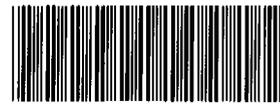


22100



000066336



Rocky Mountain  
Remediation Services, L.L.C.  
... protecting the environment

# INTEROFFICE MEMORANDUM

DATE: March 11, 1997

TO: Distribution

FROM: *MCB*  
M. C. Burmeister, RMRS Accelerated Actions, x5891, T893B

SUBJECT: PROPOSED ACTION MEMORANDUM FOR THE SOURCE REMOVAL AT  
TRENCH 1 - MCB-005-97

Attached is a draft copy of the Proposed Action Memorandum for the Source Removal at Trench 1, IHSS 108. This draft document is provided for RMRS internal review and comment before submittal to K-H on March 20. Please provide your comments to me or Anne White by 12:00 on Friday, March 14.

I will be out of the office, on travel, from March 11 through March 13. If you have any questions during this time, please contact Annette Primrose at extension 4385.

MCB/aw

Distributor:

RMRS

- Jerry Anderson, x6438, T893B
- Mike Bemski, x4090, T893B
- Marla Broussard, x6007, T893B
- Russ Cirillo, x5876, T891A
- Greg DiGregorio, x5688, T893B
- Susan Evans, x3199, T893B
- Susan Myrick, x5051, T893B
- Steve Paris, x3656, T893B
- Ian Paton, RMRS, x2680, T893B
- Annette Primrose, x4385, T893B
- John Schmuck, x4092, T893B
- Tracey Spence, x4322, T893B
- Ann Tyson, x4829, T893B

M-K

Hopi Solomon, x6627, T893B

RTG

Corrine Bogert, x9656, T891C

Enclosure:  
As stated

cc: RMRS Records



ADMIN RECCRD

-1108-A-00077-

000077

1/38

**PROPOSED ACTION MEMORANDUM  
FOR THE SOURCE REMOVAL AT  
TRENCH 1  
IHSS 108**

**DRAFT**

**March 10, 1997**

**Preliminary Draft D  
Document Control Number RF/RMRS-97-????  
RMRS Review DRAFT**

2

**PROPOSED ACTION MEMORANDUM  
FOR THE SOURCE REMOVAL AT THE TRENCH 1  
IHSS 108**

**DRAFT**

**TABLE OF CONTENTS**

1.0	PURPOSE .....	1
2.0	PROJECT DESCRIPTION .....	1
2.1	Background .....	2
2.2	Existing Conditions .....	4
2.3	Hydrogeologic Setting .....	4
2.4	Trench 1 Characterization Data Summary.....	7
	2.4.1 Groundwater .....	8
	2.4.2 Soil.....	
3.0	PROJECT APPROACH.....	11
3.1	Proposed Action Objectives .....	12
3.2	Proposed Action .....	12
	3.2.1 Excavation.....	12
	3.2.2 Staging/Segregation of Contaminated Materials and Soils .....	15
	3.2.3 Treatment .....	15
	3.2.4 Site Reclamation .....	16
3.3	Worker Health and Safety .....	17
3.4	Waste Management .....	18
4.0	ENVIRONMENTAL IMPACTS.....	18
5.0	APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS .....	19
5.1	CHEMICAL-SPECIFIC REQUIREMENTS AND CONSIDERATIONS .....	20
	5.1.1 NESHAPs.....	20
	5.1.2 Action Level Framework .....	20
5.2	ACTION-SPECIFIC REQUIREMENTS AND CONSIDERATIONS.....	20
	5.2.1 Remediation Waste.....	21
	5.2.2 Identification and Listing of Hazardous Waste .....	21
	5.2.3 Land Disposal Restrictions .....	21
	5.2.4 Containment Building .....	22
	5.2.5 Contaminated Soil Stockpile(s).....	23
	5.2.6 Temporary Unit Tank and Container Storage.....	24
	5.2.7 Particulate Emission Controls.....	24
	5.2.8 VOC and Particulate Emission Controls.....	25
5.3	LOCATION-SPECIFIC REQUIREMENTS AND CONSIDERATIONS .....	26
6.0	IMPLEMENTATION SCHEDULE .....	26
7.0	REFERENCES.....	27

## ACRONYMS

AHAs	Activity Hazard Analysis
ALF	Action Levels & Standards Framework
AOC	Area of Contamination
ARARs	Applicable or Relevant and Appropriate Requirements
CAMU	Corrective Action Management Unit
CCR	Colorado Code of Regulations
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
COC(s)	Contaminant(s) of Concern
CSS	Contaminated Soil Stockpile
CWTF	Consolidated Water Treatment Facility
DOE	Department of Energy
EPA	Environmental Protection Agency
HEPA	High Efficiency Particulate Air
HASP	Site-Specific Health and Safety Plan
IHSS	Individual Hazardous Substance Site
LDRs	Land Disposal Restrictions
LLRW	Low Level Radioactive Waste
mg/L	Milligrams Per Liter
mg/Kg	Milligrams Per Kilogram
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEPA	National Environmental Policy Act
OSHA	Occupational Safety and Health Administration
PA	Protected Area
PAM	Proposed Action Memorandum
PCE	Tetrachloroethylene or Perchloroethylene
pCi/g	Pico Curies Per Gram
PPE	Personal Protective Equipment
RACT	Reasonable Available Control Technologies
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RMRS	Rocky Mountain Remediation Services
RFI/RI	RCRA Facility Investigation/Remedial Investigation
SAP	Sampling and Analysis Plan
TCE	Trichloroethene
TDU	Thermal Desorption Unit
TUs	Temporary Units
UCL	Upper Confidence Limit
VOC(s)	Volatile Organic Compound(s)
yd <sup>3</sup>	Cubic Yards

**DRAFT**

**DRAFT**

## 1.0 PURPOSE

This Proposed Action Memorandum (PAM) outlines the project approach and applicable requirements for the excavation and subsequent segregation and treatment of depleted uranium chips and associated soils and wastes at Trench 1 (T-1), Individual Hazardous Substance Site (IHSS) 108. T-1 is ranked number five (of over 200 sites) in the Environmental Ranking [Attachment 4 to the Rocky Flats Cleanup Agreement (RFCA), DOE, 1996]. T-1 received a high ranking because it is the single largest known source of radioactive contaminants buried at the Rocky Flats Environmental Technology Site (RFETS). The location of T-1 is shown on Figure 1-1.

Objectives of the proposed accelerated action are to remediate the risk posed to future users of the site by removing and stabilizing the potentially pyrophoric uranium from the trench and removing and treating (if necessary) debris, contaminated soils, and other material that may be contained in the trench. Upon completion of the accelerated action the trench will not contain soils contaminated above RFCA Tier I action levels for radionuclides or volatile organic compounds (VOCs), and T-1 will have been restored to an improved natural condition. This source removal will remediate one of the top ten IHSS sites at RFETS.

Environmental remediation of T-1 will consist of excavation of the materials in the trench, segregation of contaminated and uncontaminated soils and materials, treatment of depleted uranium to a stabilized form, and off-site disposal of the stabilized waste and other contaminated materials.

This source removal is being conducted in accordance with the RFCA, and Federal, State, and local laws, as well as U.S. Department of Energy (DOE) Orders and RFETS policies and procedures. The depleted uranium and associated materials addressed by this action are expected to be Low Level Radioactive Waste (LLRW) following stabilization by encapsulation. At the conclusion of the project, clean backfill and thermally treated soils (if any) below RFCA Tier II action levels will be returned to the T-1 excavation, and the area restored to a comparable undisturbed condition. Remedial activities performed under this PAM will be consistent with and contribute to the efficient performance of anticipated long-term remedial action for the buffer zone and will be conducted in a manner which is protective of site workers, the public, and the environment.

6

**DRAFT**

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
3 of 33

## 2.0 PROJECT DESCRIPTION

T-1 is located just northwest of the inner east gate, and about 40 feet south of the southeast corner of the Protected Area (PA) fence (Figure 1-1). The trench is approximately 250 feet long, 16 to 22 feet wide, and 10 feet deep. Historical documentation indicates depleted uranium metal chips (lathe and machine turnings) packed in lathe coolant were buried in the west end of T-1 in approximately 125 drums. The drums were reportedly double stacked end-on-end in the trench and covered with one to two feet of soil. No written documentation exists for the contents of the center and east end of the trench. Interviews with former site workers indicate that the eastern two-thirds of the trench is likely to contain trash (pallets, paper) and debris such as empty or crushed drums.

Under this proposed action, the drums of depleted uranium chips and related contaminated soils will be excavated and treated to stabilize the potential pyrophoric nature of the uranium chips. Soils contaminated with high levels of depleted uranium will also be excavated and stabilized, if necessary. The stabilized wastes will be shipped off-site for disposal.

The available historic information and data do not indicate that T-1 is a source of VOC contamination to subsurface soil or groundwater. If extensive VOC contamination above Tier I action levels is encountered in the trench, these materials would be treated by low temperature thermal desorption. This process has been used successfully at similar sites at RFETS.

### 2.1 Background

Drums of waste from Building 444 were first placed in T-1 in November 1954 and burial operations continued intermittently until December 1962. Wastes were initially buried in T-1 when Building 444 could not safely process drums of oily turnings that were combustible and presented a pyrophoric hazard. The pyrophoric nature of this waste made transporting the depleted uranium (often called tuballoy or D-38) a safety hazard. The depleted uranium chips were in drums which also contained oil coolant (primarily a mixture of water, mineral oil, fatty amides), dirt and other foreign material. Historical information indicates other wastes are buried in T-1 from Building 444 including ten drums of cemented cyanide, one drum of "still bottoms" and copper uranium alloy. The east end of the trench is expected to contain crushed drums, broken pallets, debris and trash.

