

35667

Final

**PLUTONIUM IN SOILS TREATABILITY STUDIES
Work Plan: TRUclean PROCESS**

**ROCKY FLATS PLANT
OPERABLE UNIT 2**

**U. S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GOLDEN, COLORADO**

ENVIRONMENTAL RESTORATION MANAGEMENT

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EXECUTIVE SUMMARY

The Plutonium in Soils Treatability Studies Work Plan provides procedures for conducting treatability studies on Rocky Flats Plant (RFP) plutonium-contaminated soils with the TRUClean Process. TRUClean was selected during the development of the Final Treatability Studies Plan (TSP - DOE, 1991) as technology requiring further evaluation through bench and laboratory treatability testing. The TSP details the screening process that was utilized in selecting these technologies for bench/laboratory testing for the treatment of radionuclides in soil or sediments. The TRUClean Process treatability study will be conducted by Lockheed Environmental Science and Technology (LES&TC) personnel. Tests will be performed on RFP soil samples obtained in accordance with the Field Sampling Procedure for Sampling Plutonium-Contaminated Soils to Support Treatability Tests included as Attachment to this work plan.

The primary objective of the plutonium in soils treatability study is to evaluate the ability of the TRUClean Process to reduce the concentration of plutonium as well as the levels of gross alpha and gross beta in RFP soils to acceptable levels. The proposed treatability study performance goals (from Rules and Regulations Pertaining to Radiation Control - Colorado Department of Health, December 30, 1985) at RFP for plutonium, gross alpha, and gross beta are 0.9, 5, and 50 picocuries/gram (pCi/g), respectively. Investigations in 1987 indicated that the TRUClean Process could remove radioactivity down to levels approaching the current proposed performance goals (AWC, 1987). Results of the 1987 tests performed by AWC are summarized in Attachment 4. This technology involves excavation of soils, ex-situ treatment, return of "clean" soil to the site of excavation, and transportation of soils with concentrated contaminants to off-site storage. The TRUClean treatability test developed as part of this work plan incorporates modifications to the 1987 TRUClean Process tests that focus primarily on soil feed preparation.

The TRUClean Process is made up of several unit operations that effect segregation of particles based on differences in specific gravity and size. The main components of the process include a gravimetric separator, a multi-

gravity separator, a centrifugal gravity separator, and a spiral classifier.

Performance data from the TRUClean tests will be used to quantify the primary evaluation criteria: residual contamination and degree of separation. Residual contamination refers to the concentrations of gross alpha, gross beta, and plutonium 239 plus 240 in the outlet streams of the TRUClean processes. Degree of separation refers to the mass percentage of the original soils meeting the residual contamination proposed cleanup goals as a result of treatment. When evaluating the performance of the treatment technologies with regard to the primary evaluation criteria, a technology will not be considered to "meet cleanup goals" if the clean soil it produces (clean with regard to goals for gross alpha, gross beta and plutonium 239 plus 240) is not a significant percentage of the original mass of contaminated soil. A "significant percentage" means greater than 50 percent. A higher percentage would likely be required for full-scale operations.

This work plan is structured to present information and requirements applicable to the TRUClean Process. A general overview of the treatability test steps is represented in Figure ES-1. Details specific to the treatability tests associated with technology are presented in separate sections (Sections 7.0 - TRUClean Process).

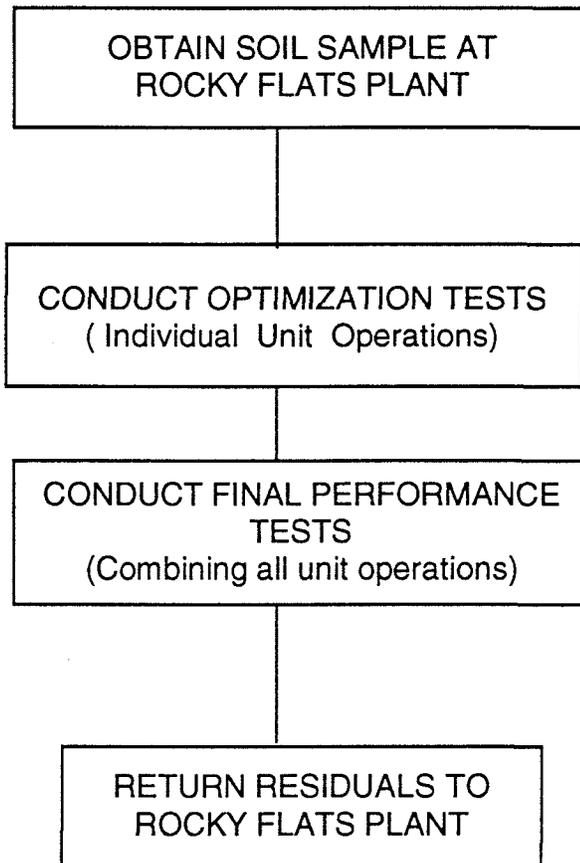


Figure ES-1. GENERAL OVERVIEW TREATABILITY TEST STEPS

ACRONYMS

AP	Analytical Procedures
CDH	Colorado Department of Health
CLP	Contract Laboratory Program
DOE	Department of Energy
DOT	Department of Transportation
DQO	Data Quality Objectives
EM	Environmental Management
EM SOP	Environmental Management Standard Operating Procedures
EPA	United States Environmental Protection Agency
CMS/FS	Corrective Measures Study/Feasibility Study
GRRASP	ERP General Radiochemistry and Routine Analytical Services Protocol
GS	Gravimetric Separator
LES&TC	Lockheed Environmental Science and Technology Company
LES&TC-CS	LES&TC Characterization Sample
LSCOPP	Land Surface Clean-Up of Plutonium Project
OU2	Operable Unit 2
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
pCi/g	Picocuries per Gram
QAA	Quality Assurance Addendum
QAPjP	Quality Assurance Project Plan
RAS	Routine Analytical Services
RFEDS	Rocky Flats Environmental Data Tracking System
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFP	Rocky Flats Plant
RI/FS	Remedial Investigation/Feasibility Study
SOP	Standard Operating Procedures
SVOC	Semivolatile Organic Compounds
TCL	Target Compound List
TSP	Final Treatability Studies Plan
VOC	Volatile Organic Compounds

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Plutonium in Soils Treatability
Studies Work Plan -TRU Clean Process

Michael Harris 2/2/93
Name Michael Harris Date

1.0 INTRODUCTION

1.1 Background

The Plutonium in Soils Treatability Studies Work Plan provides procedures for conducting treatability studies on Rocky Flats Plant (RFP) plutonium-contaminated soils with the TRUclean Process. TRUclean was selected during the development of the Final Treatability Studies Plan (TSP) as technology requiring further evaluation through bench and laboratory treatability testing.

The TSP was developed to meet the requirements of Article XI of the January 22, 1991 Final Inter-Agency Agreement. The TSP identifies candidate technologies for use in corrective/remedial actions at the RFP and provides information regarding the screening of those technologies. The candidate technologies for treatment of radionuclides in soil were identified through literature/database searches, review of conference proceedings, U.S. Environmental Protection Agency (EPA) guidance documents, government reports, and discussions with equipment vendors and other technical experts. These technologies underwent screening based on the following screening factors:

- Applicability to RFP soils
- Expected contaminant removal efficiency
- Potential to meet cleanup goals
- Technology maturity
- Operating and Maintenance requirements
- Implementability
- Adverse impacts

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As a result of the screening process, TRUClean was selected for bench/laboratory treatability testing of radionuclides in soil.

1.2 Previous Related Work

Successful removal of plutonium contamination from solids by the TRUClean Process has been demonstrated on plutonium-contaminated coral sand at the Johnston Atoll, and on plutonium-contaminated soil from RFP.

The application of TRUClean to RFP soil was investigated in 1987 (AWC, 1987). At that time the results indicated that the TRUClean Process could reduce radioactivity level. The TRUClean treatability test developed as part of this work plan incorporates modifications to the 1987 TRUClean Process that focus primarily on soil feed preparation. It is expected that these modifications will improve performance by achieving cleanup goals with an increased mass of soil.

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2.0 ROCKY FLATS PLANT SITE DESCRIPTION

The RFP is a U.S. Department of Energy (DOE) facility located approximately 16 miles northwest of downtown Denver. RFP occupies approximately 6,550 acres of federally-owned land in northern Jefferson County, Colorado. The majority of the plant buildings are located within a 400-acre area referred to as the RFP security area. The 6,150 acre balance of the total plant area provides a buffer zone around the RFP security area.

RFP is managed by EG&G Rocky Flats, Inc. (hereinafter referred to as EG&G-RF) for DOE. The facility is one of several nationwide involved in nuclear weapons research, development, and production. The production process at RFP results in the generation of radioactive and nonradioactive wastes. Past production operations resulted in on-site storage and disposal of these wastes.

Of particular importance in the development of this Plutonium in Soils Treatability Studies Work Plan is the area comprising Operable Unit 2 (OU2). OU2 includes the 903 Pad, Mound, and East Trench areas. The soils in these areas are known to be contaminated with plutonium; thus, the soil in OU2 will be subject to the treatability test procedures included in this work plan.

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3.0 SITE CHARACTERIZATION DATA FOR SOILS

Characterization data will be obtained for the soil subject to treatability tests prior to shipment off site. Characterization will include a radiological assay, radiological screening, metals assay, and a determination of volatile and semivolatile organics. This characterization of untreated soils will be performed in accordance with the requirements of Section 5.2 of this work plan.

Sampling and shipment preparation of the soil to be tested will be performed in accordance with the Field Sampling Plan for Sampling Plutonium-Contaminated Soils to Support Treatability Tests included as Attachment 1 to this work plan. The procedure identifies two sampling locations within OU2 to support the TRUclean treatability tests as described in this work plan; however, the procedure may be applied (with minor modifications) when obtaining soil for future treatability tests of other technologies.

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4.0 TEST OBJECTIVES

The primary objective of the plutonium in soils treatability studies is to evaluate the ability of the TRUClean Process to reduce the concentration of plutonium in soils to an acceptable level. If metals are present, their redistribution will be noted. This technology was selected during the development of the TSP for bench/laboratory treatability testing for treatment of radionuclides in soil or sediment.

4.1 Level of Work Plan Development

The procedures developed as part of this treatability studies work plan cover bench-scale testing. Bench-scale testing will be performed on the TRUClean Process to determine its ability to meet cleanup goals of plutonium-contaminated soils at RFP. The TRUClean Process tests will require approximately 1450 kilograms (4-55 gallon drums) of bulk soil sample from RFP to perform different process equipment tests with approximately 22 to 23 kilograms each, plus duplicate tests and five record runs with 90 - 100 kilograms each.

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4.2 Basis for Clean Soils

Soil treatability study performance goals for the RFP have been proposed for gross alpha, gross beta, and plutonium 239 plus 240 based on human health and environmental risk assessment criteria or applicable state and federal requirements. These proposed performance goals for gross alpha (5 pCi/g), gross beta (50 pCi/g) and plutonium (0.9 pCi/g) are listed in Table 4-2 of the TSP. In addition to the aforementioned cleanup goals, consideration must be given to a Technology's ability to achieve these goals while reducing the mass of soil exceeding the proposed cleanup goals (i.e. doing the best job of concentrating the bulk of the contaminants into the smallest soil mass - see Section 4.3).

4.3 Intended Use of Data

The data resulting from the TRUClean tests will be used primarily to evaluate performance against the Basis for Clean Soils discussed in Section 4.2. The performance data will be used to quantify the following primary evaluation criteria: residual contamination and degree of separation. Residual contamination refers to the concentrations of gross alpha, gross beta, and plutonium 239 plus 240 in the outlet streams of the TRUClean process. Degree of separation refers to the mass split between those soils meeting the residual contamination cleanup goals for gross alpha, gross beta, and plutonium 239 plus 240 and those soils not meeting the cleanup goals.

When evaluating the performance of the treatment technology with regard to the primary evaluation criteria, a technology will not be considered to "meet cleanup goals" if the clean soil it produces is not a significant percentage of the original mass of contaminated soil. A "significant percentage" means greater than 50 percent, based on engineering judgement at

treatability tests to be conducted (i.e. if the TRUClean process achieve the 50 percent level, then more advanced treatability tests are justified to further investigate performance). It would not be appropriate to consider TRUClean as a "primary" treatment processes if it is unable to achieve the contaminant concentration cleanup goals with at least 50 percent of the soil being treated. The 50 percent level is not intended to be the final cleanup goal for the total mass of soil treated. Additional treatment of residuals can be studied to achieve a greater reduction in the mass of soil exceeding the proposed cleanup goals discussed in Section 4.2.

Data obtained from the TRUClean Process will supplement information found in technical literature during feasibility study efforts. This supplemental information is needed in order to evaluate and select a treatment alternative for those operable units with plutonium-contaminated soils. Specific remedial investigation/feasibility study (RI/FS) evaluation criteria that can be addressed as a result of the treatability tests include:

- 1) Overall protection of human health and the environment
- 2) Compliance with applicable or relevant and appropriate requirements (ARARs)
- 3) Implementability
- 4) Reduction of toxicity, mobility, or volume
- 5) Short-term effectiveness
- 6) Cost
- 7) Long-term effectiveness.

This work plan has been structured so that the TRUClean Process will primarily provide information to assess evaluation criteria numbers 2 and 4. Evaluation of the remaining criteria may occur at a qualitative level in order to provide input to future investigations of this technology during the RI/FS process.

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5.0 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative and quantitative statements that describe the data quality needs of a project. The DQO development process is divided into three stages. Stage 1 consists of identifying the decision makers and data users, reviewing existing information to assist in establishing the objectives of the treatability study, and establishing the study-specific objectives of the data collection program. In Stage 2, the data uses and data types are established. This requires the selection of appropriate analytical levels for the measurement data and the identification of the appropriate types of analyses to be utilized. Stage 3 encompasses the data collection program. The DQO process is used to establish the specific goals of the treatability study and to identify the data needs for achieving these goals.

5.1 Stage 1 - Decision Types

5.1.1 Data Users

The collected data will be used by the decision makers, that is, the management and regulatory personnel of EG&G-RF, DOE, the U.S. EPA, and the Colorado Department of Health (CDH). The primary data users are the EG&G-RF and contractor technical staff who are involved in the daily, ongoing treatability activities. These are the individuals involved in the collection

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and analysis of the data and the operation and evaluation of the TRUClean system. Secondary data users are those individuals that will rely on the outputs of these treatability studies to support their activities (e.g. feasibility study managers).

5.1.2 Available Data/Sample Location

Available characterization data from previous OU2 investigations were evaluated to select appropriate sampling locations for treatability studies. These data came from the Phase I Remedial Investigation (RI) and investigations that have been completed prior to the Phase II RCRA Facility Investigation/Remedial Investigation (RFI/RI). The sampling location supporting the TRUClean treatability tests, is identified in Attachment 1 as the southeast sample location. This location was selected because observed concentrations of plutonium in this area are approximately 83 pCi/g of soil. The bulk of the plutonium contamination resulted from the windblown dispersion of plutonium from the 903 Pad area.

5.1.3 Specific Treatability Study Objectives

Data will be obtained in order to evaluate the TRUClean in terms of reducing plutonium contamination to an acceptable level (the target of the process technology is to reduce the plutonium concentration to 0.9 pCi/g, achieving this level with at least 50 percent of the original soil mass).

5.2 Stage 2 - Identify Data Uses/Needs

Stage 2 of the DQO process defines data uses and specifies the types of data needed to meet the project objectives. The summary of Stage 2 of the DQO process is presented as Table 5-1.

5.2.1 Identify Data Uses

Data uses for this treatability study consist of evaluation of treatment technologies to support the soil characterization for remediation alternatives.

5.2.2 Data Types

The types of measurement data that will be generated in support of this treatability study include:

- Untreated soil chemical and radiological characterization data obtained from analysis of the bulk soil sample. Chemical parameters to be analyzed include: EPA Target Analyte List (TAL) metals, EPA Target Compound List (TCL) volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Radionuclides to be analyzed for, include plutonium 239 plus 240, gross alpha, and gross beta. Level IV as defined in Section 5.2.3.
- Bench-scale screening data for the TRUClean Process produced from analyses of samples collected during expected process optimization test runs. The screening data will be used to adjust the process operation to obtain optimum operating conditions. These samples will be analyzed by Lockheed Environmental Systems and Technologies Company (LES&TC) at the testing laboratory to provide estimates of particle size fractions and the associated gross alpha, gross beta, and plutonium 239 plus 240 concentrations. Levels II or III as defined in Section 5.2.3.

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- Analytical data produced from the analyses of split samples collected from effluent streams during and following the test runs at the optimal operating condition for the TRUClean Process. These samples will be analyzed by a laboratory chosen by EG&G-RF to determine posttreatment concentrations of TAL metals, gross alpha, gross beta, and plutonium 239 plus 240. Particle size distribution of posttreatment soils will also be determined. Level IV as defined in Section 5.2.3.

5.2.3 Data Quality Needs

The EPA defines five levels of analytical data in EPA/540/G-87/003, Data Quality Objectives for Remedial Investigations and Feasibility Studies Under CERCLA (OSWER Directive 9355.0-7B, March 1987). These five analytical levels are as follows:

- Level I - field screening, which is characterized by measurement data produced using portable field measuring instruments
- Level II - field analysis, which is characterized by measurement data produced from the use of portable analytical instruments that can be used on site or in laboratories
- Level III - laboratory analytical data produced by adhering to standard EPA-approved analytical methods and procedures
- Level IV - laboratory analytical data produced by adhering to EPA Contract Laboratory Program (CLP) Routine Analytical Services (RAS) analytical methods and procedures or equivalent
- Level V - laboratory analytical data produced by using nonstandard analytical methods, which typically involves method modification and/or development.

