GWOU ADMINISTRATIVE RECORD
SECTION TITLE:
GW-200-201-1.12

DOE/OR/21548-119
CONTRACT NO. DE-AC05-86OR21548

ENVIRONMENTAL DATA ADMINISTRATION PLAN

Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

AUGUST 1993 **REV. 3**

U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

050493

MK-FERGUSON A MORRISON KNUDSEN COMPANY Weldon Spring Site Remedial Action Project Contract No. DE-AC05-86OR21548	Issue Date: Rev. No. 3
PLAN TITLE: Environmental Data Administration Plan	

APPROVALS

[signature] 7/15/93
ES&H Department Manager — Date

[signature] 08/13/93
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DOE/OR/21548-119

Weldon Spring Site Remedial Action Project

Environmental Data Administration Plan

Revision 3

August 1993

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Printed in the United States of America. Available from the National Technical Information Service, NTIS, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161

NTIS Price Codes - Printed copy: A04
Microfiche: A01

ABSTRACT

Environmental monitoring and surveillance activities at the Weldon Spring Site Remedial Action Project (WSSRAP) result in data and documentation that are used to develop remedial action alternatives and demonstrate compliance with U.S. Department of Energy (DOE) environmental protection policies.

This *Environmental Data Administration Plan* (EDAP) summarizes standard operating procedures and data quality requirements developed for use in the collection and analysis of environmental data. Guidance on developing investigation-specific data quality objectives (DQOs) is also detailed. Data quality review programs are conducted to ensure data integrity and validity. The EDAP describes administrative procedures adopted by the WSSRAP to manage the use of environmental data.

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1 INTRODUCTION

Environmental monitoring, surveillance, and characterization activities are conducted at the Weldon Spring site (WSS) as part of the Weldon Spring Site Remedial Action Project (WSSRAP). These activities are described in detail in numerous sampling plans, monitoring programs, and permits. Environmental monitoring activities are conducted at the WSS to ensure that any potential public exposure is documented and quantified in an effort to protect the health and safety of the public and the environment. These activities are also required to demonstrate compliance with regulatory requirements and U.S. Department of Energy (DOE) environmental protection policies (MKF and JEG 1992a).

Two types of information are collected and evaluated during environmental monitoring activities: documentation (field notes, data quality reviews) and analytical data. The information collected is used to support evaluations of alternative remedial actions. Future environmental sampling activities will provide data to evaluate remedial efforts, public and worker safety, and protection of the environment.

This plan provides guidance for developing data quality objectives (DQOs) in accordance with the Environmental Protection Agency (EPA) guidelines (EPA 1987). DQOs are the full set of constraints needed to design a study that will result in a decision. DQOs are prepared in the planning stages of an investigation and are designed to ensure that a study provides data needed to make a decision with acceptable confidence.

Data quality requirements (DQRs) have been established for environmental data. DQRs are qualitative and quantitative statements that specify characteristics of the data required to support decisions during remedial action activities. The DQRs identify specific goals for WSSRAP data that include precision, accuracy, and completeness. The DQRs (Appendix A) review these goals. The WSSRAP DQRs are standard in their application and are used as a guideline for the project.

Standard Operating Procedures (SOPs) have been developed to provide consistency in sample collection methodology and documentation of environmental activities. SOPs include procedures for sample collection and identification, and for data quality review. SOPs are issued as controlled copies and are reviewed annually. The procedures are reviewed annually and updated as necessary to incorporate changes.

1.1 Purpose

The purpose of this *Environmental Data Administration Plan* (EDAP) is to identify the approach to, and conduct of, all activities related to the planning, collection, analysis, and administration of data and documentation gathered to make WSSRAP environmental decisions.

The EDAP discusses methods used for documenting the acquisition of technical data, programs for quality assurance, and maintenance of documents and data. The plan establishes a foundation for gathering and examining data prior to its use by the WSSRAP.

1.2 Scope

The EDAP provides guidance on the management of environmental data and documentation resulting from monitoring, surveillance, and characterization activities by the WSSRAP. All phases of data collection, analysis, and quality are performed as detailed in this plan. This includes sampling plan preparation, data verification and validation, database administration, and data archiving. This plan does not govern monitoring of worker protection or the quality of data generated as a result of such monitoring. The *Environmental Data Administration Plan* is directed by the *Environmental Quality Assurance Project Plan* (EQAPjP) (MKF and JEG 1992b) and the *ES&H Department Plan* (MFK and JEG 1993) which are shown on the WSSRAP Document Hierarchy (Appendix B).

1.3 Historical Overview

Analytical data collected from 1987 through 1989 by the Project Management Contractor (PMC) have been managed on an investigation-by-investigation basis. Sampling plans have included quality control measures to ensure data integrity.

During 1990, specific DQO (subsequently termed DQR) were established, and the initial EDAP was prepared to document data management activities. Under this program, PMC personnel (1) examined the data to ensure that sampling was properly documented; (2) made a preliminary review of quality-affecting aspects; (3) assessed precision, accuracy, representativeness, completeness, and comparability (PARCC); and (4) compared data to the DQRs.

Data generated from 1987 through 1989 were reviewed for correct reporting and consistency between hard copy and electronic copy. A separate but related effort to assess and document the validity, precision, and accuracy of analytical results was also made. The results of these efforts are presented in a document entitled, *Chemical Plant Site Remedial Investigation/Feasibility Study Data Validation Report* (MKF and JEG 1991).

The data verification and validation programs described in this EDAP were initiated in 1990 for environmental sampling activities. These programs establish additional quality control measures and are detailed in this plan.

Revision 1 of the EDAP incorporated new EPA guidance on data quality objectives; the previous DQOs have been renamed data quality requirements. Guidance is provided on the development of DQOs for environmental investigations.

1.4 Maintenance

The EDAP will be reviewed annually and revised as necessary to ensure compliance with DOE orders and the overall mission of the WSSRAP. All documents and data will be maintained in accordance with procedures specified in Section 4.0 of this plan.