The depleted uranium casting and machining began in Building 444 in 1953 (Chem Risk, 1992). The production operations in Building 444 were conducted to support war reserve, special order and manufacturing development work. Weapons components were fabricated from various

DRAFT

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
4 of 33

materials such as depleted uranium, beryllium, stainless steel, and aluminum (EG&G,1993). Operations in Building 444 included casting, fabrication, assembly, inspection and testing, coating and plating, special projects and support operations. Machining operations included turning, facing, boring, milling, and sawing of the above materials using lathes, saws, milling equipment and other conventional machine tools (EG&G, 1994; EG&G,1991). In 1956 the chip roaster began operation in Building 447 to roast depleted uranium chips from the machining processes conducted in Building 444. The roaster was out of service from 1959 to 1961 (EG&G, 1991). Storage for the waste depleted uranium chips in lathe coolant, dirt, and floor sweepings were stored on the building dock before the roaster became operational and during the roaster shutdown period. It was during these periods that wastes from Building 444 went to T-1 and also to the Mound Site for burial.

According to the DOE Handbook - 1081-94, *Primer on Spontaneous Heating and Pyrophoricity*; (DOE, 1994) "Depleted uranium is a radioactive metal that is also combustible. Most uranium is handled in massive forms that do not present a significant fire risk unless exposed to severe and prolonged external fire. Unless covered with oil, massive uranium burns with virtually no visible flame. Burning uranium reacts violently with carbon tetrachloride, 1,1,1-trichloroethane, and the Halons. Uranium in the finely divided form is readily ignitable, and uranium scrap from machining operations is subject to spontaneous combustion. The reaction can usually be avoided by storage under dry (without moisture) oil. Because of uranium's thermal conductivity, larger pieces have to be heated entirely to their ignition temperature before igniting. Moist dust, turnings and chips react slowly with water to form hydrogen (and uranium oxides)."

**DRAFT**

## 2.2 Existing Conditions

The T-1 area was investigated during the Operable Unit 2 (OU 2) Phase II Resource Conservation and Recovery Act (RCRA) Field Investigation/Remedial Investigation (RFI/RI) Program (DOE 1995). Additional characterization was conducted as part of the 1995 Trenches and Mound Site investigation (Rocky Mountain Remediation Services 1996). Due to the suspected presence of pyrophoric uranium and its associated hazards, no drilling or subsurface sampling was performed inside of the Trench T-1 boundaries.

The Trench T-1 area was investigated in 1995 using the following methodologies:

- Historical data were compiled using the Historical Release Report and supplemented with employee interviews to identify buried materials, potential contaminants, trench location, and trench size.
- Aerial photographs were examined to identify disturbed areas, verify trench dimensions and location, and determine time of operation.
- A site visual survey was performed to identify physical features and establish a geophysical sampling grid.
- Electromagnetic (EM) and Ground Penetrating Radar (GPR) surveys were conducted to locate buried conductive and/or metallic objects and define trench boundaries.
- Soil gas surveys were conducted to identify and delineate potential contaminant plumes.

Historical records and information obtained through employee interviews indicate that as many as 125, 30-gallon and 55-gallon steel drums containing depleted uranium chips and turnings, and miscellaneous debris are disposed in T-1. Drum inventory lists, memorandums, and drum shipping logs documenting the placement of 85 drums in T-1 have been located. The Inventory lists and former employee interviews indicate that the depleted uranium waste disposed in T-1 originated from Building 444. The uranium chips and turnings were coated with a water-soluble lathe coolant (trade name CimCool) during machining of parts. The inventory records also include ten drums of cemented cyanide waste from Building 444. Cyanide and cadmium wastes are known to have been generated during metallurgical operations in Building 444.

A pilot-scale 55-gallon drum evaporator was reportedly used in Building 444 for reducing machine coolant oil waste (DOE, 1992). The resulting condensate was transferred to the process waste treatment system in Building 774 (Hornbacher, 1994), and the "still bottoms" were "drummed and buried through normal disposal channels" (Rains and Hawley, 1955; Cichorz, 1970). "Still

DRAFT

bottoms" from Building 444 could potentially consist of either the lathe coolant sludge discussed above or residual trichloroethene and perchlorethene waste solvents and sludge generated from machined parts cleaning.

Several of the drums containing depleted uranium and lathe coolant oil are described in historical documents as 30-gallon drums placed inside 55-gallon drums and then over packed with graphite. The graphite is believed to have been excess material derived from waste graphite molds utilized during production operations in Building 444.

Personnel directly involved in the trench disposal activities stated that the buried 30- and 55-gallon drums were generally double-stacked in the trench on-end (vertically), in rows of 4 to 5 drums across. The trench is estimated to be approximately 10 feet deep, 15 feet wide, and 200 to 250 feet long. This correlates well with investigation results. The bulk of the drums containing depleted uranium were reportedly disposed in the west portion of the trench from 1954 to 1962. Individual groups of drums were reportedly completely covered with one to two feet of soil immediately after placement in the west end of T-1. Miscellaneous debris was placed mostly in the central and eastern portions of the trench until the trench was closed in 1962. The drums and debris were covered with one to two feet of soil.

Weed cutting activities in October and November, 1982 unearthed two drums not adequately covered with fill material. Both drums were sampled and successfully removed for offsite disposal. One drum contained an oil/water mixture which yielded plutonium analyses of 55 pico Curies per liter (pCi/l) and uranium analyses of  $2.3 \times 10^5$  pCi/l. The other drum was found to contain an oily sludge which yielded results of 4.3 pico Curies per gram (pCi/g) plutonium and  $1.2 \times 10^6$  pCi/g uranium (Illsley, 1983).

Conflicting information was found during this historical review regarding the potential contaminants in the trench. All references that mention the origin of the waste confirm that it was from Building 444 exclusively. It is believed from interviews with retired Rocky Flats employees and the HRR that Building 444 processed uranium and not plutonium; yet, several references state that analytical results from the drum uncovered in 1982 indicated the presence of plutonium (DOE, 1992). The presence of low levels of plutonium (if confirmed) will not affect the project approach.

### 2.3 Hydrogeologic Setting

The hydrogeologic setting consists of 12 to 25 feet of poorly consolidated Rocky Flats Alluvium and disturbed soil unconformably underlain by bedrock consisting of weathered claystone and minor sandstones of the Cretaceous Arapahoe and Laramie Formations (DOE, 1995). The Rocky Flats Alluvium consists of lenses of poorly to moderately sorted clayey and silty gravels and sands

**DRAFT**

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
7 of 33

interbedded with clay and silty lenses. Mean hydraulic conductivities are  $2.06 \times 10^{-4}$  centimeters per second (cm/s) for the Rocky Flats Alluvium and  $8.82 \times 10^{-7}$  cm/s for the weathered claystone of the Arapahoe Formation (EG&G, 1995). The T-1 area consists of one to two feet of artificial fill deposits over the Rocky Flats Alluvium. The surface soils in the vicinity of T-1 were extensively disturbed during the creation and removal of the Mound Site, construction of the Protected Area fence, excavation of the Central Avenue ditch, and other construction activities in the area (DOE, 1995).

The locations of boreholes and wells used to characterize the T-1 area are presented in Figure 2-1. Groundwater seasonally ranges in depth from approximately 10 feet below ground surface to below the contact between the underlying Arapahoe Formation and the Rocky Flats Alluvium. The depth to groundwater can fluctuate up to approximately 6 feet below ground surface. The water table occasionally reaches the level of the drums in the trench.

Seasonal recharge from the ground surface and the unlined Central Avenue ditch causes shallow groundwater to flow towards the north. Figure 2-2 depicts the generalized hydrogeologic cross section at the T-1 site. An east-west trending bedrock high is located between the 903 Pad and the T-1 area, just south of the trench (DOE, 1995). Groundwater within the saturated alluvium south of the trench has been interpreted to flow eastward, along the south side of the bedrock high.

12

**DRAFT**

## 2.4 Trench 1 Characterization Data Summary

Evaluation and characterization of the environmental conditions in the vicinity of T-1 was conducted using available data compiled from the OU 2 Phase II RFI/RI report (DOE, 1995) and the Draft Trenches and Mound Site Characterization Report (RMRS, 1996). Subsurface soil and groundwater data evaluated include analytical results from three boreholes and five groundwater monitoring wells installed near the west portion of T-1 in 1986, 1987, and 1991. In addition, a limited soil gas survey was performed at the trench site to screen for VOCs. Electromagnetic and ground penetrating radar surveys were conducted at the site in 1995 to locate buried conductive objects and define the trench boundaries.

The available subsurface soil and groundwater data does not provide conclusive information to characterize the entire trench site (i.e., the central and east portions of the trench area), or determine if the site is contributing to subsurface contamination in the area. However, because this source removal action is focused on removing and stabilizing the drums of depleted uranium known to be in the trench, complete environmental characterization of the trench area is not required to perform the T-1 accelerated action. Based on review of the available data for T-1, there does not appear to be significant subsurface soil or groundwater contamination in the area surrounding T-1. A summary of the T-1 characterization data is presented below.

### 2.4.1 Groundwater

Groundwater data was obtained for five monitoring wells (4386, 2387, 12091, 1891, and 1791) near the west portion of T-1 (see Figure 2-2). Well 4386 is screened in the Rocky Flats alluvium. The remaining wells are screened in weathered claystone of the Arapahoe Formation (DOE, 1995). Because of the limited well placement, no data is available for groundwater flowing beneath the central and eastern portions of the trench.

Wells 12091 and 1891 are located approximately 10 feet south of the southern boundary of the trench, approximately 40 feet east of the southwest corner of the trench boundary. These two wells are likely hydraulically upgradient or cross-gradient to the trench (see Figure 2-1). Monitoring wells 4386 and 2387 are located about 130 feet and 75 feet west of the west trench boundary, and are located cross-gradient and/or upgradient to the trench. The remaining well 1791 is approximately 45 feet hydraulically downgradient (north) of the western portion of the trench. Groundwater sample results for the upgradient wells (12091, 1891, 4386, and 2387) and the downgradient well (1791) are summarized in Table 2-1.

