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THE CAMU RULE:
A TOOL FOR IMPLEMENTING A PROTECTIVE, COST-EFFECTIVE REMEDY
AT THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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ABSTRACT

The Fernald Environmental Management Project (FEMP) is a former uranium processing facility currently under remediation pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act as amended (CERCLA). Contamination at the FEMP consists of low-level radioactivity, hazardous substances, hazardous wastes and/or mixed wastes. Regulations promulgated under the Resource Conservation and Recovery Act as amended (RCRA) are evaluated as applicable or relevant and appropriate requirements (ARARs) for remediation of the FEMP.

Historically, joint CERCLA-RCRA guidance dictated that hazardous waste could not be treated, or moved out of the designated area of contiguous contamination (AOC), without triggering land disposal restrictions (LDRs) or minimum technology requirements (MTRs). To avoid invoking these stringent requirements, in situ capping was chosen as the lower cost remedy at many sites, although on-site disposal and/or treatment of hazardous wastes would have been more protective.

The Corrective Action Management Units (CAMUs) and Temporary Units (TUs) Final Rule [58 FR 8658, Vol. 58, No. 29, hereinafter the "CAMU Rule"], promulgated on February 16, 1993, provides facilities regulated under RCRA corrective action authority with greater flexibility to move, treat, and dispose of wastes on site without triggering LDRs or MTRs, thereby encouraging application of innovative technologies and more protective

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remedies. Application of the "CAMU Rule" at the FEMP would allow the remedy to include consolidation of materials that present minimal threat in an on-site engineered disposal facility. The waste acceptance criteria for the on-site disposal facility is based on site-specific considerations including the mobility of the contaminants through the underlying site geology and the protectiveness of the engineered liners. Application of the "CAMU Rule" allows for disposition in the on-site facility based on these technical considerations rather than on regulatory classifications.

INTRODUCTION

The Fernald Environmental Management Project (FEMP) is a facility owned by the U. S. Department of Energy (DOE). The Fernald facility occupies approximately 1050 acres in a rural area approximately 18 miles northwest of downtown Cincinnati, Ohio. The facility was operated for production of purified uranium metal from 1952 until 1989, when operations were suspended. In July 1986, a Federal Facility Compliance Agreement was jointly signed by the U.S. Environmental Protection Agency (EPA) and the DOE to perform site characterization. In April 1990, the EPA and DOE entered a Consent Agreement for cleanup of Fernald as a Superfund site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This agreement has been revised several times, and is now referred to as the Amended Consent Agreement (ACA). In 1988, a Consent Decree was jointly signed by the Ohio Environmental Protection Agency (OEPA) and the DOE, under Clean Water Act and RCRA authorities, that provides for the management of water pollution and hazardous wastes, including closure of hazardous waste management units (HWMUs). This Consent Decree was amended in January 1993, and together they are collectively referred to as the Stipulated Amendments to the Consent Decree.

Several RCRA-regulated hazardous wastes were generated during the production of uranium. Since the shutdown of production operations at the facility, several HWMUs have been identified. Knowledge of releases from the HWMUs will necessitate compliance with RCRA during the remediation of building debris, and soil and groundwater impacted by these releases. All environmental media (soil, groundwater, and sediment) which contain hazardous waste constituents are anticipated to also be low-level mixed waste (LLMW) due to pervasive low-level radioactive contamination at the FEMP. These remediation wastes will be managed under the provisions set forth by DOE, EPA, and OEPA to designate the CAMU at the FEMP.

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The ACA divided the site into the following five operable units (OUs) based upon their location or the potential for similar response actions:

- OU1 Waste Pit Area — Waste Pits 1 - 6, Burn Pit, Clearwell
- OU2 Other Waste Units — Solid Waste Landfill, Southfield Disposal Areas, Flyash Piles, Lime Sludge Ponds
- OU3 Former Production Area — production area and production-associated facilities and equipment
- OU4 Silos 1 - 4
- OU5 Environmental Media — soil, groundwater, surface water and sediments, flora and fauna

In accordance with their signed Records of Decision (RODs), OUs 1 and 2 will ship their RCRA-regulated remediation wastes off-site, which will require meeting the RCRA LDRs for acceptance at the off-site disposal facility. In contrast, OUs 3 and 5 intend to dispose of material containing hazardous waste constituents in an on-property engineered waste disposal facility. OU3 is chartered with the decontamination and dismantlement of man-made improvements, whereas, OU5 is responsible for remediation of soil and groundwater for the site.