2 DATA COLLECTION

2.1 Sampling and Analysis Plans

Sampling and analysis plans are to be developed and prepared for all site activities (within the scope defined in Section 1.2) requiring field collection and laboratory analysis of samples. These plans are activity-specific, describing the objectives and details of the individual sampling efforts and the ultimate uses of the data generated. Sampling and analysis plans will specify the types, locations, and frequency of samples to be collected, as well as the sampling protocol and procedures. The plans also should detail the specific quality assurance/quality control (QA/QC) measures to be taken during sampling and analysis efforts and reference the requirements of the *Environmental Quality Assurance Project Plan* (EQAPjP) (MKF and JEG 1992b) for the Weldon Spring Site Remedial Action Project (WSSRAP). Sampling plans will also specify detailed data quality objectives (DQOs) and data quality requirements (DQRs) that have been developed from guidance in this plan. The sampling and analysis plans must be reviewed and approved by affected department managers, project management, and project QA personnel prior to initiation of sampling activities.

2.2 Sample Collection and Documentation

Samples are collected from specific, preplanned locations as detailed in the sampling plans. Standard operating procedures (SOPs) are to be referenced in the sampling plan and followed in the field. Collection activities must be documented in two types of records: field sampling data forms and field log books in accordance with Procedure ES&H 1.1.4.

The field sampling data form is completed for each sample location at the time of sample collection. These forms are specific to the common types of samples collected at the Weldon Spring site (WSS); i.e., soils, groundwater, and surface water. The field sampling forms record the sample identification numbers which are assigned to the samples on the basis of location and date (Procedure ES&H 4.1.1). For each sample, this unique ID number is to be used throughout the documentation and reporting of data. These forms also are to (1) initiate the tracking of laboratory performance and evaluate data quality; (2) document that field personnel collected samples in accordance with WSSRAP procedures, preserved samples properly, and collected QA/QC samples; (3) document field measurements and other important information.

The field log books are to be used by field sampling personnel to record information not recorded on field data forms such as unusual weather conditions, deviations from sampling protocol, and any other information that could affect the specific sampling event. The level of detail is to be sufficient that, when used in conjunction with field data forms, it will allow understanding and re-creation of the activity at a later date, even in the absence of the original field personnel. Log books are to be maintained in accordance with Procedure ES&H 1.1.4.

Samples are to be collected in containers consistent with standard operating procedures and analytical requirements. Sample containers are identified by placing an adhesive label on each container. The labels will contain information about the sampling event including identification number, site location, chemical parameters to be analyzed, sample matrix, collector's names, and sample date.

2.3 Chain of Custody

Sample custody is an integral part of quality assurance. It is to be initiated during field activities and maintained through shipment to the laboratory and during sample analysis. Sample possession must be traceable from the time the sample is collected until it is received by the laboratory or placed in final storage. A sample is considered under custody if one or more of the following criteria are met:

- The sample is in the actual possession of the responsible party.
- The sample is in the view of the responsible party, after being in his or her possession.
- The sample was in the responsible party's possession and locked up or sealed to prevent or detect tampering.
- The sample is in a designated and identified secure area under control of the responsible department.

All samples are to be collected according to SOPs for the particular sample type. The field personnel are responsible for the collection, care, and custody of the sample until it is properly transferred or dispatched. An Environmental Chain-of-Custody Form must be

completed for each sample or group of samples according to Procedure ES&H 4.1.2. The Chain-of-Custody Form (which also serves as a Laboratory Services Authorization Form) includes sample identification numbers, number of containers, sample matrix, analytical parameters requested, sample preservation method, samplers' signatures, and a section for tracking sample possession.

When the samples are shipped to the laboratory for analysis, the individuals relinquishing and receiving the samples must sign, date, and note the time and reason for transfer on the Chain-of-Custody Form. The completed original form is then to be placed inside the shipping container. The laboratory will document receipt of the samples on the Chain-of-Custody Form and notify the shipper and the WSSRAP in the event that samples are damaged, tampered with, or missing.

Corrections to Chain-of-Custody Forms are to be made by a single strike-mark through the error. The person making each correction must initial and date the correction.

2.4 Request for Analysis

Samples collected in the field generally require analysis by an off-site laboratory subcontracted by the WSSRAP. To authorize testing of the samples, Project Management Contractor (PMC) personnel must complete the Laboratory Services Authorization section of the Chain-of-Custody Form. This form includes such information as laboratory name, sample identification numbers, number of containers, analytical parameters, turnaround time requested, and required analysis numbers. The form authorizes analytical service and provides a mechanism for tracking analytical laboratory budgets and performance.

2.5 Sample Shipment

Samples are to be packaged and shipped to analytical laboratories in accordance with WSSRAP procedures RC-17s, *Off-Site Transportation of Hazardous Materials* and RC-19s, *Hazardous Materials/Sample Transportation Activity (HMSTA) Operations*. These procedures detail the requirements of packaging and shipping common types of samples to protect them during shipment. All samples collected at the site are to be shipped to the analytical laboratory in appropriate containers. Sample containers will be sealed with standard packaging tape before they are placed in the shipping containers. Shipping containers will be sealed with chain-of-

custody tape and initialed and dated. As standard chain-of-custody procedure, the laboratory is to contact the PMC if this custody seal has been tampered with or destroyed. All sample shipments will be reviewed and approved by the Site Shipping Officer (SSO) or a designate. The SSO will verify that the samples have been shipped in compliance with Department of Transportation packaging and labeling requirements.

All samples shipped off site are to be accompanied by a Shipping Order Form. This form will be completed by the Subcontract Administrator following his/her review and approval of the Chain-of-Custody/Laboratory Services Authorization Form. These two forms are to be combined, placed in a plastic bag, and will accompany the samples being shipped.

2.6 Sample Tracking

Sample shipments to analytical laboratories will be inventoried and controlled through laboratory contract request numbers. When a sample shipment is made, sample information from the documentation is entered into a WSSRAP-specific computerized database entitled the Environmental Sample Tracking (EST) system.

The EST system allows timely inventory of the status of analytical samples from collection through receipt of data results. The EST system also performs an accounting function by calculating analytical costs, assisting in invoice payment authorization, and providing budget reporting.

3 DATA QUALITY

All data and documentation from sampling activities are reviewed under *Environmental Data Administration Plan* (EDAP) data quality programs. Data quality objectives are to be established during the planning stages of investigations used to support decision making. Data received from analytical laboratories are also to be reviewed for completeness and quality (see Appendix A for definitions). The data verification program will examine documents and data before they are used at the Weldon Spring Site Remedial Action Project (WSSRAP).

