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TRANSMITTAL OF OPERABLE UNIT 3 PROPOSED PLAN FOR FINAL REMEDIAL ACTION, FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

04/09/96

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MEMORANDUM

DOE-1325.8 (5-63)

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United States Government

Department of Energy

Fernald Area Office

memorandum

DATE: APR 0 9 1996

DOE-0745-96

REPLY TO ATTN OF: FN:Hall

SUBJECT: **TRANSMITTAL OF OPERABLE UNIT 3 PROPOSED PLAN FOR FINAL REMEDIAL ACTION, FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

TO: L.G. Dever, DOE-NV

Enclosed for your review is a copy of the above referenced Proposed Plan. This plan reflects the preferred alternative for disposition of the Department of Energy, Fernald Area Office's (DOE-FN) Operable Unit 3 (OU3) decontamination and dismantlement materials and low-level wastes under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The OU3 includes the former production area and associated structures at the site and the remaining inventories of products and low-level wastes.

Three alternatives were evaluated under the CERCLA process for OU3; the preferred alternative (Alternative 2 in the Proposed Plan) primarily involves on-site disposal of materials removed during decontamination and dismantlement of the structures that comprised the former production area. The preferred alternative also involves the off-site disposal of limited materials (above waste acceptance criteria for the On-Site Disposal Facility) at the Nevada Test Site (NTS) and/or at a representative Permitted Commercial Disposal Facility (PCDF). The amount of material to be dispositioned at NTS or a PCDF under the Proposed Plan is estimated at 174,000 cubic feet over the course of the remedial action (assumed to be approximately ten years). The remaining materials, below the Waste Acceptance Criteria (WAC), will be placed in the On-Site Disposal Facility.

The decontamination and dismantlement of the structures is currently being undertaken through an Interim Record of Decision (IROD) that was approved in July 1994. The content of this Proposed Plan has been approved by the U.S. Environmental Protection Agency (U.S. EPA) and the Ohio Environmental Protection Agency (OEPA).

The public comment period for the Proposed Plan began on April 3, 1996, and is scheduled to end on May 2, 1996. A public meeting is being held on April 23, 1996, to formally receive comments from the affected stakeholders. We would appreciate receiving your comments on the Proposed Plan by May 2, 1996. In addition, we will have a representative of our site at the May 1, 1996, meeting of the Community Advisory Board for Nevada Test Site Programs to address their questions and concerns.

Recycled and Recyclable

If you or your staff have any questions, please contact John Hall at (513) 648-3118.

Johnny Reising

Johnny W. Reising
Associate Director
Environmental Management

Attachment: As Stated

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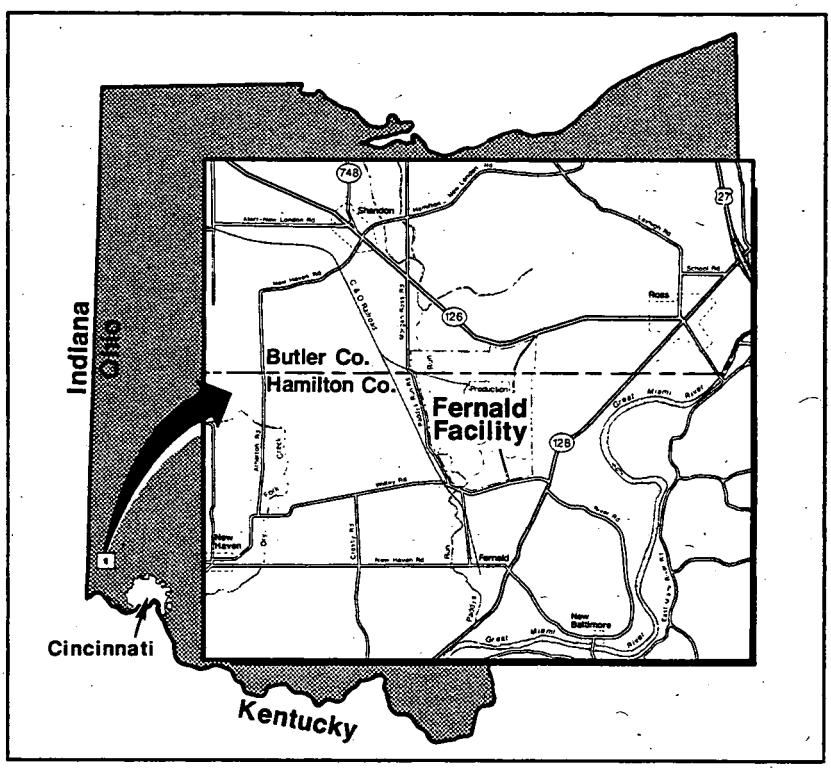
Proposed Plan for the Operable Unit 3 Final Remedial Action

Treatment and Disposition of Buildings and Structures at Fernald

APRIL 1996



This Proposed Plan Will Describe for You:

- The background of Operable Unit 3;
- The outcome of the Remedial Investigation and Feasibility Study process for Operable Unit 3;
- The three cleanup alternatives considered;
- DOE's preferred alternative for final remedial action;
- How to participate in the selection/modification of the preferred alternative; and
- Where to get more information.

You are invited to a public meeting

to discuss the alternatives being considered for the final cleanup of Operable Unit 3 at the Fernald Environmental Management Project. The U.S. Department of Energy (DOE), together with the U.S. and Ohio Environmental Protection Agencies (EPAs), encourages public participation in the decision-making process for the remediation of the Fernald site. Representatives from DOE and U.S. and Ohio EPAs will be present to discuss the alternatives, including the preferred alternative, answer questions, and accept comments. The meeting is scheduled for 7:00 p.m. on Tuesday, April 23, 1996 at The Plantation in Harrison, Ohio.

Document Control No. OU3-3001

INTRODUCTION

This *Proposed Plan for the Operable Unit 3 (OU3) Final Remedial Action* summarizes information presented in the *OU3 Remedial Investigation/Feasibility Study (RI/FS) Report*. This summary includes a discussion of the types and levels of contamination within OU3 and a discussion of the remedial alternatives evaluated for treatment and disposal of materials generated during the OU3 interim remedial action. Finally, this Proposed Plan identifies the preferred remedial alternative for the safe and cost-effective treatment and disposition of these building materials.

OU3 includes buildings (both production and administrative), equipment, unused uranium and thorium products, residues, and wastes associated with the former Production Area at the Fernald Environmental Management Project (FEMP), a former uranium processing facility owned by the U.S. Department of Energy (DOE). The previously approved interim remedial action, which is currently underway, consists of the decontamination and dismantlement of

all structures in OU3. The preferred final remedial alternative, discussed in more detail later in this document, involves selected material treatment, on-property disposal of OU3 material that presents minimal ***risk*** to human health, and off-site disposal of material that is highly contaminated. Environmental media, such as soils and groundwater underlying or in the vicinity of OU3, are being addressed within the scope of Operable Unit 5. Accordingly, this Proposed Plan does not address remediation of environmental media.

The remainder of this plan will present the rationale for proposing the preferred remedy, background information, and the proposed path forward for achieving final cleanup of OU3. This Proposed Plan is issued in accordance with the ***Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980***, as amended, and structured to solicit public involvement in the selection of the final remedy for OU3. Public involvement opportunities will be discussed on pages 19 and 20.

*Note: explanations of terms shown in **bold italics** are provided in the glossary on pages 21 and 22 of this Proposed Plan.*

SITE BACKGROUND

The FEMP was originally known as the Feed Materials Production Center (FMPC) and was constructed in the 1950s as part of the atomic weapons complex. The 1,050-acre site is located near the village of Fernald, Ohio, approximately 17 miles northwest of Cincinnati. The site's primary mission was to process uranium into metal products, which were shipped to other DOE and Department of Defense facilities for defense activities. Production operations began in 1952 and continued until the facility was closed in 1989, due to the declining demand for uranium metals.

Concerns about the impact that production operations and waste storage activities were having on human health and the environment were evident before production was suspended. Contaminants were released to the environment primarily through air emissions, wastewater discharges, leaks, and spills. In 1985, the U.S. Environmental Protection Agency (U.S. EPA) issued a Notice of Noncompliance to the DOE, which led to the signing of a Federal Facility Compliance Agreement in 1986. This agreement marked the initiation of the ***RI/FS*** to investigate environmental concerns at the Fernald site and to identify the most promising cleanup actions. In 1989, the Fernald site was included on the U.S. EPA's ***National Priorities List*** of sites requiring urgent cleanup attention. In 1990, a Consent Agreement was signed by U.S. EPA and DOE; this document detailed a schedule for conducting the RI/FS process and identified five ***operable units***. Operable units are established based on physical proximity of contaminated areas, similar types or amounts of contamination, or the potential for similar remedial technology types to be used in cleanup activities, among other criteria. The operable units, as currently defined, are as follows:

- Operable Unit 1 (OU1) consists of six waste pits, a burn pit, a clearwell, and associated liners and berms;

JUNE 1995 AERIAL PHOTO OF THE FERNALD SITE

- Operable Unit 2 (OU2) consists of two lime sludge ponds, two flyash piles, a disposal area containing construction rubble (the "South Field"), and a solid waste landfill;

- Operable Unit 3 (OU3), which consists of all building, structures, and equipment at Fernald, is discussed in detail in the next section;

- Operable Unit 4 (OU4) consists of four concrete storage silos, associated facilities, and stored wastes; and

- Operable Unit 5 (OU5) includes environmental media, such as soils and groundwater, not associated with other operable units.

Additional information about the operable units, as well as the remedial decisions made for each of them, is available through the Public Environmental Information Center (see page 20).

The DOE Fernald Area Office, as the lead agency, is responsible for oversight of the cleanup at Fernald in accordance with provisions of CERCLA. All remedial decisions reached for the Fernald site are subject to approval by the U.S. EPA, with input from Ohio EPA and the public.

OPERABLE UNIT 3 DESCRIPTION

OU3 consists of the former Production Area and production-associated buildings and equipment. This area includes a fenced, 136-acre tract of land near the center of the Fernald site and contains many buildings, containerized materials, storage pads, roads, railroad tracks, above- and below-ground tanks, and utilities. OU3 also includes an administrative area with several office buildings, a parking lot, several impoundments, ponds, rainwater collection basins, and a sewage treatment plant. Environmental media are addressed as part of OU5 but are important considerations because they are potential pathways between sources of contamination in OU3 and off-site ***receptors***.

Most OU3 remediation materials are typical of building materials used during the 1950s for industrial type construction. OU3 building materials have been divided into nine material categories, as shown in the table on this page, based on their physical properties and/or configurations, and then further divided into ***segregation categories*** based on regulatory waste classification (e.g., ***hazardous waste***, low-level radioactive waste, etc.).

