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FINAL
Proposed Action Memorandum for the Source Removal at the Mound Site IHSS 113

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FINAL PROPOSED ACTION MEMORANDUM FOR THE SOURCE REMOVAL AT THE MOUND SITE IHSS 113

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FINAL PROPOSED ACTION MEMORANDUM
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IHSS 113

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ACRONYMS

AHAs	Activity Hazard Analysis
ALF	Action Levels & Standards Framework
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
CSFS	Contaminated Soil Feed 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
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^3	Cubic Yards

1 0 PURPOSE

This Final Proposed Action Memorandum (PAM) outlines the approach that will be taken and the applicable requirements for the excavation and subsequent removal of volatile organic compounds (VOCs) from soil at the Rocky Flats Environmental Technology Site (RFETS), Individual Hazardous Substance Site (IHSS) 113 The IHSS 113 is also known as the Mound Site

This source removal is being conducted in accordance with the Final Rocky Flats Cleanup Agreement (RFCA [DOE, 1996]), and Federal, State, and local laws, as well as U S Department of Energy (DOE) Orders and RFETS policies and procedures The VOCs addressed by this action are Comprehensive Environmental Response Compensation and Liability Act (CERCLA) hazardous substances and Resource Conservation and Recovery Act (RCRA) hazardous waste constituents contained in an environmental media (soil) Removal and treatment of the hazardous substances at this site will mitigate a source of groundwater contamination in the area This action will be conducted in a manner which is protective of site workers, the public, and the environment

2 0 PROJECT DESCRIPTION

Between 1954 and 1958, drums containing uranium, beryllium, hydraulic oil, carbon tetrachloride and tetrachloroethylene (PCE) were stored at the Mound Site Records also indicate that some of the drums contained low levels of plutonium Prior to removal of the drums in 1970, some of the drums were known to have leaked, and the resulting contamination is impacting groundwater It is expected that approximately 400 to 1,000 cubic yards (yd^3) of soil are contaminated with VOCs above the Tier I subsurface action levels specified in Attachment 5, The Action Levels & Standards Framework for Surface Water, Ground Water, and Soils, of RFCA (DOE, 1996)

Under this proposed action, the contaminated soils will be removed from the Mound Site and processed using thermal desorption to remove the VOC contamination, a process used successfully at several similar sites at the RFETS At the conclusion of the project, the treated soil will be returned to the Mound Site and the area restored to a comparable undisturbed condition The intent of this source removal is to remove the VOC contaminants

of concern (COCs), that may leach into the groundwater The groundwater at the Mound Site will be addressed as part of the site groundwater management strategy

Information on site history, chemical and radiological contamination, geology, and hydrogeology of the Mound Site have been collected over many years and documented in various reports Information used to prepare this PAM has been taken from the *Rocky Flats Environmental Technology Site Historical Release Report for the Rocky Flats Plant* (DOE, 1992), the *Phase II RFI/RI Report for Operable Unit No 2* (DOE, 1995), the *Soil Vapor Survey Report for Operable Unit 2 Subsurface Interim Remedial Action* (EG&G, 1994), the *Draft Trenches and Mound Site Characterization Report* (RMRS, 1996a), and from *Results of the 1996 Pre-Remedial Investigation of the Mound Site* (RMRS, 1996b) The location of the Mound Site is shown in Figure 2-1

The cleanup targets used for determining the extent of excavation are the RFCA Tier I subsurface action levels, and are given in Section 3 2 1 The performance or treatment goals for the thermal desorption unit (TDU) have been established at levels that meet or are below the RCRA Treatment Standards For Hazardous Waste (6 Colorado Code of Regulations (CCR) 1007-3, 268 40) and at levels that meet or are below Tier I Subsurface Soil Action Levels (DOE, 1996) for the VOCs found in the Mound Site soils The TDU performance goals are given in Section 3 2 3

2 1 Background

The Mound Site is located north of Central Avenue, and east of the protected area (PA) fence Approximately 1,405 intact drums were placed at the Mound Site between April 1954 and September 1958 and covered with soil, thus generating a "mound" The drums originated from Building 444, Building 883, Building 771, and Building 776 The drums contained uranium and beryllium-contaminated lathe coolant (a mixture of approximately 70 percent hydraulic oil and 30 percent carbon tetrachloride) Historical information also indicates that some of the coolant contained plutonium In addition, some of the drums contained PCE, which has been found at high concentrations in monitoring wells and soil borings at the Mound Site

In 1970, all drums were removed from the Mound Site along with some radiologically contaminated soil Approximately 10 percent of the drums were thought to have holes at the time of removal Solid material was shipped offsite for disposal, while liquids were sent to

Building 774 for processing No airborne radiological contamination was detected during the drum removal Soil from the excavation was graded, and the excess was placed in the landfill

Recent characterization data indicates VOCs, predominantly PCE, have been detected in subsurface soils at levels requiring cleanup Records, however, do not exist of the volume of contaminants released to the soils at the Mound Site

