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INTEGRATING REMOVAL ACTIONS AND REMEDIAL ACTIONS - SOIL AND DEBRIS MANAGEMENT AT THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

by

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ABSTRACT

Since 1991, excess soil and debris generated at the Fernald Environmental Management Project (FEMP) have been managed in accordance with the principles contained in a programmatic Removal Action (RvA) Work Plan (WP). This plan provides a sitewide management concept and implementation strategy for improved storage and management of excess soil and debris over the period required to design and construct improved storage facilities. These management principles, however, are no longer consistent with the directions in approved and draft Records of Decision (RODs) and anticipated in draft RODs other decision documents. A new approach has been taken to foster improved management techniques for soil and debris that can be readily incorporated into remedial design/remedial action plans.

In accordance with proposed and selected remedies, the Removal Action Work Plan has been revised to update the soil and debris management approach to recognize recent decisions under the FEMP's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process. This paper describes the methods that were applied to address the issues associated with keeping the components of the new work plan field implementable and flexible; this is especially important as remedial design is either in its initial stages or has not been started and final remediation options could not be precluded. A sitewide interim policy that will allow each of the five operable units (OUs) to conduct remedial actions consistent with the respective RODs, yet achieve a consistent methodology for soil and debris management, has been developed in the Revised Work Plan. Under the revised work plan, remedial activities can proceed in advance of the remedial design under the auspices of the removal action; the removal action work plan can subsequently be integrated into the remedial design.

This paper finally identifies applications and lessons learned that evolved from the process of developing the revised removal action work plan, and provides general examples of how other facilities can benefit from this approach.

BACKGROUND

Since production operations at the Fernald site were halted in 1989, removal actions have successfully been used to address threats from the facilities, structures, and contaminants that remain. These actions have been implemented as interim measures until the final remedial actions can fully mitigate the impacts to human health and the environment associated with site contaminants. As an example, Removal Action No. 17 (RvA 17), which is programmatic in nature, was initiated to provide controlled storage of excess contaminated soils and debris generated during maintenance, construction, and removal actions at the FEMP. Specifically, it established procedures for the management and storage of soil and debris.

In establishing the procedures, thresholds were established for managing the soil in distinct piles. These initial thresholds were:

- Category I Radiologically Contaminated Soils
  - ≤100 pCi/g total uranium (U)
  - ≤5 pCi/g total radium (Ra)
  - ≤50 pCi/g total thorium (Th)
  - No Resource Conservation and Recovery Act (RCRA) hazardous waste or polychlorinated biphenyl (PCBs) contamination

- Category II Radiologically Contaminated Soils
  - >100 pCi/g total U
  - >5 pCi/g total Ra
  - >50 pCi/g total Th

Category I soils could be stored in stockpiles that were covered with tarpaulins. Category II soils could be stored in stockpiles that were placed on tarpaulins and also covered with tarpaulins. Soils containing hazardous waste or PCBs were to be containerized and placed in approved storage. The area of contiguous contamination (AOC) concept that is employed under CERCLA was incorporated into the work plan such that each operable unit was to maintain its own stockpiles.

RvA 17 was to be conducted in two phases. In Phase I, the stockpiles were to be established in accordance with the above thresholds and were to remain in existence until new storage facilities could be constructed under Phase II. Once the new storage facilities were in place, the soil would be moved into them until final disposition decisions were made.

<u>WHY CHANGE?</u>
Since the implementation of RvA 17, several events have occurred. First, with the concurrence of the regulatory agencies, the FEMP determined that new storage facilities were not needed. The ability to dispose of some debris under the Record of Decision for Interim Remedial Action for OU3 (former production area decontamination and dismantling [D&D]) coupled with projected increases in storage capacity resulting from completion of facility D&D projects and accelerated shipments of existing and legacy wastes resulted in a reduction of scope for RvA 17 activities. Second, the RODs for each of the OUs have either been issued or are to be issued within the near term. Most notably, the ROD for OU2 (other waste units, including flyash piles, lime sludge ponds, and solid waste landfill) included the construction of an on-site disposal facility (OSDF) and associated waste acceptance criteria (WAC); it also adopted final remediation levels (FRLs) for contaminated soil located within OU2. The OU5 (environmental media) ROD expanded the OSDF to accept additional materials,

and expanded the waste acceptance criteria for the soil; additional FRLs were developed for contaminated soils within the OU5 area. The WAC were not consistent with the thresholds that existed in RvA 17. The OU5 ROD also adopted a sitewide Corrective Action Management Unit for soil remediation which includes the OSDF to replace the AOC concept that was previously utilized. Finally, the draft OU3 Remedial Investigation/Feasibility Study for final disposition of D&D debris was issued, which recommends disposal of the D&D debris in the OSDF and establishes appropriate WAC for the debris.

