RF/RMRS-99-355

Sampling and Analysis Plan for the Installation of a Fire Hydrant Along Tenth Street in the Protected Area

May 1999
Revision 0

SAMPLING AND ANALYSIS PLAN FOR THE INSTALLATION OF A FIRE HYDRANT ALONG TENTH STREET IN THE PROTECTED AREA

RF/RMRS-99-355

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May, 1999

This Sampling and Analysis Plan has been reviewed and approved by:

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ACRONYMS

ALARA	As Low as Reasonably Achievable
Am	Americium
ASD	Analytical Services Division
CDPHE	Colorado Department of Public Health and Environment
COC	Contaminant of Concern
DOE	U. S. Department of Energy
DQO	Data Quality Objective
EDD	Electronic Disc Deliverable
EMD	Environmental Management Department
EPA	U. S. Environmental Protection Agency
ER	Environmental Restoration
FID	Flame Ionization Detector
FIDLER	Field Instrument for the Detection of Low Energy Radiation
$HN0_3$	Nitric acid
HRR	Historical Release Report
HSS	Health and Safety Specialist
IHSS	Individual Hazardous Substance Site
IMP	Integrated Monitoring Plan
K-H	Kaiser-Hill
PA	Protected Area
PAC	Potential Area of Contamination
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PID	Photoionization detector
PM	Project Manager
PPE	Personal protective equipment
Pu	Plutonium
QA/QC	Quality Assurance/Quality Control
QAPD	Quality Assurance Program Description
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RIN	Report Identification Number
RMRS	Rocky Mountain Remediation Services, L.L.C.
RPD	Relative Percent Difference
RWP	Radiological Work Permit
SAP	Sampling and Analysis Plan
SOPs	Standard Operating Procedures
SWD	Soil and Water Database
TAL	Target Analyte List
TCL	Target Compound List
U	Uranium
VOC	Volatile Organic Compound

LIST OF APPLICABLE STANDARD OPERATING PROCEDURES (SOPs)

Identification Number	Procedure Title
RF/RMRS-98-200	*Evaluation of Data for Usability in Final Reports*
2-S47-ER-ADM-05.15	*Use of Field Logbooks and Forms*
RMRS/OPS-PRO.127	*Field Decontamination Operations,*
RMRS/OPS-PRO.070	*Decontamination of Heavy Equipment at Decontamination Facilities*
RMRS/OPS-PRO.128	*Handling of Purge and Development Water*
5-21000-OPS-FO.06	*Handling of Personal Protective Equipment*
RMRS/OPS-PRO.112	*Handling of Field Decontamination Water and Field Wash Water*
4-K55-ENV-OPS-FO.10	*Receiving, Marking, and Labeling Environmental Materials Containers*
RMRS/OPS-PRO.069	*Containing, Preserving, Handling and Shipping of Soil and Water Samples*
5-21000-OPS-FO.15	*Photoionization Detectors and Flame Ionization Detectors*
5-21000-OPS-FO.16	*Field Radiological Measurements*
RMRS/OPS-PRO.101	*Logging Alluvial and Bedrock Material*
RMRS/OPS-PRO.115	*Monitoring and Containerizing Drilling Fluids and Cuttings*
RMRS/OPS-PRO.117	*Plugging and Abandonment of Boreholes*
RMRS/OPS-PRO.102	*Borehole Clearing*
RMRS/OPS-PRO.123	*Land Surveying*
RMRS/OPS-PRO.124	*Push Subsurface Soil Sampling*
RMRS/OPS-PRO.105	*Water Level Measurements in Wells and Piezometers*
RMRS/OPS-PRO.108	*Measurement of Groundwater Field Parameters*
RMRS/OPS-PRO.113	*Groundwater Sampling*
RMRS/OPS-PRO.072	*Field Data Management*
RM-06.02	*Records Identification, Generation and Transmittal*
RM-06.04	*Administrative Record Document Identification and Transmittal*

SAMPLING AND ANALYSIS PLAN FOR THE INSTALLATION OF A FIRE HYDRANT ALONG TENTH STREET IN THE PROTECTED AREA

1.0 INTRODUCTION

Rocky Mountain Remediation Services, L.L.C. (RMRS) has prepared this Sampling and Analysis Plan (SAP) for the Department of Energy (DOE) at the Rocky Flats Environmental Technology Site (RFETS). Activities performed during this investigation are being conducted under guidance provided in the RFETS Integrated Monitoring Plan (IMP) and the Rocky Flats Cleanup Agreement (RFCA).

