in Laboratory By:				