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COMPANY

Field Sampling Plan for the Source Removal at Trenches T-3 and T-4 IHSSs 110 and 111.1

RMRS Rocky Mountain Remediation Services L.L.C.
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Environmental Restoration
Rocky Flats Environmental Technology Site

April 9, 1996
Revision 2

TABLE OF CONTENTS

ACRONYMS

ASTM	American Society for Testing Materials
BFB	Bromofluorobenzene
CCR	Colorado Code of Regulations
CLP	Contract Lab Program
COC	Chain of Custody
EPA	Environmental Protection Agency
EMD	Environmental Management Department
DCA	Dichloroethane
DCE	Dichloroethene
FIDLER	Field Instrument for the Detection of Low Energy Radiation
FSP	Field Sampling Plan
Hcl	Hydrochloric acid
HPGE	High Purity Germanium Spectroscopy
IHSS	Individual Hazardous Substance Site
MCLs	Maximum Concentration Levels
OU	Operable Unit
PAM	Proposed Action Memorandum
PCE	Tetrachloroethene
PPRGs	Programmatic Preliminary Remediation Goals
PQLs	Practical Quantitation Limits
QA	Quality Assurance
QC	Quality Control
RFCA	Rocky Flats Cleanup Agreement
RFEDS	Rocky Flats Environmental Database System
RFETS	Rocky Flats Environmental Technology Site
ROI	Radiological Operating Instruction
SOPs	Standard Operating Procedures
SOW	Statement of Work
TCA	Trichloroethane

1.0 INTRODUCTION

This Field Sampling Plan (FSP) supports the Source Removal at Trenches T-3 and T-4, Individual Hazardous Substance Sites (IHSSs) 110 and 111 1, at the Rocky Flats Environmental Technology Site (RFETS), which are contributing to the degradation of groundwater in the area This FSP meets the requirements of a sampling and analysis plan This source removal project is described in the Proposed Action Memorandum (PAM) for the Source Removal at Trenches T-3 and T-4, including details on project scope, contamination levels, and regulatory concerns Information presented in this FSP is intended to be brief and provide the information necessary to understand the sampling approach for the project

Based on historical aerial photographs and records, Trench T-3, (IHSS 110), is approximately 134 feet long, 20 feet wide, and 10 feet deep The trench was used from approximately October 1964 through April 1966 Trench T-4, (IHSS 111 1), is approximately 125 feet long, 20 feet wide, and 10 feet deep The trench was used from approximately April 1966 through April 1967 Both trenches were used to dispose of sanitary sewage sludge contaminated with uranium and plutonium Crushed drums also contaminated with uranium and plutonium were disposed in the trenches There are no reports of metallic nuclear materials deliberately buried in the trenches Furthermore, analysis of characterization soil samples indicates radionuclide concentrations are below the action levels currently being developed by the Rocky Flats Cleanup Agreement (RFCA) Working Group and are, therefore, not a factor in the need for a source removal at these trenches Tables summarizing the existing data for the trenches are given in Appendix 1

Groundwater samples were taken from wells up-gradient (24393, 25093, and 3091) and down-gradient (24193, 24993, and 3687) of the trenches The results of these analyses are summarized in Table 1-1 and indicate an increase in volatile organic compounds (VOCs) in the groundwater after passing under the trenches Radionuclide contamination was not detected at significant levels in the groundwater samples

The proposed action entails excavating VOC-contaminated soil and material from Trenches T-3 and T-4 and processing the excavated material to remove the VOCs using thermal desorption The project will be a source removal to prevent further degradation of the surrounding soils and groundwater The trench boundaries as shown in Figures 1 and 2 will be staked prior to excavation, and the material within the trench boundaries will be excavated Sampling and analysis will be used to ascertain which soils need to be removed that may extend beyond the