Low concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) were detected in all five monitoring wells. The PCE measured in the downgradient well 1791 exceeded the RFCA Tier II groundwater action levels. However, PCE also exceeds the action level in well 2387. There are

15

**DRAFT**

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
11 of 33

not enough data available to determine whether PCE in groundwater at well 1791 is from either the same sources as well 2387, or from a source in T-1. The presence of contamination in wells upgradient and/or cross-gradient to T-1 has been linked to the 903 Pad and other potential sources.

Methylene chloride was detected in wells 2387, 12091, 1891, and 1791. Methylene chloride is a common laboratory and sampling analytical contaminant. It is not known to have been used extensively as a solvent at RFETS. Therefore, PCE and TCE are used as indicators of groundwater contamination in relation to T-1.

Dissolved uranium-233/234, and uranium-238 activities observed in all five wells exceed Tier II groundwater action levels. However, all of these activities are within the background uranium ranges of the respective isotopes as defined by the mean plus two standard deviations.

**DRAFT**

**TABLE 2-1  
SUMMARY OF GROUNDWATER SAMPLE RESULTS**

ANALYTE	WELL 4386	WELL 2387	WELL 12091	WELL 1891	WELL 1791	TIER II ACTION LEVELS	BACKGROUND (M2D)	UNITS
Methylene Chloride	ND	0.008	0.016	0.007	0.022	0.005	NA	mg/l
Tetrachloroethene	0.0003	0.074	0.00059	0.002	0.016	0.005	NA	mg/l
Trichloroethene	<0.005	<0.005	0.0003	<0.0002	0.001	0.005	NA	mg/l
Plutonium-239/240	-0.20	0.0250	ND	ND	ND	0.151	0.01	pCi/l
Americium-241	0.11	0.10	ND	ND	ND	0.151	0.013	pCi/l
Uranium-233/234	9.858	3.60	5.643	5.0	4.0	2.98	60.7	pCi/l
Uranium-235	0.301	0.30	0.279	1.0	1.0	1.01	1.79	pCi/l
Uranium-238	7.629	2.20	4.337	3.0	4.0	0.768	49	pCi/l

Notes:

All concentrations reported are maximum observed.

All concentrations reported for metals and radionuclides are for dissolved analyses.

ND = Not Detected

NA = Not Applicable

mg/l = milligram per liter

pCi/l = picocuries per liter

Values used for the radionuclide background comparisons are the background mean plus two standard deviations (M2D). These values were obtained from the draft Background Comparison for Radionuclides in Groundwater report (DOE, 1997).

**DRAFT**

#### 2.4.2 Soil

Subsurface soil samples were collected from three boreholes (BH3487, BH3587, and BH3687) in the vicinity of T-1 (see Figure 2-1). Subsurface soil sampling from beneath the bottom of the trench was attempted by using angle drilling methods, but was unsuccessful due to the amount and size of cobble material encountered.

##### Organic Compounds in Soil

Results from the Phase II RFI/RI investigations and the Trenches and Mound Site Characterization indicate that no VOC, semivolatile organic compound (SVOC), or polychlorinated biphenols (PCB) concentrations detected in the vicinity of T-1 exceed the RFCA Tier II subsurface soil action levels.

##### Metals in Soil

Cadmium was detected in subsurface soil samples collected from borehole BH3487 [2.0 to 3.1 milligrams per kilogram (mg/kg)], BH3587 (2.2 to 3.3 mg/kg), and BH3687 (2.0 to 2.4 mg/kg). Arsenic was detected at 14 mg/kg in borehole BH3587 at a depth of 18 to 19 feet. At this writing, the RFCA subsurface soil action levels for cadmium and arsenic have not been determined.

##### Radionuclides in Soil

Available analytical results for radionuclides in soil are summarized in Table 2-2 for comparison to RFCA Tier I subsurface soil action levels. None of the radionuclide activities exceeded RFCA action levels. Plutonium-239/240 and americium-241 activities detected in each of the three boreholes generally decreased with depth, indicating the sources of these radionuclides are likely present in or near the surface. The maximum plutonium-239/240 activity (1.5 pCi/g) was observed from the 0 to 12 foot sample interval in borehole BH3587. Borehole BH3687 was observed with 1.7 pCi/g uranium-238 from the surface to 5 feet and 2.2 pCi/g at a depth of 18 to 20 feet (see Figure 2-1).

It is anticipated that uranium activities in subsurface soil immediately beneath T-1 will exceed the RFCA Tier I subsurface soil action levels. Soil samples will be collected during excavation of the trench for evaluation of radionuclides.

**DRAFT**

**TABLE 2-2  
SUMMARY OF RADIONUCLIDE RESULTS FOR SUBSURFACE SOIL**

BOREHOLE	SAMPLE DEPTH (ft)	ANALYTE	CONCENTRATION (pCi/g)	TIER I SUBSURFACE SOIL ACTION LEVELS (pCi/g)
BH3487	8 to 14.7	Plutonium-239/240	0.09	252
	17 to 18	Plutonium-239/240	0.06	252
BH3587	0 to 12	Americium-241	0.40	38
	0 to 12	Plutonium-239/240	1.5	252
	12 to 15	Americium-241	0.02	38
	12 to 15	Plutonium-239/240	0.06	252
	14 to 15	Americium-241	0.06	38
	18 to 19	Americium-241	0.03	38
BH3687	0 to 5	Americium-241	0.12	38
	0 to 5	Plutonium-239/240	0.53	252
	0 to 5	Uranium-238	1.7	103
	5 to 15	Americium-241	0.03	38
	18 to 20	Americium-241	0.04	38
	18 to 20	Plutonium-239/240	0.03	252
	18 to 20	Uranium-238	2.2	103
	23 to 25	Americium-241	0.08	38

Soil Gas Survey

Soil gas samples were collected at depths of five and ten feet below ground surface at 25 sample locations around the perimeter of the trench to screen for total volatile organic compounds (TVOCs) using an organic vapor analyzer. No samples were collected within the trench boundaries because of the suspected presence and potential hazards associated with pyrophoric uranium. The soil gas survey results are presented in Figure 2-3.

**DRAFT**

Elevated levels of TVOCs were detected in 19 of 24 sample locations ranging from 11 parts per million (ppm) to 1,726 ppm. The VOC levels detected north of the trench boundary were generally higher than those observed to the south. The highest TVOC result was measured at sample location 9A, approximately 40 feet north of the northern trench boundary. The survey results do not show a definite trend in TVOC concentrations with depth or location in the vicinity of the trench. Based on the limited data obtained, no source from within the trench area was identified. This conclusion was based on comparison of the soil gas survey data with that from other areas with known VOC sources. The soil gas survey was performed in the Spring of 1995, the wettest spring in 25 years. Soil gas surveys have been shown to be unreliable if conducted when the vadose zone contains high water content (Devitt, et al, 1987).

#### Electromagnetic and Ground Penetrating Radar Surveys

Two electromagnetic surveys were performed to locate buried conductive objects and define the trench boundaries. Both surveys identified anomalies representing areas within the trench most likely to contain buried metallic objects. The anomalies were identified in the west end, and to a lesser extent in the east end of the trench. The anomalies vary in size from 10 to 24 feet wide and indicate that the trench is approximately 200 feet in length.

Ground penetrating radar surveys were performed to determine the extent of T-1. The surveys indicated that the trench width varies from 10 to greater than 20 feet. The GPR survey results show that the trench is approximately 6 to 10 feet deep. The geophysical survey results are consistent with information obtained from the interviewed employees formerly associated with T-1 activities.

### **3.0 PROJECT APPROACH**

The proposed accelerated action will entail excavating drums containing depleted uranium chips in lathe coolant, associated radiologically contaminated soils, and other wastes and debris from T-1. Materials will be segregated as they are removed from the trench, and further segregated in a staging area. Depleted uranium chips will be stabilized to address their potential pyrophoricity. Associated radiologically contaminated soils will be excavated, treated if necessary, and staged for off-site disposal. The project will be conducted in accordance with the RFCA guidelines, DOE Orders, and RFETS policies and procedures. The project will also utilize lessons learned from previous accelerated actions conducted at RFETS and other DOE - complex sites.

**Process selection** - Several alternative processes for the stabilization of the potentially pyrophoric depleted uranium wastes were evaluated for this project. The processes evaluated were thermal oxidation, chemical oxidation, and stabilization by cementation. All three processes have been successful in converting pyrophoric uranium to a stable, non-reactive form. Thermal

21

**DRAFT**

oxidation requires extensive off-gas treatment to control emissions. Chemical oxidation can produce both chlorine and hydrogen gas during the process and may not be appropriate for the anticipated mixture of soils, lathe coolant and other impurities. Both thermal and chemical oxidation would produce waste streams in addition to stabilized uranium oxide. These waste streams would require further stabilization or treatment prior to disposal. Thermal and chemical oxidation would both require pre-treatment of the waste, and separation of coolant, soils, and other material from the depleted uranium. Stabilization of the uranium chips by cementation type processes was selected based on the simplicity of the process, its ability to handle uranium chips coated with lathe coolant and mixed with soil and debris, and its history as a safe, proven technique for converting the depleted uranium to a non-reactive form.

### 3.1 Proposed Action Objectives

Objectives of the proposed accelerated action are to remediate the risk posed to future users of the site by removing and stabilizing the potentially pyrophoric uranium from the trench and removing and treating (if necessary), contaminated debris soils, and other material that may be contained in the trench. All materials above RFCA Tier I action levels will be removed from the trench, treated as necessary, and staged for disposal. Upon completion of the accelerated action, the trench will not contain soils contaminated above RFCA Tier I action levels for radionuclides or VOCs, and T-1 will have been restored to an improved near natural condition.

### 3.2 Proposed Action

This action will involve excavating both the drums of depleted uranium chips and approximately 250 cubic yards of soil associated with the depleted uranium in the west end of the trench, and excavating the debris and associated potentially contaminated soils (1,000 to 1,500 cubic yards) in the eastern two-thirds of the trench. Potentially pyrophoric uranium chips will be stabilized in a cementation-type process to remove the hazard of pyrophoricity along with contaminated soils associated with the uranium above Tier I action levels for radiological activity. Other wastes suspected in the west end of the trench (cemented cyanide solutions and "still bottoms") will also be excavated, sampled, treated as necessary, and staged for appropriate off-site disposal.