1.1 Purpose

This SAP describes the soil sampling and analysis of three Geoprobe boreholes associated with the removal of an old fire hydrant and installation of a new fire hydrant in the Protected Area (PA) at RFETS. The new hydrant will be located east of Tents 3 and 4 on the 750 Pad, along Tenth Street, in the PA (Figure 1-1). The activities presented in this SAP are designed to accomplish the objective of assessing the impact of potential soil contamination in the area on activities associated with construction of the hydrant. The Geoprobe work is being performed to ensure construction worker safety and to ensure that there is not a Resource Conservation and Recovery Act (RCRA) issue with the excavated material. The potential RCRA issue would be the storage, and/or disposal of a RCRA waste generated during the drilling and construction phases of this project. This project will be performed in accordance with applicable Federal, State, and local regulations and agreements, as well as DOE Orders, RFETS policies and procedures, and Environmental Restoration (ER) Operating Procedures.

Field activities planned under this SAP are limited to advancing three Geoprobe boreholes, soil sampling, and potentially groundwater sampling activities. The purpose of this SAP is to define the project objectives, tasks, specific data needs, sampling and analysis requirements, data handling procedures, associated Quality Assurance/Quality Control (QA/QC) requirements, and schedule for this project. All work will be performed in accordance with the RMRS Quality Assurance Program Description (QAPD) (RMRS, 1998a, Rev. 2).

1.2 Background

The 750 Pad is located in the PA at RFETS and is used for the storage of pondcrete and saltcrete waste. Pondcrete consists of solidified low-level radioactive and hazardous waste extracted from the Solar Evaporation Ponds. Saltcrete consists of solidified low-level radioactive and hazardous waste extracted from process waste by distillation at Building 374. The 750 Pad is immediately upgradient of the new hydrant construction site. The work area is in or near Individual Hazardous Substance Site (IHSS) 214 and associated Potential Area of Concern (PAC) 700-214. IHSS 214 was established based on past operations at the 750 Pad, specifically the storage of pondcrete and saltcrete. Releases have occurred over the years that may have resulted in contamination of nearby surface soils. The contaminants of concern (COCs) are volatile organic compounds (VOCs), metals, and radionuclides. There is little data available relating to the specific metals and VOCs, and their concentrations, which may potentially be encountered. Plutonium (Pu-239/240) and americium (Am-241) are the radionuclides that may be encountered.

It is possible that groundwater will be encountered during completion of the Geoprobe boreholes, and during removal of the old hydrant and installation of the new hydrant. Therefore, this SAP provides for the possibility of encountering groundwater.

1.2.1 Potential Areas of Contamination (PACs)

The PACs were established at RFETS as a result of documented spill incidents.

1.2.1.1 Pertinent 750 Pad PAC

PAC 700-214 is the only potential area of concern associated with this project, and encompasses the 750 Pad pondcrete and saltcrete storage area. The storage area has been in operation from 1986 to the present. Numerous spills of pondcrete and saltcrete have been documented since 1988 (DOE, 1992a). All ruptured pondcrete and saltcrete containers were repackaged, and spilled material was cleaned from the pad surface and containerized. A surface water runoff containment structure was constructed around the pad. Portable buildings (tents) were constructed to prevent precipitation from coming in contact with the waste (DOE, 1992a)