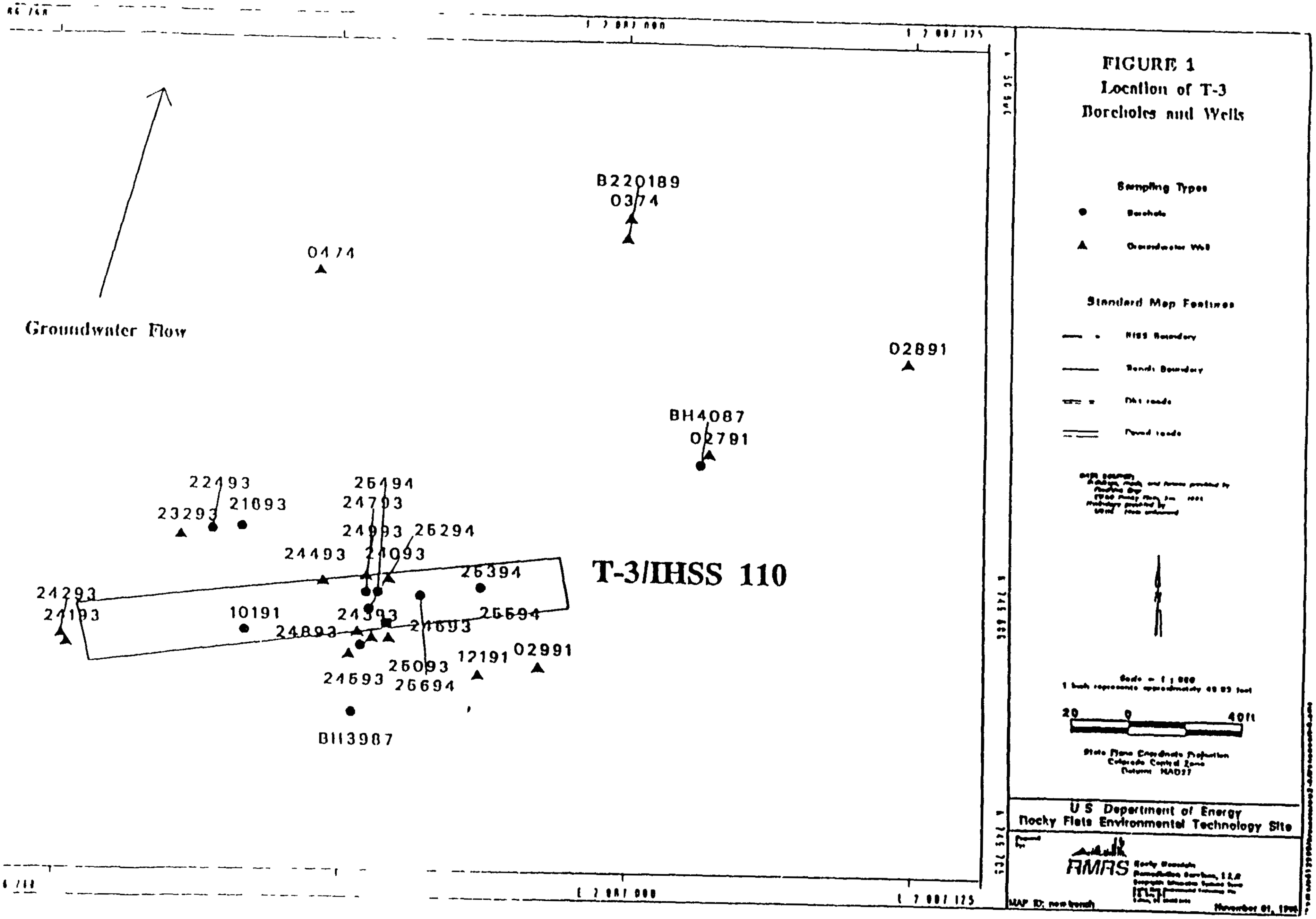


FIGURE 1
Location of T-3
Boreholes and Wells
Sampling Types
Borehole
Groundwater Well
Standard Map Features
20
0
40ft
U S Department of Energy
Rocky Flats Environmental Technology Site
RMRS
Groundwater Flow
T-3/IHSS 110
B220189
0374
0474
02891
BH4087
02791
22493
23293
21093
26494
24793
24993
26294
24493
24093
26394
24293
24193
10191
24393
24893
24693
26594
26093
12191
02991
24593
26694
BH3987

2.0 SAMPLING AND DATA QUALITY OBJECTIVES

The purpose of this sampling effort is multi-fold and is described below

- Samples will be collected to evaluate/verify that excavation cleanup standards stated in the PAM are met These samples may also be used to document the conditions remaining in the excavation for a future RFETS Site-wide Risk Assessment and to supply data for evaluating any future impacts on groundwater from the remaining soils in the trenches
- Samples will be collected to evaluate/verify that post-processing performance standards stated in the PAM are met These samples may also be used to document the concentration of VOCs in soils returned to the trench after processing
- Samples will be collected to verify existing radiological data from soils within the trenches, and to confirm the determination that these soils can be returned to the trenches
- Samples will be collected to support various waste classifications and determinations for off-site shipment of debris

After excavation, samples will be collected along the base and sides of the excavations and analyzed using a screening technique (described in Appendix 2) for the contaminants of concern (all VOCs) to establish the post-action condition of the trenches The screening technique was developed such that the action levels required by the PAM are within the linear range of the calibration of the screening equipment, a gas chromatograph/mass spectrometer Excavation will continue until excavation boundary sample results are below the excavation cleanup standards specified in the PAM or until groundwater or bedrock is encountered, or the limits of the excavation equipment are reached