MANAGEMENT OF REMEDIATION WASTE UNDER RCRA AND CERCLA

If on-property disposal is selected as part of the preferred alternative for a CERCLA site, there are three possible options for on-site management, treatment, and disposal:

1. comply with LDRs and possibly request any combination of the following: a no migration petition, a treatability variance, a treatment and storage facility variance, or a delisting petition; or
2. application of the "CAMU Rule"; or
3. request an ARARs waiver under CERCLA.

Management and treatment of low-level mixed waste (LLMW) at the FEMP was proposed using the "CAMU Rule" because the soil and debris containing hazardous waste are remediation wastes, and because the other possibilities cited above under option 1 would prove to be more costly to meet treatment requirements and time-consuming to receive approval for variances, waivers, or petitions that do not improve the degree of protection to human health or the environment.

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The "CAMU Rule" can be invoked if the waste to be managed is a remediation waste, not part of an "as generated" process. A "remediation waste" is defined in 40 CFR §260.10 [58 FR 8683] 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 requirements under §264.101 and RCRA section 3008(h). For a given facility, remediation wastes may originate only from within the facility boundary, but may include waste managed in implementing RCRA section 3004(v) or 3008(h) for releases beyond the facility boundary."

CERCLA "Area of Contamination" vs. RCRA Unit

Disposal of hazardous waste constituents during Superfund actions requires compliance with several potential ARARs under RCRA. At the FEMP, one of the most significant potential RCRA ARARs includes compliance with the LDRs. LDRs can be triggered as applicable requirements by "placement" of restricted RCRA hazardous wastes in land-based units. Land-based units include landfills, surface impoundments, waste piles, and land treatment facilities. "Placement" also occurs when wastes are moved from one unit and placed in another unit. Movement of waste within a unit does not constitute "placement." A RCRA unit can be considered equivalent to an "area of contamination" (AOC) at a Superfund site, as defined under CERCLA, for the purpose of determining when LDRs are applicable. An AOC is defined by the continuous extent of contamination, even though one AOC may contain varying types and concentrations of contamination.

"Placement" does *not* occur in an AOC if wastes are moved within a unit or are left in place by capping, in-situ treatment, or consolidation within a unit; a unit can include landfills, treatment units, surface impoundments, or waste piles. "Placement" does occur if wastes from different AOCs are consolidated into one AOC or if wastes are removed and treated outside the AOC and returned to the same or a different AOC. For example, transferring waste into an incinerator or tank located within the AOC and then redepositing it into the AOC constitutes "placement" of waste and triggers LDRs, because the incinerator and tank are considered separate units from the AOC.

CAMU Rule Criteria

EPA promulgated the "CAMU Rule" under RCRA to promote the most efficient and cost-effective remediation possible. Because LDRs are triggered when "placement" occurs, as

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described above, many sites have used capping in place as the selected method of remediation, primarily because of the higher costs associated with meeting LDRs. The existing LDRs regulatory structure provided an incentive for leaving hazardous wastes in place or selecting a remedy that minimized regulation under Subtitle C, instead of one that maximized treatment of the hazardous constituents and provided more permanence. The EPA provided a separate regulatory framework to manage remediation waste, judiciously expedite cleanups, and reduce costs. In this respect, CAMUs can *only* be used for management of remediation waste, not for "as generated" hazardous wastes from ongoing production processes or other industrial activities.

The CAMU designation criteria are related to the practical necessities of managing remediation wastes on site during cleanup, rather than to the areal extent and the contiguousness of the contamination prior to cleanup. A CAMU can be designated to include the entire facility, but cannot be extended beyond the facility property boundary even if the contamination release has migrated beyond the facility boundary. However, remediation wastes, especially environmental media, can be managed within the CAMU even if they are associated with a release that has migrated beyond the facility boundary.

CAMU provisions [40 CFR §264.552, 58 FR 8683-8684] are determined by the EPA Regional Administrator. Under the "CAMU Rule", contaminated media and any hazardous or solid wastes generated during remediation may be managed in the CAMU, or moved between CAMUs, without triggering the LDRs as applicable requirements.