The analytical levels appropriate for the data use are specified in Table 5-1. Level IV analytical methodologies are specified in General Radiochemistry and Routine Analytical Services Protocol Scope of Work (EG&G, 1990). Levels II and III analytical methodologies may be selected from either internal analytical procedures (APs) or from Test Methods for Evaluating Solid Waste, SW-846 (EPA, 1986).

TABLE 5-1
 Summary of Data Uses and Analytical Levels

DATA USES	ANALYTICAL LEVEL	TYPE OF ANALYSIS
Untreated soil characterization	Level IV	TAL Metals, TCL VOCs and SVOCs, gross alpha, gross beta, and Pu 239 plus 240, using EPA CLP or equivalent methods.
Adjust treatment process/laboratory optimization	Level II or III	Particle size, gross alpha and beta, Pu 239 plus 240.
Posttreatment soil analysis to evaluate the treatment technology	Level IV	TAL Metals, gross alpha, gross beta, and Pu 239 plus 240.

5.2.4 Analytical Options

An important aspect of technology evaluation relates to the chemical and radiological characteristics of the initial or untreated sample. This characterization data will be compared to posttreatment data to evaluate the performance objectives of the TRUclean process. The data used to define the untreated soil characteristics should consist of analytical data of a known quality, which requires analysis by EPA CLP or equivalent methods capable of producing analytical Level IV data.

Data obtained from treatability tests includes optimization and analytical data. The optimization data will be used to adjust the various components of the TRUClean process during initial test runs to determine optimum operating conditions. Concentration data in the form of ranges are acceptable, and quick turnaround time is important. It is not necessary to know the quality of this data because it will not be used to make final evaluations of the effectiveness of the treatment technology. Analytical Level II or III data is sufficient for this optimization. The analytical data that will be used to evaluate the effectiveness of a technology should be of a known quality generated from analytical methods capable of producing analytical Level IV data.

5.2.5 Review PARCC Parameter Information

Parameters that are used as indicators of data quality are precision, accuracy, representativeness, comparability, and completeness (referred to as PARCC parameters). Precision and accuracy objectives for the analytical data will be based on the historical precision and accuracy achieved by the standard analytical method selected to generate the data. These objectives along with the objective for completeness are specified in the Quality Assurance Addendum (QAA) for this treatability studies work plan (included in the Attachment). Representativeness and comparability are qualitative parameters that will be ensured by obtaining representative samples for analysis prior to, during, and after the treatment process, comparing the results of these analyses, and by adhering to the sampling and analysis strategy presented in this work plan.

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5.3 Stage 3 - Data Collection Program

The purpose of Stage 3 of the DQO process is to design the data collection program for this treatability study in order to meet the work plan's objectives. The sample collection and analysis components of this study, discussed in Section 7.3.6 of this work plan, were based on the study objectives, the uses of the data and types of data needed to meet those uses, and the types of decisions that will be made concerning the evaluation of the TRUclean process as support technologies to remedial alternatives.

5.3.1 Sampling and Analysis

The untreated soil characterization data will be obtained for the RFP bulk soil sample (see Attachment 1). The split from the bulk soil sample will be sent to an EG&G-RF contract laboratory capable of performing EPA CLP or equivalent analyses.

Samples collected during optimization testing of the individual unit operations will be analyzed to determine the optimum operating conditions of the TRUclean Process. Optimization testing is described in detail in Section 7.3. The Lockheed Environmental Science and Technology Company (LES&TC) operator(s) will collect and analyze representative samples.

Samples will be collected following test runs at the optimum operating conditions to provide data to evaluate the effectiveness of the treatment technologies. Samples for the TRUclean Process will be split. One split will remain with the treatment operator for in-house analyses; the other split will be sent to an EG&G-RF contract laboratory capable of performing analyses according to, or equivalent to, EPA CLP methods.

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5.3.2 Sampling and Analysis Quality Controls

The QAA for this Plutonium in Soils Treatability Studies Work Plan addresses the quality controls that will be implemented to ensure the quality of the pre- and posttreatment data used to evaluate the effectiveness of the treatment technology process.

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6.0 DATA MANAGEMENT

As specified in the TSP, records of observations and raw data generated in the field and laboratory must be managed. Additionally, the TSP requires that data tables presenting field and laboratory test data be verified against the original (raw) data sheets to verify the accuracy of transcription. The Site-Wide Rocky Flats Quality Assurance Project Plan (QAPjP - EG&G, 1991) establishes data management requirements and methods for the generation, control, validation, maintenance, and disposition of QA Records. QA Records include documents that furnish evidence of the quality and completeness of the RFI/RI and Corrective Measures Study/Feasibility Study (CMS/FS) processes as well as field notebooks, field data collection forms, laboratory data reports, chain-of-custody forms, calibration records, field activity reports, photographs, and electronic formats. Management of the site characterization data is discussed below. The data management requirements for the TRUClean treatability study are discussed in Sections 7.4.

6.1 Site (Bulk Sample) Characterization Data

Appropriate Environmental Management (EM) Standard Operating Procedures (SOPs) which relate to management of the characterization sample acquisition process and the associated QA Records generated will be identified in the QAA for the Plutonium in Soils Treatability Studies Work Plan. More specifically,

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EM SOP 1.14, Data Base Management, delineates the responsibilities and procedures that provide an orderly method by which field data will be recorded, entered into electronic form, validated, transferred, and filed. The procedure encompasses the data handling process from the point of data collection by field personnel to the filing and transmission of the field data to EG&G-RF personnel.

The management of the analytical data generated (including the reporting format and electronic deliverables) by EG&G-RF contract laboratories is controlled contractually through the EG&G-RF ERP General Radiochemistry and Routine Analytical Services Protocol (GRRASP) Scope of Work and Procedures for Providing the Electronics Deliverable Lab Data to the Rocky Flats Environmental Data Tracking System (EG&G, 1991). The RFEDS module (electronic format) required for storage, use, and compilation of the treatability test data is under development by EM. The EM Data Management Plan, which will describe the EM policies and procedures for managing the data, is also under development along with supporting data management SOPs. Until the RFEDS module and formal data management procedures are in place, data management will be the responsibility of the EG&G-RF Project Manager. The Project Manager will store and secure electronic and hard copy deliverables from the site characterization and TRUclean process.

6.2 Quality Control Procedures

Quality control procedures for the treatability testing include data review exercises to ensure accuracy of data transcription and transmission as well as validation exercises to evaluate data quality. Verification and validation requirements are included in the following sections.

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6.2.1 Verification

QA Records

The correctness and completeness of the data contained on QA Records is the responsibility of the subcontractor performing the task. Quality control procedures for the QA Records supporting field activities and associated electronic media are described in EM SOP 1.14, Data Base Management. This SOP describes the procedures for field data receipt and completeness check, data validation, and data entry. Quality control checks on the analytical data and reports are prescribed in GRRASP. QA Records generated from the specific treatability tests will be checked for accuracy and completeness by the test contractor project manager prior to transmission to EG&G-RF. These records include all treatability operations data.

Database

The TSP states that data tables generated from the database system for both field and laboratory data will be checked against the source document. This verification exercise should be conducted prior to reporting or release of study information. This requirement is necessary to verify the transcription accuracy of information from the original field and laboratory data against that contained in the RFEDS. The field and laboratory data will be verified against source documents after upload into RFEDS in accordance with EM data management procedures. The treatability test subcontractor will verify data entry into the selected electronic format prior to submittal to EG&G-RF. After upload of the information to RFEDS, accuracy of the transmission will be verified by checking data tables against the original documentation provided by the test subcontractor.

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6.2.2 Validation

As stated in the QAPjP, the appropriate EM division or its subcontractor will validate field data prior to inclusion into the RFEDS database as specified in SOP 1.14, Data Base Management and the DQOs identified in Section 5.0 of this work plan. Laboratory data are routinely reviewed and validated by the EM laboratory validation subcontractor. Results of data review and validation activities are documented in data validation reports. The quality control measures implemented during the analysis of the bulk subsample and process characterization split samples are described in GRRASP. The data generated from these analyses will be validated against the guidelines specified in the Site-wide QAPjP. Additional quality control procedures (i.e., analysis of duplicate samples, reporting of standard results) were prescribed in Section 5.0, Data Quality Objectives. These data will undergo a data review by the EM validation subcontractor to assess the overall quality of the laboratory screening results.

**SECTION 7.0 TRUclean PROCESS
CONTAINS PROPRIETARY INFORMATION**

to LES&TC

**SUB SECTIONS 7.1 THRU 7.9
see VOLUME II of this DOCUMENT**

SECTION 8.0 REFERENCES

CONTAINS PROPRIETARY INFORMATION

to LES&TC

see VOLUME II of

PLUTONIUM IN SOILS TREATABILITY STUDIES

Work Plan: TRUclean PROCESS

ATTACHMENT I

Approved by:

Michael Harris 2/2/93
 Name Michael Harris Date _____

INTRODUCTION AND SCOPE

This section consists of the Quality Assurance Addendum (QAA) for the Plutonium in Soils Treatability Studies Work Plan for the TRUclean Process (referred to herein as the STS Work Plan). This QAA supplements the "Rocky Flats Plant Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigation/Feasibility Studies and RCRA Facility Investigations/Corrective Measures Studies Activities" (QAPjP). This QAA establishes the project-specific QA controls applicable to the TRUclean treatment process described in the STS Work Plan.

The objective of the plutonium in soils treatability study is to evaluate the ability of the TRUclean process to reduce the concentration of gross alpha, gross beta and plutonium 239 plus 240 to acceptable levels in soils collected from the Department of Energy (DOE) Rocky Flats Plant (RFP). A bulk soil sample, consisting of approximately 1450 kilograms, will be collected from the RFP Operable Unit No. 2 (OU-2) area. This bulk soil sample will be shipped to the DOE's Nevada Test Site (NTS) to a testing laboratory operated by Lockheed Environmental Science and Technology Company (LES&TC). LES&TC will conduct and document the results of the treatability test. Collection of the bulk soil sample was addressed in the Field Sampling Plan for the Plutonium in Soils Treatability Study Plan and accompanying QA Addendum, which were prepared under separate cover from the STS Work Plan.

1.0 ORGANIZATION AND RESPONSIBILITIES

The organization for the plutonium in soils treatability study is illustrated in Figure 1. The EG&G Rocky Flats Environmental Restoration Management (ERM) Operation is functionally responsible for the management and implementation of the RFP Environmental Restoration (ER) Program. The Environmental Science and Engineering Department (a department with ERM) is functionally responsible for managing and overseeing treatability studies conducted in support of the RFP ER Program. The Treatability Study Project Manager is responsible for management and oversight of the Plutonium in Soils Treatability Study, including planning, directing, controlling, and reporting project activities; measuring project progress; monitoring project budget; and evaluating and reporting project performance. The Project Manager shall interface directly with the sampling subcontractor's Site Manager and the treatability testing subcontractor's Project Manager regarding the performance and day-to-day management of the project. The Project Manager is the responsible interface with other EG&G Rocky Flats organizations at the RFP site that may be involved in various aspects of the Plutonium in Soils Treatability Study, including the Transportation organization for shipment of samples and receipt of residual materials; Health and Safety for review and approval of the Project Health and Safety Plan; Radiological Engineering for providing Radiation Protection Technicians to monitor workers during sampling; and Waste Management for storage of hazardous and/or radioactive contaminated residuals shipped back to the RFP from LES&TC.

The Project Manager will be provided task support from other ERM organizations for laboratory analysis of the characterization soil sample, data validation, and data management. The Project Manager is responsible for implementing the QA requirements and controls of the QAPjP and this QAA. The ERM Environmental Quality Support Manger (EQSM) is responsible for verifying that the plutonium in soils treatability study activities described in this work plan and the Field Sampling Plan are conducted in accordance with the requirements of the QAPjP,

this Workplan (including this QAA), and any administrative, operating, and testing procedures referenced herein.

2.0 QUALITY ASSURANCE PROGRAM

The QAPjP was written to address QA controls and requirements for implementing Interagency Agreement (IAG) related activities. As such, the controls and requirements addressed in the QAPjP are applicable to the plutonium in soils treatability study activities, unless specified otherwise in this QAA. As a supplement to the QAPjP, this QAA addresses additional and site-specific QA controls and requirements that are applicable to the treatability study activities.

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THRU _____

2.1 Personnel Training and Qualification

All EG&G Rocky Flats and on-site, subcontractor personnel shall complete the minimum training requirements specified in Section 2.0 of the QAPjP. In addition, all personnel performing activities in accordance with EG&G Rocky Flats Operating Procedures (OPS) shall be trained in the requirements of the OPS prior to performing the work. Completion of training required by the QAPjP and this QAA shall be documented. The training requirements of the QAPjP and this QAA are not applicable to LES&TC personnel performing and documenting testing activities associated with the TRUclean process at the NTS or at LES&TC offices in Nevada.

All personnel shall be qualified to perform their assigned tasks. Personnel qualifications shall be based on the minimum education, experience, and training requirements specified in position descriptions. The EG&G Project Manager is responsible for assuring that all EG&G Rocky Flats and subcontractor personnel are qualified. Subcontractor Site Managers and Project Managers should furnish objective evidence of personnel qualifications to the EG&G Project Manager, or have objective evidence of personnel qualifications on file available for review by independent verification personnel.

3.0 DESIGN CONTROL AND CONTROL OF SCIENTIFIC INVESTIGATIONS

3.1 Design Control

The plutonium in soils treatability study shall be controlled by conducting and documenting the study in accordance with the Plutonium in Soils Treatability Studies Work Plan for the TRUclean Process (the STS Work Plan). The STS Work Plan specifies the objectives and evaluation criteria of the treatability tests and describes the TRUclean process. The TRUclean process is considered a bench-scale treatability study. The equipment used to conduct the test is located at the LES&TC study laboratory at the NTS. Process parameters and equipment will

be varied during Phase I of the testing in an attempt to optimize the performance of the process. The TRUClean process shall be controlled by adhering to the test procedures included as Attachment 2 of the STS Work Plan.

3.2 Data Quality Objectives

This treatability study is considered a bench-scale test. The actual testing will consist of two phases. Phase I consists of testing individual pieces of process equipment to determine the optimum sequence and settings of equipment and process variables. Phase II consist of testing the TRUClean process at the optimum sequence to evaluate the ability of the process to reduce contaminant concentrations to levels below applicable or relevant and appropriate requirements (ARARs) and to reduce the toxicity, mobility, or volume of contaminants.

Data quality objectives (DQOs) quantitatively and qualitatively describe the uncertainty that decision makers are willing to accept in results derived from environmental data. This uncertainty is used to specify the quality of the data required to meet the objectives of the investigations. The process for developing DQOs for remedial investigations is summarized in Appendix A of the QAPjP. An integral part of the DQO development process is defining the intended use(s) (or objectives) of the data. The objective of the treatability study is to evaluate the ability of the treatment process to reduce the level of radionuclide contamination, specifically gross alpha, gross beta, and plutonium 239 plus 240, in samples of RFP soils to acceptable levels. Soil cleanup goals for RFP have been established for these radionuclides based on human health and environmental risk assessment criteria and applicable regulatory requirements. These treatability study performance goals and the criteria for evaluating the success of this treatability study are:

gross alpha \leq 5 pCi/g

gross beta \leq 50 pCi/g

plutonium \leq 0.9 pCi/g

In addition to these performance goals, the clean soil produced from the treatment process should be a significant percentage of the total amount of soil treated. The evaluation criteria for reducing the amount of contaminated soil is to reduce the mass of contaminated soil following treatment to less than 50 percent of the pretreatment soil mass.

In order to evaluate the success of the TRUClean process, data is needed that reflects the concentration of gross alpha, gross beta, and plutonium 239 plus 240 in soils before and after treatment. The mass of pretreatment soil and post-treatment soil meeting residual contamination goals is also needed. The bulk density, moisture content, pH, and particle size distribution of the bulk soil sample will also be determined to assist in determining the optimum testing sequence and variables.

The chemical and radiological characteristics of the pre-treatment bulk sample and one of the three Phase II, post-treatment samples will be determined. This characterization will include a radiological assay, radiological screening, metals assay, and a determination of volatile and semivolatile organics in the pretreatment sample.

Five analytical levels have been established for determining DQOs. The analytical level assists in determining the sampling and analytical controls and the methods of analysis or measurement needed to produce data of a quality appropriate for its intended use(s). These levels (analytical levels I - V) are discussed in Appendix A of the QAPjP. Analytical level III data is appropriate for evaluating bench scale treatability tests. Therefore, the measurements of gross alpha, gross beta, plutonium 239 plus 240, and total soil mass of soil samples prior to and following the optimum (or Phase II) treatment runs shall be equivalent to analytical level III data. Analytical level I or II data, which

variables to determine optimum process sequence. Analytical level IV data is appropriate for determining the chemical characteristics of the pre- and post-treatment soils.

Based on EPA's definition of analytical levels (see appendix A of the QAPJP), analytical level I and II data should be generated using portable field and/or laboratory analytical or measurement instrumentation, which have rapid turn around times. Analytical level III data should be generated by adhering to standard, EPA approved/recognized analytical methods. Analytical level IV data should be produced by adhering to analytical methods and protocols of, or consistent with, EPA's Contract Laboratory Program (CLP) for Routine Analytical Services.

Sampling options to collect samples for generating analytical I and II data should consist of standard, industry recognized methods. Samples collected to generate analytical level III and IV data should consist of standard methods that have been reviewed and approved by EPA.

The pre- and post-treatment physical property and radionuclide contamination data should be of a known quality, since these data will be used to evaluate the effectiveness of the treatment. Measurements of precision, accuracy, representativeness, completeness, and comparability (PARCC parameters) are used to indicate data quality. These parameters are defined and the method of calculation is presented in Appendix A of the QAPJP. Based on the objectives of the analytical data discussed above, the following objectives for the PARCC parameter measurements are applicable to the data produced during this treatability study.