Following processing through the TDU treated soils will be sampled and tested for process verification using the screening technique for VOCs to verify compliance with the performance standards stated in the PAM The sampling frequency used for this verification is described in Section 3 2 and the statistical analysis supporting the sampling frequency is given in Appendix 3 Since the existing characterization data indicates that metals and semivolatile organics are not a concern in the trenches no further analyses will be done for those constituents

An extensive amount of sampling data has been collected regarding radiological contamination in the trench soils Data collected to date indicate very low levels of radiological contamination

3 0 SAMPLE COLLECTION AND ANALYSIS

A number of different sampling events will be conducted to support this project These events include excavation boundary soil sampling for VOCs, post-process soil sampling for VOCs, radiological verification sampling of the treated soil and sampling to determine if some of the debris within the trenches requires treatment The sampling scheme for each type of event is described in the following sections

3.1 EXCAVATION BOUNDARY SAMPLING

In order to determine the number of samples required in each trench to evaluate attainment of excavation performance standards specified in the PAM, the suggested guidelines from *Soil Sampling Quality Assurance User's Guide* published by the U S Environmental Protection Agency were used The number of samples required in each trench is 16 The perimeter of the grid boundaries will be staked prior to sampling Trench-3 is approximately 134 feet long, while Trench-4 is approximately 125 feet long The trenches will be divided into approximately seven equal-length sections along the bottom axis of each trench As an example, this would allow for a 19-foot lengthwise grid dimension along the axes of Trench-3 and an 18-foot lengthwise dimension along the axes of Trench-4 The grid dimensions are dependent upon the final excavation, and the actual grid dimensions will be described in the field logbook Individual grids will represent approximately equal areas However, the two grid locations representing only the sidewalls of the trench (grids 8 and 9) will be made up of smaller areas because they lack a trench bottom component The grid layout will be oriented so that grid 8 represents the western portion of the trench, while grid 9 represents the eastern portion of the trench (see Figure 3-1)

FIGURE 3-1 T-3 AND T-4 EXCAVATION BOTTOM SAMPLING SCHEME

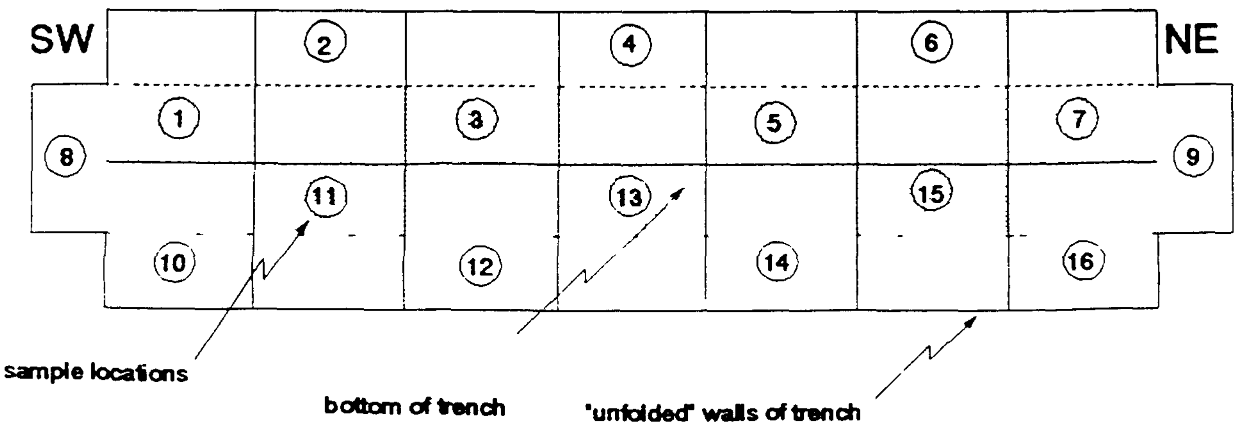


TABLE 3-1 EXCAVATION BOUNDARY SAMPLES PER TRENCH

	Post Excavation Analysis per Trench			
Analysis Method	Excavation Samples	QC Samples per Trench	Total Samples per Trench	Container Preservation Holding Time
Total VOAs by Appendix 2 Screening Method (on-site)	16	1 field duplicate	17	4 oz. glass with Teflon liner at 4°C for 14 days
Rinsates Blanks by Appendix 2 Screening Method (on-site)		1	1	2-40 ml glass vial Teflon-lined septa lid, HCl pH<2, 4°C for 14 davs
Total VOAs by SW846 Method 8240/8260 (off-site)		1 split	1	4 oz glass with Teflon liner at 4°C for 14 days
Trip Blanks by SW846 Method 8240/8260 (off-site)		1/cooler for off-site VOC samples	1	40 ml glass vial Teflon-lined septa lid, HCl pH<2, 4°C for 14 days
Radiological Screen (@ Building 881) to support off-site shipping requirements		1 per off-site shipment	1	40 ml glass vial 6 months Note substitute a 250 ml wide-mouth plastic jar when using a Nomad portable gamma spectroscopy system