VOLUMES OF MATERIALS IN OU3 7593

OU3 Material Category	Volume (ft^3)
Accessible Metals	63,400
Inaccessible Metals	1,740,000
Process-Related Metals	151,000
Painted, Light-Gauge Metals	7,150
Concrete	4,700,000
Brick	20,700
Non-Regulated Asbestos-Containing Materials	71,300
Regulated Asbestos-Containing Materials	80,200
Miscellaneous Materials	704,000
Product, Residues, and Special Materials	1,730,000
Total	9,270,000

Note: Divide numbers by 27 to convert volumes from cubic feet to cubic yards.

Also shown in the table, a tenth material category, termed "Product, Residues, and Special Materials," contains all non-building materials in OU3, such as nuclear product, ***hold-up material*** (i.e., product left inside machinery and buildings when production was shut down in 1989), wastes generated during daily decontamination activities, and "legacy" wastes. ***Legacy wastes*** are containerized waste materials which remained when production ceased, such as low-level radioactive waste, hazardous waste, and mixed waste (hazardous waste mixed with low-level radioactive waste). These non-building materials and wastes are currently being addressed through programmatic ***removal actions***, which are discussed later in this Proposed Plan. These removal actions will be included within the scope of the final remedial action ***Record of Decision (ROD)***.

The buildings, equipment, and other facilities within OU3 show concentrations of radiological and other hazardous substances at levels which represent a potentially unacceptable long-term threat to human health and the environment.

OU3 Interim Remedial Action

Although DOE maintains an active maintenance program, the former uranium processing facilities are at or beyond their design life and in a state of advancing deterioration. These current conditions present an increasing probability of further releases

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of hazardous substances to the environment in the event of structural collapse or other failure mechanisms.

For these reasons, DOE and U.S. EPA signed a Record of Decision for Interim Remedial Action (IROD) in July 1994. The IROD calls for the decontamination and dismantlement of all above- and below-ground improvements, including all buildings and support structures, to reduce any potential threat posed by these facilities. It also calls for the removal of equipment and machinery that have no identifiable role to support the site cleanup mission and removal of product, residues, and wastes. According to the IROD, the building debris and resultant waste would primarily be placed in interim storage until a final remedial decision is made, although some limited material disposition could occur. That decision will be made based on public comments received on the three alternatives offered in this Proposed Plan.

As part of the ***remedial design*** of the interim remedial action, a schedule for Fernald building dismantlement was submitted in June 1995 to the U.S. EPA and Ohio EPA in the *OU3 Remedial Design Prioritization and Sequencing Report*. This 31-year schedule, which was subsequently approved by the EPAs, was based on the anticipation of reduced funding levels. However, recent cleanup successes at Fernald, coupled with strong support from the public and other stakeholders, have led the U.S. Congress and DOE to endorse greater funding for the final cleanup of Fernald. Therefore, a ten-year dismantlement schedule can be anticipated. The first dismantlement project under the interim remedial action, Plant 4 (the Hydrofluorination Plant), is currently underway. Under the accelerated schedule, several other plants are anticipated to be dismantled starting in 1996.

OU3 Final Remedial Action

The final remedy will address treatment and final disposition of the materials and wastes resulting from performance of the interim remedial action. The two actions will be combined to provide a unified remediation approach to OU3. Under the IROD, all buildings and structures will be dismantled and the resulting materials will be segregated into ten material categories. The material categories (as described on page 3) will be evaluated for treatment and disposition options. However, as the figure on the following page illustrates, the materials placed within the "Product, Residues, and Special Materials" category will be handled and dispositioned off-site under existing removal actions. All items within the shaded area of the figure have been previously addressed as indicated and are not evaluated within the *OU3 RI/FS Report*. The final remedy for OU3 will determine the appropriate treatment and disposition of the materials generated by the dismantlement of OU3 buildings. The final remedy will be cost-effective, implementable, and protective of human health and the environment and will accommodate the application of new, more effective technologies which may emerge during the OU3 final remedial action.

In July 1995, the Fernald Citizens Task Force issued a recommendation on the disposal of soils, construction rubble, and other waste materials with relatively low levels of contamination in an on-property disposal facility. The Task Force, a DOE site-specific advisory board comprised of local residents and community leaders, is chartered to make recommendations to DOE and the EPAs about future courses of action, cleanup levels, and waste disposition options, including future land uses for the Fernald site.

Integration of the Interim and Final Remedial Actions

The scope of the interim remedial action, as set forth in the IROD, consists primarily of the removal of gross surface contamination from material in facilities, dismantlement of facilities, limited off-site disposal for non-recoverable/non-recyclable remediation materials, and interim storage for the majority of resulting remediation materials until the OU3 final remedial action ROD is issued. The scope of the final remedial action encompasses the handling, treatment, and final disposition of OU3 materials not dispositioned under the IROD. Once the remedy is selected, requirements specifically related to that remedy will be integrated into the remainder of the interim remedial action to allow seamless execution of both the interim and final remedial actions.

Several elements developed to support the final remedial action may need to be incorporated into the interim remedial action. For example, any restrictions on the size of material prior to disposition, as required by the selected remedy, would be incorporated into the design specifications of the remaining dismantlement projects under the IROD. Since the implementation of the final remedial action may influence interim remedial action activities, the remedial design and remedial action work plans for the final remedial action would be integrated documents, representing both the OU3 interim and final remedial actions.

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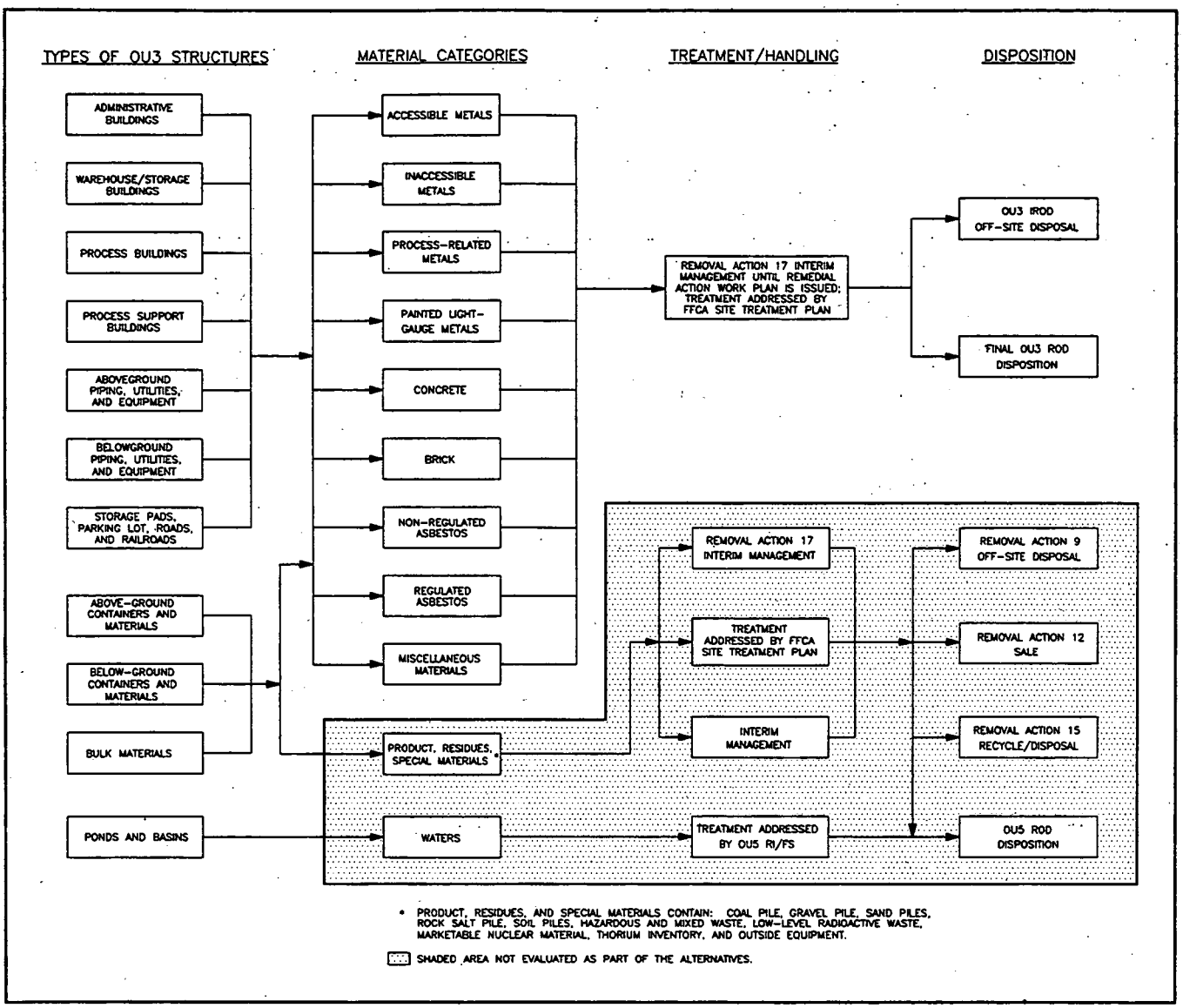

APPROACH TO OU3 MATERIAL MANAGEMENT

REMOVAL ACTIONS RELATED TO THE FINAL REMEDIAL ACTION

Removal actions are conducted to mitigate an immediate threat to human health and the environment, including actions necessary to monitor, assess, or evaluate the threat. Of the thirty FEMP removal actions, four are considered "programmatic," since the scope of the activities applies to OU3 as a whole rather than targeting specific physical locations. The four programmatic removal actions are discussed below. Each of these removal actions will be incorporated into the OU3 final remedial action ROD and will be performed throughout the remediation of OU3. The other OU3 removal actions are discussed in greater detail in Section 1 of the *OU3 RI/FS Report*.

Removal Action 9: Removal of Waste Inventories

This waste shipping program was initiated in August 1985, before the RI/FS process was initiated at Fernald. Removal Action 9 is a large-scale waste shipment program, which primarily involves transferring inventoried and newly generated wastes for off-site disposal. The program includes characterization of waste materials, treatment to meet the ***waste acceptance criteria*** of the off-site disposal facilities, and transport in a manner that ensures full compliance with DOE Orders and Department of Transportation requirements. This removal action also governs the treatment and disposition of mixed wastes and polychlorinated biphenyls (PCBs) in accordance with the *Site Treatment Plan*.