Soils will be screened, segregated and stockpiled at the T-1 site. If present, VOC-contaminated soils above Tier I action levels will be treated using a low temperature thermal desorption remediation technology. Treated soil, upon attainment of Thermal Desorption Unit (TDU) performance goals, will be backfilled into the excavation if below Tier II action levels. Radionuclide contaminated soils will be stockpiled and staged for disposal. Soil below the RFCA Tier II action levels will be returned to the trench. The remainder of the trench will be filled with clean backfill, and the top 6 inches will be covered with topsoil. The trench and associated areas

**DRAFT**

used for the accelerated action activities will be reclaimed to return these areas to near natural conditions.

### 3.2.1 Excavation

Conventional excavation techniques will be used to remove the soil, drums, debris, and contaminated soils at the T-1 site. Excavation equipment will consist of a track-mounted excavator, backhoe, and/or front-end loader. The excavator bucket will be equipped with brass or bronze teeth to minimize spark-potential while handling drums containing depleted uranium. Drums will be removed from the excavation individually, one-at-a-time, in order to minimize exposure to workers, environment, and the public. Standard fire prevention and suppression techniques for pyrophoric metals will be utilized. Extinguishing agents for the potentially pyrophoric depleted uranium chips will be located immediately adjacent to the excavation site and ready for use. Soils, drums, and debris will be moved in dump trucks, roll-offs, or by similar transport to a staging/segregation area, described in Section 3.2.2.

During soil handling activities, dust minimization techniques, such as water sprays, will be used to minimize suspension of particulates. In addition, earth-moving operations will not be conducted during periods of sustained high winds. The RFETS Environmental Restoration Field Operations Procedure FO.01, Air Monitoring and Dust Control, will be incorporated into the project. Air monitoring for radioisotopes, VOCs, and particulates will be performed during excavation and transport activities.

At the completion of excavation, verification samples will be collected along the base and sides of the excavation to determine the post-action condition of the subsurface soils. Samples will be analyzed according to the Sampling and analysis Plan. This sampling will be performed after an initial nominal six inch scrape below the drums and debris to clear the trench bottom of any sluff material. Visible staining which may extend beneath the trench bottom will also be removed prior to collecting samples. If analytical results indicate that contamination is present above Tier I action levels, further excavation and sampling will continue until the clean-up target levels listed in Table 3-1 have been met, or the limiting condition (top of unweathered bedrock) is met.

If contamination is encountered below the bottom of the trench, the excavation will be limited to the highly weathered bedrock, one to three feet below the alluvial/bedrock contact, or to the depth of groundwater, if encountered. Unweathered bedrock will not be excavated. An organic vapor analyzer and a field instrument for the detection of low energy radiation (FIDLER) will be used as field screening tools to guide excavation activities before collection of the excavation verification samples.

23

**DRAFT**

Cleanup target levels used for the excavation activities are the RFCA Tier I subsurface soil action levels (DOE, 1996) for radionuclides, and VOCs, if encountered. These action levels were incorporated to reduce risk to future site workers and users of the site, and to prevent degradation of groundwater quality above the RFCA Tier I groundwater action levels (DOE, 1996). Table 3-1 lists the radionuclide and VOC cleanup target levels for excavation per RFCA (DOE, 1996). The contaminants listed in Table 3-1 are the potential chemicals of concern for the project. This list was developed by assessing the historical data, retired worker interviews, and waste records from the site, and by the use of process knowledge to ascertain what contaminants existed in the drums that were initially buried at the site.

**TABLE 3-1  
CONTAMINANT OF CONCERN  
CLEANUP TARGET LEVELS FOR EXCAVATION**

<b>Contaminant</b>	<b>Activity or Concentration</b>
Uranium (U-238)	586 pCi/g
Cyanide	154,000 mg/kg
PCE	11.5 mg/kg
TCE	9.27 mg/kg

Radiological monitoring of the soils will be performed for protection of the workers, the public, and the environment in accordance with 10 CFR 835 and the RFETS Radiological Controls Manual (K-H, 1996). If unexpected levels of radioactivity are encountered in the soil, such as greater than three times background, the soils will be segregated and further sampling and evaluation will be performed to compare radioisotopic concentrations with RFCA subsurface soil action levels.

Based on available site characterization data, no recoverable free product is expected in the trench. Free product, if present, would likely remain in the soil when excavated and small lenses or pockets when disturbed during excavation will be absorbed by surrounding soils. Visibly stained areas of the excavation will be removed. If a sufficient amount of recoverable free product is encountered, the free product would be containerized, characterized, and appropriately disposed offsite.

24

**DRAFT**

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
20 of 33

Based on historical groundwater level measurements in the vicinity of T-1, groundwater is not expected to be encountered during excavation activities. If groundwater and/or incidental water is encountered during excavation, a field sump will be used to transfer the water into a temporary storage container onsite. The collected water will be evaluated per plant procedures for disposition. If the water requires treatment, it will be treated in the Consolidated Water Treatment Facility (CWTF) located in Building 891. Following treatment, the water will be sampled and released in accordance with CWTF discharge criteria.

As part of the Mound Site Source Removal project, an extension to the existing Central Avenue ditch, located north of T-1, will be installed which will minimize local groundwater recharge to the T-1 area. Surface water monitoring will be performed during excavation activities using existing automated stations near the site, and storm water run-on and run-off around the excavation will be controlled.

### 3.2.2 Staging/Segregation of Contaminated Materials and Soils

Drums containing waste materials, drum fragments, debris, etc. will be evaluated for inclusion into the stabilization process and segregated accordingly. Liquids and sludge, if encountered, will be segregated and managed appropriately. Uranium chips to be stabilized, debris, and other waste materials will be transported to the treatment area. Wastes not suitable for stabilization will be packaged and disposed of appropriately.

Drums containing waste materials, drum fragments, debris, etc. will be segregated based on field screening. Each drum or artifact will be evaluated, and inventoried. First, materials will be segregated according to suspect radiological contamination, suspect hazardous contamination, or suspect mixed contamination (contaminated with both a radiological and hazardous component). Drums will be inspected for labels, markings, texture, color, and any other information which may assist in identification. Solid materials will then be segregated and assigned to one of the following waste types: depleted uranium chips and turnings, cemented cyanide wastes, suspected "classified" artifacts, debris, or unknown materials.

Drums identified as containing uranium chips, and/or uranium chips in a soil matrix will be containerized and transported to the treatment area for stabilization. These materials and wastes should be easily identifiable by visual inspection, and by their location within the trench.

Cemented cyanide wastes will be re-packaged and sampled in accordance with the Sampling and Analysis Plan (SAP). Sampling results will be used to verify the material waste type, characterize the waste for applicable disposal, storage, and treatment options (if required), and/or resolve whether the present waste form is acceptable for disposal. The re-packaged waste material will be stored in a Temporary Unit (TU) established for storage of wastes during this project.

**DRAFT**

Artifacts suspected as being "classified" items will be immediately isolated, and packaged appropriately. The RFETS Classification Office will be contacted to remove the artifact, and store it in a secure location.

Miscellaneous debris is expected to include compatible materials such as waste personal protective equipment (PPE), wood, rubber, plastics, paper, and glass excavated from the trench. These items will be visually inspected for stains or discolorations, in addition to radiological and volatile organic screening. In general, these items are anticipated to be low level radioactive waste materials unless hazardous characteristics are indicated. These materials will be packaged appropriately for disposal, with like waste forms.

Materials which cannot be immediately identified will be repackaged, and sampled to identify the contents. Once the material is identified, it can be disposed of properly.

Liquids and sludge, if encountered, will be segregated and managed appropriately. The excavated containers will be inspected for labels, markings, or other information which may indicate its contents. The liquids/sludge will be screened for radiological and volatile organic contamination and will be re-packaged if required, in order to ensure container integrity. After container integrity is assured, the liquids will be stored within secondary containment. If the liquids/sludge cannot be identified, the material will be sampled to determine its characteristics.

During the excavation, exposed soils will be screened for volatile organic compounds and radioactivity using appropriate instrumentation and analysis. Soils that appear stained or discolored or appear to possess chemical or radiological contamination will be automatically segregated as suspect-contaminated to ensure waste minimization. Soils suspected to be clean will be staged and stockpiled for reuse in backfilling and restoration of excavations. Sampling of suspect clean soil will be performed according to the SAP.

Soils excavated directly from the areas of the trench containing waste drums, debris, etc. may possess hazardous or radiological characteristics. It is anticipated that T-1 received containers as well as many loose items. Visual indicators may include debris and particulates mixed in with soils, staining and discoloration, fumes, odors, or other indications from field instruments that indicate the soils may be contaminated.

Soils suspected to be contaminated will be temporarily staged in a contaminated soil stockpile (CSS), in the northeast trenches area. This site was chosen because it is relatively flat and contains support trailers and utilities from the previous thermal desorption projects at RFETS. The CSS will be designed to contain the contaminated soil and minimize wind blown dispersion and storm water interaction with the soil by using concrete barriers and a water-resistant tarpaulin. In addition, a plastic lined ditch will be constructed surrounding the stockpile to capture local

**DRAFT**

stormwater. Stormwater collected from this ditch may be used to control dust on soils awaiting treatment or will be collected for onsite treatment at CWTF in Building 891. Air monitoring for VOCs, particulates, and radioisotopes will be performed during staging of soils in the CSS. Dust minimization will be performed during the staging of soils in the CSS and a water-resistant tarpaulin or equivalent will be placed after daily stockpiling operations.

Storm water collected from the trench may be used to control dust on soils awaiting treatment or will be collected for onsite treatment at the CWTF in Building 891. Dust minimization will be performed during the excavation and soil handling.