3 2 PROCESS VERIFICATION SOIL/DEBRIS SAMPLING

Following TDU treatment of soils and debris, samples will be collected from each batch of treated soil or soil commingled with debris A batch is defined as the material within a processing run of 6 full TDU treatment ovens Each oven will contain approximately 5 yd^3 of soil and/or debris Therefore, a batch will be approximately 30 yd^3 These samples will be collected to document attainment of treatment performance goals as stated in the PAM Most of the samples collected will be analyzed using the screening technique described in Appendix 2 Additional QC samples (splits) will be collected for analysis using more rigorous SW-846 methods (see Section 3 3)

Process verification soil samples are expected to be collected at two frequencies Samples will first be collected at a high frequency, to establish baseline conditions of the TDU If the results of baseline sampling indicate that treatment performance standards are being met (e g by evaluating mean and variance values from samples), then the sampling frequency may be reduced

3.2.2 Sampling Frequency After Baseline Conditions are Established

If baseline samples indicate that the treatment process is in control, samples will be collected at a reduced frequency An evaluation of the confidence level associated with the sampling frequency is given in Appendix 3 This reduced frequency is expected to consist of one representative grab sample per batch, contrasted to one sample per oven as required by the initial baselining evaluation The number and types of samples expected to be required are described in Table 3-3 A sample will be collected as a grab from a single oven during each batch processing run During successive batch processing runs, the ovens being sampled will be alternated, so that during 6 runs, all 6 ovens are sampled at least once The grab sample will be collected from the center (approximate) of the equipment bucket used to unload the TDU ovens The bucket sampled (sampling position) within the oven will be systematic and representative, in that successive samples will be collected from buckets removing soil from a corner, from a side, and from the center of the ovens All sample locations within the ovens will be noted in the sampling logbook Detrimental anomalies in process controls, feed stock composition, and waste type may require additional sampling to determine any effects that the anomalies may have on VOC concentrations in the treated soil

TABLE 3-3 PROCESS VERIFICATION SOIL SAMPLING

	Process Verification Soil Sampling		
Analysis Method	**Process Verification Samples**	**QC Samples per 20 Batches**	**Container, Preservation, Holding Time**
Total VOAs by Appendix 2 Screening Method (on-site)	1 per batch	1 field duplicate	4 oz glass with Teflon liner at 4°C for 14 days
Rinsates Blanks by Appendix 2 Screening Method (on-site)		1	2-40 ml glass vial, Teflon-lined septa lid HCl pH<2, 4°C for 14 days
Total VOAs by SW846 Method 8240/8260 (off-site)		1 split	4 oz. glass with Teflon liner at 4°C for 14 days
Trip Blanks by SW846 Method 8240/8260 (off-site)		1/cooler for off-site VOC samples	40 ml glass vial Teflon-lined septa lid HCl pH<2 4°C for 14 days
Radiological Screen (@ Building 881) to support off-site sample shipping requirements		1 per off site shipment	40 ml glass vial 6 months Note substitute a 250 ml wide-mouth plastic jar when using a Nomad portable gamma spectroscopy system
Total Expected Number of samples	100 regular samples	5 field duplicates 5 rinsates 5 splits 5 trip blanks 5 rad screens	

3 4 SAMPLES COLLECTED FOR RADIOLOGICAL ANALYSIS

Samples will be collected for radiological analysis to support the following tasks

- Off-site shipments of samples
- Evaluation of radiological controls for the on-site analytical laboratory (Building 881)
- Determining if radionuclide levels in soils are below the Soil Action Levels currently being developed by the RFCA Working Group

3 4 1 Radiological Screening Samples

A radiological screening sample will be taken whenever samples are being collected for off-site analysis These samples will be analyzed for gross alpha/beta in Building 881 Results of these samples will be used to evaluate shipping requirements In addition, at the discretion of Building 881 laboratory management and radiological engineering personnel, additional radiological screening samples may be collected for internal laboratory monitoring purposes An interoffice memorandum prepared by Building 881 Radiological Engineering personnel (AEM-025-96) suggests collection of radiological screening samples at the following rate

- One radiological screen per day during the first week of TDU processing and laboratory analysis
- One radiological screen per week, thereafter