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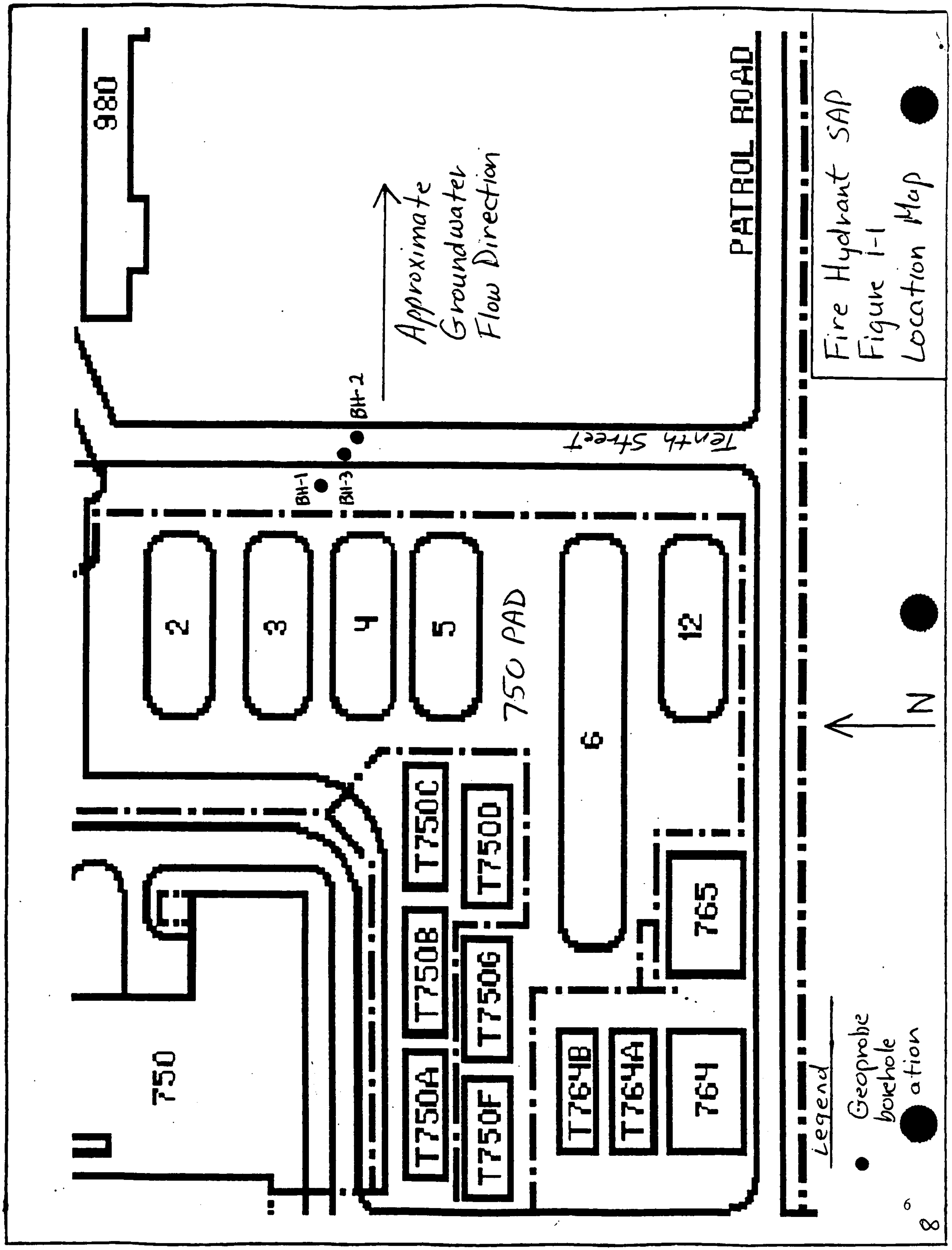
Figure 1- 1 Site Location, Proposed Geoprobe Locations



1.3 Hydrogeologic Setting

The RFETS is situated on a gently eastward sloping topographic and bedrock pediment surface mantled by, depending on location, unconsolidated Rocky Flats Alluvium and/or colluvium, and underlain mainly by claystones and siltstones of the Cretaceous Laramie Formation (EG&G, 1995a). The 750 Pad lies on a thin veneer of Rocky Flats Alluvium.

The thickness of the alluvium at the 750 Pad was estimated from monitoring wells 05293 and P207389, which are located approximately 310 feet northwest of the construction site. The thickness of alluvium at wells 05293 and P207389 is 6.6 and 7.0 feet, respectively. The depth to groundwater in alluvial well 05293 ranges from approximately 6 to 9 feet, depending on the season and the amount of recharge the well has experienced (RMRS, 1998b). Groundwater at the 750 Pad is presumed to flow in an easterly direction.

The presence of subsurface barriers or artificial sinks, such as building basements, foundation drains, deep storm drains, excavations, and buried utility corridors can locally alter groundwater flow directions and lead to containment or spreading of contaminant plumes. There are no foundation drains associated with the 750 Pad, however, just northeast of the site there is a storm sewer outfall which emanates from the 700-complex. The effect of these manmade features on the water table is expected to be greatest during spring when water levels reach seasonal highs and interact more extensively with the subsurface drainage structures.

2.0 SAMPLING RATIONALE

Historical information detailed in Section 1.2 provides general indications of the types of compounds anticipated in soils at the hydrant construction area, and was used to develop a systematic sampling strategy for this investigation. The sampling rationale also accounts for the presumed direction of groundwater flow evaluated for the area in Section 1.3. Geoprobe boring locations have been selected based on the location of the construction of the hydrant and associated appurtenances. Groundwater samples will only be collected if groundwater is encountered within eight feet of the ground surface. The following conditions were considered in the development of the sampling strategy:

- The operating history of the 750 Pad indicates that volatile organic, uranium isotopes, plutonium and americium may have been released to the environment from surface sources;

- The physical and chemical properties of these contaminants suggest a chronic presence if released into the environment; and

- Subsurface Industrial Area structures and operations may cause local effects on groundwater flow direction and discharge that affect the sampling strategy.

