

ADMIN RECORD

**FINAL  
B-1 DAM SAMPLING AND ANALYSIS PLAN  
HOT SPOT REMOVAL**

**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE  
OPERABLE UNIT 6**

**U.S DEPARTMENT OF ENERGY  
Rocky Flats Environmental Technology Site  
Golden, Colorado**

**JUNE 1995**

**ADMIN RECORD**

**DOCUMENT CLASSIFICATION  
REVIEW WAIVER PER  
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EG&G ROCKY FLATS  
Final B-1 Dam Sampling and Analysis Plan

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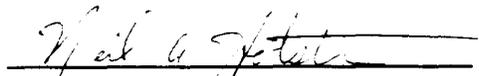
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Date

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## LIST OF ACRONYMS

COC	Chain of Custody
DEFT	Decision Error Feasibility Trials
DQO	Data Quality Objectives
EPA-CLP TAL	Environmental Protection Agency-Contract Laboratory Program Target Analyte List
FIDLER	Field Instrument for Detection of Low-Energy Radiation
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
IHSS	Individual Hazardous Substance Sites
OU 6	Operable Unit 6
PCB/PEST/HERB	Poly-Chlorinated Biphenyls/Pesticides/Herbicides
PRG	Preliminary Remediation Goals
QAA	Quality Assurance Addendum
QC	Quality Control
RCA	Radiological Control Area
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
SAP	Sampling and Analysis Plan
VOA	Volatile Organic Analytes

## 1.0 BACKGROUND

Laundry waste water was released from several on site laundry facilities into the B-series ponds through a discharge pipe from 1953 to 1980. The laundry water was known to contain nitrates, uranium, and plutonium. On May 20, 1993, during renovation activities at Retention Dam B-1, a hot spot of soil contamination was identified by a Radiological Control Technician (RCT) using a Field Instrument for the Detection of Low-Energy Radiation (FIDLER). The FIDLER readings were more than an order of magnitude above local background levels. In addition, smears taken from an excavated drain pipe registered counts above background.

Upon discovery of the hot spot, renovation work was stopped and RCTs were called in to survey the area. No additional contamination was found. An area of approximately 65 square feet was staked, roped, and has been posted as a Radiologically Controlled Area (RCA). The radiological contamination lies outside of Pond B-1(IHSS 142.5) and Pond B-2(IHSS 142.6) based on the description of the IHSSs in Operable Unit 6 (OU 6). After dam renovations, the contaminated area was backfilled with approximately 4 feet of clean soil.

A sediment sample of the hot spot was taken on May 21, 1993. Elevated levels of americium-241 and plutonium-239/240 were found. However, the americium and plutonium sample data were rejected due to several errors in the analysis process. It is therefore difficult to determine the extent of radiological contamination at this hot spot.

## 2.0 OBJECTIVE AND SCOPE

The objective of this SAP is to identify the nature and extent of contamination at the B-1 dam. This SAP will address the methodology for selecting the number of samples necessary in the field.

## 3.0 PROPOSED SAMPLING PLAN

The sampling effort for investigation of the hot spot at the B-1 dam will define the extent of contamination at the hot spot area and help to determine the appropriate strategy for remediation. It is essential to determine the precise location of the radiological contamination in order to minimize the amount of waste generated when the removal takes place. Also, it is necessary to determine whether or not RCRA constituents are present to select the appropriate sampling methods in accordance with the waste acceptance criteria for the final off site disposal facility. The samples will be extracted through the use of a direct push rig sampler (geoprobe).

The area of investigation will be contained to the limits of the RCA. It will be necessary to remove rip rap and large rocks from the RCA in order to penetrate the ground with the direct

push rig sampler. The rocks should be moved aside to allow the rig sampler to penetrate the ground without interference but not removed from the RCA. The rocks can be moved by hand and should be put back in place when drilling is completed.

The sampling plan consists of drilling as many as 10 cores approximately 10 feet in depth spaced evenly within the RCA with the geoprobe sampler. The field sampling manager can change the number of cores at any time in order to better define the extent of contamination. The location of the samples will be spaced evenly within the RCA in order to investigate the areal extent of contamination.

Each core removed by the geoprobe will measure approximately 2 feet in depth and will be analyzed with a FIDLER instrument in the field for radioactivity measurements in accordance with RFP Procedure 5-21000-OPS-FO.16 *Field Radiological Measurements*. These FIDLER measurements will then be recorded with respect to depth and this information will be used to create a three dimensional plot of the extent of radionuclide contamination in the soil. The cores with the three (3) highest FIDLER readings will be shipped for radioactive isotope and RCRA analysis. The remaining soil cores extracted from the push rig core will be placed in core boxes and stored on site in an approved storage facility until the final remedial action is completed. Samples shall be packaged, transported, and stored in accordance with RFP Procedure 5-21000-OPS-FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples*. The three cores selected for analysis will be sampled according to the methods listed in Appendix B Quality Assurance Addendum Table 1-1.

### **3.1 SAMPLE COLLECTION AND HANDLING**

The collection of all samples will be performed in accordance with the appropriate procedures. The collection of samples will follow procedures FO.10, *Receiving, Labeling and Handling Environmental Containers* and FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples*. The screening of samples for shipment will follow procedure FO.18, *Environmental Sample Radioactivity Screening*, prior to shipment. In the event the samples are greater than 2 nCi/g, procedure FO.25, *Shipment of Radioactive Materials Samples*, will be used for sample shipment.

### **4.0 ANALYTICAL REQUIREMENTS**

The analytical specifications for this project will follow the protocol described in the General Radiochemistry and Routine Analytical Services Protocol (GRRASP)(EG&G, 1993b). The GRRASP describes the protocol for analytical methods that will be used, detection limits, holding times, laboratory COC, extraction/preparation criteria and reporting requirements.

#### **4.1 DATA NEEDS**

The data needs for this project include the collection of sufficient information of adequate quality to meet the specific objectives of the project. As described above, this includes characterization of the removed core material for RCRA constituents, levels of radioactive isotopes present and determination of the areal extent of radiological contamination.

#### **4.2 ANALYTICAL METHODS**

The analytical methods that will be used for this project can be found in Table 1-1. Note this table also includes the total number of samples that will be analyzed by each method, including field QC samples. The actual analytes for each method are included as a part of the QAA. All data received from the analytical laboratories will be validated following analysis to ensure that an adequate amount of usable data exists.

**FINAL**  
**B-1 DAM SAMPLING AND ANALYSIS PLAN**  
**APPENDIX A - DATA MANAGEMENT PLAN**

**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**  
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**JUNE 1995**

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## 1.0 INTRODUCTION

The purpose of this Data Management Plan (DMP) is to support the Sampling and Analysis Plan for the B-1 Dam Hot Spot Removal project and to identify the mechanisms and procedures for the efficient and accurate transfer of data from collection/generation of the data through its end-use. This is achieved by identifying the sources of data, establishing systematic procedures for quality assurance/quality control, and creating a suitable database to allow end users the appropriate access to meet project requirements and to establish appropriate security and back-up measures to ensure data integrity. The DMP identifies and defines sample documentation, sample tracking, data entry, data proofing, data reporting, and data management personnel responsibilities.

The B-1 Dam Hot Spot Removal Project will involve the collection and analysis of data from several sources:

- Screening parameters collected manually including radiological screening,
- Field measurements of radiological contamination in soil, and
- Analytical data generated from off site laboratory testing of borehole samples.