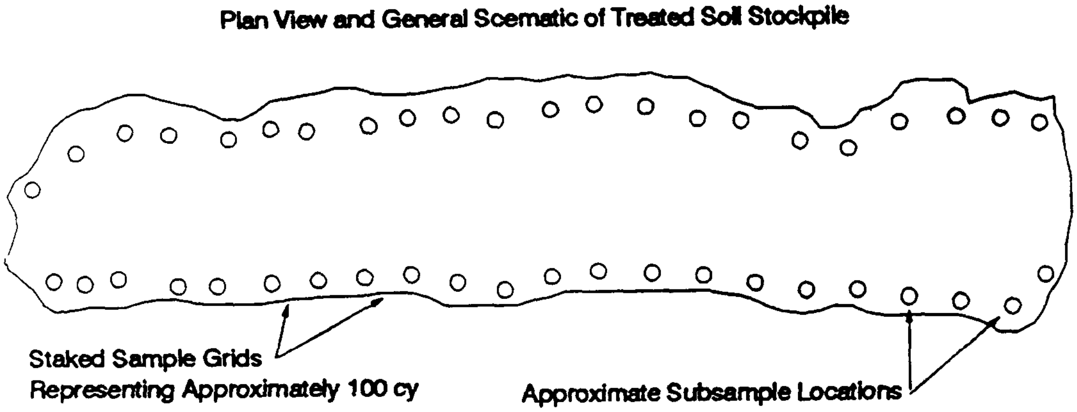
Radiological Engineering personnel require that samples be collected randomly and that results are reported to Radiological Engineering, as the individual analysis is completed

At the discretion of the field supervisor, samples analysis using a high purity germanium gamma spectroscopy (HPGE) system may substitute for radiological screens This HPGE analysis is described in the following subsection

3 4 2 Radiological Verification of Soils Returned to the Excavation

As soils are being excavated from the trenches they will be screened with a Field Instrument for the Detection of Low Energy Radiation (FIDLER) The determination of what to screen will be based on visual characteristics indicative of contamination such as staining, metallic debris free product and direction given by Radiological Engineering Any material indicating screening

Figure 3-2 Stockpile and Sampling Layout for Radiological Verification Samples



3 5 DEBRIS SAMPLING

A significant amount of characterization data exists for the soils in T-3 and T-4 However, very little information exists regarding volume, type, and chemical characterization of the debris within the trenches The possibility exists that some of the debris is not contaminated with VOCs As the excavation proceeds, if it appears from field organic vapor screening and visual observations that much of the debris is not contaminated, then per RFETS waste management policies, efforts will be made to segregate this apparently "clean" debris from the debris which is obviously contaminated with VOCs Segregated debris, thought to be "clean" would then be more rigorously sampled to evaluate if it is contaminated with VOCs above hazardous waste standards If the debris exceeds VOC hazardous waste standards, it will be treated If sampling results indicate that VOC hazardous waste standards were not exceeded, then the debris would not require processing in the TDU This evaluation process is described in the following subsections

3 5 1 Initial VOC Evaluation

As the debris is removed from the excavation the field supervisor will have the option to segregate the debris into two basic waste types One waste type will be debris that is obviously contaminated with VOCs, or in which a representative sample could not be collected to assure the debris is VOC free This debris pile will be processed in the TDU

3 5 3 Sampling After Treating Debris

After debris is processed in the TDU, the debris itself will not be sampled to show attainment of performance goals Rather, in accordance with EPA guidance, samples will be collected from soil residues commingled with the processed debris These soil "residues" will be analyzed for total VOCs using either the screening method listed in Appendix 2 or SW-846 Method 8240/8260 These samples will be collected from commingled soil which is expected to be "caked on" to some of the debris Sample results will be evaluated against the VOC action levels listed in 6 CCR 1007-3, Section 261 24 (the TCLP standards), to support proper disposition of the waste

3 5 4 Sampling of Debris for Other than VOCs

A hazardous waste determination will be required for all debris In some instances, this determination may be able to be made without the need for the collection of additional samples, based on the type of debris, and its prior use before becoming a waste However, in other situations, information will not be available to make a determination without the aid of appropriate analytical results Therefore, flexibility will be given to the field supervisor in making these determinations It is expected that the field supervisor will work with the RFETS Waste Management Organization in determining analysis requirements (other than for VOCs) for debris slated for off-site disposal Any additional sampling will be fully documented in the sample logbook

5.0 SAMPLING EQUIPMENT AND PROCEDURES

This FSP lists the procedures used to conduct the sampling program, and the procedures list the required task specific sampling equipment If conditions are encountered in the field which make the use of a procedure unsafe or inappropriate for the task at hand, the procedures specified below may be modified or replaced as long as the modification or replacement procedure is detailed in the field logbook and the justification for its use is explicitly stated

5 1 SAMPLE HANDLING AND PROCEDURES

Samples collected for laboratory analysis will follow *Environmental Management Department (EMD) Operating Procedures Volume I Field Operations 5-21000-OPS-FO 13, Containerization, Preserving, Handling, and Shipping of Soil and Water Samples* All water samples will be collected without the use of filters Packaging of samples in paint cans required by the procedure for medium level samples (e g , samples with VOC concentration above 10 ppm) will not be adhered to for this project Other modifications to the procedure include