2 2 Hydrogeologic Setting

The hydrogeologic setting (DOE, 1995, EG&G, 1994, RMRS, 1996a, and RMRS, 1996b) consists of 12 to 13 feet of Rocky Flats Alluvium (calcareous sandy gravel and clayey gravel) unconformably overlying claystone and sandstone of the Arapahoe Formation, which unconformably overlies the primarily massive claystone of the Laramie Formation The surface soils in the vicinity of the Mound Site were disturbed during the creation and removal of the Mound, construction of the PA 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 Mound Site are given in Figure 2-2 Groundwater seasonally ranges in depth from approximately 6 feet below ground surface to below the contact between the underlying Arapahoe Formation and the Rocky Flats Alluvium The bedrock water table, defined by wells completed in the Arapahoe Formation, ranges in depth from 15 to 20 feet below ground surface The groundwater flow direction in the Rocky Flats Alluvium is primarily to the north Seasonal recharge from the ground surface and the Central Avenue ditch causes groundwater to flow towards the north at a gradient of 0 011 ft/ft Mean hydraulic conductivities are 2 06 x 10^{-04} cm/s for the Rocky Flats Alluvium and 8 82 x 10^{-07} cm/s for the weathered claystone (EG&G, 1995) Volatile organic contaminants that may originate from the Mound Site are observed in downgradient monitoring wells and seeps Figure 2-3 depicts the generalized hydrogeologic cross section at the Mound Site

2 3 Mound Site Contamination Data Summary

A brief summary of the Mound Site characterization data is presented below (DOE, 1995, EG&G, 1994, RMRS, 1996a, and RMRS, 1996b) In May 1995, four boreholes were drilled at the Mound Site (RMRS, 1996a) to evaluate soil gas survey results from the previous year

(EG&G, 1994) During August 1996, sixteen boreholes were drilled for the purpose of characterizing and defining the extent of subsurface contamination (RMRS, 1996b) identified by the 1995 investigation In addition, seven monitoring wells and six boreholes have been drilled in the vicinity of the Mound Site during the past nine years The locations of these boreholes and wells are shown in Figure 2-2 Subsurface soil and groundwater contamination at the Mound Site are summarized below

2 3 1 Groundwater

Groundwater samples from upgradient wells (4386, 2387, 01791, 01891, and 12091) and downgradient wells (0174, 1987, 2087, 02191, and 02291), summarized in Tables 2-1 and 2-2, indicate an increase in PCE and trichloroethene (TCE) in the groundwater passing through the Mound Site These wells are screened in the Rocky Flats Alluvium and weathered claystone of the Arapahoe Formation (DOE, 1995) The presence of VOC contamination in the upgradient wells has been linked to the 903 Pad and other potential sources The increase in concentrations of PCE in the groundwater downgradient of the Mound Site indicates the site is a source of groundwater contamination The solubility of PCE is 150 mg/L (Cohen and Mercer, 1993) This contaminant was observed at a concentration of 528 mg/L in downgradient well 0174 This indicates the potential presence of a dense nonaqueous phase liquid, PCE product, in the source area (EPA, 1992)

TABLE 2-1
MOUND SITE UPGRADIENT GROUNDWATER SAMPLING RESULTS SUMMARY

Contaminant	Well 4386	Well 2387	Well 01791	Well 01891	Well 12091
PCE	0 0003	0 074	0 016	0 002	0 00059
TCE	<0 005	<0 005	0 001	<0 0002	0 0003

Note all concentrations are maximum observed concentrations and reported in mg/L

TABLE 2-2
MOUND SITE DOWNGRADIENT GROUNDWATER SAMPLING RESULTS SUMMARY

Contaminant	Well 0174	Well 02191	Well 02291	Well 1987	Well 2087
PCE	528	0 98	3 4	0 88	0 091 J
TCE	18	0 067	0 41	0 07	0 005

Note all concentrations are maximum observed concentrations and reported in mg/L, J= Analyte detected below method practical quantitation limit

2 3 2 Soil

Results from the Phase II RFI/RI investigations, soil gas surveys, and the 1995 and 1996 subsurface investigations of the Mound Site indicate the highest levels of soil contamination are observed in the northeast portion of the site (Figure 2-4) The primary contaminants found during previous soil investigations are PCE and methylene chloride both of which exceed the RFCA Tier I subsurface soil action levels However, results associated with methylene chloride have all had laboratory qualifier flags indicating blank contamination Therefore, methylene chloride may not be a contaminant at this site, but is included as a COC for completeness

Volatile Organic Compounds in Soil

Figures 2-3 and 2-4 show the extent of PCE contamination at the Mound Site Several subsurface soil samples collected from the surface to 20 feet in borehole 14295, exceeded the PCE Tier I subsurface soil action level specified in Table 3-1 These samples contained concentrations of PCE up to 760 mg/kg Borehole 250296 was observed with 160 mg/kg PCE at a depth of 5 1 to 5 5 feet Borehole 251696 was observed with 440 mg/kg PCE at a depth of 7 to 8 feet and 0 41 mg/kg PCE at a depth of 11 to 13 feet Figure 2-4 presents the PCE concentrations detected in the Mound Site boreholes Trichloroethene was not detected above the RFCA Tier I subsurface soil action levels in Mound Site boreholes

Polychlorinated Biphenyls in Soil

No polychlorinated biphenyls (PCBs) were detected above the RFCA subsurface soil action levels

Metals in Soil

Analyses for beryllium, a component of the material contained in drums previously stored at this site, indicated no detections above Tier I subsurface soil action levels In addition, no other metals were detected exceeding the RFCA Tier I subsurface soil action levels