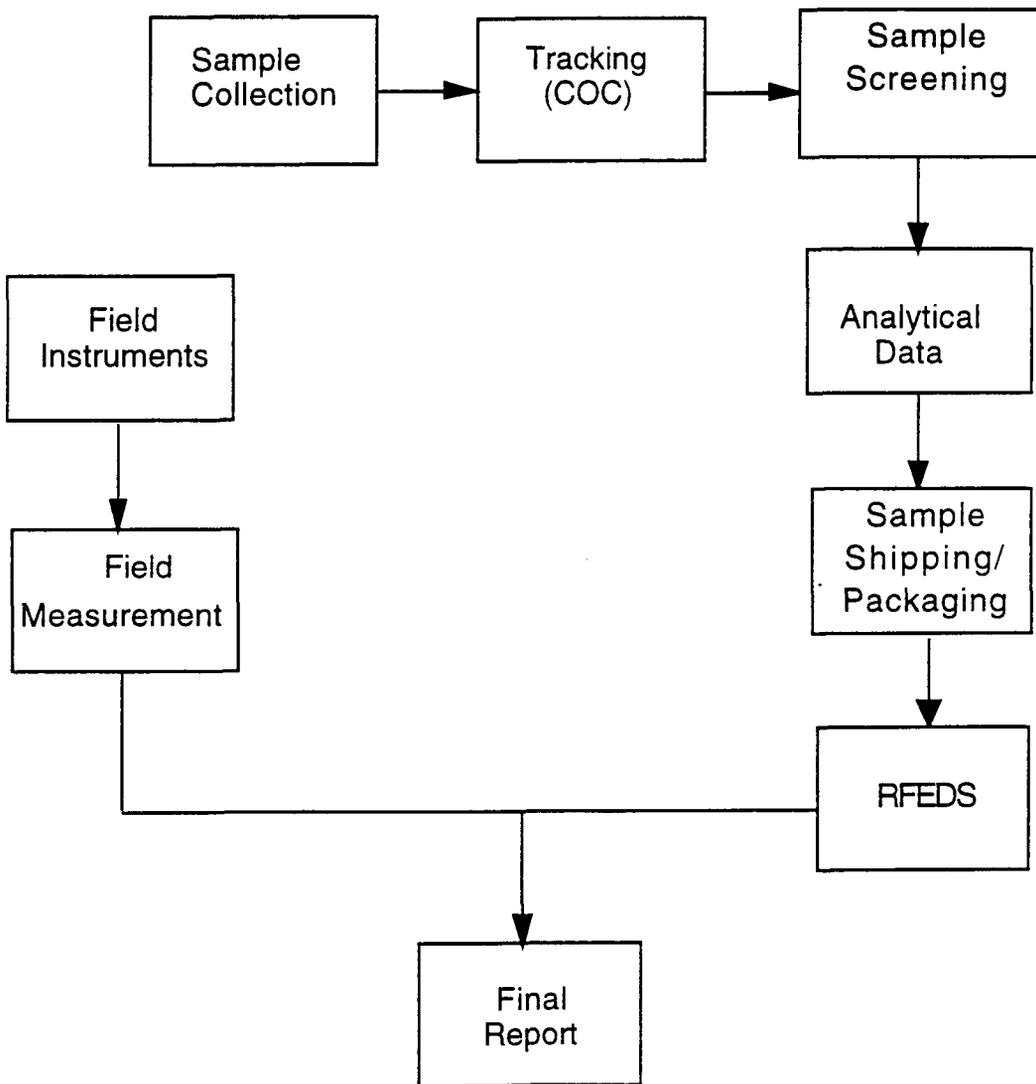
This DMP has been developed to promote the proper and complete management of scientific and technical data that will be generated from the B-1 dam hot spot removal activity. The primary purpose of a DMP is to communicate to personnel collecting, using, and managing information how this information will be recorded, stored, accessed, and reviewed. Procedures are defined and implemented to ensure that data are collected, entered, and stored in a secure, controlled, and retrievable manner to accurately and efficiently transfer data into useful information. This plan addresses the planning, implementation, and responsibilities to optimize data management and use of the Rocky Flats Environmental Database System (RFEDS) and the interim database, Datacap.

This DMP focuses principally on the data management and data handling. A detailed discussion of peripheral activities (i.e., field data collection methods etc.) are described in the main portion of the Sampling and Analysis Plan (SAP). RFEDS will be the ultimate repository for all data generated during this project.

Tracking and verification of data at each stage of the project is important. The data tracking procedures identified in this DMP vary according to the data collection method employed. Figure 1-1 provides a summary of the data sources and the flow of the data.

Figure 1-1

SUMMARY OF DATA SOURCES AND DATA FLOW



## 2.0 RESPONSIBILITIES AND QUALIFICATIONS

Support staff for the data management tasks includes all personnel involved in data acquisition, quality control (QC), and data processing. The designated staff are responsible for implementing and carrying out data management activities according to this plan.

The primary personnel responsible for data management are the EG&G Project Manager, Sample Crew Personnel, Sample Manger, Qualified Technical Reviewer, Field Data Manager, RFEDS User System Manager (USM), Data Verifier and Project Quality Assurance/Quality Control (QA/QC) Officer. The responsibilities for these positions are summarized in the following sections.

### 2.1 EG&G Project Manager

The EG&G Project Manager will be responsible for ensuring that all data are collected, processed, and stored in a manner consistent with this DMP and in compliance with 5-21000-OPS-FO.14 Field Data Management. Data management support personnel will report to the EG&G Project Manager with any problems that may impact the integrity of the data and/or the removal action.

Prior to sample collection, the EG&G Project Manger will:

- Coordinate sample shipping with a Utah or Nevada State Certified Laboratory, **or** other analytical laboratory.
- Obtain RFEDS assigned sample numbers and location codes from the RFEDS USM to use on the Chain of Custody (COC) forms.

After sample collection, the EG&G Project Manager will:

- Manage any feedback from the contract laboratory.
- Ensure that any data from sample locations that have been surveyed are given to the RFEDS GIS group.
- Ensure that the appropriate authenticated quality-related records and Administrative Records are transmitted to the Central Records Center.

### 2.2 RFEDS User System Manager

The RFEDS User System Manager will:

Prior to sampling:

- Verify all locations of samples to be taken and assign any new location codes to sample locations.
- Assign sampler numbers, COC numbers, and any applicable codes and abbreviations for the EG&G Project Manager.

After sampling, the RFEDS USM will:

- Verify any transmitted records for accuracy and completeness.
- Ensure the data are preserved, retrievable, traceable, and available for response to regulatory agency requirements.

### **2.3 Sample Crew Personnel**

The Sample Crew Personnel will be responsible for field data collection. Their tasks include:

- Completing all applicable entries on appropriate FO.14 forms.
- Documenting all field observations and data on field data forms.
- Recording field observations and data with black, waterproof ink.
- Delivering field data forms and corresponding COCs to the Sample Manager by the end of each day of field operations.
- Delivering samples to the 891 Contractor yard for shipping.

### **2.4 Sample Manager**

The Sample Manager is responsible for:

- Receiving field data forms daily and reviewing for completeness and verifying that all forms have been received.
- Resolving any discrepancies with Sample Crew Personnel and clearly documenting any corrections, change, or insertions made as a result of discrepancy resolution.
- Verifying that the COCs are complete, accurate and error-free. When the COCs are complete, accurate, and error-free, and before samples are shipped to the contract laboratory, the Sample Manager will copy all COCs on a daily basis and place copies in T891E.
- Transferring the field data to the Field Data Manager for input into Datacap.

## 2.5 Qualified Technical Reviewer

The Qualified Technical Reviewer performs a technical verification of the data, including:

- Reviewing field data to ensure consistency with known chemical and physical properties of the media being sampled.
- Verifying all calculations and reported units.
- Verifying that the correct number of QC samples were collected.
- Resolving any discrepancies with Sampling Crew Personnel and clearly recording any and all corrections, changes, or insertions made as a result of discrepancy resolution.
- Ensuring that documentation for the verification of data in this record includes the date of verification and the initials of the verifier.

## 2.6 Field Data Manager

The Field Data Manager is responsible for:

- Entering any relevant field parameters into the appropriate Datacap module.
- Entering the COC/tracking information into the Tracking section of Datacap within two days of sample shipment to the analytical laboratory.
- Printing data from Datacap and giving it to the Data Verifier for review.
- Verifying that all samples intended to be collected are in Datacap.
- Transmitting field information, sample collection data, and COC tracking data to the RFEDS USM.
- Backing up and ensuring the security of Datacap.

## 2.7 Data Verifier

The Data Verifier will:

- Compare the original field data forms and Datacap printout for consistency and accuracy.
- Report any transcription errors and return them to data entry for correction.

## 2.8 EG&G Sample Management GIS Group

The EG&G Sample Management GIS Group receives surveying and sample data information from the EG&G Project Manager and digitizes the data.

## **2.9 Project QA/QC Officer**

The Project QA/QC Officer will ensure that procedures are carried out in accordance with this DMP. The QA/QC Officer will report to the EG&G Project Manager or designee.

## **3.0 DATA HANDLING SYSTEMS EQUIPMENT, DATA BACKUP, AND SECURITY PROCEDURES**

### **3.1 Hot Spot Removal Data Handling and Storage Systems**

The B-1 dam hot spot removal data handling and storage system will handle and store data including: field data forms for the field instrumentation (i.e., FIDLER), laboratory screening data, and laboratory generated data from RFEDS. The raw data will be manually input into Datacap, an interim database in Microsoft Excel, by the Project Manager, Project Data Manager, or designee. Datacap is a PC-run, temporary database used to store the field data in an easily-retrievable and an easily recognizable manner by the RFEDS database, ORACLE, to ensure completeness and accuracy prior to data transfer to RFEDS.

Datacap is able to generate appropriate reports and tables, provide systematic review, and efficient access and retrieval to optimize data use after downloading from RFEDS or manual input. It is recognized that different types of data (e.g., physical and chemical parameters together with associated location information) from a variety of sources will be collected at various times.

The RFEDS data system is capable of managing fundamental sample data, reports, queries, and exports of the data. RFEDS is amenable to reporting either all or part of the data in selected fields. Furthermore, all or any subset of the data can be selected for review and analysis. RFEDS has the capability to export data to numerous personal computer applications such as Wordperfect, Autocad, Lotus, and Stratigraphics, and can be transferred in ASCII, Microsoft Excel, or DBASE III-compatible file formats.

### **3.2 Database Backup**

#### **3.2.1 Field Data Acquisition**

Data manually acquired in the field will be directly entered onto the appropriate forms as raw data and will be subsequently entered into Datacap. A hard copy of the most recent version of the data will be kept with the data disks. The original data will be kept in an orderly manner in

the EG&G Project Manager's office. Copies of all data collected, both disk and hard copy, will be sent to the Field Data Manager upon completion. The Sample Manager will be responsible for transmittal of the field data to the Field Data Manager.