### 3.2.3 Treatment

A stabilization process will be utilized to encapsulate uranium metal chips, contaminated soils, and other low-level radioactive debris associated with the depleted uranium recovered from the trench. Stabilization involves mixing the wastes with a cement-based mixture to form a solid monolith. Encapsulation within the monolith isolates the uranium from oxygen and moisture, rendering it stable and non-reactive. Cement-based stabilization can be sensitive to the presence of oils or solvents. If these materials are detected, the cement mixture may be modified or the oils/solvents may be separated and containerized. Following stabilization, the monolith will be sampled and analyzed for TCLP metals, VOCs, and reactivity. These activities will be conducted within a containment building described in section 5.2.4.

As a contingency, if sufficient VOC-contaminated soils and debris are present to justify the expense, a low-temperature TDU will be used to remove the VOCs from contaminated soils in a non-destructive manner. If thermal desorption is used, the TDU will be similar to that described in the Mound PAM (DOE, 1996), and the performance goals would be as discussed for the Mound project.

### 3.2.4 Site Reclamation

At the completion of remediation activities, radiological surveys of the T-1 Site excavation and treatment areas will be performed and the areas will be revegetated. Radiological surveys of the equipment will be performed per the RFETS Radiological Control Manual (K-H, 1996) prior to release from RFETS. Excavation, stabilization, and thermal desorption equipment will be decontaminated. Typical decontamination methods include pressure washing and hand washing. Revegetation will be performed in accordance with guidance from RFETS ecologists using approved seed mixtures.

**DRAFT**

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
23 of 33

### 3.3 Worker Health and Safety

Due to the contaminants present in T-1, this project falls under the scope of the Occupational Safety and Health Administration (OSHA) construction standard for Hazardous Waste Operations and Emergency Response, 29 Code of Federal Regulations (CFR) 1926.65. Under this standard, a Site-Specific Health and Safety Plan (HASP) will be developed to address the safety and health hazards of each phase of site operations and specify the requirements and procedures for employee protection. In addition, the DOE Order for Construction Project Safety and Health Management, 5480.9A, applies to this project. This order requires the preparation of Activity Hazard Analyses (AHAs) to identify each task, the hazards associated with each task, and the precautions necessary to mitigate the hazards. The AHAs will be included in the HASP.

An Activity Control Envelope (ACE) review is being performed to develop the safety envelope for performing the T-1 remediation. The ACE team consists of a group of individuals with varied training and backgrounds applicable to the T-1 project, and includes subject matter experts on treating potentially pyrophoric depleted uranium, nuclear safety, health and safety, radiation control, excavation processes, waste handling and treatment, as well as the DOE project representative. The ACE team will develop detailed project task and activity flow charts, and performed an AHA for each of the activities. These AHAs will be incorporated into the HASP. An auditable safety analysis (ASA) is also being developed for the T-1 project in parallel with the ACE review. Any specific requirements of the ASA that are not covered by the ACE AHAs will also be incorporated into the HASP. The ACE process is evaluating special safety and radiological concerns of handling depleted uranium drums in an unknown condition and configuration, including fire hazard, and radiological and chemical exposure.

This project could expose workers to physical, chemical, and low levels of radiological hazards. Physical hazards include those associated with excavation activities, use of heavy equipment, noise, heat stress, cold stress, and work on uneven surfaces. In addition, there is potential for a uranium chip fire. Fire safety will be addressed in the HASP and in a job-specific fire prevention and response plan.

Physical hazards will be mitigated by engineering controls, administrative controls, and appropriate use of PPE. Chemical hazards will be mitigated by the use of PPE and administrative controls. Appropriate skin and respiratory personal protective equipment will be worn throughout the project. Routine VOC monitoring will be conducted with an organic vapor monitor for any employees who must work near the drums of waste or related contaminated soil. Based on employee exposure evaluations, the Site Health and Safety Officer may downgrade personal protective equipment requirements, if appropriate.

**DRAFT**

The HASP details project "radiological hold points," encountering unexpected contaminated debris, contaminated drums, or removable contamination above limits. Radiation monitoring will be included in the HASP per the RFETS Radiological Control Manual (K-H, 1996).

If field conditions vary from the planned approach, an AHA will be prepared for the existing circumstances and work will proceed according to the appropriate control measures. Data and safety controls will be continually evaluated. Field radiological screening will be conducted using radiological instruments appropriate to detected surface contamination and airborne radioactivity. As required by 10 CFR 835, Radiation Protection of Occupational Workers, all applicable implementing procedures will be followed to insure protection of the workers, Colorado located workers, the public, and the environment. The HASP describes the air monitoring equipment to be used to monitor for radiation, VOCs, and particulates. Dust minimization techniques will be used to control suspension of contaminated soils and particulates.

### 3.4 Waste Management

Stabilized depleted uranium chips and associated soils and metal debris will be packaged to meet the waste acceptance criteria (WAC) of the receiving facility, and will be stored onsite pending final off-site disposition at either a low-level or low-level mixed waste repository. Waste associated with the stabilization process, such as cement bags or other containers will be screened for radiological contamination. If this waste is not low-level or low-level mixed it will be placed in the on-site landfill.

Metal and other debris including empty drums will be decontaminated if possible and placed in the on-site landfill. If the debris cannot be radiologically decontaminated, it will be sized and packaged for off-site disposal as low-level waste. HEPA filters (if any) from the temporary stabilization facility may contain low levels of radionuclides and will be managed on-site until they can be sent off-site to an approved disposal facility. Any secondary wastes generated as part of this proposed action, such as personal protective equipment, will be characterized based on process knowledge and radiological screening. Wastes identified as non-radiological and non-hazardous will be disposed at the landfill. Wastes identified as hazardous or low level/low level-mixed will be stored on-site prior to shipment off-site to an appropriate disposal facility. Wastes will be managed, recycled, treated, and /or disposed of in accordance with RFETS policies and procedures, and in accordance with Federal, State and local laws and regulations. The Closure Report for the project will document the types, volumes, and disposition of all wastes generated by this project.

**DRAFT**

#### **4.0 ENVIRONMENTAL IMPACTS**

The National Environmental Policy Act (NEPA) requires that actions conducted at the RFETS consider potential impacts to the environment and NEPA values. The no action alternative was not considered. No action is unacceptable because it would result in no improvement to the contaminated soil resources or the risk to the environment of leaving the waste in place. Air quality impacts are expected to be of short duration and of de minimus quantity, and will be mitigated by dust suppression techniques and excavation controls. Dusts generated during the stabilization process will be controlled by engineering barriers, including use of a temporary building to cover the stabilization process area. Surface water and groundwater quality and wetlands impacts are not anticipated. Only limited, temporary changes to groundwater flow are anticipated due to the small area excavated, and the depth of excavation, which will be above the average groundwater table. Clearance for concerns related to the Migratory Bird Treaty Act and threatened and endangered species will be obtained from RFETS ecologists prior to any construction/excavation activity.

The excavation and stabilization areas have been disturbed over the past forty years. This action is not anticipated to have direct or indirect, or irreversible and irretrievable impacts to natural resources at RFETS and ultimately the action will improve natural resources by removing a known radiological contamination source. Revegetation will mitigate any impacts caused by this action and the previous disturbances. Impacts to the soil's ability to support vegetation following excavation and backfill will be addressed. Given the relatively small area of excavation and backfill, and the project's short duration, impacts to fauna will also be limited and of short duration. Because the project is located away from any surface water, wetlands, or habitat suitable for the threatened and endangered species known to inhabit RFETS, impacts to threatened and endangered species and migratory birds are not anticipated. Periodic surveys for these species will be conducted per RFETS procedures. Historic and cultural resources are not present at the site.

Human health impacts are addressed through requirements for worker protection, and requirements to control the dispersion of contamination to air, water, and soil. The native vegetation has already been disturbed. A net improvement in resource quality will occur and will be consistent with both the short and long term uses anticipated at RFETS. Cumulative impacts will be extremely limited or nonexistent due to the project's short duration. Historically disturbed areas will be revegetated per guidance from RFETS ecologists. Historic impacts to soil and potential impacts to groundwater will be reduced.

**DRAFT**

## **5.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS**

RFETS accelerated actions performed under a PAM must attain, to the maximum extent practicable, Federal and State applicable or relevant and appropriate requirements (ARARs). For that reason, the substantive attributes of the Federal and State ARARs must be identified.

In addition, RFCA provides for waiver of permits for accelerated actions conducted in the buffer zone (RFCA ¶16.a.). T-1, the containment building, and any temporary units (TUs) will all be located in the buffer zone. For each permit waived, RFCA requires identification of the substantive requirements that would have been imposed in the permit process (RFCA ¶17). Further, the method used to attain the substantive permit requirements must be explained (RFCA ¶17c). The following discussion is intended to compliment other descriptions provided in the PAM in a manner that satisfies the RFCA permit waiver requirements.

### **5.1 Chemical-Specific Requirements and Considerations**

The only chemical-specific ARAR identified was the National Emission Standards for Hazardous Air Pollutants (NESHAP) for radionuclides. In addition, the RFCA Action Level Framework (ALF) Tier I subsurface soil action levels were identified as to-be-considered.

#### **5.1.1 NESHAPs**

The 40 CFR §61.92 is applicable and requires that no member of the public receive more than 10 mrem per year above background from airborne sources of radiation. Demonstration of compliance with 40 CFR §61.92 is performed on a sitewide basis taking into consideration all RFETS sources. Stack monitoring is required for all release points which could contribute greater than 0.1 mrem/year. Based upon air dispersion monitoring results .... (need Carol Patenoe input on excavation and outside soil handling; TUs; and containment building)

#### **5.1.2 Action Level Framework**

The Tier I subsurface soil action levels provided in the RFCA Action Level Framework (ALF) were considered and adopted as the cleanup target levels for uranium and cyanide. Similarly, if unexpected sources of VOCs are encountered, the ALF Tier I subsurface soil actions levels will be adopted as the cleanup target levels. (See Table 3-1).