Radionuclides in Soil

Thirty-three samples have been collected from the Mound Site and analyzed for radionuclide content As stated in RFCA, in order to account for the total dose from multiple radionuclides, the sum-of-ratios method must be applied to evaluate potential dose Further evaluation is triggered if the sum-of-ratios from multiple radionuclides, in the same sample, exceed a value of 1, using Tier I subsurface action levels Results of this evaluation indicate that the RFCA Tier I subsurface soil action levels for radionuclides were not exceeded for any of the thirty-three samples collected Therefore, remedial action for radionuclides was not triggered under RFCA As an indicator of the data, results of the highest radiological concentration sample is evaluated and presented in Table 2-3

TABLE 2-3
EVALUATION OF HIGHEST MOUND SITE SAMPLE RESULT TO TIER I SUM-OF-RATIO VALUE*

Radioisotope	Concentration (pCi/g)	Tier I Action Level (pCi/g)	Ratio
Uranium-233/234	18 41	1738	0 0106
Uranium-235	1 376	135	0 0102
Uranium-238	101 1	586	0 1725
Americium-241	0 3572	215	0 0017
Plutonium-239/240	1 905	1429	0 0013
Total Sum-of-Ratio			0 1963

* From borehole 14295, sample number BH20837WC

For the treated soil planned for return to the site, an additional evaluation of the radiological data was performed, where the sum-of-ratios was calculated from the 95% upper confidence limit (UCL) of the mean using the six samples collected within the proposed Mound Site

ere compared to the Tier I and Tier II subsurface action for both Tier I and Tier II were less than 1 Therefore, all ite is anticipated to be returned after treatment, without on However, for protection of the workers, the public, and itoring of the excavated soil will be performed in ological Controls Manual (K-H, 1996) Table 2-4 ed above

TABLE 2-4
UCL FOR THE MEANS AND SUM-OF-RATIOS ER I AND TIER II ACTION LEVELS

n	Standard Deviation (pCi/g)	95% UCL (pCi/g)	Tier I Ratio	Tier II Ratio
	7 43184	9 35588	0 00538	0 03047
	0 60013	0 72909	0 00540	0 03038
	40 00499	47 0687	0 08032	0 45698
	0 14715	0 19046	0 00089	0 00501
	0 78040	0 9955	0 00070	0 00395
			0 0927	0 52679

vill entail excavating soil contaminated with VOCs from the il using thermal desorption technology to remove the VOCs treated soil will be returned to the site and the area re-nducted in accordance with the RFCA guidelines, DOE

Orders, and RFETS policies and procedures The project will also utilize lessons learned from previous accelerated actions

3 1 Proposed Action Objectives

The objective of the accelerated action is to excavate and thermally treat VOC-contaminated soils from the Mound Site, thereby preventing further degradation of groundwater and to protect human health and the environment The subsurface soils at the Mound Site contain substantially higher concentrations of VOCs than the surrounding area This source removal will remediate one of the top ten IHSS sites at RFETS

3 2 Proposed Action

This action will involve excavating approximately 400 to 1,000 yd^3 of soil from the site using standard excavating equipment The soil will be temporarily stockpiled in the Contaminated Soil Feed Stockpile (CSFS), approximately 600 feet east of the Mound Site, in the area south of where the thermal desorption treatment equipment will be mobilized to process the soil (Figure 2-1) Contaminated soil will be treated using a low temperature thermal desorption remediation technology and stockpiled in the treated soil stockpile area Treated soil, upon attainment of TDU performance goals, will be backfilled into the excavation Reclamation of the treatment area and the excavation area will be performed to return these areas to improved natural conditions

3 2 1 Excavation

Conventional excavation techniques will be used to remove the contaminated soil at the Mound Site Excavation equipment will consist of a track-mounted excavator, backhoe, and/or front-end loader Contaminated soils will be moved in dump trucks or by similar transport to a staging area which is 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 Perimeter air monitoring for VOCs, particulates, and radioisotopes will be performed during excavation and transport activities

An organic vapor analyzer will be used as a field screening tool to guide excavation activities before collection of excavation verification samples Considering the bedrock and groundwater conditions, and the possible depth of dense nonaqueous phase liquid contamination at the Mound Site, the excavation will be limited to the highly weathered bedrock below the alluvial/bedrock contact This highly weathered bedrock is expected to be approximately two to three feet below the top of bedrock At the completion of excavation, samples will be collected for laboratory analyses, along the base and sides of the excavation, in accordance with the Sampling and Analysis Plan, to establish the post-action condition of the subsurface soil Further excavation and sampling will continue until the cleanup target levels listed in Table 3-1 have been met, or the limiting condition described above is met

Cleanup target levels used for the excavation activities are the RFCA Tier I subsurface soil action levels (DOE, 1996) for VOCs These action levels were incorporated to prevent any further degradation above the RFCA Tier I groundwater action levels (DOE, 1996) Table 3-1 lists the VOC cleanup target levels for excavation per RFCA (DOE, 1996)

TABLE 3-1
VOC CLEANUP TARGET LEVELS FOR EXCAVATION

Contaminant	Concentration (mg/kg)
Carbon Tetrachloride	11 0
Methylene Chloride	5 77
PCE	11 5
TCE	9 27

