

## **Appendix E**

### **Engineering Design File for the Decontamination of Rocks**

1. Project File No.: 020991 2. Project/Task: Waste Area Group 5 Remedial Design/Remedial Action-Phase 2

3. Subtask: N/A

4. Title: ARA-23 ROCK DECONTAMINATION

5. Summary: This EDF discusses the methods to clean and decontaminate the rocks from a large volume of contaminated soil in the Auxiliary Reactor Area (ARA) and Power Burst Facility (PBF) areas has been identified for removal and subsequent disposal at the proposed Idaho National Engineering and Environmental Laboratory (INEEL) CERCLA Disposal Facility. A small field study was performed to identify the nature of contamination. As a result of this study, it is recommended that cleaning and rad screening should not be performed because the porous nature of the rocks makes decontamination unlikely.

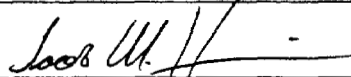
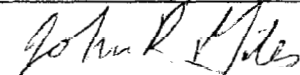

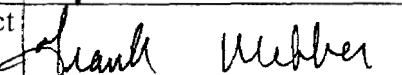
6. Distribution (complete package):

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Distribution (summary package only):

7. Review (R) and Approval (A) Signatures:

(Minimum reviews and approvals are listed. Additional reviews/approvals may be added.)

	R/A	Printed Name/Organization	Signature	Date
Performer	R	J. M. Harris/Engineering Specialists		12/8/2000
Independent Reviewer	R	J. R. Giles/Applied Geosciences		12/7/2000
Requestor	A	F. L. Webber/WAG 5 Project Department Manager		12/7/2000
Approver	A	F. L. Webber/WAG 5 Project Department Manager		12/7/2000

## 1.0 Introduction

A large volume, estimated at 39,298 m<sup>3</sup> (51,432 yd<sup>3</sup>), of contaminated soil and rocks at five Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites in the Auxiliary Reactor Area (ARA) and Power Burst Facility (PBF) areas have been identified for removal and subsequent disposal at the proposed Idaho National Engineering and Environmental Laboratory (INEEL) CERCLA Disposal Facility (ICDF). Specifically, these sites are: the ARA-I Chemical Evaporation Pond (ARA-01), the ARA-III Radioactive Waste Leach Pond (ARA-12), ARA-I and ARA-II Radiologically Contaminated Soils (ARA-23), ARA-I Soils Beneath the ARA-626 Hot Cells (ARA-25), and the Special Power Excursion Reactor Test No. 2 (SPERT-II) Leach Pond (PBF-16).

The Waste Area Group (WAG) 5 team identified early in the remedial design/remedial action (RD/RA) process that the amount of soil requiring disposal must be minimized in order to minimize costs and reduce the total volume of soils disposed at the ICDF. Additionally, the State of Idaho Department of Health and Welfare, Division of Environmental Quality noted with the signature of the Record of Decision (ROD) that U.S. Department of Energy (DOE-ID) minimize the volume of soils from ARA-23 that are sent to ICDF. Therefore, the RD/RA process for the five contaminated soil sites addressed in the Operable Unit (OU) 5-12 ROD will incorporate methods for minimizing the amount of soil material requiring disposal at ICDF.

A potential area for volume reduction and volume minimization will be in the handling of the large rocks at ARA-23 that are presently identified as contaminated with Cs-137 above the 23 pCi/g remedial action goal. There are approximately 2,217m<sup>3</sup> (2,900 yd<sup>3</sup>) of contaminated rock at ARA-23; however, it is generally accepted that the contamination associated with the rock is actually in the soil that partially covers and surrounds the rock.

The alternative to decontaminating the rock is removal and bulk disposal. If decontamination methods are not feasible, either physically or in terms of cost, then the rock will be removed and disposed at ICDF. The 2,217 m<sup>3</sup> (2,907 yd<sup>3</sup>) of rock material comprises only 6% of the total estimated WAG 5 volume. It should be noted that the volume of large rock encountered in the excavation of the other CERCLA sites will be excavated and dispositioned with the soils.

It is assumed that some rocks cannot be decontaminated below the 23 pCi/g remedial action goal. This means the decontamination method will generate two piles of rocks, contaminated and free released. The contaminated pile will be disposed at the ICDF with the ARA-23 soils. The free released pile can be used as rip rap or any other purpose. Described below are several methods to be considered for decontaminating the large rocks.

## 2.0 Methods

The purpose of each method discussed below is to remove the loose dirt on the surface of the rocks. Once disturbed, this loose dirt will remain in the ARA-23 to be dispositioned at the ICDF with the remainder of the ARA-23 soils.

### **2.1 Dry Slotted Bucket**

Using a front-end loader with a slotted bucket, pick up rocks and shake the bucket until much of the loose dirt has fallen off. Drive to a clean area and have a radcon tech screen the bucket with a hand-held sodium iodide detector. At the direction of the radcon tech, place the bucket of rocks into the contaminated pile or free released rock pile.

### **2.2 Wet Slotted Bucket**

Construct a large basin with a liner to catch water. Using a front-end loader with a slotted bucket, pick up rocks and shake the bucket until much of the loose dirt has fallen off. Drive to the large wash area and rinse the bucket of rocks with a low-pressure sprayer until water runs clean. Drive to a clean area and have a radcon tech screen the bucket with a hand-held sodium iodide detector. At the direction of the radcon tech, place the bucket of rocks into the contaminated pile or free released rock pile.

### **2.3 ShopVac with a Stiff Brush**

Using a front-end loader with a slotted bucket, pick up rocks and shake the bucket until much of the loose dirt has fallen off. Place the load of rocks on a rad free surface. Using a HEPA filter vacuum with a stiff brush attachment, scrub the dirt from the sides of the rocks. The contaminated dirt will be collected in the vacuum. Have a radcon tech screen the rock with a hand-held sodium iodide detector and at his direction place the bucket of rocks into the contaminated pile or free released rock pile.

### **2.4 High Pressure Water**

Excavate a large basin and install a water-tight liner. Using a front-end loader with a slotted bucket, pick up rocks and shake the bucket until much of the loose dirt has fallen off. Drive to the large wash area place the rocks on the liner. Using a high-pressure sprayer, wash the soil off the surface of the rocks until water runs clean. Have a radcon tech survey the rocks with a hand-held sodium iodide detector. Pick up the rocks from the liner with the slotted bucket and, at the direction of the radcon tech, place the bucket of rocks into the contaminated pile or free released rock pile.

### **3.0 Conclusions**

In August 2000, a radcon tech performed a survey of the ARA-23 rock pile. The majority of the rocks are in piles consistent with the dumping of a truck however, there are also loose rocks between the piles. The survey included selecting many individual rocks from levels ranging from the tops of the piles to partially buried in the ground. The rad measurements were taken with a sodium iodide scintillator. Approximately 90% of all rocks from the tops of the piles were free of rad contamination. All rocks taken from the ground surface were rad contaminated. The apparent trend was rocks that had visible dirt were contaminated, and rocks with no visible dirt were not contaminated. The porous nature of these rocks would make decontamination difficult or impossible.

Due to the small volume of rocks that could be cleaned or sorted compared to the total waste volume, it is recommended the rocks should be excavated and disposed of with the surrounding and underlying contaminated soil.