

**DRAFT PROPOSED ACTION MEMORANDUM
FOR THE REMEDIATION OF TRENCH T-2:
OPERABLE UNIT 2
JULY 12, 1995**

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TABLE OF CONTENTS

Section	Page
1.0 Purpose	1
2.0 Project Description	1
2.1 Background	1
2.2 Data Summary	1
3.0 Project Approach	5
3.1 Proposed Action Objectives	5
3.2 Proposed Action	5
3.3 Worker Health and Safety	6
3.4 Waste Management	6
4.0 Environmental Impacts	7
5.0 Compliance With ARARs	8
6.0 Implementation Schedule	8

ACRONYMS

Am	Americium
ARARs	Applicable or Relevant and Appropriate Requirements
BH	Borehole
BGS	Below ground surface
BSL	Background screening level
CCR	Colorado Code of Regulations
CHWA	Colorado Hazardous Waste Act
COC	Contaminant of Concern
DCA	Dichloroethane
DCE	Dichloroethylene
EPA	Environmental Protection Agency
IHSS	Individual Hazardous Substance Site
IAG	Rocky Flats Interagency Agreement
OU	Operable Unit
PCE	Tetrachloroethylene (synonym perchloroethylene)
Pu	Plutonium
RFETS	Rocky Flats Environmental Technology Site
SQL	Sample quantitation limit
SVOCs	Semi-volatile organic compounds
TCE	Trichloroethylene
TD	Thermal desorption
USDOE	United States Department of Energy
VOCs	Volatile organic compounds

DRAFT PROPOSED ACTION MEMORANDUM FOR THE REMEDIATION OF TRENCH T-2: OPERABLE UNIT 2

1.0 PURPOSE

This source removal action is proposed to remediate the contaminated soils in Trench T-2 of Operable Unit 2, Rocky Flats Environmental Technology Site (RFETS), which is contributing to the degradation of groundwater in the area. Organic chemicals were disposed in the trench for a period of approximately five years before the trench was backfilled and its use was discontinued. Under this proposed action, the contaminated soils will be removed from the trench and will be remediated using thermal desorption. The trench site will be reestablished to achieve comparable conditions in the surrounding area.

2.0 PROJECT DESCRIPTION

2.1 Background

Operable Unit 2 (OU 2) Trench T-2, Individual Hazardous Substance Site (IHSS) 109 was used from approximately 1966 through 1970 to dispose of nonradioactive liquid chemicals. The organic chemicals, disposed in small quantities, included trichloroethane, tetrachloroethylene, trichloroethylene, and diesel fuel. Other chemicals may have included paint thinner and small quantities of construction-related materials.

Organic compounds from miscellaneous small projects, e.g. bench scale testing and special projects, were believed to be collected for disposal at Trench T-2. Standard process waste solvents from production buildings are not believed to have been disposed in Trench T-2.

The trench is approximately 25 feet by 12 feet by 5 feet deep. These dimensions are based on field investigations and sample collection in the spring 1995, historical aerial photography, and historical accounts by a health physicist familiar with the trench and its whereabouts (see Figure 2.1-1). These dimensions, however, conflict with the reported dimensions identified in the "Phase II RFI/RI Report, Operable Unit No. 2," April, 1995 which references two historical documents. In 1970, when the boundaries for IHSS 109 were being created, the boundary was based on the general area of where the trench existed but was not intended to map the boundaries of that particular trench. This discrepancy in the IHSS 109 boundaries will be addressed and corrected in the next quarterly report update for the Historical Release Report.

The trench lies within an area where surficial soils are contaminated with Americium-241 (Am-241) and Plutonium-239 (Pu-239). These contaminants were deposited by wind transport from the 903 Pad drum storage area.