### **3.2.2 Backup and Security Procedures**

To limit the likelihood of data corruption and to maintain the integrity of the database, only the EG&G Project Manager, the Field Data Manager, and the RFEDS personnel will have unlimited access to the data by means of password protection. The Sample Manager will have entry/edit/query access. The individual user access privilege level will be designated by the EG&G Project Manager and the Field Data Manager. General user access for the hot spot removal database will be to query the chemical and field information. Data editing will be performed by the RFEDS USM, the Field Data Manager, or designees. It is also anticipated that once data are loaded, little or no changes to the data are expected. Any modifications to the data must receive the authorization of the Field Data Manager. Changes to the data will be documented as described in Section 5.0 of this DMP, "DATA MANAGEMENT, DATA TRACKING, DATA ENTRY AND DATA PROOFING."

The RFEDS User System Manager or other RFEDS group member will back up RFEDS daily onto tape. This level of backup is considered to be sufficient for the B-1 dam hot spot removal database. The Field Data Coordinator is responsible for backing up any data generated in the field by photocopying hard copies and backing up Datacap data daily to disk or tape.

## **4.0 DOCUMENTATION**

### **4.1 Data Acquisition Documentation**

It is necessary to record detailed information so that data acquisition can be reconstructed. The Scientific Notebook System (SNS) is one of the primary mechanisms for data acquisition. Any data that are collected using non-standard procedures will be collected in accordance with the SNS and documented in the scientific notebook. Data for the B-1 dam hot spot removal project will be compiled from a number of different sources. At a minimum, the scientific notebook, electronically collected data records, field instrument data, and sample collection forms should include the following information for each data or sample point:

1. Field sample identification (ID)
2. Date and time of sampling/measurement
3. Sample measurement location

4. Sample measurement description
5. Sample depth (if appropriate)
6. Parameters or analyses being reported
7. Associated quality control (QC) samples (e.g., duplicates, matrix spikes, etc.)
8. Approximate levels (in counts/minute, parts per million etc...) of contaminants as reported by field instrumentation

#### **4.2 Transmittal of Field Data to Field Data Manager**

All data generated in the field will be copied and transferred to the Field Data Manager or designee. This data will include COC forms, field notes, data generated by field instruments (i.e., FIDLER), and any other data generated in the field. Following shipment of data from the field to the Field Data Manager or designee, the Sample Manager will verbally confirm the data have been received. The field data will be transferred to the Datacap database by the Field Data Manager/EG&G Project Manager or designee. The data will then be transmitted to the RFEDS USM via diskette.

#### **4.3 Data Receipt Confirmation**

Upon receipt of the data, the Field Data Manager is responsible for checking, at a minimum that:

1. All data were received and the receipt was noted on the Field Data Transmittal Form.
2. The data received matches the data acquisition plans.
3. The appropriate field QC checks were performed (calibration of instruments, etc.)

The Field Data Manager will have the responsibility of ensuring that discrepancies identified during the checking process are corrected and documented.

### **5.0 DATA MANAGEMENT-DATA TRACKING, DATA ENTRY, AND DATA PROOFING**

#### **5.1 Manually Collected Field Data**

Data collected manually will consist of field measurements from the FIDLER probe. Figure 5-1 Manual Data Collection System Flow chart summarizes the data flow for the manually recorded data from collection through data reporting. The results and other pertinent information will be recorded on the appropriate data collection forms, including FO14.C, *Sample Collection Form*, Figure 5-2. The results from the forms will be entered into a PC database system. The data

entry will be QC reviewed by the Project Data Manager prior to entry of the data.

## 5.2 RFEDS Analytical Data

Figure 5-3 summarizes the data flow for the analytical data. Analytical data will be obtained from RFEDS in electronic format. The data will be checked by the Data Verifier for format correctness and completeness. The RFEDS analytical data will be downloaded into Datacap to allow an end user to easily query the data from the database. Upon completion of downloading, the RFEDS USM will review the data for completeness in comparison to plan.

## 5.3 Data Entry

Data can be entered in two ways: (1) manual entry from data collection forms and analytical data sheets, and (2) data electronically downloaded from RFEDS.

### 5.3.1 Manual Data Entry

Manual data entry will be followed by a 100 percent data review by the Data Verifier. Errors will be researched and corrected. A hard copy of the manually entered data will be initialed and dated by the person performing the review.

### 5.3.2 Corrections and Changes to Sample Data

Changes or corrections may be required in the data stored in Datacap. All changes must be accompanied by a Data Correction/Change Form, Figure 5-4. The form will detail the changes to be made and document that the changes were completed. Corrections to the database will be reviewed by the Field Data Manager or designee for potential entry errors.

## 5.4 Data Verification/Technical Review

Problems encountered in data management are typically because of inconsistencies or errors in the data reporting. The field data in the database will be verified by the Data Verifier, who will compare a printed hard copy from the database to field forms using the procedures in RFP Procedure 5-21000-OPS-FO.14, *Field Data Management*, Section 7.5. Typical errors that are found include, but are not limited to, the following:

- Incorrect field sample numbers
- Duplicate data and samples

- Improper parameter names
- Samples with missing data
- Missing samples
- Incorrect sample collection data
- Incorrect units
- Incorrect qualifiers
- Missing detection limits, as applicable
- Incorrect number of significant figures reported
- Incorrect recording of times
- Inconsistencies in the sequences of data collection

Data will be checked for transcription errors, accuracy and to ensure that all samples that were intended to be collected were collected, shipped, and entered into Datacap and that any samples that were intended to be collected, but not collected were clearly noted, verified, and entered in Datacap.

It is important that data inconsistencies and errors be identified as soon as possible to allow for correction prior to data use. To track the number of data points, samples, and analyses requested, it is important that all data (whether physical, chemical, or other parameters) be recorded and checked to verify that the data collected meet the project requirements.

### 5.5 Final QC Review

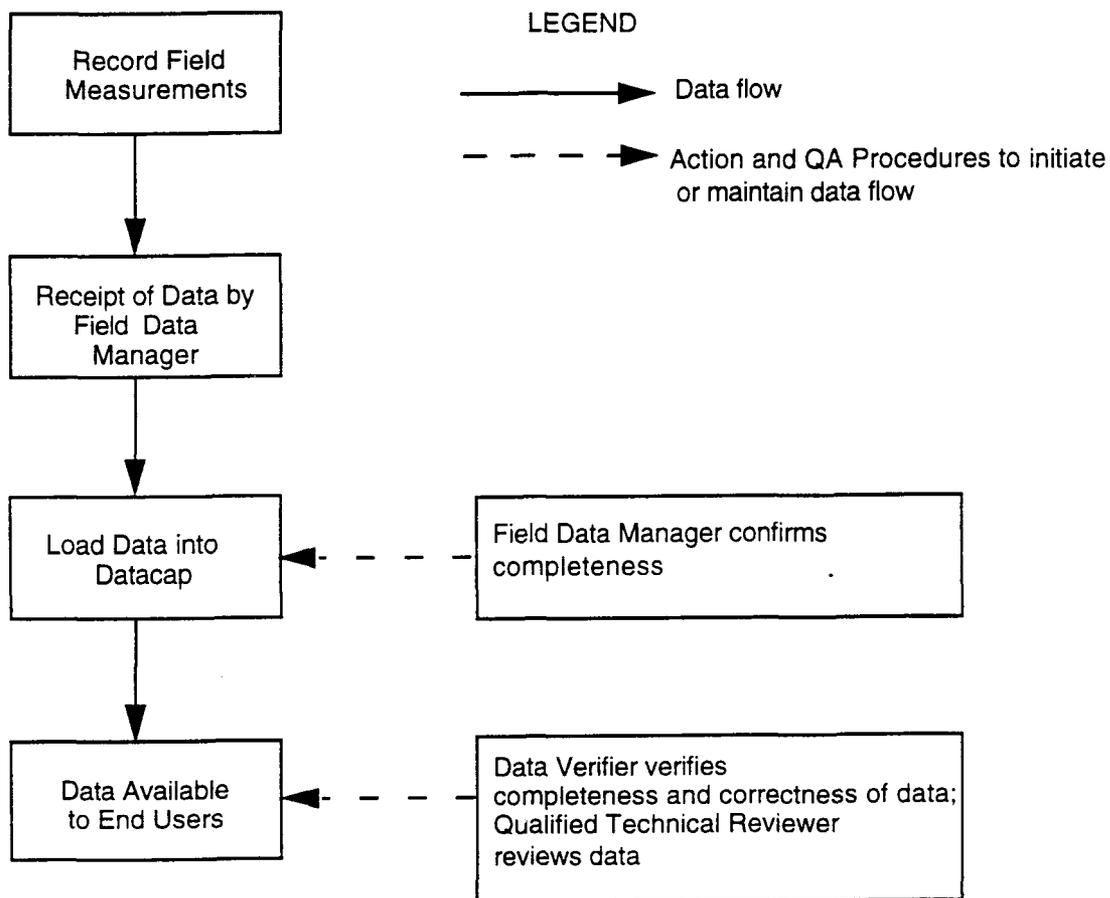
The following data final QC review procedures are applicable to all data acquisition for the project. These procedures are designed to ensure the final database in RFEDS is complete and correct.