3.1 Data Quality Objectives/Requirements Development

Data quality objectives (DQOs) are to be developed during the planning stages for each activity designed to achieve a decision. DQOs are related to data quality requirements (DQRs) and provide quantitative requirements/guidance for analytical data quality. This section provides guidance for developing DQOs and DQRs for each sampling plan.

Data quality objectives are the full set of constraints needed to design a study including the level of uncertainty the decision maker is willing to allow in the decision. DQOs should be generated in the planning stages of any investigation which will make a decision or recommend a course of action. DQOs help data users plan for uncertainties when designing studies and help document the decision making process prior to initiating data collection activities. Review and approval of sampling plans by WSSRAP management and U.S. Environmental Protection Agency (EPA) review and concurrence prior to sample collection will be performed to ensure that the decision criteria in the final work or sampling plan are acceptable.

The DQO development process consists of the following seven steps:

1. State the problem to be resolved.
2. Identify the decision to be made.
3. Identify information required to reach the decision.
4. Define the boundaries of the study.
5. Develop and define decision criteria.
6. Evaluate uncertainty constraints.
7. Optimize the design of data collection.

3.1.1 DQO Development and Documentation

Each step in the DQO development process should be specifically addressed in sampling plans designed to achieve a decision. Quantitative statements should be used to the extent practical. Statistical considerations should be included in defining the scope of the effort. Statistical data evaluation/interpretation methods should be described to the extent practicable. The need and extent of pre-use data validation should also be addressed.

The following guidance should be used to develop data quality objectives during the planning phases of any data collection activity required to reach a decision. DQOs should be documented in work plans or sampling and analyses plans in a dedicated section. Each of the first six steps identified in Section 3.1 should be addressed. The DQO process described in this plan has been developed from guidance prepared for conducting remedial investigations at hazardous waste sites. The general process described here has been modified so that it may be applied to any investigation or data collection activity that will result in a decision.

Generally, the DQO development process is summarized in three stages. The first stage qualitatively addresses the steps of the process. The second stage qualitatively and quantitatively addresses the problem. Annotated outlines are presented in Tables 3-1 and 3-2 for Stage 1 and Stage 2 DQOs, respectively, and these stages are to be completed prior to developing the data collection program. Depending upon the scope of the investigation, formal review and approval of the Stage 1 and Stage 2 DQOs may, or may not, be required prior to actual data collection program design. Stage 3 of the DQO process consists of developing data collection design strategies. The rationale for each strategy is presented and evaluated using the desired performance criteria stated in Stage 2. Sample collection activities are then to be optimized using the stated requirements and constraints.

All three stages of DQO development should be discussed in the work plan or sampling plan. The review and approval process for all sampling plans ensures that the DQOs established are acceptable for the intended purpose.

TABLE 3-1 Data Quality Objectives Stage 1 Report

State the Problem.

- Provide historical information.
- Describe existing and assumed knowledge.

Define the Decision.

- Describe the decision.
- Provide background for the problem to be resolved.
- State the authority for the decision.
- Identify actions to be considered.
- Describe the domain of the decision.

Describe the information required to make the decision.

- State the basis for the decision.

Define the use of data in the decision.

- Identify elements of the decision that require data.
- Explain how will each element will be used in the decision.

Assess the consequences of error - qualitatively.

- Identify the consequences of incorrect decisions.
- Define the tolerances for these errors.

Other Constraints.

- Time.
- Budget.
- Other.

TABLE 3-2 Data Quality Objective Stage 2 Report

State the Problem.

- Include quantitative information regarding types and concentrations of contaminants.

Restate the Decision.

- Describe the decision quantitatively.
- Define the decision elements.
  - Data needs.
  - Spatial domain.
  - Temporal domain.

Formalize the Decision Process.

- State the decision rule - an if/then statement defining the decision.
- Explain the role of data in the decision.
- Identify other considerations to be factored into decision.
- Determine the need for new data in the decision.

Desired Performance.

- Identify quantitative error tolerances - must incorporate sampling and analytical errors.
  - False negatives - probability of not taking action when action is warranted.
  - False positives - probability of taking action when action is not warranted.

Identify Initial Design Considerations.

- Determine the range of likely values.
- Identify sources of error.
  - Sampling error - location.
  - Measurement error - analytical.

3.1.2 Data Quality Requirements Development

Data quality requirements are specific statements regarding the precision, accuracy, and completeness of data to be used in reaching environmental decisions. A generic set of DQRs is presented in Appendix A. These will be used to qualify data during the data validation process. This will ensure that the data available to the users are consistently qualified. These generic DQRs should be reviewed during the development of each sampling and analysis plan and revised as appropriate. If the data users elect to modify the DQRs for a specific investigation, they will be responsible for determining whether the DQRs were attained.

3.2 Data Verification Program

The verification program is primarily designed to ensure that documentation and data are reported in compliance with established reporting requirements and standard operating procedures (SOPs), and to ensure that all requested analyses are performed. This process is completed in accordance with Procedure ES&H 4.9.1 by the Data Verification Group. The data verification program consists of the following: (1) data delivery tracking and analytical costing; (2) review of sample identification, sample custody, analytical holding times, analytical turnaround times, and data review information; (3) editing and merging completed data into the WSSRAP databases (Generic Universal Report Utility [GURU]). The results of the verification program are documented with a verification checklist.

3.2.1 Data Delivery

Delivery of analytical data will be tracked to ensure that the requested laboratory services are performed in an accurate and timely manner. Data delivery is logged into the Environmental Sample Tracking (EST) system which automatically determines if the data were received on time.

Analytical results are delivered in one or two formats. A formal hard copy report is always provided and some laboratories also provide an electronic copy. Analytical results not reported in electronic format are transcribed to electronic records by the Project Management Contractor (PMC).

Analytical results from subcontract laboratories are received at the Weldon Spring site (WSS) and are logged and dated by the PMC Subcontract Administrator. They are then forwarded to the PMC Data Verification Group where receipt is electronically logged using EST. This date will be compared with the shipping date to determine the turnaround time. If turnaround time is greater than the requested time, it is to be recorded on a verification checklist.

After receiving the data reports, they are to be reviewed to determine if all contractual format requirements have been met. In addition, data are reviewed to confirm that all requested parameters are received. If additional data are required to complete the laboratory request, a discrepancy is noted and sent to the subcontract administrator for processing.