DRAFT

## 5.2 Action-Specific Requirements and Considerations

The following action-specific requirements and considerations were evaluated specific to the T-1 project:

- Definition of Remediation Waste
- Identification and Listing of Hazardous Wastes
- Land Disposal Restrictions
- Containment Building
- Contaminated Soil Stockpiles
- Temporary Unit Tank and Container Storage
- Particulate Emission Controls
- Debris Treatment

### 5.2.1 Remediation Waste

In RFCA remediation waste is defined as all:

- (1) *Solid, hazardous, and mixed wastes;*
- (2) *All media and debris that contain hazardous substances, listed hazardous or mixed wastes or that exhibit a hazardous characteristic; and*
- (3) *All hazardous substances. (See RFCA ¶25.bf.).*

A parallel definition is also found in 40 CFR §260.10. As such, the definition of remediation waste is applicable to all wastes, environmental media (soil, groundwater, surface water, stormwater and air) and debris generated in conjunction with this action.

### 5.2.2 Identification and Listing of Hazardous Waste

Requirements governing the identification and listing of hazardous wastes are applicable to the T-1 accelerated action (see 40 CFR §261). Based upon process knowledge, potentially reactive (pyrophoric uranium) will be present in the trench. For that reason, the reactivity characteristic (D003) is relevant and appropriate as a hazardous waste code for the potentially pyrophoric waste and soil/waste mixtures, debris or wastewater. (See 40 CFR §261.23(a)(1)). Where appropriate, any uranium waste, soil/waste mixtures, debris, or wastewater will be evaluated for other hazardous characteristics.

The historical record indicates that drums of cemented cyanide wastes were disposed in T-1. The cyanide wastes could have originated from either listed electroplating sources or non-listed heat treating activities conducted in Building 444. Because of the uncertainty as to the source, any

DRAFT

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
28 of 33

cyanide waste, soil/waste mixture, debris or wastewater will be considered potentially reactive until tested and determined otherwise. (See 40 CFR §261.23(a)(5)). Where appropriate, any cyanide waste, soil/waste mixtures, debris, or wastewater will be evaluated for other hazardous characteristics.

The operational record reveals only one instance where a single drum of "still bottoms" was disposed in T-1. This occurred during a period where material identified as "perclene still bottoms" were routinely taken to the Mound Site. The drum originated in Building 444 where distillation of lathe coolants also occurred. The uncertainty as to the source, the non-routine nature of the activity, and the doubt about T-1 as a source of VOC groundwater contamination, do not, at this time, justify identification of any RCRA listed waste codes as ARAR for VOCs. If T-1 is identified as a source of VOC groundwater contamination, appropriate ARARs, (e.g., F001 from still bottoms from PCE used for degreasing) will be identified to address soil excavation and disposition.

### 5.2.3 Land Disposal Restrictions

If reactive remediation wastes (D003) are actively managed (i.e., excavated and treated), the land disposal restrictions (LDRs) become applicable. Any reactive uranium waste, soil/waste mixture, debris or liquid requires treatment to deactivate the reactive characteristic. (See §268.40 Treatment Standards for Hazardous Wastes, D003, Other Reactives Subcategory). D003 reactives are not subject to evaluation of underlying hazardous constituents. (See §268.40(e)).

Any reactive cyanide waste, soil/waste mixture, debris or liquid requires treatment to the LDR levels for wastewater or nonwastewaters, as appropriate. (See §268.40 Treatment Standards for Hazardous Wastes, D003, Reactive Cyanides Subcategory). D003 reactives are not subject to evaluation of underlying hazardous constituents. (See §268.40(e)).

Remediation wastewaters generated during remediation will be transferred to the CWTF (Building 891) for treatment. If these remediation wastewaters contain listed RCRA hazardous wastes or if the remediation wastewaters exhibit a RCRA characteristic, the RCRA hazardous waste codes would not be applicable or relevant and appropriate because of the Waste Water Treatment Unit Exclusion (see §260.10 and §264.1(g)(6)). Prior to treatment the remediation wastewaters will be analyzed to ensure consistency with the CDPHE "Policy on Wastewater Treatment Unit Exemption" dated June 25, 1991. The CWTF will treat the remediation wastewaters to meet applicable surface water quality standards under a National Pollution Discharge Elimination System ARARs framework.

33

DRAFT

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
29 of 33

#### 5.2.4 Containment Building

Waste, soil/waste and debris treatment will be conducted in a containment building. The requirements include design criteria, operating standards, and closure standards. (See 40 CFR 264.1100)

The design criteria for the containment building require that the structure be an enclosed, self-supporting structure with a durable primary barrier that is compatible with the wastes being managed. The building must assure containment by preventing exposure to the elements, (e.g., precipitation, wind, run-on) and be of sufficient structural strength to accommodate local geotechnical considerations, climatic conditions, and operational stresses.

For limited management of liquids in the containment building, secondary containment appropriate to the types and quantities of liquids to be managed will be identified during design of the containment building and implemented as part of construction.

Operationally, the primary barrier must be maintained free of significant cracks, gaps, corrosion or other deterioration. The level of waste within the containment must be lower than the containment walls. The building must be operated to prevent tracking of wastes from the unit by personnel and equipment. Fugitive dust emissions must be controlled to a no visible emissions level.

For closure, all wastes and contaminated subsoils must be removed, and structures and equipment must be decontaminated or managed as waste.

Table 5-1 identifies the general RCRA requirements that are being identified as relevant and appropriate to the Containment Building, the CSSs and the Temporary Units.

DRAFT

**TABLE 5-1  
GENERAL RCRA SUBSTANTIVE REQUIREMENTS**

Citation and Title	Requirement
§264.13 - Waste Analysis	Satisfied by characterization data presented in the PAM.
§264.14 - Security	Rely on RFETS infrastructure.
§264.15 - General Inspection Requirements	Personnel will inspect equipment during operations as provided in the Field Implementation Plan.
§264.16 - Personnel Training	Training requirements will be identified in the project Health and Safety Plan.

§264 Subpart C, Preparedness and Prevention is addressed in the RFETS RCRA Part B Permit and by RFETS infrastructure. Similarly, §264 Subpart D, Contingency Plan and Emergency Procedures is also addressed in the RFETS RCRA Part B Permit and by RFETS infrastructure. §264 Subpart E requirements are administrative in nature and will not be applicable or relevant and appropriate.

5.2.5 Contaminated Soil Stockpile(s)

The contaminated soil stockpile(s) (CSSs) will be located within the large area of contamination east of the plant site where waste management activities were historically conducted. Details on the configuration and operation of the CSSs are provided in section 3.2.2. The movement and stockpiling of wastes within the area of contamination (AOC) will not trigger LDRs (see 55 FR 8760). The CSSs will also be subject to the general RCRA requirements identified in Table 5-1.

For closure, all wastes and contaminated subsoils must be removed, and structures and equipment must be decontaminated or managed as waste.

5.2.6 Temporary Unit Tank and Container Storage

The establishment of Temporary Units (TUs) may require a permit waiver if any of the tanks or containers are used for longer than 90-days. Therefore, the discussion in this section is provided to satisfy ¶17 of RFCA.

§264.553 provides that temporary tanks and containers used for the storage or treatment of hazardous remediation wastes may be subject to alternative design, and operating and closure

35

**DRAFT**

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
31 of 33

requirements as long as the requirements are protective of human health and the environment (See §264.553(a)). The TU must be located within the facility boundary and may only be used for treatment or storage of remediation wastes (See §264.553(b)).

In establishing requirements for TUs seven factors must be considered: the length of time the unit operates; the type of unit; the volumes of remediation waste; the physical and chemical characteristics of the remediation waste; the potential for releases; the conditions at the site that will influence migration; and the potential for exposure if a release occurs (See §264.553(c)).

In conjunction with the T-1 remediation, all tanks and containers will be compatible with the waste and be in good condition. Where practicable, secondary containment will be provided when liquid wastes are stored or treated in tanks or containers. In addition, the TUs will also be subject to the general RCRA requirements identified in Table 5-1.

For closure, all wastes and contaminated subsoils must be removed, and structures and equipment must be decontaminated or managed as waste.

#### 5.2.7 Particulate Emission Controls

Regulation No. 1, Section III.(D)(2)(b), (e), and (f) requires control measure to be implemented for construction activity, haul roads and haul trucks to prevent emission of fugitive particulates in excess of air standards. During soil handling activities, dust minimization techniques such as water sprays, will be used to minimize suspension of particulates. In addition, earth-moving operation will not be conducted during periods of high wind. The RFETS Environmental Restoration Field Operation Procedure FO.01, Air Monitoring and Dust Control, will be incorporated into the project.

#### 5.3 Location-Specific Requirements and Considerations

No location-specific requirements or considerations unique to the activity were identified. RFETS site procedures will be followed.

### 6.0 IMPLEMENTATION SCHEDULE

The remediation of T-1 is scheduled to commence the first quarter of fiscal year 1998. Treatment of contaminated soils, if encountered, is scheduled to begin immediately after the excavation activities during spring 1998. Data reduction and reporting efforts are scheduled to be completed by September 1998. Any delays, scope, or budget changes may affect these dates.