In late 1994, a new strategy was developed for managing waste materials that remained when production ceased (also called legacy wastes). This strategy was to continue waste management programs and removal actions as they currently exist to quickly reduce the volume of (and, therefore, the risks associated with) Fernald waste through off-site disposal. Because of this approval, issues related to the treatment and disposition of legacy wastes have not been evaluated in the *OU3 RI/FS Report*.

As of July 1995, approximately 589,000 drum equivalents (i.e., the amount of material that would fit in one 55-gallon drum) had been shipped to the Nevada Test Site (NTS) for final disposal. These waste shipments include legacy wastes as well as wastes generated through cleanup activities. Removal Action 9 will continue as a distinct program within the OU3 final remedial action until these wastes have been fully dispositioned.

Removal Action 12: Safe Shutdown

The Safe Shutdown Program was initiated in July 1991, while the site was being officially closed as a production facility. This removal action involves planning, engineering, and program control for the proper removal and disposition of uranium products and hold-up materials, residues, excess supplies, chemicals, and associated process equipment. This removal action also provides for the isolation and de-energizing of former production-related equipment and utilities.

The primary objective of the Safe Shutdown Program is to remove materials from previously operated production equipment to reduce the overall risk posed by the facilities. After the materials are characterized, they are placed in approved storage configurations and transported to NTS under Removal Action 9.

Another significant objective of this removal action is to identify other customers or users for Fernald equipment and nuclear products. For instance, some equipment in Plants 5 and 6 is being transferred to OU4 for use in remediation activities. Off-site customers are being sought as well. The equipment will be decontaminated as necessary prior to being transported off-site. Safe Shutdown Program activities will continue as necessary throughout the interim and final remedial actions. In preparation for building dismantlement, Safe Shutdown has been completed in Plants 4 and 1, is nearing completion in Plant 9, and has commenced in the Pilot Plant and Plant 5.

Removal Action 17: Improved Storage of Soil and Debris

The primary goal of Removal Action 17 is to establish a site-wide management concept and implementation strategy for soil and debris storage at Fernald. Soils and debris generated by maintenance, construction, and removal action activities have been stored in accordance with this removal action. Removal Action 17 is being conducted to provide interim management of soil and debris until final remedial action plans are in place. The scope of this removal action will continue during the interim remedial action for OU3. Generated materials will be retained in storage until the OU3 final remedial action ROD specifies a disposition option for debris and the on-property disposal facility is available for disposition of soils.

Removal Action 26: Asbestos Removal

The asbestos abatement program was established to mitigate potential release and migration of asbestos during routine facility maintenance. Abatement within this program includes in situ repairs, encasement and encapsulation, and removal of asbestos-containing material.

Asbestos removal is also the first step in building decontamination and dismantlement. Therefore, Removal Action 26 will continue for OU3 facilities during the interim remedial action. The scope of this removal action will also be incorporated into the OU3 final remedial action ROD.

OUTCOME OF THE RI/FS

Issuance of the IROD had a significant impact on the data requirements for the OU3 RI/FS. Since the IROD already established the requirement for dismantlement of OU3 structures, the remaining tasks were field characterization and determination of final disposition requirements for the materials remaining after the interim remedial action is complete. Collected data were used to determine:

- Accurate media volume and weight estimates for various waste classifications, which were used to determine the treatment and disposal needs, costs, implementability, and environmental impact of each alternative.
- Waste characteristics and potential treatability of various media to reduce waste volume, toxicity, or contaminant mobility.
- ***Source term*** estimates for contaminants in OU3 material.

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- ***Leachability*** of contaminants from OU3 materials for use in the preparation of waste acceptance criteria for potential on-property disposal.

The sampling approach used for the characterization study was to collect one ***intrusive sample*** from each major medium (concrete, asphalt, acid brick, masonry, transite, and steel coatings) in each defined process area at the location of greatest known radiological and/or chemical contamination. Each major media sample was then, in general, analyzed for all radiological and chemical contaminants of potential concern. More than one sample was collected if there were distinct areas of chemical and radiological contamination. Confirmatory field screening was conducted in representative buildings that were considered uncontaminated and, therefore, not sampled.

In addition to major media sampling, samples of supplemental media were collected, including loose material (e.g., residues, floor sweepings, sediment, sludges, etc.), unknown liquids, and heating, ventilation, and air conditioning (HVAC) filters. These samples were used to support major media sampling results or to confirm assumptions.

The data obtained from these sample analyses were used in conjunction with other data to determine the ***constituents of concern (COCs)*** within OU3 building materials. COCs are those contaminants that may substantially contribute to risks to human health and the environment. COCs are usually determined in the RI/FS process as part of a baseline risk assessment. However, the IROD has already determined that remedial action is necessary. In addition, the *Site-Wide Characterization Report* has already documented the general level of risk from the current condition of OU3. Therefore, the development of a baseline risk assessment as part of the *OU3 RI/FS Report* would have little added value. Since no baseline risk assessment was performed for the *OU3 RI/FS Report*, COCs were determined for each OU3 medium by comparing maximum detected concentrations against risk-based values for direct contact. This conservative approach ensures that all potentially significant risks to human health and the environment are considered.

Consistent with the production history at Fernald, the most common (and highest levels of) radionuclide contaminants found within OU3 major media were uranium-238 (and its decay products, uranium-234, thorium-230, and radium-226), uranium-235 (and its primary decay product, actinium-227), and thorium-232 (and its decay products, radium-228 and thorium-228). The most common (and highest levels of) inorganic chemical contaminants found within OU3 major media were lead, chromium, cadmium, and mercury. The most common (and highest levels of) organic chemical contaminants were 1,4-dichlorobenzene, hexachlorobutadiene, nitrobenzene, and tetrachloroethene.

A contaminant source term was developed for each COC in OU3, considering the projected volume and weight of the materials. Calculations of the contaminant source terms were based on the assumption that the maximum contaminant concentration within a medium in a process area provided a conservative estimate of the contaminant level for the entire process area.

The most meaningful way to develop the source terms was to group OU3 materials into ten distinct categories, which are listed in the table on page 3. The ten categories were then further subdivided into segregation categories to allow for evaluation of treatment and disposition options. The table on the top of page 8 shows the quantity and characterization of materials per material category.

The disposition of the material category termed "Product, Residues, and Special Materials" is being addressed under existing approved programs. The significant quantities within this category include various soil piles (almost one million cubic feet) and drummed wastes (approximately 620,000 cubic feet). The soil piles have been addressed within the OU5 Feasibility Study and will be dispositioned according to the OU5 ROD. For the drummed wastes, Removal Action 9 (discussed previously on pages 5 and 6) is the mechanism for off-site disposition. These materials will continue to be disposed of off-site in accordance with the approved removal action work plan. Therefore, the volumes within this material category have not been included further in this evaluation.

Remedial action objectives are established to mitigate the potential threat posed by contaminants to human health and the environment. These objectives are developed based on characterization information contained in Section 3 of the *OU3 RI/FS Report* and are consistent with provisions in the National Contingency Plan as well as U.S. EPA guidance.

For Fernald operable units that address environmental media, such as soils and groundwater, remedial action objectives reflect the conditions that may remain in place without causing unacceptable risk to human health or the environment. For OU3, there will be no material left in place; as stated in the IROD, all buildings, equipment, products, and wastes will be removed and placed in interim storage pending a final remedy decision. Residual

SUMMARY OF OU3 WASTE VOLUMES AS ESTIMATED BY CATEGORY (IN CUBIC FEET)

OU3 Material Category	Potentially Hazardous/ Mixed Waste	Regulated PCBs (TSCA)	Low-Level Radioactive Waste	Below *Baseline*	Total
Accessible Metals	0	0	63,400	0	63,400
Inaccessible Metals	0	14,900	1,730,000	0	1,740,000
Process-Related Metals	0	0	151,000	0	151,000
Painted Light-Gauge Metals	49	0	7,100	0	7,150
Concrete	0	0	541,000	4,160,000	4,700,000
Brick	5,280	0	15,400	0	20,700
Non-Regulated Asbestos-Containing Materials	0	0	71,300	0	71,300
Regulated Asbestos-Containing Materials	0	0	80,200	0	80,200
Miscellaneous Materials	0	0	163,000	541,000	704,000
Product, Residues, and Special Materials	56,000	0	1,670,000	105	1,730,000
Total	**61,300**	**14,900**	**4,490,000**	**4,700,000**	**9,270,000**

contamination will not exist after remediation of OU3 is complete. Therefore, in general, the remedial action objectives are as follows:

- Remediate OU3 to mitigate the potential exposure of human and environmental receptors to contaminants; and
- Implement the final disposition of OU3 materials in a manner that ensures potential receptors are protected from the contaminants.

These objectives are achieved by establishing waste acceptance criteria for the disposal facilities, both on-property and off-site. Waste acceptance criteria, which are specifications and conditions under which waste can be accepted for disposal, include regulatory standards, facility design information, and risk-based analyses. For the on-property disposal facility, the waste acceptance criteria for OU3 were based on the OU2 and OU5 feasibility study modeling, and then adjusted to apply to OU3-specific materials.

Of the OU3 COCs, only uranium and technetium-99 were identified as having the potential to exceed acceptable groundwater levels beneath the on-property disposal facility. Experimental lab studies were conducted to determine uranium and technetium-99 leachability from various construction materials. For conservativeness, samples of OU3 materials with highest technetium-99 and uranium concentrations were used. The results of the studies demonstrated that uranium concentrations that leached from all test samples were well below acceptable levels for on-property disposal. Conservative modeling also showed that the small volume of OU3 materials that were not tested for uranium leachability were also acceptable for on-property disposal. Therefore, all uranium-contaminated materials, with the exception of highly contaminated process materials, can be safely disposed of in the on-property disposal facility.

On the other hand, the studies showed that technetium-99 has the potential to leach at levels that could impact groundwater. Modeling was then used to determine that a safe level of technetium-99 within the on-property disposal facility is 105 grams. This modeling used the conservative assumption that technetium-99 would completely leach out of the on-property disposal facility over a 70-year span (which is considered by U.S. EPA to be an average human lifespan). Therefore, an allowable mass of 105 grams was adopted as the OU3 on-property waste acceptance criteria for technetium-99. Specific details on the development of the waste acceptance criteria for the on-property disposal facility are provided in Appendix G of the *OU3 RI/FS Report*.

Waste acceptance criteria for the off-site disposal facilities are derived from the relevant permits and licenses of those facilities. Specific values for a representative facility are detailed in Appendix F of the *OU3 RI/FS Report*.

