DOE–LM/GJ1232–2006


# Legacy Management CERCLA Sites Quality Assurance Project Plan


U.S. Department of Energy

**Office of Legacy Management**

*Work Performed Under DOE Contract No. DE–AC01–02GJ79491*
*for the U.S. Department of Energy Office of Legacy Management.*

**Summary of Changes**
**LM CERCLA Sites Quality Assurance Project Plan**

No changes were made to the main body of the document.

Appendix A site specific changes are:

Fernald—Changed project manager designation.

Monticello—Addition to the document. The *LM CERCLA Sites QAPP*, including this site-specific section, replaces the previous stand-alone *Quality Assurance Project Plan for the Monticello Long-Term Surveillance and Maintenance Project.* This document reflects details of the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites.*

Mound—Changed project manager designation.

Rocky Flats—Changed project manager designation. Changes to the section reflect details of the *Rocky Flats Legacy Management Agreement.*

Weldon Spring—No changes.

DOE-LM/GJ1232-2006

**Legacy Management CERCLA Sites**

# Quality Assurance Project Plan

Work Performed by S.M. Stoller Corporation under DOE Contract No. DE–AC01–02GJ79491
for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado

# Policy and Signature Page

Project Managers for Legacy Management CERCLA sites are committed to establishing, maintaining, and implementing an effective Quality Assurance program that achieves quality in all activities through planning, performing, assessing, and continually improving the process. The achievement of quality is an interdisciplinary function led by management and is the responsibility of all personnel. Work is accomplished through the resources of people, equipment, and procedures. Managers are responsible for ensuring that people have the information, resources, and support necessary to complete the work in a safe, efficient, and quality manner. All work performed by the S.M. Stoller Corporation for Legacy Management at the remediated CERCLA Sites must comply with the requirements of this Quality Assurance Project Plan.

**Prepared By:**

*signature on original*

Donna L. Riddle, Stoller QA Lead

**Approved By:**

*signature on original*

Sam Marutzky, Stoller Programs and Projects Manager

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# Contents

## Tables



## Figures

# Appendix

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# Acronyms and Abbreviations

| | |
|---|---|
| CAD/ROD | Corrective Action Decision/Record of Decision (Rocky Flats) |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| DOE | U.S. Department of Energy |
| DOE-EM | DOE Office of Environmental Management |
| DOE-LM | DOE Office of Legacy Management |
| EDD | electronic data deliverable |
| EMCAP | Environmental Management Consolidated Audit Program |
| EPA | U.S. Environmental Protection Agency |
| GIS | Geographic Information System |
| ISMP | Interim Surveillance and Maintenance Plan (Rocky Flats) |
| LCSs | laboratory control samples |
| LM | Legacy Management |
| LMIC | Comprehensive Legacy Management and Institutional Controls Plan (Fernald) |
| LTS&M | Long-Term Surveillance and Maintenance |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| NCRs | nonconformance reports |
| QA | quality assurance |
| QAPP | Quality Assurance Project Plan |
| QC | Quality Control |
| SAP | Sampling and Analysis Plan |
| SEEPro | Site Environmental Evaluation for Projects (database) |
| SOPs | standard operating procedures |
| TAC | Technical Assistance Contract |

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# 1.0 Project Management

## 1.1 Introduction

S.M. Stoller Corporation is the contractor for the Technical Assistance Contract (TAC) for the U.S. Department of Energy (DOE) Office of Legacy Management (LM) operations. Stoller employs a management system that applies to all programs, projects, and business management systems funded through DOE-LM task orders. The management system incorporates the philosophy, policies, and requirements of health and safety, environmental compliance, and quality assurance (QA) in all aspects of project planning and implementation. Health and safety requirements are documented in the *Health and Safety Manual* (STO 2), the *Radiological Control Manual* (STO 3), the *Integrated Safety Management System Description* (STO 10), and the *Drilling Health and Safety Requirements* (STO 14). Environmental compliance policy and requirements are documented in the *Environmental Management Program Implementation Manual* (STO 11). The QA Program is documented in the *Quality Assurance Manual* (STO 1).

The QA Manual (STO 1) implements the specific requirements and philosophy of DOE Order 414.1C, *Quality Assurance*. This manual also includes the requirements of other standards that are regularly imposed by customers, regulators, or other DOE orders. Title 10 *Code of Federal Regulations* Part 830, "Quality Assurance Requirements," ANSI/ASQC E4-2004, "*Quality Systems for Environmental Data and Technology Programs – Requirements with Guidance for Use*," and ISO 14001-2004, "Environmental Management Systems," have been included. These standards are similar in content.

The intent of the QA Manual (STO 1) is to provide a QA management system that incorporates the requirements and philosophy of DOE and other customers within the QA Manual. Criterion 1, "Quality Assurance Program," identifies the fundamental requirements for establishing and implementing the QA management system; QA Instruction (QAI) 1.1, "QA Program Implementation," identifies the TAC organizations that have responsibility for implementing the QA program requirements; and Appendix C of the QA Manual provides comparison tables that identify where the requirements of other standards are addressed in the QA Manual.

### 1.1.1 Quality Assurance Project Plan Basis

The U.S. Environmental Protection Agency (EPA) requires the format of Quality Assurance Project Plans (QAPPs) to be consistent with the requirements in the *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5) (EPA 2001). This QAPP covers Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) sites now under the long-term care of DOE-LM and subject to regulation by EPA.

This QAPP identifies and documents the QA Program requirements to address the specifications listed in EPA's QA/R-5 that applies to the LM CERCLA Sites. EPA's *Guidance for Preparing Quality Assurance Project Plans* (QA/G-5) (EPA 2002b) was used in preparing this QAPP. All work must comply with the requirements established through this QAPP. This QAPP is one of several documents providing information and management controls for site activities.

The requirements of Criterion 1 and QAIs 1.2, 1.3, and 1.5 of the QA Manual apply to planning and provide companywide information, considerations, and responsibilities. The Project

Manager is responsible for notifying the QA Lead of new work, task order modifications, major procurements, or other long-term complex or high-visibility activities that require substantial planning to ensure that applicable requirements of the QA Program are identified and applied.

### 1.1.2 Purpose and Scope

This QAPP has been prepared to provide assurance that the administrative and technical work will be of sufficient quality to satisfy project objectives. The major objective for LM sites is to provide long-term environmental monitoring and site maintenance. The sites covered by this QAPP are CERCLA remediated sites from the point of transition from the DOE Office of Environmental Management (DOE-EM) to DOE-LM. This QAPP addresses the common activities conducted at multiple remediated CERCLA sites over a long period of time using the same site management methodology. Site-specific details are provided in Appendix A, "Site-Specific Requirements for Legacy Management CERCLA Sites." Additional site-specific information will be added to Appendix A as information is known or becomes defined. Sites covered by this QAPP are listed below. The status of each site is specified in Appendix A.

- Fernald
- Monticello
- Mound
- Rocky Flats
- Weldon Spring

Table 1 lists the Stoller manuals that provide guidance or implementing procedures for elements of the QA management system. Table 2 lists the requirements of the quality management system that apply to the LM CERCLA Sites. Additional information is included in Appendix A relevant to site-specific key project documents that provide site history and background information, establish the technical basis for remedial actions, provide information on the current status, and establish requirements and procedures for work.

*Table 1–1. Stoller Manuals that Implement Portions of the QA Management System*

| Manual | Title |
|---|---|
| STO 1 | *Quality Assurance Manual* |
| STO 2 | *Health and Safety Manual* |
| STO 3 | *Radiological Control Manual* |
| STO 4 | *Training Manual* |
| STO 5 | *Construction Procedures Manual* |
| STO 6 | *Environmental Procedures Catalog* |
| STO 9 | *Records Management Manual* |
| STO 10 | *Integrated Safety Management System Description* |
| STO 11 | *Environmental Management Program Implementation Manual* |
| STO 12 | *Project Management Control System Manual* |
| STO 14 | *Drilling Health and Safety Requirements* |
| STO 17 | *Information Technology Policy and Procedures Manual* |

*Table 1 (continued). Stoller Manuals that Implement Portions of the QA Management System*

| Manual | Title |
|---|---|
| STO 18 | *Procurement Manual* |
| STO 100 | *General Administrative Procedures Manual* |
| STO 204 | *Engineering Procedures and Guidelines* |
| STO 206 | *Quality Assurance Desk Instructions* |

*Table 1–2. Quality Management System Requirements*

| Applicable QA Program Criteria and Quality Assurance Instructions (QAIs) | |
|---|---|
| **Criterion 1** | **Quality Assurance Program** |
| QAI 1.1 | QA Program Implementation |
| QAI 1.2 | Development and Approval of QA Program Documents |
| QAI 1.3 | Administrative and Technical Planning |
| QAI 1.4 | QA Review of Documents that Implement the QA Program |
| QAI 1.5 | Program Directives |
| **Criterion 2** | **Personnel Training and Qualification** |
| **Criterion 3** | **Quality Improvement** |
| QAI 3.1 | Lessons Learned |
| QAI 3.2 | NCR Reporting, Disposition, and Closure |
| **Criterion 4** | **Documents and Records** |
| **Criterion 5** | **Work Processes** |
| QAI 5.1 | Instructions and Procedures |
| **Criterion 6** | **Design** |
| QAI 6.1 | Design of Data Collection Programs |
| **Criterion 7** | **Procurement** |
| **Criterion 8** | **Inspection and Acceptance Testing** |
| **Criterion 9** | **Management Assessment** |
| QAI 9.1 | Management Assessments |
| **Criterion 10** | **Independent Assessment** |
| QAI 10.1 | Internal Independent Assessments |
| QAI 10.2 | Surveillances |
| QAI 10.3 | External Assessment Tracking and Response |

### 1.1.3 QAPP Review, Revision, and Distribution

QAI 1.2, "Development and Approval of QA Program Documents"(STO 1) provides direction in the preparation, review, and approval of QA Program Plans. For the LM CERCLA Sites, the QAPP will be reviewed by affected Project Managers in accordance with company policy for controlled documents. Revisions will be made at the direction of the QA Manager to reflect changes in work scope, organizational interfaces, or DOE-LM or TAC requirements. The Programs and Project Manager will specify additional reviewers (e.g., from support organizations). This plan will be reviewed annually to ensure the content remains valid and applicable over the course of LM environmental monitoring activities. Applicable regulatory agencies will be included in this review as defined in Appendix A.

Revisions will require approvals at the same level as the original document. The plan will be available on the public website at http://www.lm.doe.gov/. Document Control is responsible for assigning the distribution copy numbers, coordinating distribution, and maintaining the distribution list for any paper copies that are distributed. Distribution of QA plans shall be determined by the Programs and Projects Manager. At a minimum, the plans shall be available to all affected support organizations. Copies are available on request. The record copy will be submitted to the project file as specified by the project working file index and procedures documented in the *Records Management Manual* (STO 9).

## 1.2 Project Organization

### 1.2.1 DOE Management Structure

Administration of LM CERCLA Sites activities is the responsibility of DOE-LM.

DOE-LM maintains the authority, responsibility, and accountability for overall project implementation and contract administration. The DOE-LM Director, through the Contracting Officer's Representative, assigns a DOE Task Order Monitor for each site who is the DOE-LM implementing official for the project and has been delegated the authority from the DOE-LM Director for administrative management and direction of the project. The DOE Task Order Monitor is responsible for day-to-day administrative and technical services that relate to their assigned site.

### 1.2.2 Regulatory Interaction with EPA

Regulatory interaction with EPA is defined at the time a site is transferred from DOE-EM to DOE-LM at the applicable state or federal level. Details for each site are in Appendix A.

### 1.2.3 DOE's TAC Contractor

The TAC contractor oversees the implementation of the LM CERCLA Sites and provides technical support to DOE-LM for long-term surveillance and maintenance of these sites as identified in the scope of work specified in the LM task orders. Stoller employs a matrix management approach, drawing on the expertise within its various functional organizations to support the task and subtask activities. The organization chart for Stoller is shown in Figure 1. Key personnel for each of the LM CERCLA Sites are listed in Appendix A.

DOE task order activities at the LM CERCLA Sites include cost-effective management of the sites in full compliance with the applicable decision documents and local, state, and federal rules, regulations, and policies. Core activities are records management, site maintenance, stakeholder relations, performance sampling, and ongoing remediation operations, where applicable. Additional site-specific activities are specified in Appendix A.

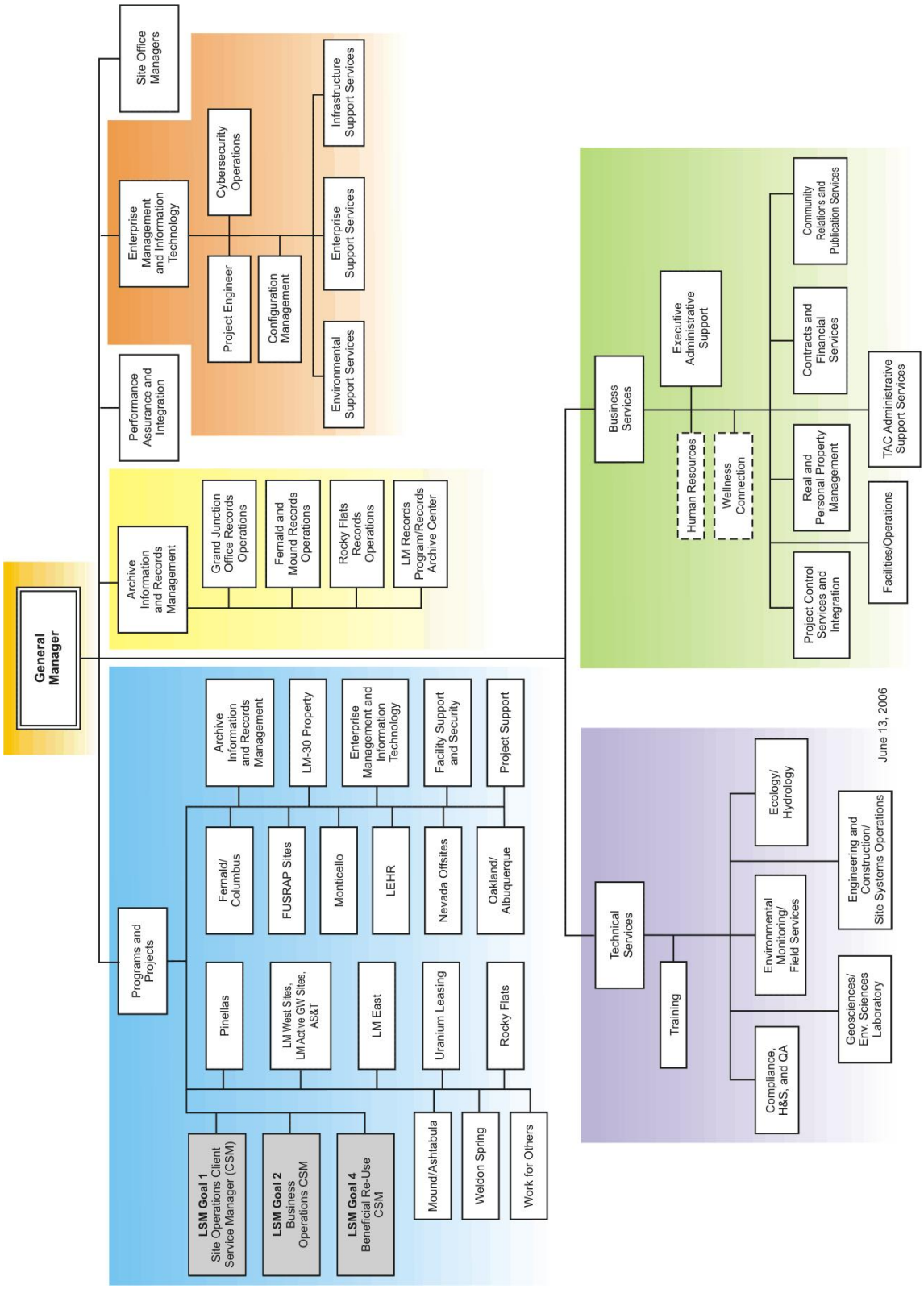


*Figure 1–1. Stoller Organizational Chart*

### 1.2.4 Organizational Responsibilities

Key positions and organizations within the contractor's management system include:

***General Manager***—The General Manager serves the DOE-LM organization in providing contracted services for long-term legacy management of remediated DOE sites, including the LM CERCLA Sites.