Data received from the analytical laboratories are to be maintained in the electronic database in an uncensored form. Specifically, this means any concentration values reported by a laboratory that are detects at less than the reported detection limit (which may actually reflect a quantitation limit or contract limit) are not to be edited to a non-detect status.

3.2.2 Sample Preservation and Identification

Documents prepared during sample collection are to be reviewed to verify compliance in identifying and preserving samples. In accordance with procedures, consistent numbering of sample location is necessary for sample identification (ID). Sample IDs are to be checked for proper use of sample type identifiers, location number/coordinates, date codes, and quality assurance/quality control (QA/QC) codes.

Preservation of samples is required for certain analytical methods. Preservation of samples is to be documented on Field Data Forms and Chain-of-Custody Forms. These forms are to be reviewed for completeness and accuracy during the verification process.

3.2.3 Chain of Custody

Copies of signed chain-of-custody records are to be returned to the PMC with the analytical results. The signed chain-of-custody records will be reviewed for compliance with procedures as described in Section 2.3 of this plan and in Procedure ES&H 4.1.2. The Chain-

of-Custody Form is to be reviewed for sample custody (signatures) and sample integrity (preservation, damage).

3.2.4 Analytical Holding Times

WSSRAP DQRs incorporate analytical methods specified by U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) protocols, EPAs *Methods for Chemical Analysis of Water and Wastes*, Test Methods for Solid Wastes (SW 846), and other approved methods. These methods designate maximum analytical holding time for analysis. Holding time, in most cases, is the period between sample collection and analysis. For CLP protocols, the holding time is from the date received at the laboratory to the extraction and analysis. Some methods also specify extraction procedures and holding times.

When analytical results are received, the date of extraction and date of analysis for each analyte are to be reported. The extraction and analysis dates will be compared with the sample collection date to determine total holding time for the sample. The sample's holding time will be compared to the holding time for the analytical method as defined by the WSSRAP DQRs. A discrepancy form will be completed for sample holding times that exceed DQR protocol. Data that have exceeded holding time and that have not been validated are to be marked as "N-H" in the WSSRAP database (GURU).

3.2.5 Data Review

All analytical data will be reviewed by technical personnel familiar with the monitoring program or investigation. The data review process evaluates comparability of sample data with other previously reported concentrations for the sample location. The data review process is prescribed in Procedure ES&H 4.9.3s - *Surface Water and Groundwater Data Review*. Sample data are also to be compared with the QA/QC samples, field blanks, and laboratory duplicate samples collected on the same sample lot. The data review is used to report inconsistencies in concentrations, sampling procedures, and sample identification.

The data review form is to be completed by PMC personnel reviewing analytical data. The data reviewer designates the data as "acceptable" or "unacceptable" and includes qualifying comments on the data review sheets for all data designated as unacceptable. Unacceptable data

may require explanation or inquiry from the laboratory. Such inquires shall be implemented in accordance with Procedure ES&H 4.9.1 by the Data Verification Group.

Electronic data that will be merged into the WSSRAP database will serve as the source of data for review by technical personnel and for verification. If electronic data are not provided by the laboratory, the data are manually entered and compared to hard copy prior to entering into GURU. All identified discrepancies are to be resolved. Currently, all modifications to electronic records are made by the PMC prior to incorporation into the WSSRAP environmental database. Original copies of floppy disks submitted to the WSSRAP by laboratories are not modified. Original floppy disks are to be assigned control numbers and placed in storage at the site.

3.2.6 Verification Documentation

The verification checklist is completed in accordance with Procedure ES&H 4.9.1 by the Data Verification Group. The verification checklist documents the factors potentially affecting data quality.

A data verification package is to be prepared for each request from a laboratory. This package will include all documents prepared during the verification process, including Chain-of-Custody Forms, Field Sampling Forms, verification checklists, electronic data printouts, hard copy laboratory data reports, applicable discrepancy forms, and other pertinent documentation. The verification review does not disqualify data for use.

All completed verification packages are submitted to the Project Quality Department on a quarterly basis or as needed. Data verification packages are used to determine compliance with analytical requests, holding times, contractual requirements, and standard operating procedures (SOPs).

3.3 Data Validation

Data validation is the process of reviewing laboratory records of analytical data and quality related field data to assess laboratory performance as compared to quality control (QC) criteria, data quality requirements, and procedural requirements. The purpose of validation is to document the quality and completeness of the WSSRAP databases.

Data validation is divided into the following three tasks: (1) identification of data to be validated, (2) technical review, and (3) documentation. These tasks are discussed in the following sections. Data are validated by the Data Validation Group. This group is part of the PMC Project Quality Department.

3.3.1 Identification

Data to be validated will be identified in two ways. The first method will consist of routine validation. Approximately 10% of the data points are selected for routine validation. These data points will be selected randomly by the Data Validation Manager at the end of each calendar quarter when a 10% level can be accurately determined. The outcome from the random validation activities will be used to extrapolate an overall completeness of the GURU database. Consequently, data points selected for random validation will represent all sample types and analysis types affected by the extrapolation.

The second approach to validation identification consists of special validation. Typically, additional data points may be identified for validation through the DQO process to support particular projects, programs, or applications. For example, data that contribute to risk assessments or final remedial action decisions may be identified for validation under a special validation request. All special validation requests are to be submitted on the Validation Request Form and approved by the Environmental Safety and Health (ES&H) Manager.

The 10% quantity of routine validation may be adjusted based on the quantity of special validation requests made. Regardless of which approach is used during a calendar quarter, a minimum of 10% of the quarterly data points will be selected for validation.

3.3.2 Technical Review

The actual data validation process is detailed in Procedure ES&H 4.9.2a, *Environmental Monitoring Data Validation*. This process consists of reviewing and evaluating the analytical documentation supporting the data resulting from laboratory analyses. The review is done in two phases. The first deals with the analytical process itself. Laboratory analytical records are reviewed and evaluated to ensure compliance with the procedures governing the analysis. These records may include, but are not limited to, sample custody records, sample preparation logs, instrument printouts, calibration checks, and initial calibration data.

The second phase of the data validation process evaluates the data for precision, accuracy, and completeness by comparing the data to the applicable DQRs.