- Complete database (RFEDS and Datacap) QC review. A hard copy of the database, organized by location, will be verified by the Field Data Manager or designee.
- Clearly mark corrections to the hard copy database report in red ink.
- Using the data entry sheets and sample collection sheets, check that data identifications are correctly listed on the database hard copy and the number of data points or number of samples for the removal are reported on the database hard copy.
- Check that all the parameters requested for each analysis are reported on the database hard copy and that units reported on the database hard copy are correct.

- Check that data time sequences are correct.
- Check values for all manually collected parameters reported from the database against the field collection forms, at a frequency of approximately 10 percent of the data for each test. If errors are found, an additional 10 percent of results will be checked for similar errors. If errors are found in the second 10 percent, all results will be checked.
- Check the corrected copy of the database to determine that corrections have been completed (i.e., verify the final hard copy of the database).
- The data will then be reviewed by a scientist familiar with the project objectives and data collection activity (Qualified Technical Reviewer) for data that do not make scientific sense (i.e., a concentration value of 2,000,000 mg/kg).
- Following completion of the QC procedure, the EG&G Project Manager, in consultation with the Project QA/QC Officer and Field Data Manager, will change the database reporting status to "FINAL."

Figure 5-1

MANUAL DATA COLLECTION SYSTEM FLOWCHART



**Figure 5-2**  
**SAMPLE COLLECTION FORM**

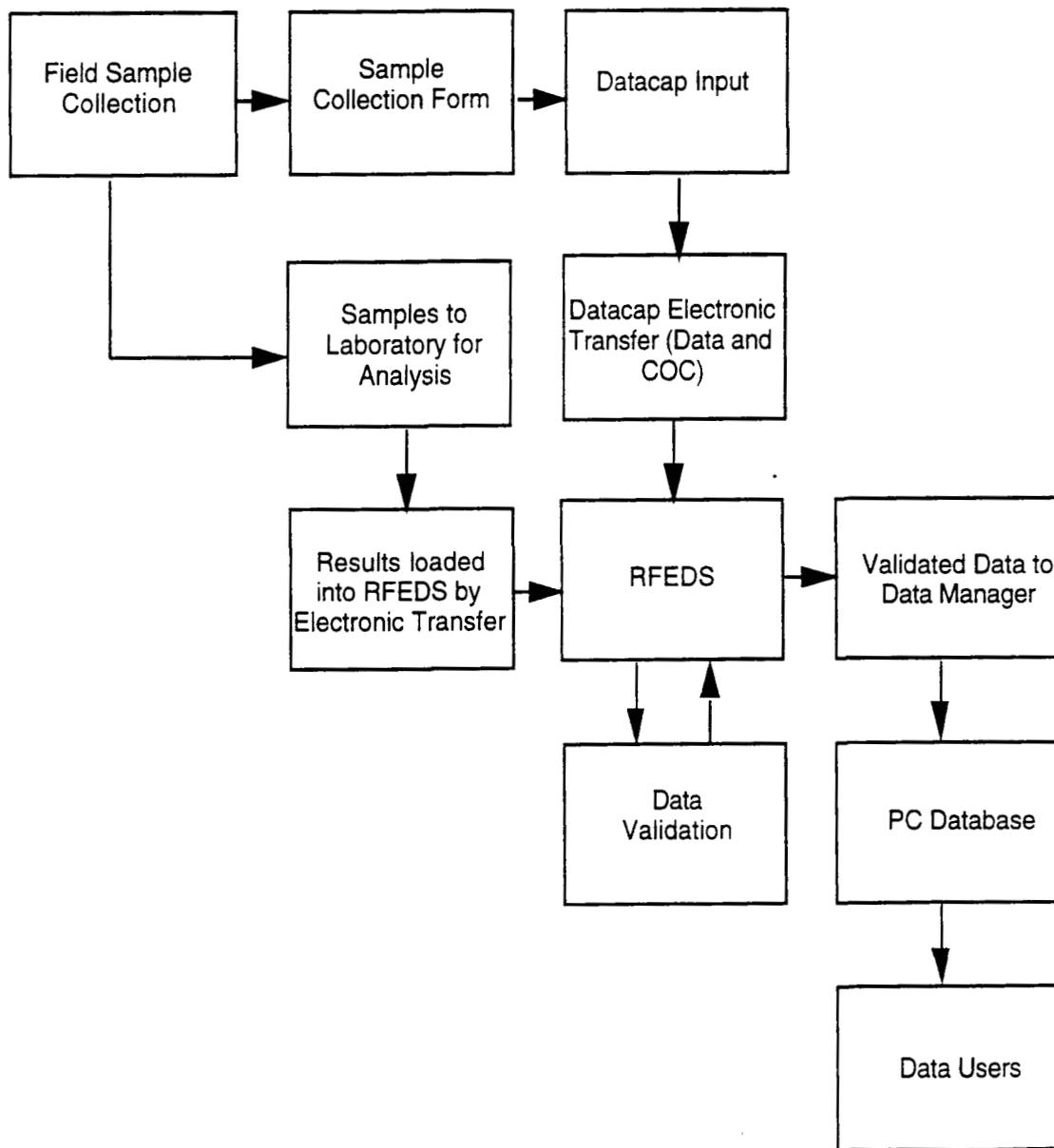
Sample Collection Form	
Project Number :	
Sample Number :	Type: SS
Contractor :	
Station Code :	
Collection Date :	Quarter: Disposition:
Collection Time :	Purpose:
Sample Location :	
Composite (Y/N) :	
Composite Desc :	
QC Type :	Partner:
Collection Method :	
Sample Team Leader :	
Member :	
Member :	
Volume Collected :	Units:
Prepared By :	

Surface Soil Sample Form	
Depth of Take :	Start (in.) End (in.)
Headspace Reading :	
Comments	

Sample Crew Member:	_____
	Print Name
	_____
	Signature Date

Figure 5-3

DATA FLOW FOR ANALYTICAL DATA



**Figure 5-4**  
**DATA CORRECTION/CHANGE FORM**

The following changes and/or corrections to the database are required (check all that apply):

\_\_\_\_\_ Data qualifiers have been assigned to the attached sample data

\_\_\_\_\_ The following sample analyses have been changed:

\_\_\_\_\_ Other changes or corrections (describe below):

Changes Requested By: \_\_\_\_\_  
(Print Name) (Signature) (Date)

Changes Made By: \_\_\_\_\_  
(Print Name) (Signature) (Date)

Changes Checked By: \_\_\_\_\_  
(Print Name) (Signature) (Date)

**FINAL  
B-1 DAM SAMPLING AND ANALYSIS PLAN  
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## 1.0 PURPOSE

This appendix consists of the Quality Assurance Addendum (QAA) for the Final B-1 Dam Sampling and Analysis Plan. The purpose of the QAA is to identify QA requirements and specific measures for implementing these requirements, that are applicable to the sampling of the hot spot (radiologically contaminated spot) found at the B-1 Dam location within OU 6.

This QAA is intended to supplement the *Rocky Flats Environmental Technology Site Site-Wide Quality Assurance Project Plan for Comprehensive Environmental Response Compensation Liability Act (CERCLA) Remedial Investigation/ Feasibility Studies and RCRA Facility Investigations/Corrective Measures Studies Activities* (referred to as the RFP Site-Wide QAPjP, or simply QAPjP). As a supplement to the QAPjP, this QAA establishes the site-specific measures and QA controls applicable to the actions described in this Sampling and Analysis Plan (SAP).

## 2.0 SCOPE

This QAA addresses all quality-related activities as described in the SAP to be performed by EG&G Rocky Flats (EG&G); other organizations (subcontractors) will implement similar QA programs under the auspices of the Department of Energy Rocky Flats Field Office's direction (DOE/RFFO).

The major actions within this SAP, to which this QAA applies, include:

- Conformance with sampling procedures
- Gathering of field data
- Sample collection
- Sample handling and shipping
- Data Analysis

### 3.0 BASIS FOR TECHNICAL ACTIVITY

The work specifically supports the verification, confirmation, and characterization of radiologically contaminated areas within OU 6. The available data in OU 6 are insufficient to determine the nature and extent of contamination at the B-1 Dam. The sampling actions described in this SAP will be used exclusively to determine the extent of radiological contamination and to determine if RCRA constituents are present in the soil. The results of the soil characterization will be used to plan an appropriate removal action and off site waste disposal strategy.

Data collected during the B-1 Dam Sampling and Analysis Plan field investigation will be used to provide support for developing a removal action strategy. The data collected will consist of:

- Radiological isotopic levels and field radiological measurements of the removed core to approximate areal and vertical extent of radiological contamination.
- Total Volatile Organic Analytes, Semi-Volatile Organic Analytes, and Total Metals Analysis to determine if RCRA constituents are present in the soil.

