WORK PLAN FOR INITIAL BENCH SCALE TREATABILITY STUDY
ROCKY FLATS PLANT
O U.2 SOIL CONTAMINATED WITH Pu AND Am

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1 SUMMARY

1 1 INTRODUCTION

This work plan outlines the initial bench scale soil cleaning treatability study for soils contaminated with plutonium and americium from Rocky Flats Plant Operable Unit 2 NRT's objective is to demonstrate the capability of our soil cleaning process to meet the anticipated 0 9 pCi/gm Rocky Flats cleanup standard The results of the study will identify the separation and cleaning efficiency of major process steps and provide data on the likelihood of success and applicability of NRT's technology to Rocky Flats soils

1 2 PROJECT APPROACH

For Phase 1A work, the parameters addressed by the treatment studies are restricted to those of the soils from O U 2 to be provided by EG&G Rocky Flats Most of the radionuclide contamination is expected to be associated with the finest (clay) fraction of the soil A smaller amount would be expected to be associated with the course fraction (sand and larger) Ultimately treatment process parameters would be designed to have sufficient flexibility and throughput to accommodate the range of soil/contaminant characteristics likely to be encountered at various impacted sites across Rocky Flats The approach for the full scale implementation of a soil cleaning volume reduction process would be divided into three phases This work plan describes only the testing to be performed during Phase 1A.

Phase 1	Treatability Study 1A Initial Bench Scale Soil/Treatability Study 1B Engineering Treatability Tests/Conceptual Design
Phase 2	Site Integrated Pilot Demonstration
Phase 3	Site Remediation

1 3 PHASE 1A WORK SCOPE

The Phase 1A objective is to characterize the soils and contaminant distributions and to obtain sufficient bench scale treatability test data to evaluate the effectiveness of various components of the soil cleaning process on Rocky Flats soils from O U 2

In order for NRT to carry out the Phase 1A work, EG&G Rocky Flats will obtain and furnish a sample of approximately 20 to 30 kg of contaminated soil from O U 2 EG&G will acquire the soil and composite the samples to be vertically and laterally representative of the area with total activity level of approximately 100 pCi/gm (50 to 200 pCi/gm)

NRT will perform a series of analyses and tests on the composite soil sample to establish the physical and chemical characteristics and the behavior of the soil when subjected to bench scale physical and chemical separation processes

Phase 1A includes the following tasks

Qualitative Examination of contaminated soil

Sieve Analysis

Baseline activity of contaminated soil by sieve size

Attrition Scrub Tests

Leach Tests

The information developed during this phase will confirm the conceptual viability of the soil cleaning approach and provide a preliminary estimate of overall volume reduction

2 DESCRIPTION OF BENCH SCALE TESTS

2 1 QUALITATIVE EXAMINATION

The soil will be examined to qualitatively determine handling properties, natural organic content, particle size distribution fraction oversize and untreated mineral appearance This information will influence the following test types, conditions and sequence

2 2 SAMPLE BLENDING AND SPLITTING

The soil received from Rocky Flats Plant will be thoroughly blended and split into 3 approximately equal samples The first sample will be used for the analytical and test work, the second sample will be retained as a archive sample or for further tests and the third sample will be retained for EG&G Rocky Flats Plant.

2 3 AS RECEIVED MOISTURE AND BULK DENSITY

The as received moisture will be measured by ASTM D 2216 at 60 C Rough bulk density will be determined by appropriate methods

2 4 SIEVE ANALYSIS

Wet sieve 500 grams of sample to determine contaminated soil size distribution (3/8 4 10 24 35 60 100 150 200 325 400 mesh) All results will be reported as dry weight percent. The results from this test will influence the selection of test conditions and size splits

2 5 BASELINE ACTIVITY

Wet sieve sufficient sample for attrition scrub and leach tests, approximately 5000 grams, into appropriate mesh fractions Typical splits are +4 -4/+200 200/+325 and 325 Measure Pu and Am activity of composite the sieve samples and the water used for screening

Pu will be determined using representative samples and a destructive chemical analysis acid digestion Pu extraction followed by alpha spectroscopy (GA procedure ACD RC-016) Am will be quantified using gamma spectroscopy Once the baseline activity and the Pu to Am ratio have been determined, the additional activity measurements after each attrition or leach test will track Am only assuming the Am and Pu were scrubbed or leached to approximately the same degree Once the tests are complete Pu measurements will be used to verify this assumption

2 6 ATTRITION SCRUB TESTS

Attrition scrub tests will be performed on selected size splits. The typical attrition scrub sample size is 700 to 1000 grams It is anticipated that attrition scrub reagents will be selected from the following deionized water dilute surfactant solution caustic solution

After each attrition scrub the slurry is vacuum filtered through a fine filter and the Pu and Am activities of both filtrate and solid residue are measured The dry weight of the solid is determined

2 7 LEACH TESTS

Leach tests using acidic and/or basic lixivants will be performed on the selected, fine size split Multiple leaches may be performed on the same sample to determine the appropriate leach residence time and minimum activity level achievable

After each leach the slurry is filtered and the Pu and Am activities of both filtrate and solid residue are measured The dry weight of the solid is determined

3 TEST REPORT

The results of the bench scale tests will be reported in a memo with a summary of the test conditions The report will include

a summary of the results of the characterization tests described in sections 2 1 through 2.5 of the work plan

an activity analysis of the residue after the final scrub or leach

a calculation of the mass of decontaminated material as a percentage of starting mass

Since the process used to decontaminate the soil is proprietary only a very limited description of the test conditions and reagents will be included

4 TEST RESIDUES

All solid test residues, the remaining sample material and laboratory solid waste generated during the testing will be returned to EG&G Rocky Flats These solid materials may include some or all of the following contaminated soil, materials used to package the soil, plastic containers and beakers, gloves, disposable lab coats, waste paper respirator cartridges, other laboratory trash The volume of waste to be returned to EG&G will not exceed one 55 gallon drum The waste will be radioactive but will not be hazardous according to RCRA standards

5 QUALITY CONTROL

The bench scale soil cleaning treatability study for O U 2 soils will be conducted in accordance with the GA Quality Assurance Program All test activities will be conducted according to standard laboratory practices and procedures Since this is not a comprehensive treatability study duplicate samples will not be routinely analyzed

6 HEALTH AND SAFETY

Testing will be conducted under the safety regulations of the GA Health and Safety Plan