REMEDIAL ALTERNATIVES

One goal of CERCLA is to select remedial actions, or an appropriate combination of methods, that protect human health and the environment, maintain protection over time, and minimize the amount of untreated waste. This goal reflects the preference for treatment over ***engineering controls*** and/or ***administrative controls*** to reduce toxicity and/or mobility of contaminants whenever practical to ensure that material remaining on-property can be reliably controlled over time. However, for secondary threat materials, or wastes that pose a relatively low long-term threat, U.S. EPA allows the use of engineering controls or a combination of engineering and administrative controls, where appropriate. Surface decontamination of buildings and structures will be performed during the interim remedial action. Based on the projected residual contamination of remediation materials following dismantlement, the decontamination steps associated with that process, and the results of treatment technology evaluation, the OU3 wastes are principally considered to be secondary threat materials. The OU3 remedial strategy provides for further treatment on a selected basis as necessary to ensure protectiveness during the final remedial phase.

The remedial alternatives were developed based on technology types and process options that were identified to achieve remedial action objectives. The primary focus of the alternative development was disposition rather than treatment. Treatment was evaluated as required to facilitate meeting the waste acceptance criteria for final disposal. Therefore, administrative and engineering controls were the primary bases on which alternatives were developed. Administrative controls have been established by the OU5 response actions. Engineering controls for on-property or off-site disposal are also limited because of the few facilities capable of disposing of radiologically contaminated materials.

Three alternatives for the final remedial action have been developed and are summarized below:

Alternative 1 -- No Further Action

This alternative is required by CERCLA so that a basis for comparison exists for any cleanup alternatives identified. Alternative 1, called the "No Further Action Alternative," assumes that the interim remedial action proceeds to completion and places all generated materials within a hypothetical interim storage area. The interim storage area would contain uncovered piles of accessible metals, inaccessible metals, concrete, and transite. All other materials would be staged in containers. At the completion of the interim remedial action, maintenance of the interim storage area would be terminated. Thus, materials would be exposed to the environment with potential releases of contamination to environmental media. Within an unmaintained area, no mechanisms would be employed to prevent trespassers from entering the area. Because of commitments to the public by DOE and U.S. EPA, the IROD specifically commits to performing a final remedial action that involves the disposition of OU3 materials. However, Alternative 1 is retained as a baseline against which the effectiveness of the other alternatives may be compared.

Alternative 2 -- Selected Material Treatment, On-Property Disposal, and Off-Site Disposition

As stated above, most OU3 remediation materials contain low levels of contaminants and are therefore not a principal threat. For these materials, the remedial strategy calls for disposition, using administrative and engineering controls, in an on-property disposal facility.

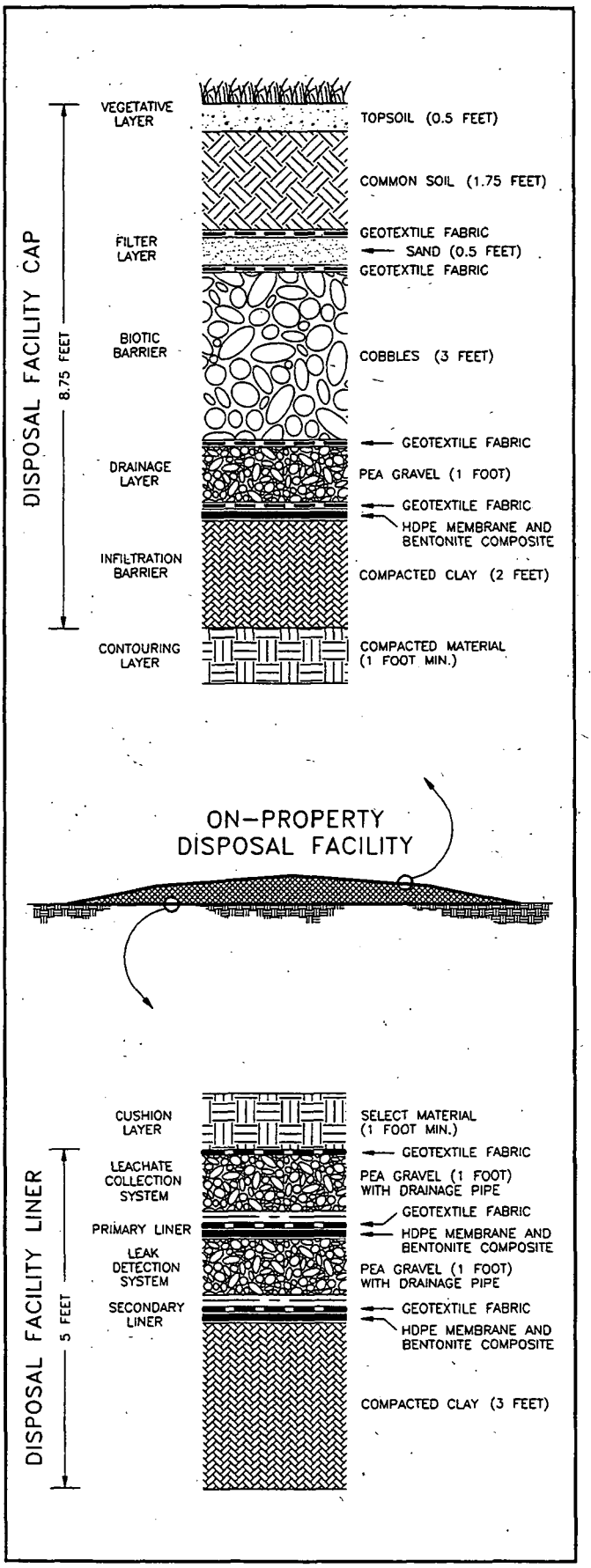
The RI/FS process estimated that the total amount of technetium-99 in OU3 materials is approximately 127 grams. However, leachability study data, supplemented with conservative modeling assumptions, showed that the maximum amount of technetium-99 for OU3 materials that could safely be stored in the on-property disposal facility is 105 grams. In order to not exceed this 105-gram limit for the on-property disposal facility, those materials that have the highest amounts of technetium-99 will be packaged and transported to NTS or an off-site commercial disposal facility.

Process-related metals, acid brick, product, residues, and special materials generally have high concentrations of several contaminants, including technetium-99. By administratively deciding to disposition these materials off-site, the technetium-99 source term remaining in materials considered for on-property disposal is 116 grams. Of all materials contributing to this source term, the most significant contributor is concrete (and concrete-like materials) with a total 102 grams. In order to further reduce the amount of technetium-99 going into the on-property disposal facility, Alternative 2 includes scabbling the top inch of the three most contaminated concrete areas within OU3: the enriched uranium casting area in Plant 9; the uranium machining area in Plant 9; and the muffle furnace area in Plant 8. Additionally, due to inherent chemical and radiological contamination in the Pilot Plant, the top half inch of concrete in the southern extraction area would also be scabbled. The removal and off-site disposition of the scabbled concrete from these four process areas would reduce the total amount of technetium-99 going into the on-property disposal facility to less than 59 grams, which is 44 percent below the 105-gram allowable mass limit.

Under Alternative 2, most of the OU3 remediated materials would be permanently dispositioned in an on-property disposal facility, which would be designed and constructed in accordance with the relevant requirements of the Resource Conservation and Recovery Act and the Uranium Mill Tailings Remediation Control Act. As described in the OU2 ROD, the facility would feature a multi-layer capping system, including a vegetative soil layer, a filter layer, a biotic barrier, a drainage layer, and an infiltration barrier. The disposal facility would also feature a multi-layer liner that would include a leachate collection system, primary and secondary liners separated by a leak detection system, and a low-permeability compacted clay layer. The layers of both the cap and liner would be separated by geotextile fabrics and high-density polyethylene (HDPE) and bentonite composites for added protection. The drawing on the right depicts a possible multi-layered capping and liner system for the on-property disposal facility. The disposal facility would prevent contaminant migration to the air and surface water and is modeled to protect groundwater for a 200- to 1,000-year performance period.

Key elements of Alternative 2 are summarized below:

- Provide for ***unrestricted release*** of materials, as economically feasible, for recycling, reuse, or disposal at a commercial landfill;
- Administratively disposition process-related metals and brick off-site because of the high concentration of COCs generally found in these materials;
- Remove identified material as necessary to achieve the technetium-99 mass-based waste acceptance criteria for on-property disposal and dispose of it off-site;
- Dispose of all remaining wastes in the on-property disposal facility (along with wastes generated by OU2 and OU5);
- Treat materials, where required, to meet the waste acceptance criteria for the off-site disposal facility;
- Impose administrative controls through deed restrictions and access controls; and
- Incorporate post-remediation activities that include long-term monitoring and maintenance of the on-property disposal facility and operation of a groundwater monitoring network to evaluate the performance of the on-property disposal facility.



MULTI-LAYERED LINER AND CAPPING SYSTEM FOR THE ON-PROPERTY DISPOSAL FACILITY

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ALTERNATIVE 2 MATERIAL DISPOSITION QUANTITIES (IN CUBIC FEET)

OU3 Material Category	On-Property Disposal	Unrestricted Release	Off-Site Disposal	Total
Accessible Metals	62,600	835	0	63,400
Inaccessible Metals	1,740,000	0	0	1,740,000
Process-Related Metals	0	0	151,000	151,000
Painted, Light-Gauge Metals	7,150	0	0	7,150
Concrete	4,700,000	0	2,400	4,700,000
Brick	0	0	20,700	20,700
Non-Regulated Asbestos-Containing Materials	71,300	0	0	71,300
Regulated Asbestos-Containing Materials	80,200	0	0	80,200
Miscellaneous Materials	396,000	308,000	0	704,000
Total	**7,060,000**	**309,000**	**174,000**	**7,540,000**

A summary of the disposition paths for OU3 materials is presented in the table above. As shown in this table, approximately 7.06 million cubic feet of OU3 materials (not including product, residues, and special materials) would be disposed of directly in the on-property disposal facility. Approximately 308,000 cubic feet of miscellaneous materials and 835 cubic feet of structural steel associated with administrative structures are not contaminated and could be released for unrestricted reuse or recycling, disposed of in a commercial landfill, or also included in the on-property disposal facility. Release of these materials would be subject to a certification program coordinated with the EPAs. Another 174,000 cubic feet are to be disposed of at NTS or an off-site commercial disposal facility.

Implementation of Alternative 2 would rely on coordination with other Fernald remedial actions to provide certain elements, including the on-property disposal facility, long-term monitoring, and security.

The OU3 interim action started generating debris with the removal of pipe insulation from Plant 4 in the summer of 1995. If Alternative 2 is selected, remediation materials from Plant 4 (and following projects) would stay in interim storage for approximately two to three years until the on-property disposal facility is engineered, constructed, and begins accepting OU3 materials. At that time, the movement of remediation materials from interim storage to the disposal facility (as well as newly-generated debris from on-going dismantlement projects) would be prioritized to reduce interim storage requirements.