Section 6 2, page 8 The outside of sample containers will be wiped clean Due to the rapid nature of the collection and submittal of samples, the samples will be placed in coolers with blue ice and/or transferred to on-site refrigeration as soon as possible However, it is recognized that samples collected out of the TDU ovens will be warm, and that the cooler temperature will not be able to be maintained at 4° C In addition, because the samples may be carried directly to the on-site laboratory for analysis they may still be warm

Section 6 5, page 14 Samples will not be placed in plastic bags

When reusable sampling equipment is used the equipment will be decontaminated in accordance with EMD Operating Procedure 5-21000-OPS-FO 03, *General Equipment Decontamination, Section 5 3, Cleaning Procedures for Stainless Steel or Metal Sampling Equipment*

5 2 DOCUMENTATION

Samples collected for other than field screening will follow the requirements of 5-21000-OPS-FO 14, *Field Data Management*, and 3-21000-ADM-17 01 *Quality Assurance Records*

Changes or corrections may be required in the data stored in Datacap All changes must be accompanied by a data correction/change form The form will detail the changes to be made and document that the changes were completed Corrections to the database will be reviewed by the Data Manager or designee for potential entry errors

The following actions are designed to ensure the final data submitted to RFEDS is complete, correct, and consistent with procedure FO 14, *Field Data Management*

- A hard copy of the data organized by location will be verified by the Data Manager or designee
- All corrections to the hard copy will be made in red ink
- Using the data entry sheets and sample collection sheets, the information will be checked to assure that data identifications are correctly listed on the hard copy, and the number of samples collected and shipped is correct
- Check that all the parameters requested for each analysis are reported on the hard copy, and that units reported on the hard copy are correct
- Check values for all manually collected parameters reported from the database against the field collection forms
- The data will be reviewed by project personnel familiar with the project objectives and data collection activity to disposition data containing gross errors
- Check the corrected copy of the database to determine that corrections have been implemented

7.0 REFERENCES

RMRS, 1995 Quality Assurance Program Plan (QAPP) 95-QAPP-001 Golden, Colorado October 1995

RMRS, 1996 Proposed Action Memorandum for the Source Removal at Trenches T-3 and T-4 (IHSSs 110 and 111.1) Revision 2 March 1996

RMRS, 1996 Field Implementation Plan for Trenches T-3 and T-4 Source Removal Draft April 1996

United States Environmental Protection Agency, 1991 USA EPA-CLP Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration Document number OLM 01 1, Rev OLM 01 8 August 1991

TABLE A1-1 (continued)
ANALYTES DETECTED IN SUBSURFACE SOILS AT TRENCH T-3

Analyte	Background Mean plus 2 Standard Deviations(5)	Number of Samples	Number of Detections(4)	Percent Detections	Concentration or Activity Range(1)
Semivolatile Organic Compounds (mg/kg)(5)					
2-Methylnaphthalene	NA	12	2	16 7	8 0(E)-9 3(E)
2-Methylphenol	NA	12	2	16 7	0 45-0 5(DJ)
4-Methylphenol	NA	12	2	16 7	2 9-3 6(D)
Bis(2-ethylhexyl)phthalate	NA	11	9	81 8	0 051(J)-6 3(D)
Di-n-butyl phthalate	NA	12	2	16 7	1 3-1 7(D)
Hexachlorobutadiene	NA	12	1	8 3	0 17(J)
Hexachloroethane	NA	12	2	16 7	0 37-1 1
Naphthalene	NA	12	2	16 7	0 96-2
Phenanthrene	NA	12	2	16 7	2 5-2 7

(1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics
indicates analyte was detected in blank sample and the B qualifier for metals represents estimated result
(2) For metals and radionuclides only potential chemicals of concern (PCOCs) were reviewed and presented in this table
(3) Radionuclide activities less than or equal to zero are considered to be non-detections
(4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
(5) Background concentrations do not exist and are not applicable for organic compounds

TABLE A1-1 (continued)
ANALYTES DETECTED IN SUBSURFACE SOILS AT TRENCH T-3

Analyte	Background Mean plus 2 Standard Deviations	Number of Samples	Number of Detections(4)	Percent Detections	Concentration or Activity Range(1)
PCOC Radionuclides above background (pCi/g)(2)(3)					
Americium-241	0 012	12	12	100	0 0007-0 598
Plutonium-239/240	0 018	12	12	100	0 009-3 12
Strontium-89/90	0 747	12	9	75	0 008(J)-0 748(J)
Tritium (pCi/l)	395 211	12	12	100	0 536-333(J)
Uranium-233/234	2 643	12	12	100	0 551-14 4
Uranium-235	0 114	12	12	100	0 0097(J)-0 751
Uranium-238	1 485	12	12	100	0 628-26 4