The data collected will be used to determine if the B-1 dam hot spot should be removed as an accelerated response action or if it should be left in place and addressed under the final remedial strategy for OU 6. Also, the data will indicate if the waste contains RCRA constituents.

### 4.0 BASIS OF QUALITY ASSURANCE REQUIREMENTS

The QAPjP was prepared to identify the QA requirements and methods applicable to the RFP Environmental Restoration (ER) Program activities, as identified in the Attachment 2 of the IAG Statement of Work. Section IV.A of the Interagency Agreement (IAG) specifies the minimum quality elements that the QAPjP must include and references EPA QAMS/005/80, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, for guidance in preparing the QAPjP.

### 5.0 QUALITY REQUIREMENTS

The following outlines the quality requirements for the B-1 Dam Sampling and Analysis Plan.

## 5.1 Organization and Responsibilities

The EG&G Environmental Restoration Management (ERM), OU 5-6-7 Closure group is responsible for the overall coordination of the B-1 Dam Hot Spot Removal Project. Other organizations such as the internal sampling management group and the subcontracted external laboratory will be involved with this work. Responsibilities of other organizations will be assigned by the OU 5-6-7 Closure group.

An organization chart for this project is shown in Figure 5-1. The organization has been structured to maintain a high level of quality in all areas of work to be performed. Conformance to established requirements will be verified by individuals and groups not directly responsible for performing the work. The EG&G ERM organization, specifically the OU 5-6-7 Closure group, is responsible for management and coordination of the EG&G resources dedicated to the project.

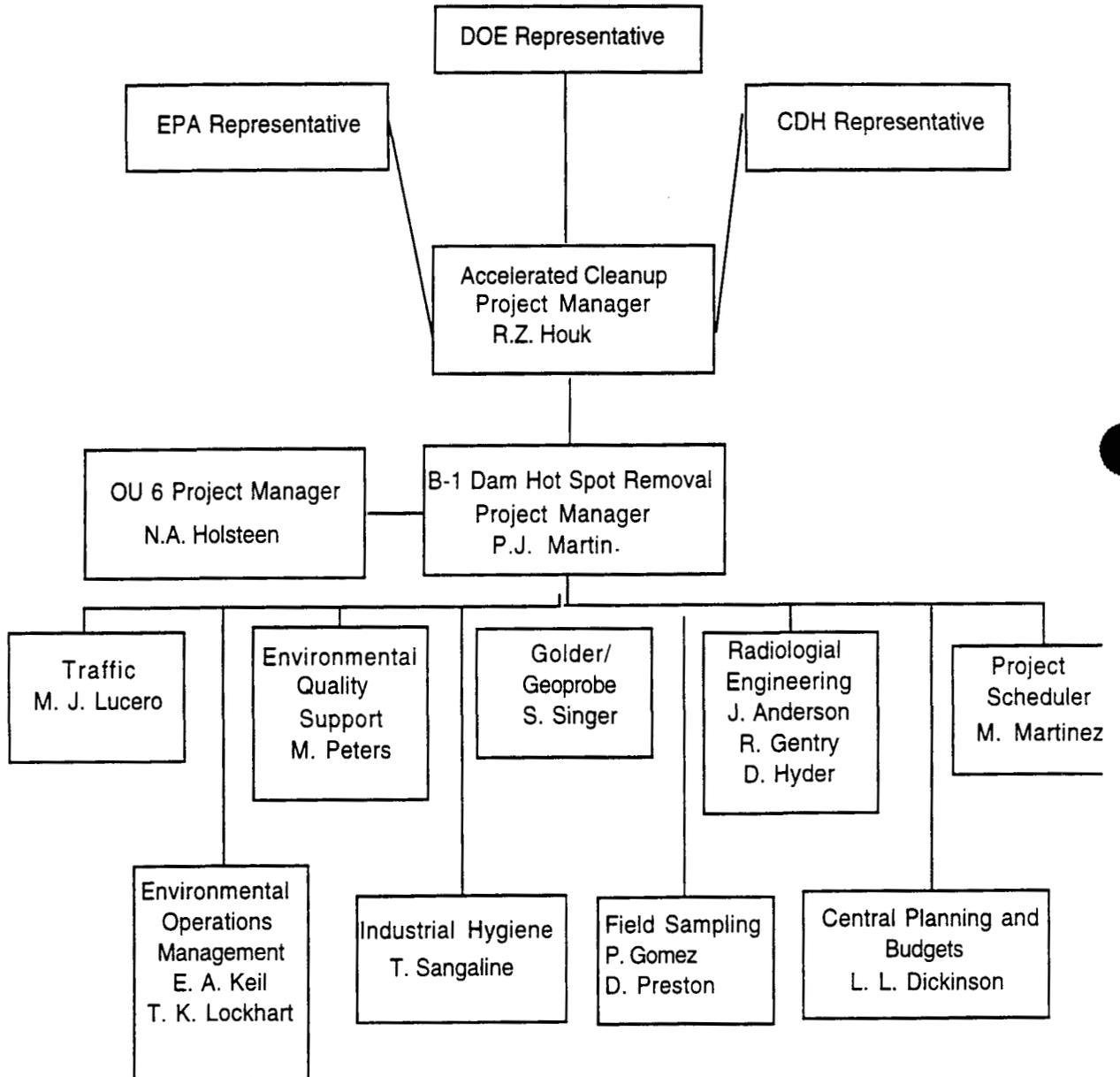
## 5.2 Quality Assurance Program

The EG&G ERM Environmental Quality Support (EQS) department is responsible for preparing this QAA and providing internal quality implementation support (including inspections and surveillance of system acceptance and performance) to ensure that the quality requirements of this QAA and the QAPjP are being implemented. The QAPjP was written to address QA controls and requirements for implementing environmental restoration activities, as required by the RFP IAG.

The content of the QAPjP was driven by the DOE Order 5400.1, the RFP QA Manual (RFP QAM), and the IAG. Both, the DOE Order 5400.1 and the RFP QAM, require a QA program to be implemented based on the American Society of Mechanical Engineers (ASME) NQA-1, *Quality Assurance Requirements for Nuclear Facilities*. The IAG specifies development of a QAPjP in accordance with the Environmental Protection Agency (EPA) QAMS-005/80,

*Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*. The 18-element format of NQA-1 was selected as the basis for both the QAPjP and subsequent QAAs with the applicable elements of QAMS-005/80 incorporated where appropriate. Figure 2-1 of Section 2.0 of the QAPjP illustrates where the 16 QA elements of QAMS-005/80 are integrated into the QAPjP and also into this QAA. Section 2.0 of the QAPjP also identifies other DOE Orders and QA requirement documents to which the QAPjP and this QAA are responsive. The controls and requirements addressed in the QAPjP are applicable to hot spot sampling activities, unless specified otherwise in this QAA. Where site-wide actions are applicable to hot spot sampling activities, the applicable section of the QAPjP is referenced in this QAA.

**FIGURE 5-1**  
**B-1 Dam Hot Spot Removal Organization Chart**



This QAA addresses additional and site/project specific QA controls and requirements that are applicable to SAP activities to be conducted at the B-1 Dam hot spot in OU 6 that may not have been addressed on a site wide basis in the QAPjP. Many of the QA requirements specific to the hot spot removal sampling are addressed in the Final B-1 Dam Sampling and Analysis Plan, and are referenced in this QAA.

### 5.2.1 Training

The minimum personnel qualification and training requirements that are applicable to EG&G and subcontractor staff for RFP ERM Program activities are addressed in Section 2.0 of the QAPjP.

All EG&G and subcontractor personnel that perform quality-related activities on this project will have qualification records that document they are qualified to perform their assigned tasks. The EG&G Project Manager will identify any Rocky Flats Environmental Technology Site (RFETS) area-specific and/or specialized training requirements that are applicable to project personnel.

Job-specific training for field personnel will include:

- Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations training
- OSHA Field Experience Checklist
- RCRA Computer-Based training
- RCRA Supervisors Checklist
- Field Operating Procedures
- Laboratory Analytical Procedures that are applicable to the assigned tasks of the field personnel
- Radiation Worker Level II
- Designated Waste Generator will be RCRA Waste Generator Qualified

In addition to procedures training, EG&G and subcontractor personnel will receive training on (1) the requirements of the QAPjP and (2) the B-1 Dam Sampling and Analysis Plan, including this QAA. This training must be recorded, with verifiable documentation of training submitted to the EG&G Project Manager prior to implementing the sampling and analysis activities described in the SAP.

EG&G and subcontractor personnel will also be qualified to perform the tasks they have been

assigned. Personnel qualifications must be documented, with documentation of qualifications verified by the EG&G Project Manager in accordance with ERM Administrative Procedure 3-21000-ADM-02.02, *Personnel Qualifications*.

## 5.2.2 Quality Assurance Reports

A QA summary report will be prepared at the conclusion of the hot spot removal activities by the EG&G QA Program Manager. This report will include a summary of field operation and sampling oversight inspections, laboratory assessments, surveillances, and a report on data verification/validation results.