The primary end result of the validation process is a qualifier which denotes the quality of a data point and the quantitative accuracy, precision, and completeness values for the associated data. The validation qualifiers range from "acceptable with no limitations" to "not acceptable". This qualifier enables data evaluation personnel to incorporate data quality into interpretations.

3.3.3 Documentation

Data validation activities are to be recorded in several documents including a detailed validation checklist specific to each analysis. Data validation reports are generated for each validation request and for each calendar quarter, and provide information substantiating the assignment of validation qualifiers and percent completeness. All data, regardless of validation status code, are considered available for use by the WSSRAP.

As a result of validation activities, at least 10% of the WSSRAP environmental data will be directly validated. The identification of validation data points will be monitored by the Data Validation Group to ensure that the minimum 10% goal is met.

The percentage of data points selected for validation is calculated each calendar quarter by the following formula:

$$\%\ selected = \frac{\text{Total data points selected from calendar quarter}}{\text{Total data points received from calendar quarter}} \times 100$$

The results will be reported in the *Data Validation Quarterly Summary Report* for each calendar quarter. The results from validation of any special validation requests will also be addressed in the *Data Validation Quarterly Summary Report.*

The quarterly validation summary report also tracks trends to document completeness ratios of analytical data. Completeness for each calendar quarter is to be calculated by the following formula:

$$\%\ completeness = \frac{Total\ NON\text{-}REJECTS\ from\ calendar\ quarter}{Total\ validated\ data\ points\ from\ calendar\ quarter} X\ 100$$

Percent completeness calculations are to be made and reported each quarter for each applicable contract laboratory. If an individual laboratory reaches a 20% rejection level during any calendar quarter, a trend analysis of the laboratory's performance will be made. If the calculated completeness value appears to reflect a low bias due to a one-time poor performance, close evaluation of the laboratory's future performance may be all that is necessary. However, if a trend of poor performance appears to be developing, a *Quality Finding Report* (QFR) or Corrective Action Request (CAR) may be issued in order to implement corrective action from the laboratory. Under extreme conditions, a Stop Work Order may be issued (through the Project Quality Department) to the laboratory to ensure no additional analysis are performed until the problems are resolved. The Data Validation Manager is responsible for notifying the ES&H Environmental Protection Manager, the Project Quality Manager, and the Laboratory Coordinator that corrective actions by a laboratory are necessary. Contracts must be in place for shipment of samples to alternate laboratories. If a laboratory is "suspended" for a specific analysis, the alternate laboratories are to be used.

4 DATA ADMINISTRATION

All documentation and data generated through characterization and environmental monitoring activities will be managed and maintained according to this *Environmental Data Administration Plan* (EDAP). Each document created, from sample collection to data quality review, will provide information and support for environmental decisions by the Weldon Spring Site Remedial Action Project (WSSRAP). Standardized forms required by standard operating procedures (SOPs) provide a source of information that is complete and unique for each sample. The documentation assembled is a result of collection, analysis, and verification as well as other applicable documentation. This is termed the data audit trail. Data administration must include the maintenance of all documents and data in the audit package; provide information to the WSSRAP in an organized flexible manner; and incorporate a system to archive data and audit packages.

In this discussion of data administration plans, all environmental data and documentation from sampling, analysis, and quality review programs are collectively referred to as records.

4.1 Record Maintenance

Environmental records are to be maintained in two formats: hard copy and electronic file. Hard copy records include all documents and data preserved in written, typed, or instrument-printed form. All environmental records originate in hard copy format.

Electronic records are computerized records of environmental data. Currently, only analytical data are maintained in electronic format. Most subcontract laboratories transcribe analytical reports into electronic format. Analytical results not reported in electronic format are to be transcribed to electronic records by the Project Management Contractor (PMC).

4.1.1 Hard Copy Records

Original records are received by the PMC. These are records to be copied upon receipt from the laboratory and filed in the data verification package. When record copies are made for the data verification package, the originals are to be forwarded to the Project Quality Department for secured storage. All original documents are to be inventoried by the Project

Quality Department and retained in fireproof storage at the Weldon Spring site (WSS) or other appropriate location.

4.1.2 Electronic Records

Electronic records are to be maintained in a computerized database system termed the WSSRAP database. The WSSRAP database is a microcomputer-based system utilizing dBASE III Plus software. Analytical records are organized into database files by sample type, such as "groundwater." The database files contain specific information on each sample. The fields maintained in the WSSRAP database include sample identification number, sample date, analytical date, and parameter.

Analytical results reported by the subcontract laboratory in electronic format are submitted on diskettes. Each diskette contains a dBASE III Plus file recording specific sampling information. The diskettes received by the PMC should be copied to the WSSRAP database during the verification program (Section 3.2). After the disk transfer is completed, a control number is to be assigned to each diskette. All diskettes are to be filed in storage located at the Weldon Spring site.

A printout of the electronic records is to be made and filed with the Data Verification Group in the work data library. This library is a centralized system that contains documentation and data related to the environmental monitoring activities. The data are to be classified and filed according to sample type. Sample types, as discussed in Section 2.2, are a means of assigning sample identification numbers. Functionally, sample types also form the basis for data interpretation and, therefore, they are used in record management.

When data are submitted to the library files, they are to be assigned an index number based on the sample type. For example, in index number ES-19-01-02, the first four characters (ES-19) identify the document as an environmental record. The fifth and sixth character (01) designate the record as analytical data. The seventh and eighth characters (02) designate the sample type as surface water.

4.2 Record Use

The work data library and the WSSRAP database provide a centralized source for information to be used in preparing environmental reports and remedial action alternatives. However, since the electronic records consist of both old and new data, and since these records reflect the actual data that have undergone the verification/validation process (and subsequently contain any associated qualifiers), these electronic records are the preferred source of information.

Data are currently being merged into the electronic databases in an uncensored form, meaning "detect" values at less than the reported detection limits are maintained as detects in the database. True "non-detects" are identified as "ND" in the databases along with the reported detection limits.

To use the data in the electronic or hardcopy records, the following set of data calculations rules are to be implemented per parameter:

- To calculate average concentrations:
  - If the concentration value is uncensored or a concentration value is provided, use it.
  - If the concentration value is listed as a non-detect (ND), use 1/2 the detection limit value.
- Calculate the average of the detection limit values.
- To report average concentrations (for detects):
  - If the average concentration < average detection limit, report as (AVG) ex: (0.004).
  - If the average concentration > average detection limit, report as AVG ex: 0.011.