2.2 Data Summary

Three sets of data are presented in this section which support the indication that Trench T-2 is a contributing source of volatile organic contaminants to the downgradient subsurface soils and groundwater. The first set of data was collected in 1992 as part of the remedial investigation. Four boreholes were sampled downgradient of the trench. The second set of data represents the samples collected in the spring of 1995. These samples were taken directly within the trench boundaries, and show increased concentrations of volatile organic compounds as compared to the downgradient boreholes. The final set of data is a compilation of monitoring data taken from the monitor wells located downgradient from Trench T-2. As the monitoring well data indicates, the groundwater downgradient of the trench contains elevated concentrations of volatile organics similar to those present in the trench.

1992 Sampling

Soil samples were collected from a series of boreholes (09291, BH2587, 21893, 09491) located downgradient of Trench T-2 in 1992 (see Figure 2.2-1). The data are presented in the Remedial Investigation Report, May 1995, and are summarized as follows.

Volatile organic compounds (VOCs) detected in subsurface soil samples collected downgradient of Trench T-2 included tetrachloroethylene (PCE) (maximum concentration of 10,000 $\mu\text{g}/\text{kg}$ in a sample collected from borehole BH2587 at a depth of 14.5 to 15.7 feet below ground surface (BGS)); trichloroethylene (TCE) (maximum concentration of 16,000 $\mu\text{g}/\text{kg}$ in a sample collected from borehole BH2587 at a depth of 18.5 to 19.3 feet BGS); toluene (maximum concentration of 2,000 $\mu\text{g}/\text{kg}$ in a sample collected from borehole 21891 at a depth of 43.8 to 44.1 feet BGS); and total xylenes (maximum concentration of 3,300 $\mu\text{g}/\text{kg}$ in a sample collected from borehole BH2587 at a depth of 14.5 to 15.7 feet BGS). Several additional VOC compounds were also detected but at concentrations less than 800 $\mu\text{g}/\text{kg}$. Detected VOC compounds are summarized in Table 2.3-1. The depth to the seasonal high groundwater level ranges from three to ten feet BGS. Therefore, most of the VOC maximum concentrations detected were found in samples collected below the water table.

All of the semi-volatile organic compounds (SVOCs) detected were at concentrations below their respective sample quantitation limits (SQLs). Therefore, the SVOCs are not considered to be chemicals of concern.

Six metals (arsenic, barium, cadmium, cobalt, lead, and zinc) were detected above the background screening levels (BSLs) in subsurface samples collected (by Target Analyte List "total" metals analysis). However, detections were typically at or only slightly above the respective BSLs (with the exception of cobalt and barium). One sample analyzed had a cobalt concentration of 204 mg/kg that exceeded the BSL of 29.2 mg/kg . Barium concentrations exceeded the BSL of 289 mg/kg in 2 samples; the maximum concentration was 1899 mg/kg .

