RFP-5196

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REMEDIAL ACTION PLANNING FOR TRENCH 1

CONF-980905--

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ABSTRACT

The accelerated action to remove the depleted uranium chips and associated soils and wastes from Trench 1 at the Rocky Flats Environmental Technology Site (RFETS) will begin in June 1998. To ensure that the remedial action is conducted safely, a rigorous and disciplined planning process was followed that incorporates the principles of Integrated Safety Management and Enhanced Work Planning. Critical to the success of the planning was early involvement of project staff (salaried and hourly) and associated technical support groups and disciplines. Feedback was and will continue to be solicited, and lessons learned incorporated to ensure the safe remediation of this site.

INTRODUCTION

An accelerated action for the excavation, segregation and treatment of Trench 1 (T-1) will begin in June 1998. This site is ranked fifth on the priority listing of Environmental Restoration cleanup sites at the RFETS, and is the largest buried source of radioactive contaminants at the RFETS. Due to the presence of potentially pyrophoric uranium, additional precautions have been taken during the planning stages to ensure that workers, the public, and the environment are protected during remediation activities.

To plan for the safe execution of the accelerated action, an approach was taken that incorporates the principles of Integrated Safety Management and Enhanced Work Planning. This approach relied heavily on involvement of workers, associated technical support groups and disciplines, as well as project staff during the planning phases. Feedback during the project, and experience from similar projects, was also solicited to ensure that lessons learned were incorporated, and that issues are resolved in a effective and efficient manner.

PROJECT DESCRIPTION

T-1 is located just northwest of the inner east gate approximately 40 feet south of the southeast corner of the Protected Area fence (Figure 1). The trench is estimated to be 250 feet long, 16 to 22 feet wide, and 10 feet deep. Historical documentation indicates depleted uranium metal chips (lathe and machine turnings along with floor sweepings) packed in lathe coolant were buried in the west end of T-1 in approximately 125 drums. The uranium chips and turnings were coated with a water-soluble lathe coolant during machining of parts. The drums were reportedly double stacked end-on-end in the trench and covered with two to five feet of soil. Burial of depleted uranium began in November 1954 and ended in December 1962. In addition to the drums, an estimated 1,000 to 1,500 cubic yards of associated radiologically contaminated soils, debris and other drummed wastes are also assumed to be located within the trench and will be excavated and treated as necessary.

The other wastes buried in T-1 include ten drums of cemented cyanide, one drum of still bottoms, copper, and uranium alloy. Trash and debris are expected in the center and east end of the trench. The still bottoms could consist of either the lathe coolant sludge discussed above or residual trichloroethene and tetrachloroethene waste and sludge generated from machined parts cleaning[1].

No intrusive activities were performed to characterize the trench contents due to the suspected presence of pyrophoric uranium. Instead, the trench was characterized by compiling historical data, conducting retiree and employee interviews, examining aerial photographs, and conducting electromagnetic, ground