(1) In this column the J qualifier represents estimated results the D qualifier represents dilution results, the B qualifier for organics indicates
analvte was detected in blank sample, and the B qualifier for metals represents estimated result
(2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
(3) Radionuclide activities less than or equal to zero are considered to be non-detections
(4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
(5) Background concentrations do not exist and are not applicable for organic compounds

TABLE A1-2 (continued)
ANALYTES DETECTED IN SUBSURFACE SOILS AT TRENCH T-4

Analyte	Background Mean plus 2 Standard Deviations[5]	Number of Samples	Number of Detections[4]	Percent Detections	Concentration or Activity Range[1]
Semivolatile Organic Compounds (mg/kg)[5]					
2-Methylnaphthalene	NA	16	3	18 8	0 051(J)-0 29(J)
Bis(2-ethylhexyl)phthalate	NA	16	8	50 0	0 038(J)-0 76(B)
Naphthalene	NA	16	2	12 5	0 052(J)-0 15(J)
Phenanthrene	NA	16	4	25 0	0 13(J)- 57

(1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics
indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result

(2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table

(3) Radionuclide activities less than or equal to zero are considered to be non-detections

(4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections

(5) Background concentrations do not exist and are not applicable for organic compounds

TABLE A1-2 (continued)
ANALYTES DETECTED IN SUBSURFACE SOILS AT TRENCH T-4

Analyte	Background Mean plus 2 Standard Deviations	Number of Samples	Number of Detections[4]	Percent Detections	Concentration or Activity Range[1]
PCOC Radionuclides above background (pCi/g)[2][3]					
Americium-241	0 012	16	16	100	0 002[J]-5 91
Plutonium-239/240	0 018	16	16	100	0 003[J]-16 6
Strontium-89/90	0 747	10	10	100	0 002[J]-0 586[J]
Tritium (pCi/l)	395 211	10	10	100	57 8[J]-211[J]
Uranium-233/234	2 643	16	16	100 00	0 449-191 7
Uranium-235	0 114	16	16	100	0 008[J]-11 5
Uranium-238	1 485	16	16	100 00	0 543-113 1

(1) In this column the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte
was detected in blank sample, and the B qualifier for metals represents estimated result
(2) For metals and radionuclides only potential chemicals of concern (PCOCs) were reviewed and presented in this table
(3) Radionuclide activities less than or equal to zero are considered to be non-detections
(4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
(5) Background concentrations do not exist and are not applicable for organic compounds

Blanks·
A method blank of methanol matrix (100 uL methanol) shall be analyzed daily, or every 20 samples, which ever is more frequent, during sample analysis The blank shall be analyzed after the initial or daily calibration, and prior to sample analysis Blank subtraction is not permissible All analytes present in the blank will be reported A water matrix blank will be analyzed for the rinsate sample

Surrogates and Internal Standards:
Surrogates and internal standards shall be used in all analyses Surrogate recoveries will be compared to CLP or SW-846 requirements Internal standard areas shall be within -50% to +100% of the mid level standard of the day

Matrix Spikes/Laboratory Control Samples
Matrix spikes/laboratory control samples are not required for screen samples

Tentatively Identified Compounds (TICs).
TICs are not required for screen samples Electronic data shall be maintained so that TICs may be retrieved at a later date

Retention Times·
Retention times shall be monitored for shifts Corrective action is required for shifts greater than 30 seconds from the daily calibration or mid-level initial calibration performed the day of sample analysis

Dilutions
Dilutions should not be required for screen samples If the sample exceeds the linear range, the Project Manager will be notified immediately, and a result of greater than the upper linear range will be reported for the sample If dilutions are requested by the Project Manager, serial dilutions shall be performed

Forms·
CLP or equivalent forms are requested Faxed Form I of the blank and samples are required Full CLP data packages are not required

Target Compounds for T-3/T-4 Remediation Project·
The following list of VOCs, are the essential target compounds used to evaluate the attainment of both excavation performance and processing performance

Appendix 3

Optimizing the Number of VOC Samples Collected from Baseline Processing

Given adequate process control, the number of samples required to be collected through the thermal desorption remediation process is a function of the performance of the TDU. The lower the mean value of remaining VOC concentrations within the soils (as established by the initial baselining processing runs), the fewer samples required after the baseline has been established Conversely, the higher the mean value of remaining VOC concentrations during baselining, the more samples required after baselining An example of the type curve used for establishing the number of samples is given in Figure A3-1 As the figure indicates, if the mean VOC concentration of concern (e g , PCE) is 3 mg/kg, than 3 samples will be required per batch for a 95% confidence If the mean concentration is 2 mg/kg, then one sample will be required per batch Assuming, that baseline sampling will establish a mean concentration of 2 mg/kg or less, one sample would be collected per batch after baseline conditions have been established