***EM Projects***—Not applicable to the LM CERCLA Sites activities.

***Programs and Projects***—The Programs and Projects group define all the projects in the TAC. The LM CERCLA Sites are assigned under the follow projects:

- Fernald/Columbus
- Monticello
- Mound/Astabula
- Rocky Flats
- Weldon Spring

***Performance Assurance and Integration***—Provides direct support to management for oversight management, performance improvement, promotion of efficient and effective contract performance, and worker feedback.

***Archives and Information and Records Management***—Provides records systems for current and stored records for all projects and functions, as well as records research required by the Energy Employees Occupational Illness Compensation Program Act, the Freedom of Information Act, and Privacy Act requests. The services for the LM CERCLA Sites are provided through the operations centers listed below:

- Grand Junction Records Operations (includes Monticello and Weldon Spring)
- Fernald and Mound Records Operations
- Rocky Flats Records Operations

***Technical Services***—The technical services group provides support to all the LM CERCLA Sites. Services are arranged through the functional groups listed below, and staffing is provided as needed:

- Geosciences/Environmental Sciences Laboratory—Provides support to projects in the areas of geology, geochemistry, and experimental laboratory services.
- Compliance, Health &Safety, and QA—Provides Compliance, Health and Safety, and Quality Assurance support for projects and functional groups.
- Ecology/Hydrology—Provides support in the areas of ecology and hydrology.
- Environmental Monitoring/Field Services—Provides support services in subcontract analytical laboratory management, data validation, sampling, sample protocols, and monitor well maintenance.

- Engineering and Construction/Site Operations—Provides support services in engineering, drafting, construction management, and site systems operations.

***Site Office Managers***—Site office managers have been assigned for the LM CERCLA Sites to serve as the coordinators for facilities, equipment, and infrastructure.

***Business Services***—Provides all the business aspects for the LM CERCLA Sites through the following functional groups:

- Executive Administrative Support—Provides administrative support to executive management.
- Project Control Services and Integration—Supports sites through functions such as budgeting, scheduling, reporting, and project management.
- Real and Personal Property—Provides services such as permits, access agreements, real estate management, and administration and tracking services for personal property.
- Facilities/Operations—Provides facilities operations and security services.
- TAC Administrative Support Services—Provides administrative support to all TAC organizations from a common pool.
- Contracts and Financial Services—Supports the sites through procurement, subcontracts, accounts payable, travel, and purchase card services.
- Community Relations and Publication Services—Community Relations Supports sites through activities such as release of fact sheets, public meeting management, and local organization coordination. Publication Services provides support through document production, graphic art, website design, and publications.

***Enterprise Management and Information Technology***—Supports all the LM CERCLA Sites in managing hardware, software, data transfer, data protection, and digital mapping through the following functional groups:

- Configuration Management—Supports sites in managing the software and hardware configuration.
- Cybersecurity Operations—Supports projects and functional groups in data protection.
- Environmental Support Services—Supports projects in data management, global positioning systems and geographic information systems, and computer-aided drafting.
- Infrastructure Support Services—Support includes Help Desk, Network Management, Client/Server Management, Telecommunications and Computer Support specialists, and Transition Site IT Integration.
- Enterprise Support Services—Supports projects and functional groups in development and maintenance of computer support services.

## 1.3 Problem Definition/Background

The objectives of the long-term environmental monitoring program will be to confirm the success and effectiveness of the remedial actions, demonstrate compliance with applicable regulations, and ensure long-term protection of human health and the environment. The specific problem, decision, and outcomes to be achieved for each LM CERCLA Site are stated in Appendix A.

## 1.4 Project Description

Descriptions of project activities and strategies for meeting environmental requirements are established in each Long-Term Surveillance and Maintenance (LTS&M) Plan, which provides comprehensive information regarding site background, and relevant environmental compliance requirements, permits, and associated schedules. Refer to Appendix A for site-specific project descriptions.

Health and safety requirements and descriptions are addressed in the site-specific Health and Safety Plans and relevant subcontract documents. Additional tools such as briefings, inspection forms, safe-work permits, and job safety analyses are used in supplementing the basic requirement to help ensure safety of the worker, the public, and the environment.

### 1.4.1 Project Planning

Planning is performed to ensure efficient and effective approaches to the work, to identify and document the methods to be used, to specify the sequence of actions to be taken, to determine the need for procedures before the work starts, and to establish schedules of activities. QAI 1.3, "Administrative and Technical Planning," will be used as guidance in planning, developing, and revising administrative and technical plans for the project and in conducting readiness reviews before the work starts.

QA requirements will be applied to subcontractors through the appropriate procurement documents.

### 1.4.2 Task Order Management and Project Controls

The *Project Management Control System Manual* (STO 12) is the guiding document for managing task orders. The manual establishes the administrative system employed for project cost controls, authorized work scope, deliverables, modifications, and approval authorities.

## 1.5 Quality Objectives and Criteria for Measurement Data

### 1.5.1 Data Quality

Environmental data for the LM CERCLA Sites, derived through long-term monitoring and data interpretation, will be of sufficient quantitative and qualitative value for use in determining whether performance criteria are being met. The type and quality of the data provided to the regulating agencies will be used to document the performance of the remedy and later attainment of remedial action goals.

The field and analytical methods chosen for use in completing the work are industry standards and, when used in combination with EPA data quality requirements, are consistent with accepted standards for conducting environmental investigations. Where applicable, method precision, accuracy, and sensitivity are reviewed to determine if they are sufficient to meet project objectives.

Monitoring strategy for sampling and analytical data are described in the LTS&M Plan for each site. Project QA objectives for data include:

- Data will be of sufficient quality to withstand scientific and legal scrutiny.
- Data will be acquired in accordance with procedures appropriate for their intended use.
- Data will be of known accuracy and precision.
- Data will be complete, representative, and comparable.

The quality of data generated by the analytical laboratory is dependent on method precision, accuracy, and sensitivity and the basic nature of the analysis and type of equipment used to perform an analysis. Precision is a measure of the reproducibility of an analytical measurement, and accuracy is the difference between a measured value and a true or known value. These considerations are dependent upon the sample matrix and performance criteria, and method sensitivity may not be achieved in all sample matrices.

#### *1.5.1.1 Precision*

Precision is the agreement between a set of replicate measurements without an assumption or knowledge of the true value. Precision is assessed on the basis of repetitive measurements. Replicate field measurements of ground water are not needed because they are sequentially recorded during well purging. Evaluations will be performed to judge the precision of both field and laboratory measurement processes.

Duplicate sample analyses are used to monitor the overall precision that can be expected for a particular environmental medium within an analytical sample batch. The TAC contractor has chosen a frequency of one duplicate sample for every 20 investigative samples. If a sampling event consists of collecting less than 20 samples, a duplicate sample will still be collected. Requirements for the collection frequency of QA samples will be specified in the site-specific environmental planning document sample events.

Site-specific precision requirements are defined in or referenced by the LTS&M plan for that site. Control limits will be verified during data validation.

In the laboratory, precision is a measure of reproducibility and may be determined by repeated analysis of laboratory control samples (LCSs) or reference standards or by duplicate analysis. The laboratory will demonstrate precision through analysis of replicate standards and performance samples prior to analysis of investigative samples as required by the particular analytical method.

#### *1.5.1.2 Bias*

Bias is the systematic or persistent distortion of a measurement process that causes errors in one direction. The analytical laboratory will analyze reference materials to verify that the analytical results are not biased. Calibration and operational checks of field instruments will verify that no bias is present in field measurements.

#### *1.5.1.3 Accuracy*

Accuracy is the nearness of a measurement, or the mean of a set of measurements, to the true value and is usually expressed as the difference between the two values or the difference as a percentage of true value.

It is not possible to directly assess accuracy of field measurements and water levels because true values for these measurements are not known. To ensure accuracy of the field data, instruments and equipment used in surveying, sampling, or obtaining the measurements will be maintained and calibrated as specified in Sections 2.6 and 2.7. Accuracy of surface water and ground water field measurements is addressed indirectly through instrument checks and calibrations, which will be documented in field logbooks or on field data sheets, as appropriate.

Accuracy will be assessed for analytical data by examining the results obtained from laboratory Quality Control (QC) samples. The primary means of determining the accuracy of an analytical method is to compare the results of repeated measurements of LCSs and reference material with published known values. The secondary method of accessing accuracy is to analyze matrix spike samples. Accuracy requirements of routine analytical services are specified in the analytical methods. Accuracy for each analysis will be stated as a percent recovery in laboratory analytical reports.

#### *1.5.1.4 Representativeness*

Representativeness is generally ensured through the use of a carefully prepared sampling and analysis plan and through the use of standard sampling protocols. Representativeness will be accomplished

- Through extensive sampling that includes implementation of field QA/QC procedures.
- By careful and informed selection of sampling sites, sampling depths, and analytical parameters.
- Through the proper collection and handling of samples to avoid interferences and to minimize constituent loss.
- By monitoring field activities to ensure procedure compliance and adherence to sampling protocols.
- By meeting sample care and custody requirements.

#### *1.5.1.5 Comparability*

Comparability is the confidence with which one data set can be compared to another. Comparability is ensured by employing approved sampling plans, standardized field procedures,

and experienced personnel using properly maintained and calibrated instruments. In the laboratory, sample handling and preparation procedures, analytical procedures, holding times, and QA protocols will be adhered to. All data in a particular data set will be obtained by the same methods and will use consistent units for reportable data. Prescribed QC procedures will be used to provide results of known quality. Data will be grouped and evaluated according to similar sampling methods, sampling media, and laboratory analytical methods.

#### *1.5.1.6 Sensitivity*

Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing different levels of the analyte of interest. An evaluation of sensitivity is included in the analytical methods that are used to analyze samples.

## 1.6 Special Training/Certifications

### 1.6.1 Training

The requirements of Criterion 2, "Personnel Training and Qualifications" (STO 1), are applied to ensure that personnel will be qualified to perform their assigned job through meeting basic job description requirements, education standards, experience, and ongoing performance reviews. Training will be provided when needed to maintain proficiency; to adapt to new technologies, equipment, or instruments; and to perform new assigned responsibilities. The requirements of the *Training Manual* (STO 4) apply, and the companion learning management and database tracking systems will be used to identify, provide, and track required training.

The Training group manages, maintains, and tracks employee training records, provides in-house and on-line training, and coordinates off-site and vendor-provided training.

Site access training requirements and personal protective equipment needs are specified in Health and Safety Plans and should be consulted prior to arriving at the site to ensure access to required work areas.

The Project Manager is responsible for determining site-required training and communicating the requirements to appropriate functional group managers. Managers are responsible for determining training needs of their staff and for ensuring that required training is established in the training database for personnel assigned to support project activities. Personnel assigned to project activities are responsible for ensuring that their required training and medical surveillance (if applicable) are documented and are maintained in a current status as required by the project and their position/assignments. At a minimum, individual training requirements will be reviewed annually and updated as needed.

The Project Manager is responsible for ensuring that personnel assigned to project tasks are sufficiently familiar with the project implementing documents (e.g., plans, procedures, and drawings) and the requirements established for inspection, systems monitoring, sample collection, analysis, documenting and reporting project activities, and demonstrating proficiency. The Field Supervisor will ensure that personnel assigned to field sampling activities can demonstrate proficiency when performing the work or that they are properly supervised by a team lead who is proficient.

### 1.6.2 Certifications

Personnel assigned to waste management activities will be certified in accordance with the appropriate level of U.S. Department of Transportation certified shipper requirements for the work they perform.

QA staff that perform independent assessments of project activities or management systems will be qualified as lead assessors through participation in a nationally-recognized certification program such as Registrar Accreditation Board or American Society for Quality.

Laboratories used for analysis of samples collected for characterization, compliance, or other purposes will be required to pass an audit by the DOE-EM Consolidated Audit Program (EMCAP).

State and regional requirements for registration or certification (e.g., state-licensed engineer or surveyor) will be addressed in the LTS&M Plan.

## 1.7 Documentation and Records

The requirements of Criterion 4, "Documents and Records" (STO 1), and company policy and procedures in Sections 2.0, 3.0, and 9.0 (STO 100) apply to the preparation, review, approval, issue, use, and revision of documents or forms that prescribe processes, specify requirements, or establish design. Records must be specified, prepared, reviewed, approved, and maintained as directed by company policy. LTS&M Plans outline the documentation and records requirements for each site.

Field and laboratory data will be sufficiently documented to provide a scientifically defensible record of the activities and analyses performed. Records of field variance reports, internal reviews, field and laboratory records of tests and analyses, field logs, Chain of Sample Custody forms, and project reports will be used in interpreting and assessing the usability of the data. Standardized forms and computer files, codes, programs, and printouts will be designed to eliminate errors made during data entry and reduction. Calculation steps are described in the technical and analytical procedures and software lists. Routine data-transfer and data-entry verification checks are performed.

Laboratories must demonstrate continued proficiency through participation in performance evaluation programs required by DOE Quality Systems for Analytical Services.

### 1.7.1 Records File Plans

Site-specific file plans have been prepared to identify the records to be generated, file locations, and retention schedule for each LM CERCLA Site. The file plans are augmented by the *Records Management Manual* (STO 9), which establishes the requirements for preparing, preserving, and storing records. Project personnel will work with the Records Management Lead to ensure that project records are correctly identified and maintained in accordance with the applicable file plan. Modifications to the file plans shall be submitted to the Records Management Lead and are subject to review and approval by the Project Manager.

### 1.7.2 Document Control and Changes

Company policy and procedures documented in Criterion 1 (STO 1) and Sections 2.0, 3.0, and 9.0 (STO 100) will be followed to ensure that the preparation, issuance, and revisions to project documents and forms will be controlled so that current and correct information is available at the work location. These project documents (e.g., plans, procedures, drawings, and forms) and subsequent revisions will be reviewed for adequacy and approved before being issued for use. Written records and photo documentation will be handled in a manner that ensures association to the activity, the samples, and their locations. The Project Manager can authorize minor changes to project documents without requiring a formal review process.

At a minimum, personnel assigned to the work will have access to the applicable project documents and will be knowledgeable of the contents before the associated work.

Program directives will be used to document changes to the routine sampling events as established in each site's LTS&M Plan. QAI 1.5, "Program Directives," establishes the requirements for preparing, reviewing, and issuing program directives. Nonroutine sampling and field investigations will be documented in Sampling Plans prepared to meet the specific objectives. The DOE-LM Task Order Monitor will be briefed on all program directives and nonroutine field investigations before the work begins.

### 1.7.3 Corrections to Documents

When practical, correction of errors should be made by the individual who made the entry. The method used to make a correction is to draw a line through the error, enter the correct information, then initial and date the entry. The erroneous material must not be obscured.

When a document requires replacement due to illegibility or inaccuracies, the document will be voided, and a replacement document will be prepared. A notation will be made on the voided document that a replacement document was completed. The voided document will be retained with the field documentation.