DISCLAIMER

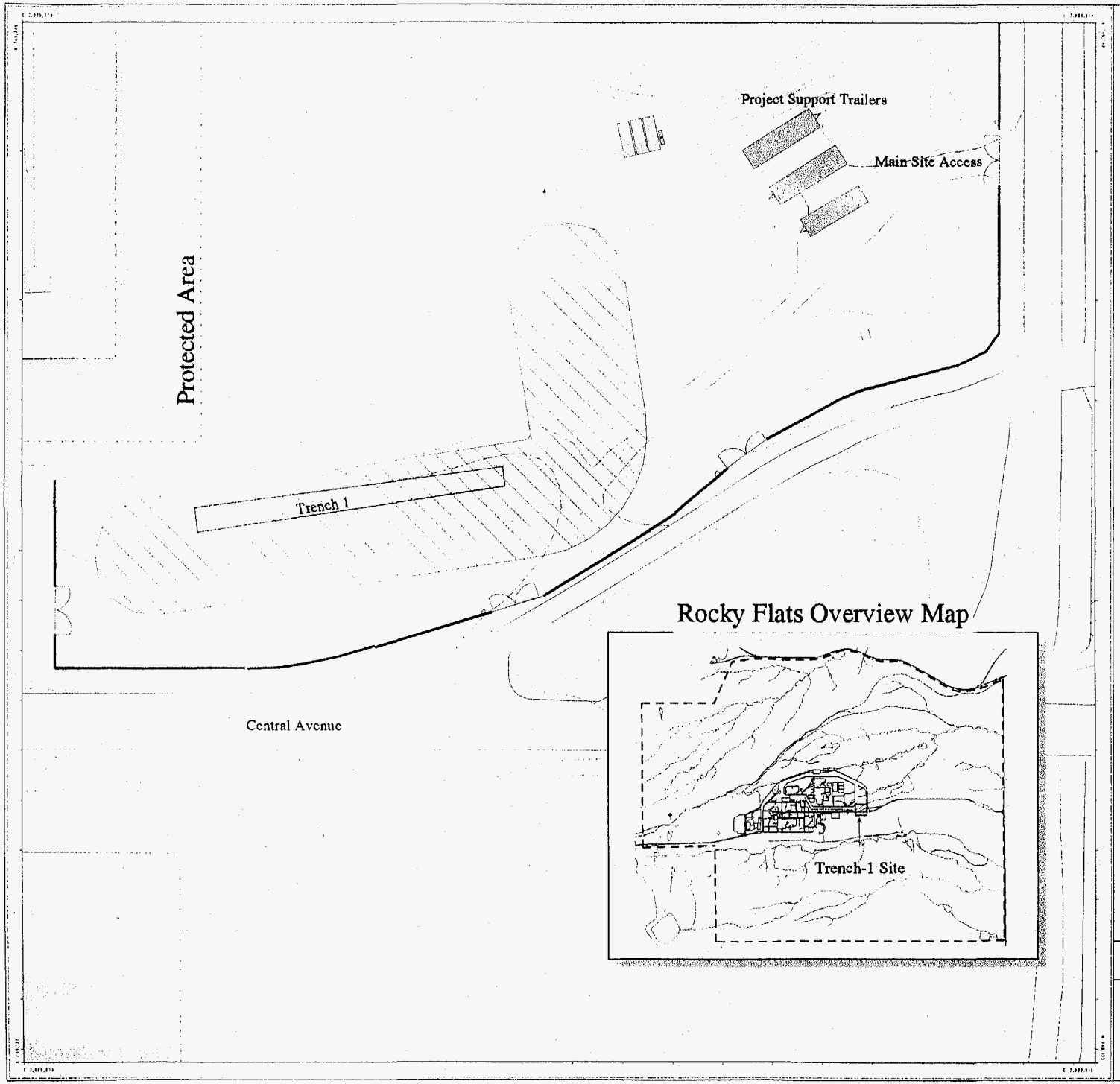

Figure 1
Trench 1 Site

EXPLANATION

2 Foot Contours

Safety Fence

Trench 1 Boundary

Weather Shelter

Standard Map Features

Buildings and other structures

Fences and other barriers

Paved roads

Dirt roads

DATA SOURCE:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the othophotographs. 1/95

Scale = 1 : 1030
1 inch represents approximately 86 feet

25 0 50 100 ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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penetrating radar, and soil gas surveys, and by using data from nearby wells and boreholes[2].

PROJECT PLANNING FOR HEALTH AND SAFETY

A rigorous planning process was followed to ensure the protection of workers, the public and the environment. Representatives of all support organizations, union craft, and project staff met regularly to develop the project planning documents. Input from personnel involved in previous, similar projects was solicited, and lessons learned from these projects were incorporated during the planning meetings.

Planning meetings were held weekly and included heavy equipment operators and laborers who previously worked on remedial actions at RFETS, radiological engineers, health and safety specialists, waste management specialists, and other project personnel. Subject matter experts attended as necessary to provide information on subjects such as uranium fire hazards, regulatory compliance, and air monitoring and emissions. The purpose of these meetings was to:

- Identify the scope of work to be performed including
  - Site preparation
  - Removal of waste and debris
  - Sampling, packaging and shipment of depleted uranium and depleted uranium mixed with soils offsite for treatment
  - Sampling, packaging and disposition of other wastes
  - Site reclamation
- Identify and analyze the hazards using
  - Enhanced work planning by multi-disciplinary teams
  - Hazard identification including chemical, industrial, radiological, fire and environmental hazards
  - Identification of equipment and personnel needs
- Identify Controls including
  - Engineering controls with control limits and expected values defined
  - Health and Safety Plans with activity hazard analyses and controls for each task
  - Auditable Safety Analyses to determine nuclear safety requirements
  - Personnel qualifications and training program
  - Field Implementation Plan
  - Pre-job briefings

In addition to the planning meetings outlined above, the Activity Control Envelope (ACE) process was used[3]. This process, which is primarily used for operations in nuclear facilities, was employed to develop the safety envelope for performing the T-1 remediation. The ACE process uses a team approach to prepare a detailed analysis of the tasks which will be performed to complete the project, and to rigorously evaluate the safety and radiological concerns for each task. For the T-1 project, the following were identified and developed:

- Task identification and development of detailed flow charts
- Bounding conditions of the project and for each task
- Standards and expectations for each task
- Detailed hazard assessments for each task
- Impediments to implementation
- Criteria used to determine readiness for each task.

All aspects of excavation, segregation and treatment of the materials buried in T-1 were extensively evaluated, including evaluation of fire hazard, and potential radiological and chemical exposures. The safety and radiological controls were identified for the safe handling of drums containing depleted uranium chips, which are in an unknown condition and configuration, as well as for all other anticipated waste materials. The appropriate methodology for dealing with unknowns was also identified and evaluated. In addition, the various anticipated waste streams were identified along with disposition requirements.