## 5.3 Design Control and Control of Scientific Investigations

### 5.3.1 Design Control

The B-1 Dam Sampling and Analysis Plan describes the sampling and analysis techniques, describes analytical requirements, and summarizing data management processes. As such, this SAP is considered the environmental investigation control plan for the hot spot removal sampling and analysis at B-1 Dam.

The QAPjP considers activities that generate analytical data, which requires collection and analysis of environmental samples to be scientific investigations. Controls for scientific investigations include:

- Collecting and analyzing samples according to approved procedures.
- Establishing and implementing quality controls.
- Reducing and reporting data in a controlled manner.

Precision, accuracy, representativeness, completeness, and comparability (referred to as PARCC parameters) are fundamental parameters used to indicate data quality. The PARCC parameters are summarized in Table 5-1. Detailed definitions and determinations of the PARCC parameters are given in ERM Procedure 2-G32-ER-ADM, 08.02, *Evaluation of ERM Data for Usability in Final Reports*, (EG&G, 1994).

**TABLE 5-1  
 PARCC PARAMETER SUMMARY**

	<b>RADIONUCLIDES</b>	<b>ANALYTICAL</b>
<b>PRECISION</b>	RPD $\leq$ 200% for Pu and Am RPD $\leq$ 30% all others	RPD $\leq$ 20% for liquid RPD $\leq$ 30% for solid
<b>ACCURACY</b>	Detection limits in GRRASP	Comparison of LCS with true values
<b>REPRESENTIVENESS</b>	Based on Use of SOPs and Work Plans	Based on Use of SOPs and Work Plans
<b>COMPARABILITY</b>	Based on Use of SOPs and Work Plans	Based on Use of SOPs and Work Plans
<b>COMPLETENESS</b>	90% Usable 100% Lab Validation	90% Usable 100% Lab Validation

**Precision** can be defined as how well sample measurement values compare with each other. This comparison can be quantified by the Relative Percent Difference (RPD) value. An RPD of  $\leq$  30% will be considered acceptable for analytical in soil samples. An RPD of  $\leq$  200% will be considered acceptable for plutonium and americium radiochemistry samples and 30% for all other isotopes. The RPD of plutonium and americium radiochemistry samples is higher than analytical samples because these isotopes are extremely sensitive to Mesoscopic and Microscopic Heterogeneities within the sample.

**Accuracy** can be defined as the agreement of the measured value with the true value of a parameter. For analytical and radiochemistry purposes, accuracy is indicated by the comparison of laboratory control samples to their true values.

**Representativeness** is based on sampling locations and matrices specified in the SAP. The sampling procedures outlined in the SAP will ensure that samples represent the three-dimensional volume of interest (i.e., shallow soils).

**Comparability** is established by use of Department of Energy (DOE) and Environmental Protection Agency (EPA) approved standard operating procedures (SOPs) and analytical/radiochemistry laboratory methods. Field and administrative SOPs are listed Table 5-2. Laboratory methods are listed in Table 5-3. Detection limits for all methods are also given in the GRRASP (EG&G, 1992). When deviations from the standard operating procedures (SOPs) occur, or when new or nonstandard procedures are implemented, a Scientific Notebook System (SNS) will be used as the primary means of documenting quality-related information (analytical method changes are requested from the program chemists and documented in the case narratives).

**Completeness** is defined as usable data from  $\geq 90\%$  of all planned field samples. This will include 100% of the usable data as validated with respect to analytical and radiochemical laboratory analyses.

**TABLE 5-2**  
**FIELD AND ADMINISTRATIVE STANDARD OPERATING PROCEDURES**

EG&G IDENTIFICATION

NUMBER:

PROCEDURE TITLE:

FIELD

- 5-21000-OPS-FO.3 General Equipment Decontamination
- 5-21000-OPS-FO.6 Handling of Personal Protective Equipment
- 5-21000-OPS-FO.7 Handling of Decontaminated Water and Waste Water
- 5-21000-OPS-FO.8 Handling of Drilling Fluids and Cuttings
- 5-21000-OPS-FO.10 Receiving, Labeling, and Handling Environmental Materials Containers
- 5-21000-OPS-FO.11 Field Communications
- 5-21000-OPS-FO.12 Decontamination Facility Operations
- 5-21000-OPS-FO.13 Containerization, Preserving, Handling, and Shipping of Soil and Water Samples
- 5-21000-OPS-FO.18 Environmental Sample Radioactivity Content Screening
- 2-G06-ER-ADM-05.10 Use of Controlled Scientific Notebooks.
- 2-G32-ER-ADM-08.02 Evaluation of ERM Data for Usability in Final Reports
- 4-E42-ER-OPS-GT.08 Surface Soil Sampling
- 5-21000-OPS-FO.16 Field Radiological Measurements
- 4-B11-ER-OPS-FO.25 Shipping Limited Quantities of Radioactive Materials in Samples

ADMINISTRATIVE

- 5-21000-OPS-FO.14 Field Data Management
- 3-21000-ADM-5.01 Document Control
- 3-21000-ADM-15.01 Control of Nonconforming Items and Activities
- 1-50000-ADM-12.01 Control of Measuring and Test Equipment
- 1-50000-16.16 Corrective Action Program
- 5-21000-OPS-FO.02 Field Document Control
- 3-21000-ADM-17.01 Records Management
- 3-21000-ADM-18.03 Readiness Reviews

**TABLE 5-3  
LABORATORY STANDARD OPERATING PROCEDURES**

ANALYTICAL SUITE:

- VOCs
- SVOCs
- Metals
  
- Radionuclides

CONTROLLING DOCUMENTS:

SW-846 METHODS

All laboratory analyses will also adhere to protocols specified in Parts A and B of the EG&G General Radiochemistry and Routine Analytical Services Protocol (GRRASP).  
Part B of the GRRASP.

**5.3.2 DATA QUALITY OBJECTIVE PROCESS**

In addition to the PARCC requirements that are used to assess overall data quality, the following section on Data Quality Objectives (DQO's) is used to identify the actual number of samples that needs to be collected to adequately characterize the contaminated area. This approach is based on radionuclide contamination and utilizes the seven step process and EPA's Decision Error Feasibility Trials (DEFT) program to estimate the number of samples required.

**Step 1 - State the Problem**

The available data in Operable Unit 6 are insufficient to delineate the high concentration areas for Plutonium-239/240 and Americium-241 at the B-1 Dam. In addition, the data regarding the presence or absence of RCRA constituents in soil and sediment are insufficient to plan an appropriate off site waste management strategy. Thus the extent and type of contamination and estimates of the volume of material requiring removal cannot be resolved and a method for remediation cannot be recommended.

**Step 2 - Identify the Decision**

Data collected as part of the B-1 Dam Sampling and Analysis Plan field investigation will be used to confirm the existence of radiological contamination and recommend an appropriate strategy for removal. The characterization data gathered from the sampling plan will also determine whether the soil is a potential RCRA hazardous waste. Knowing this will decide which off site facility is best suited for the type of waste encountered. Either mixed waste or straight radioactive waste.

The Proposed Action Memorandum will recommend that a removal action takes place at the B-1

Dam but the strategy will be finalized with an Integrated Work Control Package (IWCP).

### **Step 3 - Identify Inputs to the Decision**

Data collected during the B-1 Dam Sampling and Analysis Plan field investigation will be used to provide support for developing a removal action strategy. The data collected will consist of:

- Radiological isotopic contamination levels in soils at the hot spot. This will be the most pertinent information generated during this sampling event.
- Field radiological measurements of removed core which will determine depth and areal extent of radiological contamination. Volume of contaminated media can be estimated from this data.
- Total VOAs to determine if the soil is a potential RCRA hazardous waste.
- Semi-VOAs to determine if the soil is a potential RCRA hazardous waste.
- Total Metals to determine if the soil is a potential RCRA hazardous waste.