The conceptual model of contaminant migration to groundwater involves percolation of liquids and leaching of contaminants from surface soils and foundations and drains downward through the unsaturated zone to the water table, and leaching of contaminants from subsurface waste lines during high water table periods. After contaminants encounter the saturated zone, contaminant migration will proceed laterally and follow the principal direction of groundwater flow. Contaminant movement in the unsaturated and saturated zones may be retarded to various degrees by sorption, volatilization, or biodegradation, depending on the chemical behavior of the contaminant. Contaminant concentrations may also be reduced by dispersion during migration. Paved portions of the 750 Pad, which encircle much of the area out to the surrounding streets, are expected to significantly impede contaminant migration from the surface. As a result most precipitation and surface runoff is diverted to the storm water drainage instead of percolating through surface soils.

3.0 DATA QUALITY OBJECTIVES

The data quality objective (DQO) process consists of seven steps and is designed to be iterative; the outputs of one step may influence prior steps and cause them to be refined. Each of the seven steps are described below for the investigative area presented in Figure 1-1. Data requirements to support these investigations were developed and are implemented in the project using criteria established in *Guidance for the Data Quality Objective Process*, QA/G-4 (EPA 1994).

3.1 State the Problem

To summarize the problem, a new fire hydrant is being constructed near IHSS 214 and associated PAC 700-214 (750 Pad area). Previous investigations near IHSS 214 have identified various types of contamination (VOCs, metals, plutonium and americium) that have either been released to soils or leaked from various subsurface lines and/or sumps. The purpose of this investigation is to establish soil geochemical conditions at the site prior to construction activities, and to determine the presence or absence of potential hazardous and/o radioactive contamination located in soil at the construction site.

3.2 Identify the Decision

This step identifies what questions the study will attempt to resolve, and what actions may result. Characterization data collected for this study will be used to make the following decisions. The following are questions that may be answered by this study:

- Do COCs from the soil excavated during activities associated with construction of the fire hydrant have the potential to impact worker safety?
- Will concentrations of potential contaminants in soil result in cost prohibitive waste generation?

3.3 Identify Inputs to the Decision

Inputs to the decision include radiochemical and chemical results from soil and groundwater (if groundwater is encountered) samples collected from the Geoprobe holes. The parameters of interest include the analyses outlined in Table 4-1, *Soil and Groundwater Sampling and Analysis Program.*

3.4 Define the Boundaries

The investigative boundary is shown on Figure 1-1.

3.5 Decision Rule

If the radiochemical activities or chemical concentrations in the soil exceed established Rocky Flats Cleanup Agreement (RFCA) guidelines an evaluation of potential impacts is required. The action levels for the individual constituents are not given at this time as the individual VOCs and metals potentially to be encountered are not known.

3.6 Limits on Decision Errors

Tolerable limits on decision errors will be described in the Project Health and Safety Plan since the project objective is to ensure worker safety during excavation for a new fire hydrant.

3.7 Optimize the Design

Additional characterization, if required, will be based upon an evaluation of data collected under this SAP. If further characterization is required, based on laboratory analytical results, then the results of this investigation will be used to design additional characterization field activities associated with the installation of the new hydrant.

4.0 SAMPLING ACTIVITIES AND METHODOLOGY

4.1 Geoprobe Boring Locations

The three Geoprobe borings will be located so that they are just inside the outer edge of the excavation needed to remove the old hydrant and associated appurtenances.

4.1.1 Pre-Drilling Activities

Before drilling activities begin, all locations will be cleared in accordance with RMRS/OPS-PRO.102, *Boreh[illegible] Clearing*, and marked in accordance with RMRS/OPS-PRO.124, *Push Subsurface Soil Sampling*. A radiological survey will be conducted before site work begins in accordance with 5-21000-OPS-FO.16, *Field Radiological Measurements*. All necessary health and safety protocols will be followed in accordance with the Project Health and Safety Plan.

4.1.2 Borehole Drilling and Logging

Borings will be drilled using push-type techniques (Geoprobe) at all proposed locations. Detailed drilling and sampling procedures using this method are provided in OPS-PRO.124. If probe refusal is encountered before reaching the target borehole depth of approximately 8 feet, the boring will be abandoned using procedure OPS-PRO.117, *Plugging and Abandonment of Boreholes*, and an offset boring will be attempted within 3 feet of the original boring. If probe refusal occurs on the third attempt, the total depth will be recorded from the deepest Geoprobe boring at that location.

Soil cores will be recovered continuously in at least two-foot increments using a 2-inch diameter (or 2.125-inch diameter for the dual-wall system) by 24- to 48-inch long stainless steel- or lexon-lined core barrel. Two soil samples from each borehole will be submitted to the analytical laboratory; one collected just below the pavement and the other a composite of total depth (minus the initial sample interval) or to just above the water table, if encountered. Cores will be monitored following recovery, for health and safety purposes, with a Flame Ionization Detector (FID) or a Photoionization Detector (PID), as appropriate, in accordance with Site Procedure 5-21000-OPS-FO.15, *Photoionization Detectors and Flame Ionization Detectors*. The core samples will then be boxed and logged in accordance with OPS-PRO.101, *Logging Alluvial and Bedrock Material*, except that logging will be conducted more qualitatively than specified in OPS-PRO.101 (i.e., sieving, examination with a microscope, and plasticity testing will not be conducted).