The ACE team members included individuals with varied training and backgrounds applicable to the T-1 project, such as subject matter experts on treating potentially pyrophoric depleted uranium, nuclear safety, health and safety, radiation control, excavation processes, waste handling and treatment. The following major activities were evaluated in detail, using subject matter experts and activity walkdowns:

- Material Excavation
- Material Segregation and Staging
- Packaging, Inerting and Sampling of Excavated Materials

As a result of this input, the project is expected to be safely completed. During implementation of the remedial action, data and safety controls will be continually evaluated. If field conditions vary from the planned approach, the situation will be evaluated to determine if

work can continue using the existing project controls. If not, the necessary work controls will be identified and put into place before proceeding. If necessary, additional activity hazard analyses will be prepared to address the new circumstances prior to work proceeding.

PROJECT APPROACH

Based on the results of these planning meetings, remediation of T-1 will consist of excavation of the drummed wastes and other materials in the trench, segregation of contaminated and uncontaminated soils and debris, and stabilization of the depleted uranium for offsite treatment and disposal. At the conclusion of the project, clean backfill and soils below cleanup levels will be returned to the T-1 excavation, other wastes will be dispositioned, and the area will be restored to a comparable undisturbed condition.

A temporary weather shelter was constructed over the T-1 site to provide protection from the elements, specifically wind and precipitation (Figure 1). The shelter is designed to withstand winds of 116 miles per hour. The panels extends 18 inches away from the shelter to divert precipitation away from the base. All excavation, soil stockpiles and inerting operations will be conducted within this structure. The shelter is free standing, and requires no internal supports, allowing use of the entire floor space. A ventilation system is in place to remove the exhaust from the heavy equipment. Quick shutdown buttons are position within the shelter at numerous locations to allow for emergency shutdown of the ventilation system. As a result of the analysis performed during the planning and ACE processes, the shelter will not operate as a sealed structure.

The peak of the shelter is translucent, allowing light to enter. Additional portable light towers are in place to ensure a well lit, working environment. The doors at the ends of the weather shelter offer relatively large openings for moving equipment and waste containers into and out of the structure. These doors also allow access by emergency vehicles if necessary. Personnel entry is through double and single width doors[3].

The remedial action will consist of excavating drums containing depleted uranium chips, the associated radiologically contaminated soils, and excavating the debris and associated potentially contaminated soils in the eastern two-thirds of the trench. Materials will be segregated as they are removed from the trench. Drums and decayed drums with depleted uranium chips will be inerted, then shipped offsite for treatment and disposal. Associated radiologically contaminated soils will be excavated, inerted if necessary, and staged for off-site disposal[1].

Cleanup target levels used for the excavation activities are based on the potential chemicals of concern for the project. Chemicals of concern were 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. The levels are the Rocky Flats Cleanup Agreement[4] (RFCA) action levels for radionuclides, and if encountered, volatile organic compounds (VOCs) and cyanide. Table 1 lists these cleanup target levels.

Soils will be segregated and stockpiled at the T-1 site. If sufficient volume of VOC-contaminated soils are present, these will later be treated using low temperature thermal desorption. After field instrumentation and visible inspection indicate that the contamination was removed from the trench, verification samples will be collected along the base and sides of the excavation to determine the post-action condition of the subsurface soils. If analytical results indicate that contamination is present above RFCA action levels, further excavation and sampling will continue until the clean-up target levels have been met, or the top of unweathered bedrock is reached. Excavation into the unweathered bedrock is not anticipated due to the difficulty of excavation, health and safety concerns for workers, and the decreased mobility of contaminants in this material[1].

Soil will be backfilled into the excavation if it is below RFCA action levels for VOCs and cyanide. Radionuclide contaminated soils will be returned to the excavation if based on the analytical data, the calculated value for the radionuclide sum-of-ratios meets the requirements specified in RFCA[4]. If not, this material will be stockpiled and staged for disposal. 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 used for the accelerated action activities will be reclaimed to return these areas to near-natural conditions[1].

Table 1. Cleanup Target and Putback* Levels for the T-1 Excavation

Contaminant	Activity or Concentration
Uranium (U-238)	586 pCi/g
Cyanide	154,000 mg/kg
Tetrachloroethene	11.5 mg/kg
Trichloroethene	9.27 mg/kg

* Putback levels are for VOCs and cyanide only

REFERENCES

1. RMRS, 1997, *Proposed Action Memorandum for the Source Removal at Trench , IHSS 108.* RF/RMRS-97-011.

2. 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.

3. RMRS, 1998, *Rocky Flats Environmental Technology Site, Activity Control Envelope for the Source Removal at Trench 1, IHSS 108.* RF/RMRS-98-224.UN.

4. DOE, 1996, *Final Rocky Flats Cleanup Agreement,* Rocky Flats Environmental Technology Site, Golden, CO.