Precision and accuracy objectives are dependent on the analyte or physical property of interest, the sample matrix, analytical method, and the quality control procedures that are applicable to the method of analysis. Precision for

a given analyte is measured by the relative percent difference in concentration of the analyte or property between the sample and a duplicate sample, or between a spiked sample and a spiked duplicate sample. Precision objectives for analytical level IV data are based on historical measures of precision for the method of analysis or ± 40 percent relative percent difference if historical data are not available. Precision objectives for the process operation screening data (i.e., analytical level II data) are not required.

Accuracy is measured by the percent recovery of a known spike concentration added to a sample matrix or analysis/measurement of a known and traceable standard. Accuracy objectives for analytical level III and IV data are also based on historical objective measures of the method of analysis. Where historical measures of accuracy are not available, the objective is 75 to 125 percent recovery. This is also the accuracy objective for the process screening data.

Completeness is expressed as the percentage of valid or acceptable data points obtained from measurement or analysis. The target goal for completeness for data packages is 100 percent, with a minimum acceptable of 90 percent.

Comparability and representativeness are qualitative parameters that are ensured through careful development of and adherence to the sampling and analysis plan, including establishing and following standard sampling and analytical procedures.

3.3 Field Sampling Program and Sampling Procedures

The bulk soil sample that will be collected for conducting this treatability study will be taken from an area east of the 903 pad (OU-2). This bulk sample will be collected, composited, split, and containerized as described in the Field Sampling Plan for the Plutonium in Soils Treatability Study (FSP) and the QAA

prepared specifically to address collection of the bulk sample.

At the time the bulk soil sample is collected and composited as described in the FSP, a portion of the sample will be collected and prepared for shipment to an outside analytical laboratory for determination of the pre-test chemical and radiological characteristics. The remainder of the bulk sample (approximately 1450 kilograms) will be packaged and shipped to the LES&TC treatability testing laboratory at the NIS. Prior to shipment of any samples off the RFP-site, radiological screening samples will be collected and shipped to off-site analytical laboratories to determine radiation levels of the soil to be collected for analysis. Package and shipping requirements will be based on the results of the radiation screening. All samples to be shipped off-site shall adhere to Department of Transportation (DOT) packaging and shipping regulations for radionuclide containing materials. EG&G Rocky Flats Operating Procedure 5-21000-OPS-FO.18, Environmental Sample Radioactivity Content Screening, provides instructions and criteria for screening samples.

The treatability subcontractor will prepare pretreatment characterization samples from the bulk soil sample after it arrives at their testing facility. The subcontractor will split the bulk soil sample following the standard "cone and quartering" method described in Section 7.3.3. Two pre-test characterization samples (approximately 45 kilograms) will be generated. One sample will be retained by the subcontractor for determining the physical and radiological characteristics of interest and the other sample will be offered to EG&G Rocky Flats for analysis as a check sample.

During the Phase I testing, containers will be used to collect and accumulate the effluent (i.e., soil) from each process equipment test. Each of the effluent products will be sized according to the sizes described in Section 7.3.3.4 and, depending on the weight, a representative samples will be taken for physical and chemical testing to determine the effectiveness of the various equipment or

process.

Following Phase I, at least three soil samples from the bulk sample split will be run through the optimum operating sequence of the TRUClean process (as determined from Phase I). Containers will be used to collect and accumulate the various products at all process equipment discharge points during this test. The products from these test runs will comprise the post-treatment characterization samples, the results of which will be compared to the pre-test characterization samples to evaluate the effectiveness of the TRUClean process. The products from one of the optimization (Phase II) test runs will be made available to EG&G Rocky Flats as a check sample.

3.4 Analytical Procedures

The pre-test RFP characterization soil sample (taken from the bulk sample prior to shipment to the treatability subcontractor) will be analyzed for Target Analyte List Metals, Target Compound List VOCs and SVOCs, gross alpha, gross beta, and plutonium 239 plus 240.

The pre-test characterization samples will be air dried and weighed to determine sample mass and analyzed for bulk density, pH determination, particle size distributions, gross alpha, gross beta, and plutonium 239 plus 240. Gross alpha, gross beta, and plutonium 239 plus 240 will be determined for each of the particle size fractions listed in Section 7.3.3.4.

Data to be generated during Phase I test runs, which will be used to determine the optimum process sequence, includes moisture content (from wet solids only), particle size analysis, pH, gross alpha, gross beta, and plutonium 239 plus 240.

Data to be generated from the post-test, Phase II, products include particle size

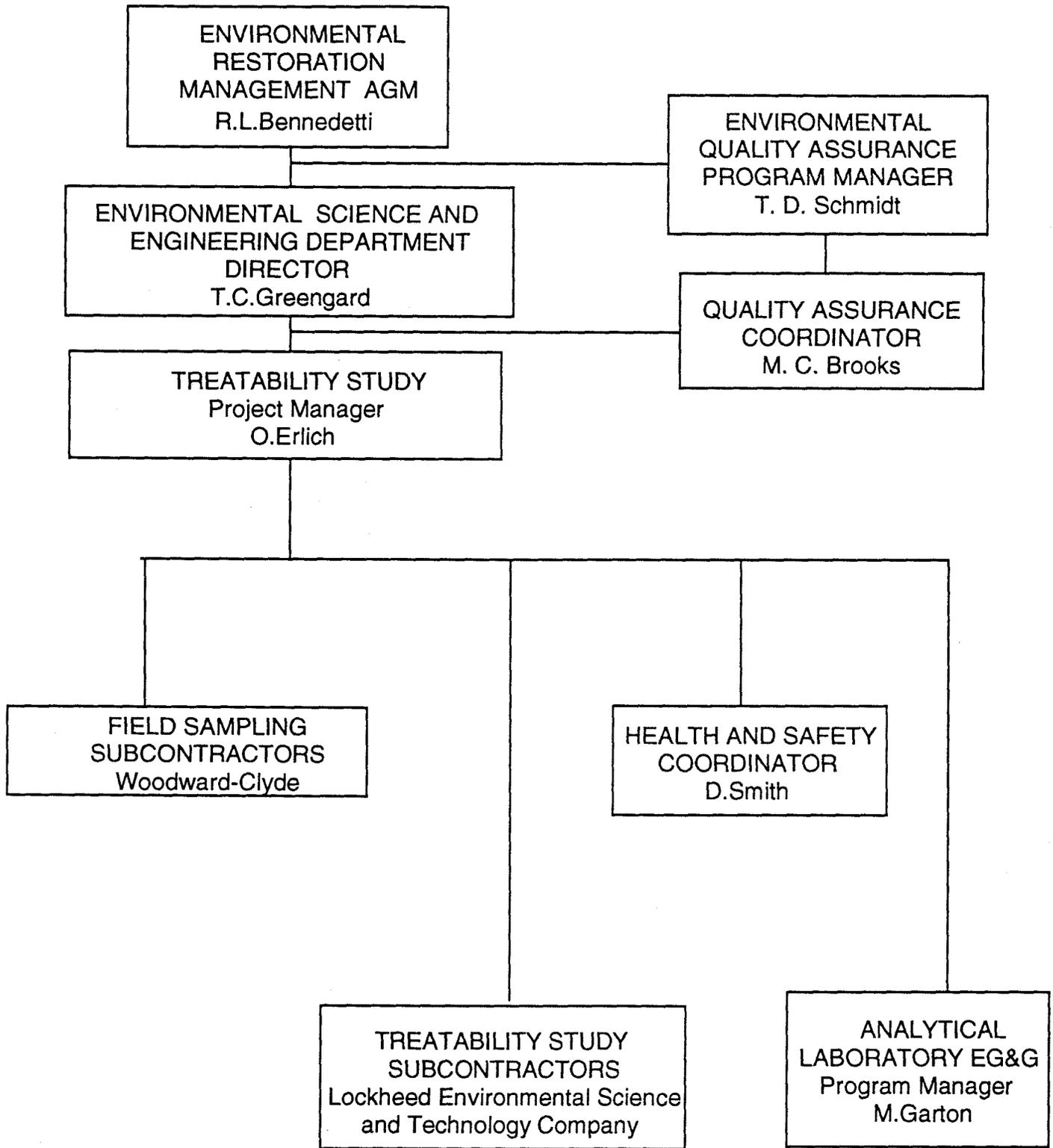


Figure 1. PROJECT MANAGEMENT FOR SAMPLING PLUTONIUM CONTAMINATED SOILS

analysis, pH, air-dry moisture determination, gross-alpha, gross beta, plutonium 239 plus 240, and product weight.

The analytical equipment to be used to determine physical and radiochemical characteristics are listed in Section 7.3.5.3. The sampling and measurement requirements for the pre-test, Phase I tests, and post-Phase II tests, are listed in Section 7.3.6. The analytical methods to be used to determine the chemical and physical soil parameters of interest are listed in Table 1. Standard analytical procedures that are applicable to the analytical method to be used shall be adhered to by the laboratory(ies) conducting the analysis.

3.5 Equipment Decontamination

Decontamination of equipment used to collect the bulk soil sample is discussed in the FSP QAA. Decontamination of the treatability testing equipment will adhere to LES&TC internal decontamination procedures.

3.6 Quality Control Checks

A pre-test characterization check sample will be collected following the split of the bulk soil sample by the treatability subcontractor and offered to EG&G Rocky Flats for independent analysis of physical and radiochemical properties. Post-test products from one of the three Phase II test runs will also be offered to EG&G Rocky Flats for physical and radiochemical characterization of post-treatment soil. The LES&TC pre- and post-test characterization results will be used to evaluate the effectiveness of the TRUclean process in meeting the objectives of the treatability study. The results of the EG&G Rocky Flats check samples will serve as an independent verification of the LES&TC physical and radiochemical analytical results.

No other QC samples are planned for the TRUclean process treatability test.

Analytical laboratory QC procedures applicable to the method of analysis shall be adhered to to ensure internal consistency of analytical and storage procedures. Laboratory QC procedures for CLP analyses shall include the use of replicate analysis and analysis of duplicate and matrix spike duplicates. All laboratory analysis results, including results of QC sample analysis, will be forwarded to the EG&G Rocky Flats Laboratory Analysis Task Leader.

Table 1 ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	Detection Limit	Precision Objective	Accuracy Objective
TAL Metals	EPA 6010 ^a	1	**	***
TCL VOCs	EPA 8240 ^a	1	**	***
TCL SVOCs	EPA 8250 ^a	1	**	***
Radionuclides	2	1	**	***
Physical Analysis				
Particle Size N/A	ASTM D-422		N/A	N/A
Specific Surface N/A	Agronomy #9		N/A	N/A
Bulk Density N/A	TDL 2110		N/A	N/A

** Precision objective based on relative percent difference (see QAPjP Appendix A for equation) between sample and spiked duplicate. Precision objective based on referenced method.

*** Accuracy objective is based on the percent recovery of spiked duplicate (see Appendix A of the QAPjP). Accuracy objective based on referenced method.

^a "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods" (SW-846, 3rd ED.), U.S. Environmental Protection Agency.

1. Detection limit will be based on practical quantitation limit, which is dependent on the specified method of analysis.
2. The method of analysis has not yet been specified, but one of the methods listed in Appendix B of the QAPjP will be used.

3.7 Data Reduction, Validation, and Reporting

Analytical and/or measurement data generated by the treatability subcontractor during and after the Phase I and II test runs will be tabulated to evaluate the effectiveness of the various pieces of equipment or process parameter and the overall effectiveness of the TRUClean process. Data will be presented in table format for evaluation purposes. The subcontractor's personnel shall review the tabulated data against the raw data to verify that it is correct prior to any further evaluations.

All analytical data generated by EG&G Rocky Flats contract analytical laboratories shall be reviewed, evaluated, and verified by the laboratory contractor prior to submitting the data to the Laboratory Analysis Task Leader or data validation subcontractor, as appropriate. The Laboratory Analysis Task Leader or validation contractor will validate the data as described in Section No. 3.0 of the QAPjP. The Laboratory Analysis Task Leader will then forward the validation results along with the entire data package for these samples to the EG&G Rocky Flats Treatability Study Project Manager and the Data Base Management Task Leader. The Data Base Management Task Leader shall enter the data into the Rocky Flats Environmental Data System. The Project Manager shall prepare a data report for this activity.

4.0 PROCUREMENT DOCUMENT CONTROL

The treatability subcontractor (LES&TC) and the laboratory analytical contractors are required to adhere to the applicable requirements of the STS Work Plan, including this QAA and appendices, and the QAPjP. These contractors may be required to prepare and submit their own QA Program for review and approval by the EQSM. Their QA Program would be required to meet the applicable requirements of the QAPjP and this QAA.

5.0 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

The STS Work Plan describes the TRUClean and magnetic separation process, and the soil sampling and characterization activities to be performed. The STS Work Plan is subject to preparation, review, and approval according to the requirements of Section 5.0 of the QAPjP. The STS Work Plan will be reviewed and approved by the EG&G Rocky Flats Environmental Science and Engineering Department Director, or designee, and the Project Manager prior to implementing the study. The STS Workplan is also subject to review and comment by the EQSM or designee. Once the Work Plan has been reviewed and approved, any changes or revisions will also be reviewed by the EQSM and approved by the Project Manager. Any revisions to the STS Workplan that result in a change in the scope of work, such that a contract modification is required, will also require approval of the Department Director, or designee.

The treatability testing procedures contained in Appendix A shall control the treatability activities. The analytical methods referenced in Section 3.4 are the analytical procedures that shall control the analytical process. The applicable data verification and validation procedures described and referenced previously in Section 3.7 shall control the data verification and validation process. Any changes or revisions to these procedures that are necessary to complete the testing and sampling and characterization processes shall be documented by preparing a Document Change Notice.

6.0 DOCUMENT CONTROL

The following documents will be controlled in accordance with Section 6.0 of the QAPjP:

- "Plutonium in Soils Treatability Studies Work Plan for the TRUclean Process, Rocky Flats Plant Operable Unit 2"
- "RFP Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigation/Feasibility Study (RI/FS) and RCRA Facility Investigation/Corrective Measures (RFI/CMS) Studies Activities"

7 CONTROL OF PURCHASED ITEMS AND SERVICES

Contractors that have been selected to perform the treatability study and laboratory analysis of soil samples shall be required to implement all requirements contained in the STS Work Plan, including this QAA and appendices, and the QAPjP. Subcontractor performance shall be evaluated through the conduct of independent self-evaluations consisting of field and laboratory inspections, surveillances, and/or audits as described in Section 18.0 of the QAPjP.

8.0 IDENTIFICATION AND CONTROL OF ITEMS, SAMPLES, AND DATA

8.1 Sample Containers

The sample container and volume requirements for the analytical soil samples (i.e., the samples taken from the bulk composite soil sample for chemical and physical characterization and the VOC samples) and the duplicate samples are as follows:

Analyte	Volume/Sample	Container
VOCs	2 X 120 mL	VOA vials
Semi-Volatiles	8 oz	wide-mouth glass jars
TAL Metals	8 oz	wide-mouth glass jars
Radionuclides	1 liter	wide-mouth glass jars

No preservatives will be used on soil samples. VOC and semi-volatiles (SVOCs) samples will be cooled to approximately 4° C. Holding times are 7 days for VOCs and SVOCs and 6 months for TAL metals. Holding times are not applicable for radionuclides or physical analyses.

Sample containers for shipment of bulk soil samples to NTS shall consist of 8-, 30-, and/or 55-gallon DOT 17H steel drums.

8.2 Sample Identification

Samples shall be labeled and identified in accordance with Section No. 8.0 of the QAPjP. A block of sample numbers shall be assigned to the EG&G Treatability Study Project Manager by the EG&G Rocky Flats Environmental Data System (RFEDS) group manager.

8.3 Chain-of-Custody

Sample chain-of-custody will be maintained through the application of OPS-FO.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples (SOP 1.13).

8.4 Residuals Management

Residual material at the conclusion of the treatability study will be handled as

specified previously in Section 7.7. This includes shipment of all solids, both "clean" and contaminated, back to the RFP for disposal and/or storage in accordance with EG&G Rocky Flats Waste Operations procedures for management of hazardous and mixed wastes.

9.0 CONTROL OF PROCESSES

The TRUclean process is described in Section 7 of the STS Work Plan.

10.0 INSPECTIONS

Internal ERM oversight inspections may be conducted of the sample handling and shipment process, the treatment process, and the residuals shipping and receiving process at the discretion of the Project Manager and the EQSM. These inspections, if conducted, will be performed in accordance with the requirements of Section 10.0 of the QAPjP and ERM administrative procedure 3-21000-ADM-10.01, Inspections. (Note: inspections of the field sampling and handling process may also be conducted and was addressed in the QAA for the FSP).

11.0 TEST CONTROLS

The standard operating procedures for controlling the TRUclean process are included as Appendix A. Those procedures, along with this STS Work Plan, particularly Section 7.0, provide for the test controls that will be adhered to during the conduct of the Phase I and Phase II tests. In addition to these procedures, all process variables that are tested during Phases I and II, and their corresponding results, shall be documented in laboratory notebooks.

Following completion of the Phase I test runs, the optimum testing sequence will be determined by the treatability testing subcontractor. The plan for the optimum, or Phase II, testing will be submitted to the EG&G Treatability Study

Project Manager for concurrence prior to initiating the Phase II tests.

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT (M&TE)

Field M&TE is not anticipated for use in this activity. The sampling and analytical equipment to be used to determine the physical and radiochemical characteristics of the pre- and post-test products are listed in Section 7.3.5.

The analytical laboratory equipment used to analyze environmental samples shall be calibrated, maintained, and controlled in accordance with the requirements contained in the specific analytical methods used and the instrument manufacturer's instructions.