Alternative 3 -- Selected Material Treatment and Off-Site Disposal

The primary difference between Alternatives 2 and 3 is the disposal location for OU3 materials. Under this alternative, all remediation materials would be dispositioned at an off-site disposal facility. Key elements of the alternative are summarized below:

- Provide for unrestricted release of materials, as economically feasible, for recycling, reuse, or disposal at a commercial landfill;
- Treat materials, where required, to meet the waste acceptance criteria for the off-site disposal facility; and
- Dispose of wastes in an off-site disposal facility if waste acceptance criteria are met.

Like Alternative 2, 309,000 cubic feet of miscellaneous materials and structural steel, which are not contaminated, could be released or disposed of in a commercial landfill. The remaining material (7.23 million cubic feet) would be disposed of at NTS or an off-site disposal facility.

Implementation of Alternative 3 would rely on coordination with other Fernald remedial actions to provide for certain elements, including the waste shipment facilities, and the fencing and security prescribed under administrative controls. For this alternative, any rail shipment of materials off-site would be coordinated with the rail shipments occurring for OU1.

COMPARISON AND EVALUATION OF ALTERNATIVES

To provide a basis for selecting the preferred remedial action alternative, each alternative is evaluated against specific U.S. EPA criteria. These criteria are described in the shaded box to the right.

The first two criteria are "threshold" criteria, meaning that they must be attained if the alternative is to be considered further in the evaluation and selection process. The one notable exception is that waivers to ***applicable or relevant and appropriate requirements (ARARs)*** can be obtained in accordance with 40 CFR 300.430 (f)(1)(ii)(C), as long as protectiveness of human health and the environment can still be demonstrated. The next five criteria form the basis for the comparative analysis of viable remedial alternatives. These five are called "primary balancing" criteria because they are used to evaluate the relative tradeoffs among the alternatives that pass the threshold criteria. The last two criteria are "modifying" criteria because DOE and U.S. EPA may modify the preferred alternative or select another response action based on comments received during the public comment period.

Overall Protection of Human Health and the Environment

This criterion addresses the means by which a potential remedy would reduce, eliminate, or control the risks posed by OU3 materials to human health and the environment. The methods used to achieve an adequate level of protection may include engineering controls, waste treatment techniques, or other controls such as restriction on the future use of the site. Total elimination of risk is often impossible; however, a remedy must minimize risk to ensure human health and the environment are protected.

Under Alternative 1, all OU3 materials at the site would be stored without continued maintenance. Over the long-term, exposure of these materials to the weather would lead to unacceptable releases to the environment. This alternative would not protect human health or the environment. Alternative 2 would employ conservative design considerations from other engineered disposal facilities, including Uranium Mill Tailings Remediation Control Act standards and Resource Conservation and Recovery Act regulations, to ensure the long-term performance of the disposal facility. These standards would require the use of multilayered capping and lining systems, the development of contaminant- and material-specific waste acceptance criteria, and the use of a design which ensures protectiveness for 200 to 1,000 years. These design considerations would supplement the natural containment capabilities of

EVALUATION CRITERIA

The following criteria are based on guidance published by the U.S. EPA and are used to evaluate each of the possible remedial action alternatives. The first seven criteria are discussed more thoroughly in this Proposed Plan along with how the criteria apply to each alternative. The last two criteria, *State Acceptance* and *Community Acceptance*, will be addressed during the public comment period.

1. *Overall protection of human health and the environment* addresses whether an alternative eliminates, reduces, or controls threats to public health and the environment.

2. *Compliance with ARARs* addresses whether an alternative meets federal and state environmental laws and regulations.

3. *Short-term effectiveness* considers the time needed for an alternative to achieve remedial response objectives and the risks posed to workers, residents, and the environment during the remedial action.

4. *Long-term effectiveness and permanence* considers the ability of an alternative to protect public health and the environment long after remedial action is complete.

5. *Reduction of toxicity, mobility, or volume through treatment* evaluates an alternative's use of treatment to reduce the harmful nature of contaminants, their ability to move in the environment, and the amount, or volume, of contamination present.

6. *Implementability* addresses the feasibility of an alternative, both from a technical and an administrative standpoint.

7. *Cost* considers the amount of money it will take to design, construct, operate, and maintain the alternative.

8. *State acceptance* addresses comments made by the Ohio EPA concerning the alternatives considered.

9. *Community acceptance* addresses the formal comments made by the public on the alternatives being considered. You can voice your opinion as a member of the public either by completing the attached comment sheet and sending it to DOE, or by speaking at the public meeting on April 23, 1996. At the end of the public comment period, DOE will respond to questions and comments. These responses will become part of the Record of Decision document.

the existing site geology to ensure the long-term performance of the disposal system. Alternative 3 would also protect human health and the environment because all OU3 materials would be removed from Fernald and dispositioned off-site.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

This criterion determines whether a selected remedy will meet all related federal, state, and local requirements. These requirements may specify maximum concentrations of chemicals that can remain at a site, specify design or performance requirements for treatment technologies, and impose restrictions that may limit potential remedial activities at a site because of its location.

Because of anticipated releases from ongoing storage, Alternative 1 would not comply with ARARs. Alternative 2 would comply with all identified ARARs or meet the requirements of an ARAR waiver of the State of Ohio solid waste disposal facility siting requirements [OAC 3745-27-07(H)(2)(c)and(d)]. To be granted the waiver, the DOE would be required to adopt an engineering design for the facility which, when coupled with existing site geologic conditions, would attain a standard of performance that is equivalent to that required under State of Ohio solid waste disposal facility siting requirements. Alternative 3 would comply with all ARARs.

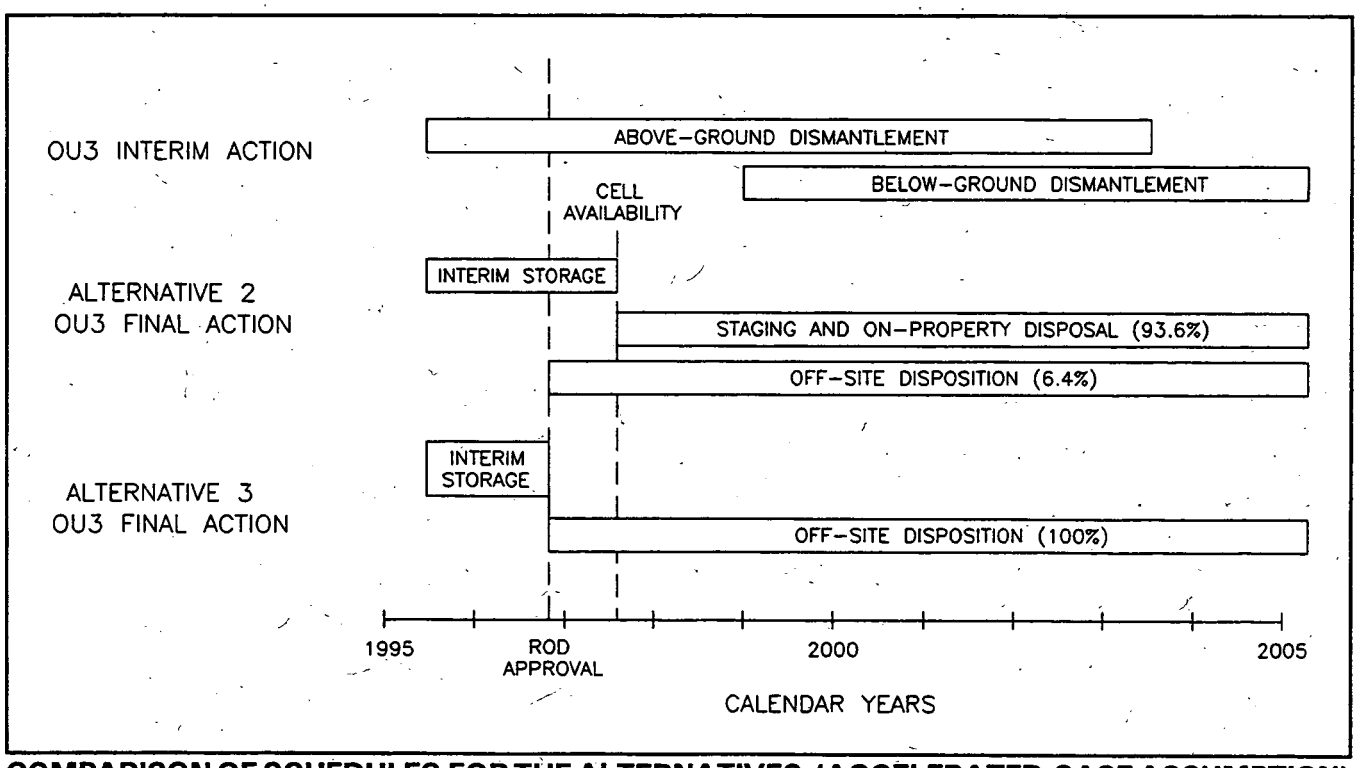
Short-Term Effectiveness

This criterion evaluates the potential impacts of the alternative to workers, the public, and the environment.

Alternative 1 presents no short-term impacts since no worker action would occur. Risks from radiological and chemical exposures from both Alternatives 2 and 3 are within acceptable levels. The most significant element of the short-term effectiveness of Alternatives 2 and 3 is the risk associated with projected injuries related to mechanical hazards. These risks are greater for Alternative 3 than Alternative 2 due to the greater number of manhours associated with weighing, certifying, and loading containers for off-site shipment. Additionally, the increased number of shipments off-site associated with Alternative 3 raises the risk for potential accidents. The schedule, as shown below, illustrates the overlap of the final remedial action and the interim remedial action. This schedule is based on site remediation under a DOE budget scenario that would enable the completion of OU3 remediation in approximately ten years.

Long-Term Effectiveness and Permanence

This criterion evaluates the ability of a potential remedy to reliably protect human health and the environment over a long period of time after the remedial goals have been accomplished.



COMPARISON OF SCHEDULES FOR THE ALTERNATIVES (ACCELERATED CASE ASSUMPTION)

Alternative 1 would present an unacceptable magnitude of risk remaining at Fernald and would provide the most limited amount of reliability and permanence. Long-term risks to potential trespassers from uncontrolled storage of contaminated materials would exceed acceptable risk levels. Both Alternatives 2 and 3 achieve high levels of protectiveness and permanence. The implementation of Alternative 2 would rely on engineering and administrative controls to ensure the long-term performance of the remedy and maintain the protection of human health and the environment over time. Long-term monitoring activities are currently proposed by other approved remedial actions and would continue for OU3. For Alternative 3, the removal of all materials to off-site disposal locations would ensure the long-term protection of human health and the environment at Fernald. Under Alternative 3, no long-term requirements for continued administrative controls, surveillance, or maintenance would be necessary for OU3.

Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion assesses how effectively a proposed remedy will address the contamination problem. Factors considered include the nature of the treatment process, the amount of hazardous materials that will be destroyed by the treatment process, how effectively the process reduces the toxicity, mobility, or volume of waste, and the type and quantity of contamination that will remain after treatment.

Alternative 1 would provide no reduction in contaminant toxicity, mobility, or volume. Furthermore, by placing all materials into permanent storage without continued maintenance, the mobility of the contaminants would increase over time and would lead to eventual releases to the environment. For Alternatives 2 and 3, mixed wastes would be treated through solidification or encapsulation to meet land disposal restrictions and would thereby reduce the contaminant mobility. Because the same quantity of material would be treated, the reduction of toxicity, mobility, or volume would be the same for Alternatives 2 and 3.

Implementability

This criterion addresses the relative ease or difficulty with which a remedy can be put in place. Factors affecting implementability include materials and services.

Alternative 1 is the most readily implementable, since it requires no additional action beyond the implementation of the OU3 IROD. Because of the approval and construction of a site-wide on-property disposal facility for OU2 and OU5, Alternative 2 would be easier to implement than Alternative 3. The construction of an on-property disposal facility is considered readily implementable through the use of existing technologies and construction methods. Furthermore, under Alternative 2, a small portion of the OU3 materials would be dispositioned off-site, and would thus require truck transportation. For Alternative 3, implementation would require coordination with OU1 to transport OU3 material to the representative off-site disposal facility. This quantity to be transported off-site currently exceeds Fernald's shipping capacity. Considerable coordination would be required between DOE and various states and municipalities to facilitate the transportation of such large quantities of materials. Due to the large quantity of material to be disposed and the extended duration of the project, the available capacity for off-site disposal at current facilities or facilities yet to be constructed is unclear. For these reasons, Alternative 3 is considered less implementable than Alternative 2.

Cost

This criterion includes capital costs for design and construction as well as projected long-term maintenance costs. The cost is considered and compared to the benefit that will result from implementing the remedy.

Two methods are used to present costs associated with implementing each of the alternatives. As shown in the "Summary Table for the Evaluation of Alternatives" on page 16, the first method illustrates the costs in 1995 constant dollars. In other words, if the entire cost of the alternative was paid in 1995, then that cost would be considered to be in 1995 constant dollars. However, because of inflation, work performed in the future will undoubtedly cost more than work performed today.

To account for this and the time value (or investment potential) of money, a second cost estimating approach is used, called present worth analysis. Present worth analysis calculates the amount of money that would have to be invested today to pay for the cleanup over the years of implementation. The real interest rate applied in the present worth analysis is determined by the Federal Government's Office of Management and Budget to be 4.8 percent, based on an investment interest rate minus the rate of inflation.

No additional cost is associated with Alternative 1 since no additional action would be required. Current estimates indicate that Alternative 2 would cost $95

million in constant year dollars, which is equivalent to a present worth cost of $71 million. Due to the higher costs associated with off-site transportation and disposal, the cost of Alternative 3 is estimated to be $190 million in constant year dollars. This equates to a present worth cost of $150 million.

State Acceptance

State acceptance and/or concerns regarding the *OU3 RI/FS Report* and Proposed Plan have been incorporated in the final version of those documents. Any additional concerns identified during the public comment period will be incorporated in the final ROD and responsiveness summary.

Community Acceptance

During the public comment period, interested members of the public can voice their opinion on which parts of the alternative they support, which parts they may have reservations about, and which parts they oppose. Public comments may be submitted in writing using the attached comment sheet, or verbally during the public meeting. Community acceptance will be assessed after the public comment period and will be addressed in the ROD.

PREFERRED REMEDIAL ALTERNATIVE

Based on the comparative evaluation presented above and summarized on page 16, U.S. EPA and DOE have identified Alternative 2, *Selected Material Treatment, On-Property Disposal, and Off-Site Disposition,* as the preferred remedial alternative. This alternative calls for the release of certain items, such as equipment, tools, etc., to other DOE sites or as scrap material to the extent practicable. All OU3 materials that remain at Fernald following the interim remedial action will be evaluated, based on material type and contaminant levels, to determine the least-cost disposition option.

Alternative 2 is recommended because it provides a remedy which is reliable over the long term, is less costly, and is readily implementable. All short-term exposures from the preferred alternative are estimated to be within acceptable limits. Also, the alternative would be in compliance with all ARARs or meet the requirements of an ARAR waiver of the State of Ohio solid waste disposal facility siting requirements [OAC 3745-27-07(H)(2)(c)and(d)].

The DOE will continue to assess the viability of emerging technologies to support the selected remedy in a more cost effective and equally or more protective manner.

SUMMARY OF RISKS FOR THE PREFERRED ALTERNATIVE

The proposed action was analyzed for potential health effects on the general public and workers and for general environmental impacts. Potential health impacts were analyzed for two general types of receptors: remediation workers involved in the proposed action; and the general public. An assessment of both radiological and chemical contaminants was performed to support this summary. Both potential ***doses*** and risks were developed as estimates; dose represents the amount of exposure to a contaminant that an individual receives, while risk is the affect of that dose and equals the chance of additional cancer incidence. The potential risks to the general public, the workers, and the environment are summarized in the following sections.

Health Effects: General Public

For the general public, two hypothetical receptors (an off-site resident and an individual along the primary transportation route) were assessed for radiological and chemical contaminants under maximum exposure situations. Based on this assessment, it is estimated that the total risk to each receptor, under the preferred alternative, is expected to be lower than the EPA acceptable risk range of 10^{-4} (one in ten thousand) to 10^{-6} (one in a million). The estimated risk to the maximally exposed off-site resident due to radionuclide inhalation associated with the preferred remedial alternative is about 2.9×10^{-6}, which represents a one in 340,000 chance of additional cancer incidence. The risk due to inhalation of chemicals is about 5.8×10^{-7} (one in 1.7 million). These potential risks would be minimized by implementing a combination of engineering (dust suppression) and administrative (physical barriers) controls.

Risks to the maximally exposed member of the public along the off-site transportation route are a result of direct radiation exposure and equal about 1.9×10^{-9} (one in 530 million) for incident-free transport. Under a potential traffic accident, the risks to the maximally exposed member of the public could be 6.6×10^{-11} (one in 15 billion) chance of additional cancer incidence. These risks are below the EPA risk range and are, therefore, acceptable.

Health Effects: Workers

Potential health impacts were analyzed for three types of Fernald workers: remediation workers involved in the loading, inspection, and movement of containerized material within the Fernald site boundaries; administrative support staff at Fernald

SUMMARY TABLE FOR THE EVALUATION OF ALTERNATIVES

Evaluation Criteria	Alternative 1 No Further Action	Alternative 2 Selected Material Treatment, On-Property and Off-Site Disposal	Alternative 3 Selected Material Treatment and Off-Site Disposal
Overall protection of human health and the environment	Not protective of human health and the environment.	Provides overall protection of human health and the environment.	Provides overall protection of human health and the environment.
Compliance with ARARs	Not compliant because no further action would likely result in exposures to the public and releases to the environment.	Compliant with all ARARs or meets the requirements of an ARAR waiver of the State of Ohio solid waste disposal facility siting requirements.	Compliant with all ARARs.
Short-term effectiveness	No short-term risks since no action would be taken.	All radiological and chemical exposures are estimated to be within acceptable limits. This alternative presents lower short-term risks associated with mechanical hazards than Alternative 3.	All radiological and chemical exposures are estimated to be within acceptable limits. Greater mechanical hazards than Alternative 2 due to injuries from transporting all materials to off-site disposal facilities.
Long-term effectiveness and permanence	Not protective in the long-term. Would result in unacceptable long-term risks to the public.	Is protective of human health and the environment through site geology, engineering, and administrative controls. However, Alternative 2 is less effective and permanent in the long-term than Alternative 3.	Is the most effective and permanent since all contaminated material would be removed from Fernald with no long-term requirements for continued administrative controls, surveillance, or maintenance activities.
Reduction in toxicity, mobility, or volume through treatment	Due to unmaintained storage of dismantled debris, contaminant mobility is expected to increase.	Potentially treats 5,280 cubic feet of material to meet land disposal restrictions for off-site disposal and 50 cubic feet of material to meet criteria for on-property disposal.	Potentially treats 5,330 cubic feet of material to meet land disposal restrictions for off-site disposal.
Implementability	Easier to implement than Alternatives 2 or 3 because no action occurs.	Easier to implement than Alternative 3 because this alternative only requires placement of OU3 materials into an on-property disposal facility already being constructed for OU2 and OU5 materials.	Hardest alternative to implement because it is dependent on whether agreements are reached with off-site disposal facilities to accept waste. Considerably more coordination would be required with state and local authorities along transportation routes. The volume of material would also require a longer time period to complete shipments.
Current year (1995) cost (in millions)	$0	$95	$190
Present worth cost (in millions)	$0	$71	$150
State Acceptance	Will be documented in the ROD and responsiveness summary.	Will be documented in the ROD and responsiveness summary.	Will be documented in the ROD and responsiveness summary.
Community Acceptance	Will be addressed when comments are received from the public.	Will be addressed when comments are received from the public.	Will be addressed when comments are received from the public.

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referred to as non-remediation workers; and truck drivers who transport wastes to off-site disposal facilities.

The dose to the maximally exposed remediation worker as a consequence of direct radiation and inhalation of radionuclides is estimated to be 140 millirem per year, which is 36 times below the safe limit for occupational workers of 5,000 millirem per year, as specified in DOE Order 5480.11. These occupational doses are based on a remediation worker standing one meter away from waste containers and piles while inspecting them for eight hours per day, 250 working days per year. For comparison purposes, an average individual in the United States receives a radiation dose of about 300 millirem per year from natural ***background radiation***.

Based on the annual dose of 140 millirem and a ten-year schedule, the total project risk to a remediation worker from radionuclides would be about 1.2×10^{-5} (one in 83,000). The associated chemical risk to a remediation worker, based on inhalation, would be 9.8×10^{-7} (one in a million) for the entire ten-year action.

The non-remediation worker is an administrative worker who is located more than 300 meters from cleanup activities. Because of this distance, the annual dose of 0.005 millirem to non-remediation workers from direct radiation is considerably lower than the dose to the remediation worker. Based on a ten-year schedule, the total project risk to a non-remediation worker would be about 1.2×10^{-6} (one in 830,000) from radionuclides and 9.8×10^{-8} (one in ten million) from chemicals.

