SITEWIDE SOIL AND DEBRIS MANAGEMENT PROGRAM
FOR A DOE SITE UNDER REMEDIATION

BY
BRENT F. HARVEY, P.E. et al
PARSONS ENVIRONMENTAL SERVICES, INC.
6120 S. GILMORE ROAD
FAIRFIELD, OHIO 45014

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Fernald Environmental Restoration Management Corporation*
P.O. Box 398704
Cincinnati, Ohio 45239-8704

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Introduction

In 1986, the United States Department of Energy (DOE) and the United States Environmental Protection Agency (US EPA) entered into a Federal Facility Compliance Agreement (FFCA). The agreement included provisions to investigate and define the nature and extent of contamination and to determine the necessity for remediation at the Fernald Environmental Management Project (FEMP) near Cincinnati, Ohio. The agreement is also pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Uranium enrichment production activities at the facility ceased in 1989. The FEMP mission is now environmental clean-up and remediation under the management of the Fernald Environmental Restoration Management Corporation.

The provisions of the 1986 FFCA relating to Remedial Investigation/Feasibility Studies and remedial actions were amended in 1990 with the signing of a Consent Agreement under CERCLA Sections 120 and 106(a). The Consent Agreement also identified five Operable Units (OUs). An Amended Consent Agreement (1991) specified several added removal actions that would be undertaken by the FEMP. A removal action is an action that is performed prior to the issuance of a Record of Decision (ROD) to address an immediate release or threat of a release at a CERCLA site. Removal Action 17 required improvement of the storage of contaminated soil and debris for the protection of site workers and the public. Soil and debris were being accumulated on site in open piles since storage/disposal capacity was limited. The final disposition of these materials is part of the ongoing remediation efforts. The open piles were located in areas which were as unobtrusive and controllable as possible. However, these open piles were exposed to the weather which may cause the release of contaminants to the environment. The exposure pathways that were most significant include the inhalation of suspended particles and direct external radiation exposure. The primary potential contaminant receptors are site workers. However, wind- and water-dispersed contaminants could migrate off site and result in exposure to the general public.

Various types of contaminated soil and debris have been, and will continue to be, generated and managed as a result of removal and remedial actions, construction projects, and maintenance activities. PARSONS Environmental Services, Inc., developed a sitewide soil and debris management plan as a component of the Removal Action Work Plan. The list of Applicable or Relevant and Appropriate Requirements (ARARS) for this project is extensive and includes the Resource Conservation and Recovery Act (RCRA) regulations. The RCRA program at the FEMP is administered under a separate Consent Decree between the DOE and the Ohio Environmental Protection Agency. The soil and debris management plan was prepared to integrate RCRA, the Toxic Substances Control Act (TSCA) and CERCLA since some soil and debris materials contain hazardous waste constituents, asbestos and/or Polychlorinated Biphenyls (PCBs). Integration will eliminate duplication of effort, thereby resulting in lower cost and higher efficiencies in managing soil and debris.

The goal of the Removal Action is to prepare a sitewide soil and debris management plan, and to construct improved storage facilities to manage soil and debris generated from removal and remedial actions, closures, construction projects, and emergency maintenance activities until remediation/disposal facilities are designed and constructed in accordance with the CERCLA RODs. Specific objectives of
the removal action include:

1) Minimize the potential for contaminant migration release from soil and debris to the environment
2) Contribute to efficient performance of interim response actions and other FEMP activities
3) Support the future implementation of the final remediation activities
4) Minimize soil and debris waste volumes requiring storage
5) Comply with Federal and State ARARs to the maximum extent practicable

Management Plan

Soil and Debris Contaminants and Definitions

Soil and debris at the FEMP are contaminated with radiological, hazardous, mixed (radiological and hazardous constituents), petroleum, PCB, and asbestos constituents. Uranium is the primary contaminant at the FEMP. The FEMP will minimize the generation of waste by returning excavated soil to its source (where applicable) and decontaminating and re-using/disposing debris (where applicable). The Removal Action Work Plan also addresses excess materials that can not be re-used as backfill and cannot be decontaminated for re-use or disposal. Soil that is contaminated with constituents other than PCBs or petroleum wastes can be placed back into the excavation provided that there exists adequate capacity. The return of soil (not containing PCB or petroleum contamination) to the excavation of its origin as backfill reduces the amount of clean backfill that is brought on site and mixed with contaminated soils. This will reduce waste generation, because clean backfill will require treatment/disposal after it is mixed with contaminated soils.