13.0 HANDLING, STORAGE, AND SHIPPING

Samples shall be packaged, transported, and stored in accordance with the requirements specified in Section 8. The soil samples shall be screened for radiation contamination in accordance with OPS-FO.18, Environmental Sample Radioactivity Content Screening (SOP 1.18). The laboratory that will perform the pre- and post-test characterization analyses on the RFP sample and check samples will accept samples only if radiation levels are less than 100 millicurie per sample.

14.0 STATUS OF INSPECTION, TEST, AND OPERATIONS

The treatability subcontractor shall maintain and report the status of the process operations to the EG&G Rocky Flats Treatability Study Project Manager.

15.0 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 No. 15.0 of the QAPjP. Nonconformances identified by the treatment and analytical subcontractors shall be submitted to the EQSM for processing as outlined in the QAPjP.

16.0 CORRECTIVE ACTION

The requirements for the identification, documentation, and verification of corrective actions for conditions adverse to quality will be implemented as outlined in Section No. 16.0 of the QAPjP. Conditions adverse to quality that are identified by contractors shall be documented and submitted to the EQSM for processing as outlined in the QAPjP.

17.0 QUALITY ASSURANCE RECORDS

Field sampling data records will be controlled in accordance with OPS-FO.02 (SOP 1.2), Field Document Control, and shall be considered QA records. Laboratory chemical and physical analytical data packages shall also be considered QA records. Other records associated with this activity that will be considered QA records include, but are not necessarily limited to, the following:

- Chain-of-custody records
- STS Work Plan
- Subcontractor deliverables, including the performance evaluation report; originals (or legible copies) of the project logbook containing results of physical and chemical tests, weights, temperatures, and other pertinent information; process equipment run sheets; and test parameters and analytical results in Lotus format,

organized by test run number

- Raw data results
- Audit/Surveillance reports
- Nonconformance reports
- Corrective Action reports
- Data validation results
- Procurement/contracting documentation

All QA records generated during the planning and implementation of this activity will be submitted to the ERM record center for processing according to the ERM Administrative Procedure 17.0, Records Management and Section No. 17.0 of the QAPjP.

18.0 QUALITY VERIFICATION

The requirements for the verification of quality shall be implemented as specified in Section No. 18.0 of the QAPjP. The EQSM, or designee, shall develop a surveillance and/or inspection schedule as deemed appropriate for this treatability study. The surveillance will be scheduled to observe the TRUclean process. A surveillance of the records produced from this activity will also be conducted.

19.0 SOFTWARE VERIFICATION

The use of computer software during the conduct of this activity is not anticipated. Therefore, the requirements of Section No. 19.0 of the QAPjP are not applicable to this activity.

ATTACHMENT 2

ATTACHMENT
STANDARD OPERATING PROCEDURES
CONTAINS PROPRIETARY INFORMATION

to LES&TC

see VOLUME II of

PLUTONIUM IN SOILS TREATABILITY STUDIES
Work Plan: TRUclean PROCESS

ATTACHMENT 3

FIELD SAMPLING PLAN
FOR THE
PLUTONIUM IN SOILS TREATABILITY STUDY

(OPERABLE UNIT NO. 2)

U. S. DEPARTMENT OF ENERGY

ROCKY FLATS PLANT

GOLDEN, COLORADO

FINAL

ACRONYMS

EPA	Environmental Protection Agency
cm	centimeters
cpm	counts per minute
FIDLER	Field Instrument for Detection of Low Energy Radiation
IHSS	Individual Hazardous Substance Sites
m	meters
OU2	Operable Unit 2
OP	Operating Procedures
pCi/g	picocuries per gram
Pu	plutonium
RCRA	Resource Conservation and Recovery Act
RFP	Rocky Flats Plant
EMD	Rocky Flats Environmental Management Department
TAL	Target Analyte List

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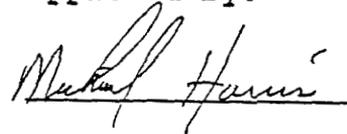
6.0 REFERENCES.....12

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Field Sampling Plan

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Organization: ERM/ESE

Title:
Plutonium in Soils
Treatability Study Work Plan
Field Sampling Plan

Approved by:

 1/15/93
Date

1.0 INTRODUCTION

This Field Sampling Plan for sampling plutonium (Pu) contaminated soils from Operable Unit 2 (OU2) at the Rocky Flats Plant (RFP) describes the sampling objectives, the location and the number of samples to be collected, the chemical and physical parameters to be analyzed, and references the procedures for collecting the samples.

The objective of sampling Pu-contaminated soils from OU2 is to provide data which will support Pu in soil treatability studies. In August of 1990 Final Treatability Study Plan was developed for implementation at Rocky Flats Plant. This document screened potential technologies and selected technologies applicable to the contaminants at Rocky Flats Plant. Gravimetric separation - TRU Clean (physical separation/soil washing) was selected as a potential treatment process for Pu in soils.

Four sampling locations have been selected based on the soil type and expected Pu concentration. The samples will be collected from the most common types of soil present at OU2 as described and mapped by U.S. Department of Agriculture. Expected Pu concentrations have been estimated based on analytical results obtained during past soil sampling efforts east of the 903 Pad area. A bulk composite sample will be collected from each of the sample locations. A subsample of the bulk sample will be analyzed for various physical and chemical parameters.

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Field Sampling Plan

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2.0 SITE BACKGROUND

RFP is located in northern Jefferson County, Colorado, approximately 16 miles northwest of downtown Denver (Figure 1). The plant site consists of approximately 6,550 acres of federally owned land in Sections 1 through 4, and 9 through 15, of T2S, R70W, 6th principal meridian. Plant buildings are located within a 400-acre area known as RFP security area. The security area is surrounded by a buffer zone of approximately 6,150 acres.

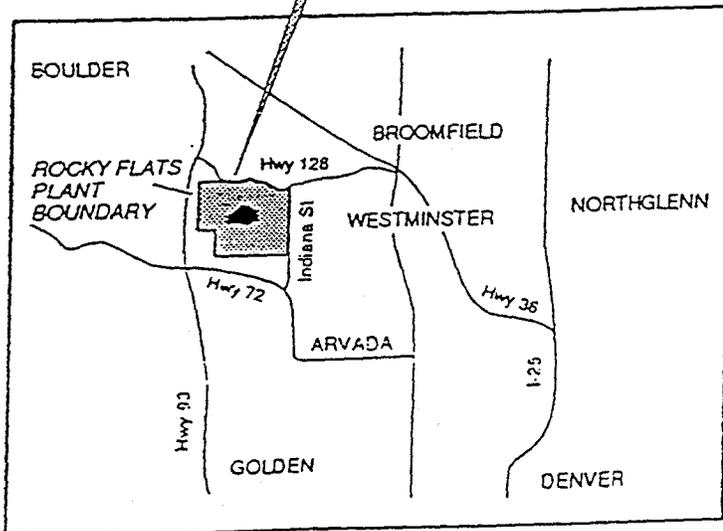
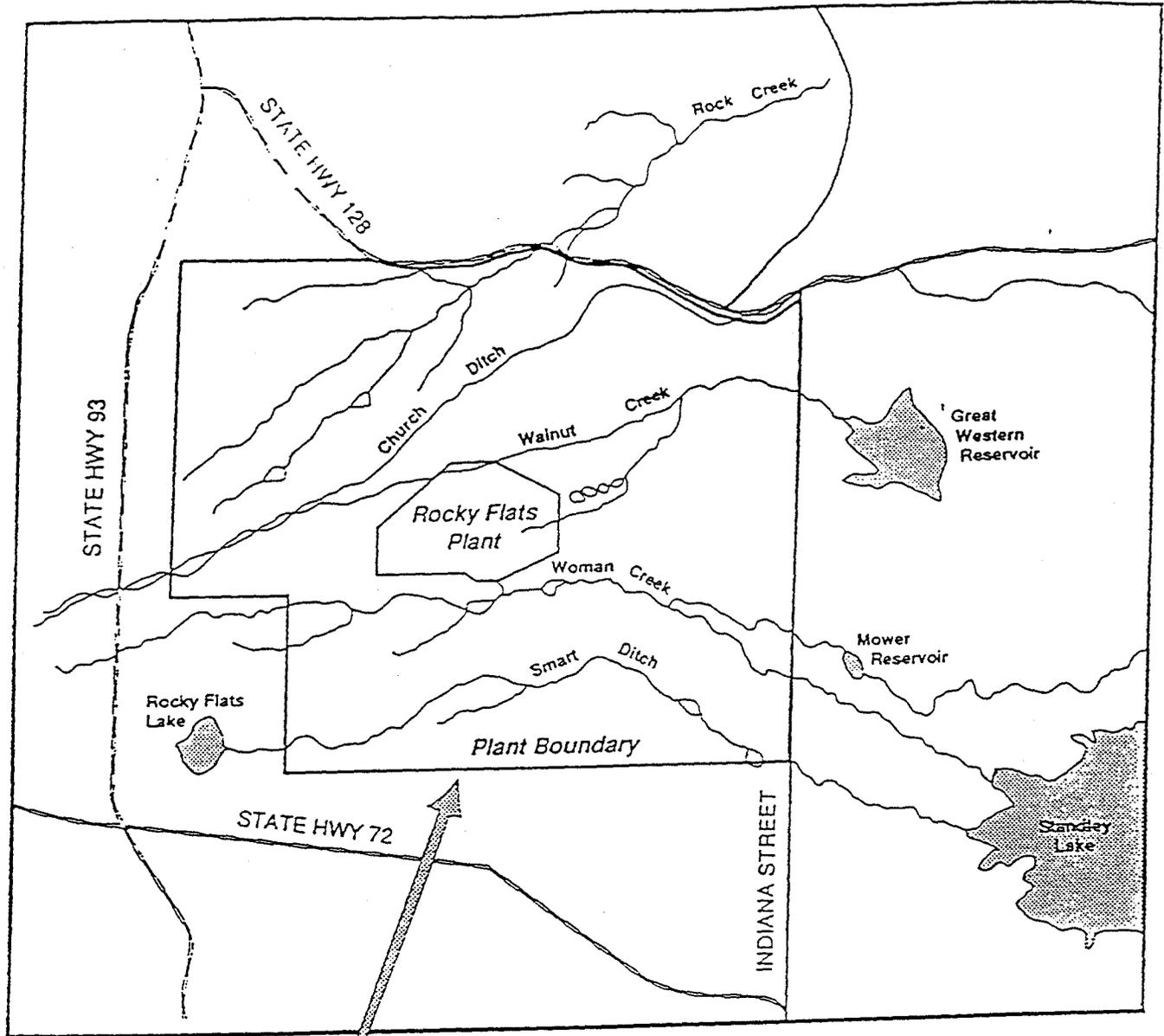
RFP is a government -owned, contractor operated facility. It is a part of a nationwide nuclear weapons research, development, and production complex administrated by Department of Energy Rocky Flats Office. The operating contractor for RFP is EG&G Rocky Flats, Inc. The facility manufactures components for nuclear weapons and has been in operation since 1951. Historically, production activities have included metal fabrication, machining and assembly. Both radioactive and nonradioactive wastes are generated in the process. Current waste handling practices involve onsite and offsite recycling of hazardous materials and onsite storage of solid radioactive materials.

RFP is currently an interim status Resource Conservation and Recovery Act (RCRA) hazardous waste treatment /storage facility. In past, both storage and disposal of hazardous and radioactive wastes occurred onsite. Preliminary assessments conducted under Phase 1 of the Environmental Restoration Program identified some of the past onsite storage and disposal locations as potential sources of environmental contamination (EG&G, 1989).

2.1 OPERABLE UNIT 2

There are 20 sites designated as Individual Hazardous Substance Sites (IHSSs) that compromise the 903 Pad, Mound and East Trenches Area. These sites are known collectively as OU2 and are located east-southeast of RFP security area (Figure 2).

The 903 Drum Storage Site (903 Pad) (IHSS No.112) was used from 1958 to 1967 to store drums containing mixed waste. The drums, some of which corroded and leaked, contained oils and solvents



Maps not to scale

FIGURE 1 Location Map of Rocky Flats Plant

EXPLANATION



SOIL TYPES

STREAMS, DITCHES
DRAINAGE FEATURES

PAVED ROADS

DIRT ROADS

SECURITY FENCE

INDIVIDUAL HAZARDOUS
SUBSTANCE SITES

SURFACE WATER
IMPOUNDMENTS

BUILDINGS

SOIL TYPE NUMBER

SERIES

27	DENVER
29	DENVER-KUTCH
31	DENVER-KUTCH-MIDWAY
31	ENGLEWOOD
42	FLATIRON
45	HAYDEN
60	LEWIS-PITKIN-STANLEY
80	MIDWAY
80	NEWERLAND
100	NUN
102	NUN
103	STANLEY-NUN
149	WILLOW-HAYDEN
174	WILLOW-HAYDEN

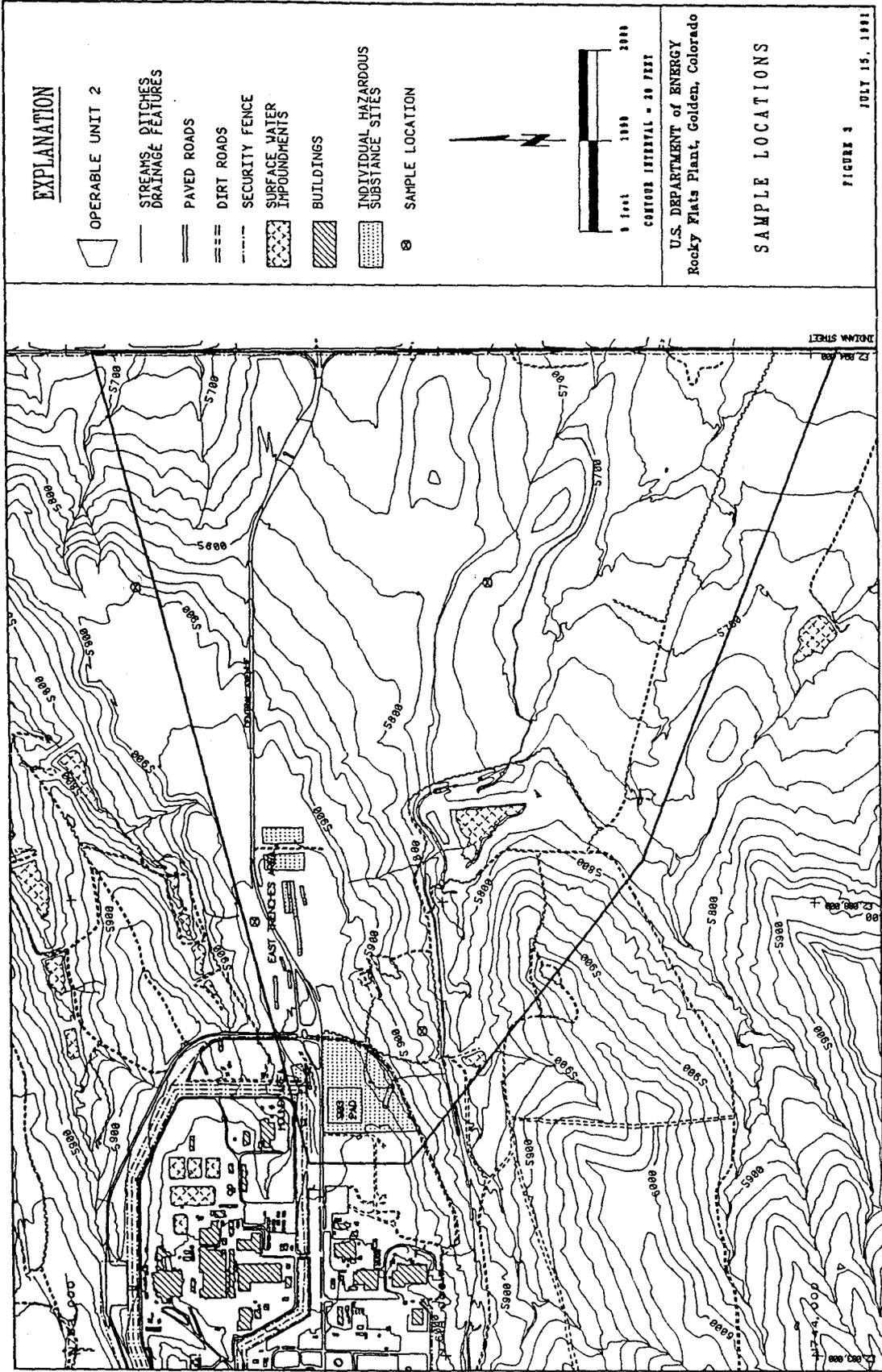


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Rocky Flats Plant, Golden, Colorado