The third type of worker is a truck driver, who is conservatively assumed to transport every container destined for off-site disposal. The cumulative dose from radiological direct exposure for this maximally exposed driver is estimated at 570 millirem over the duration of the ten-year project. The associated total project risk for this truck driver is 4.3×10^{-4} (one in 2,300).

Because of worker protection including engineering, administrative, and monitoring controls that would be used during the preferred alternative, all exposures to the three types of workers would remain within acceptable levels. In addition, the risks from inhalation for both remediation and non-remediation workers may be overestimated by two orders of magnitude. These risks were calculated using the conservative assumption that all contaminants within OU3 concrete would become airborne as the concrete is placed in the on-property disposal facility. However, dust suppressants would be used to control contaminants from becoming airborne.

Another consideration when determining project risk to workers is mechanical hazards (industrial accidents) associated with site remediation activities. The number of accidents from on-property activities estimated from the preferred remedial alternative is approximately 14 injuries and less than one fatality. Mechanical hazards associated with transporting waste materials are estimated to result in less than one injury to members of the public and truck drivers combined.

Environmental Effects

The preferred alternative would produce overall positive environmental impacts because disposing of the contaminated material generated during the interim remedial action would reduce the potential for releases to the environment. Also, cleanup activities would allow for the majority of the Fernald site to be returned to some form of beneficial use, like an undeveloped park.

SITE-WIDE INTEGRATION OF REMEDIES

Of the five operable units at Fernald, OU3 is chronologically the last to issue a Proposed Plan for public comment. Each of the operable unit FS reports has provided a progressive evaluation of the projected Fernald site-wide remedy, using the best information available at the time, to predict post-remediation site conditions. This site-wide remedy incorporates the selected or preferred alternative for each operable unit, as appropriate. The intent of the analysis is to progressively monitor the interfaces among the operable units to ensure that the final adopted site-wide remedy would be well thought out, would be cost effective, and would ensure the long-term protection of human health and the environment.

The *OU3 RI/FS Report* includes an evaluation employing the preferred OU3 alternative in conjunction with the selected remedies for other operable units listed in the table on the top of page 18.

Material with higher levels of contamination, deemed to represent the principal threat at the site, would be treated (if required) and shipped off-site for disposal. Material exhibiting lower contaminant concentrations

REMEDIES ADOPTED TO COMPLETE SITE-WIDE ANALYSIS

Operable Unit	Key Components
OU1 - Waste Pits	• Excavation of pit contents, caps, berms, and lining system • Excavation of contaminated soil underlying pits and placement of soil and oversized debris meeting the waste acceptance criteria in the on-property disposal facility • Drying of excavated soil and waste, as required • Shipment of excavated material (including soils and debris not meeting the waste acceptance criteria of the on-property disposal facility) by rail to off-site disposal facility • Decontamination and demolition of all OU1 structures and support facilities
OU2 - Other Waste Units	• Excavation of waste materials and adjacent contaminated soil • Shipment to off-site disposal facility of material not meeting waste acceptance criteria of on-property disposal facility • Placement of excavated material meeting waste acceptance criteria in on-property disposal facility
OU4 - Silos 1-4	• Removal and vitrification of waste inventories • Off-site disposal of vitrified waste • Excavation of contaminated soil and placement of soil and oversized debris meeting the waste acceptance criteria in the on-property disposal facility • Decontamination and demolition of silo structures and support facilities • Placement of rubble and debris in on-property disposal facility
OU5 -Environmental Media	• Excavation and consolidation of contaminated soil and sediment • Disposal of soil and sediment meeting waste acceptance criteria in the on-property disposal facility • Off-site disposal of soil and sediment not meeting waste acceptance criteria of on-property facility • Extraction and treatment of contaminated groundwater • Collection and treatment of contaminated stormwater • Decontamination and demolition of support facilities used during remedial activities • Recycling/reuse of generated debris and equipment to the extent practical • Disposal of all materials remaining after closure of the on-property disposal facility at an off-site disposal facility
Continuing Site-wide Issues	• Long-term environmental monitoring program for the Fernald site • Continued maintenance and surveillance of the on-property disposal facility • Performance of reviews of site conditions by EPA every five years • Continued federal ownership of on-property disposal facility area • Restrictions placed in FEMP property deed pertaining to future uses of the site

distributed over a larger volume, termed a secondary threat, would be permanently disposed of at the Fernald site in one central engineered disposal facility.

The analysis of the adopted site-wide remedy performed for the OU3 RI/FS included a risk analysis of the post-remedial site conditions. The purpose of this risk analysis was to determine whether the clean-up levels of the site-wide remedy would ensure the long-term protection of hypothetical recreational users and off-site farmers. This risk analysis examined the long-term performance of the disposal facility and the potential risks to future human receptors. The risks are due to residual concentrations of contaminants remaining at the site in soil and groundwater following the certified completion of remedial actions at Fernald.

The results of this risk analysis indicate that the adopted site-wide remedy would provide a maximum estimated risk to a future recreational user of the Fernald site within the 10^{-6} (one in a million) range. The maximum calculated risk to a hypothetical off-site farmer located immediately adjacent to the Fernald site for a 70-year lifetime would be within the 10^{-5} (one in 100,000) range.

In the unlikely event the projected administrative controls (i.e., continued federal ownership, deed

restrictions, etc.) established to maintain the adopted land use were to fail, the maximum incremental risk a hypothetical on-property farmer would receive from the post-remediation site conditions was in the 10^{-4} (one in 10,000) range.

In completing the RI/FS for OU3 and the other Fernald operable units, DOE has acknowledged that uncertainties exist which may affect the course of remedial actions once field work is underway. Uncertainties can be managed by emphasizing conservatism for any assumptions made and by planning for additional data evaluation and assessment as the remedial actions are implemented. By acknowledging the existence of uncertainties, bounding assumptions on the conservative side, and planning for an iterative approach to implementation of the remedial actions, DOE and Fernald stakeholders can move forward with the decision-making process.

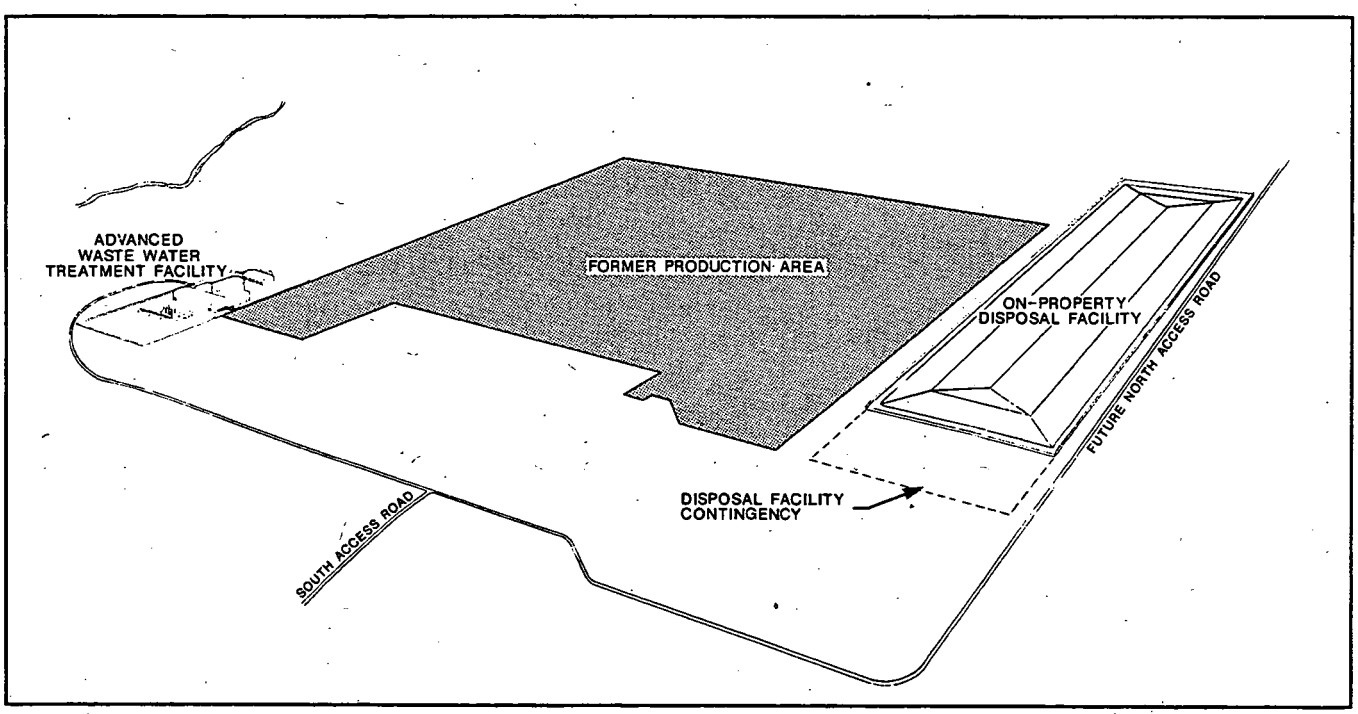
An artist's rendition of the appearance of the site following implementation of the adopted site-wide remedy is shown below. The proposed engineered disposal facility is estimated to be 3,700 feet (including contingency) by 800 feet and range in height from approximately 40 to 65 feet (including the cap, which is shown on page 10). The size of the facility is based upon the consolidation of about 2.5 million cubic yards of contaminated soil and construction debris from all operable units, with Operable Units 1 and 4 contributing a small portion of soil and debris.

The overall conclusion of the evaluation completed for the adopted site-wide remedy was that, collectively, the selected or preferred alternative for each operable unit would provide for the protection of human health and the environment over the long-term (i.e., up to or beyond 1,000 years). The evaluation further concluded that the adopted site-wide remedy would attain the adopted land use objective (i.e., restricted use of Fernald for industrial and recreational purposes) and provide for the long-term protection of the water quality in the Great Miami Aquifer.

COMMUNITY PARTICIPATION

DOE encourages public participation in the selection of the preferred alternative for the cleanup of OU3. Members of the public are encouraged to read and provide comments on the *OU3 RI/FS Report* and this Proposed Plan. The *OU3 RI/FS Report* describes the remedial action alternatives, based on field characterization, and describes the advantages and disadvantages of each alternative.

A final remedy selection for the disposal of OU3 materials will be made with consideration of stakeholder input. Based upon comments and information received, the preferred remedial alternative may be modified, another alternative identified in this Proposed Plan may be selected, or a new alternative may be selected.