The "CAMU Rule" also created Temporary Unit (TU) provisions [40 CFR §264.553, 58 FR 8684] that can be applied to treatment or storage of remediation wastes during remedial activities. TUs can be located inside or outside the physical boundaries of a CAMU; however, like CAMUs they must be located at the facility. The EPA Regional Administrator determines the requirements for siting, operating, monitoring and closing a TU. Like CAMUs, TUs are also not subject to LDRs and MTRs. There is a one-year time limit on the use of the TU which can only be extended an additional year if the wastes have to remain in the unit due to "unforeseen, temporary, and uncontrollable" circumstances.

According to 40 CFR §264.552(c), seven criteria are to be considered to determine the site-specific requirements for using a CAMU:

1. Facilitate the implementation of reliable, effective, protective, and cost-effective remedies.

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2. Waste management activities will not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes or hazardous constituents.
3. Include uncontaminated areas of the facility, only if including such areas for the purpose of managing remediation waste is more protective than management of such wastes at contaminated areas of the facility.
4. Wastes that remain in place after "closure" of the CAMU shall be managed and contained so as to minimize future releases, to the extent practicable.
5. Expedite the timing of remedial activity implementation when appropriate and practicable.
6. Use treatment technologies (including innovative technologies) to enhance the long-term effectiveness of remedial actions by reducing the toxicity, mobility, or volume of wastes that will remain in place after "closure" of the CAMU.
7. To the extent practicable, minimize the land area of the facility upon which wastes will remain in place after "closure" of the CAMU.

PROPOSED USE OF THE CAMU AT THE FEMP

The proposed boundaries of the CAMU coincide with the FEMP property boundaries, such that remediation waste from the entire site (CERCLA's definition of "site") can be managed within the CAMU. Figure 1 provides a map of the Fernald site with the area of excavation, determined by the lateral extent of uranium using a cleanup level based on an 1×10^{-5} incremental lifetime cancer risk for an undeveloped park, as described in the OUS Proposed Plan. The Production Area on this map generally represents the anticipated areas containing potential hazardous wastes. The on-property disposal facility will also function as part of the CAMU. Other units to be closed during remediation may also serve as part of the CAMU, if they are needed to manage or treat remediation waste for on-property disposal. If remediation waste constituent concentrations do not meet the waste acceptance criteria (WAC) for the on-property disposal facility, it is anticipated that the specific remediation waste would be shipped off-site for treatment and disposal.

The seven criteria described above would be met through the selected remedies described in the OUS and OU3 RODs, respectively. The specific criteria above are referenced in parentheses where each of the criteria are met. The on-property disposal facility would serve as a reliable method of containment, which will be designed to be effective for 1,000

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years [40 CFR §192] (Criteria 1 and 4). In addition, the on-property disposal facility will minimize the land area for wastes that remain on-property (Criteria 7). The use of concentration-based WAC for on-property disposal of LLMW constituents will ensure protection to the sole-source aquifer beneath the site, which are determined through site-specific extensive remedial investigations, risk-based calculations and modelling (Criteria 2). Therefore, on-property disposal will be more cost-effective than shipping large volumes of LLMW off-site for disposal (Criteria 1).

Expedited remediation time through the application of the CAMU will occur through minimized segregation, analytical testing, and handling time that would be needed to meet the specific treatment requirements for individual hazardous wastes, as specified in the LDR requirements (Criteria 1).

The use of existing interim status HWMUs as TUs under the "CAMU Rule" during the remediation timeframe is also anticipated to expedite remediation efforts because the need for construction of new storage or treatment facilities would be minimized. In addition, the use of these existing facilities would not cause any additional impact to the environment because pervasive soil and groundwater contamination already exists beneath the Fernald site. Application of MTRs, which are intended to prevent contamination of soil and groundwater, would not be logical for existing facilities/units since the very situation which they are intended to prevent already exists at the site. If TUs are used for the Fernald site, initial analysis within the OU5 Feasibility Study (FS) indicates they might be needed for the duration for soils remediation.