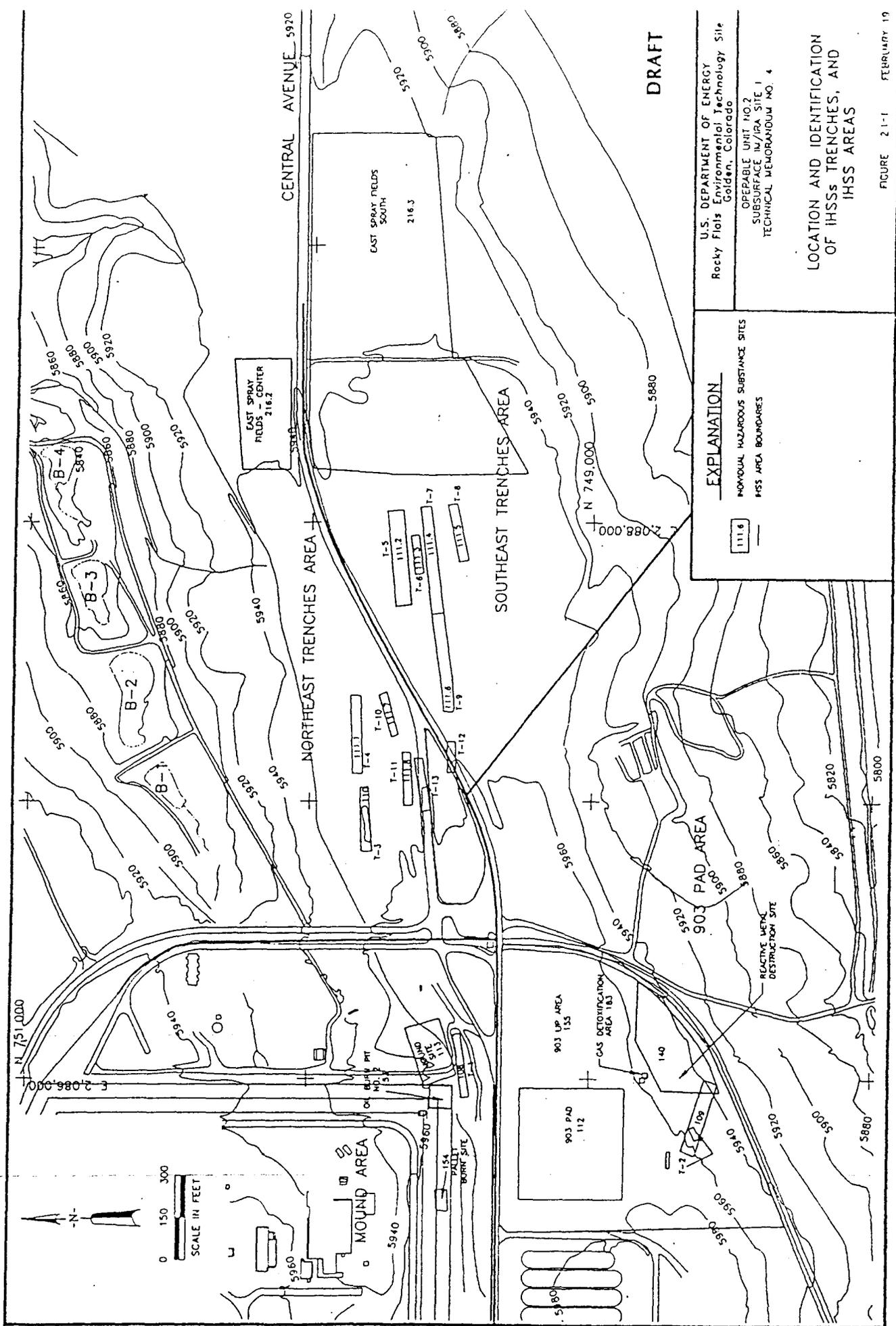
Several radionuclides were detected above the BSLs. However, only Pu-239/240 (a subsurface soil contaminant of concern (COC)) exceeded the BSLs (0.066 pCi/g). The maximum detected activity of Pu-239/240 was 3.2 pCi/g , associated with a sample collected at a depth of zero to nine feet. One sample analyzed had a detected Am-241 activity (0.22 pCi/g) that exceeded the BSL (0.022 pCi/g) by one order of magnitude.

1995 Sampling

During the spring of 1995, soil samples were collected at various depths from soil borings in the trench. The maximum concentrations of VOCs from preliminary analytical data are identified in Table 2.3-2. The analytical data for the metal and radionuclide samples collected from the trench are still unavailable.

Monitoring Well Sampling

The downgradient monitoring wells, 07391 and 0271, show similar contamination in the groundwater as to what is present in Trench T-2. Table 2.3-3 shows a summary of the detectable organic contamination data in the groundwater.