The VOCs listed in Table 3-1 are the COCs for the project This list was developed by assessing the existing analytical data from the site and by the use of process knowledge to ascertain what VOCs existed in the drums that were initially stored at the site If other VOCs are identified during excavation, the appropriate RFCA Tier I subsurface soil action levels for VOCs will be incorporated as cleanup target levels

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 action levels

Based on the site characterization data, the amount of recoverable free product (DNAPL) is expected to be minimal Free product (DNAPL), if present, is expected to remain in the soil when excavated and small lenses or pockets when disturbed during excavation will be immediately absorbed by surrounding soils Visibly stained areas of the excavation will be removed If a sufficient amount of recoverable free product (DNAPL) is encountered, the free product will be containerized, characterized, and disposed offsite

To minimize groundwater seepage, and to assist in trench-wall stability, efforts will be made prior to excavation to inhibit the seasonal rise in the water table around the Mound Site The Central Avenue Ditch running along the southern perimeter of the Mound Site is probably the primary cause of the local water-level fluctuation at the Mound Site Since this ditch is unlined, surface water may be recharging the groundwater at the Mound Site Also, as part of the Mound Site excavation, the northern wall of the Central Avenue ditch in the vicinity of the excavation will be removed, leaving a pathway for stormwater to run into the excavation Therefore, prior to excavation, an extension to the existing Central Avenue ditch culvert will be placed along the southern perimeter of the Mound Site This effort will minimize local groundwater recharge and greatly simplify subsequent excavation activities Surface water monitoring will be performed utilizing existing automated sampling stations onsite Storm water run-on and run-off around the excavation area will also be controlled

De-watering of incidental water encountered during excavation activities may be necessary due to seasonally high water tables If de-watering of the excavation is necessary, a field sump will be used to transfer the water into temporary storage container(s) onsite and evaluated per plant procedures for disposition If the incidental water requires treatment, the water will then 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

3 2 2 Staging of Contaminated Soil

Contaminated soil excavated from the Mound Site will be temporarily staged in a contaminated soil feed stockpile (CSFS) approximately 600 feet to the east of the Mound Site, 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 CSFS 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 stormwater Stormwater collected from this ditch may be used to control dust on soils awaiting treatment in the TDU or will be collected for onsite treatment at CWTF in Building 891 Perimeter air monitoring for VOCs, particulates, and radioisotopes will be performed during staging of soils in the CSFS Dust minimization will be performed during the staging of soils in the CSFS and a water-resistant tarpaulin or equivalent will be placed after daily stockpiling operations

After treating the stockpiled soil within the CSFS, any residual contaminated surface soil will be removed as necessary and treated by the TDU The criteria listed in Table 3-1 will be used to evaluate the soils beneath the CSFS The regulatory framework for the CSFS is described in Section 5 0

3 2 3 Treatment

A low-temperature TDU will be used to remove the VOCs from the contaminated soils in a non-destructive manner The TDU process heats and passes air through the soil to volatilize or "strip" the VOCs into the vapor phase Vacuum is applied to the soils which further enhances the VOC stripping process Depending on the specific thermal desorption vendor/unit selected, the treatment unit heats the soil to a temperature range between 120 and 700 degrees Fahrenheit No incineration or destruction of VOCs occurs in the TDU at these temperatures Perimeter air monitoring for VOCs, particulates, and radioisotopes will be performed around the site during treatment Dust minimization will be performed during the treatment and staging of soils in the treated soil stockpile A water-resistant tarpaulin or equivalent will be placed over the CSFS

The system will be equipped with a high-efficiency particulate air (HEPA) filter to minimize particulate emissions The off-gases will be captured and cooled in a condenser The

aqueous phase condensate will be removed from the condenser for further processing at the CWTF in Building 891 If organic phase liquids are recovered from the condenser, these liquids will be containerized for offsite disposal The regulatory framework for the TDU operation is described in Section 5 0

Following processing of soil through the TDU, the soil will be sampled and analyzed to verify that it meets the TDU Performance Goals Should the treated soil fail to meet the goals, the soil will be reprocessed at a minimum, until it reaches LDR levels (see Section 5 2 3) The treated soil will then be returned to the Mound Site and backfilled into the excavation The TDU Performance Goals for the COCs have been established at levels that meet or are below LDRs (see section 5 2 3) and at levels that meet or are below Tier 1 Subsurface Soil Action Levels (see Table 3-1) As a result, the TDU Performance Goals will provide additional risk reduction benefits The Performance Goals for the Mound Site COCs are listed in Table 3-2

TABLE 3-2
TDU PERFORMANCE GOALS

Contaminant	Concentration (mg/kg)
Carbon Tetrachloride	2 0
Methylene Chloride	5 77
PCE	6 0
TCE	4 0

3 2 4 Site Reclamation

At the completion of remediation activities, radiological surveys of the Mound 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 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 Site ecologists using approved seed mixtures

3 3 Worker Health and Safety

Due to the contaminants present at the Mound Site, this project falls under the scope of the Occupational Safety and Health Administration 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 cautions necessary to mitigate the hazards The AHAs will be included in the HASP