Remediation costs would be considerably reduced by the application of the "CAMU Rule" at the FEMP. OU5 contains an estimated minimum volume of 28,000 cu. yds. of soils containing RCRA-regulated constituents. Most of this soil contains constituents that *may* be from listed wastes, but which are not anticipated to exceed the WAC for the on-property engineered disposal facility. Only small volumes of soil may be characteristically hazardous.

OU3 (the former production facilities) activities currently involve decontamination and dismantlement of the structures under a Record of Decision for Interim Remedial Action (IROD); up to 10% of the material removed under the IROD can be disposed at an off-site location. It is anticipated that this will typically consist of radioactively-contaminated building materials which will be handled as low-level waste (LLW). Other wastes are currently being managed in accordance with approved removal actions. Final disposition of the material removed in building dismantling will be addressed in a combined Remedial Investigation/ Feasibility Study (RI/FS) Report and Proposed Plan currently in preparation,

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leading to a final ROD. The OU3 RI/FS is analyzing three alternatives: (1) no further action (indefinite storage); (2) disposal in an on-site engineered disposal facility; and (3) off-site disposal.

Although some of the resultant OU3 remediation waste material will likely be classified as mixed waste, the implementation of the "CAMU Rule" will impact the level of treatment that will be required for disposal in an on-site disposal facility. The constituents in the material are not expected to exceed the WAC for the on-site disposal facility. If they do, however, the remediation waste material will either have to be treated to meet the WAC, or be treated in accordance with LDR requirements and be disposed of off-site at a permitted/licensed mixed waste disposal facility at a significantly greater cost.

CURRENT LEGAL STATUS OF THE CAMU

Environmental groups and the treatment industry challenged the "CAMU Rule" shortly after its final promulgation because they claimed that it allowed industry too much discretion in managing hazardous waste. The Environmental Defense Fund (EDF), the Natural Resources Defense Council, the Environmental Technology Council, and the EPA filed a joint motion to stay the CAMU lawsuit until the Hazardous Waste Identification Rule for Contaminated Media is made final [EDF v. EPA, CA DC, No. 93-1316, 10/11/94]. The purpose of staying the case was to save resources on bringing the CAMU case so that the issues can be resolved in the Rule, according to the joint motion. The "Contaminated Media Rule" is being developed by a federal advisory group on hazardous waste identification. This Rule is expected to be proposed in the fall of 1995.

The "Contaminated Media Rule" would set a "bright line" which will be proposed as level of contamination or risk posed by the hazardous waste that needs to be cleaned up. Contaminated media with concentrations of hazardous waste constituents above the "bright line" would have to be remediated according to federal hazardous waste regulations under Subtitle C of RCRA. Media below the "bright line" would be considered non-hazardous, and the state or EPA would determine the appropriate management requirements on a site-specific basis.

The EPA has presented options to EDF *et al* which EPA plans to incorporate into the proposed "Contaminated Media Rule". This presentation could resolve the issues in EDF's "CAMU Rule" petition by allowing the "Contaminated Media Rule" to replace a substantial portion of the "CAMU Rule". In essence, "Contaminated Media Rule" is intended to allow more oversight to the EPA or the states, and less discretion to the waste handlers. If EDF

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et al agree to the Rule then the parties would request dismissal of the case. However, EDF *et al* are free to resume the case if the agency does not address their concerns.

During the interim, the CAMU is intended to be used when considered appropriate, according to the EPA's Office of Solid Waste. EPA reports that some regions are using the "CAMU Rule" while others are more cautious.

SUMMARY

The use of the CAMU is currently proposed in the EPA-approved OU5 FS and Proposed Plan (PP), and is anticipated to be accepted by the regulatory agencies via OEPA concurrence and EPA's signature of the OU5 ROD (projected for November 1995). A similar approach is anticipated for OU3's FS, PP and ROD (projected for EPA signature in 1996). The "CAMU Rule" is the most appropriate method for compliance during remediation of soil and debris at the FEMP because the substantive requirements under Subtitle C will be met for providing long-term, cost-effective, practical and protective remediation. In this respect the "CAMU Rule" should be considered for application at other sites undergoing environmental restoration, regardless of whether it is being conducted as a CERCLA response action (removal action or remedial action) or RCRA corrective action.