DRAFT

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

OPERABLE UNIT NO. 2
 SUBSURFACE IN/RA SITE 1
 TECHNICAL MEMORANDUM NO. 4

EXPLANATION

- INDIVIDUAL HAZARDOUS SUBSTANCE SITES
- IHSS AREA BOUNDARIES

**LOCATION AND IDENTIFICATION
 OF IHSS TRENCHES, AND
 IHSS AREAS**

Operable Unit 2
IHSS 109
Trench T-2

Figure 2.2-1

Sampling Types

- Borehole
- ▲ Groundwater Well
- ◆ Geoprobe Site

Standard Map Features

- - - IHSS Boundary
- - - Trench Boundary
- · - · - Fences
- = - Paved roads
- · · - · - Dirt roads

DATA SOURCE:

Buildings, roads, and fences provided by
Facilities Eng.
EG&G Rocky Flats, Inc. - 1991.
Hydrology provided by
USGS - (date unknown)



State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site
MAP ID: "Draft"

July 03, 1995

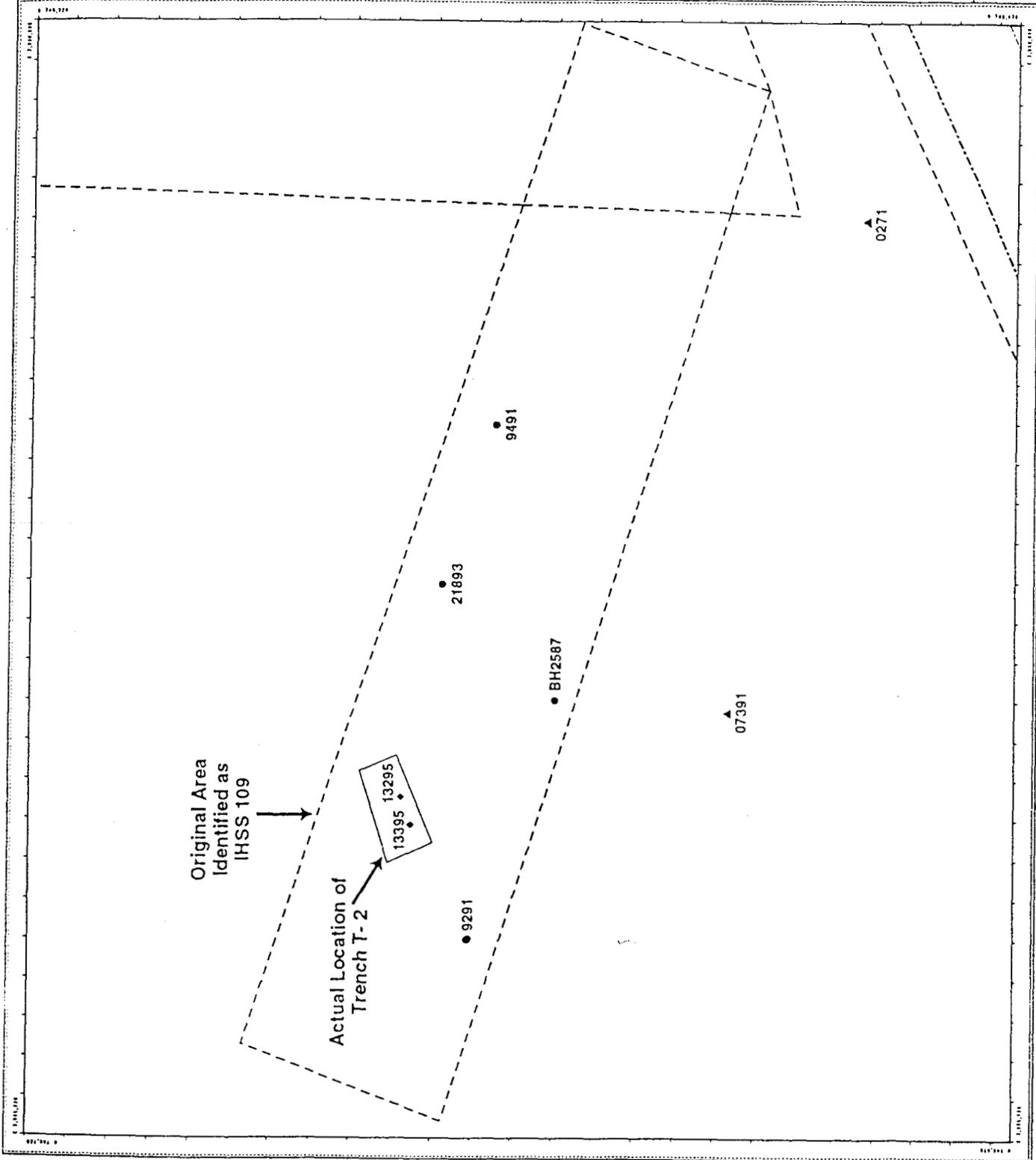


TABLE 2.3-1
903 PAD SOURCE AREA
ANALYTES DETECTED IN SUBSURFACE SOILS AT IHSS 109 (Trench T-2)

<u>Analyte</u>	<u>Background Mean Plus Two Standard Deviations</u>	<u>Number of Samples</u>	<u>Number of Detections</u>	<u>Percent Detections</u>	<u>Concentration or Activity Range</u>	<u>Mean Concentration or Activity(2)</u>
Volatile Organic Compounds						
1,1,1-Trichloroethane (µg/kg) ⁽³⁾	NA	20	1	5.0%	75J	75
2-Butanone	NA	14	3	21.4%	6J-210J	77
4-Methyl-2-pentanone	NA	16	1	6.3%	120J	120
Acetone	NA	20	7	35.0%	8BJ-1100B-RV	339
Chloroethane	NA	20	2	10.0%	7J-50J	28.5
Chloroform	NA	20	1	5.0%	130J	130
Ethylbenzene	NA	20	3	15.0%	11J-780	360
Methylene chloride	NA	20	5	25.0%	3JB-150JB-RV	40
Tetrachloroethene	NA	20	5	25.0%	8J-10000	2793
Toluene	NA	20	17	85.0%	6J-2000	263
Total xylenes	NA	20	3	15.0%	60-3300	1280
Trichloroethene	NA	20	13	65.0%	3J-16000	2242