### 1.7.4 Project Documents

Project documents are written materials that provide a background or history of the work, establish the basis for the work, give guidance to the work, and provide a summary of the work. They may be documents such as task orders, technical reports, technical and administrative plans, inspection or test documents, and design and as-built drawings. Documents prepared for the LM CERCLA Sites that establish work controls or procedures will be developed in accordance with the applicable requirements of QAI 1.3, "Administrative and Technical Planning," Criterion 5, "Work Processes," and QAI 5.1, "Instructions and Procedures." Documents that are subject to revision will be managed and issued as controlled documents. These include, but are not limited to, the following documents:

- Health and Safety Plans
- Sampling Frequencies and Analysis

- QAPPs
- LTS&M Plans
- Sampling and Analysis Plans
- Site-Specific (sampling, monitoring, maintenance and inspection) Plans
- Management Action Process Document
- Management Plan for Field Investigation Derived Waste

### 1.7.5 Procedure Requirements

QA requirements for preparing and issuing procedures are documented in Criterion 5, "Work Processes" (STO 1), and in the *General Administrative Procedures Manual* (STO 100). Project personnel will comply with the requirements of written procedures or other instructions that have been approved for the work. Any deviation from approved field procedures must be documented by the Field Supervisor and authorized by the Project Manager. Field changes to project plans or deviation from procedures will be documented in the field book as a field variance, communicated to the Project Manager as soon as possible, and noted in the trip report to management.

The Laboratory Coordinator will be notified of any changes to subcontract laboratory procedures. The Project Manager will be informed of and review changes to laboratory procedures for their impact to project objectives. Impacts will be identified to the Project Manager and resolved through Environmental Monitoring/Field Services and Contracts and Financial Services. As appropriate, procedure changes that affect laboratory data will be identified and documented during the data review, verification, and validation activities (see Section 4.0 of this QAPP). As appropriate, the Project Manager will inform the DOE Task Order Monitor of technical or other substantive changes to laboratory procedures that may affect reporting limits or analytical sensitivity.

### 1.7.6 Field Documentation

Field documentation requirements are specified in the sampling procedures that are provided as an appendix to the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (SAP) (DOE 2006). All entries in field documents will be made with indelible (waterproof) ink and will be legible, reproducible, accurate, complete, and traceable to the sample measurements and/or site location. These documents will be retained as project records. Field documents are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the field sampling activities. Field logbooks and forms (e.g., sample collection data sheets, field measurement data forms, Chain of Sample Custody forms, and shipping forms) will be stored in a manner that protects them from loss or damage. At the conclusion of a field task or sampling event, the field and data collection activities will be reviewed and summarized in a report to the Project Manager, as specified in the discussions of Data Review and QA/QC Assessment in Section 3.2.3.1 of this QAPP.

The field sampling team will adequately document and identify field measurements and each sample collected. Field records will be completed at the time the observation or measurement is

made and when the sample is collected. Project documents and written procedures will be available at the work site. The Field Supervisor will ensure that specified requirements are followed so that an accurate record of sample collection and transfer activities is maintained.

As appropriate, sample disposition will be specified to the subcontract laboratory in the appropriate procurement documents.

#### *1.7.6.1 Field Books and Forms*

The field sampling team will maintain a field book to provide a daily record of field activities associated with drilling and sampling events and to document relevant treatment system operations and measurements. If initials are used in place of signatures, a signature/initials log will be maintained to identify personnel who are authorized to record, review, and authenticate field data.

Field books for project activities will be prepared, managed, and maintained in accordance with project records requirements. Project field books (e.g., well evaluation, area-specific or site wide sampling and drilling) will be prepared and issued by Environmental Monitoring/Field Services. Field book information may include documentation associated with routine or ad hoc field measurements and sampling, chain of custody, soil boring and well installation, sampling equipment, calibration records and standards, and general field notes, including repairs made to equipment and instruments.

#### *1.7.6.2 Field Variance and Nonconformance Documentation*

Changes from specified field protocols established in planning documents or standard operating procedures (SOPs) must be authorized by the Project Manager or approved planning document and fully documented by the field sampling team. Field variances will be reported in a timely manner to evaluate the impact the variance has on the data or system operations. Field variance reporting applies to deviations from (1) prescribed field sampling and measurement requirements; (2) specified shipping, handling, or storage requirements; and (3) decontamination procedures.

A variance must be documented whenever an activity is performed or sample is obtained where:

- The activity performed or sample collection technique does not fall within the methods or protocols specified.
- The monitoring or measurement instrument that was used was out of calibration or had failed an operational check.
- Insufficient documentation results in the inability to trace the activity, measurement, or sample to the prescribed or selected location.
- There is a loss of or damage to records that cannot be duplicated.

The variance should be fully described, and corrective action, if applicable, should be taken immediately. Comments describing the variance will be used during data evaluation to assess the use of associated results and validity of the data. Field variances should be noted in the comments portion of the field data sheet, on a general log sheet, or in the activity logbook. As appropriate, field variances will be summarized in the report at the conclusion of the activity.

Ongoing treatment system operations should develop a tracking system for trending variances to operations activities, system settings, and process controls.

#### *1.7.6.3 Chain of Sample Custody*

The custody of individual samples will be documented by recording each sample's identification, number of containers, and matrix on a standardized Chain of Sample Custody form. This form will be used to list all transfers of sample possession.

### 1.7.7 Laboratory Documentation

The format and content of laboratory reports depend on project needs such as client or contract requirements, government agency reporting formats, and whether explanatory text is required. At a minimum, the laboratory data report will include the following items:

- Analytical method used.
- Date and time of analysis.
- The Chain of Sample Custody form.
- Sample receiving documentation.
- QC data results and report.
- Sample data results by analysis, including method detection limits, reporting limits, and dilution factors.
- Summary of results (e.g., case narrative).
- Certification by the laboratory that the analytical data meet applicable data quality requirements.

Analytical data that do not meet specified criteria will be qualified and flagged to allow data evaluation before use. Any nonconformances or difficulties encountered during analyses will be documented in the case narrative with each data package.

### 1.7.8 Reports Received from Subcontractors

#### *1.7.8.1 Laboratory or Other Data Reports*

Reporting requirements and formats meeting the electronic data deliverable (EDD) specifications will be defined in procurement documents issued for subcontracted services. The contents of the analytical report should address the items listed in Section 1.7.7, as appropriate. Environmental Monitoring/Field Services will be contacted regarding difficulties or nonconformance associated with subcontracted analytical services and will work closely with the data management personnel and technical specialists to identify and, where possible, resolve disputes that could affect data quality.

### *1.7.8.2 Plans and Technical Reports*

The applicable procurement document will specify the criteria for technical and administrative plans and reporting requirements for technical reports received from subcontracted services. Elements to be addressed may include a deliverable schedule for draft and final documents, required reviews, format, software type and version requirements, and contents of the document, including any supporting documents, data, and references.

End of current text

# 2.0 Data Generation and Acquisition

This section addresses aspects of the measurement system design and implementation to ensure that appropriate methods for sampling, analysis, data handling, and QC are employed and will be thoroughly documented. The surface water and ground water sampling addressed in this section applies to all LM CERCLA Sites. Additional types of sampling and any modifying project directives are in Appendix A.

## 2.1 Sampling Process Design

The data obtained through monitoring site conditions will be of sufficient quantity and quality to achieve project objectives. A summary of activities for each site is presented in Appendix A.

Monitoring programs for each LM CERCLA Site have been established, and those requirements transfer with the site to the DOE-LM program. These monitoring programs were designed to ensure that monitoring data would satisfy applicable regulations and would ensure that there were no unacceptable risks to human health or the environment. The site-specific LTS&M Plans define the sample locations and sampling frequency and determine the types of analyses that will be conducted on the samples collected from these locations. The plans are reviewed every 5 years, and changes to sampling strategies may be proposed on the basis of analytical results, site conditions, and regulatory requirements. Changes will be with approval from the appropriate regulatory agencies.

## 2.2 Sampling Methods

Field measurements and sample collection will follow procedures attached to the SAP or nationally recognized consensus standards such as EPA methods, American Society for Testing and Materials standards, or instrument manufacturer recommended procedures. Deviation from approved procedures requires approval by the Project Manager before the start of work.

### 2.2.1 Sample Collection Procedures

Sampling procedures used for all LM CERCLA Sites are defined in the appendix to the SAP.

QAI 1.5, “Program Directives,” may be used to authorize interim changes to the sampling prescribed in the LTS&M Plan. The DOE-LM Task Order Monitor will be informed of proposed changes documented in program directives before the work begins. Program directives will be managed as controlled documents and will be appended to the affected plan.

Procedures established in the SAP and relevant requirements identified in this QAPP must be followed for documenting field activities and delivering the samples to the laboratory. Procedures will identify the methods employed to obtain representative field measurements and samples of specified media. The procedures will identify the equipment, instruments, and sampling tools that are needed and, where appropriate, performance criteria (e.g., special handling, operational checks, field calibrations) to ensure the quality of the field data. The sampling lead is responsible for ensuring that inspections, operations and maintenance activities, field measurements, and specified samples are properly documented, occur at the prescribed frequency and locations, and are obtained in compliance with procedures and

requirements specified in the project documents. Daily QC checks and data reviews will ensure that requirements have been met. If field conditions prevent inspections, required field measurements, and/or specified sample collection, the conditions will be fully documented in the field book as a field variance. The appropriate technical staff will be notified of such deviations. Variances will be summarized in the various reports (i.e., weekly reports, trip reports, or status reports).

### 2.2.2 Field Measurements and Sampling Methods

The site-specific LTS&M Plan presents the background and objectives of the annual monitoring program. Field measurements and sampling schedules are summarized in these plans. The data obtained through these activities will be used to monitor compliance with performance measure requirements.

Field procedures used in well inspections, field measurements, sample collection methods, field data, equipment and supplies applicable to the field activities, sample preservation requirements, and QC sample requirements are described in an appendix to the SAP.

Task-specific data quality objectives, procedures, and QC requirements will be established, as appropriate, to address the needs of ongoing treatment systems. This information is available in Appendix A of this document.

### 2.2.3 Preparation and Decontamination Requirements for Sampling Equipment

#### *2.2.3.1 Requirements for Sample Containers, Preservation, and Holding Times*

Nondedicated equipment used in obtaining samples will be visually inspected and cleaned before use at each sample location. Measures will be taken (e.g., storage in trays, plastic bags, or boxes) to protect clean or decontaminated equipment while it is not being used. Sample containers will be inspected for integrity and cleanliness before being used. Suspect containers will be discarded in a manner that will preclude their inadvertent use, or they will be tagged and segregated for return to the supplier.

*Container Requirements*

Sample containers will be new or pre-cleaned to EPA standards (EPA 1992). Containers will be of an adequate size to contain the required sample volume and of an approved material (e.g., amber/clear glass or HDPE) that does not promote sample degradation. As appropriate, supplier-provided certificates of cleanliness will be retained with the project documentation.

Water samples collected for analysis of volatile organic compounds will be bottled with no headspace or bubbles. All other sample bottles will be filled to near 90 percent of capacity to allow for expansion.

#### *2.2.3.2 Preservation and Holding Times*

Efforts to preserve the integrity of the samples through prescribed chemical additives and/or temperature-controlled storage will be maintained as appropriate from the time the containers are received, throughout the sample collection and shipping process, and will continue until all

analyses are performed. Procedures that will be employed to collect and preserve the integrity of the samples are described in the SAP. Holding times begin at the time the sample is collected, not when the sample is received by the laboratory.

#### *2.2.3.3 Decontamination Procedures and Materials*

Where practical, dedicated pumps will be installed in monitor wells, sample ports will be used at treatment systems, and disposable materials will be used to minimize the decontamination requirements. The final rinse following equipment decontamination will be collected as an equipment blank QC sample, in accordance with the type and frequency prescribed in the plan. Procedures to clean or decontaminate nondedicated sampling equipment are provided in the SAP.

## 2.3 Sample Handling and Custody Requirements

Sample handling, custody, and shipping procedures are addressed in the SAP. A minimum number of individuals should be involved in sample collection and handling to ensure integrity of the sample and compliance with custody procedures. To maintain evidence of authenticity, the samples collected must be properly identified and easily discernable from like samples. To maintain the integrity of the sample, proper preservation, storage, and shipping methods will be used.

Unused sampling equipment, sample containers, and coolers that have been shipped or transported to a sampling location will be kept in a clean, temperature-controlled, and secure location to minimize damage, tampering, degradation, and possible cross-contamination.

### 2.3.1 Identification, Handling, Packaging, and Storage

#### *2.3.1.1 Sample Identification*

Environmental samples and associated QC samples will be assigned a unique identification number. In addition to the unique number, QC samples will be assigned a fictitious location identifier that is consistent with the sample location identification scheme. Detailed procedures for assigning sample identification by media type and location are specified in Appendix A of the SAP.

Samples will be identified by a label or tag attached to the sample container that specifies, as appropriate, the project, sample location, unique identification number, preservatives added, date and time collected, and the sampler's name. Sample labels, tags, and/or container markings should be completed with indelible (waterproof) ink. Clear tape may be placed over each sample label for added protection, if needed.

#### *2.3.1.2 Sample Handling and Storage*

During field collection, sample containers may be stored in boxes, trays, or coolers, as dictated by protection and preservation needs. Samples that require refrigeration will be stored in coolers with sufficient ice to maintain the required temperature controls during field collection, packaging, and shipping. Samples that are not transported to the laboratory the day of collection

must be stored in containers that will prevent damage or degradation of the sample. In addition, samples must be stored in locked containers or buildings when they are out of the direct control of the responsible custodian. Samples stored overnight or at locations where access is not solely controlled by the contractor will have custody seals placed on the outside of the container (cooler or box) as a measure of security.

#### *2.3.1.3 Sample Custody*

To ensure the integrity of the sample, the field custodian is responsible for the care, packaging, and custody of the samples until they are transferred to the laboratory. The procedures described in Appendix A to the SAP will be implemented to provide security and to document sample custody.

Chain of Sample Custody forms will be used to list all samples and transfers of sample possession to provide documentation that the samples were in constant custody between collection and analysis. The filled-in Chain of Sample Custody form, a copy of which is retained by the originator, will accompany samples that are sent or transported to the analytical laboratory.

#### *2.3.1.4 Sample Packaging and Shipping*

All samples will be handled, packaged, and transported or shipped in accordance with applicable U.S. Department of Transportation requirements. Sample storage containers (e.g., boxes or coolers) and sample containers will be securely packaged to protect the contents from damage, spilling, leaking, or breaking. Void space in shipping containers should be filled with an inert material or additional ice, if appropriate, to further protect and secure the contents.

Custody seals are not required for containers or samples that are transported by contractor personnel and taken directly to the analytical laboratory for analysis or interim storage. Custody seals are required for shipping containers (e.g., coolers or boxes) that are sent by common carrier. Clear tape should be placed over the seals as protection against tearing during shipment.

Mailed sample packages will be registered with return receipt requested. If packages are sent by common carrier, receipts are retained as part of the chain of custody documentation. Other commercial carrier documents shall be maintained with the chain of custody records.

### 2.3.2 Laboratory Requirements

#### *2.3.2.1 Laboratory Sample Receipt*

The subcontract analytical laboratory personnel are responsible for the care and custody of samples from the time they are received until the time the sample is analyzed and archive portions are discarded. On arrival at the laboratory, laboratory personnel must examine the container and document the receiving condition, including the integrity of custody seals, when applicable. When opening the shipping container, laboratory personnel will examine the contents and record the condition of the individual sample containers (e.g., bottles broken or leaking), the temperature (when applicable), method of shipment, carrier name(s), and other information relevant to sample receipt and log-in. Laboratory personnel verify that the information on the sample containers matches the information on the Chain of Sample Custody form.

#### *2.3.2.2 Discrepancies Identified During Sample Receipt*

If discrepancies are identified during the sample receiving process, laboratory personnel will attempt to resolve the problem by checking all available information (e.g., other markings on sample containers and type of sample), recording appropriate notes on the Chain of Sample Custody form, and contacting Environmental Monitoring/Field Services to resolve any questions.

