PROGRESS REPORT ON DECOMMISSIONING ACTIVITIES AT THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT (FEMP) SITE

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1. OVERALL PROGRESS OF THE PROJECT

1.1 Background

The Fernald Environmental Management Project (FEMP), is located about 18 miles northwest of Cincinnati, Ohio. Between 1953 and 1989, the facility, then called the "Feed Material Production Center" or "FMPC," produced uranium metal products used in the eventual production of weapons grade material for use by other U.S. Department of Energy (DOE) sites. In 1989, FMPC's production was suspended by the federal government in order to focus resources on environmental restoration versus defense production. In 1992, Fluor Daniel Fernald assumed responsibility for managing all cleanup activities at the FEMP under contract to the DOE.

In 1990, as part of the remediation effort, the site was divided into five operable units based on physical proximity of contaminated areas, similar amounts or types of contamination, or the potential for a similar technology to be used in cleanup activities. This report continues the outline of the decontamination and decommissioning (D&D) activities at the FEMP site Operable Unit 3 (OU3) and provides an update on the status of the decommissioning activities.

OU3, the Facilities Closure and Demolition Project, involves the remediation of more than 200 uranium processing facilities. The mission of the project is to remove nuclear materials stored in these buildings, then perform the clean out of the buildings and equipment, and decontaminate and dismantle the facilities. The dismantlement sequence for the OU3 Complex and related major components are listed in Table 1.

For the main production facilities on-site, the process of reaching the end-state is a two-step process. The first step in the process is to achieve a "safe shutdown" condition for each plant. This is then followed by a second step which is the decontamination and dismantlement of each plant. Ultimately all of the remaining small support structures on-site will also be demolished using conventional structural demolition techniques.

The D&D work activities have been planned utilizing a performance based methodology using performance based specifications. The use of these specifications requires that the subcontractor(s) develop work plans, subject to FEMP and DOE approval which specify proposed methods necessary to accomplish certain tasks and to meet project objectives.

DISCLAIMER

Table 1 Status of Above-Grade Decontamination and Dismantlement of Operable Unit 3 Complexes

OU3 Complex	Components	Status
Plant 7	4C, 7	Demolition completed
Building 4A	4A	Demolition completed
High & Low Nitrate Tanks	18K, 18L	
Plant 1 Complex - Phase I	1A, 30B, 56B, 56C, 66, 67, 72	Demolition completed
Boiler Plant/Water Plant Complex	10A, 10B, 10C, 10E, 20A, 20B, 20C, 20H, 24A, P-005	Demolition underway
Thorium/Plant 9 complex	9A - 9F, 32A, 32B, 64, 65, 69, 78, 81	Demolition underway
Tank Farm Complex	19A, 19C, 19D, 19E	Impl. Plan drafted
Maintenance Complex	12A - 12D, 24B, 38A, 38B	Impl. Plan drafted
Plant 5 Complex	4B, 5A - 5G, 55A, 55B	Safe shutdown completed
Plant 3 Complex	3B - 3G, 3J, 3K, 39A, 39C	Safe shutdown completed
Plant 6 Complex	6A - 6G	Safe shutdown underway
Sewage Treatment Plant Complex	25A - 25E, 28F, 39D	Impl. Plan drafted
Plant 2 Complex	2A, 2D - 2G, 39B	Safe shutdown underway
Plant 8 Complex	8A - 8F, 80	Safe shutdown completed
East Warehouse Complex	20D, 77, 79, 82	
Plant 1 Complex - Phase II	1B, 30A, 56A, 60 - 63, 71, TS-004, TS-005, TS-006	Safe shutdown completed
Pilot Plant Complex	13A - 13D, 37, 54A - 54C, 68	Safe shutdown completed
General Sump Complex	2B, 2C, 3A, 3H, 3L, 18B, 18D, 18H	
Liquid Storage Complex	18J, 20E - 20G, 22A, 22B, 22D, 26A, 26B, 45A, 45B	
Administration Complex	11, 14A, 14B, 28A, 28B, 53A, 53B	
Laboratory Complex	15A, 15B	
Electrical Station Complex	16A - 16G, 26C, 31A, 46	
Miscellaneous Complex*	16H, 16J, 18G, 23, 25J, 28C, 28D, G-004, G-006, G-007, G-008	On-going

* These structures (e.g., pipe bridges, process and on-process trailers, security shacks, etc.) will be dismantled throughout the remedial action on an "as-available" basis and will, therefore, not be scheduled.