Semivolatile Organic Compounds						
Benzo(a)pyrene (µg/kg) ⁽³⁾	NA	18	2	11.1%	200J-350J	275
Bis(2-ethylhexyl)phthalate	NA	18	1	5.6%	200J	200
Di-n-butyl phthalate	NA	18	1	5.6%	63J	63
Di-n-octyl phthalate	NA	18	3	16.7%	56J-260J	130
PCOC Metals above BSL						
Arsenic (mg/kg) ⁽⁴⁾⁽⁵⁾	13.2	24	2	8.3%	14-15.7	14.85
Barium	289	24	2	8.3%	466-1899	1183
Cadmium	1.7	24	6	25.0%	1.9-5.2	3.9
Cobalt	29.2	24	1	4.2%	204	204
Lead	24	1	4.2%	24.9		24.9
Zinc	139.1	24	1	4.2%	158	158

TABLE 2.3-1
 903 PAD SOURCE AREA
 ANALYTES DETECTED IN SUBSURFACE SOILS AT IHSS 109 (Trench T-2)
 (continued)

Analyte	Background Mean Plus Two Standard Deviations	Number of Samples	Number of Detections	Percent Detections	Concentration or Activity Range	Mean Concentration or Activity(2)
PCOC Radionuclides above BSL						
(pCi/g)(4)(5)(6)						
Americium-241	0.012	21	2	9.5%	0.0137-0.22	0.117
Cesium-137	0.094	9	2	22.2%	0.1-1.4	0.8
Gross alpha	43.483	21	3	14.3%	45-48	46
Gross beta	36.839	22	1	4.5%	37	37
Plutonium-239/240	0.018	21	8	38.1%	0.04-3.2	0.47
Radium-2282.038	2.038	9	1	11.1%	2.2	2.2
Tritium (pCi/l)	395.211	18	1	5.6%	640	640
Uranium-235	0.114	15	2	13.3%	0.1162-0.185	0.151
Uranium-238	1.485	21	3	14.3%	1.5-1.7B	1.6
Other Analytes and Parameters						
(3)(7)						
Ammonia (µg/g)	NA	12	5	41.7%	0.777-5.82	3.983
Cyanide (mg/kg)	NA	24	2	8.3%	1.25-2.44	1.845
Ignitability (F)	NA	6	6	100.0%	230	230
Oil and grease (mg/kg)	NA	6	1	16.7%	1.7	1.7
Percent moisture	NA	6	6	100.0%	9.36-16.01	12.608
Percent solids	NA	6	6	100.0%	76.2-88.3	83.12
pH	NA	24	24	100.0%	7.81-10.03	NA
Sulfide (µg/g)	NA	18	1	5.6%	200	200
Total organic carbon (µg/g)	NA	12	12	100.0%	312-8030	1975.20