### **Step 4 - Define the Boundaries of the Study**

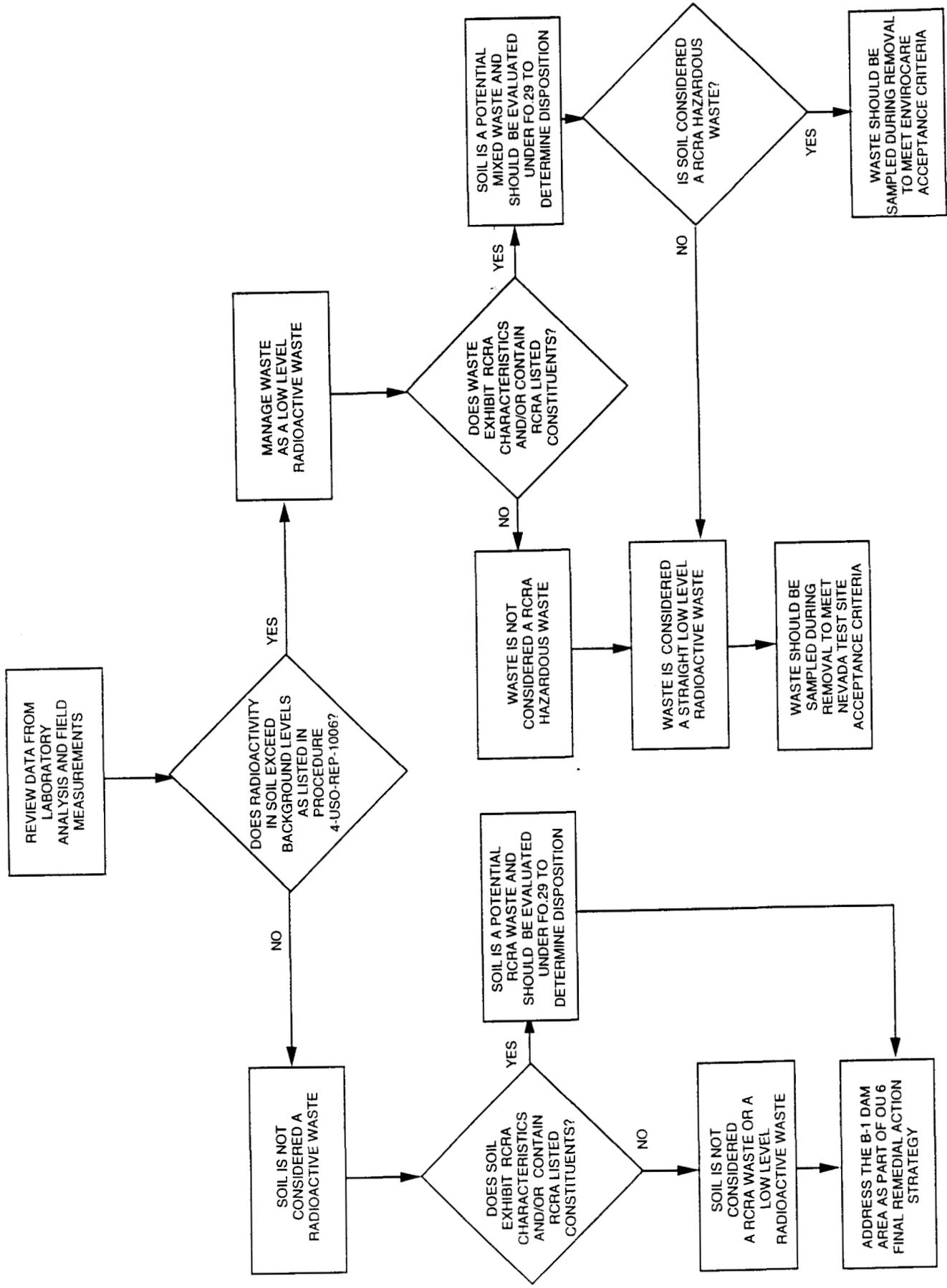
The B-1 Dam hot spot removal project takes place in Operable Unit 6. Most of Operable Unit 6 is located in the buffer zone, beyond the security fence. Current activities in these areas consist of environmental investigations, monitoring, cleanup, and routine maintenance and security surveillance.

The sampling effort will be located outside the boundaries of all Individual Hazardous Substance Sites (IHSSs) designated to OU 6. The investigation will be limited to the RCA.

### **Step 5 - Develop a Decision Rule**

The radiological data collected will be used to determine/verify if a removal action is necessary or if the B-1 dam contamination should be addressed under the final remedial strategy for OU 6. Also, the data will indicate if the waste is a RCRA mixed or non-mixed waste based upon the characteristics of the waste and whether or not listed constituents are detected. A decision rule diagram has been included in Figure 5-2.

**FIGURE 5-2  
B-1 DAM HOT SPOT INVESTIGATION DECISION RULE**



### Step 6 - Specify Acceptable Limits on the Decision Error

One of the activities that will ensure quality of data is the duplicity of radiological measurements in the field compared to laboratory analytical data. The removed cores will be screened with a FIDLER in the field and those cores with the three highest readings will be sent to a laboratory for radioactive isotopic analysis to confirm that contamination exists.

The primary objective of this work plan is to identify the nature and extent of the radiological contamination in order to develop an appropriate remediation strategy. The risk of deciding that the soil at the B-1 dam is not contaminated when it actually is should be minor. The duplicity of field data and laboratory data for radioactivity in soil should minimize this possibility. If the decision error is made, however, then the B-1 Dam area would be evaluated as part of the OU 6 final remedial action strategy.

Two errors are possible in the decision of whether or not radioactive soils are above or below the local background levels of contamination. The first possibility is to decide that soils do not exceed local background when they actually do (False Positive) and the second is to decide that the soils are above local background when they actually are not (False Negative).

Two errors are also possible in the decision of whether or not the soils contain RCRA constituents. The first possibility is to decide that soils do not exceed RCRA action levels when they actually do (False Positive) and the second is to decide that the soils are above RCRA action levels when they actually are not (False Negative).

The risk of making a decision error in either direction is minimal, due to the extensive FIDLER screening and soil and sediment sampling. The risk of making a decision error on the existence of RCRA constituents is also minimal due to the extensive soil and sediment sampling. The consequence of deciding that soils do not exceed local background when they actually do is to possibly endanger human health and the environment. Also, additional costs may be incurred at a later date for environmental cleanup. The consequence of deciding that soils exceed local background when they actually do not will be the additional costs incurred performing unnecessary excavation and the associated waste disposal costs.

If the soil sampled is determined to be contaminated with radioisotopes when it actually is not contaminated, the outcome should be inconsequential. This preliminary data will decide only how the removal will take place, not what will be removed. During the removal action, soils will be analyzed again with field instrumentation (i.e., FIDLER) to decide if it exceeds background and

should be removed. Once again, the removed soil will undergo laboratory analysis to meet waste acceptance criteria before being shipped off site to a disposal facility.

The Quality Assurance Addendum includes quality assurance/quality control procedures that will be implemented to minimize sample collection and data transfer errors. This will further ensure that the correct decisions will be made. To define decision errors and assess the potential consequences of incorrect decisions, it is necessary to determine the range of possible concentrations on either side of a numerical standard where the consequences of a of decision errors are relatively minor(defined by the value of delta), assign probability values for Type I and Type II errors(i.e. alpha and beta) that reflect the acceptable probability for the occurrence of decision errors, and check the limits on the decision errors to ensure that they accurately reflect the relative consequences for each type of decision error.

DQOs were established to make decisions on the number of samples required with a 95% level of confidence. The EPA's Decision Error Feasibility Trials(DEFT), Version 3.01, EPA, 1994 was used to determine the appropriate number of samples to be collected to characterize and determine the extent of contamination of the soils and sediments at the hot spot. The isotope of concern's maximum value was derived from a sediment sample taken at the B-1 dam in May of 1993. Action levels, as required by the DEFT program, were based on Programmatic Risk Based Preliminary Remediation Goals(PRGs). The null hypothesis  $H_0$  mean < action level was chosen for this project. This hypothesis will result in a 95% confidence interval, indicating only a 5% chance of the mean being higher than the action level(false positive).

Appendix B, Quality Assurance Addendum, includes quality assurance/quality control procedures that will be implemented to minimize measurement error to the extent practical.

**TABLE 5-4 DEFT Software Input/Output Parameters**

Isotope of Concern	Minimum Value (pCi/g)	Maximum Value (pCi/g)	Standard Deviation	Action Level (pCi/g)	Gray Region (95% conf.)	Number of Samples
Pu-239/240	0.0	1927	321	3.43	L: 3.43 U: 965	3
Am-241	0.0	157.7	26.3	2.37	L: 2.37 U: 80.0	3
U-235	0.0	0.7521	0.13	0.17	L: 0.17 U: 0.46	4
U-238	0.0	7.898	1.32	0.80	L: 0.8 U: 4.35	3

**Step 7 - Optimize the Design**

Step 7 describes the procedures that will be implemented to obtain data of acceptable quality and quantity to make the required decisions. Step 7 will utilize the previous 6 steps in its development. Since DQO development is an iterative process, the conclusions from one step may influence prior steps and cause them to be redefined.

The DQOs in this section represent the uncertainty that decision makers are willing to accept in results derived from environmental data using the criteria in the previous steps. The DQOs were established to determine the number of samples needed to adequately establish the level of radiological contamination with a 95% level of confidence. The EPAs Decision Error Feasibility Trials (DEFT), Version 3.01, was used to determine the number of samples to be collected. The isotopes estimated maximum value was used for the upper value and the action levels were based on the draft Preliminary Remediation Goals (PRGs). Because of the very limited amount of

previous data, the program default values were used for the standard deviation and grey region limits. The number of samples obtained from the DEFT program, using the previous inputs, determined that 3 samples of Plutonium-239/240 and Americium-241 would be adequate to determine if the concentrations of radioisotopes exceed the PRGs.

The sampling plan consists of drilling 10 cores approximately 10 feet in depth spaced evenly within the RCA with the geoprobe sampler. The locations will be determined by the project manager in the field. Each core removed by the geoprobe will measure approximately 2 feet in depth and will be analyzed with a FIDLER instrument in the field for radioactivity measurements in accordance with RFP Procedure 5-21000-OPS-FO.16 *Field Radiological Measurements*. These FIDLER measurements will then be recorded with respect to depth. The 2 foot cores with the three (3) highest readings will be shipped for radioactive isotope and RCRA analysis. Samples shall be packaged, transported, and stored in accordance with RFP Procedure 5-21000-OPS-FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples*. The three cores selected for analysis will be sampled according to the methods listed in Table 5-5 Estimated Number of Samples and Analytical Methods.