If the laboratory judges the sample integrity to be questionable (e.g., samples arrive damaged or leaking, or the temperature range is exceeded), Environmental Monitoring/Field Services will be contacted and will bring in appropriate technical staff to make a decision regarding rejecting or flagging the data and/or re-sampling the location. Damaged samples will be rescheduled for collection and analysis, if necessary.

Discrepancies noted during sample receiving at a subcontracted laboratory or testing facility will be resolved in accordance with the procurement documents. In general, Environmental Monitoring/Field Services personnel, in discussion with Ecology/Hydrology or Geosciences/Environmental Services, will be contacted to facilitate resolution of a problem.

#### *2.3.2.3 Sample Disposition*

When sample analyses and necessary QA/QC checks have been completed in the laboratory, the residual sample material and wastes generated as a result of the analytical process will be treated, shipped, and disposed of in accordance with all applicable federal, state, and local transportation and waste management requirements. When samples are stored, they will be protected to prevent damage or degradation. At a minimum, samples shall not be removed from the laboratory sooner than 60 days after the delivery of laboratory data reports, or as otherwise agreed to in the procurement documents.

## 2.4 Analytical Methods

Laboratories involved in the analysis of samples will have a written QA/QC program that provides rules and guidelines to ensure reliability and validity of the work conducted at the laboratory.

The analytical methods to be used by subcontracted laboratory services are specified in the Statement of Work. These procedures consist of EPA methods. The use of these methods will ensure that required method detection limits and project reporting limits are achieved for each of the requested analytes.

Required analytical methods are documented in appropriate site-specific documents. Refer to Appendix A of this document for references to these documents.

### 2.4.1 Subcontracted Laboratory Requirements

The laboratory will have a documented QA program in place, the implementation of which may be independently verified through proposal reviews, prior history, and/or pre-award survey. As appropriate, subcontracted laboratories will use EPA or EPA-approved methods or other

methods specified and approved within the provisions of the procurement documents. Subcontracted laboratories are required to pass an audit by the DOE EMCAP. Internal method requirements for analysis of spikes, duplicates, or replicates will be followed and may be used as performance indicators for these services.

Data turnaround times, sample disposition, and other requirements of the analytical laboratory are identified in procurement documents (e.g., the Statement of Work).

The laboratory must obtain authorization from Environmental Monitoring/Field Services for changes to the procurement documents.

Work submitted to the laboratory may not be subcontracted by the laboratory without prior consent from Environmental Monitoring/Field Services.

## 2.5 Quality Assurance/Quality Control

### 2.5.1 Field QA/QC

A variety of instruments, equipment, sampling tools, and supplies will be used to collect samples and to monitor site conditions. Proper inspection, calibration, maintenance, and use of the instruments and equipment are required to ensure field data quality. In addition, field QA will be implemented through the use of approved SOPs, proper cleaning, decontamination, protective storage of equipment and supplies, and timely data reviews during field activities. The QC objective of these data collection activities is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the intended use of the data.

QC samples will consist of field duplicates, equipment rinsate blanks, and trip blanks as appropriate for the matrix and analytes involved. An additional volume of ground water for selected organic analyses will be collected for matrix spike/matrix spike duplicate (MS/MSD) use, as requested by the laboratory. Requirements for QC samples are specified in Section 4 of the SAP. Field QC samples will be used to quantitatively and qualitatively evaluate the analytical performance of the laboratory and to assess external and internal effects on the accuracy and comparability of the reported results. Field QC samples will be uniquely identified in a manner consistent with the project sample-numbering scheme. Additional ground water sample volume collected for MS/MSD use by the laboratory will receive the same identification as the investigative sample.

#### *2.5.1.1 Field Measurement Data Comparison*

Where applicable, field measurement data will be compared to previous measurements obtained at the same location. Large variations (greater than 30 percent) in field measurement data at a location will be examined to evaluate whether general trends are developing. Variations in data that cannot be explained will be assigned a lower level of confidence through assignment of qualifiers or will be flagged for additional sampling or evaluation.

### 2.5.2 Laboratory QA/QC

Laboratory QC checks are internal system checks and control samples introduced by the laboratory into the sample analysis stream. These checks are used to validate data and calculate the accuracy and precision of the data. The objectives of the laboratory QA/QC program should be to

- Ensure that procedures and any revisions are documented.
- Ensure that analytical procedures are conducted according to sound scientific principals and have been validated.
- Monitor the performance of the laboratory by a systematic inspection program and provide for corrective measures, as necessary.
- Collaborate with other laboratories in establishing quality levels, as appropriate.
- Ensure that data are properly recorded and archived.

Internal QA procedures for analytical services will be implemented by the laboratory in accordance with SOPs. Data sheets, which also report the blank and spiked sample checks that have been performed, will be provided and will indicate when a QC check was performed. Analytical data that do not meet acceptance criteria will be qualified and flagged in accordance with SOPs.

Laboratory quality control procedures are defined within the particular analytical method or are defined in procurement documents (e.g., the Statement of Work).

## 2.6 Instrument/Equipment Testing, Inspection, Calibration, and Maintenance

A variety of equipment, instruments, and sampling tools will be used to collect data and samples for the LM CERCLA Sites. Proper maintenance, calibration, and use of equipment and instruments are imperative to ensure the quality of all the data that are collected.

Both field and laboratory equipment, instruments, tools, gauges, and other items used in performing work tasks that require preventive maintenance will be serviced in accordance with manufacturers' recommendations and instructions. When applicable, technical procedures will identify the manufacturers' instructions and recommended frequency for servicing the equipment. Preventive maintenance for calibrated measuring and test equipment will be performed either by field or laboratory personnel who are knowledgeable of the equipment, or by manufacturer’s authorized service center as part of routine calibration tasks. Records of equipment calibration, repair, or replacement of controlled instruments will be filed and maintained in accordance with the applicable records management requirements.

As appropriate, the requirements for calibration and control of measuring and test equipment will meet the requirements of Criterion 8, “Inspection and Acceptance Testing” in the QA Manual (STO 1), and will be addressed to subcontractors in the appropriate procurement documents. As applicable, instruments will be calibrated to proper specifications following maintenance.

Instruments that are not calibrated to the manufacturers' specifications will display a warning tag to alert the sampler and analyst that the instrument has only limited calibration.

### 2.6.1 Field Equipment and Instruments

Field equipment, instruments, and associated supplies used to obtain field measurements and collect samples are specified in sampling procedures appended to the SAP.

Field personnel will conduct visual inspections and operational checks of field equipment and instruments before they are shipped or carried to the field and before using the equipment or instruments in field data collection activities. Whenever any equipment, instrument, or tool is found to be defective or fails to meet project requirements, it will not be used, and as appropriate, it will be tagged defective and segregated to prevent inadvertent use. Backup equipment, instruments, and tools will be available on site or within 1-day shipment to avoid delays in the field schedule. The sampling team lead is responsible for the overall maintenance, operation, calibration, and repairs made to field equipment, instruments, and tools. The sampling team lead is also responsible for ensuring that the field book has adequate documentation that describes any maintenance, repairs, and calibrations performed in the field.

Equipment and instruments used to obtain data will be maintained and calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturers' specifications. Calibration of equipment and instruments will be performed at approved intervals, as specified by the manufacturer, or more frequently as conditions dictate. Calibration standards used as reference standards will be traceable to the National Institute of Standards and Technology or other recognized standards when available. Instruments found to be out of tolerance will be tagged defective and segregated to prevent inadvertent use.

In some instances, calibration periods will be based on usage rather than periodic calibration. Equipment will be calibrated or checked as a part of its operational use. Records of field calibration will be documented on forms provided for technical procedures or recorded in the field logbook. Calibration checks will be performed in accordance with procedures attached to the SAP.

Procedures recommended by the manufacturer will be used for equipment preventive maintenance. Backup equipment, supplies, and critical spare parts (e.g., tape, bottles, filters, pH paper, tubing, probes, electrodes, and batteries) will be kept on site to minimize downtime. The field supervisor is responsible for ensuring that routine maintenance is performed and that tools and spare parts used to conduct routine maintenance are available. The field sampling team is also responsible for contacting the Procurement organization to facilitate maintenance that cannot be performed by field personnel.

### 2.6.2 Laboratory Equipment and Instruments

As part of the QA/QC program for the analytical laboratory, routine preventive maintenance is conducted to minimize the occurrence of instrument failure and other system malfunctions. The laboratory will maintain a schedule for servicing critical items and will perform routine maintenance, schedule maintenance and repair, or coordinate with the vendor to arrange for maintenance and repair service, as required. All laboratory instruments will be maintained in

accordance with the manufacturers' specifications and the requirements of the specific method employed. Equipment will be tested during routine calibration, and deficiencies will be corrected as specified in the SOP.

The concentration of standards and frequency of initial and continuing calibration of analytical instruments will be as specified in the laboratory SOPs. Calibration data will be provided with the analytical data package, as specified in the subcontract documents. Calibration records pertaining to subcontracted laboratory services will be filed and maintained by the laboratory in accordance with internal procedures.

## 2.7 Instrument/Equipment Calibration and Frequency

Calibration procedures for field equipment are described in Appendix A to the SAP.

Calibration of analytical laboratory equipment will be based on approved written procedures. The concentration of standards and frequency of initial and continuing calibration of analytical instruments will be as specified in the laboratory SOPs. The analytical laboratory will maintain calibration records. Calibration data will be provided with the analytical data package, as specified in the procurement documents.

## 2.8 Inspection/Acceptance of Supplies and Consumables

### 2.8.1 Sample Containers

Sample containers for water, soil, sediment, and other media will be provided by the subcontracted laboratory and will be new or pre-cleaned according to EPA protocol in *Specifications and Guidance for Contaminant-Free Sample Containers* (EPA 1992), or as specified in the procurement documents. As appropriate, supplier-provided certificates of cleanliness will be retained with field documentation.

Containers will be visually inspected for integrity and cleanliness before being used. Suspect containers will not be used and will be discarded in a controlled manner to prevent inadvertent future use. If sufficient quantities of containers are suspect, the laboratory will immediately be notified of the condition and requested to provide a sufficient quantity of replacement containers. Suspect containers will be collected, segregated, and tagged for return to the analytical laboratory. The Field Supervisor will describe the situation in the field book as a field variance.

### 2.8.2 Supplies and Consumables

The Field Supervisor is responsible for ensuring that supplies, materials, and consumable items used during field activities are properly inspected for integrity, cleanliness, and compliance with specified tolerances and that they are appropriate to the activity. Items with a specified shelf life or expiration date will be labeled. Expired materials will not be used and will be properly disposed of or returned to the laboratory for disposal, as appropriate. Supplies, materials, and equipment will be inventoried at the conclusion of the sampling event in preparation for the next scheduled event.

The laboratory will have system/inventory controls and implementing procedures to address inspection, acceptance, and management of supplies and consumables. An effective tracking system will ensure that items with a limited shelf life are identified and properly managed.

## 2.9 Data Acquisition Requirements Through Non-Direct Measurements

Data acquired through non-direct measurements may include data from historical databases, literature references, background information from historical facility files, climatic data, and regional geology or hydrology descriptions. Generally, these data are ancillary to the project.

Data from historical databases or historical facility files should be evaluated within the context in which they are presented and a determination made as to how accurate the data of interest may be. The exact nature of the evaluation likely will have to be made on a case-by-case basis. Information obtained from literature references should be from peer-reviewed journals or books whenever possible. Information such as climatic data and regional geology or hydrology descriptions should be obtained from documents produced by state or federal agencies whenever possible.

## 2.10 Data Management

Project data are generated mainly from routine sampling of monitor wells, routine operations system sampling, and occasional soil sampling events. The Environmental Support Services group is responsible for managing and maintaining the electronic data system for project data in compliance with company requirements and systems established and managed by the Enterprise Management and Information Technology group.

Field data books are assembled for most sampling events. These books contain information such as sample location identification (ID), date, QA sample ID, well purge method, sampling method, and field measurements. These forms are completed at the time of sample collection. Separate data books may be generated for water levels. From the completed field books, the relevant data (water levels, temperatures, pH, conductivity, dissolved oxygen, oxidation-reduction potential, and turbidity) are loaded into the database.

Data from samples submitted to an analytical laboratory are received as both hard copy and as an EDD. The electronic data are loaded into the Oracle electronic database maintained by Environmental Support Services. The electronic data are accessible using Site Environmental Evaluation for Projects (SEEPro), a custom database interface based on Microsoft Access. Database security is maintained by keeping the majority of the records in a read-only mode and limiting the ability to change data in the database to only a few of the database managers. Data validation procedures are described in Procedure GT-9, “Standard Practice for Validation of Laboratory Data” in the *Environmental Procedures Catalog* (STO 6).

The hard copy analytical reports are archived in the project records along with the original field data forms and other relevant hard copy forms or documents containing project data. The hard copy forms are categorized in the project records library according to the project Working File Index.

Soil boring logs are generated for some soil sampling events, and well construction and lithology logs are generated for all new wells drilled. These logs are archived in the project records library and are also entered into the SEEPro database in the form of gINT logs.

In addition to the data collected from sampling, physical project data are also collected and maintained. Physical project data are those that describe the layout of the site, such as buildings, survey markers, fence lines, utilities, and roads. Any modification to these features requires documentation and base map feature updates. These updates can be documented by redlining an existing as-built map. If a contractor is used, both hard copy and EDDs are needed. These deliverables will be archived as appropriate. Where appropriate, a detailed as-built set of maps will be created and maintained for a specific area.

Some cases require the services of a licensed surveyor. In these cases, the surveyor must submit both hard copy and EDDs. These deliverables will then be archived and verified, and the appropriate data sources will be updated.

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# 3.0 Quality Improvement, Assessment, and Oversight

All personnel must continually seek to improve the quality of their work in order to provide the highest quality goods and services for customers, both internal and external. This section addresses the activities for assessing the effectiveness of the implementation of the project and associated QA/QC requirements. Processes to detect and prevent problems and improve quality are addressed in the requirements of Criterion 3.0, QAIs 3.1 and 3.2; Criterion 9, QAI 9.1; and Criterion 10 and QAIs 10.1, 10.2, and 10.3 (STO 1). These requirements apply to quality improvement, assessment, and oversight activities.

## 3.1 Quality Improvement

Management encourages innovation and continuous improvement in the work environment by fostering a "no fault" attitude to encourage the identification of problems and create an atmosphere of openness to suggestions for improvement. All personnel are encouraged to identify and suggest improvements.

Personnel have the freedom and authority to stop work until effective corrective action has been taken. Work that is performed by subcontractors will be subject to oversight. The work may be suspended immediately for imminent threats to health, safety, environmental release, or significant adverse quality issues. Re-start to such work stoppages will be at the direction of the Project Manager.

## 3.2 Assessment and Response Actions

Assessments of project activities will be planned and scheduled with the appropriate levels of management. The QA Lead is responsible for scheduling and administering the internal assessment plan. When the assessment is conducted, results will be evaluated to measure the effectiveness of the implemented quality system. At the project or task level, assessment activities may include management assessments and independent assessments.

Assessment activities will be documented in standard reporting formats. Reports resulting from management or QA assessments will be issued to the responsible manager and distributed internally to project management, the QA Lead, and appropriate levels of Stoller management.

Assessment activities involving subcontracted services will be coordinated with the appropriate levels of project management and will be administered in conjunction with the Procurement organization. Criterion 7 (STO 1) identifies the interactions and documentation requirements associated with supplier/subcontractor oversight activities.

The responsible manager will promptly define corrective actions and correct deficiencies identified through assessments. QA staff will independently verify completed corrective actions. Verification will be documented and retained in the assessment file.