This project could expose workers to physical, chemical, and low levels of radiological hazards The physical hazards include those associated with excavation activities, use of heavy equipment, noise, heat stress, cold stress, and work on uneven surfaces Physical hazards will be mitigated by appropriate use of PPE, engineering, and administrative controls 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 contaminated soil (i e soil sampling or excavation personnel) Based on employee exposure evaluations, the Site Health and Safety Officer may downgrade personal protective equipment requirements, if appropriate The HASP details project "radiological hold points", such as radioactive levels in soil greater than three times background, encountering unexpected contaminated debris, or removable contamination above limits Radiation monitoring will be included in the HASP per the RFETS Radiological Controls Manual (K-H, 1996) If field conditions vary from the planned approach, an AHAs will be prepared for the existing circumstances and work will proceed according to the appropriate control measures Data and controls will be continually evaluated Field radiological screening will be conducted using radiological instruments appropriate to detect surface contamination and airborne radioactivity Perimeter monitoring for radionuclides using high volume air samplers, or equivalent, will be performed to monitor occupational worker exposure As required by 10 CFR 835, Radiation Protection of Occupational Workers, all applicable implementing procedures will be followed to insure protection of the workers, co-located workers, the public, and the environment The HASP describes the air

monitoring equipment to be used to monitor for VOCs, particulates, and radiation Finally, dust minimization techniques will be used to minimize suspension of contaminated soils

3 4 Waste Management

The soils processed in the TDU will be returned to the Mound Site after a determination that soils have attained the treatment performance goals, and unexpected levels of radionuclides were not encountered during field operations Additional sampling for radioisotopes will be performed if direct monitoring indicates that radionuclide are present above expected levels

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 Wastes identified as non-hazardous will be disposed at the landfill Wastes identified as hazardous or low level/low level-mixed will be stored in a permitted location onsite prior to shipment offsite 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 residual materials collected as part of the thermal treatment process, the aqueous and organic phase condensate, and the high efficiency particulate air (HEPA) filters, will be managed according to the knowledge of the process that generated the residual wastes, radiological screening, and, where appropriate, additional analytical characterization The aqueous phase condensate will be treated onsite at the CWTF, located in Building 891 If an organic phase condensate is recovered, this material will be packaged for offsite incineration The HEPA filters may contain low levels of radionuclides and will be managed onsite until they can be sent offsite to an approved disposal facility

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 considered and is not acceptable because it would result in no improvement to the contaminated groundwater and soil resources Air quality impacts are expected to be of short duration and of deminimus quantity, and will be mitigated by VOC emission controls on the thermal desorption unit and through dust control Surface water quality and wetlands impacts

are not anticipated Groundwater quality will be improved as a result of the action and only limited changes to groundwater flow would be expected given the small area excavated

The excavation and treatment areas have seen repeated disturbances over the past four decades This action is anticipated to have no indirect or irreversible and irretrievable impacts to natural resources at RFETS and ultimately the action will improve natural resources by removing a known groundwater contamination source Revegetation will mitigate any impacts caused by this action and the previous disturbances Any impacts to the soil's ability to support vegetation following excavation and treatment will be addressed Given the relatively small area of excavation and treatment, and the projects 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, and periodic surveys 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 been repeatedly disturbed, and soil and groundwater are currently contaminated with VOCs A net improvement in resource quality will occur and will be consistent with the both the short term and long term uses anticipated at the site Cumulative impacts will be extremely limited or nonexistent due to the projects short duration and the historically disturbed areas will be revegetated per guidance from RFETS ecologists In fact, historic impacts to soil and groundwater resources will be reduced

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) The Mound Site, the CSFS the TDU and Temporary Units 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)

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 Although air monitoring for VOCs may not be required, stack monitoring of emissions will be performed

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 modeling results, stack monitoring for radionuclides is not required, and hence will not be performed

5 1 2 Action Level Framework

The Tier I subsurface soil action levels for VOCs provided in the RFCA Action Level Framework were considered and adopted as the cleanup target levels for excavation (See Table 3-1)

5 2 ACTION-SPECIFIC REQUIREMENTS AND CONSIDERATIONS

The following action-specific requirements and considerations were evaluated specific to the source removal at the Mound Site

Identification and Listing of Hazardous Wastes
Remediation Waste
Land Disposal Restrictions
Contaminated Soil Feed Stockpile
RCRA Subpart P Thermal Treatment Unit

Temporary Unit Tank and Container Storage
VOC and Particulate Emission Controls

5 2 1 Identification and Listing of Hazardous Waste

Requirements governing the identification and listing of hazardous wastes are applicable to the source removal (See 6 CCR 1007-3, §261) Based upon process knowledge and characterization data specific to the Mound Site, the contaminated soil contains F001/F002 solvents that were released from the drums In addition, F001/F002 hazardous waste listings are applicable to the aqueous phase condensate

5 2 2 Remediation Waste

Remediation waste is defined as

> *all solid and hazardous wastes, and all media (including groundwater, surface water, soils and sediments) and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action (See §260 10)*

The definition of remediation waste is applicable to all wastes and media generated in conjunction with this action