RFP SURFACE SOILS MAP

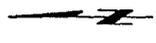
FIGURE 4 JULY 15, 1981





EXPLANATION

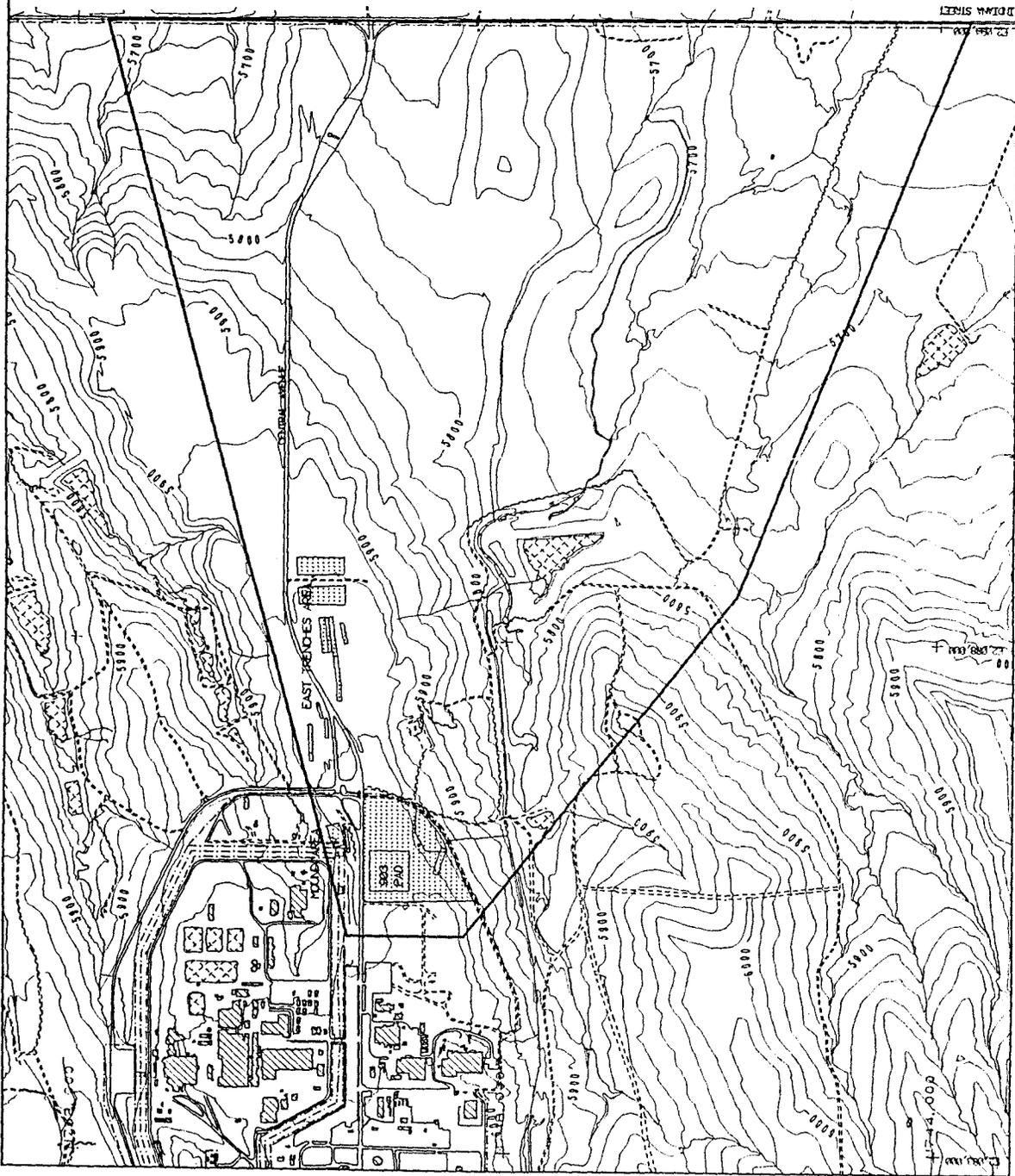
- OPERABLE UNIT 2
- STREAMS, PITCHES, DRAINAGE FEATURES
- PAVED ROADS
- DIRT ROADS
- SECURITY FENCE
- SURFACE WATER IMPOUNDMENTS
- BUILDINGS
- INDIVIDUAL HAZARDOUS SUBSTANCE SITES
- SAMPLE LOCATION



U.S. DEPARTMENT OF ENERGY
 Rocky Flats Plant, Golden, Colorado

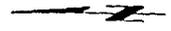
SAMPLE LOCATIONS

FIGURE 3 JULY 15, 1981



EXPLANATION

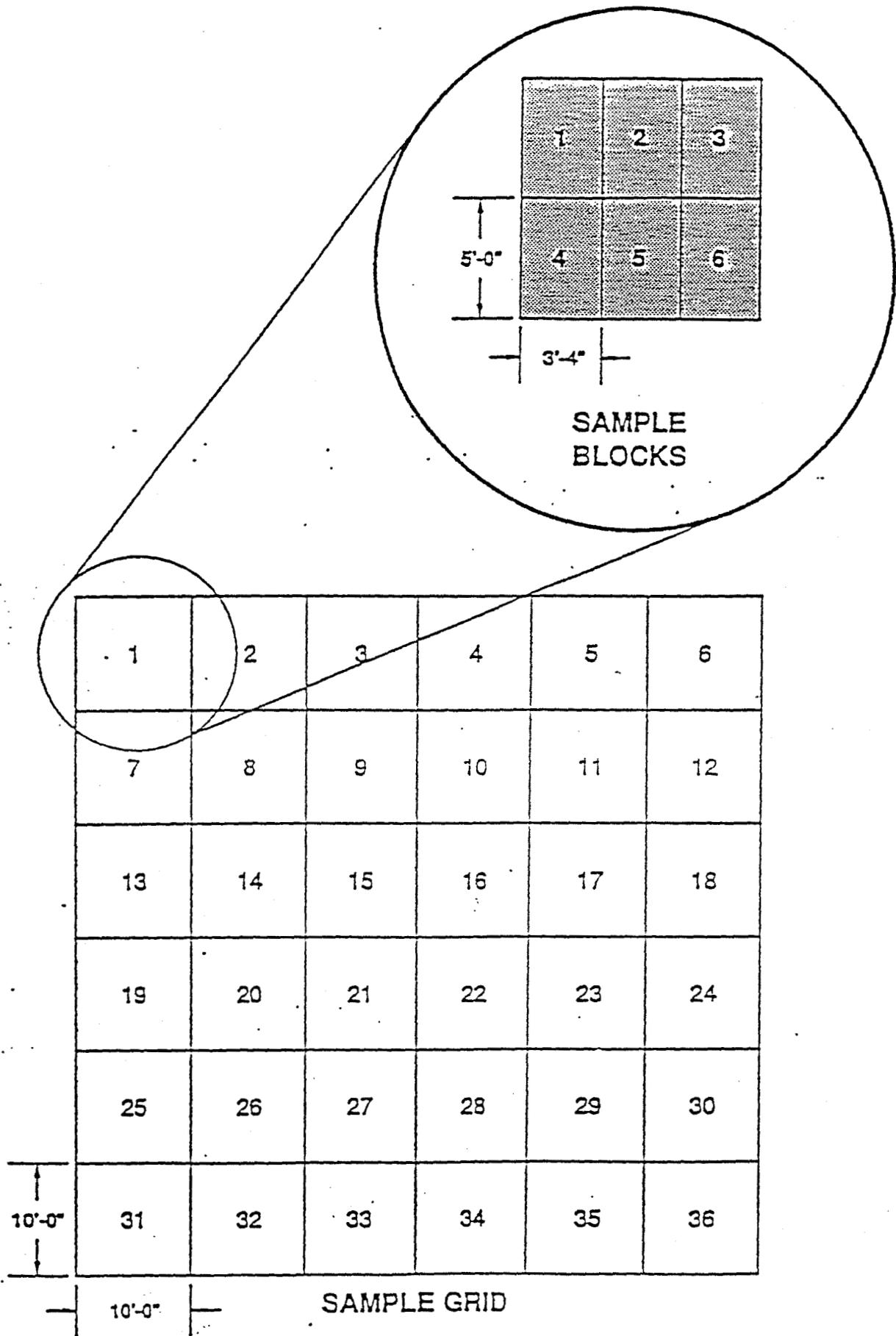
- OPERABLE UNIT 2
- STREAMS, DITCHES, DRAINAGE FEATURES
- PAVED ROADS
- DIRT ROADS
- SECURITY FENCE
- SURFACE WATER IMPEDIMENTS
- BUILDINGS
- INDIVIDUAL HAZARDOUS SUBSTANCE SITES



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Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 2

FIGURE 2 JULY 15, 1991



Figure

EG&G ROCKY FLATS PLANT
Field Sampling Plan

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There will be one sample taken from one of the sample blocks in each grid, according to the random selected number generated by computer. This will result in 36 discrete random samples being taken to provide the bulk sample.

Within the grid block, selected by the number from the computer generated list, excavation will be performed in the approximate center of the block by excavation of 12-inch wide, 18-inch long, 8-inch deep section of soil (1 cubic foot) section of soil with stainless steel shovel. In case of heavy vegetation location will be shift within the same grid block to avoid small bushes, tumbleweeds, etc. Grass type vegetation will be collected together with the soil sample. All rocks larger than 2 inches will be separated by hand and placed on the plastic liner. At the time when each drum will be filled with the soil sample, all rocks collected during sampling of this drum should be weighed on the scale and the weight recorded.

3.2 RADIOLOGICAL SCREENING OF REPRESENTATIVE SOIL SAMPLE PRIOR TO THE SAMPLING

Prior to the collection of the bulk soil sample in the drums soil samples for the radiological screening should be collected and sent for the analysis. Soil sample for radiological screening will be collected from the center of each grid and block number selected for collection of the actual bulk soil sample (see Section 3.1).

Each of 36 soil samples collected for radiological screening purposes will be placed on the stainless steel sheet and homogenized by stainless trowel. Six representative soil samples will be taken from homogenized mixture and sent to the analytical laboratory for radiological screening. The remainder of the soil sample will be placed in the stainless steel container, labeled as potentially contaminated material, and stored in the temporary storage area for potentially contaminated radiological material.

After results from radiological screening of the soil samples will come back, determination will be made on placement of the temporarily stored soil sample and on labeling of the bulk soil sample for the transportation purposes. Only after this, bulk soil sampling will be performed from the same sampling area by following

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Field Sampling Plan

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guidelines described in the Section 3.1.

3.3 DOCUMENTATION

To document and track sampling activities and resultant data, the following record keeping procedures will be followed.

3.3.1 FIELD LOG

Each sampling team will keep a log of all sampling activities. The information will be recorded in a bound, page-numbered journal. This journal should contain a description of all activities related to sampling (equipment, decontamination, field tests, etc.), as well as sample locations, sample identification, dates, times, weather conditions, and identification of individuals present.

3.3.2 SAMPLING RECORD FORM

To avoid incomplete field logs and to aid in sample source tracking, a sampling form requiring specific information on sample collection, field conditions and sample distribution will be completed for each sampling event (Figure 6). At the end of each sampling day, the sampling forms will be compared with information recorded in the field log, organized sequentially by grid number, and placed in three ring binder.

A separate, bound journal will be kept for logging and tracking the samples. This log will record the sample location by the project sample identification number. An example of the sampling log format is shown in the Figure 7.

3.3.3 CHAIN OF CUSTODY

A required part of this soil sampling and analytical program is the integrity of the sample from collection to data reporting. This includes the ability to trace the possession and handling of samples from the time of collection, through analysis, to final deposition by proper documentation of the samples - chain of custody.

All soil samples submitted to the analytical laboratories for

SOLID SUBSTANCES SAMPLING FORM

Project _____ Date _____
Task No. _____ Time _____
Site _____ Sampling Team Members _____
Sample ID _____ Location _____
Quantity _____

SUBSTANCE DESCRIPTION

Sample Type Soils _____
 Sediments _____
 Other _____

Sampling Procedures/Methods (describe)

Sample Containers

Comments

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

General Comments

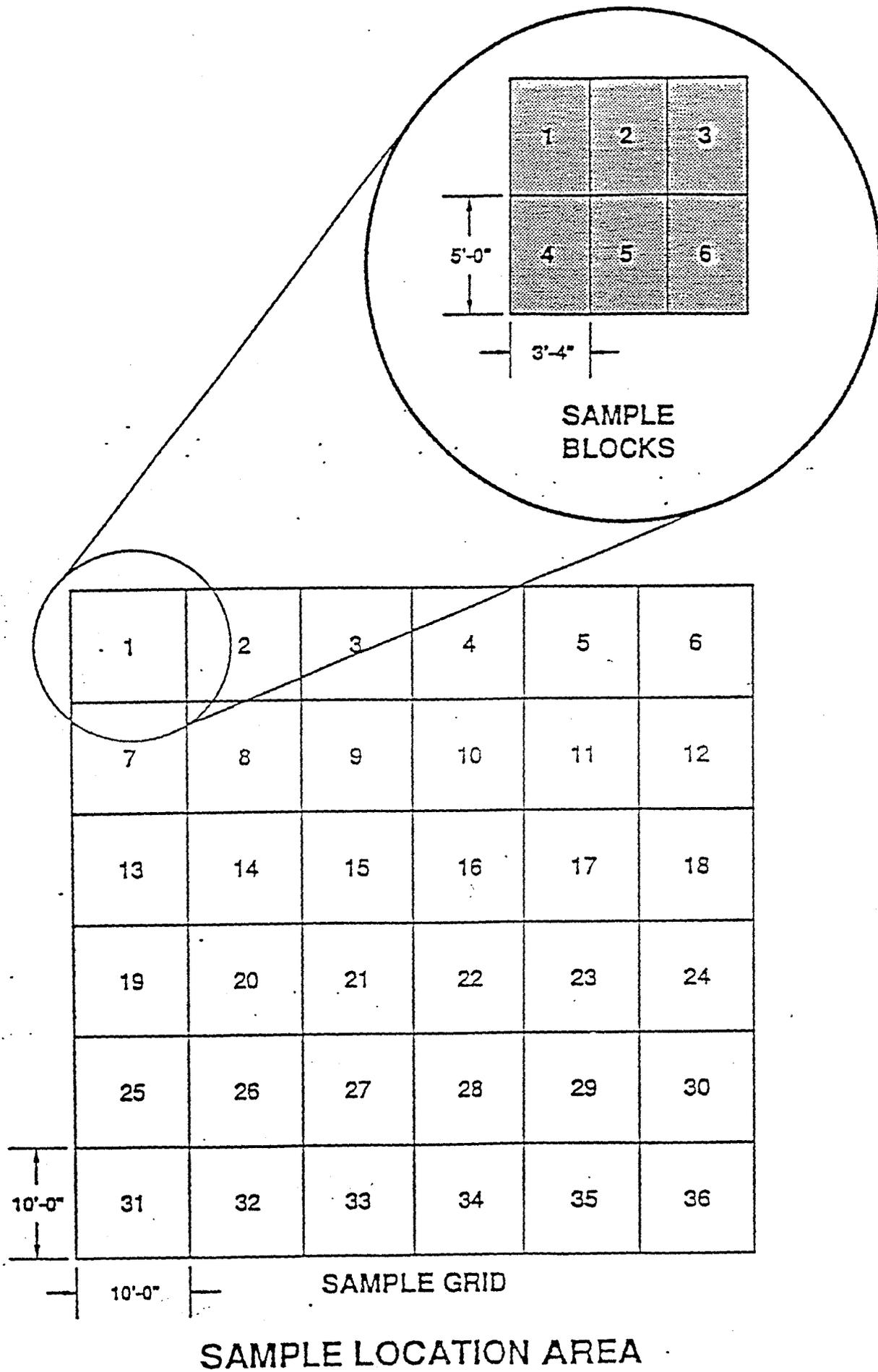
FIGURE

6

SAMPLE LOG

Date	Time	Sample Collection Location		Sample Identification Number	Quantity/Type	Logged By
		Grid No.	Block No.			
		1				
		2				
		3				
		4				
		5				
		6				
		7				
		8				
		9				
		10				
		11				
		12				
		13				
		14				
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		23				
		24				
		25				
		26				
		27				
		28				
		29				
		30				
		31				
		32				
		33				
		34				
		35				
		36				

FIGURE 7



Figure

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Field Sampling Plan

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analysis required to have chain of custody. Procedures for these samples shall be consistent with the Rocky Flats Plant Environmental Management Department (EMD) Operating Procedures (OP) EMD FO.13 titled, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples.

Responsibility for RFP plutonium contaminated bulk soil sample will vary. From sampling at RFP, bulk soil samples will be transported to the Lockheed Environmental Systems and Technologies Company treatability laboratory for testing of TRU Clean technology. Upon completion of the characterization and treatability tests, residual materials will be return to RFP for final disposition. Chain of custody will accompany bulk soil sample along the way during transportation from one place to another.

3.4 SAMPLE SHIPMENT

Each soil sample require a radiological screening per RFP procedures (Environmental Management - Standard Operating Procedure No. 1.13) prior to shipment offsite.

Based on this requirement and in order to decide marking and labeling of bulk soil sample, radiological screening on the soil sample will be performed prior to the collection of actual bulk soil sample from the same sampling location. On site transfer of these soil sample materials (within the boundaries of RFP) will be considered radioactive until the screen has been performed. If an off-site laboratory is used for this radiological screening, requirements of 49 CFR 100-180 apply.

Decision on packaging, marking, and labeling of the bulk soil sample material will be made after results of the radiological screening are reviewed.

3.5 INITIAL SOIL SAMPLE CHARACTERIZATION

A subsample of the collected soil sample will be obtained for analyses and sent to the EG&G RFP selected analytical laboratory. Total of six soil samples will be collected for the analysis indicated below (representing each drum of soil sample).

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Field Sampling Plan

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The sample area is divided into 36 10-foot by 10-foot grids. There will be six grids in a row and six rows (Figure 5). Random selected number by the computer will identify one grid block selected in each row. When the soil sample is taken from the selected sample block a portion of the sample will be placed in a sampling containers and submitted for the appropriate analysis indicated below.

Total of six soil samples will be submitted for each of the following analysis:

- * Target Analyte List (TAL) metals using Environmental Protection Agency (EPA) method 6010;
- * Volatile organic compounds using EPA Method 8240;
- * Semi-volatile organic compounds using EPA Method 8250; and
- * Total Radionuclides, including Pu 238, Pu 239, Pu 240, Am 241, U 233, U 234, U 235, U 238, gross alpha, and gross beta.

One duplicate soil sample will be sent for each of the analysis for Quality Assurance purposes.

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4.0 PROJECT MANAGEMENT

This section describes the management approach for the performance of the field activities during collection of the soil samples. The lines of authority for each team member of the project are shown on the Figure 8.

The objective of the project management during soil sampling is to direct and document field sampling activities so that obtained as a result of these activities bulk soil sample will be fully representative sample, which can be utilized during treatability study.