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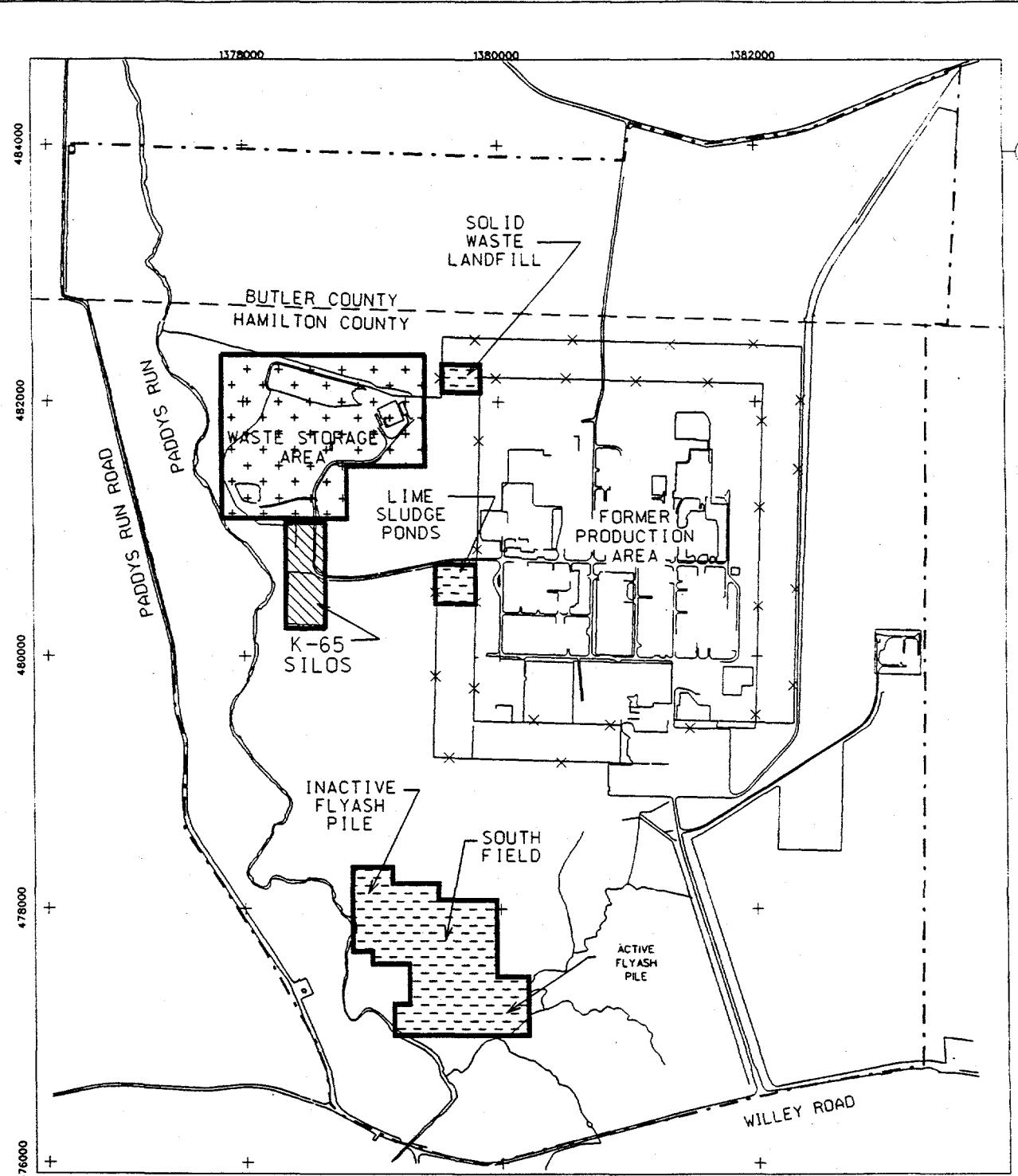
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LEGEND:

- Operable Unit 1
- ▨ Operable Unit 2
- ▨ Operable Unit 4
- FEMP Boundary (CAMU Boundary)
- County Line

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NOTE:

Operable Unit 3 includes all buildings, pipelines, and aboveground structures in the former production area. Operable Unit 5 includes groundwater, surface water, soil, sediment, flora and fauna within the regional area as well as the former production area.

Figure 1. FEMP Site showing operable units and CAMU boundaries