4.2.1 Use of Work Data Library

The work data library is located at the WSS. All personnel have full access to records in the library for use and/or copying. Personnel requiring use of records must sign the documents out on a library log maintained by the PMC. A maximum check-out period of one day is allowed and only on-site use of records is permitted. The Data Verification Group manages the use of the work data library.

4.2.2 Use of WSSRAP Database

The electronic record database is widely used by WSSRAP personnel for review of analytical data. Database use is managed by a customized software program called the Generic Universal Report Utility (GURU). The GURU program was developed by the PMC for use in accessing the WSSRAP database. GURU is a compiled dBASE program written for the IBM PC network system.

The GURU program provides a tool for easy and flexible access to data records. GURU is also a data extraction program since data can be selected and sorted based on sample identification number, parameter, or any other field definition. Selected data can be extracted, copied to other computerized formats, or printed.

GURU also provides data security. Data are made available to the user without risking the integrity of the data. Users are allowed to view or copy records, but records cannot be modified or deleted within the GURU system.

On-site use of the WSSRAP database is through the WSSRAP local area network. Users must complete a user registration form provided by the PMC Management Information System (MIS) Coordinator. A user name and password specifying access to the database and GURU is assigned to each user.

WSSRAP personnel may also use the database and GURU off site through a modem. Users may dial in on standard phone lines and connect to a computer at the WSS. Convenience and security features are the same as for on-site use. Off-site users must also complete the MIS users registration, and user names and passwords are assigned.

In accordance with DOE Order 5700.6C *Quality Assurance*, personnel using GURU attend a user training class and are issued the *GURU Users Manual* (MKF and JEG 1992c) which documents the proper method for the operation of GURU.

4.3 Data Archiving

A system of archiving environmental data is necessary due to the volume of data and the duration of the WSSRAP. All forms of data documentation--hard copy, originals, and electronic--are archived. Archiving of data is allowed only after all EDAP data quality activities have been completed on the data to be archived. Specifically, the data must be verified in accordance with the EDAP program.

All original documents must be transferred to the Project Quality Department and archived according to the U.S. Department of Energy (DOE) contract requirements. The original documents are to be stored as WSSRAP quality assurance (QA) records in fireproof storage and will be maintained by the Project Quality Department for the duration of the project. Work data library records and diskette deliverables are maintained by the Data Verification Group for approximately one year prior to shipping to off-site storage. Electronic data stored in GURU are backed up daily during the general WSSRAP PC network backup. Specific GURU files are backed up quarterly by MIS and archived in Project Quality Department storage. The backups will be maintained for the life of the project.

5 REFERENCES

EPA, see U.S. Environmental Protection Agency.

MKF and JEG, see MK-Ferguson Company and Jacobs Engineering Group.

MK-Ferguson Company and Jacobs Engineering Group, 1991a. *Chemical Plant Site Remedial Investigation/Feasibility Study Data Validation Report*, Rev. 0. DOE/OR/21548-256. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, Missouri. February.

MK-Ferguson Company and Jacobs Engineering Group, 1992a. *Environmental Monitoring Plan for Calendar Year 1992*, Rev. 1. DOE/OR/21548-237. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. January.

MK-Ferguson Company and Jacobs Engineering Group, 1992b. *Environmental Quality Assurance Project Plan*, Rev. 0. DOE/OR/21548-352. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. October.

MK-Ferguson Company and Jacobs Engineering Group, 1992c. *GURU Version 1 Users Manual*, Rev. 1. DOE/OR/21548-195. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office, Weldon Spring Site Remedial Action Project. St. Charles, MO. November.

MK-Ferguson Company and Jacobs Engineering Group, 1993. *Environmental Safety and Health Department Plan*, Rev. 0. DOE/OR/21548-362. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. January.

U.S. Environmental Protection Agency, 1987. *Data Quality Objectives for Remedial Response Activities - Development Process*. EPA 540/G-87/003. March.

DOE ORDERS

5700.6C, *Quality Assurance*

PROCEDURES

ES&H 1.1.4, *Logbook Procedure*
ES&H 4.1.1, *Numbering System for Environmental Samples and Sampling Locations*
ES&H 4.1.2, *Chain of Custody*
ES&H 4.9.1a, *Environmental Monitoring Data Verification*
ES&H 4.9.2a, *Environmental Monitoring Data Validation*
ES&H 4.9.3s, *Surface Water and Groundwater Data Review*
RC-17s, *Off-Site Transportation of Hazardous Materials*
RC-19s, *Hazardous Material/Sample Transportation Activity (HMSTA) Operations*

APPENDIX A
Data Quality Requirements

Specific Data Quality Requirements (DQRs) for the Weldon Spring Site Remedial Action Project (WSSRAP) have been developed according to the U.S. Environmental Protection Agency (EPA) Guidance. These site-specific DQRs include precision, accuracy, and completeness goals for data collection activities. Each of these requirements is discussed in the following paragraphs.

PRECISION AND ACCURACY

Precision: A statistical measurement, expressed as a percentage, which represents the repeatability of the analytical system. This measurement is based on the percent differences between laboratory duplicates. 0% precision is the best precision.

Accuracy: A statistical measurement, expressed as a percentage, which represents how close the analytical data are to the "true" value. This measurement is based on the percent recoveries associated with the laboratory analytical control spikes (blank spikes), surrogate spikes, or matrix spikes. 100% accuracy is the best accuracy.

Precision and accuracy goals for analytical data are presented in Table A-1. Analytical methods, detection limits and precision and accuracy goals are presented by analytical parameter and media for both soil and water. Generic precision and accuracy goals are also presented.

COMPLETENESS

Completeness: The percentage of acceptable data points associated with a group of data, such as those in a validation request or those addressed in a quarterly or summary validation report.