Specific project management activities will occur throughout the field sampling and will include the following: meetings; cost and schedule control; data management; quality control; health and safety. These activities will be conducted to identify potential problems quickly enough to make necessary corrections and keep the project on its objectives, on schedule, and within budget.

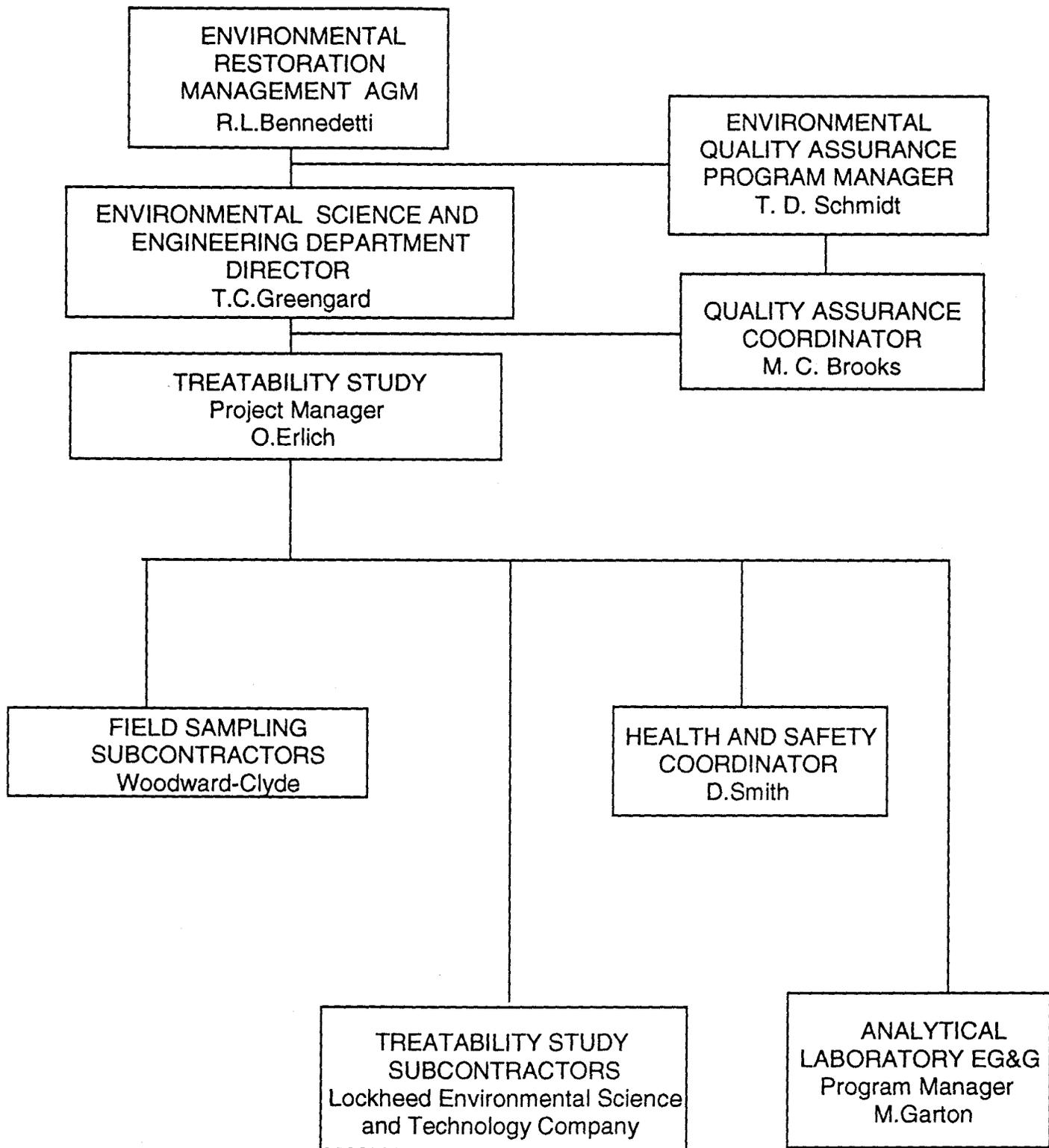


Figure 8. PROJECT MANAGEMENT FOR SAMPLING PLUTONIUM CONTAMINATED SOILS

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Title:
Plutonium in Soils
Treatability Study Work Plan
Field Sampling Plan

Approved by:

_____/_____/_____
Date

5.0 SAMPLING PROCEDURES

Sampling procedures will follow those specified in the procedure change notice to ER OP GT.08. The specifics of the sampling are detailed in Section 3. All field work will be performed in accordance with the Health and Safety Plan developed for this task. The Health and Safety Plan is attached as an Appendix to this Field Sampling Plan.

Samples will be collected using stainless-steel shovels and will be limited to A-horizon material. The sampling will be conducted in a manner that minimizes impact to the surrounding vegetation. Sampling will continue until the necessary volume of soil has been obtained see Section 3 for details. Sampling and decontamination procedures will follow guidelines presented in RFP EG&G OP and their change notices:

- FO.03 - General Equipment Decontamination;
- FO.13 - Containerization, Preserving, Handling and Shipping of Soil and Water Samples;
- FO.16 - Field Radiological Measurements;
- GT.08 - Surface Soil Sampling.

Any substantial excavation will be backfilled with pea gravel. The sample location will be marked with a metal stake in the event that additional sampling is required for the treatability study. The project, time, and date will be recorded on a metal tag which will be attached to the stake.

Chain-of-custody procedures outlined in EG&G OP FO.13 will be strictly followed. Samples will be shipped to NTS in accordance with U.S. Department of Transportation regulations.

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ATTACHMENT 4

HEALTH AND SAFETY PLAN
TO THE
FIELD SAMPLING PLAN FOR
PLUTONIUM IN SOILS TREATABILITY STUDY

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LIST OF ACRONYMS

CDH	Colorado Department of Health
CERCLA	Comprehensive Environmental Response Compensation and Recovery Act
cm	centimeter
cpm	counts per minute
DOE	Department of Energy
EMAD	Environmental Monitoring and Assessment Division
EPA	Environmental Protection Agency
ER	Environmental Restoration
FID	Flame Ionization Detector
FIDLER	Field Instrument for Detection of Low Energy Radiation
FO	Field Operations
H&S	Health and Safety
HAZMAT	Hazardous Materials Agency
HEPA	High Efficiency Particulate Air
HSPP	Health and Safety Program Plan
IHSS	Individual Hazardous Substance Site
mph	miles per hour
NPL	National Priority List
OP	Operating Procedure
OTJ	On the Job
pCi/g	picocuries per gram
ppm	parts per million
PU	Plutonium
RCRA	Resource Conservation and Recovery Act
RFP	Rocky Flats Plant
ROI	Radiological Operating Instructions
RPTs	Radiation Monitor Technician
SCBA	Self Contained Breathing Apparatus
VOCs	Volatile Organic Compounds

1. GENERAL INFORMATION

SITE NAME: Rocky Flats Plant (RFP)
PROJECT NO: 989039
PROJECT NAME: SOIL SAMPLING AT ROCKY FLATS PLANT FOR THE
PLUTONIUM CONTAMINATED SOILS CLEANUP
SITE LOCATION: Golden, Colorado
DATES TO VISIT: November 30, 1992 - February 26, 1993
OBJECTIVE:

This plan outlines the health and safety protocol to be followed during SOIL SAMPLING AT ROCKY FLATS PLANT FOR THE PLUTONIUM CONTAMINATED SOILS CLEANUP. The program consists of the collection of four bulk sample of plutonium (Pu) contaminated surface soils. The expected Pu concentration in the soils range from 10 pCi/g to 500 pCi/g. The samples will be obtained from four areas located east of 903 Pad (IHSS 155). The sample locations are plotted on Figure 3. This health and safety plan is a revision of a health and safety plan that was approved by EG&G for a similar sampling task that occurred on October 19, 1990. The task is expected to take up to three weeks to complete and is scheduled to be performed sometime during 1992-1993. The comments received from the EG&G Health and safety (H&S) review have been incorporated.

ORIGINAL SAFETY PLAN? no REVISION NO. 3

SITE CONTACT & PHONE NO.:

M.Z.Litaor 966-8583 - Principal Senior Soil Geochemist
O.Erlich 273-6110 - Environmental Engineer
D.Smith 966-8636 - Health and Safety Officer
E.A.Dille 966-8684 - Operable Unit 2 Project Manager

SITE TYPE:

Active Department of Energy (DOE) facility involved in the production of metal components for nuclear weapons.

MAP ATTACHED? yes

SITE HISTORY:

RFP is a government owned operated facility. EG&G is the present primary operating contractor. The plant has been in operation since 1952. It is involved in manufacture of the "pit assembly" plutonium component of nuclear weapons, reprocessing scrap and plutonium from dismantled weapons, laboratory research on

properties of nuclear materials, and fabrication of other metals such as steel and beryllium. Wastes produced include hazardous wastes, low-level and transuranic radioactive wastes, and mixed wastes. Historically, these wastes have been either disposed onsite, stored in containers onsite, or disposed off site. RFP was proposed for inclusion on the Superfund National Priority List (NPL) in 1984, and included on NPL in October 4, 1989, Federal Register. Cleanup has been conducted under the Comprehensive Environmental Response and Recovery Act (CERCLA). Environmental Protection Agency (EPA), DOE, Colorado Department of Health (CDH) are involved in assessment and cleanup roles at the plant. A draft Interagency Agreement between the three was released for public comment in December 1989 and was produced to clarify the roles and responsibilities of each agency.

SITE DESCRIPTION & FEATURES:

The plant site covers approximately 6,550 acres in Jefferson County, Colorado, Section 1 through 4 and 9 through 15 of R70W, T2S. The facility is centered at 105 degrees 11'30" west longitude, 39 degrees 53'30" north latitude. This location is 16 miles northwest of Denver and 9 to 12 miles from the communities of Boulder, Broomfield, Golden, and Arvada. It is approximately bounded on the north by State Highway 128, on the west by State Highway 93, on the south by State Highway 72, and in the east by Jefferson County Highway 17 (Indiana Street). Major plant structures, including all production buildings, are located within a 384-acre security fenced area. The plant is divided into several areas consisting of several operational complexes. The major production facilities and associated complexes are in the 300, 400, 600, 700, 800, and 900 areas (refer to Figure 1).

The Environmental Science and Engineering Division (ES&E) has requested soil sampling be performed to provide a bulk sample required for the Plutonium-contaminated soils cleanup treatability study under Sitewide Treatability Study Program.

DESCRIPTION OF SPECIFIC SITE AREA(S) OF CONCERN:

The areas to be sampled are plotted on the Figure 3. The areas were impacted by wind-born contamination emanating from 903 Pad drum removal activities. The site to be sampled is located east of the 903 Pad (IHSS 155). No ongoing plant activities will impact the sample area. The following is a brief discussion of the history of IHSS 155 obtained from the PHASE II RI/FS WORK PLAN ROCKY FLATS PLANT 903 PAD, MOUND, AND EAST TRENCHES AREAS OPERABLE UNIT NO.2, DECEMBER 1989:

IHSS 155: 903 Lip Site

During drum removal and cleanup activities associated with 903 Drum Storage Site (903 Pad), winds redistributed plutonium to the south

and east. The most contaminated area was immediately adjacent to the pad to the south and southeast. Survey at the time of the drum removal project and subsequent annual soil sampling from 1969 to 1972 showed a maximum plutonium concentration of 2,258 pCi/g in the top five centimeters (cm) of soil at the 903 Lip Site.

Soil cleanup efforts were undertaken in 1976, 1978, and 1984 to remove plutonium-contaminated soils from the 903 Lip Site. The 1976 soil removal consisted of hand-excavating contaminated soils until the contamination levels were below the lower detection limit of the Field Instrument for Detection of Low-Energy Radiation (FIDLER). The lower detection limit of FIDLER is 250 counts per minute (cpm). The excavated area was covered with clean topsoil and reseeded with native grasses.

During the 1978 soil removal project, all soil that exceeded 2000 cpm, as determined with FIDLER, was removed. The excavated areas were resurveyed with FIDLER, and soil removal continued until background readings (approximately 250 cpm) were obtained. Topsoil was added to the excavated areas, and the site was reseeded with native grasses.

A third soil removal effort was performed during 1984. An area along the eastern edge of the 903 Lip Site was excavated and backfilled with clean topsoil.

SURROUNDING POPULATION:

rural/residential/commercial/industrial/other

The Plant is located adjacent to foothills west of Denver. Rural areas are located to west; populated areas are located to the east.

B. HAZARDOUS MATERIALS/WASTE CHARACTERISTICS

MATERIAL TYPE(S):

Liquid	___
Solid	<u> X </u>
Sludge	___
Gas	___
Other	___

CHARACTERISTICS:

Corrosive	___
Ignitable	___
Radioactive	<u> X </u>
Volatile	___
Toxic	___
Reactive	___
Unknown	___
Other	<u> X </u> Organics

HAZARDOUS MATERIALS SUMMARY:

<u>Hazardous Material/Waste</u>	<u>Source/Quantity/Characteristics</u>
Plutonium-contaminated soil	903 Pad/Obtain 4-16 55 gal drums of soil/10-500 pCi/g bulk soil samples

C. HAZARD EVALUATION

HAZARD OF CONCERN:

Organic Chemicals	<u>X</u>
Inorganic Chemicals	---
Pesticides/PCBs	---
LLW	---
TRU	---
Biologic	<u>X</u>
Slip, trip, fall	<u>X</u>
Weather	<u>X</u>
Ongoing facility operations in area	---
Power lines	---
Other	<u>X -radiological</u>

Describe ongoing facility operations of concern & any other potential hazards:

The sites to be sampled are located in the RFP east buffer zone; no operations will impact the area.

CHEMICAL EXPOSURE HAZARD SUMMARY:

TASK HAZARD ASSESSMENT

OVERALL HAZARD: High___ Moderate X Low___ Provide Rational:

The overall exposure hazard is considered to be moderate, as Plutonium concentrations detected during 1989 sampling in this area ranged from 7.7 to 283 pCi/g. EG&G Site Specific Administrative Dose Guideline (ADG) is 1.8 Rem per year. The primary hazard associated with this sampling task is the threat of ingestion or inhalation of Plutonium-contaminated material. This threat will be minimized by utilizing the procedures listed in Section D of this plan.

CHEMICAL EXPOSURE HAZARD SUMMARY

Hazardous Material/ Waste	Exposure Limit	Potential Pathway of Exposure	Derived Air Concentr.	Signs or Symptoms of Acute Exposure
Plutonium 239	5 rem/yr ALARA	Inh, Ing, Con	2×10^{-12} mCi/ml	(Personnel continuously monitored with RFP dosimeters)
Plutonium 240	5 rem/yr ALARA	Inh, Ing, Con	2×10^{-12} mCi/ml	(Personnel continuously monitored with RFP dosimeters)
Americium 241	5 rem/yr ALARA	Inh, Ing, Con	2×10^{-12} mCi/ml	(Personnel continuously monitored with RFP dosimeters)

D. SITE OPERATIONS

TASK 1

Obtain a bulk soil sample (0 to 20 cm) from four locations using a shovel or a stainless-steel scoop. The site will be monitored with an Foxboro OVA 128 by the contractor's field crew prior to and during sampling. The Foxboro be calibrated with methane at 100 ppm in air. Volatile organic compounds (VOCs) are not anticipated to be present. The use of a Flame Ionization Detector (FID)-type monitor will confirm that VOCs are not present at the sample location. The site will be monitored by EG&G or contractor's Radiation Monitor Technicians (RPTs) during sampling. Copies of H&S equipment calibration and data obtained during the sampling task will be made available to EG&G H&S personnel.

Level of protection: A ___ B ___ C X D ___

Schedule:

Sampling is scheduled to take place during FY93 and depend on the funding availability. Sampling can occur as follows in two different scenarios however, the most likely is "b" scenario:

- a. All soil samples from all four locations will be collected at the same time frame, and
- b. Soil samples will be collected at different time frame from different locations based on the necessity through the Fiscal Year 93-94. The first part of the sampling is scheduled to be performed during the period of time between November 30, 1992 and January 15, 1993.

PROTECTIVE EQUIPMENT (specify probable quantity required; N/A = not applicable):

Respiratory N/A___

- ___ SCBA, Airline
 Full Face Respirator
HEPA/ACTIVATED CARBON cartridge
 ___ Escape Mask
 ___ None
 ___ Other___

Clothing N/A___

- ___ Fully Encapsulating Suit
 ___ Chemically Resistant Splash Suit
 ___ Apron, Specify___
 Tyvek Coverall
 ___ Saranex Coverall
 Cotton Coverall to be worn under the tyvek
 ___ Other

Head and Eye N/A___

- Hard Hat around overhead hazards
 ___ Goggles
 ___ Face Shield
 ___ Chemical Eyeglasses
 ___ None
 Other Safety Glasses with side shields

Hand Protection N/A___

- Gloves
 (Type) see below
 Undergloves
 (Type) Latex
 Overgloves
 (Type) Nitrile
 ___ Other ___

Foot Protection N/A___

- Safety Boots
 Latex Disposable Overboots
 ___ Other___

MONITORING EQUIPMENT:

 CGI PID FID - action level is 2.5 ppm sustained above background for volatile compounds - If a sustained reading of 2.5 ppm is measured in the breathing zone of the worker, full-face respirators with appropriate cartridges will be donned. O2 Meter Rad Survey: provided by RFP or Contractor RPTs following ROI 2.1, 2.3, 3.1, 3.2 procedures. RPT will monitor the site prior to sampling activities and when the workers are leaving the sample location. Other: External Dosimetry, Fecal and Urine bioassays Detector Tubes Type: Other: RPTs will utilize EBERLINE SAC-4, LUDLUM-31 monitors

SITE ACCESS/CONTROL:

M.Z.Litaor 966-8583 - Principal Senior Soil Geochemist
 O.Erlich 273-6110 - Environmental Engineer
 D.Smith 966-8636 - Health and Safety Officer
 E.A.Dille 966-8684 - Operable Unit 2 Project Manager

DECONTAMINATION PROCEDURES

TASK 1

An exclusion zone for decontamination activities will be delineated by four traffic cones adjacent to the sample location. The decontamination area within the exclusion zone will consist of plastic set on the ground with two tubs, two scrub brushes, and two sprayer set on the plastic. One sprayer will be filled with a non-phosphate detergent and distill water, the other sprayer will contain distilled water. Prior to leaving the sampling area, all personnel will be required to decontaminate themselves by the following process: All personal equipment contacting soil will be scrubbed with a non-phosphate detergent wash followed by a thorough distilled water rinse. Personnel will perform a field hand wash with distilled water at the work area. Personnel will be monitored by an RPT following procedure ROI 2.1, 3.1, and 3.2, prior to leaving the work area. Personnel determined to be contaminated by the RPT will be handled following procedure ROI 2.3, to be followed by a bioassay. Personnel determined not to be contaminated will take a total body shower at Building T 764A.