### 3.2.1 Management Assessments

Criterion 9 of STO 1, "Management Assessment," lists the common review elements routinely engaged in by senior management. Included in the reviews are human resource issues, operations

issues, resource allocation, financial performance, financial controls, quality, and customer relations. The Project Manager is responsible for ensuring that project staff support these activities as delegated, that they observe firsthand the work in progress, communicate with those performing the work, identify potential or current problems, and identify good practices.

The Project Manager shall determine the scope, schedule, and responsibilities for site-specific management assessment and notify the QA Manager for inclusion in the assessment schedule. All levels of management are responsible for responding to assessment findings and completing agreed-upon corrective actions. QAI 9.1, "Management Assessments" (STO 1), provides instructions for planning, performing, documenting, and tracking these activities.

### 3.2.2 Independent Assessments

Independent assessments (e.g., audits and surveillances) will be planned, performed, and documented by QA staff in accordance with written instructions, procedures, or checklists. STO 1, Criterion 10, "Independent Assessment," and QAI 10.1, "Internal Independent Assessments," QAI 10.2, "Surveillances," and QAI 10.3, "External Assessment Tracking and Response," and assessment procedures documented in the *Quality Assurance Desk Instructions* (STO 206), or their equivalent, will be followed.

Personnel who lead independent assessments (audits or surveillances) must be qualified (STO 1, Criterion 2), have reporting independence, and have access to the areas of inquiry. QA staff will track, report on the status, and verify closure of QA independent assessments and external assessment findings through use of the QA tracking system.

The Project Manager is responsible for responding to assessment findings and ensuring that agreed-upon corrective actions are completed in a timely manner.

### 3.2.3 Reviews

#### *3.2.3.1 Internal Reviews*

Reviews are an integral component to the success of project activities. Reviews are conducted during planning, throughout the project to ensure that project objectives will be met, and as a measure of QC. Responsibilities and instructions for reviews by QA staff of documents (plans, procedures, designs, and procurement documents) that implement QA requirements or define responsibilities or interfaces between organizations are addressed in QAI 1.4, "QA Review of Documents That Implement the QA Program" (STO 1).

Reviews conducted at the project level may consist of

- Management reviews—To ensure the adequacy of planning and availability of resources.
- Administrative and technical reviews—Typically include reviews of project documents to ensure that project objectives are clearly described and sufficiently planned, scheduled, and managed in accordance with project management strategies. QAI 1.3, "Administrative and Technical Planning," provides information on the planning of programs and activities.
- Procurement Reviews—Company policies and procedures that apply to purchasing goods and services are documented in the *Procurement Manual* (STO 18). Procurement

documents will be prepared, reviewed, and authorized as prescribed in company policy and the QA requirements documented in Criterion 7, "Procurement" (STO 1). Subcontracted analytical laboratories are required to have a documented QA program. The procurement package specifies the applicable technical and QA requirements and that project and QA staff concur with those requirements. Laboratory capability may be evaluated through review of QA program description or through pre-award survey or vendor audit activities. The results of the survey are documented and provided to the laboratory and the assigned purchasing agent. A file copy is retained by QA.

- Design Reviews—To ensure the adequacy and completeness of the design assumptions, inputs, and outputs. Criterion 6, "Design" (STO 1), addresses the standard requirements associated with design development, documentation, reviews, and change control. QAI 6.1, "Design of Data Collection Programs," addresses supplemental requirements that apply to the systems and programs used to collect environmental data. QA review of design documents will be implemented in accordance with QA Desk Instruction 6.1 "Review of Design Documents" (STO 206).
- Readiness Reviews—Readiness reviews are routinely conducted to ensure that appropriate planning has taken place to allow the work to proceed safely and effectively and to ensure that as many contingencies and prerequisites as possible have been reviewed and addressed for the work. The Project Manager is responsible for determining the level of rigor and formality of project readiness reviews based on complexity, frequency, and risk of work. Readiness reviews are routinely planned and conducted before the start of major project activities, before the start of new or infrequent tasks, and prior to scheduled sampling events. Review responsibilities are typically delegated based on type and significance to the over-all process success. QAI 1.3, "Administrative and Technical Planning" (STO 1), provides guidance on readiness review responsibilities, planning, and documentation.
- Work Readiness Reviews—To ensure through independent reviews that appropriate planning has taken place by project personnel to allow the operation to proceed safely and effectively. The Project Manager is responsible for determining the need for a formal independent review and for implementing the review process as described in QAI 1.3, "Administrative and Technical Planning" (STO 1).
- Independent Peer Reviews—May be conducted to solicit input for the planned technical approach, remediation system design, and data quality objectives of the project or task.
- Data Review and QA/QC Assessment—To ensure that the data collected and used for each activity of the project are of sufficient quality. The field team will conduct data reviews as a QC measure to ensure the adequacy and completeness of field activities. A trip report will be prepared immediately following the sampling event or field activity (e.g., drilling and well installation). In addition, data review, verification, and validation will be conducted after a sampling event to provide a tabulated summary of the field activities to the Project Manager. Analytical data will be reviewed and summarized in the laboratory report. The results will include a tabulation of analytical data and an explanation of any laboratory QA/QC problems and their possible effects on data quality.

#### *3.2.3.2 External Reviews and Oversight*

DOE or regulatory agencies may initiate external oversight of site activities as an audit, appraisal, or assessment. The DOE-LM Task Order Monitor, Project Manager, and designated technical staff will be available on site during such oversight functions.

The QA organization is responsible for managing documentation and tracking closure of external assessments performed by DOE and other agencies. The Project Manager, upon notification that an appraisal will be performed by an external agency, shall notify the DOE-LM Task Order Monitor and QA manager. The QA organization will maintain a central file of external assessment documentation. Corrective actions will be defined and completed by the Project Manager and verified by QA staff in accordance with QAI 10.3, "External Assessment Tracking and Response" (STO 1).

## 3.3 Reports to Management

### 3.3.1 CERCLA Reports

Technical reports are prepared as needed to summarize treatment strategies, technology evaluations, and remedial action progress. The project status, analytical results, and ongoing activities are summarized in the various project quarterly and interim measures reports. Technical reports are issued to relevant project staff and the DOE-LM Task Order Monitor. Routine reports for the sites include the following:

- Annual site inspection report
- Five-year review reports

### 3.3.2 Reports to Management

Project management practices include general status-reporting requirements that are standard to company business (e.g., weekly activity reports, monthly summary reports, mid-year and end-of-year reviews, assessment status). All organizations participating in project activities provide input into these reports that go to Stoller management and are summarized in reports to DOE.

Reports are prepared following field activities to document the sampling events or a sampling period. These reports are issued to the Project Manager and relevant project staff.

Project management meetings are regularly scheduled and attended by designated personnel representing those organizations supporting the project. Meeting agendas and action items are routinely provided to project staff.

Management assessments, internal assessments, and external appraisal report findings are documented and verified in accordance with the requirements of Criterion 9, "Management Assessment," and Criterion 10, "Independent Assessment" (STO 1). The QA organization maintains the schedule and file for these reports that are typically issued to the responsible manager.

Quality improvement actions (e.g., planning, lessons learned, nonconformance reporting, tracking and follow-up, and reviews) will be documented, reported to management, and administered in accordance with the requirements identified in Criterion 3.0, "Quality Improvement," QAI 3.1, "Lessons Learned," and QAI 3.2, "Nonconformance Reporting, Disposition, and Closure" (STO 1).

The QA organization maintains a central file for internal and external assessments, management reviews and assessments, nonconformance reports, and lessons-learned reports, including any resulting corrective actions. Nonconformance to subcontract requirements will be administered as described in Criterion 7, "Procurement" (STO 1).

End of current text

# 4.0 Data Validation and Usability

Technical data, including field data and results of laboratory analyses, will be routinely verified and validated to ensure that the data are of sufficient quality and quantity to meet the project's intended data needs. Results of data validation efforts will be documented and summarized in the site-specific validation reports. Environmental Monitoring/Field Services is responsible for initiating the review, verification, validation, and screening associated with field and/or laboratory data. Procedures for validating field measurements and laboratory data are based on EPA functional guidelines (EPA 1999 and EPA 2004). The data validation process is defined in Appendix B of the SAP.

## 4.1 Field Measurement Data

The objective of field data verification is to ensure that data are collected in a consistent manner and in accordance with the SAP and schedules established in site-specific environmental planning documents. Field data validation procedures include a review of raw data and supporting documentation generated from field investigations. The data are reviewed for completeness, transcription errors, compliance with SOPs, and accuracy of calculations.

The validator (in consultation with the field sampling team if required) may correct problems that are found or noted in field documentation. Corrections to data forms will be made by lining through the incorrect entry, correcting the information, then initialing and dating the corrected information. The validator may also determine that incorrect data should not be entered into the SEEPro database or that the data should have an additional qualifier.

## 4.2 Laboratory Data

The laboratory performing the analyses will document the analytical data in accordance with standard procedures inherent in the analytical methods and as approved under the DOE certification program.

Once the data package is received from the analytical laboratory, laboratory records and data package requirements will be checked to assess the completeness of the data package, and the data will be validated using Procedure GT-9(P), "Standard Practice for Validation of Laboratory Data," in the *Environmental Procedures Catalog* (STO 6). Personnel qualified and experienced in laboratory data validation will perform the validation.

The QC data provided by the laboratory (method blanks, matrix spikes, and LCSs) will be evaluated to see if they are within the acceptance range. If they are not, the data set affected by the QC samples will be evaluated to determine if corrective action is necessary.

### 4.2.1 Quality Control Samples

QC samples consisting of trip blanks, equipment rinsate blanks, field duplicate samples (replicated or co-located samples), laboratory spikes, laboratory blanks, laboratory duplicates, and laboratory control samples are evaluated in the data validation process.

## 4.3 Qualification of Data and Corrective Actions

Qualification criteria are defined in the SAP and in Procedure GT-9(P), "Standard Practice for Data Validation of Laboratory Data" in the *Environmental Procedures Catalog* (STO 6). In addition to the process of qualifying the data in the SEEPro database, other corrective actions may be used. These may include reanalysis of the data by the laboratory or re-sampling of the affected locations. Other corrective actions to prevent contamination of future samples may also be proposed.

## 4.4 Determination of Anomalous Data

The final aspect of data validation involves the screening of both field and laboratory analytical data for potentially anomalous data points.

### 4.4.1 Data Screening

The initial step in determining potentially anomalous data points consists of screening all data from a sampling event for values that fall outside a designated historical data range. DataVal, a Microsoft Access front-end database application will be used to accomplish the data screening. The historical data range used for comparison will be from previous sampling events.

### 4.4.2 Technical Review

The next step involves a review of the screened data by a qualified individual, such as a hydrogeologist or other technical specialist experienced in data review. Each data point will be evaluated to determine if the data point is acceptable or if follow-up action is required. This evaluation will consider factors such as number of historical data points, analyte concentration, magnitude of the deviation from the historical data range, number of historical non-detects, variability of the historical data, location of the well relative to remediation activities, and correlation with other analytes.

### 4.4.3 Follow-up Actions

Follow-up actions can include one or more of the following:

- Requesting a laboratory check of calculations and dilutions
- Sample reanalysis
- Re-sampling
- Comparison to results from the next sampling event
- Data qualification

Based on the results of the follow-up action, the technical specialist will make a final determination of validity of the data point. The data point will be considered acceptable or it will be qualified, which will be noted on the anomalous data report. A summary of any anomalous data will be included in the site-specific data validation report.

If the follow-up action is to compare the data to results from a subsequent sampling event, the affected sample locations, analytes, and the duration of the proposed evaluation will be included in the report to the Project Manager.

### 4.4.4 Data Qualification

After the technical specialist has determined that a data point is anomalous, the data point will be qualified with an "R" flag (unusable) in the database. Qualification of data will be noted on the Anomalous Data form with a brief justification for the qualification. "R" flags will be entered into the database using the data validation module.

End of current text

# 5.0 References

10 CFR 830. U.S. Department of Energy, "Energy," Chapter III, Nuclear Safety Management, Subpart A, "Quality Assurance Requirements," *Code of Federal Regulations.*

DOE Order 414.1C, *Quality Assurance,* June 17, 2005.

ANSI/ASQC E4-2004, *Quality Systems for Environmental Data and Technology Programs—Requirements with Guidance for Use.*

International Organization for Standardization (ISO) 14001-2004, *Environmental Management Systems–Specifications with Guidance for Use.*

STO 1. *Quality Assurance Manual,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 2. *Health and Safety Manual,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 3. *Site Radiological Control Manual,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 4. *Training Manual,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 5. *Construction Procedures Manual,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 6. *Environmental Procedures Catalog,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 9. *Records Management Manual,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 10. *Integrated Safety Management System Description,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 11. *Environmental Management Program Implementation Manual,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 12. *Project Management Control System Manual,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 14. *Drilling Health and Safety Requirements,* continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 17. *Information Technology Policy and Procedures Manual*, continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 18. *Procurement Manual*, continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 100. *General Administrative Procedures Manual*, continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 204. *Engineering Procedures and Guidelines*, continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

STO 206. *Quality Assurance Desk Instructions*, continuously updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

U.S. Department of Energy (DOE), 2006. *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*, DOE−LM/GJ1197−2006, May.

U.S. Environmental Protection Agency (EPA), 1992. *Specifications and Guidance for Contaminant-Free Sample Containers*, OSWER Directive 9240.0–05A, December.

———, 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*, EPA-540/R-99-008, Office of Emergency and Remedial Response, October.

———, 2001. *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5), EPA/240/B-01/003, Office of Environmental Information, March.

———, 2002a. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA 540-R-04-004, Office of Superfund Remediation and Technology Innovtion, October.

———, 2002b. EPA *Guidance for Preparing Quality Assurance Project Plans* (QA/G-5), EPA/240/R-02/009, Office of Environmental Information, December.

# Appendix A

# Site-Specific Requirements for Legacy Management CERCLA Sites

# Fernald

The Fernald Site will continue to operate under the existing EPA-approved Site wide CERCLA Quality (SCQ) Assurance Project Plan – Revision 3. Consistent with obtaining agency approval, a path-forward has been developed that will address revisions to the current SCQ that will be implemented over the next 1 – 2 years, with the eventual merging of the SCQ into this QAPP as the Fernald CERCLA quality plan. Expected discussions with the regulators will begin Spring 2006.

## Fernald Organization

Project Manager: Frank Johnston

## Regulatory Interfaces

Regulatory interfaces for the Fernald site are defined in the *Comprehensive Legacy Management and Institutional Controls Plan* (LMICP). Both U.S. Environmental Protection Agency (EPA) and the Ohio Environmental Protection Agency (OEPA) will be provided this QAPP for review and approval to replace the SCQ when all parties have agreed upon the timing. The SCQ fulfills requirements of the Amended Consent Agreement between the DOE and the USEPA.

## Problem Definition/Background

There will be two DOE contractors operating under the SCQ for a period of 90 to 120 days. The current SCQ is needed by the DOE-EM subcontractor for a minimum of 90 days after Declaration of Physical Completion in order to closeout remaining sampling/data requirements. Stoller will be held to this same level of rigor required by the SCQ, but will submit a few Document Change Requests to address primarily administrative type modifications to maintain compliance. Once the DOE-EM contractor is no longer operating under the SCQ, a comprehensive revision will be submitted to the regulatory agencies for their review and approval that streamlines the document removing remediation activity regulations no longer being implemented. This comprehensive revision will result in no changes to sampling frequency or analytes for the ongoing aquifer remediation and environmental monitoring.

### Project Description

The U.S. Department of Energy (DOE) Fernald Site (Site), near Cincinnati, Ohio, was a key component of the nation's nuclear weapons production program from 1952 -1989.
The production activities resulted in chemical and radiological contamination of environmental media at the Site including surface water, ground water, soil, and air.