Locations: 09291,09491,21893, BH2587

TABLE 2.3-1
903 PAD SOURCE AREA
ANALYTES DETECTED IN SUBSURFACE SOILS AT IHSS 109 (Trench T-2)
(continued)

NA – Not applicable

BSL – Background screening level, defined as the background mean plus 2 standard deviations

PCOC – Potential chemical of concern

- (1) J qualifier for organic detections indicates an estimated result; D qualifier for organic detections indicates a dilution result; B qualifier for organic detections indicates an analyte was detected in a blank sample; and B qualifier for inorganic detections indicates an estimated result. RV means rejected during validation; therefore, the data must be evaluated using professional judgement.
- (2) The calculation for the mean concentration includes all J,D, and B qualified data.
- (3) Background concentrations do not exist and are not applicable for organic compounds and Other Analytes and Parameters.
- (4) For metals and radionuclides, only PCOCs have been reviewed and are presented on this table.
- (5) Radionuclide and metal results less than the BSL are considered to be non-detections.
- (6) Radionuclide activities less than or equal to zero are considered to be non-detections.
- (7) The Other Analytes and parameters are listed under the title of Water Quality Parameters in Appendix C and in RFEDS.

Table 2.3-2
Trench T-2 Data Collected March, 1995*
Maximum Concentrations for Analytes

Location 13295

Analyte	Concentration (ppb)	Depth (ft.) BGS
TCE	20,000	3-5
1,2-Dichloropropane	330 J	3-5
4-Methyl-2-pentanone	5,300	3-5

Location 13395

Analyte	Concentration (ppb)	Depth (ft.) BGS
1,1,1-TCA	430,000	3-5
PCE	470,000	3-5
Toluene	310,000	3-5
Ethylbenzene	92,000	3-5
Xylene	590,000	3-5
1,2-DCE	90,000 J **	3-5
1,1-DCE	94	3-5
1,1-DCA	340	3-5
2-Butanone	110 J	3-5
1,1,2-TCA	10 J	8-10
1,1-DCE	94	8-10
1,1-DCA	340	8-10
1,1,1-TCA	260	8-10
TCE	100	8-10
Toluene	220	8-10
Xylene	40	8-10

*Data are unvalidated.

** J qualifier for organic detections indicates an estimated result.

Table 2.3-3 Groundwater Well Data Downgradient of Trench T-2

Groundwater Monitoring Well 07391

Analyte	Concentration (µg/l)	Sample Date	MCL(µg/l)
Chloroform	1200	12-5-94	100
Chloroform	1100	03-14-95	100
PCE	600	12-5-94	5
PCE	780	03-14-95	5
TCE	65000	12-5-94	5
TCE	67000	03-14-95	5

Groundwater Monitoring Well 0271 (abandoned)

Analyte	Concentration (µg/l)	Sample Date	MCL (µg/l)
1,1,1-TCA	12	02-25-92	200
1,2-DCE	180	02-25-92	100
Chloroform	75	02-25-92	100
PCE	57	02-25-92	5
TCE	4800J	02-25-92	5

3.0 PROJECT APPROACH

3.1 Proposed Action Objectives

The Trench T-2 remediation will remove contaminated material identified in association with the trench. The subsurface soils within the trench have substantially higher concentrations of volatile organic contamination than the surrounding areas. This approach of removing the contaminant source from the trenches located in OU 2 is consistent with the long-term objectives and assumptions being used in preparing the Feasibility Study for OU 2. The Feasibility Study assumes that the necessary contaminated sources will be removed from the historical trenches located in OU 2.