The FEMP may establish an area of contamination (AOC) in the event that a large quantity of soil containing hazardous waste is excavated. The AOC concept is presented in the US EPA Superfund Land Disposal Restriction (LDR) guides and the National Contingency Plan preamble (55 FR 8758 and 8760). The AOC will be delineated by contiguous contamination with respect to contaminants and concentrations. The establishment of an AOC will enable the FEMP to return excess soil from that AOC, back into an excavation within that AOC, without constituting placement and invoking the RCRA LDR regulations. The AOC can be considered a mini soil management area within a larger Operable Unit.

Improved Storage Disposition Determination

A contaminant assessment will be performed on excess soil and debris materials to determine where they will be dispositioned for improved storage. The contaminant assessment will begin prior to initiating field activities by reviewing existing analytical data (Remedial Investigation characterization results, RCRA waste determinations, and environmental monitoring results), historical facility information, and/or process knowledge to determine constituents of concern and concentrations of contaminants. If adequate data exists to complete a material evaluation, then the disposition assessment can be completed prior to field activities. If adequate existing information does not exist to complete the material evaluation, then excess soil and debris material will be temporarily stockpiled under tarps at the construction site until samples can be analyzed to complete the disposition assessment.

Table I provides the approved storage disposition limits that were developed for soil and debris specifically for the Removal Action period prior to the issuance of the RODs. Therefore, the values are not final clean-up standards. Radiologically contaminated soils that contain activity concentrations that
exceed 100 pCi/g total uranium; contain total thorium at activity concentrations that exceed 50 pCi/g; or contain total radium at activity concentrations that exceed 5 pCi/g will be dispositioned for improved storage. Excess soil that has a total uranium activity concentration that is less than 100 pCi/g, and does not contain thorium, radium, or other nonradiological regulated (including hazardous) waste materials at concentrations that exceed disposition limits, will be placed on controlled stockpiles.

Table I
EPA Approved Storage Disposition Limits

<table>
<thead>
<tr>
<th>Material</th>
<th>Disposition Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uranium*</td>
<td>100 pCi/g</td>
</tr>
<tr>
<td>Thorium*</td>
<td>50 pCi/g</td>
</tr>
<tr>
<td>Radium*</td>
<td>5 pCi/g</td>
</tr>
<tr>
<td>Hazardous</td>
<td>Hazardous waste per 40 CFR 261</td>
</tr>
<tr>
<td>Mixed</td>
<td>Presence of mixed waste</td>
</tr>
<tr>
<td>PCB</td>
<td>2 ppm per Fernald Environmental Management Project Sitewide Quality Assurance Project Plan (April 27, 1993)</td>
</tr>
<tr>
<td>UST</td>
<td>Petroleum waste per Ohio Administrative Code (OAC) 1301:7</td>
</tr>
<tr>
<td>Asbestos</td>
<td>Asbestos waste per OAC 3745-20</td>
</tr>
</tbody>
</table>

*Noted limits apply to the total of all isotopes.

Each OU will have a controlled stockpile for the disposition of soil that does not contain radiological or other regulated waste materials at concentrations higher than those specified on Table I. Controlled stockpiles will be outdoor piles that are seeded and have drainage controls. Excess soil dispositioned to storage on controlled stockpiles may be used as backfill within the OU from which it originated. This will also help to minimize the amount of clean soils that are brought into contaminated areas as backfill that will then require remediation during the future remedial action period.