In 1991, the was officially closed as a production facility, followed by the DOE's management of the site switching from the Defense Programs division to the Environmental Restoration and Waste Management division. As CERCLA is the primary driver for the environmental

remediation of the Fernald site, it was divided into 5 operable units: OU1−Waste Pits Area, OU2−Other Waste Units, OU3−Production Area, OU4−Silos 1 through 4, and OU5−Environmental Media. Based upon the results of the RI/FS process, Records of Decision were issued outlining the selected remedy for all five OUs. With remediation activities having been completed for OU1 through OU4, the only Operable Unit that remains open post-closure is OU5, which addresses the on-going aquifer restoration and environmental monitoring.

Final Site conditions after completion of remedial action will result in reduction of risk to acceptable levels, implementation of remedies to achieve compliance with regulatory standards, and protection of human health and the environment.

Post-closure activities involve institutional controls monitoring, including the OSDF, routine operations and maintenance of the aquifer restoration and water treatment facility, and environmental monitoring of impacted media as required by regulations. All of these activities are requirements of the OU2 and OU5 RODS and detailed in the LMICP.

Responsibility for site long-term maintenance and surveillance has transferred to Legacy Management. Surveillance and maintenance requirements and protocols are defined in the LMICP and referenced documents.

## Status of LMIC Plan

The LMICP (equivalent to the LTS&M Plan at other CERCLA sites) documents the planning process and the requirements for the long-term care of the Fernald site. The LMICP is a two-volume document with supporting documents included as attachments to each volume. Volume I provides planning details for the management of the Fernald site that go beyond those identified as institutional controls in Volume II. Volume II is a requirement of CERCLA, and provides the institutional controls that will ensure the cleanup remedies implemented at the Fernald site will protect public health and the environment. The schedule and process for revising and updating the LMICP is detailed in the plan. At a minimum, updates to the LMICP will occur in conjunction with the CERCLA five-year reviews.

## Quality Objectives and Criteria for Measurement Data

The objectives of the long-term environmental monitoring program will be to confirm the success and effectiveness of the remedial actions, demonstrate compliance with applicable regulations, and ensure long-term protection of human health and the environment. Final guidance for environmental monitoring is provided in the LMICP and this QAPP, as applicable.

## Sampling Process Design

Of the five support plans attached to Volume II of the LMICP, three contain the sampling requirements. Those three plans are summarized below:

- *The Operations and Maintenance Master Plan for the Aquifer Restoration and Wastewater Project* (Attachment A) establishes the design logic and priorities for the major flow and water treatment decisions needed to maintain compliance with the NPDES permit and OU5

ROD based surface water discharge limits. It is designed to guide and coordinate the extraction, collection, conveyance, treatment and discharge of all groundwater, storm water, sanitary and remediation wastewater generated site-wide through the duration of the aquifer remediation program.

- *The Groundwater/Leak Detection and Leachate Monitoring Plan* (Attachment C) specifies the frequencies and parameters being monitored in four horizons for each cell of the facility. The horizons are the leachate collection system, the leak detection system, the perched water in the glacial overburden, and the Great Miami Aquifer.
- *The Integrated Environmental Monitoring Plan* (IEMP) (Attachment D) directs the environmental monitoring program elements that support site remediation. The plan presents the monitoring strategy for groundwater, surface water/NPDES, sediment, and air, detailing for each media the project organization, sampling program, data management and quality assurance requirements. The IEMP also integrates numerous routine environmental reporting requirements under a single comprehensive framework.

# Site-Specific Methods

Methods are specified in the SCQ.

End of current text

# Monticello Mill Tailings and Vicinity Properties Sites

## Monticello Organization

DOE-LM Monticello Project Manager: Jalena Maestas
Task Order Manager: Michael Butherus
Monticello LM Site Manager: Timothy Bartlett
Monticello LM Representative(s): Joe Slade (Lead), Todd Moon
Site Safety Supervisor: Joe Slade
Environmental Specialist: Paul Wetherstein
Administrative Record/Information Repository Coordinator: Linda Sheader

## Regulatory Interfaces

Regulatory interfaces for the Monticello National Priorities List (NPL) sites (Site) are defined in the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites*. Both the U.S. Environmental Protection Agency (EPA), Region VIII and the Utah Department of Environmental Quality (UDEQ) will be provided a copy of this Quality Assurance Project Plan (QAPP) for review and comment in accordance with the Federal Facilities Agreement. The *Legacy Management CERCLA Sites Quality Assurance Project Plan,* and this site-specific information appended to the plan, replaces the *Quality Assurance Project Plan for the Monticello Long-Term Surveillance and Maintenance Project*, (Rev. 1 December 2001).

## Project Definition/Background

### Project Description

The Monticello NPL sites consists of (1) the Monticello Mill Tailing Site (MMTS), which includes the property where the former Monticello uranium and vanadium-ore processing mill was located, various peripheral properties near or adjacent to the former mill, and the repository site which includes the on-site disposal cell; and (2) the MonticelloVicinity Properties (MVP) site, comprising 424 private and publicly owned properties remediated in and nearby the City of Monticello.

The MVP site was delisted from the NPL in February 2000. Partial deletion of 22 MMTS Operable Unit (OU) II Non-Surface and Ground Water Impacted Peripheral Properties from the NPL occurred in October 2003. Remaining on the MMTS NPL are 13 properties located within OUs I and II, including the contaminated surface water and ground water associated with these properties (OU III). Deletion of the remaining MMTS properties from the NPL is dependent on meeting the remediation goals for OU III surface water and ground water.

### Location and Property Ownership

The Monticello NPL Sites are located in and near the city of Monticello, Utah, about 250 miles southeast of Salt Lake City, Utah (see Figure 1). Monticello is the county seat for San Juan

County. As of year 2000, the population of Monticello was approximately 1,900 residents. Figure 1 also identifies MMTS and MVP site boundaries and the OUs within the MMTS. Properties comprising the MVP are either privately owned (residential, commercial, or vacant) or owned by the City of Monticello or the Utah Department of Transportation (UDOT). As shown in Figure 1, property ownership by the U.S. Department of Energy (DOE) is limited to the repository and an adjacent parcel to the east, following the transfer of approximately 380 acres of former DOE-owned property to the City of Monticello in June 2000 per covenant deferral. The affected properties of that transaction, identified in Figure 1, include those north of the repository to and including the former mill site.

## 5.1 Site Operational History

In 1942, the U.S. Government through its agent, the Defense Plant Corporation, constructed the Monticello Mill at a former uranium and vanadium ore buying station, which had been constructed in 1940. The purpose of the mill was to produce vanadium and uranium for military purposes. Various government agencies operated the Mill until 1948 when it was obtained by the Atomic Energy Commission. The mill was operated through 1959 under cost type contracts until operations were terminated on January 1, 1960. Ore was processed to recover vanadium at Monticello from 1942 to 1944, in 1945 and 1946, and again from 1948 to 1960 when both uranium and vanadium were recovered. The ore-buying station opened in 1940 and closed in 1962. Mill tailings are the solid waste by-product of the processed ore, often containing potentially hazardous radiologic and non-radiologic constituents.

Between 1961 and 1965, various measures were taken to dismantle the mill, dispose of equipment and scrap, bury contaminated materials, re-grade and cover the impounded tailings and other contaminated materials with soil, and revegetate the site. A portion of the millsite (about 10 acres), including a few intact buildings, which comprised a part of the former millsite administrative area, was transferred to the Bureau of Land Management in 1962. The remainder, including the tailing piles (approximately 68 acres), remained in the custody of the Atomic Energy Commission and its successor agencies, first the U.S. Energy Research and Development Administration and later the DOE. In 1974 and 1975, mill foundations were demolished and buried and the area was graded and vegetated. A fence was constructed around the mill site to prevent public access to contaminated materials.

During the operation of the mill approximately 900,000 tons of ore were processed. The residual tailings were locally impounded in piles at four locations adjacent to Montezuma Creek. Tailings carried by wind or Montezuma Creek spread contamination to nearby properties. Throughout the operating period, mill tailings from the Monticello Millsite were commonly used in Monticello for fill for open lands; backfill around water, sewer, and electrical lines; sub-base for driveways, sidewalks, and concrete slabs; backfill against basement foundations; and as sand mix in concrete, plaster, and mortar.

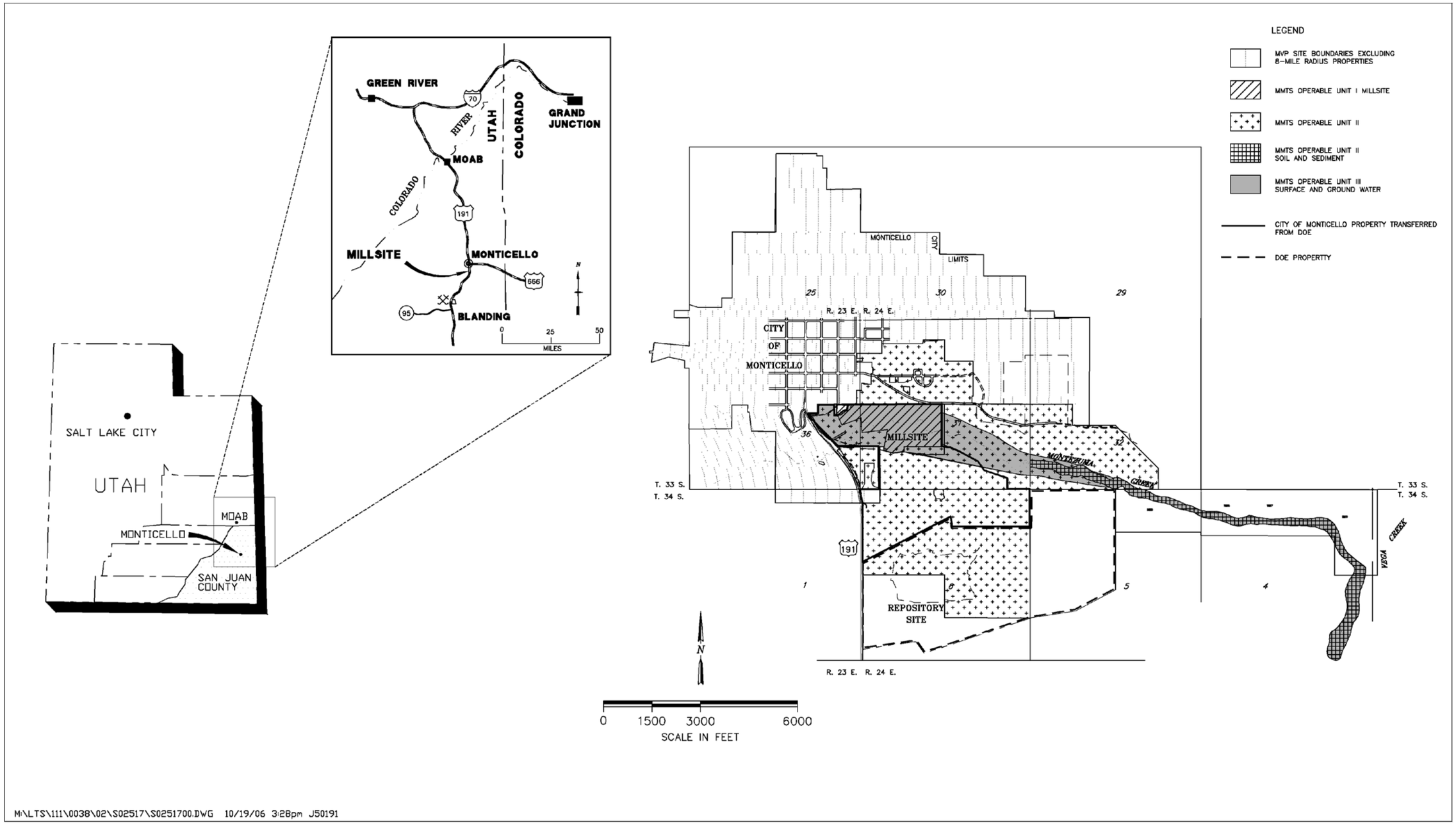


*Figure 1. Location and Features of Monticello MMTS and MVP Sites*

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## 5.2 Site Remedial Action History

In 1978, Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA). Title I of UMTRCA provided funding authorization for DOE to clean up 22 abandoned, privately owned uranium mill tailings sites. The Monticello site was not on that list. Title II of UMTRCA amended the Atomic Energy Act of 1954 (AEA) to give the U.S. Nuclear Regulatory Commission regulatory authority over the reclamation phase of then currently licensed and privately owned uranium mill sites. Although the Monticello Site was a uranium mill, it did not satisfy the legislative definition under UMTRCA owing to its federal ownership.

DOE, under the authority of the AEA, initiated the Surplus Facilities Management Program (SFMP) in 1978 to ensure safe caretaking and decommissioning of government facilities that had been retired from service but which still had radioactive contamination at the facilities. Prior to establishing the SFMP, DOE began radiological surveys throughout the City of Monticello in 1971 to identify the nature and extent of mill-related radiological contamination. In 1980, the Monticello Millsite was accepted into the SFMP for remedial action, and the Monticello Remedial Action Project (MRAP) was established to conduct those remedial actions.

In 1983, remedial activities for the vicinity properties were separated from MRAP with the establishment of the MVP Project and the MMTS. The MVP and MMTS were later placed on the NPL pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act. As owner and past operator of the site, DOE was identified as the potentially responsible party. DOE was tasked with funding and performing the remedial actions necessary at the MVP and MMTS as well as ensuring protection of human health and the environment into the future.

### Monticello Radioactively Contaminated Properties NPL Site

Following its establishment in 1983, the MVP Site was listed on the NPL on June 10, 1986, and was remediated pursuant to a Record of Decision (ROD) dated November 29, 1989. The selected remedy for cleanup of the MVP site was excavation of tailings, ore, and related by-product material from vicinity properties; temporary storage on the Monticello millsite; and final disposal in the same repository prescribed for materials from the Monticello millsite. Because mill tailings from the Monticello millsite were used for construction purposes, cleanup activities included demolition of sidewalks, patios, sheds, and other improvements. Affected properties were backfilled, graded, and reconstructed. Approximately 150,000 cubic yards of contaminated materials were temporarily placed on the millsite and ultimately disposed with contaminated millsite material. Remediation of the MVP site was completed in June 1999. A total of 424 properties were ultimately remediated under the MVP Project.

### Monticello Mill Tailings NPL Site

The MMTS was placed on the NPL in November 1989. Remediation of the MMTS was administratively divided into three OUs: Former Millsite OU I, Peripheral Properties OU II, and Surface and Ground Water OU III. A Remedial Investigation/Feasibility Study—Environmental Assessment was conducted pursuant to CERCLA and the National Environmental Policy Act,

and the ROD for OUs I and II (DOE 1990) was signed in 1990. The selected remedies are described in the following sections.