The proposed action entails removing VOC-contaminated material and additional soil as needed. Efforts will be made to over-excavate to achieve the removal of the contaminated source material during this proposed action. If bedrock is encountered before the additional buffer is excavated, the excavation will terminate at bedrock.

3.2 Proposed Action

Concurrent with the public review period, field screening and refinement of the trench boundary will be completed. The remediation of Trench T-2 will entail the excavation of up to approximately 200 cubic yards of material (total volume of the trench). After a radiological field screening, the surface topsoil (approximately the top six inches) of the trench will be laid back away from the planned excavation area of the trench.

Next, a backhoe will be used to excavate the soil from the trench. The equipment will be selected with preference towards excavators that minimize worker exposure to the trench and minimize shoring requirements. The VOC-contaminated soil removed from the trench will be containerized and will be staged for onsite thermal desorption or offsite disposal facility based on volume removed.

Throughout the excavation activities, dust minimization techniques will be used to minimize suspension of particulates, such as water sprays and/or dust suppressants. Earth moving operations will not be conducted during periods of high winds. The RFETS Environmental Restoration Field Operations Procedure for Air Monitoring and Dust Control provides guidance for monitoring of wind speed and work stoppage during high winds.

After excavating, samples will be collected and analyzed for the contaminants of concern to establish the post-action conditions of the IHSS in an effort to meet Programmatic Preliminary Remediation Goals or other appropriate action levels.

If dewatering of the trench is necessary, a field sump will be created in the trench and pumped out with a portable submersible pump into a temporary storage tank. The water will be treated in Building 891, the OU 2 Field Treatability Unit, the planned Sitewide Consolidated Water Treatment Facility, or in Building 374, then sampled and released in accordance with respective discharge criteria. Alternatively, the water may be taken offsite for treatment and disposal if appropriate.

3.3 Worker Health and Safety

Due to the contaminants present in the trench, this project falls under the scope of the Occupational Safety and Health Administration (OSHA) construction standard. Under this standard, a site-specific health and safety plan will be developed which addresses the safety and health hazards of each phase of site operations and specifies the requirements and procedures for employee protection. Additionally, a hazard analysis will be developed which specifies hazards to which employees may be exposed during each phase of the project and the appropriate control measures to be used. These documents will be integrated wherever possible.

This project involves potential worker exposure to physical, chemical, and radiological hazards. The physical hazards include those associated with excavation activities, use of heavy equipment, and work on uneven surfaces. As planned, workers will not need to enter the trench, therefore eliminating hazards associated with work in excavations and confined spaces. However, if the field conditions vary from the planned approach, an activity analysis will be prepared for the current circumstances and work will proceed according to the appropriate control measures. Employee exposure to noise and heat stress will be evaluated. Appropriate personal protective equipment will be worn throughout the project.

Airborne concentrations of VOCs are expected to be below respective employee exposure limits. However, due to the number of VOCs, the combined concentration will also be evaluated against the exposure limits for chemical mixtures. Routine VOC monitoring will be conducted for any employees who must work near the contaminated soil (ie. soil sampling personnel). Those employees will begin work in level C respiratory protection. Appropriate skin protection will also be worn. Following employee exposure evaluation, the Site Safety Officer may downgrade personal protective equipment requirements.

Monitoring for radiological contamination will be conducted throughout the project. If specified levels are exceeded, the area will be posted, and work will follow a Radiological Work Permit.