NEW APPROACH

As the RODs were moving towards approval, it was recognized that management of soil and debris under RvA 17 needed to be consistent with the anticipated remedial actions. Additionally, it was necessary to integrate the implementation of approved or anticipated RODs and individual remedial action plans with the management approach for soil and debris. Therefore, a team representing each of the key projects, the environmental compliance program, the environmental monitoring program, construction, and the waste management program was assembled to develop a revised removal action work plan that attained that consistency.

The key objectives established by the team included the need for the work plan to be practical (i.e., field-implementable) and the need for an easy transition for the existing soil and debris storage into the new concept. This involved integrated planning in recognition of the final disposition options for soil and debris. A flow chart was developed to aid in the development of the strategy (see Figure 1).

Information from the selected remedies or preferred alternatives for each operable unit will determine the potential to combine and reduce soil staging or storage areas. The needed information includes knowledge of:

- Planned final disposition (e.g., on-property or off-site disposal);
- Location and mode of transport to off-site disposal facility(ies) as applicable;
- Total number of soil staging/storage areas projected during remediation;
- Projection of on-site treatment requirements for on-property/off-site disposal; and
- Types of staging areas required (e.g., stockpiles, container storage areas, construction of new facilities, use of existing facilities/structures).

The strategy for segregating or combining soil within an operable unit or from several operable units creates a commitment to manage each staging area according to the common planned disposition of the soil in that staging area. Generally, these criteria are based on the WAC for the designated disposal facility (see Table 1); further, location criteria are based on general environmental protection requirements (e.g., floodplains/wetlands standards) and the designated FRLs for that location. Additionally, several criteria will be required for management practices for all soil stockpiles, such as run-on and run-off controls.

The key criteria for debris management revolve around the final disposition and the category of debris. Several categories of debris were identified under the RI/FS for OU3 (see Table 2); these will be used by other OUs which may generate debris also. Some of these categories were administratively precluded from on-site disposal based on process knowledge of the levels of contamination; the other categories are to be designated for storage based on final disposition and characterization data. Debris to be dispositioned off-site will be containerized at the point of generation and shipped off-site as soon as practical. For debris proposed to be disposed on-property, some debris will be bulk-staged to permit the most effective handling of these media. In cases where bulk staging is desired, the debris will be managed to assure minimization of airborne emissions, and staging will occur to assure control of run-off. These debris will be staged in a manner to minimize double handling, minimize costs by optimizing container use, and minimize labor associated with maintenance. Use of bulk storage will not preclude any disposition options, including reuse/recycling. Material will be stockpiled on an existing storage pad or on the foundations of dismantled buildings.

Another important consideration in the development of the RvA 17 WP was the duration of the plan. Since the FEMP was rapidly approaching the completion of all RODs and would soon be moving fully into remedial action, there was a recognized need to limit the duration of the removal actions consistent with NCP criteria. The RvA 17 WP will remain in effect until the OSDF is in operation and the appropriate remedial action plans are implemented. It is anticipated that the remedial action plans could utilize the work plan as the basis for soil and debris management actions.

One final aspect of the RvA 17 WP was the incorporation of a sitewide non-aqueous investigative derived waste (IDW) policy. The IDW include drilling muds and cuttings from soil borings and well installation, soil, debris, and other materials from the collection of samples; residues (e.g., ash, spent carbon) from testing of treatment technologies and treatment systems; and contaminated personal protective equipment used during investigations. The IDW policy was included in this document because the material is similar to that addressed in the soil and debris management plans. Additionally, two separate policies existed for non-aqueous IDW, and this provided an opportunity to merge them and assure consistency. The established policy states that the preferred management options for non-aqueous IDW are to return the IDW to or near its source, if possible, or to manage it in accordance with the principles delineated in the soil and debris management plans.

APPLICATION/CONCLUSIONS/LESSONS LEARNED

The RvA 17 WP was conditionally approved with comment by the U.S. Environmental Protection Agency - Region 5 on first review. The Ohio Environmental Protection Agency had several comments that focused on clarification of responsibilities and integrated planning. There are several lessons learned that can be applied from the process of developing this revised removal action work plan:

- Early discussions with the regulators on the approach to be used is very useful. By addressing the potentially controversial issues (primarily open bulk storage), acceptance of the concept was obtained early and led to expedited approval.

- Teaming and integration is important. This work plan addressed all key issues because the important internal stakeholders participated in the development of the work plan. Additionally, a workshop approach with participation from all affected parties within the FEMP was used to resolve all comments that were received during the initial internal review process.