- OU I, Monticello Millsite Tailings and Millsite Property—This OU comprises the 78-acre former millsite, tailings impoundment areas on the millsite, and storage areas on the millsite property for tailings-contaminated materials removed from the vicinity properties and peripheral properties. Construction of the on-site repository (permanent disposal cell) and its leachate collection system is also included in this OU. Components of the OU I cleanup remedy include relocating contaminated materials from the millsite to the disposal cell, revegetation after removal of the tailings, realignment of Montezuma Creek, and reestablishment of wetland areas. Of primary importance, 40 CFR 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," requires a repository design that is effective for up to 1,000 years to the extent reasonably achievable, and in any case, for at least 200 years.
- OU II, Peripheral Properties—This OU consists of 33 private properties and one former DOE-owned property peripheral to the millsite that were contaminated by windblown tailings and by soil and sediment transported downstream of the millsite and deposited in and adjacent to Montezuma Creek. Subpart B of 40 CFR 192 prescribes the cleanup standards for soils. Other components of the peripheral property cleanup remedy include revegetation after removal of the tailings and use of institutional controls where supplemental standards were applied (see Supplemental Standards Properties described below), such as limitations on access or use. Soil and sediment contamination along Montezuma Creek was remediated as a non-time-critical removal action following the completion of an engineering evaluation and cost analysis in 1998.
- OU III, Monticello Surface Water and Ground Water—This OU consists of contaminated surface water and ground water on and downstream of the millsite. OU III was not part of the original NPL listing. OU III was designated following the completion of the ROD in 1990, when DOE, with concurrence of EPA and UDEQ, deferred selection of a final remedy for surface water and ground water until surface remedial actions were completed at the millsite. In 1998, DOE, with the concurrence of EPA and UDEQ, implemented an interim remedial action that included restricting the use of contaminated ground water, a treatability study of in situ ground water treatment through a permeable reactive barrier, and continued monitoring and characterization of the ground water. The interim remedial action was completed and a ROD for OU III was signed in June 2004.

  The selected remedy for OU III is monitored natural attenuation with institutional controls. Natural hydrological and geochemical processes identified in the OU III ground water system are expected to restore water quality to remediation goals by the year 2045. Until that time, monitoring of surface water and ground water, annual reports, and CERCLA 5-year reviews will evaluate ground water and surface water restoration. Institutional controls have been implemented to make certain the selected remedy remains protective of human health and the environment. In addition, as set forth in the ROD for OU III, if the selected remedy does not remain protective of human health and the environment, or if the monitoring results indicate that the remediation goals cannot be achieved in the allotted time (by year 2045), contingency remedies will be evaluated and will be implemented if determined necessary.

Remediation of the millsite began in 1991 with the construction of access controls and the removal and abandonment of selected monitoring wells on the former millsite. Construction of the Repository began in October 1995. Placement of contaminated materials in the on-site disposal cell began in June 1997 and was completed in September 1999. Construction of the repository cover system was completed in February 2000. The disposal cell leachate collection and removal system, which was in operation with the onset of tailings placement, currently removes water that drains from the wastes contained in the disposal cell. The liquid is conveyed to Pond 4, which is an evaporation pond designed to remain in operation until water ceases to drain from the disposal cell. Pond 4 is expected to remain in service for as many as 20 years depending on the transient drainage rate from the disposal cell.

Waste materials in the disposal cell consist primarily of uranium mill tailings from the millsite, vicinity properties, and peripheral properties. The primary contaminant of concern is radium-226. Radium-226 has a radioactive half-life of 1,622 years and produces radon-222. Radon, a gas, and its decay products pose an inhalation health risk to humans. Other materials include milling byproduct materials, millsite building and other debris, radiologically contaminated debris from vicinity and peripheral property remediation activities, and small quantities of asbestos and hazardous substances that were discovered during remediation of the respective areas. The total volume of material is approximately 2.54 million compacted-in-place cubic yards. This material will be managed in accordance with the operating procedures in Section 3.0 of the Long-Term Surveillance and Maintenance Plan (LTS&M Plan).

### 5.2.1 Supplemental Standards Properties

Regulations codified in 40 CFR 192.21 allow contaminated material to be left in place in specific cases if attaining prescribed cleanup standards will cause excessive risk of injury, excessive environmental harm, or unreasonably high costs compared with the health benefits to be gained. The site-specific remediation standards, called supplemental standards, are applied to areas where contaminated material is left in place. Supplemental standards have been implemented at a number of MMTS and MVP properties, which are identified in the Section 4.0 of the LTS&M Plan.

## Status of the LTS&M Plan

The administrative systems and specific Quality Assurance (QA) program requirements that address the Management, Performance, and Assessment elements of DOE Order 414.1C, *Quality Assurance*, are identified in Section 2.0 of the LTS&M Plan.

The *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites* explains how DOE will fulfill its obligation to monitor and manage residual hazards at the Site and complete the required annual inspections and CERCLA 5-year reviews.

## Current Site Conditions

The federal government, through DOE-LM, is responsible for the radioactive and other hazardous substances released at and from the Monticello NPL sites. DOE disposed of the impounded tailings, contaminated soils, contaminated debris from the former millsite buildings,

and contaminated materials from remediated vicinity and peripheral properties in the on-site disposal cell. Regulated non-radiological hazardous materials that were encountered during remedial action were treated and disposed of either in the disposal cell or at off-site EPA-approved disposal facilities.

- The on-site disposal cell contains approximately 2.54 million cubic yards of contaminated material.
- Residual ground water contamination remains in the shallow alluvial aquifer beneath and downgradient of the former millsite (institutional controls apply).
- Residual soil and sediment contamination remains in the floodplain and banks of Montezuma Creek (institutional controls apply).
- Residual soil contamination remains in street and utility easement and Highways 191 and 491 rights of way within the City of Monticello (institutional controls apply).
- Residual soil contamination remains on other private and City-owned properties (institutional controls apply).

# Quality Objectives and Criteria for Measurement Data

## Current Regulatory Requirements

Implementation and adherence to the specifications of LTS&M Plan are applicable to four broad categories of LTS&M activities at the MMTS and MVP sites:

- Operation and maintenance of the on-site disposal cell, associated leak detection and leachate collection and recovery systems, Pond 4, and the Temporary Storage Facility.
- Surveillance of properties at which contamination was left in place (supplemental standards properties) and the former millsite. Supplemental standards properties include Monticello city streets and utility corridors, private and City-owned peripheral properties, and UDOT rights-of-way.
- Monitoring the OU III surface water and ground water and evaluating the performance of the selected remedy.
- Conducting annual inspections and CERCLA 5-year reviews to monitor and document the effectiveness of the selected remedies.

Objectives for performing LTS&M at the Monticello project site include the following:

- Ensure that remedies selected for the MMTS and MVP are effective and remain protective of human health and the environment,
- Ensure appropriate and adequate documentation of the activities performed and maintenance of site records, and
- Support transfer of information to stakeholders, including the public, EPA, and UDEQ.

The above stated objectives will be met by the provisions of the LTS&M plan by:

- Operating, inspecting, and maintaining all engineered controls.
- Conducting maintenance, inspection, and enforcement of the land and ground water use restrictions and other institutional controls necessary for the protectiveness of the remedies.
- Conducting long-term monitoring of surface water, ground water, biota, or other media necessary to demonstrate the performance, effectiveness, or protectiveness of the remedies.
- Identifying and implementing actions to optimize remedies and LTS&M activities.
- Implementing contingency actions in the event they are required.
- Identifying and meeting applicable or relevant and appropriate requirements for the post-remedial action site conditions.
- Ensuring that budgeting, funding, and personnel requirements appropriate to sustain LTS&M needs are met.
- Ensuring that public involvement, including education, outreach, notice, and informational systems are appropriate to sustain the long-term effectiveness of the remedies.
- Ensuring that information and records management requirements are appropriate and designed to be sustained over the long term.
- Developing all plans, manuals, and reports, including annual inspection and CERCLA 5-year review reports, which are required to conduct LTS&M activities and document the and findings are protective of human health and the environment.

## Sampling Process Design

The LTS&M Plan for the Monticello NPL Sites provides detail information for inspection and monitoring locations, frequencies, contingency actions, and documentation associated with (1) the performance of the disposal cell and repository site; (2) performing radiological scans of city streets, utility corridors, and highway rights-of-way excavations; and (3) institutional controls applied to land use and ground water restricted areas.

The current revision of the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*, and associated Program Directives, provides details of locations, frequencies, analytes, and discusses the sampling design for surface water, ground water, and bio-monitoring.

## Site-Specific Methods

There are no site specific methods for the Site. The site follows the CERCLA Sites QAPP, the LTS&M Plan for the Monticello NPL Sites, and the Sampling and Analysis Plan for DOE-LM Sites.

End of current text

# Mound

The Mound Site will continue to operate under the existing EPA-approved Operations and Maintenance (O&M) Plans and the *Mound Methods Compendium* – Technical Manual MD-80045, Issue 2. A path-forward will be developed that will address changes to the current *Methods Compendium* and will be implemented over the next 1 to 2 years, with the eventual merging of the procedures and methods in the O&M Plans and the *Methods Compendium* into this QAPP as the Mound CERCLA quality plan. Discussions with the regulators are expected to begin after site transition (October 2006) with all revisions being submitted to the regulatory agencies for their review and approval.

## Mound Organization

Project Manager: Glenn Griffiths

## Regulatory Interfaces

Regulatory interfaces for the Mound site are defined in the Long-Term Surveillance and Maintenance (LTS&M) Plan for the Mound Site. Both U.S. Environmental Protection Agency (EPA) and the Ohio Environmental Protection Agency (OEPA) will be provided this QAPP for review and approval to replace the Methods Compendium when the timing has been agreed upon by all parties.

## Project Definition/Background

### Project Description

The Miamisburg Closure Project, formerly known as the Mound Plant, takes its name from a nearby Native American burial mound. The facility is sited on a hill in the center of Miamisburg, Ohio, and is built on approximately 306 acres. Construction of the Mound Plant began in 1946 and the site became operational in 1948. Mound was the nation's first post-war Atomic Energy Commission site to be constructed and was established to consolidate and continue the polonium-related work being done at the Dayton Units.

Much of the work at the Mound Plant during the Cold War involved production of the polonium-beryllium initiators used in early atomic weapons, and the manufacture of and research related to radionuclides. In the 1950s, the facility began to manufacture a variety of nuclear weapons parts, including cable assemblies, explosive detonators, and the electronic firing sets that activated them. Work at Mound evolved and grew to include stable isotope separation, fossil fuels research, tritium recovery for reuse in weapons, developing radioisotopic thermoelectric generators used for providing electrical power for space exploration, and other non-nuclear research and development activities. The non-weapons polonium work at Mound ended in 1972, and the Mound Plant stopped producing weapons components in 1995.

In 1993, DOE decided to decommission the Mound Plant. The mission of the Miamisburg Closure Project was to clean up the site in accordance with CERCLA. In 1995, DOE and its regulators found the traditional CERCLA process to be inefficient because of variations in the site contamination conditions. Therefore, they developed an alternative approach, known as the Mound 2000 Process, to making decisions about the environmental restoration of Mound and its facilities. This approach satisfies the intent of CERCLA and is further discussed in two documents: the Work Plan for Environmental Restoration of the DOE Mound Site, the Mound 2000 Approach and the Mound Land Transfer Process. DOE and its regulators are using or will use the Mound 2000 Process to address the environmental issues associated with the restoration of the site, DOE's exit from the site, and deletion of the site from the NPL.

In 1998, a sales contract was established between the Miamisburg Mound Community Improvement Corporation (MMCIC) and DOE that allows for conveyance of the Mound property by discrete parcels. The MMCIC was chartered with the vision of establishing the Mound Advanced Technology Center to diversify the region's economy and generate new job opportunities for dislocated DOE contractor workers and other area residents. DOE transfers the property to the MMCIC via a quitclaim deed, which contains or refers to land use restrictions required under CERCLA to ensure that the parcel is protective of human health and the environment.

In general, by the completion of EM cleanup, the site (soils and buildings) will be remediated to industrial land use levels. Groundwater in the OU-1 area will continue to be addressed via a groundwater pump and treat system, which is used to create a hydraulic barrier to contain contaminated groundwater in the vicinity of the landfill. The groundwater is continuously pumped from a series of extraction wells and treated to remove VOCs.

Final Site conditions after completion of remedial action will result in reduction of risk to acceptable levels, implementation of remedies to achieve compliance with regulatory standards, and protection of human health and the environment.

Post-closure activities involve institutional controls monitoring, routine operations and maintenance of the OU-1 pump and treat/soil vapor extraction system, and environmental monitoring of groundwater and seeps. All of these activities are requirements of the site O&M Plans and detailed in the LTS&M Plan.

Responsibility for site long-term maintenance and surveillance has transferred to Legacy Management. Surveillance and maintenance requirements and protocols are defined in the O&M Plans, the LTS&M Plan, and referenced documents.

## Status of LTS&M Plan

The LTS&M Plan explains how the DOE will fulfill its surveillance and maintenance obligation at the Mound site. The LTS&M Plan has been developed as a two-volume set. Volume 1 is the implanting document for the operations and maintenance (O&M) plans for the CERCLA remedies and long-term operation of the site. It describes the activities, roles and responsibilities, and the process for changing the LTS&M Plan or the activities it specifies. The defined activities required to maintain the remedies and controls are specified in the O&M Plans. Volume 2

contains the individual O&M Plans that have been developed by DOE-EM and approved by the regulators and stakeholders. The activities outlined in the O&M Plans are part of the remedy for the site and are legally enforceable under CERCLA. These O&M Plans are referenced in the activities described in Volume 1.

## Quality Objectives and Criteria for Measurement Data

The objectives of the long-term environmental monitoring program will be to confirm the success and effectiveness of the remedial actions, demonstrate compliance with applicable regulations, and ensure long-term protection of human health and the environment. Final guidance for environmental monitoring is provided in the O&M Plans for the site, the LTS&M Plan, and the Methods Compendium.

## Sampling Process Design

Of the three O&M Plans in Volume II of the LTS&M Plan, two contain sampling requirements. Those two plans are summarized below:

- *The OU-1 Pump and Treatment Operation and Maintenance Plan (Rev. 3)* specifies the necessary groundwater sampling and hydrologic monitoring to ensure that groundwater contamination is contained by the extraction well network.
- *The Phase I Remedy (MNA) Groundwater Monitoring Plan* specifies the frequencies and parameters being monitored to ensure that the Buried Valley Aquifer is not being impacted and to verify that concentrations of TCE are stable or decreasing due to natural attenuation.

## Site-Specific Methods

The project will follow the O&M Plans and the Methods Compendium for all sampling activities. When methods are identified in the specific O&M Plans, these methods will have precedence over those contained in the Methods Compendium. Specific procedures regarding field activities and sampling from the Methods Compendium that will be applicable are:

S-001 General Instructions for Field Personnel
S-004 Guide to Management of Collected Investigative-Derived Material
S-005 Pre-Sample of Purging Water
S-006 Field Measurements for Ground and Surface Water Samples
S-007 Sampling of Monitoring Wells
S-012 Sampling for Volatile Organics in Groundwater
S-013 Surface Water Monitoring
S-016 Water Level Measurement
S-020 General Equipment Decontamination
S-027 Monitoring Well and Piezometer Installation and Development
S-029 Guide to Handling, Packaging, and Shipping of Samples

In order to enter data and information into the LM Contractor's systems and archives, procedures outlining the submittal of samples to laboratories and documentation of sampling and field activities in the Methods Compendium will be superseded by LM Contractor's procedures.

These activities will be performed in accordance with the Environmental Procedures Catalog - STO-6. Specific procedures from STO-6 that will be applicable are:

| | |
|---|---|
| GA-9 | Standard Practice for Sample Submittal to Contract Analytical Laboratories |
| GT-1 | Standard Practice for Field Documentation Processes |
| GT-2 | Standard Practice for Sample Labeling |
| GT-3 | Standard Practice for Chain-of-Custody Control and Physical Security of Samples |
| LQ-12 | Standard Practice for the Collection, Filtration, and Preservation of Liquid Samples |
| LQ-18 | Standard Practice for the Inspection and Maintenance of Groundwater Monitoring Wells |

# Rocky Flats

## Rocky Flats Key Personnel

DOE-LM Rocky Flats Site Manager/Task Order Monitor: Scott Surovchak
Contractor Rocky Flats Site Manager: Linda Kaiser
Rocky Flats Ground Water Lead: John Boylan
Rocky Flats Surface Water Lead: George Squibb

## Problem Definition/Background

### Project Description

Rocky Flats is located in the Denver metropolitan area, approximately 16 miles northwest of Denver, Colorado, and 10 miles south of Boulder, Colorado. Nearby communities include the Cities of Arvada, Broomfield, and Westminster, Colorado. The majority of the Rocky Flats Site is located in Jefferson County, with a small portion located in Boulder County, Colorado.