1.2 Highlights of the Reporting Period: October 1997 through March 1998

Decontamination and dismantling projects already completed at the FEMP include Plant 7 (Hexafluoride Reduction Plant), Plant 4 (Green Salt Plant), and Plant 1 (Sampling Plant). Final reports are available for each of these completed D&D projects. Refer to Section 8 for additional information.

Safe shutdown activities are continuing with over 70% of the nuclear facility "designated" portions of the plant achieving a "Safe Shutdown" state. At the start of the reporting period, only three facilities designated as "Nuclear Facilities," remained on-site (Plants 2, 6, and 8). Safe shutdown work was completed in Plant 8 in March and work is underway in Plant 6 to remove its inventory. Once inventories (or product hold-up) are removed from these plants, the required levels of oversight and management for these plants can also be reduced to a level consistent with a "non-nuclear" facility status.

The subcontractor has initiated the final demolition activities at the BP/WP Complex site. Conventional demolition techniques will be used for this demolition rather than implosion. The demolition is currently ahead of schedule due to the mild winter weather. Foster-Wheeler Environmental Corporation is performing this work under contract to Fluor Daniel Fernald.

During this reporting period, a problem was encountered with the quality of the waste boxes used to ship process wastes for disposal at the DOE Nevada Test Site. A "hair line" crack was discovered in an "in transit" shipment which has temporarily suspended any off-site waste shipments of this waste type to NTS. An investigation is underway to determine the root cause of the problem.

The main focus of this report is on: 1) the status of Safe Shutdown activities at FEMP, 2) the on-going demolition work at the Boiler Plant/Water Plant (BP/WP) Complex, 3) the status of the Thorium/Plant 9 Complex dismantlement, 4) the status of the Large Scale Demonstration Project on Plant 1, 5) the plans for the upcoming start of the next demolition project - Maintenance/Tank Farm Complex, 6) Waste Management, and 7) the status of the On-Site Disposal Facility (OSDF) for FEMP remediation wastes including most dismantlement debris.

1.3 Comparison Between Achievement and Time Schedule

Project is currently overall on schedule.

2. PROGRESS IN TECHNICAL AREAS

2.1 Decontamination

Water washdown activities during the Plant 4 D&D project to reduce surface contamination levels resulted in the production of mixed waste sludges. These materials exhibit lead and cadmium content from paints used on the structures in the Plant. An improved surface cleaning approach is desired, which results in less potential for mixed waste generation.

2.2 Cutting Technologies

Demonstration of the oxy-gasoline cutting torch in the Plant 1 Dismantlement Large-Scale Technology Demonstration proved to be highly successful. During the demonstration the oxy-gasoline torch cutting productivity was about double that of a conventional oxy-gasoline torch. Metals with a thickness up to 4 inches were cut during the demonstration.

Oxy-gasoline cutting technology has been available and in use for more than 40 years, but has not been as widely adopted as the oxy-acetylene technology; however, the cutting speeds and operating costs present a strong argument for migration to this technology, especially for the decommissioning industry.

2.3 Remote Operation

Demonstration of a mobile work platform are scheduled for April. This platform would have potential use during the dismantling of the Tank Farm Complex and other facilities at the FEMP as well. The use of a pipe shearing manipulator is planned to demonstrate a method for a faster and safer method for the removal of piping.

2.4 Radioactive Waste Management

The FEMP is managing D&D debris in several distinct manners: non-porous materials which meet the Waste Acceptance Criteria (WAC) for the On-site Disposal Facility (OSDF) are being bulk stored in several locations at the site, porous materials which meet the OSDF WAC are being stored typically in dumpable containers awaiting placement into the OSDF, and materials which do not meet the OSDF WAC are containerized and disposed of primarily at the DOE Nevada Test Site low level waste site. Regulatory approval for the on-site bulk storage concept was a significant accomplishment in the past year.