ARTIST'S RENDITION OF THE FERNALD SITE FOLLOWING SITE-WIDE CLEANUP

The Public Environmental Information Center, or PEIC, houses the ***Administrative Record***, which is the official repository for documentation related to the RI/FS process at Fernald. The public is invited to review information on the OU3 RI/FS and other Fernald activities at the PEIC. The PEIC address and operating hours are:

Fernald Environmental Management Project
Public Environmental Information Center
10845 Hamilton-Cleves Highway (S.R. 128)
Harrison, OH 45030
phone: (513) 738-0164
fax: (513) 648-3801

Monday	9:00 a.m. - 7:00 p.m.
Tuesday	9:00 a.m. - 4:30 p.m.
Wednesday	9:00 a.m. - 4:30 p.m.
Thursday	9:00 a.m. - 7:00 p.m.
Friday	9:00 a.m. - 4:30 p.m.
Saturday	9:00 a.m. - 1:00 p.m.
Sunday and Holidays	Closed

For timely information on Fernald-related meetings and documents available for public comment or inspection, call the Fernald community information line at (513) 648-6272.

The OU3 public comment period will be open from April 3 to May 2, 1996. Any changes to these dates will be announced in the local media and posted at the PEIC (see the shaded box above).

THE NEXT STEP

Following the public comment period and associated public meeting, and assuming public acceptance of the preferred alternative, the DOE and U.S. EPA, with concurrence from Ohio EPA, will sign the OU3 final remedial action ROD. The ROD will describe the selected action and will include a responsiveness summary that provides responses to comments received during the public comment period and demonstrates how the remedy was modified by public input. After the document is signed, a plan for performing the remedial design and remedial action will be prepared. Once the design is complete, the final remedial action can begin.

This publication was printed on paper that is manufactured with at least 50% reclaimed fiber.

Public Comment Period

DOE and U.S. EPA will hold a 30-day public comment period for the Operable Unit 3 Proposed Plan from April 3 to May 2, 1996. The comment period provides an opportunity for local residents and interested parties to express their views and concerns on the remedial alternatives being considered. Copies of the OU3 RI/FS Report and this Proposed Plan are available in the Fernald Administrative Record and at the U.S. EPA regional office in Chicago, Illinois.

Public Meeting

DOE, in coordination with the U.S. and Ohio EPAs, will also hold a public meeting during the public comment period to discuss the alternatives and to answer questions. The meeting is scheduled for 7:00 p.m. on Tuesday, April 23, 1996 at The Plantation in Harrison, Ohio. Written and oral comments will be accepted during the meeting.

Submitting Your Comments

Your comments on the final remedy for OU3 may be either presented at the public meeting or sent (via mail or fax) to either of the following addresses or fax numbers:

Mr. Gary Stegner
Public Information Director
DOE Fernald Area Office
P.O. Box 538705
Cincinnati, OH 45253-8705
phone: (513) 648-3153
fax: (513) 648-3073

Mr. James Saric
Remedial Project Manager
U.S. EPA Region V (HSF-5J)
77 West Jackson Blvd.
Chicago, IL 60604-3590
phone: (312) 886-0992
fax: (312) 886-0753

The Ohio EPA is also participating in the remedy selection process. For additional information concerning the State of Ohio's role in the Fernald cleanup process, contact:

Mr. Tom Schneider
Fernald Project Manager
Ohio EPA
401 East Fifth St.
Dayton, OH 45402-2911
phone: (513) 285-6466
fax: (513) 285-6404

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GLOSSARY

Accessible Metals: a material category comprised of metals with large, accessible surface areas and thicknesses greater than or equal to 1/4-inch. This category also includes structural steel and decking.

Administrative Controls: the elimination of hazards through administrative means, such as management, procedures, record-keeping, and assessments. Administrative controls are not intended to physically stop individuals from entering hazardous areas or to remove hazards.

Administrative Record: the Administrative Record contains documentation of CERCLA-related activities for each operable unit. The documents in the Administrative Record are used to make decisions in Fernald's remediation program, as well as for short-term protective measures (removal actions) implemented until a final remediation plan can be put into effect. The Administrative Record is made available for public review so that community members have the opportunity to provide comments to the DOE on proposed cleanup activities at the Fernald site. The Administrative Record for the Fernald site is located at the Public Environmental Information Center.

Applicable or Relevant and Appropriate Requirements (ARARs): federal and state (usually included if they are more strict) standards that are legally applicable, or relevant and appropriate, at a Superfund site. ARARs, specifically, are cleanup standards, controls, and other measures which are borrowed from existing regulations to protect the environment.

Background Radiation: the radiation in the natural environment, including cosmic rays and radiation from naturally radioactive elements, both inside and outside the bodies of humans and animals. Many of the radiological and all of the inorganic contaminants present at Fernald exist naturally in measurable concentrations in all environmental media. The background concentration of each contaminant varies from point to point within a range for each material.

Baseline: an estimated concentration which is based on sampling data and literature values that represents a background level for an analyte in a material.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Superfund Amendments and Reauthorization Act (SARA): CERCLA is a Federal law, passed in 1980 and modified in 1986 (called SARA), that addresses the cleanup of contaminant releases to the environment. At Fernald, the DOE is the responsible party and is remediating the site with oversight from the U.S. EPA. The relevance of SARA to the Fernald site is that SARA contains provisions for setting up the Administrative Record as a vehicle for public involvement in cleanup activities.

Constituent of Concern (COC): chemical and/or radiological contaminants present within the operable unit that pose a risk of cancer or other adverse effects to human health and the environment as a result of exposure to the contaminants.

Dose: a term to describe the amount of exposure to a contaminant an individual receives. Exposures include inhalation (breathing), ingestion (swallowing), and external contact (touching).

Engineering Controls: the elimination of hazards through mechanical means or process design, which physically prevent entry, minimize hazards, or create some kind of barrier.

Hazardous Waste: a waste material exhibiting the characteristics of ignitability, corrosivity, reactivity, or toxicity or listed in 40 CFR 261, "Protection of Environment/Solid Waste/Resource Conservation and Recovery Act" or identified in applicable state regulations.

Hold-Up Material: feed stock, intermediate product material, and residual process material remaining in and on process equipment (i.e., clinging to the surfaces of the various pumps, pipes, vessels, or other equipment surfaces).

Inaccessible Metals: a material category consisting of metals with primarily inaccessible surface areas. This category includes non-process piping, conduit/wire, electrical fixtures, miscellaneous electrical items, doors, and other materials.

Intrusive Sample: a sample that is collected by disturbing the surface of the material from which the sample is to be collected. An example would be chipping concrete off a block, drilling through wood, or digging into the ground. A non-intrusive sample, in contrast, would be obtained by wiping the surface of the material.

Leachability: describes how readily a contaminant dissolves in a liquid (like rainwater).

GLOSSARY (continued)

Legacy Wastes: a term used at Fernald for the inventory of waste that was generated during the years of Fernald production (before 1989). Legacy wastes include containerized low-level radioactive waste, hazardous waste, mixed waste, and TSCA wastes (i.e., asbestos and PCBs). All materials generated after 1989 that are similar in nature to the production-related wastes will be handled as if they are legacy wastes.

National Priorities List (NPL): U.S. EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. EPA is required to update the NPL at least once a year.

Non-Regulated Asbestos-Containing Material: a material category consisting of non-friable asbestos-containing materials, such as transite building siding and roofing, insulating bricks on boilers, and old floor tile.

Operable Unit: an operable unit (OU) can represent a number of separate activities undertaken as part of a Superfund site cleanup. At Fernald, five operable units make up the site for the purposes of cleanup. Each operable unit is defined based on a reasonable grouping or area of problems.

Painted Light-Gauge Metals: a material category consisting of painted metals less than or equal to 1/8 inch thick. All painted metals are assumed to have lead-based paint present. This category includes ductwork, louvers, metal interior and exterior wall panels, metal roof panels, and sheet lead.

Receptor: a person, animal, or plant exposed to cancer-causing or toxic agents which may cause health problems.

Record of Decision (ROD) and Interim Remedial Action Record of Decision (IROD): RODs and IRODs are public documents that explain which cleanup alternative(s) will be used at CERCLA sites.

Regulated Asbestos-Containing Material: a material category comprised of asbestos-containing material found in a loose or "friable" state. The largest source at Fernald is piping and ductwork insulation.

Remedial Action: the implementation of the action determined in the Record of Decision and represents the last phase of a Superfund site cleanup.

Remedial Design: the technical analysis and procedures that follow the selection of a site remedy, resulting in a detailed set of plans and specifications for implementation of the remedial action.

Remedial Investigation/Feasibility Study (RI/FS) Reports: two reports that are usually developed concurrently. The RI is conducted for collection of data and site characterization to determine the necessary remedial action and support the evaluation of remedial alternatives. The FS is conducted to define the objectives of the response action, develop remedial action alternatives, and undertake an initial screening and detailed analysis of the alternatives. For OU3, the RI/FS is being presented as a single document since the IROD and subsequent modification of the RI/FS Work Plan Addendum precludes much of the content normally presented in the RI and FS documentation.

Removal Action: a short-term, immediate action taken to address releases of hazardous substances that require a quick response.

Risk: the conversion of a dose value to an expected effect on living organisms is reported as a risk. Under CERCLA, risk is generally meant to indicate the probability for specific health effects as a result of dose.

Segregation Categories: the further subdivision of the ten OU3 material categories based on regulatory criteria and contaminant characteristics.

Source Term: the estimated amount of a contaminant present in a material.

Unrestricted Release: the release of materials for unrestricted use to a non-radiologically controlled environment.

Waste Acceptance Criteria: a set of specifications and conditions under which disposal facilities can accept waste. These criteria include (but are not limited to) packaging, external radiation levels, and analytical documentation.

COMMENT SHEET

DOE is interested in your comments on the cleanup alternatives being considered in the Operable Unit 3 Proposed Plan, including the preferred alternative. Please use the space provided below to write your comments, then fold, staple or tape, and mail this form. DOE must receive your comments on or before the close of the public comment period on May 2, 1996. If you have questions about the comment period, please contact Gary Stegner, the DOE Fernald Area Office Public Information Director, at (513) 648-3153.

Name:_____

Address:_____

City:_____ **State/Zip:**_____

Phone:_____

MAILING LIST ADDITIONS:

Please add my name to the Fernald Mailing List to receive additional information on the cleanup progress at the Fernald Environmental Management Project:

YES____ **NO**____

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GARY STEGNER
PUBLIC INFORMATION DIRECTOR
DOE FERNALD AREA OFFICE
US DEPARTMENT OF ENERGY
PO BOX 538705
CINCINNATI OH 45253-9985

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For More Information

Additional information or related cleanup documents are available to the public at the following location:

Public Environmental Information Center
JAMTEK Building
10845 Hamilton-Cleves Highway
Harrison, Ohio 45030
phone: (513) 738-0164
fax: (513) 648-3801

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