- Maintain flexibility. Since the site is just commencing the remedial action process, it was important to assure that remedial action options that would be defined in the remedial design/remedial action plans would not be precluded; at the same time, the approach taken in the removal action work plan had to be consistent with the direction being taken in the various RODs.

- Maintain protectiveness, but use the easiest, least cost method for the short term. This was especially true in the storage of debris. Storage containers are not inexpensive, and need to be used judiciously. By demonstrating that outside bulk storage is protective, significant costs could be saved.

- Use characterization methods that are field-implementable and appropriate for the waste acceptance criteria. Rely on process knowledge to the extent practicable. Where process knowledge is not sufficient, use field screening techniques; however, these field screening methodologies must be capable of measuring at the levels of the WAC and FRLs, as appropriate.

APPLICABILITY TO OTHER SITES

The CERCLA concepts that were incorporated into the RvA 17 Work Plan can be used by other sites in trying to accomplish expedited response actions using a removal action while awaiting remedial action RODs. For example, interim actions could be used to expedite remediation by excavating contaminated soil from a surface impoundment or managing it for final disposition prior to the final ROD. Additionally, the number of interim storage areas for debris and soil could be minimized and consolidated by identifying early on the final disposition options and then characterizing the material accordingly. Although this paper addresses the CERCLA arena, the same concepts are applicable to the RCRA process - interim measures (analogous to CERCLA removal actions) and corrective actions (analogous to CERCLA remedial actions).

TABLE I ON-PROPERTY DISPOSAL FACILITY WASTE ACCEPTANCE CRITERIA

	SOIL		DEBRIS
CONSTITUENT OF CONCERN	OU2	OU5	OU3
RADIONUCLIDES:			
Neptunium-237		3.12×10^{9} pCi/g	
Strontium-90		56.7×10^{9} pCi/g	
Technetium-99		29.1 pCi/g	105 g
U-238	346 pCi/g		
Total Uranium	1030 mg/kg	1030 mg/kg	
ORGANICS:			
1,2-Dichloroethane		*	
Carbazole		72.7×10^{3} mg/kg	
Bis(2-chlorisopropyl)ether		2.44×10^{-2} mg/kg	
Alpha-chlordane		2.89×10^{0} mg/kg	
Bromodichloromethane		9.03×10^{-1} mg/kg	
4-Nitroaniline		4.42×10^{-2} mg/kg	
Chloroethane		3.92×10^{3} mg/kg	
1,1,1-Trichloroethane[a]		*	
1,1-Dichloroethane[a]		*	
Carbon tetrachloride[a]		*	
Chloroform[a]		*	
Methylene chloride[a]		*	
Chloromethane[a]		*	
Vinyl chloride[a]		1.51×10^{0} mg/kg	
Tetrachloroethene[a]		128 mg/kg	
Trichloroethene[a]		128 mg/kg	
1,1-Dichloroehtene[a]		114 mg/kg	
1,2-Dichloroethene[a]		114 mg/kg	
Acetone[a]		*	
Benzene[a]		*	
Endrin[a]		*	
Ethylbenzene[a]		*	

TABLE I ON-PROPERTY DISPOSAL FACILITY WASTE ACCEPTANCE CRITERIA (Cont'd)

	SOIL		DEBRIS
CONSTITUENTOFCONCERN	OU2	OU5	OU3
Heptachlor[a]		*	
Heptachlor epoxide[a]		*	
Hexachlorobutadiene[a]		*	
Methoxychlor[a]		*	
Methyl ethyl ketone[a]		*	
Methyl isobutyl ketone[a]		*	
Toluene[a]		*	
Toxaphene[a]		106×10^3 mg/kg	
Xylenes[a]		*	
INORGANICS:			
Boron		1.04×10^3 mg/kg	
Mercury[a]		56.6×10^3 mg/kg	
Chromium VI[a]		*	
Barium[a]		*	
Lead[a]		*	
Silver[a]		*	

[a] RCRA-based constituent of concern.