Data Quality Requirements for the WSSRAP Precision and Accuracy Guidelines for Routine Monitoring and Characterization (Continued)

TABLE A-1 Data Quality Requirements for the WSSRAP Precision and Accuracy Guidelines for Routine Monitoring and Characterization

Category	Analytical Parameter	Analytical Method[b]	MDC soil µg/g[b]	Precision[a] (soil)	Accuracy[a] (soil)	MDL[b] µg/l	Precision[a] (water)	Accuracy[a] (water)	Comments
Radiation Screening	Gross Alpha	2.6.4 *	NA	NA	NA	NA	NA	NA	ES&H SOP
	Gross Beta/Gamma	2.6.3 *	NA	NA	NA	NA	NA	NA	ES&H SOP
Field Measurements	pH	4.5.1 *	NA	NA	NA	NA	20	NA	ES&H SOP
	Temperature	4.5.1 *	NA	NA	NA	NA	20	NA	ES&H SOP
	Conductivity	4.5.2 *	NA	NA	NA	NA	20	NA	ES&H SOP
	Specific Ions	4.5.5 *	NA	NA	NA	NA	20	NA	ES&H SOP
	Dissolved Oxygen	4.5.6s	NA	NA	NA	NA	20	NA	ES&H SOP
	Organic Vapors	3.1.1 *	NA	NA	NA	NA	20	NA	ES&H SOP
	Settleable Solids	4.5.7 *	NA	NA	NA	0.1	20	NA	ES&H SOP
Onsite Radiological Measurements	U-238	2.6.9*	1 pCi/g	50	50	NA	NA	NA	ES&H SOP
	Ra-226, Ra-228	2.6.9*	1 pCi/g	50	50	NA	NA	NA	ES&H SOP
	TH-230	2.5.8*	2 pCi/g	50	50	NA	NA	NA	ES&H SOP
	Gross Alpha	2.4.3*, 2.4.7*	NA	NA	NA	3.3 pCi/l (air)	20 (air)	NA	ES&H SOP
	Uranium, total	2.6.5*	NA	NA	NA	0.68 pCi/l	30	30	ES&H SOP

TABLE A-1 Data Quality Requirements for the WSSRAP Precision and Accuracy Guidelines for Routine Monitoring and Characterization (Continued)

Category	Analytical Parameter	Analytical Method[b]	MDC soil µg/g[b]	Precision[a] (soil)	Accuracy[a] (soil)	MDL[b] µg/l	Precision[a] (water)	Accuracy[a] (water)	Comments
Offsite Radiological Measurements	Nat. Uranium	EPA 908.0	1 pCi/g	50	30	1 pCi/l	20	20	
	Ra-226, -228	EPA 903.1	1 pCi/g	50	30	1 pCi/l	20	20	
	Th-228, 230, 232	EERF 00/07	1 pCi/g	50	30	1 pCi/l	20	20	
	Gross Alpha	EPA 900.0	3 pCi/g	50	30	3 pCi/l	40	40	
	Gross Beta	EPA 900.0	3 pCi/g	50	30	8 pCi/l	40	40	
Nitroaromatic Compounds	TNT	USATHAMA	0.006	50	50	0.03	20	20	
	2,4-DNT	USATHAMA	0.006	50	50	0.03	20	20	
	2,6-DNT	USATHAMA	0.002	50	50	0.01	20	20	
	1,3,5-TNB	USATHAMA	0.006	50	50	0.03	20	20	
	1,3-DNB	USATHAMA	0.018	50	50	0.09	20	20	
	Nitrobenzene	USATHAMA	0.006	50	50	0.03	20	20	
Miscellaneous	TSS	EPA 160.2	NA	NA	NA	2	20	20	
	TDS	EPA 160.2	NA	NA	NA	4000	20	20	
	TOC	EPA 415.1				0.1	20	20	
	Lithium	EPA 200.7	5	50	50	50	20	20	
	MO	EPA 200.7	0.4	50	50	4	20	20	

TABLE A-1 Data Quality Requirements for the WSSRAP Precision and Accuracy Guidelines for Routine Monitoring and Characterization (Continued)

Category	Analytical Parameter	Analytical Method[b]	MDC soil µg/g[b]	Precision[a] (soil)	Accuracy[a] (soil)	MDL[b] µg/l	Precision[a] (water)	Accuracy[a] (water)	Comments
Miscellaneous (cont.)	ZR	EPA 200.7	20	50	50	20	20	20	
	CR+6	Colorimetric	2	50	50	10	20	20	
	TOX	SW846 9020	5	50	50	5	20	20	
	NO3	300.0/353.1	50	50	50	250	20	20	
	SO4	300.0/375.1,.2	200	50	50	1000	20	20	
	CL	300.0/325.1,.3	50	50	50	250	20	20	
	FL	300.0/340.1,.2,.3	50	50	50	250	20	20	
	NO2	300/354.1,.2	50	50	50	250	20	20	
	% Moisture	ASTM	NA	50	NA	NA	NA	NA	
	pH (soil)	EPA 150.2	NA	50	NA	NA	NA	NA	
CLP-VOA	TCL	CLP	CRQL	As required by CLP		CRQL	As required by CLP		
CLP-Semivoa	TCL	CLP	CRQL	As required by CLP		CRQL	As required by CLP		
CLP-Pest/PCB	TCL	CLP	CRQL	As required by CLP		CRQL	As required by CLP		
CLP-Metals	AL	CLP-ICP	20	As required by CLP		200	As required by CLP		
	AS	CLP-AA	1	As required by CLP		10	As required by CLP		
	BE	CLP-ICP	0.5	As required by CLP		5	As required by CLP		
	CD	CLP-ICP	0.5	As required by CLP		5	As required by CLP		

TABLE A-1 Data Quality Requirements for the WSSRAP Precision and Accuracy Guidelines for Routine Monitoring and Characterization (Continued)