DRAFT

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

RF/RMRS-97-????  
March 10, 1997  
32 of 33

## 7.0 REFERENCES

- Chem Risk, 1992. *Project Tasks 3 & 4 Final Draft Report, Reconstruction of Historical Rocky Flats Operations & Identification of Release Points*. Prepared for Colorado Department of Health, August 1992.
- Cichorz, R.S., 1970, *Analysis Report for Sample from Still Bottom, Building 44, 3-7-55*, July.
- Cohen, R.M. and Mercer, J.W., 1993, *DNAPL Site Evaluation*, C.K. Smoley, Boca Raton, FL.
- Devitt, D.A., Evans, (to be added)
- DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO.
- DOE, 1994, *DOE - Handbook - 1081-94, Primer on Spontaneous Heating and Pyrophoricity*.
- DOE, 1995, *Phase II RFI/RI Report for Operable Unit No. 2.- 903 Pad, Mound, and East Trenches Area*, Rocky Flats Environmental Technology Site, Golden, CO..
- DOE, 1997, *Draft Background Comparison for Radionuclides in Groundwater*, January.
- DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Rocky Flats Environmental Technology Site, Golden, CO.
- EG&G, Rocky Flats, Inc., 1991, *Air Pollutant Emission Notice (APEN) Report*, Buildings 444, 445, 450, and 455.
- EG&G, Rocky Flats, Inc., 1993, *Revision of Air Pollutant Emission Notice (APEN) Report*, Buildings 444, 445, 450, and 455, December 3, 1993.
- EG&G, Rocky Flats, Inc., 1994, *Soil Vapor Survey Report for the Operable Unit 2 Subsurface Interim Remedial Action*, January.
- EG&G, Rocky Flats, Inc., 1994, *Waste Stream and Residue and Characterization*, Building 444, Version 5.0, April 5, 1994.
- EG&G, Rocky Flats, Inc., 1995, *Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site, Volume II of the Sitewide Geoscience Characterization Study*, April.
- EPA, 1992, *Estimating Potential for Occurrence of DNAPL at Superfund Sites*, OSWER Publication 9355.4-07/FS.
- Illsley, C.T., *Environmental Analysis*, January 28, 1983.
- Kaiser-Hill (K-H), Inc., 1996, *Rocky Flats Environmental Technology Site Radiological Controls Manual*.
- Rains, W.A. and R.W. Hawley, 1955, *Problem 0008 - Building 444 Machine Coolant Treatment and Disposal - Final Report*, January.

Proposed Action Memorandum  
for the Source Removal at the Trench T-1 Site  
IHSS 108

Document Number:  
Revision: D  
Page:

**DRAFT**

RF/RMRS-97-????  
March 10, 1997  
33 of 33

Rocky Mountain Remediation Services (RMRS), 1996a, *Draft Trenches and Mound Site Characterization Report*, RF/ER-96-0044.UN, September.

RMRS, 1996b, *Results of the 1996 Pre-Remedial Investigation of the Mound Site*, RF/RMRS-96-0055.UN, September.

RMRS, 1996c, *Sampling and Analysis Plan to Support the Source Removal at the Mound Site*, IHSS 113, RF/RMRS-96-0060.

**Figure 2-1  
Mound and Trench T-1  
Borehole and Groundwater  
Well Location Map**

- EXPLANATION**
- Line of Hydrogeologic Cross Section
  - Contours (2' intervals)
  - IHSS Boundary
  - Central Avenue Ditch
  - Trench Boundary
  - Historical Trench T-1 East Boundary
  - Groundwater Well Locations  
(Note: TCE 0.016 - Tetrachloroethane at 0.016 mg/L)
  - Borehole Locations
  - Area to be excavated
- Standard Map Features**
- Buildings or other structures
  - Fences
  - Paved roads
  - Dirt roads

**DATA SOURCE:**  
Buildings, roads, and fences provided by  
Rocky Mountain Remediation Services, L.L.C.  
Contours provided by  
Hydrology provided by  
USGS (Data unknown)

**NOTE:**  
IHSS Boundaries are very general



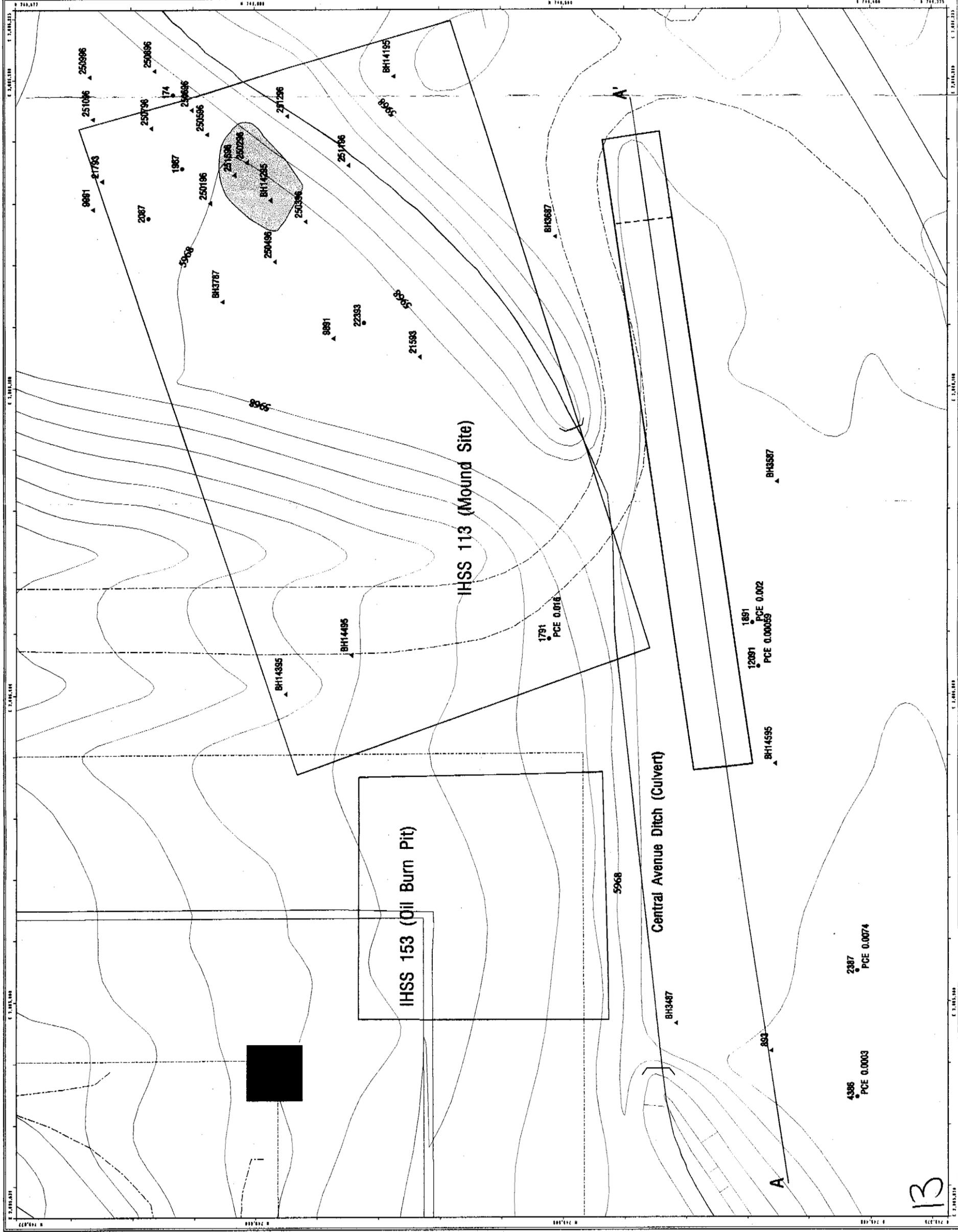
Scale = 1 : 370  
1 inch represents approximately 31 feet

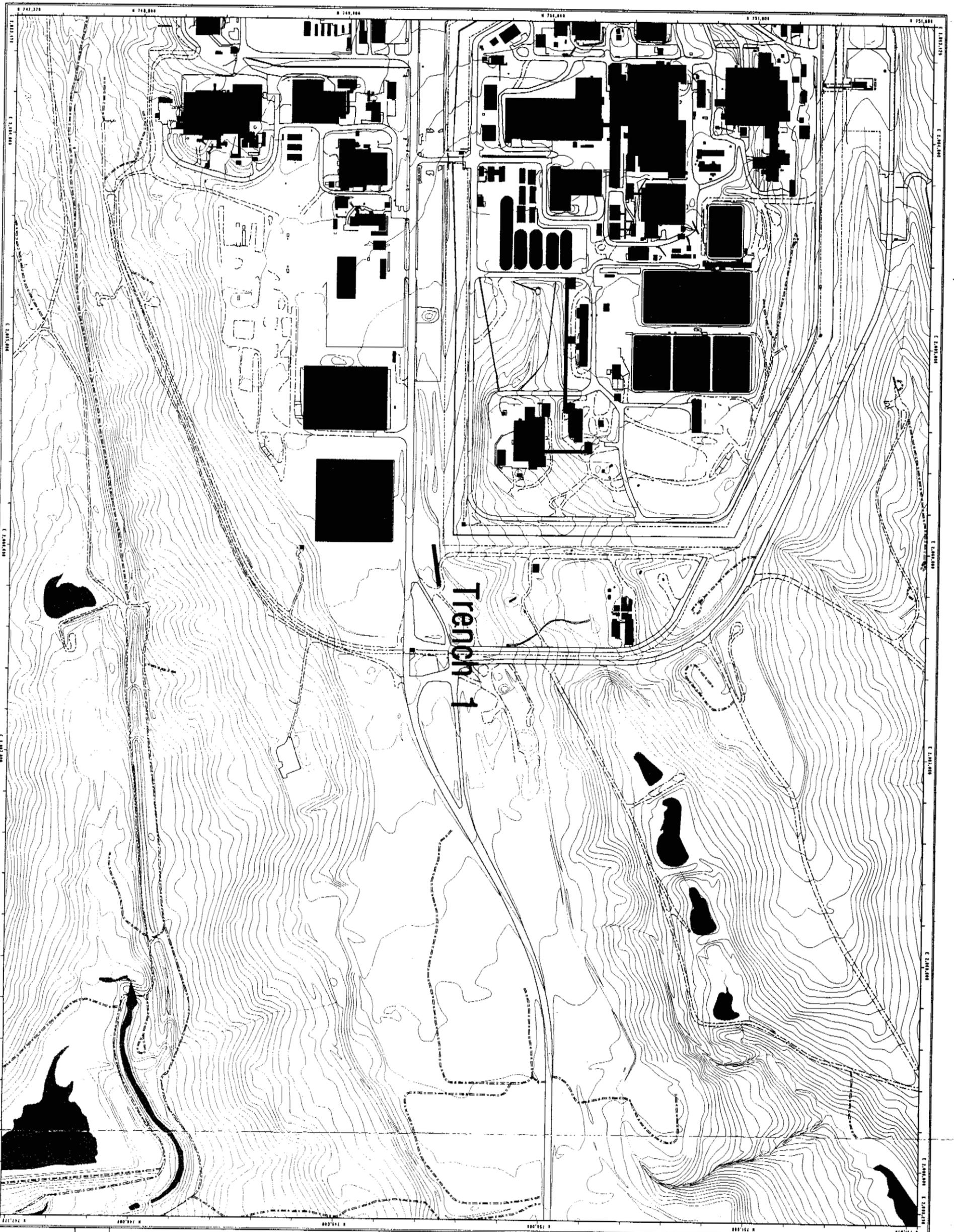
State Plane Coordinate Projection  
Central Zone  
Datum: NAD27