Rocky Flats was established in 1951 as part of the United States' nationwide nuclear weapons complex to manufacture nuclear weapons components under the jurisdiction and control of the U.S. Department of Energy (DOE) and its predecessor agencies. DOE has conducted investigation and remediation at Rocky Flats since the mid-1980s, and in 2006 completed cleanup and closure of the Rocky Flats Site in accordance with requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act, and the Colorado Hazardous Waste Act (CHWA). Rocky Flats was placed on the CERCLA National Priority List (NPL) in 1989. The final *Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit* (CAD/ROD) for Rocky Flats was issued on September 29, 2006 (DOE et al. 2006). (Note that some of the documents referenced in this appendix may be subject to revision. As such, all references to specific documents will be considered to be directed at the most recent revision.)

Two Operable Units (OUs) are within the boundaries of the Rocky Flats Site: the Peripheral OU and the Central OU. The Central OU consolidates all areas of Rocky Flats that require additional remedial/corrective actions, while also considering practicalities of future land management. In general, the Central OU consists of the former industrialized area of Rocky Flats, the Original and Present Landfills, and the land east of the former 903 Pad that contains relatively higher levels of residual contamination. The Peripheral OU includes the remaining, generally unimpacted portions of the Rocky Flats Site, and surrounds the Central OU. The response action in the final CAD/ROD is no action for the Peripheral OU, and institutional and physical controls with continued monitoring for the Central OU. The Peripheral OU will be delisted from the NPL by the U.S. Environmental Protection Agency (EPA) in 2007.

DOE has jurisdiction and control of the Rocky Flats property until such time jurisdiction and control of a portion of the Peripheral OU after delisting is transferred to the U.S. Fish and Wildlife Service for the purposes of establishing the Rocky Flats National Wildlife Refuge. The

remainder of the Peripheral OU, which contains areas where owners or assignees of subsurface mineral rights are actively mining in accordance with their mining permit, will remain under DOE jurisdiction and control for the foreseeable future.

# Regulatory Interfaces

The *Rocky Flats Legacy Management Agreement* (RFLMA) (DOE et al. 2007) establishes the regulatory framework for implementing the final response action selected and approved in the final CAD/ROD, to ensure that it remains protective of human health and the environment. RFLMA is a single document that is both a CERCLA § 120 Interagency Agreement and a CHWA corrective action order and the requirements of RFLMA are enforceable by the Parties. The Parties to the RFLMA are EPA, the Colorado Department of Public Health and Environment (CDPHE or "State"), and DOE.

# Quality Objectives and Criteria for Measurement Data

## Current Regulatory Requirements

The surveillance, monitoring, and maintenance plan for Rocky Flats is RFLMA Attachment 2. Attachment 2 defines what monitoring and maintenance is required, the frequency of each required activity, and the monitoring and maintenance locations.

Environmental sampling, analysis, and data management required by RFLMA Attachment 2 conforms to the *Legacy Management CERCLA Sites Quality Assurance Project Plan* (QAPP) (DOE 2006a) and meets the quality assurance and quality control requirements in current EPA guidance. DOE submitted the QAPP to CDPHE and EPA per RFLMA requirements.

The *Rocky Flats Site Operations Guide* (RFSOG) (DOE 2007) provides additional implementation detail for use by Rocky Flats personnel. The RFSOG also includes best management practices and specific infrastructure information, so that the document is a comprehensive guide to performing the activities required for the long-term monitoring and maintenance of the Central OU.

# Sampling Process Design

RFLMA Attachment 2, Tables 1, 2, and 5 and Figure 1 presents the sampling objectives, locations, frequency, and analytes and standards.

# Site-Specific Methods

Procedures for environmental sampling, analysis, and data management for Rocky Flats are provided in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (DOE 2006b) (LM SAP). The LM SAP contains site-specific appendices where site-specific methods are described.

Two discrepancies were noted between the QAPP's LM-wide procedures and methods used at Rocky Flats:

- Section 2.3.1.4 of the QAPP states that mailed sample packages will be registered with return receipt requested. At Rocky Flats samples are shipped via FedEx and the shipment receipts are tracked online.
- Section 2.8.1 states that sample containers will be provided by the subcontracted laboratory. Sample containers for Rocky Flats are purchased directly from the distributor, and come with the required documentation (e.g., certificate of cleanliness) outlined in the QAPP.

# References

The following references were used in preparing this site-specific information for Rocky Flats. In some cases, some of these documents may be subject to revision. As such, all references to specific documents will be considered to be directed at the most recent revision.

DOE (U.S. Department of Energy), 2006a. *Legacy Management CERCLA Sites Quality Assurance Project Plan*, DOE-LM/GJ1232-2006, U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado, June.

DOE (U.S. Department of Energy), 2006b. *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*, DOE-LM/GJ1197-2006, U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado.

DOE (U.S. Department of Energy), 2007. *Rocky Flats Site Operations Guide*, DOE-LM/1429-2007, U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado.

DOE, EPA, and CDPHE (U.S. Department of Energy, U.S. Environmental Protection Agency, and Colorado Department of Public Health and Environment), 2006, *Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit*, Jefferson and Boulder Counties, Colorado, U.S. Department of Energy, U.S. Environmental Protection Agency, and Colorado Department of Public Health and Environment, September 29.

DOE, EPA, and CDPHE (U.S. Department of Energy, U.S. Environmental Protection Agency, and Colorado Department of Public Health and Environment), 2007, *Rocky Flats Legacy Management Agreement*, U.S. Department of Energy, U.S. Environmental Protection Agency, and Colorado Department of Public Health and Environment, March 14.

End of current text

# Weldon Spring Site

## Weldon Spring Site Organization

Project Manager: Yvonne Deyo

Environmental Data Manager: Randy Thompson

Compliance/Safety Manager: Terri Uhlmeyer

## Regulatory Interfaces

Regulatory interfaces for the Weldon Spring Site are summarized in Section 2.1, "Surveillance and Maintenance Implementation" in the Long-Term Surveillance and Maintenance Plan for the U.S. Department of Energy Weldon Spring, Missouri, Site (LTS& M Plan). Both Environmental Protection Agency Region 7 and the Missouri Department of Natural Resources will be provided this QAPP for review in accordance with the recently signed Federal Facility Agreement.

## Problem Definition/Background

### Project Description

In 1941, the U.S. Government acquired 17,232 acres (6,974 hectares) of rural land in St. Charles County to establish the Weldon Spring Ordnance Works. In the process, the towns of Hamburg, Howell, and Toonerville and 576 citizens of the area were displaced (DA undated). From 1941 to 1945, the DA manufactured trinitrotoluene (TNT) and dinitrotoluene (DNT) at the Ordnance Works site. Four TNT production lines were situated on what was to be the Chemical Plant. These operations resulted in nitroaromatic contamination of soil, sediments, and some off-site springs.

Following a considerable amount of explosives decontamination of the facility by the Army and the Atlas Powder Company, 205 acres (83.0 hectares) of the former ordnance works property were transferred to the U.S. Atomic Energy Commission (AEC) in 1956 for construction of the Weldon Spring Uranium Feed Materials Plant, now referred to as the Weldon Spring Chemical Plant. An additional 14.88 acres (6.02 hectares) were transferred to AEC in 1964. The plant converted processed uranium ore concentrates to pure uranium trioxide, intermediate compounds, and uranium metal. A small amount of thorium was also processed. Wastes generated during these operations were stored in four raffinate pits located on the plant property. Uranium processing operations resulted in radiological contamination of the same locations previously contaminated by former Army operations.

The Weldon Spring Quarry was mined for limestone aggregate used in construction of the ordnance works. The Army also used the Quarry for burning wastes from explosives manufacturing and disposal of TNT-contaminated rubble during operation of the ordnance works. These activities resulted in nitroaromatic contamination of the soil and groundwater at the Quarry.

In 1960, the Army transferred the Quarry to AEC, who used it from 1963 to 1969 as a disposal area for uranium and thorium residues from the Chemical Plant (both drummed and uncontained) and for disposal of contaminated building rubble, process equipment, and soils from demolition of a uranium processing facility in St. Louis. Radiological contamination occurred in the same locations as the nitroaromatic contamination.

Uranium processing operations ceased in 1966, and on December 31, 1967, AEC returned the facility to the Army for use as a defoliant production plant. In preparation for the defoliant process, the Army removed equipment and materials from some of the buildings and disposed of them principally in Raffinate Pit 4. The defoliant project was canceled before any process equipment was installed, and the Army transferred 50.65 acres (20.50 hectares) of land encompassing the raffinate pits back to AEC while retaining the Chemical Plant. AEC and subsequently DOE managed the site, including the Army-owned Chemical Plant, under caretaker status from 1968 through 1985. Caretaker activities included site security oversight, fence maintenance, grass cutting, and other incidental maintenance. In 1984, the Army repaired several of the buildings at the Chemical Plant, decontaminated some of the floors, walls, and ceilings, and isolated some equipment. In 1985, the Army transferred full custody of the Chemical Plant to DOE, at which time DOE designated control and decontamination of the Chemical Plant, raffinate pits, and Quarry as a major project.

## Remedial Action History

EPA placed the Quarry and Chemical Plant areas on the National Priorities List (NPL) in 1987 and 1989, respectively. Initial remedial activities at the Chemical Plant, a series of Interim Response Actions (IRAs) authorized through the use of Engineering Evaluation/Cost Analysis (EE/CA) reports, included:

- Removal of electrical transformers, electrical poles and lines, and overhead piping and asbestos that presented an immediate threat to workers and the environment.
- Construction of an isolation dike to divert runoff around the Ash Pond area to reduce the concentration of contaminants going off site in surface water.
- Detailed characterization of on-site debris, separation of radiological and nonradiological debris, and transport of materials to designated staging areas for interim storage.
- Dismantling of 44 Chemical Plant buildings under four separate IRAs.
- Treatment of contaminated water at the Chemical Plant and the Quarry.

Remediation of the Weldon Spring Site was administratively divided into four Operable Units (OUs): Quarry Bulk Waste OU, Quarry Residuals OU, Chemical Plant OU, and Groundwater OU. The Southeast Drainage was remediated as a separate action through the Engineering Evaluation/Cost Analysis for the Proposed Removal Action at the Southeast Drainage near the Weldon Spring Site, Weldon Spring, Missouri. The selected remedies are described in the following sections.

***Chemical Plant OU***

In the Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site, DOE established the remedy for controlling contaminant sources at the Chemical Plant (except groundwater) and disposing of contaminated materials in an on-site disposal cell.

The selected remedy included:

- Removal of contaminated soils, sludge, and sediment.
- Treatment of wastes, as appropriate, by chemical stabilization/solidification.
- Disposal of wastes removed from the Chemical Plant and stored Quarry bulk wastes in an engineered on-site disposal facility.

The remedy included remediation of 17 off-site vicinity properties affected by Chemical Plant operations. The vicinity properties were remediated in accordance with Chemical Plant Record of Decision (ROD) cleanup criteria.

***Quarry Bulk Waste OU***

DOE implemented remedial activities for the Quarry Bulk Waste OU set forth in the Record of Decision for Management of Bulk Wastes at the Weldon Spring Quarry.

The selected remedy included:

- Excavation and removal of bulk waste (i.e., structural debris, drummed and unconfirmed waste, process equipment, sludge, and soil).
- Transportation of the waste along a dedicated haul road to a temporary storage area located at the Chemical Plant.
- Staging of bulk wastes at the temporary storage area.

***Quarry Residuals OU***

The Quarry Residuals OU remedy was described in the Record of Decision for the Quarry Residuals Operable Unit at the Weldon Spring Site, Weldon Spring, Missouri. The Quarry Residuals OU addressed residual soil contamination in the Quarry proper, surface water and sediments in the Femme Osage slough and nearby creeks, and contaminated groundwater.

The selected remedy included:

- Long-term monitoring and institutional controls to prevent exposure to contaminated groundwater north of the Femme Osage slough.
- Long-term monitoring and institutional controls to protect the quality of the public water supply in the Missouri River alluvium and implementing a well field contingency plan.
- Confirming the model assumptions regarding extraction of contaminated groundwater and establishing controls to protect naturally occurring attenuation processes.
- Restoring the Quarry and establishing institutional controls.

***Groundwater OU***

DOE implemented an interim ROD, which was approved on September 29, 2000, to investigate the practicability of remediating trichloroethene (TCE) contamination in Chemical Plant groundwater, using in situ chemical oxidation (ICO). It was determined based on extensive monitoring that the ICO did not perform adequately under field conditions; therefore the remediation of TCE was reevaluated with the remaining contaminants of concern.

The DOE issued a final ROD in January 2004, which was signed by EPA in February 2004. The Groundwater OU ROD selected a remedy of monitored natural attenuation (MNA) with institutional controls (ICs) to limit groundwater use during the period of remediation. MNA involves the collection of monitoring data to verify the effectiveness of naturally occurring processes to reduce contaminant concentrations over time. The ROD establishes remedial goals and performance standards for MNA.

***Southeast Drainage***

Remedial action for the Southeast Drainage was addressed as a separate action under CERCLA. The Engineering Evaluation/Cost Analysis for the Proposed Removal Action at the Southeast Drainage near the Weldon Spring Site, Weldon Spring, Missouri was prepared in August 1996 to evaluate the human and ecological health risks within the drainage. The EE/CA recommended that selected sediment in accessible areas of the drainage should be removed with track-mounted equipment and transported by off-road haul trucks to the Chemical Plant. The excavated materials would be stored temporarily at an on-site storage area until final disposal in the disposal cell. Soil removal was in two phases: 1997-1998 and again in 1999. Post-remediation soil sampling was conducted. More details are included in the Southeast Drainage Closeout Report Vicinity Properties DA-4 and MDC-7.

***Final Site Conditions***

Contamination remains at the Weldon Spring Site at the following locations:

- An on-site disposal cell contains approximately 1.48 million cubic yards of contaminated material.
- Residual groundwater contamination remains in the shallow aquifer beneath the Chemical Plant, at the Quarry, and at some surrounding areas.
- Several springs near the Chemical Plant discharge contaminated groundwater.
- Residual soil and sediment contamination remain in the Southeast Drainage.
- Contamination remains at two culvert locations along Missouri State Route 94 and Highway D.
- Residual soil contamination remains at inaccessible locations within the Quarry.

Residual contamination is addressed in the Long-Term Surveillance and Maintenance Plan for the U.S. Department of Energy Weldon Spring, Missouri, Site (LTS&M Plan) (DOE 2005a), which includes institutional controls established to maintain protectiveness of contaminants not contained in the disposal cell. Under current land use conditions, the remaining contamination does not pose unacceptable risks to public health and the environment.

## Status of LTS&M Plan

The Long-Term Surveillance and Maintenance Plan for the U.S. Department of Energy Weldon Spring, Missouri, Site (LTS&M Plan) explains how the DOE will fulfill its obligation to manage residual hazards at the Weldon Spring Site over the long term. The document was finalized in July 2005 and defines surveillance and maintenance requirements and protocols for the Site.

## Quality Objectives and Criteria for Measurement Data

The objectives of the long-term environmental monitoring program will be to confirm the success and effectiveness of the remedial actions, demonstrate compliance with applicable regulations, and ensure long-term protection of human health and the environment. The requirements for environmental monitoring are included in the LTS&M Plan.

## Sampling Process Design

The LTS&M Plan provides details of sample locations, frequency, and analytes and discusses the basis of sampling design for surface water and groundwater.

## Site-Specific Methods

There are no site-specific methods for the Weldon Spring Site. The Site follows the QAPP and the Groundwater and Surface Water Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites.

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