5 2 3 Land Disposal Restrictions

If the F001/F002 soil is actively managed (i e , excavated and treated), the land disposal restrictions (LDRs) for the F001/F002 soil become applicable if "placement" of the remediation wastes in or on the land will occur (see §268 40) The TDU Performance Goals (see Table 3-2) were set at levels equal to or more stringent than LDRs As a result, the TDU Performance Goals will ensure that LDRs are attained and will provide additional risk reduction For reference purposes, the LDR for COCs are presented in Table 5-1

LDRs are applicable to the F001/F002 aqueous phase condensate generated during operation of the TDU When the condensate is transferred to the CWTF (Building 891) for treatment, RCRA is no longer applicable or relevant and appropriate because of the Wastewater

TABLE 5-1
LDRs FOR COCs

Contaminant	Concentration (mg/kg)
Carbon Tetrachloride	6 0
Methylene Chloride	30
PCE	6 0
TCE	6 0

Treatment Unit Exclusion (See §260 10 and §264 1[g][6]) The condensate will be analyzed and will meet the definition of "wastewater" outlined in the CDPHE "Policy on Wastewater Treatment Unit Exemption" dated June 25, 1991 The CWTF will treat the aqueous phase condensate to meet applicable surface water quality standards under a National Pollution Discharge Elimination System ARARs framework

5 2 4 Contaminated Soil Feed Stockpile

The CSFS will be located within the large area of contamination east of the plant site where waste management activites were historically conducted Details on the configuration and operation of the CSFS are provided in section 3 2 2 and the location is depicted on Figure 2-1 The movement and stockpiling of wastes within the area of contamination does not trigger LDRs (see 55 FR 8760) Table 5-2 identifies the RCRA requirements that were identified as relevant and appropriate to the CSFS

§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

TABLE 5-2
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 perform daily inspections of tanks, piping, ancillary equipment, and the CSFS during operations, and weekly inspections of containers as provided in the Field Implementation Plan
§264 16 - Personnel Training	Training requirements will be identified in the project Health and Safety Plan

5 2 5 RCRA Subpart P Thermal Treatment Unit

The use of a TDU to treat soil containing hazardous wastes requires a permit waiver For that reason the discussion in this section is being provided to satisfy ¶17 of RFCA

The substantive requirements found in RCRA §265 Subpart P are applicable to the thermal desorption activity, because thermal treatment will occur, but the thermal treatment will not be conducted as controlled combustion in an enclosed device (See §265 370)

If the unit is continuous feed, the thermal treatment process must be brought to normal operating temperature prior to commencing treatment (See §265 373) This is not a requirement if batch treatment is used The applicable waste analysis requirements are satisfied by the site characterization that has been performed and summarized in the PAM (See §265 375) Monitoring and inspections appropriate to the selected thermal desorption equipment will be conducted Included, as appropriate, are monitoring of instrumentation, observing stack emissions, and inspecting equipment (See §265 377) The performance criteria and the requirement to re-treat materials that do not meet the performance criteria will act in lieu of specific treatment conditions Closure requirements for the TDU are presented in section 5 2 7

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 For that reason the discussion in this section is being 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 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 thermal desorption, all containers will be compatible with the waste and be in good condition If practicable, secondary containment will be provided for liquid wastes stored in containers

For tanks, piping and ancillary equipment used in conjunction with the thermal desorption activity, secondary containment will be provided where practicable Where secondary containment is not practicable (e g , piping), the duration of operation, the low concentrations of hazardous constituents in the aqueous phase condensate, and the operator's continued presence during operations support an alternative requirement that does not include secondary containment Closure requirements for the TUs are presented in section 5 2 7

5 2 7 Closure Requirements

As noted earlier, the closure of the CSFS is described in section 3 2 2 The approach is to remove any residual soils which are above the cleanup target levels and to treat those soils to below the TDU Performance Goals Any associated materials (e g tarpaulin, plastic trench lining) will be managed in accordance with regulations and RFETS procedures

This discussion addresses the requirements necessary to meet the closure performance goals for the TDU (§265 381) and for the TU tanks and containers (§264 553(a))

Following the completion of contaminated soil processing, the aqueous phase condensate, and used HEPA filters will be removed from the TDU and ancillary equipment and disposed of properly The TDU and associated equipment, and any TU tanks and containers will then be decontaminated according to procedure number 4-SO-ENV-OPS-FO 04, Decontamination of Equipment at Decontamination Facilities Performance goals are included in that procedure Two 10,000 gal TU tanks used to contain condensate will be emptied after use However, it is not practical to close these tanks after completion of this task since these tanks will be used in future environmental restoration activity

The decontamination procedure requires project personnel to complete an "Equipment Decontamination/Wash Checklist and Record" sheet Project personnel must verify that equipment has been decontaminated to levels specified in the Health and Safety Practices Manual, Section 18 10, Radiological Material Transfer and Unrestricted Release of Property and Waste This procedure incorporates the radiological release criteria stated in Table 2-2 of the RFETS (Site) Radiological Controls Manual (K-H, 1996) Performing radiological decontamination to the levels specified in Table 2-2 will ensure that all other forms of contamination are similarly removed

Decontamination methods are described in procedure 4-SO-ENV-OPS-FO 04, referenced above Volumes of waste water generated during decontamination will depend on levels of contamination and the configuration of the vendor's thermal desorption unit All efforts will be made, however, to limit the amount of decontamination water generated