WORK LIMITATIONS:

1. Heat stress limitations per the RFP HSP will be imposed. If the ambient temperature is greater than 70 F, work will be performed in 30 minute intervals with 15 minute rest periods between work intervals.

2. Work will be stopped if winds exceed 15 mph for two consecutive 15 minute intervals. Radio communication will be maintained between site workers and the EG&G construction manager, who will inform the workers of wind speed.
3. The soil will be wetted with distilled water to minimize the potential for resuspension prior to sampling.
4. The full-face respirators will be donned when intrusive activities (actual sampling) occur.
5. All personnel entering the 903 Pad Americium Zone Radiologically Controlled Area/Radiation Work Permit (RWP) Area are required to sign in/sign out on the RWP. A specific RWP will be generated for this task. Contact K.D.Anderson, Rad.Engineering for issuance of the RWP.

INVESTIGATION DERIVED MATERIAL DISPOSAL:

All solids collected will be kept as samples. Decon water will be containerized and transported to the decon pad located at the EG&G 800 Area Contractor's Lot per ER OP FO.6. Protective clothing and disposable will be bagged and transported to the contractors trailer area for the proper RFP onsite disposal per ER OP FO.7. The samples will be radiologically screened by RPTs prior to offsite transport.

ADDITIONAL NOTATIONS: None

E. SITE PERSONNEL

	Med.	40H	Fit	CPR	Cert.	Super.
	Current	OSHA	Test	F.Aid	Level	Train.
Project Manager : K.Power	Yes	Yes	Yes	No	B	Yes
Field Team Leader: D.Spruce	Yes	Yes	Yes	Yes	B	Yes
H&S Officer : G.Miller	Yes	Yes	Yes	Yes	B	Yes
Field Staff : F.Lopez	Yes	Yes	Yes	No	B	Yes
D.Spruce	Yes	Yes	Yes	Yes	B	Yes

Note:

Certification level refers to the maximum level of protection as described by OSHA 1910.120 that personnel are qualified by training and experience to wear.

SITE-SPECIFIC TRAINING AND MEDICAL MONITORING REQUIREMENTS:

RFP courses: Rad.Safety (476); RCRA(435); Respirator Indoctrination(284); Respirator Fit Test. All training records and medical fitness records are on file at the

Woodward-Clyde Office and RFP Woodward-Clyde Field Trailer located at the EG&G 800 Area Construction Lot. Fecal and urine bioassays are required for this sampling effort.

F. EMERGENCY INFORMATION

SITE RESOURCES:

Medical Clinic	<u>X</u>	
HAZMAT Team	<u>X</u>	
Phone	<u>X</u>	
2-Way Radio	<u>X</u>	channel 1 for RFP emergency response
Water Supply	<u>X</u>	
Restrooms	<u>X</u>	
Fire Department	<u>X</u>	
Police	<u>X</u>	

Emergency Phone Numbers (If onsite emergency assistance available, please list site numbers):

The nearest phone is located in the Woodward-Clyde field trailer. The field crew will be in radio communication with the Woodward-Clyde site supervisor at the Woodward-Clyde trailer:

Ambulance	<u>2911</u>	Project Manager	<u>740-2700</u>
Medical	<u>2911</u>	Site Contact	<u>273-6110</u>
Fire	<u>2911</u>	H&S Coordinator	<u>447-5940</u>
Police	<u>2911</u>		
Poison Control Center	<u>2911</u>		
Other	<u>2911</u>		

CONTINGENCY PLANS:

Spill, Accidental Release: Call 2911.

Fire, Explosion: Call 2911.

Other: Evacuate area if in immediate danger.

EMERGENCY ROUTE TO NEAREST HOSPITAL (attach map):

Onsite medical facility - Bld.122 (See Fig.2).

EVACUATION PROCEDURES:

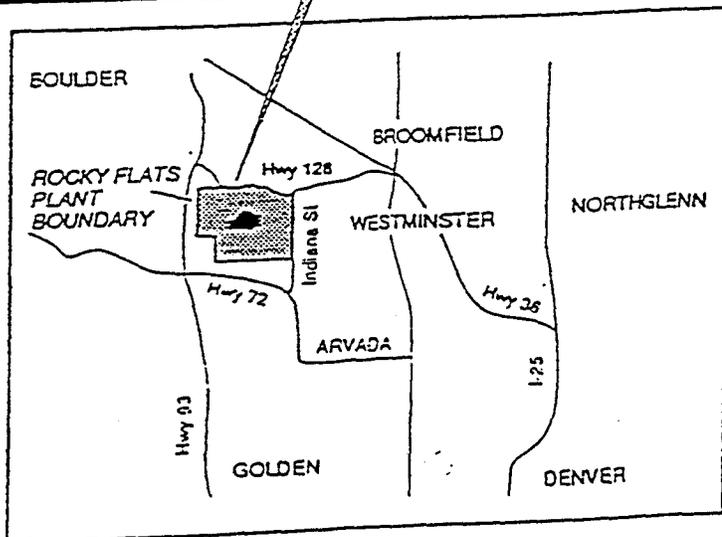
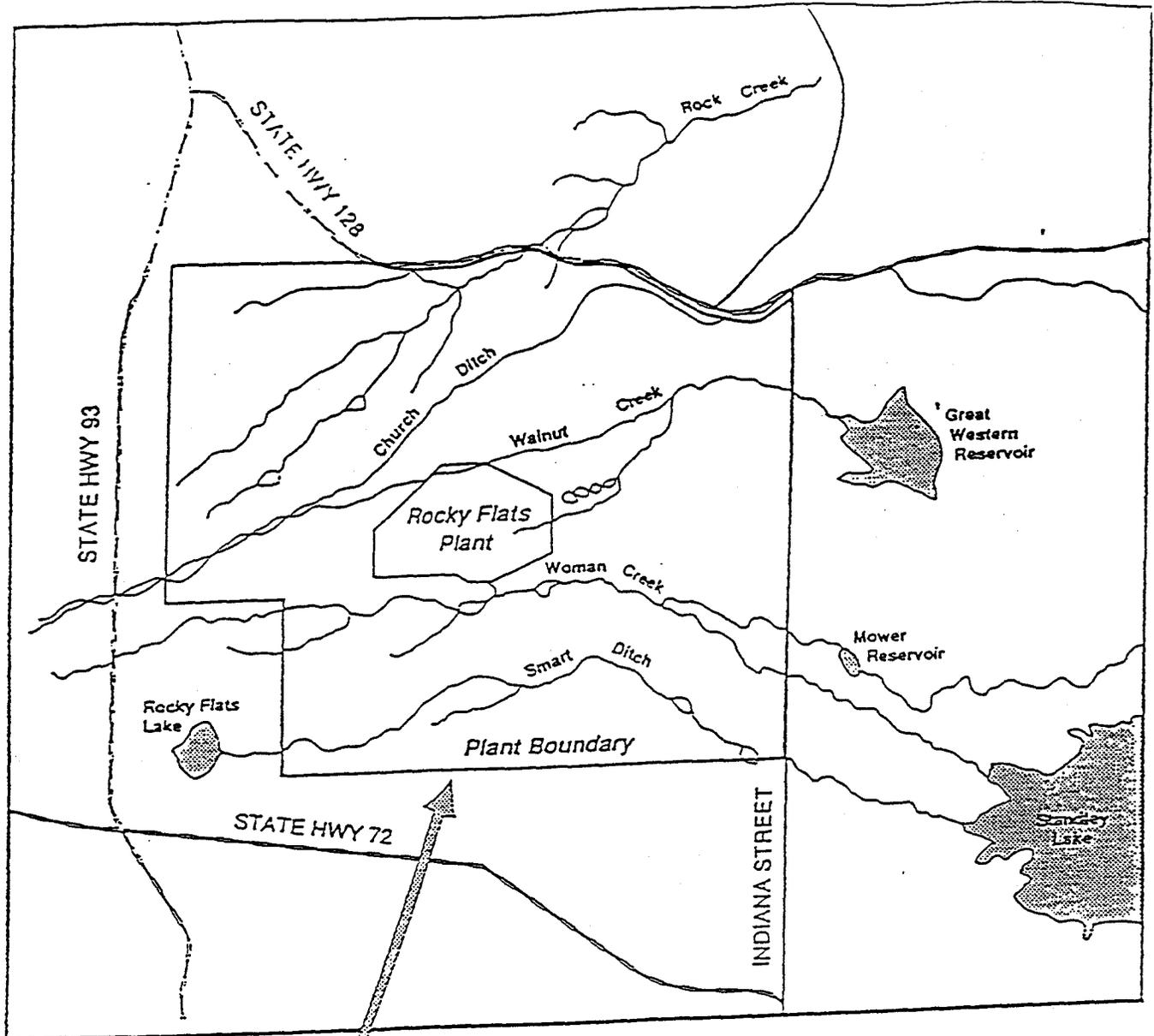
Follow instructions given to public address system, otherwise upwind.

G. EMPLOYEE CERTIFICATION

I certify that I have read, understand and agree with the contents of this Health and Safety Plan.

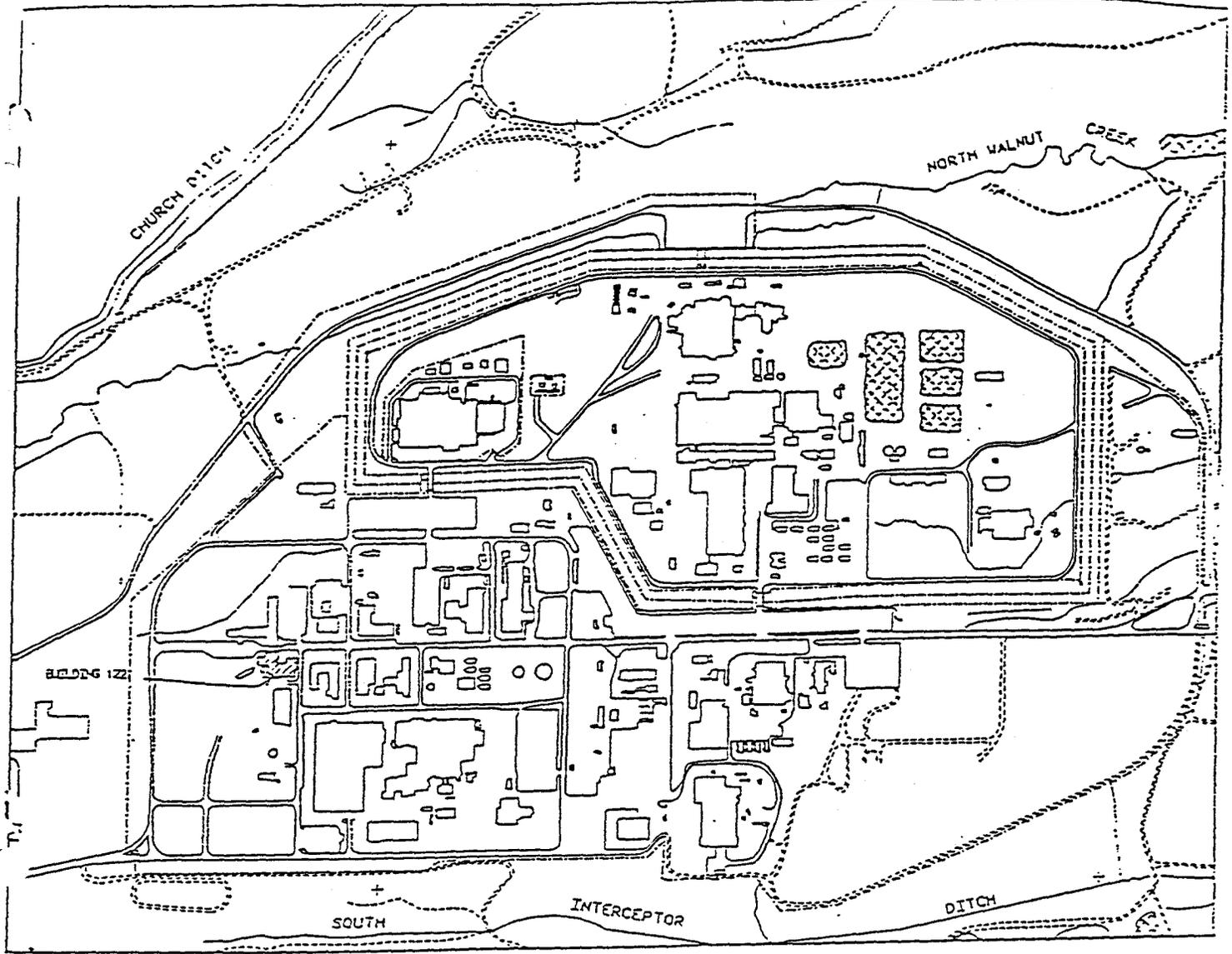
Name: _____

Date: _____



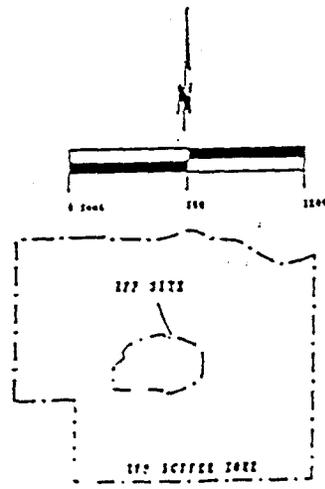
Maps not to scale

FIGURE 1 Location Map of Rocky Flats Plant



MAP LEGEND

- STREAMS, DITCHES, DRAINAGE FEATURES
- == PAVED ROADS
- === DIRT ROADS
- - - SECURITY FENCE
- ▨ SURFACE WATER IMPOUNDMENTS
- ▩ BUILDING 122



BUILDING 122
MEDICAL FACILITY

FIGURE 2

ATTACHMENT 5

QUALITY ASSURANCE ADDENDUM

to the

ROCKY FLATS SITE-WIDE QA PROJECT PLAN

**FOR CERCLA RI/FS AND RCRA RFI/CMS
ACTIVITIES**

to the

FIELD SAMPLING PLAN

for

PLUTONIUM IN SOILS TREATABILITY STUDY

(OPERABLE UNIT NO. 2)

ENVIRONMENTAL RESTORATION	Manual:	21100-WP-CU02.6
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TITLE:
 Quality Assurance Addendum to the Rocky Flats
 Site-Wide QA Project Plan for CERCLA RI/FS and
 RCRA RFI/CMS Activities for the Plutonium in
 Soils Treatability Study

Approved By:

Michael Harris
 1/15/93

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LIST OF ACRONYMS

CERCLA	Comprehensive Environmental Response Compensation and Liability Act
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQO	Data Quality Objective
EM	Environmental Management
IAG	Interagency Agreement
LANL	Los Alamos National Laboratories
NTS	Nevada Test Site
OP	Operating Procedure
OU	Operable Unit
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
pCi/g	Picocuries per gram
QA	Quality Assurance
QAA	Quality Assurance Addendum
QAPjP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFP	Rocky Flats Plant
RPD	Remediation Programs Division
SOP	Standard Operating Procedure
STS Work Plan	Plutonium in Soil Treatability Studies Work Plan
TAL	Target Analyte List
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds

INTRODUCTION AND SCOPE

This Quality Assurance Addendum (QAA) supplements the RFP Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigation/Feasibility Studies and RCRA Facility Investigations/Corrective Measures Studies Activities (QAPjP). The QAA establishes the specific Quality Assurance (QA) controls applicable to the field investigation activities described in the Plutonium in Soils Treatability Study Work Plan (TSWP).

The objective of the plutonium (Pu) in soils treatability study is to evaluate the abilities of the TRU clean process to reduce the concentration of Pu and the levels of gross alpha/beta in RFP soils to acceptable levels. The treatability study consists of collecting a bulk soil sample of Pu contaminated soils from OU-2 and shipping it offsite to conduct the tests on TRUclean process. TRUclean process treatability study tests will be conducted at Lockheed Environmental Science and Technology testing facility which is located in Las Vegas, Nevada.

In order to evaluate the effectiveness of the TRUclean process, pre-treatment and post-treatment soil samples will be characterized as described in the TSWP. This QAA addresses the quality assurance/quality control (QA/QC) requirements applicable to the collection of the bulk soil sample and analysis of the pre-treatment soil samples.

1.0 ORGANIZATION AND RESPONSIBILITIES

The overall organization of EG&G Rocky Flats and the Environmental Science and Engineering Division (ES&E) involved in environmental restoration activities is shown in Figures 1-1, 1-2, and 1-3 of Section 1.0 of the QAPjP. Individual responsibilities are also described in Section 1.0 of the QAPjP.