All core boxes will be labeled and transferred to an ER core storage conex for archiving following project completion. Land surveying of Geoprobe borehole locations (± 1.0 foot) and elevations (± 0.01 foot) will be conducted as per RMRS/OPS-PRO.123, *Land Surveying*, to provide horizontal and vertical control for borehole location.

4.2 Sample Designation

The Site standard sample numbering system will be implemented in this project, 1) a standard Report Identification Number (RIN) sample number will be assigned to the project by the Analytical Services Division (ASD), and 2) an RMRS sample number will be assigned for internal sample tracking. The block of sample numbers will be of sufficient size to include the entire number of possible samples (including QA samples) and location codes. For reporting purposes, the ASD and RMRS sample numbers will be cross-referenced with location codes.

4.3 Sample Collection and Analysis

All sampling equipment will be decontaminated with a Liquinox solution, and rinsed with deionized or distilled water, in accordance with OPS-PRO.127, *Field Decontamination Operations*. Field forms will include standard items such as chain of custody seals and forms, drilling logs, field calibration logs and investigation derived materials forms. Samples will be submitted to an offsite, EPA-approved laboratory for analysis with a 30-day turnaround time.

Health and safety requirements will be specified in the Project Health and Safety Plan. Personal protective equipment (PPE), air monitoring requirements, and hazard assessments will be addressed in the Project Heal[th] and Safety Plan.

4.3.1 Soil Sampling

Subsurface soil sampling is being conducted to characterize the vertical distribution of potential COCs present in the vicinity of the new hydrant. Soil samples will be collected using the methods specified in OPS-PRO.124, *Push Subsurface Soil Sampling.* Sampling intervals for subsurface soil will be approximately every two feet below ground surface. Two soil samples at from each borehole will be sent to the analytical laboratory. One will be collected just below the pavement and the other will be a composite of the rest of the borehole or to just above the water table, should groundwater be encountered. Table 4-1 summarizes the sampling and analysis program for soil.

Table 4-1 Soil and Groundwater Sampling and Analysis Program

Analysis	Matrix	EPA Method	Container	Preservation	Holding Time
Target Analyte List (TAL) Metals	Soil	EPA CLP SOW for Inorganics	4-oz. Plastic	None	Hg, 28 days; others, 6 months
Target Analyte List (TAL) Metals	Water	EPA CLP plus additional metals	1 (one) 1-liter poly bottle	Field filtered (0.45 μm membrane), Cool to 4° C, HNO_3 to pH<2	180 Days
Target Compound List (TCL) Volatiles	Soil	EPA CLP SOW	4-oz. Glass	Cool to 4° C	10 days
Target Compound List (TCL) Volatiles	Water	EPA 524.2	3 (three) 40 ml amber glass (AG) vials with teflon-lids	Unfiltered, Cool to 4° C	14 days
Uranium Isotopes (U233/244, U235, and U-238)	Soil	Alpha Spectrometry; N/A	125 ml glass or poly jar	None	Not specified
Uranium Isotopes	Water	N/A[a]	1 (one) 1-liter	Field filtered (0.45 μm membrane),	180 days

Table 4-1, Continued

Analysis	Matrix	EPA Method	Container	Preservation	Holding Time
(U233/244, U235, and U-238)			poly bottle	HNO_3 to pH < 2	
Am-241, Pu-239/240	Soil	Alpha Spectrometry, N/A	125 ml glass or poly jar	None	Not specified
Am-241, Pu-239/240	Water	N/A[a]	1 (one) 1-gallon poly bottle	Unfiltered, HNO_3 to pH < 2	180 days
DOT Rad Screen	Soil	Gas Flow Proportional Counting, N/A[a]	60 or 125 ml glass or poly jar	None	6 months
DOT Rad Screen	Water	N/A[a]	1 (one) 125 ml poly bottle	Unfiltered	180 days

[a] No EPA-approved method is currently in place for isotopic analysis. However, the laboratories perform isotopic analysis according to the ASD Statement of Work for Analytical Measurements, Module RC01B.

4.3.2 Groundwater Sampling

In the event that groundwater is encountered during drilling, one groundwater sample will be collected from each borehole. Groundwater samples, if necessary, will be collected using the methods specified in OPS-PRO.108, *Measurement of Groundwater Field Parameters*, and OPS-PRO.113, *Groundwater Sampling*. Groundwater samples will be collected by inserting teflon tubing through the Geoprobe drill rods and retrieving a sample with a peristaltic pump. Table 4-1 summarizes the sampling and analysis program for groundwater.