It is expected that any large scale decontamination will take place at the main decontamination facility located in the contractor's yard Efforts will be made to decontaminate equipment (e g the subcontractors TDU) sufficiently to allow reuse

5 2 8 VOC and Particulate Emission Controls

The Colorado Air Pollution Control Regulations require the application of reasonably available control technologies (RACT) to new sources of VOC emissions and to the disposal of VOCs by evaporation (5 CCR 1000-3, Regulation No 7, "Reg 7") VOCs will be emitted during soil excavation, transport, and thermal desorption Preliminary worst case calculations

estimate the total VOCs in the excavated soils at 1 2 tons Based on the low concentrations of VOCs in the soil, specific VOC control measures will not be employed during excavation and transport

The thermal desorption unit will use a condenser(s) to capture VOCs desorbed from the soil Appropriate control technologies to meet RACT requirements will be evaluated

Two other VOC work practice/equipment specifications in Reg 7 are also applicable Any gauging devices, anti-rotation devices, accesses, seals, hatches, roof drainage systems, support structures, or pressure relief valves associated with storage tanks that hold liquids containing VOCs will be maintained and operated to prevent detectable vapor loss The opening, actuation, or use of the listed devices will be limited to minimize vapor loss

In addition, Reg 7 requires that the transfer of any liquid containing VOCs to an tank, container, or vehicle compartment with a capacity exceeding 56 gallons be accomplished using submerged or bottom filling equipment to minimized splashing This requirement will potentially apply to dewatering of the excavation, as well as to the transfer of thermal desorption condensate

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 excavation of contaminated soils from the Mound Site is scheduled to commence during early spring of 1997 Treatment of the contaminated soils is scheduled to begin immediately after completion of the excavation activities during late spring of 1997 Data reduction and reporting efforts are scheduled to be completed by September of 1997 Any delays, scope, or budget changes may affect these dates

7 0 REFERENCES

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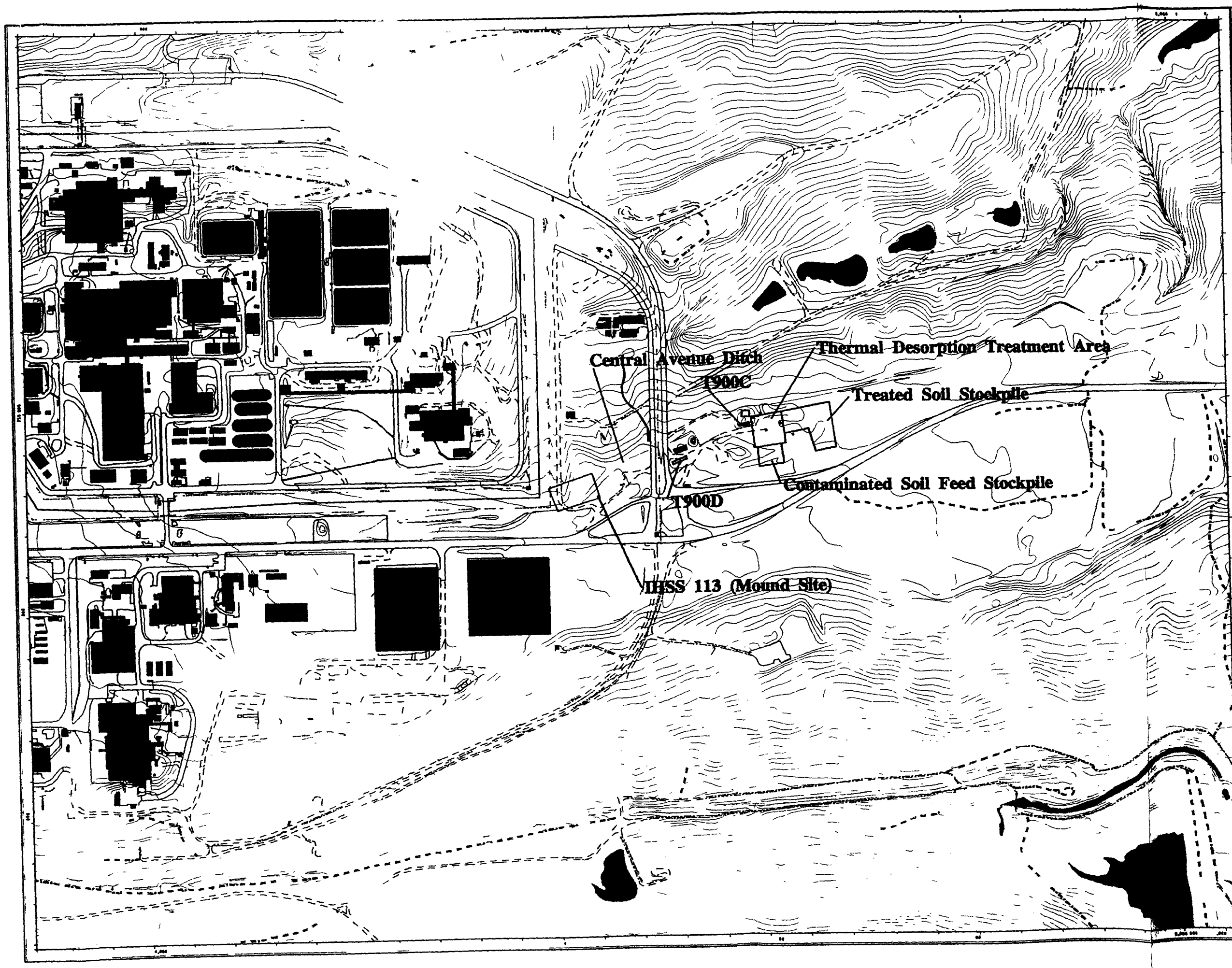
EPA, 1992, *Estimating Potential for Occurrence of DNAPL at Superfund Sites*, OSWER Publication 9355 4-07/FS