Figure A3-1 Type Curve for the Number of After-Process Verification VOC Samples Required After Baseline Conditions Have Been Established

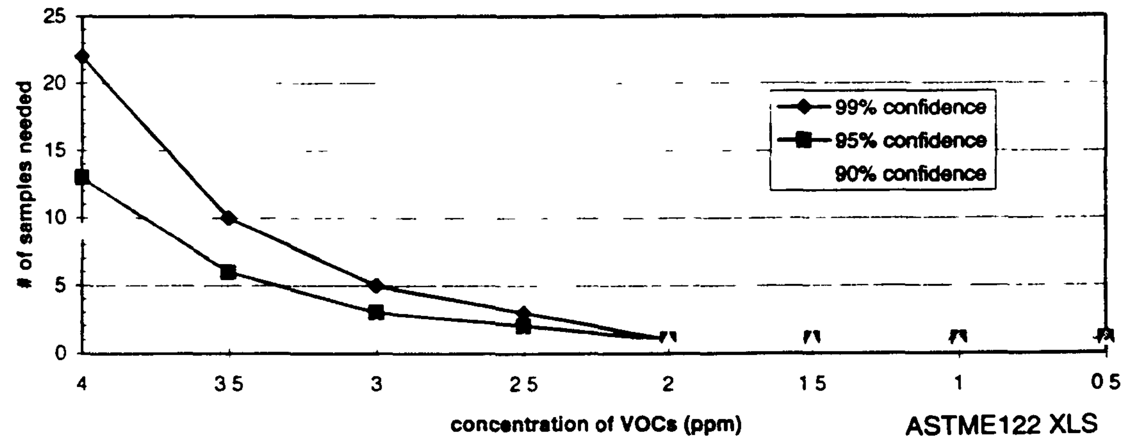


Figure A3-1 was derived by using equations from ASTM (1979[1]) A standard deviation of 67% of the mean VOC concentration was assumed (consistent with a normal distribution of data), while the maximum error allowable was set to insure that the average concentrations of limiting VOCs would not exceed regulatory thresholds (in the T-3/T-4 case, 6 mg/kg for limiting VOCs) Calculations were performed at several potential concentrations, and at several confidence levels. as seen by the data points on the type-curves A confidence of 95% or better will be achieved by using these curves to select the number of samples from a "batch" of soil

References for statistical analysis

[1]ASTM E 122 - 72, 1979 "Standard Recommended Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process"

Notwithstanding the statistical confidences derived above, the subjective uncertainty associated with potential "hotspots" in the trench (missed in prior sampling) are compelling enough to warrant limited sampling of soils AFTER excavation and BEFORE returning the treated soils to their respective trenches

Soils will be monitored for radionuclides with a FIDLER during the excavation and periodically during the treatment per Radiological Operating Instruction (ROI) - 6 6, Operation of the Bicron FIDLER The volumes of material so screened will be based on a graded approach Material with the greatest chance of being radiologically contaminated (e g , soil commingled with debris, or having visual characteristics such as staining) will be screened more rigorously than soils that do not appear to be contaminated

So that additional radiological controls can be evaluated and put in place, soil that exhibits readings greater than three times ambient background will be segregated from the other material Three times ambient background correlates to approximately 6600 counts on the FIDLER detector This FIDLER screening value was obtained by making very conservative assumptions regarding the isotopes present in the soil and their associated ratios The assumptions are given below

- ^{235}U is 0 7% of the total uranium isotope present
- ^{241}Am ingrowth is 18% of the total value of ^{239}Pu This is based on a thirty year age of plutonium
- FIDLER correction factor is 12 pCi/g, per 100 corrected counts The three times background would then convert to approximately 800 pCi/g total activity
- Since the most limiting put-back values are for ^{235}U and ^{241}Am, all indicated activity on the FIDLER is assigned to plutonium and then to uranium and the values for ^{241}Am are calculated This process assumes the worst case scenario and calculates the highest possible values for these two limiting isotopes

Soils having FIDLER readings less than three times background will be sampled for isotopic characterization at the rate of approximately 1 composite sample per 100 yd^3, after the soils are treated Any segregated material (soils having radionuclide content greater than three time background) may require additional, more detailed (on a volume basis), isotopic characterization, than soils having screening values < 3 time background This determination will be made by Radiological Engineering, and will be documented in the field logbook

The isotopic characterization will be performed using a high purity germanium gamma spectroscopy system per Radiological Engineering Procedure 14 01 Operation of the Nomad Portable Gamma Spectroscopy System This system will provide quantitative analysis of the radioisotopes, and will provide confirmation that Soil Action Levels being developed by the RFCA Working Group have not been exceeded