4.3.3 Radiological Screening

If necessary, a Health and Safety Specialist (HSS) or Radiological Control Technician (RCT) will scan each sample with a Field Instrument for the Detection of Low Energy Radiation (FIDLER). Equipment will also be monitored for radiological contamination during and after sampling activities. Samples sent offsite for analysis will require evaluation under 49 CFR 173, the U.S. Department of Transportation's (DOT) radioactive materials criteria of 2,000 pCi/g, total radioactivity. Table 4-1 includes the requirements for collecting radiological screening samples.

4.4 Sample Handling

Samples will be handled according to RMRS/OPS-PRO.069, *Containing, Preserving, Handling, and Shipping of Soil and Water Samples*, and 4-K55-ENV-OPS-FO.10, *Receiving, Marking, and Labeling Environmental Materials Containers.*

4.5 Equipment Decontamination and Waste Handling

Reusable sampling equipment will be decontaminated in accordance with procedure OPS-PRO.127, *Field Decontamination Operations*. Decontamination waters generated during the project will be managed according to procedure OPS-PRO.112, *Handling of Field Decontamination Water and Field Wash Water*. Geoprobe equipment will be decontaminated following project completion using procedure OPS-PRO.070, *Decontamination of Heavy Equipment at Decontamination Facilities*. Personal protective equipment will be disposed of according to 5-21000-OPS-FO.06, *Handling of Personal Protective Equipment*. If groundwater is encountered, purge and development water will be handled according to procedure RMRS/OPS-PRO.128, *Handling of Purge and Development Water*. Any wastes generated during drilling will be handled according to RMRS/OPS-PRO.115, *Monitoring and Containerizing Drilling Fluids and Cuttings*.

5.0 DOCUMENTATION AND DATA MANAGEMENT

A project field logbook will be created and maintained by the project manager or his/her designee in accordance with Site Procedure 2-S47-ER-ADM-05.15, *Use of Field Logbooks and Forms*. The logbook will include the time and date of all field activities, sketch maps of sample locations, and any additional pertinent information not specifically required by the SAP. The originator will legibly sign and date each completed original hard copy of data. Appropriate field data forms will also be utilized when required by the operating procedures that govern the field activity. A peer reviewer will examine each completed original hard copy of data. Any modifications will be indicated in ink, and initialed and dated by the reviewer. Logbooks will be controlled through RMRS Document Control.

Analytical data record storage for this project will be performed by Kaiser-Hill (K-H) ASD. Sample analytical results will be delivered directly from the laboratory to K-H ASD in an Electronic Disc Deliverable (EDD) format and archived in the Soil and Water Database (SWD) as per RMRS/OPS-PRO.072, *Field Data Management*. Hard copy records of laboratory results will be obtained from K-H ASD in the event that the analytical data is unavailable in EDD or SWD at the time of report preparation. Groundwater analytical results will be compiled into a sampling and analysis report.