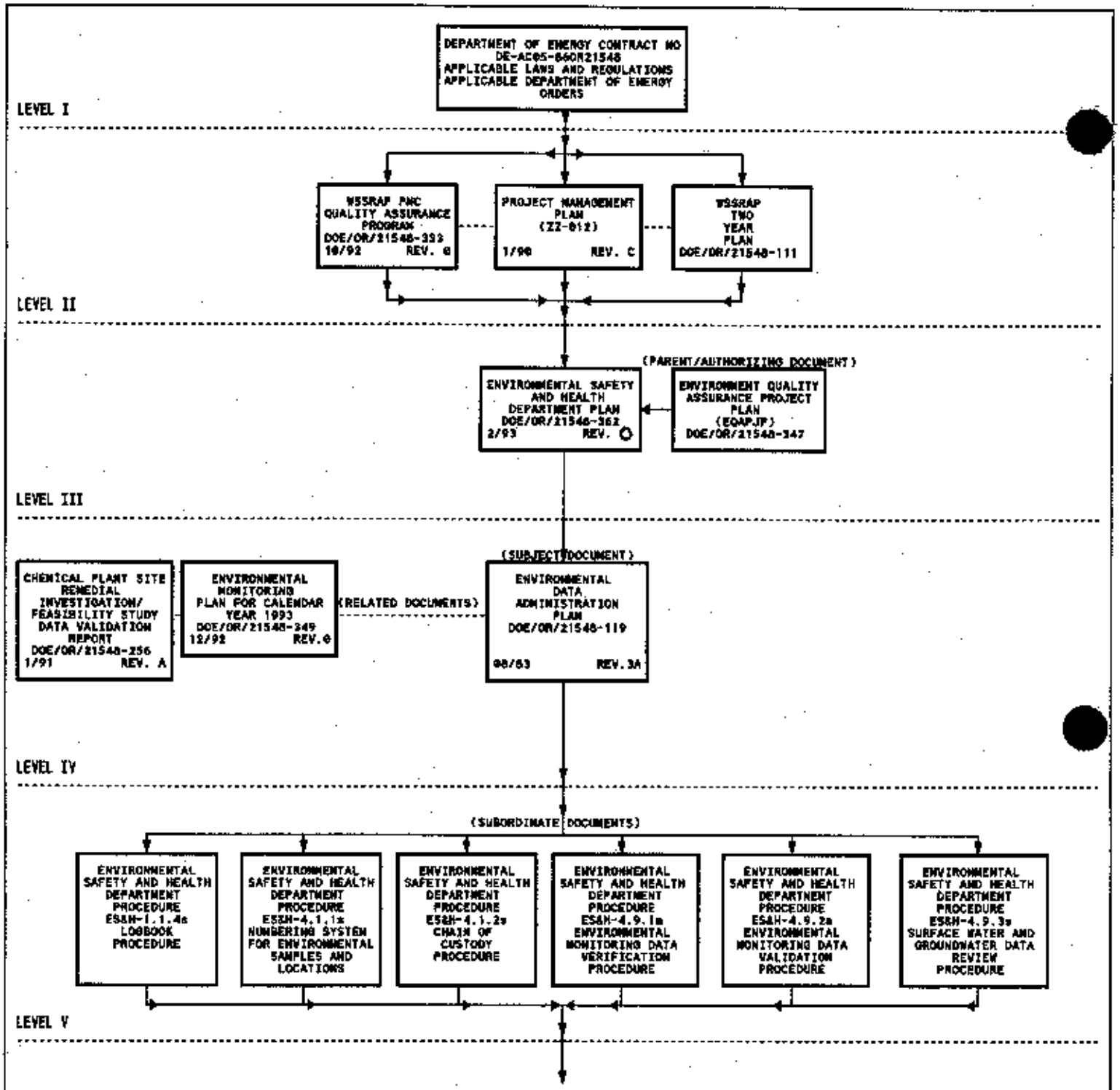
Category	Analytical Parameter	Analytical Method[b]	MDC soil µg/g[b]	Precision[a] (soil)	Accuracy[a] (soil)	MDL[b] µg/l	Precision[a] (water)	Accuracy[a] (water)	Comments
	CR (Total)	CLP-ICP	1	As required by CLP		10	As required by CLP		
	CU	CLP-ICP	2.5	As required by CLP		25	As required by CLP		
	PB	CLP-AA	0.3	As required by CLP		3	As required by CLP		
	HG	CLP-CV	0.1	As required by CLP		0.2	As required by CLP		
	NI	CLP-ICP	4	As required by CLP		40	As required by CLP		
	NA	CLP-ICP	500	As required by CLP		5000	As required by CLP		
	ZN	CLP-ICP	2	As required by CLP		20	As required by CLP		
	BA	CLP-ICP	20	As required by CLP		200	As required by CLP		
	AG	CLP-ICP	1	As required by CLP		10	As required by CLP		
	FE	CLP-ICP	10	As required by CLP		100	As required by CLP		
	K	CLP-ICP	500	As required by CLP		5000	As required by CLP		
	MN	CLP-ICP	1.5	As required by CLP		15	As required by CLP		
	MG	CLP-ICP	500	As required by CLP		5000	As required by CLP		
CLP-Metals (cont.)	SE	CLP-AA	0.5	As required by CLP		5	As required by CLP		
	V	CLP-ICP	5	As required by CLP		50	As required by CLP		
	TL	CLP-AA	1	As required by CLP		10	As required by CLP		
	SB	CLP-ICP	6	As required by CLP		60	As required by CLP		

TABLE A-1 Data Quality Requirements for the WSSRAP Precision and Accuracy Guidelines for Routine Monitoring and Characterization (Continued)

Category	Analytical Parameter	Analytical Method[b]	MDC soil µg/g[b]	Precision[a] (soil)	Accuracy[a] (soil)	MDL[b] µg/l	Precision[a] (water)	Accuracy[a] (water)	Comments
	CA	CLP-ICP	500	As required by CLP		5000	As required by CLP		
	CO	CLP-ICP	5	As required by CLP		50	As required by CLP		
Other parameters not listed		TBD	TBD	50	50	TBD	20	20	See Note

* See comment section
TBD To Be Determined
NA Not Applicable
MDC Minimum detected concentration
MDL Minimum detection limit
(a) Accuracy criteria reflect the maximum ± deviation from 100% recovery. Precision criteria reflect the maximum relative percent difference between duplicate values.
(b) Detection limits and/or methods may vary with each laboratory and assume a dilution factor of 1.0. The soil detection limits assume 100% solids content.
NOTE: Generic DQRs apply to media and/or analytical methods not listed in this table. Specific DQRs may be developed as a part of future sampling and analysis plans

APPENDIX B
Document Hierarchy



ENVIRONMENTAL DATA ADMINISTRATION PLAN

APPENDIX A

REPORT NO. DOE/OR/21548-119	EXHIBIT NO.	
ORIGINATOR. JR	DRAWN BY. BF	DATE. 05-02-1993