**TABLE 5-5 Estimated Number of Samples and Analytical Methods**

Number of Samples	Analytical Method / Instruments	Analytes	Type of Sample
5	SW-846 8240	Volatile Organic Analytes	Soil Characterization (3) Duplicate for Soil Characterization (1) Trip Blanks for Characterization (1)
4	SW-846 8270	Semi-Volatile Organic Analytes	Soil Characterization (3) Duplicate for Soil Characterization (1)
4	EPA-CLP TAL List	Metals	Soil Characterization (3) Duplicate for Soil Characterization (1)
4	SW-846 8080/8150	PCB/PEST/HERB	Soil Characterization (3) Duplicate for Soil Characterization (1)
3	GRRASP Specific	Radiological Screening	Radiological Screening for Shipping (3)
4	GRRASP Specific	Pu-239, 240	Radiological Characterization (3) Duplicate for Radiological Characterization (1)
4	GRRASP Specific	Am-241	Radiological Characterization (3) Duplicate for Radiological Characterization (1)
4	GRRASP Specific	U-233, 234, 235, 238	Radiological Characterization (3) Duplicate for Radiological Characterization (1)
4	GRRASP Specific	Gross Alpha and Beta	Radiological Characterization (3) Duplicate for Radiological Characterization (1)

**5.3.3 Equipment Decontamination**

Sampling equipment that is used at more than one location shall be decontaminated between sampling locations in accordance with Field Operations Procedure OPS-FO.03, *General Equipment Decontamination*. Other equipment (e.g., backhoe, if used) potentially contaminated

during excavation shall be decontaminated as specified in Procedure OPS-FO.04, *Heavy Equipment Decontamination*.

#### **5.3.4 Quality Control**

Field sampling quality control will consist of:

- Collection of field duplicate samples will be at a minimum of 1 per 20 samples.
- Preparation and analysis of an equipment rinsate blank for every 20 borehole samples collected (at a minimum or at least one rinsate blank if 20 borehole samples are not collected).
- Trip blanks for VOC analysis.

#### **5.3.5 Quality Assurance Monitoring**

To ensure the overall quality of the borehole sampling and analysis activities associated with the SAP for the B-1 Dam Hot Spot Removal Project, field oversight inspections will be conducted during sampling and analysis activities. Field oversight inspections to be conducted by the ERM Environmental Quality Support department will include:

- Random field inspections.
- Various intervals of audits and surveillance.
- A minimum of one surveillance per each field activity.

#### **5.3.6 Data Reduction, Validation, and Reporting**

Data evaluation and reporting requirements for field and laboratory data are discussed in Appendix A, the Data Management Plan for the B-1 Dam Sampling and Analysis Plan.

### **5.4 Document Control**

Documents produced by EG&G that control the work described in this Sampling and Analysis Plan will be "controlled" to ensure that key project personnel receive accurate and up to date information. Such documents will be controlled in accordance with Section 6.0 of the QAPjP and with ERM Procedure 3-21000-ADM-5.01, *Document Control*.

## 5.5 Control of Purchased Items and Services

Procurement documents for items and services procured under this project, including services for conducting field sampling and analysis, will be prepared, handled, and controlled in accordance with the requirements and methods specified in Section 4.0 of the QAPjP and in ERM Procedure ADM-4.01, *Procurement Document Control*, including retention of purchase order receipts, contracts, or any other documentation related to the integrity/traceability of the purchased product or service.

Subcontractors that provide services in support of the SAP activities will be selected and evaluated as outlined in Section 7.0 of the QAPjP. This includes pre-award evaluation/audit of proposed subcontractors as well as periodic assessment of the acceptability of contractor performance during the project. Any items or materials that are purchased for use during the sampling, analysis, and other SAP activities that have the ability to affect the quality of the data should be inspected upon receipt.

## 5.6 Identification and Control of Equipment/Items

Borehole samples will be identified, handled, containerized, shipped, and stored in accordance with EM Operating Procedure 5-21000-OPS-FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples*. Sampling identification and COCs will be maintained through the application of Section 8.0 of the QAPjP and of Procedure 5-21000-OPS-FO.13, which provides instructions for preparing COC forms.

A sample COC will be initiated at the time the samples are collected and maintained through all transfers of custody until the sample is received at the testing laboratory. Samples shall be logged in upon receipt at the analytical laboratory and sample tracking throughout the analytical process will be maintained in accordance with laboratory procedures.

## 5.7 Control of Sampling and Analysis Processes

The overall process of collecting and analyzing samples require control. The processes are controlled by adhering to the SAP and the sampling and analytical procedures referenced. The requirements for:

Sample Collection are addressed in Section 3.0 of the SAP.

Sample Analyses are addressed in Section 4.0 of the SAP.

Data Input will be addressed in Appendix A, Data Management Plan, of the SAP.

## **5.8 Inspection and Assessment**

Quality related activities are subject to inspection and assessments. These assessments will be performed formally in accordance with EG&G procedures (e.g., Procedures 3-21000-ADM-10.01 and/or -ADM-18.02) or informally as requested by line management. The work place and working records will be accessible during normal working hours for verification or audit by EG&G or its representatives during the performance of this project.

Any nonconformances identified during formal assessments will be documented with Nonconformance Reports in accordance with Section 15.0 of the QAPjP and EM Administrative Procedure 3-21000-ADM-15.01, *Control of Nonconforming Items and Activities*. Independent audits of the project may be conducted by the ERM EQS organization in accordance with QA procedures.

## **5.9 Control of Measuring and Testing Equipment**

Measuring and test equipment (M&TE) used in the screening of samples will be selected, identified, calibrated, and maintained in accordance with the methods established in RFP Administrative Procedure 1-50000-ADM-12.01, *Control of Measuring and Test Equipment*. The M&TE requirements of Section 12.0 of the QAPjP are implemented through operating procedures specific to the sampling/analysis event, manufacturers instructions, and specific laboratory procedures. In addition, field equipment utilized during sampling activities will include the FIDLER. Field equipment documentation will be made on forms identified in Appendix A, Data Management Plan, of this SAP. Laboratory equipment usage will be conducted in accordance to the GRRASP requirements.

## **5.10 Handling, Storage, and Shipping**

Samples shall be packaged, transported, and stored in accordance with RFP Procedure 5-21000-OPS-FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples*.

## **5.11 Status of Inspections, Tests, and Operations**

The status of the sampling and analysis inspections, start up SAP activities, log of monitoring wells and boreholes, and sustained operations shall be documented according to the requirements

of Section 14.0 of the QAPjP.

### 5.12 Control of Nonconformances

The requirements for the identification, control, evaluation, and disposition of nonconforming items, samples, and data will be implemented as specified in Section 15.0 of the QAPjP. Items, samples, and data that do not conform to specifications and/or requirements shall be identified, segregated (where necessary to prevent inadvertent use), dispositioned, and evaluated in accordance with approved procedures. Nonconformances related to the design, construction, installation, or testing of the testing system, and any waste related nonconformance, shall be controlled in accordance with ERM Procedure 1-50000-ADM-15.01, *Control of Nonconforming Items, Samples, and Data*.

### 5.13 Corrective Action

The identification, reporting, closeout, and documentation of significant conditions adverse to quality will be accomplished in accordance with Section 16.0 of the QAPjP and with ERM Procedure 1-50000-16.16, *Corrective Action Program*. Conditions adverse to quality identified by the implementing contractor will be documented and submitted to EG&G for processing as outlined in the QAPjP.

### 5.14 Quality Assurance Records

Field QA records will be controlled in accordance with RFP Procedure 5-21000- OPS-FO.02, *Field Document Control*. Project records that are considered ERM QA records include, but are not necessarily limited to:

- The final report, (including all appendixes)
- Procurement documents
- Supplier/subcontractor evaluations
- Inspection records
- Test records
- Logbooks
- Sampling records
- Sample COC records
- Analytical data packages
- Action plans
- Operation manuals
- Noncompliance Reports (NCRs)

Corrective Action Reports (CARs)

Audit reports

Surveillance reports

Self-assessment reports

Personnel training and qualification records

The QAPjP

Administrative and operating procedures referenced herein

Other project records that are used to support observations and conclusions in the final report.

All ERM QA records generated will be submitted to the ERM Project File for processing according to ERM Procedure 3-21000-ADM-17.01, *Records Management*.

#### **5.15 Quality Verification**

QA surveillances and audits will be periodically conducted by the EG&G EQS department throughout the duration of the project to verify the quality of project data. Readiness reviews will be conducted according to ERM Procedure 3-21000-ADM - 18.03, *Readiness Reviews*.

#### **5.16 Software Control**

The requirements for the control of software are not applicable to the SAP activities to be performed at the B-1 Dam hot spot removal.