Contractors will be tasked by EG&G Rocky Flats to implement the Field Sampling Plan outlined in the Attachment No. 1.0 of the TSWP. The specific ES&E

personnel who will interface with the treatability study contractors and who will provide technical direction are shown in Figure 1.

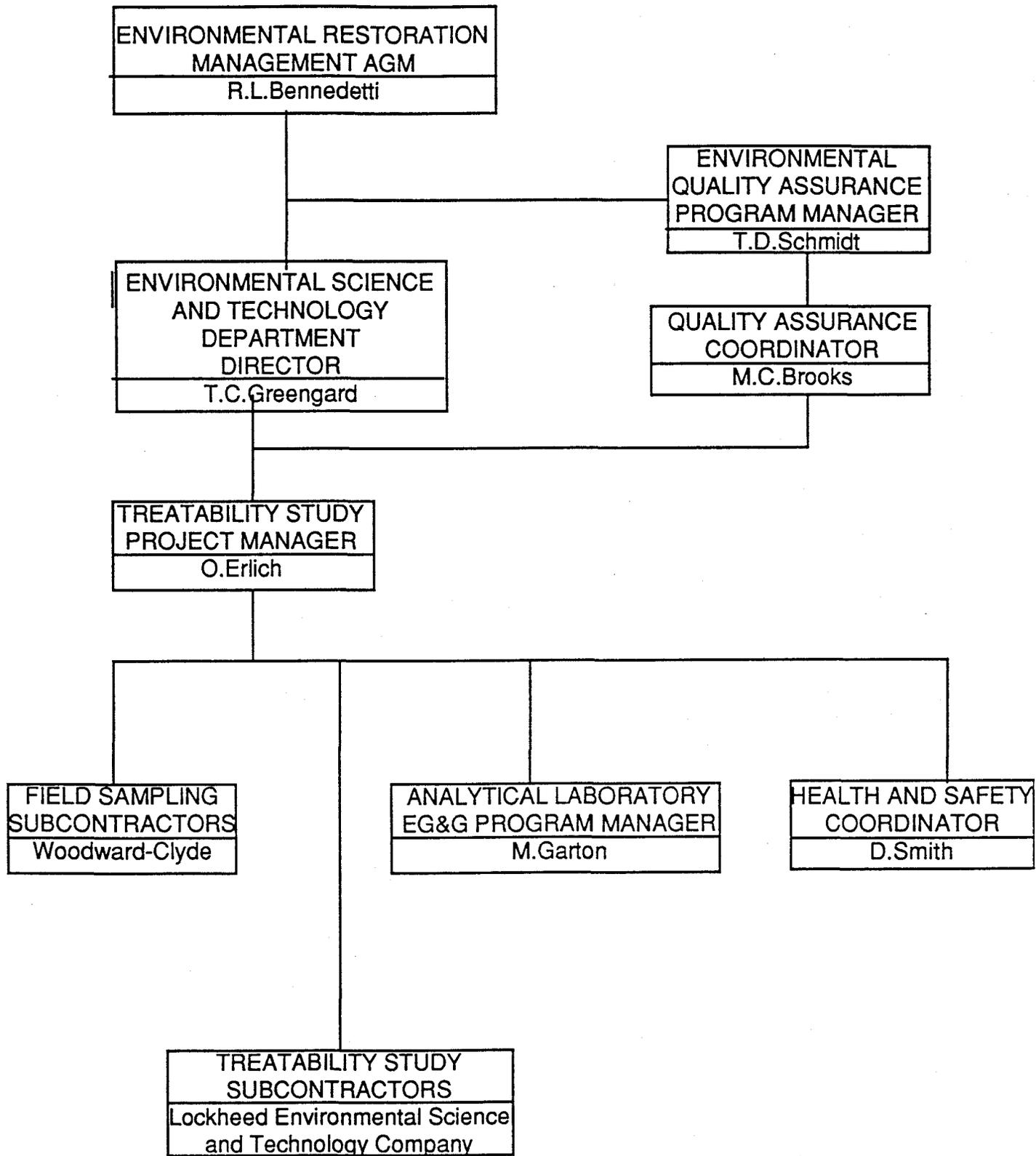


Figure 1. PROJECT MANAGEMENT FOR SAMPLING PLUTONIUM CONTAMINATED SOILS

2.0 QUALITY ASSURANCE PROGRAM

The QAPjP was written to address QA controls and requirements for implementing Interagency Agreement (IAG) related activities. As such, the controls and requirements addressed in the QAPjP are applicable to OU-2 plutonium in soils treatability study activities, unless specified otherwise in this QAA. As a supplement to the QAPjP, this QAA addresses additional and site-specific QA controls and requirements that are applicable to the treatability study activities.

2.1 Training

All EG&G Rocky Flats and contractor personnel involved in performing field activities at RFP shall complete the minimum training requirements specified in Section 2.0 of the QAPjP. In addition, all personnel performing activities in accordance with the EM Department Operating Procedures, which are also referred to as Standard Operating Procedures (SOPs), specified in this QAA shall receive documented training on the QAPjP, this QAA, the applicable OPs, and any training specified in the OPs prior to performing the work.

3.0 DESIGN CONTROL AND CONTROL OF SCIENTIFIC INVESTIGATIONS

Not applicable.

3.1 Design Control

Not applicable.

3.2 Data Quality Objectives

Not applicable.

3.2.1 Objectives

Not applicable.

3.2.2 Precision and Accuracy

Not applicable.

3.2.3 Completeness

Completeness is expressed as the percentage of valid or acceptable data points obtained from measurement or analysis. The target goal for completeness for data packages is 100 percent, with a minimum acceptable of 90 percent.

3.2.4 Comparability and Representativeness

Not applicable.

3.3 Field Sampling Program and Sampling Procedures

The bulk soil sample that will be collected for conducting this treatability study from an area east of the 903 pad (OU-2) where plutonium concentrations are expected to be approximately 83 pCi/g. This bulk sample will be collected and containerized as described in the field sampling plan for sampling plutonium-contaminated soils to support treatability tests.

EM Department Operating Procedures that are applicable to collecting plutonium-contaminated soil at OU-2 are listed in Table 1.

3.4 Analytical Procedures

The analytical methods to be used to determine the chemical and physical soil parameters of interest are listed in Attachment A of this QAA. Standard analytical procedures that are applicable to the analytical method to be used shall be adhered to by the laboratory(ies) conducting the analysis. Analytical laboratories shall prepare sample handling, analysis, and documentation procedures and submit them to the EG&G Rocky Flats Laboratory Analysis Task Leader for review and approval prior to receiving samples for analysis, as required by Section 3.0 of the QAPjP and the EG&G Rocky Flats General Radiochemistry and Routine Analytical Services Protocol.

3.5 Equipment Decontamination

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Non-dedicated sampling equipment shall be decontaminated between samples in accordance with EG&G OP FO.03 (SOP 1.3). Decontamination water will be handled according to EG&G OP FO.07 (SOP 1.7).

Table 1. EG&G Operating Procedures That Are Applicable to Collecting Plutonium-Contaminated Soils at OU-2

Former SOP Reference Number	New EMD OP Reference Number	Procedure Title
1.2	FO.02	Field Document Control
1.3	FO.03	General Equipment Decontamination
1.6	FO.06	Handling of Personal Protective Equipment
1.7	FO.07	Handling of Decontamination Water and Washwater
1.9	FO.09	Handling of Residual Samples
1.10	FO.10	Receiving, Labeling, and Handling Waste Containers
1.11	FO.11	Field Communications
1.12	FO.12	Decontamination Facility Operations
1.13	FO.13	Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples
1.15	FO.15	Use of PIDs and FIDs*
1.16	FO.16	Field Radiological Measurements*
NEW	FO.18	Environmental Sample Radioactivity Content Screening
3.8	GT.08	Surface Soil Sampling
New	TBD	Field Sampling Instruction for Sampling Plutonium-Contaminated Soils to Support

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Treatability Tests at NIS and LANL. (See
Attachment 1 of the STS Work Plan)

* As required by the Health & Safety Plan

3.6 Quality Control Checks

Duplicate samples will be collected from the bulk characterization sample. Duplicate samples shall be collected in the same manner as the analytical soil sample. The volume of the duplicate samples shall be equal to that of the analytical samples. An equipment rinsate blank shall be collected in the field prior to collecting each bulk composite sample. The procedure for collecting the equipment rinsate blank is described in Section No. 3.0 of the QAPjP.

3.6.1 Objectives for the Field QC Samples

Equipment rinsate blanks are considered acceptable (with no need for data qualification) if the concentration of the analytes of interest is less than three times the required detection limit for each analyte as specified in Attachment A. The duplicate sample analysis results should agree within 35 percent of the analytical sample. Trip blanks and field blanks are not applicable to soil samples (see Section No. 3.0 of the QAPjP).

3.6.2 Analytical Laboratory QC

Analytical laboratory QC procedures applicable to the method of analysis shall be used to ensure internal consistency of analytical and storage procedures. Laboratory QC procedures shall include the use of replicate analysis and analysis of duplicate and matrix spike duplicates. All laboratory analysis results, including results of QC sample analysis, will be forwarded to the EG&G Rocky Flats Laboratory Analysis Task Leader.

3.7 Data Reduction, Validation, and Reporting

Analytical reporting turnaround times are as specified in Table 3-1 of the QAPjP.

All analytical data shall be reviewed, evaluated, and verified by the laboratory contractor prior to submitting the data to the Laboratory Analysis Task Leader or data validation subcontractor, as appropriate. The Laboratory

Analysis Task Leader or validation contractor will validate the data as described in Section No. 3.0 of the QAPjP. The Laboratory Analysis Task Leader will then forward the validation results along with the entire data package for these samples to the EG&G Rocky Flats Treatability Study Project Manager and the Data Base Management Task Leader. The Data Base Management Task Leader shall enter the data into the Rocky Flats Environmental Data System. The Project Manager shall prepare a data report for this activity.

4.0 PROCUREMENT DOCUMENT CONTROL

The field sampling contractors and the laboratory analytical contractors are required to adhere to the applicable requirements of the Field Sampling Plan, this QAA, and the QAPjP. These contractors may be required to submit their own QA Program, which would meet the applicable requirements of the QAPjP and this QAA.

5.0 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

The Field Sampling Work Plan describes the soil sampling and characterization activities to be performed. The Work Plan shall be reviewed and approved by the Environmental Science and Engineering Manager or designee prior to implementing these activities. Any changes to the Work Plan after it has been approved shall be reviewed and approved in the same manner as the original Work Plan.

The sampling and treatment operation procedures described in the Work Plan and the general operating procedures listed in Table 1 shall control the field activities. The analytical methods referenced in the Work Plan and in Attachment A of this document are the analytical procedures that shall control the analytical process. The applicable data verification and validation procedures listed in Section No. 3.0 of the QAPjP and referenced in Section 3.7 of this QAA shall control the data verification and validation process. Any changes or revisions to these procedures that are necessary to complete

the sampling and characterization process shall be documented by preparing a Procedure Change Notice.

6.0 DOCUMENT CONTROL

The following documents will be controlled in accordance with Section No. 6 of the QAPjP:

- Field Sampling, Health and Safety Plan for "Plutonium in Soils Treatability Studies Work Plan, Rocky Flats Plant Operable Unit 2"
- "RFP Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigation/Feasibility Study (RI/FS) and RCRA Facility Investigation/Corrective Measures (RFI/CMS) Studies Activities"
- "Quality Assurance Addendum to the Rocky Flats Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities for the Plutonium in Soils Treatability Study"
- Operating Procedures (i.e., SOPs) specified in Table 1 of this QAA.

7.0 CONTROL OF PURCHASED ITEMS AND SERVICES

Contractors that have been selected to perform the soil sampling and laboratory analysis of soil samples shall be required to implement all requirements contained in the STS Work Plan, the QAPjP, this QAA, and applicable EG&G OPs listed in Table 1. Contractor performance shall be evaluated through the conduct of inspection, surveillances, and/or audits as described in Section 18.0 of the QAPjP.

8.0 IDENTIFICATION AND CONTROL OF ITEMS, SAMPLES, AND DATA

8.1 Sample Containers

The sample container and volume requirements for the analytical soil samples (i.e., the samples taken from the bulk composite soil sample for chemical and physical characterization and the VOC samples) and the duplicate samples are as follows:

<u>Analyte</u>	<u>Volume/Sample</u>	<u>Container</u>
VOCs	2 X 120 mL	VOA vials
Semi-Volatiles	8 oz	wide-mouth glass jars
TAL Metals	8 oz	wide-mouth glass jars
Radionuclides	1 liter	wide-mouth glass jars

No preservatives will be used on soil samples. VOC and semi-volatiles (SVOCs) samples will be cooled to approximately 4° C. Holding times are 7 days for VOCs and SVOCs and 6 months for TAL metals. Holding times are not applicable for radionuclides or physical analyses.

Sample containers for shipment of bulk soil samples to LES&TC consist of 8-, 30-, and 55-gallon DOT 17H steel drums.

8.2 Sample Identification

Samples shall be labeled and identified in accordance with Section No. 8.0 of the QAPjP. The project identifier will precede the nine-character alpha numeric identifier described in the QAPjP, in order to identify this as a plutonium in soils treatability study soil sample. This unique identifier shall consist of a "PC" that will precede the regular nine-character identification number described in the QAPjP. A typical soil sample number would be PC-SS00001XX, where:

PC is the treatability study identifier

SS is the sample-type identifier (e.g., SS for soil sample)
0001 is the first sequential soil sample collected
XX is the sampling contract ID.

8.3 Chain-of-Custody

Sample chain-of-custody will be maintained through the application of OPS-FO.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples (SOP 1.13).

9.0 CONTROL OF PROCESSES

Not applicable.

10.0 INSPECTIONS

Inspections are not applicable to this activity. (Note: field and laboratory observations are not considered inspections, but are rather considered surveillances or audits.)

11.0 TEST CONTROLS

Not applicable.

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT (M&TE)

Field M&TE is not anticipated for use in this activity. The laboratory equipment used to analyze environmental samples shall be calibrated, maintained, and controlled in accordance with the requirements contained in the specific analytical methods used and the instrument manufacturer's instructions.

13.0 HANDLING, STORAGE, AND SHIPPING

Samples shall be packaged, transported, and stored in accordance with the requirements specified in Section 8. The soil samples shall be screened for radiation contamination in accordance with OPS-FO.18, Environmental Sample Radioactivity Content Screening (SOP 1.18). The radiation screening process

is illustrated in Figure 8.2 of Section No. 8.0 of the QAPjP. The laboratory that will perform the physical analyses will accept samples only if radiation levels are less than 100 millicurie per sample.

14.0 STATUS OF INSPECTION, TEST, AND OPERATIONS

The treatability contractors shall maintain and report the status of the process operations to the EG&G Rocky Flats Treatability Study Project Manager.

15.0 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 No. 15.0 of the QAPjP. Nonconformances identified by the treatment and analytical contractors shall be submitted to the EM Department Quality Assurance Project Manager (QAPM) for processing as outlined in the QAPjP.

16.0 CORRECTIVE ACTION

The requirements for the identification, documentation, and verification of corrective actions for conditions adverse to quality will be implemented as outlined in Section No. 16.0 of the QAPjP. Conditions adverse to quality that are identified by contractors shall be documented and submitted to the EM Department QAPM for processing as outlined in the QAPjP.

17.0 QUALITY ASSURANCE RECORDS

Field sampling data records will be controlled in accordance with OPS-FO.02 (SOP 1.2), Field Document Control, and shall be considered QA records. Laboratory chemical and physical analytical data packages shall also be considered QA records. Other records associated with this activity that will be considered QA records include, but are not necessarily limited to, the following:

- Chain-of-custody records

- STS Work Plan
- QAPjP/QAA
- Raw data results
- Audit/Surveillance reports
- Nonconformance reports
- Corrective Action reports
- Data validation results
- Procurement/contracting documentation

All QA records generated during the planning and implementation of this activity will be submitted to the EM Department Custodian (who reports to the Environmental Resource and Information Management Division Manager) for processing according to the EM Department QA records system described in Section No. 17.0 of the QAPjP.

18.0 QUALITY VERIFICATION

The requirements for the verification of quality shall be implemented as specified in Section No. 18.0 of the QAPjP. The EM Department QAFM shall develop a surveillance/audit schedule as deemed appropriate for this treatability study. The surveillance will be scheduled to observe the TRUclean process and the gravimetric separation process. A surveillance of the laboratory analysis will be conducted at the discretion of the EG&G Laboratory Analysis Task Leader and the EG&G Project Manager for this activity. A surveillance of the records produced from this activity will also be conducted.

19.0 SOFTWARE VERIFICATION

The use of computer software during the conduct of this activity is not anticipated. Therefore, the requirements of Section No. 19.0 of the QAPjP are not applicable to this activity.

Attachment A

Analytical Methods, Detection Limits
and Data Quality Objectives

ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

Analyte	Method	Detection Limit	Precision Objective	Accuracy Objective
TAL Metals	EPA 6010 ^a	1	**	***
TCL VOCs	EPA 8240 ^a	1	**	***
TCL SVOCs	EPA 8250 ^a	1	**	***
Radionuclides	2	1	**	***
Physical Analysis				
Particle Size N/A	ASTM D-422	N/A		N/A
Specific Surface N/A	Agronomy #9	N/A		N/A
Bulk Density N/A	TDL 2110	N/A		N/A

** Precision objective based on relative percent difference (see QAPjP Appendix A for equation) between sample and spiked duplicate. Precision objective based on referenced method.

*** Accuracy objective is based on the percent recovery of spiked duplicate (see Appendix A of the QAPjP). Accuracy objective based on referenced method.

^a "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods" (SW-846, 3rd ED.), U.S. Environmental Protection Agency.

1. Detection limit will be based on practical quantitation limit, which is dependent on the specified method of analysis.

2. The method of analysis has not yet been specified, but one of the methods listed in Appendix B of the QAPjP will be used.