U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by:  
**RMRS**  
Rocky Mountain  
Remediation Services, L.L.C.  
Geographic Information Systems Group  
P.O. Box 10000  
Golden, CO 80602-0000

MAP ID: 97-0006  
March 10, 1997





**Figure 1-1**  
**Trench 1**  
**Site Location Map**

**EXPLANATION**

- Contours (5' intervals)
- Trench 1
- Standard Map Features**
- Buildings or other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Paved roads
- Dirt roads

DATA SOURCE:  
 Digital data and format provided by  
 Rocky Mountain Remediation Services, LLC  
 Hydrology provided by  
 OROG - Data referenced

**DRAFT**



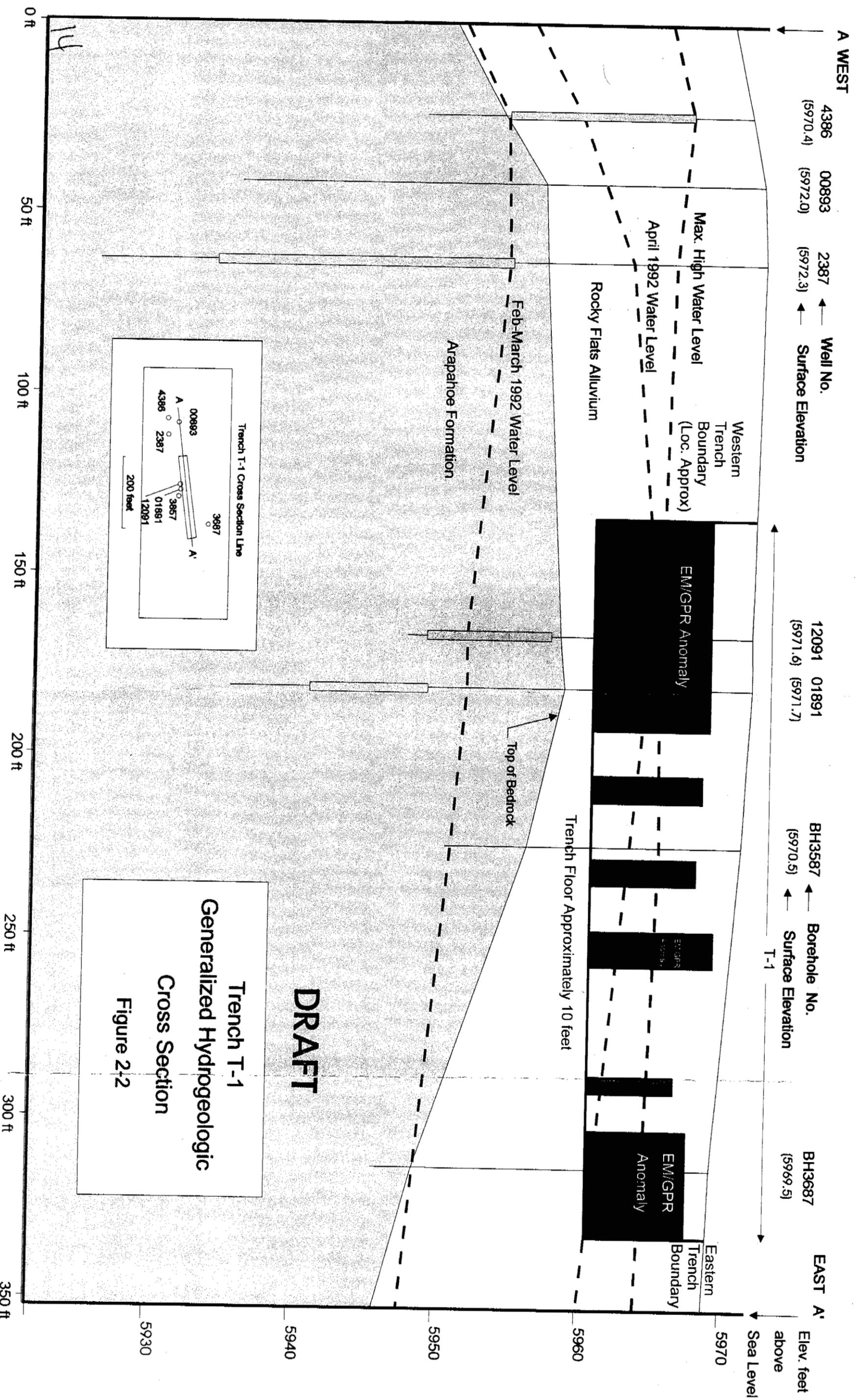
Scale = 1 : 6430  
 1 inch represents approximately 453 feet



State Plane Coordinate Projection  
 Colorado Central Zone  
 Datum: NAD27

U.S. Department of Energy  
 Rocky Flats Environmental Technology Site

Prepared by  
**RMRS**  
 Rocky Mountain Remediation Services, LLC  
 4600 South Environmental Technology Way  
 P.O. Box 441  
 Denver, CO 80222-0441  
 MAP ID: 87-0088  
 March 10, 1987



DRAFT

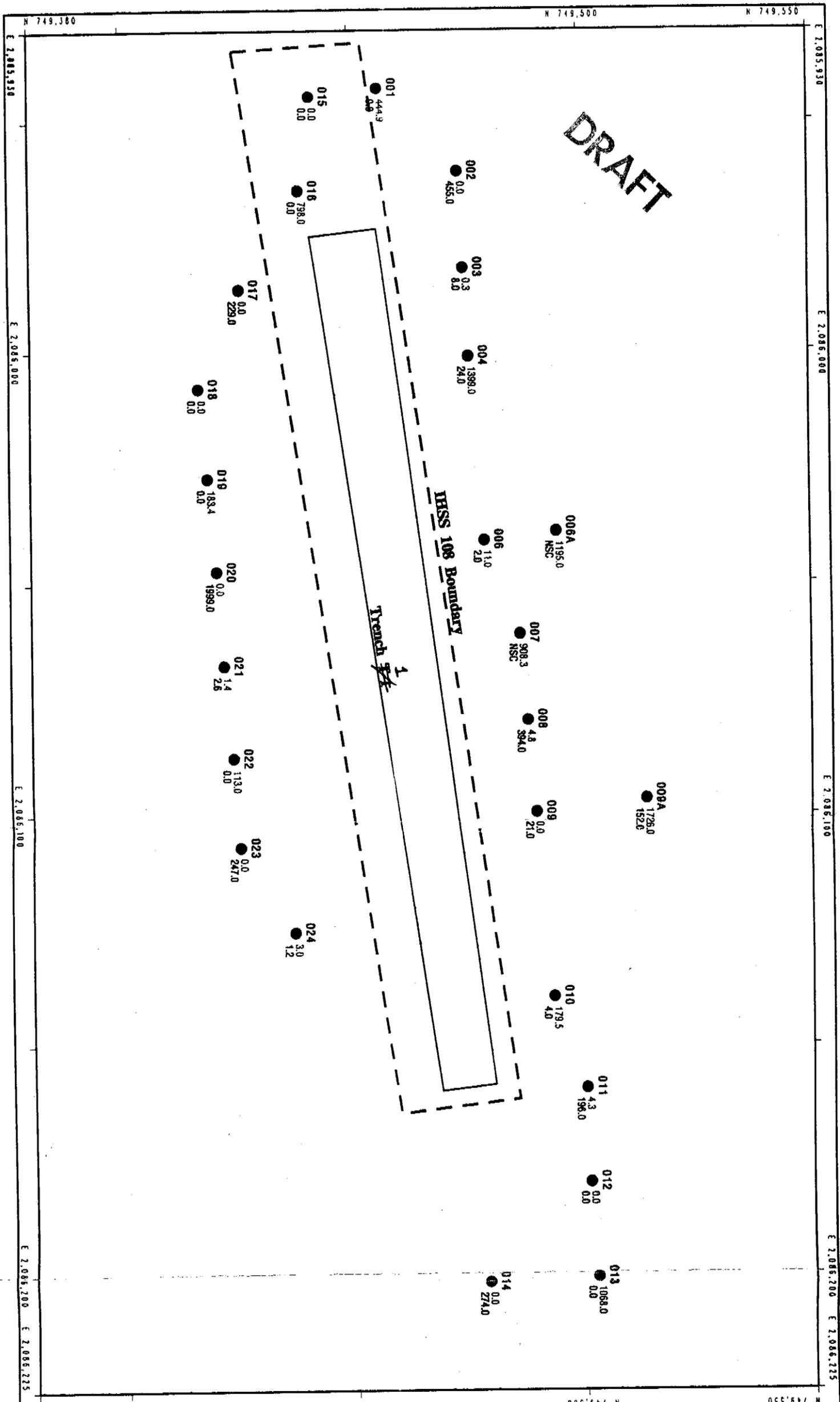


Figure 2-3  
Trench 1  
Soil Gas Survey  
Results

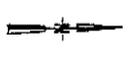
Soil Gas Results in ppm

- Soil Gas Locations

Example:  
15.6 - Depth 5 ft.  
44.6 - Depth 10 ft.  
NSC - No Sample Collected

— IHSS Boundary  
— Trench Boundary

DATE: 5/20/88  
BY: [illegible]  
FOR: [illegible]  
PROJECT: [illegible]



Scale = 1 : 275  
1 inch represents approximately 23 feet

State: [illegible]  
County: [illegible]  
District: [illegible]

U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Rocky Mountain Remediation Services, LLC  
10000 E. 1st Avenue, Suite 100  
Denver, CO 80231  
May 29, 1988