3.4 Waste Management

Soils

If sufficient volumes of contaminated soil are generated, the VOC-contaminated soils will be processed using a mobile thermal desorption unit onsite. Thermal desorption is an ex-situ process in which a contaminated soil or sludge is heated to a temperature sufficient to volatilize the organic compounds of concern. Depending on the specific thermal desorption vendor selected, the thermal desorption unit heats the contaminated soils to a temperature range between 200 to 1000 degrees Fahrenheit. The gaseous products are removed by a purge gas and treated in a downstream offgas treatment system. Again, depending on the manufacturer, the offgases may be captured and cooled in a condenser and polished through an activated carbon filter and/or a high efficiency particulate air filter. Prior to being fed into the thermal desorption unit, oversize material, such as large cobbles and debris, will be removed from the soil feedstock. The processed soils from the thermal desorption unit will be returned to the trench. If soil is disposed of offsite, clean fill will be returned to the excavated area.

Based on the historical information about the use of Trench T-2, no radiological wastes were suspected of being disposed in the trench. The radiological contaminants identified in soils during the remedial investigation were collected by compositing samples from zero to nine feet in depth and may have resulted from the surficial contamination in the area due to the proximity to IHSS 155, the 903 Lip Area. However, if radiological contaminated soils are encountered in the trench above the risk-based programmatic preliminary remediation goals for subsurface soils, the soils will be appropriately disposed of.

Miscellaneous Wastes

Results of historical record reviews and previous field investigations indicate that no metals, wood, or debris were disposed within Trench T-2. If any miscellaneous waste are encountered, they will be managed, recycled, treated and/or disposed in accordance with the Federal, State and local laws and regulations and RFETS policies and procedures.

Any ancillary wastes generated as part of this proposed action, such as personal protective equipment, will be characterized based on process knowledge and radiological screening, and will be managed, recycled, treated and/or disposed in accordance with the Federal, State and local laws and regulations and RFETS policies and procedures.

4.0 ENVIRONMENTAL IMPACTS

The National Environmental Policy Act (NEPA) requires that actions at RFETS be evaluated for potential impacts to the environment. Impacts to the natural environment resulting from the early action will be minimal and are not expected to result in any adverse impacts to wetlands, floodplains, threatened or endangered species or their habitats, and historic or cultural resources. There will be minor releases of air pollutants from heavy equipment during excavation and a very minor increase in particulates (dust) associated with the operation of loading and unloading and transferring containers. Any airborne particulates and contaminants resulting from the excavation activities will be controlled with best management practices including water sprays and covering. Once the removal of the contaminant source from the trench is complete and the processed material is replaced in the trench, the trench site will be returned to the natural grade in the area and reseeded with appropriate grasses.

5.0 COMPLIANCE WITH ARARS

In accordance with the Interagency Agreement (IAG), an objective of accelerated actions at RFETS is the identification and compliance, to the extent practicable, with federal and state Applicable or Relevant and Appropriate Requirements (ARARs) that are associated with this proposed action. ARARs relating to the action are identified in this section as summarized in Table 5.0-1.

There are no chemical-specific ARARs for this proposed action, nor are there any location-specific ARARs for this proposed action. The Colorado Air Pollution Prevention and Control Act standards for air emissions (5 CCR 1001-3, 5 CCR 1001-9) have been identified as action-specific ARARs. Based on the characterization data available from the trench and the vicinity, the anticipated air emissions will be calculated to determine what type of control measures will need to be employed to ensure compliance with the Colorado Air Pollution Prevention and Control Act standards. This analysis, when completed, will be provided to the Colorado Department of Public Health and Environment prior to the start of the operations.

Table 5.0-1 ARARs for the Proposed Action of Trench T-2

Action	Requirement	Prerequisite	Citation	ARAR	Comment
Air Quality	Compliance with air emissions	Prevention of exceeding emissions for particulates and VOCs	5 CCR 1001-3 5 CCR 1001-9	Applicable	None

6.0 IMPLEMENTATION SCHEDULE

The removal of the contaminated soils in the Trench T-2 is scheduled to commence in the last fiscal quarter of 1995 with completion of the removal of contaminated soils in Trench T-2 in the last fiscal quarter of 1995. These dates are projected from the work package; any delays, scope, or budget changes may affect these dates.