When debris is generated, the FEMP will perform the contaminant assessment to determine whether the materials can be decontaminated, sent off site for disposal, or require storage in an improved storage facility. The approved sitewide soil and debris management plan addresses the free release of debris. Debris that are successfully decontaminated and determined to be clean with respect to criteria established by 40 CFR 268.45 (hazardous debris), 40 CFR 192, NRC Regulatory Guide 1.86, and DOE Order 5400.5 for radioactivity, and do not contain hazardous wastes, petroleum products, PCBs, or asbestos will be free released for recycle/re-use.
**Improved Storage Facilities**

PARSONS Environmental Services Inc. is designing improved storage facilities to store excess soil and debris that exceed the disposition limits for controlled stockpiles (soil) and free-release criteria for recycle/re-use or disposal (debris). Tension support structures were selected for the improved storage facilities for the following reasons:

1) Cost effectiveness  
2) Structures are temporary  
3) Structures are easy to decontaminate and dismantle  
4) Structure components may be re-used

Tension support structures are buildings constructed from metallic arch frames covered by PVC-coated polyester fabric. Excess debris will be bulk stored on a concrete pad under a tension support structure.

A specially designed tension support structure is being constructed pursuant to the regulation for the storage of soil and debris that contain hazardous wastes. The improved storage facility is designed to meet the requirements of a "containment building" that is introduced in 40 CFR 264 Subpart DD without constituting land placement and invoking RCRA LDR regulations. Figure I provides a floor plan of the "containment building." Figure II provides a cross section of the subsurface secondary containment system which is required for "containment buildings" that have the potential to store or treat hazardous materials containing free liquids. Soils will be dispositioned in bulk to segregated storage bays based on contaminant types. Segregated bulk storage is technically sound to prevent cross-contamination, and because the final remedial alternative for treatment/disposal may be different for specific contaminant types.

**Management Plan Implementation**

The sitewide soil and debris management plan will be implemented in two phases. The first phase provides for improved storage during the design and construction of the improved storage structures. Table II provides a summary of the disposition requirements during the first phase of the soil and debris management plan.

**Table II**  
**Phase I Disposition Requirements**

- Soils less than disposition limits are placed on controlled stockpiles  
- Soils greater than disposition limits are tarped for future transport to storage  
- Debris less than disposition limits will be free-released (if possible)  
- Debris greater than disposition limits will be containerized, tarped, or shipped for off-site disposal
The second phase will begin when the improved storage facilities are constructed, and will remain in effect until the final remediation treatment/disposal operations commence. Table III provides a summary of the disposition requirements during the second phase of the sitewide soil and debris management plan.

Table III
Phase II Disposition Requirements

- Soils less than disposition limits are placed on controlled stockpiles
- Soils greater than disposition limits will be stored in Improved Storage Structures
- Debris less than disposition limits will be free-released (if possible)
- Debris greater than disposition limits will be stored in Improved Storage Facilities

The plan also specifies a procedure for emergency maintenance actions. The approved strategy for emergency maintenance actions consists of performing the action without initiating the contaminant assessment, and returning the soil to the excavation immediately upon maintenance completion. Excess soil will be stockpiled adjacent to the repair site. This material will be dispositioned according to the results of a contaminant assessment and material evaluation.

Finally, the plan specifies a build-over policy to minimize the amount of soil excavated during a construction project. The build-over policy depends on whether a facility is temporary or permanent. Temporary facilities are defined as those that will be removed during or following site remediation activities. Construction of temporary facilities does not require the removal of contamination before or during facility construction (i.e. contaminated soil may be used for backfill). Permanent facilities are defined as those that will remain after completion of the final remedial action. Construction of permanent facilities will require the removal of any contaminated soil under the facility before or during construction.

Conclusion

The approved FEMP sitewide management plan for soil and debris that are generated prior to the ROD's specifying final remediation treatment/disposal requirements is a compromise for maximizing the FEMP operating flexibility, while assuring that excess materials are stored at a low risk to human health and the environment. The ability to place contaminated soil back into the excavation and use soil from a controlled stockpile as backfill within the OU of origin will reduce the amount of clean backfill that is brought into the contaminated area that may also require treatment/disposal during the remedial period. The potential for dispositioning excess soil and debris based on a historical contaminant assessment will save the expense of full Hazardous Substance List Analysis. The improved storage facilities provide a cost effective means of temporary material storage. The approved FEMP soil and debris management plan may be useful to other DOE sites that need to manage soil and debris prior to treatment/disposal.
References

1. DOE Order 5400.5, "Radiation Protection of the Public and the Environment."


Figure 1
Improved Storage Facility Floor Plan
Figure II
Subsurface Secondary Containment System Cross-Section