K-H, 1996, *Rocky Flats Environmental Technology Site Radiological Control Manual*, June



Mound Site Location Map

Figure 1 1

EXPLANATION

- Contours (5 Intervals)
- IHSS

Standard Map Features

- Buildings o other structures
- Lakes and ponds
- Streams, ditches or other drainage features
- Fences
- Paved roads
- Dirt roads

DATA SOURCE
Buildings, roads, and fences provided by Kaiser-Hill Co., 1997
Rocky Flats Plan, Inc. 1991
Hydrology provided by USGS (date unknown)

Scale 1:430
1 inch represents approximately 453 feet

0 200 400 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared for
RMRS Rocky Mountain Remediation Services, L.L.C.
Geographic Information System Group
Rocky Flats Environmental Technology Site
P.O. Box 464
Golden, CO 80402-0464

MAP ID: 97-0014

December 12, 1996

Mound Site Boring and Well Location Map

Figure 2-2

EXPLANATION

- Line of Hydrogeologic Cross Section
- Contours (5 intervals)
- IHSS
- Central Avenue Ditch
- Groundwater Well Locations (Note: Well 174 is abandoned)
- Borehole Locations
- Area to be excavated

Standard Map Features

- Buildings or other structures
- Fences
- Paved roads
- Dirt roads

Data sources:
Buildings, roads, and fences provided by Facilities Group, EG&G Rocky Flats, Inc. 1991.
Hydrology provided by USGS (date unknown)

IHSS 153 (Oil Burn Pit)

IHSS 113 (Mound Site)

IHSS 108 (Trench T 1)

A

A

2191
9991
21793
251096
250996
2087
250796
250896
174
1987
250696
250196
250596
BH3787
251696
250296
250496
BH14295
251296
250396
9891
251196
22393
BH14195
21593
BH14396
BH14495
BH3887
1791
BH3687
BH3487
893
12091
1891
BH14695
BH3587
4386
2387
1787
2079
20691
20591
1787A

Scale 1 : 430
1 inch represents approximately 36 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, L.L.C.
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Rocky Flats Environmental Technology Site
[illegible]
Golden, CO 80403-8404

MAP ID: 97-0014
February 06, 1997

MOUND SITE GENERALIZED HYDROGEOLOGIC CROSS SECTION

Figure 2 3

A

A'

1891

T 1(IHSS 108)

Trench T 1

3687

Mound Site (IHSS 113)

Central Avenue Ditch

251196

14295

251696

250596

250696

174

250896

251096

2191

5970

5960

5950

5940

Qrf

Qrf

Ka

220

760

550

320

0 6

0 2J

440

96

75

0.14J

5/94

from Well 1987 with 0.88 mg/L

3 3E/250D

5 4E/250D

5/74

528 mg/L

Dry 5/94

0.98 mg/L

5/94

0 002 mg/L

8/94

EXPLANATION

- Monitoring Well Screen Interval
- 8/94 — Water Level with Date of Measurement
- 0 6U — Concentration of Tetrachloroethene in Soil (reported in mg/Kg)
- 528 mg/L — Concentration of Tetrachloroethene in Water (reported in mg/L)
- Qrf — Rocky Flats Alluvium (Quaternary Age) (primarily clayey sandy gravel)
- Ka — Arapahoe Formation (Cretaceous Age) (primarily silty claystone)
- Bedrock Contact (dashed where inferred)
- Approximate Vertical Extent of PCE Contamination

Note All values are maximum reported concentrations for tetrachloroethene,
J=analyte was detected below method detection limit
D=dilution
E=estimated value
U=method detection limit

SCALE

Vertical 4ft, 0

Horizontal 40ft

10x Vertical Exaggeration

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by RMRS Rocky Mountain Remediation Services, L.L.C.

MAP ID: 97-0014

November 06, 1996

PCE Concentrations at Mound Site Boreholes

Figure 2-4

IHSS 113 (Mound Site)

EXPLANATION

- Contours (5 Intervals)
- IHSS
- Central Avenue Ditch
- Groundwater Well Locations
- Borehole Locations
  5-8/760
  5-8 = Sample Depth (ft)
  760 = PCE Concentration(mg/Kg)

Standard Map Features

- Buildings or other struct res
- Fences
- Paved roads
- Dirt roads

DATA SOURCE:
Buildings, roads, and fences provided by
Parsons ES,
2000 Family Data, Inc. 199
Hydrology provided by
USGS (Date unknown)

NOTE:
Meaning: analyte detected below method practical quantitation limit
D=dilution, E=estimated value, ND=analyte not detected
Method detection limit

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:
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MAP ID: 97-0014

February 05,