3. ORGANIZATIONAL AREAS

3.1 Project Management

Methods to further streamline project management for D&D have been developed and implemented on-site. Smaller project teams have been identified as core teams for planning and execution of the dismantlement work, primarily because many of the major issues have been addressed in the initial projects.

A change from an Invitation for Bid (IFB) process to a Request for Proposal (RFP) process has been made in the contracting method for future dismantlement projects. A heavy weighting on technical content is made to allow selection of the best candidate, not simply the best price.

3.2 Quality Assurance

Since the most significant product of a decommissioning project is debris, a significant effort is placed on assuring that debris is properly categorized at the job site. FEMP waste management begins at the point of generation and tracks the material through final disposition. The cost of finite tracking is believed to be more than offset by the alternative costs of recharacterizing for the purpose of manifesting the waste for both on- and off-site disposal. Due to the large volumes of waste being generated from the remediation activities, this is a critical record keeping and management activity.

3.3 Regulatory Aspects

Regulatory concern over D&D at Fernald seems to be relatively low, possibly due to the successes to date. Decommissioning has nearly become a routine activity and the project teams can be entrusted to comply with commitments to all parties.

3.4 Public Relations

The FEMP continues to be a leader in public involvement in site remediation. Current initiatives include; 1) the development of a decision-making framework for recycling, which incorporates public sentiment into the decision-making equation and 2) the conduct of periodic public meetings as well as tours of the site to highlight remediation progress.

Public concern over the D&D projects at Fernald seems to be relatively low in comparison to other projects underway, possible due to successes to date.

4. COSTS

FEMP cost estimating for D&D projects has been further refined in the past period to reflect a life-cycle cost approach for the entire FEMP remediation project. Confidence in the estimates is high, based on the availability of actual costs from Plant 4 and Plant 1 D&D. No other new information to report on at this time.

5. OU3 COMPONENT STATUS

The general process used at FEMP is to use in-house crafts support to perform safe shutdown activities in a building or complex. This is followed by a competitive bid process to select a subcontractor to perform plant decontamination and dismantlement activities.

5.1 Safe Shutdown Activities

To date, all safe shutdown activities have been performed by the in-house crafts personnel and represent actions required on a plant-by-plant basis to: 1) mitigate the potential for release of contamination to the environment from hold-up materials in the plants and 2) stabilize, isolate and/or treat any existing contamination to prevent its release or migration.

The following items are typical safe shutdown activities:

- Removal of nuclear holdup material from equipment, tanks, piping, and ductwork.
- Removal of non-nuclear hazardous wastes (except asbestos).
- Isolation of all utilities (typically electrical power, steam, water, and compressed air) to each facility and its equipment.
- Removal of any salvageable and/or stored equipment.
- Gross decontamination of remaining equipment and interior.

Once these areas are processed through the safe shutdown process, they are turned over to the D&D group for eventual demolition.

Three basic concepts are used to govern these safe shutdown operations: minimize intrusive work to the greatest extent possible, isolate the building areas so that any necessary intrusive work can be accomplished with little or no impact on other activities in adjacent areas, and involve team members from all disciplines when planning work.

FEMP Crafts personnel have completed safe shutdown activities of the following nuclear facilities on the indicated dates:

• Plant 4	Green Salt Plant	March 24, 1995
• Plant 1	Preparation Plant	August 24, 1995
• Plant 9	Special Products Plant	January 26, 1996
•	Pilot Plant Complex	June 14, 1996
• Plant 5	Metals Production Plant	March 14, 1997
• Plant 3 Complex		September 30, 1997
• Plant 8	Recovery Plant	March 1998

During this reporting period,. final activities in Plant 8 included: removal of water and sludge from interior and exterior sumps, termination of all remaining utilities (fire water, electrical power, communications/alarms) to the facility and disconnecting of overhead piping systems. The sludge removal from the sump pits was a very intensive activity requiring the removal of approximately 2,500 gallons at a rate of 2 gallons/ bucket. The extensive use of non-destructive assay techniques helped to quickly isolate the areas of residual "hold up" material saving considerable time and money in the overall schedule.