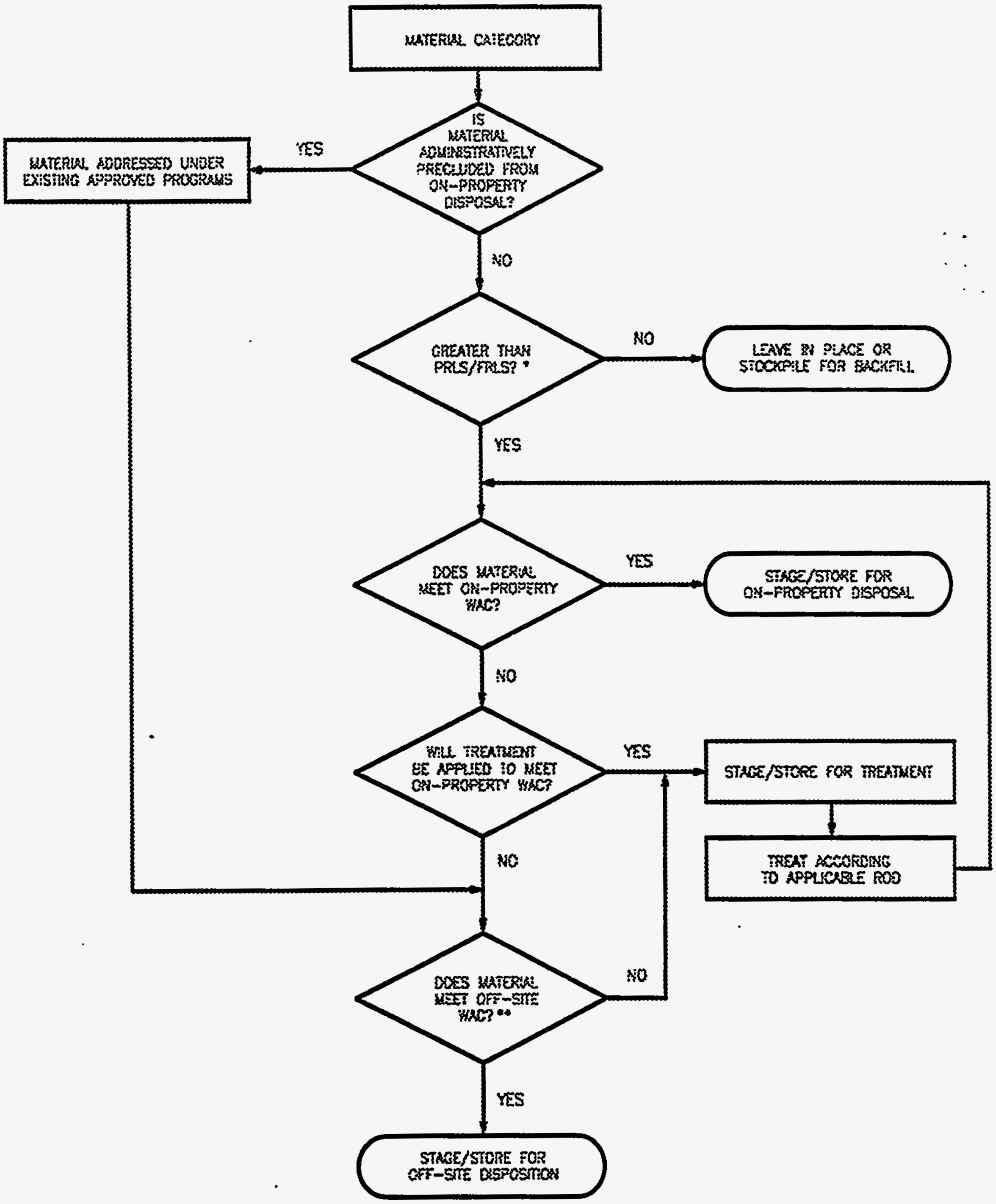
* Denotes compounds that will not exceed designated Great Miami Aquifer action level within 1000-year performance period, regardless of starting concentration in the disposal facility.

SOURCE - Operable Unit 2 Record of Decision
Operable Unit 5 Feasibility Study
Operable Unit 3 Remedial Investigation/Feasibility Study Report

TABLE II DEBRIS SEGREGATION APPROACH

	Debris Category	Storage Configuration [1]	Disposition
A	Accessible Metals	Stockpile	On-Property
B	Inaccessible Metals	Stockpile	On-Property
C	Process-Related Metals	Containerize	Off-Site
D	Painted Light-Gauge Metals	Stockpile	On-Property
E	Concrete	Stockpile	On-Property
F	Acid Brick	Containerize	Off-Site
G	Non-Regulated ACM [2,3]	Stockpile/Containerize	On-Property
H	Regulated ACM	Containerize	On-Property
I	Miscellaneous Materials [3]	Containerize	On-Property

Notes:
[1] Typical approach for storage of predominant materials. All hazardous and mixed waste debris will be containerized.
[2] Transite will be handled separate from other Non-Regulated ACM. Transite is to be band-wrapped to pallets and stored in stockpile configuration.
[3] Miscellaneous Materials can be containerized with other Non-Regulated ACM materials.



* EVALUATE DIVERGENT FRLS AND BTVS AS WELL
** DISPOSAL AND RECEIPT CRITERIA, INCLUDING LDRS

FIGURE 1 FLOWCHART OF GENERAL SOIL & DEBRIS MANAGEMENT STRATEGIES