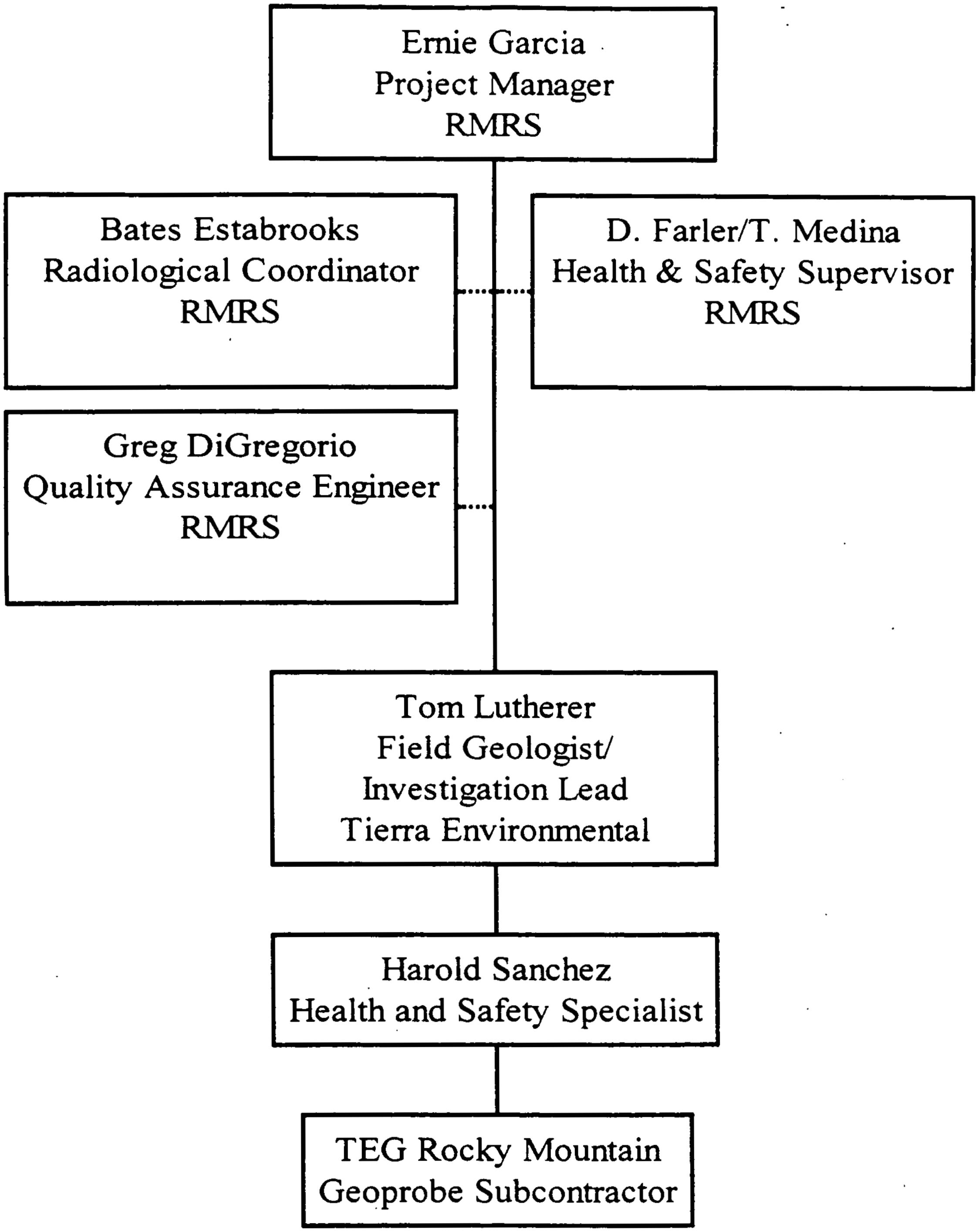
The QA Records for the project include the field forms and chain of custody records. Each QA Record is subject to the applicable QA Records management procedures, RM-06.02, Records Identification, Generation, and Transmittal.

6.0 PROJECT ORGANIZATION

Figure 6-1 illustrates the project organization structure. The RMRS ER Groundwater Operations Project Manager (PM) will be responsible for maintaining data collection and management methods that are consistent with Site operations. The PM is the individual responsible for overall project execution from pre-conceptual scoping through project implementation and closeout. Other individuals assisting with the implementation of this project are the RMRS Health and Safety Supervisor who is responsible for overall compliance with and implementation of the Project Health and Safety Plan. The RMRS Quality Assurance Engineer will provide the first level of oversight and support implementation of quality controls within all quality-affecting activities of the project. The RMRS Radiological Engineer is responsible for overseeing the development and implementation of and ensuring compliance with the radiological aspects of the Project Health and Safety Plan, As Low As Reasonably Achievable (ALARA) Job Review, and approval of applicable Radiological Work Permits (RWPs).

The Field Geologist/Investigation Lead will be responsible for field data collection, documentation, and directing sampling activities. The Geologist will oversee the Health and Safety Specialist who will be responsible for onsite compliance with and implementation of the Project Specific Health and Safety Plan. In addition, the Geologist will also oversee sampling personnel responsible for field data collection, sample collection, and transfer of samples for analysis. Field data collections will include sampling and obtaining screening results. Documentation will require field logs and completing appropriate forms for data management and chain-of-custody shipment. The sampling crew will coordinate sample shipment for onsite and offsite analyses through the ASD personnel. The sampling personnel are responsible for verifying that chain-of-custody documents are complete and accurate before the samples are shipped to the analytical laboratories.

Figure 6- 1 Project Organization Chart



7.0 QUALITY ASSURANCE

All components and processes within this project will comply with the RMRS Qualify Assurance Program Description RMRS-QAPD-001, Revision 2, April 15, 1998, which is consistent with the K-H Team QA Program. The RMRS QA Program is consistent with quality requirements and guidelines mandated by the Environmental Protection Agency (EPA), Colorado Department of Public Health and Environment (CDPHE), and DOE. In general, the applicable categories of quality control are as follows:

- Quality Program;
- Training;
- Quality Improvement;
- Documents/Records;
- Work Processes;
- Design;
- Procurement;
- Inspection/Acceptance Testing;
- Management Assessments; and
- Independent Assessments.

The project manager will be in direct contact with the QAEngineer to identify and correct potential quality affecting issues. Field sampling quality control will be conducted to ensure that data generated from all samples collected in the field for laboratory analysis represents the actual conditions in the field. The confidence levels of the data will be maintained by the collection of QC samples, consisting of duplicate samples and equipment rinsate samples.

Duplicate samples will be collected on a frequency of one duplicate sample for every 20 real samples. Rinsate samples will be generated at a frequency of one rinsate sample for every 20 real samples collected. Rinsate samples will be collected only when re-usable sampling equipment is utilized and will be prepared by pouring carbon-filtered water over decontaminated sampling equipment. This shall take place between the collection of regular samples. Table 7-1 provides the QA/QC samples and frequency requirements of QA sample generation. Data validation will be performed on 25% of the laboratory data according to the Rocky Flats ASD, Data Assessment Guidelines. Samples will be randomly selected from adequate subsurface sample sets (RINS) by ASD personnel to fulfill data validation of 25% of the total number of VOC and radioisotope analyses.

Table 7- 1 QA/QC Sample Type, Frequency, and Quantity

Sample Type	Frequency	Comments	Estimated Quantity
Duplicate	One duplicate for each twenty real samples		1
Rinse Blank	One rinse blank for each twenty real samples	To be performed with reusable sampling equipment following decontamination procedures	1

Analytical data that is collected in support of this SAP will be evaluated using the guidance developed by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08.02, *Evaluation of ERM Data for Usability in Final Reports*. This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Quantitative values for PARCC parameters for this project are provided in Table 7-2.

A definition of PARCC parameters and the specific applications to the investigation are as follows:

Precision. A quantitative measure of data quality that refers to the reproducibility or degree of agreement among replicate or duplicate measurements of a parameter. The closer the numerical values of the measurements are to each other, the lower the relative percent difference (RPD) and the greater the precision. The RPD for results of duplicate and replicate samples will be tabulated according to matrix and analytical suites to compare for compliance with established precision data quality objectives (DQOs). Specifications on repeatability are provided in Table 7-2. Deficiencies will be noted and qualified, if required.

Table 7- 2 PARCC Parameter Summary

PARCC	Radionuclides	Non-Radionuclides
Precision	Duplicate Error Ratio ≤ 1.42	RPD ≤ 30% for Organics RPD ≤ 30% for Non-Organics
Accuracy	Detection Limits per method and ASD Laboratory SOW	Comparison of Laboratory Control Sample Results with Real Sample Results
Representativeness	Based on SOPs ,SAP, and analytical methods	Based on SOPs, SAP, and analytical methods
Comparability	Based on SOPs and SAP	Based on SOPs and SAP
Completeness	90% Useable	90% Useable

Accuracy. A quantitative measure of data quality that refers to the degree of difference between measured or calculated values and the true value of a parameter. Accuracy is quantitative and usually expressed as the percent recovery of a sample result. The closer the measurement to the true value, the more accurate the measurement. The actual analytical method and detection limits will be compared with the required analytical method and detection limits for VOCs and radionuclides to assess the DQO compliance for accuracy.

Representativeness. A qualitative characteristic of data quality defined by the degree to which the data absolutely and exactly represents the characteristics of a population. Representativeness is accomplished by obtaining an adequate number of samples from appropriate spatial locations within the medium of interest. The actual sample types and quantities will be compared with those stated in the SAP or other related documents and organized by media type and analytical suite. Deviation from the required and actual parameters will be justified.

Completeness. A quantitative measure of data quality expressed as the percentage of valid or acceptable data obtained from a measurement system. A completeness goal of 90% has been set for this SAP. Real samples and QC samples will be reviewed for the data usability and achievement of internal DQO usability goals. If sample data cannot be used, the non-compliance will be justified, as required.

Comparability. A qualitative measure defined by the confidence with which one data set can be compared to another. Comparability will be attained through consistent use of industry standards (e.g., SW-846) and standard operating procedures, both in the field and in laboratories. Statistical tests may be used for quantitative comparison between sample sets (populations). Deficiencies will be qualified, as required.

Laboratory validation shall be performed on 25% of the characterization data collected in support of this project. Laboratory verification shall be performed on the remaining 75% of the data. Data usability shall be performed on laboratory validated data according to procedure RF/RMRS-98-200, *Evaluation of Data for Usability in Final Reports*.

Data validation will be performed according to K-H ASD procedures, but will be performed after the data is used for its intended purpose. Analytical laboratories supporting this task have all passed regular laboratory audits by KH-ASD.

8.0 SCHEDULE

Drilling activities are scheduled to begin in May, 1999. A summary report will be submitted within 60 days of the receipt of the final analytical laboratory report or completion of the construction phase of the project, whichever is later.

9.0 REFERENCES

DOE 1992a, *Historical Release Report for the Rocky Flats Plant,* Rocky Flats Plant, Golden, CO.

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