Currently, work is underway on completing safe shutdown activities at the last two nuclear facilities on-site:

• Plant 2 Complex	Ore Refinery
• Plant 6	Metals Fabrication Plant

Isolation of several storage tanks is underway in Plant 6 and the rolling mill area was isolated. During this reporting period, work continued on the removal of the hold up materials in the Plant 2 Complex and Plant 6.

Once activities are completed on these two plants, work on non-nuclear facility components of the site will begin.

The primary goal of the safe shutdown activities is to recover remaining nuclear material held-up in plant processing systems. To date, the following quantities of hold up material have been recovered:

Plant 4	25,000 lbs.
Plant 1	25,000 lbs.
Plant 9	38,000 lbs.
Pilot Plant Complex	28,000 lbs.
Plant 5	182,000 lbs.
Plant 3 Complex	31,000 lbs.
Plant 8	55,000 lbs. (Preliminary)
Plant 2 Complex	51,000 lbs. (On-going)
Total	435,000 lbs.

The recovered materials are drummed in 55-gallon drums and sent to the DOE Nevada Test Site for disposal at their LLW disposal site.

During the course of the Safe Shutdown work in the former nuclear facilities at the FEMP site, a number of situations have been encountered in which process (historical) knowledge has proved to be inaccurate. Typically, these situations involved the discovery of holdup nuclear material in locations in which it was not previously believed to exist. In order to minimize these "surprises," Safe Shutdown has relied heavily on radiological non-destructive assay (NDA) methods to locate potential holdup nuclear material in tanks, piping, and process equipment. NDA has shown itself to be a quick, low-cost, and safety-enhancing method for locating holdup nuclear material. The use of NDA methods, combined with a dose of skepticism about process knowledge, has proved to be one of the most important Lessons Learned by the Safe Shutdown Program at the FEMP site.

Work will continue in both Plant 2 and 6 through the next reporting period.

5.2 Boiler Plant/Water Plant (BP/WP) Complex

The Boiler Plant/Water Plant (BP/WP) complex facilities provided steam service to the entire site for heating and provided drinking water and cooling water services. Most of the facilities are located in the north-central portion of the former production area. The largest buildings in the complex, Buildings 10A and 20B, are physically connected to one another, and are centrally located within the complex. Building 10A (Boiler Plant) is a five-story rectangular structure with a footprint of almost 12,000 square feet. The main structure consists of a structural steel frame with a poured concrete floor, and transite sheet siding. A railroad car shaker shed, electrostatic precipitators, and fly ash silo are among the ancillary facilities attached to the building. Building 20B (Water Plant) treated water extracted from the site to provide the FEMP with drinking and process water. It is a two-floor structure with a footprint of 3900 square feet and is constructed with a structural steel frame and metal and transite panels on a poured concrete floor. This component includes the clearwell building attached to the east end and two aboveground lime reactivator tanks. Two additional buildings, a wet salt storage bin, cooling towers, railroad tracks, trailers, pipe bridges, and the railroad scale house comprise the rest of the BP/WP complex.

The primary factors that determine the sequence for remediation of components in the BP/WP complex are the proximity of the surrounding structures, physical constraints of the site, and the availability of components. such constraints have impact on the determination and coordination of the use of material handling and subcontractor staging and storage areas, as well as the provision of adequate space for dismantlement operations. The BP/WP Complex contaminants consist of mainly: lead-based paint, localized low-level radiological contaminants, and asbestos containing materials.

In the BP/WP dismantlement, there is an estimated 91,400 cubic feet of "unbulked material" to be removed with over 71,000 cubic feet of this material coming from Building 10A. By waste type, the three largest types of bulked waste material are: 1) the regulated asbestos containing materials amounting to about 14,600 cubic feet 2) the inaccessible metals category which amounts to about 50,200 cubic feet, and 3) miscellaneous metals consisting of about 11,700 cubic feet.

An estimate of 211,000 cubic feet of waste generated in the BP/WP demolition will be "bulked material." Again, as with the unbulked material, nearly 80% of this material will be generated from the dismantlement and demolition of Building 10A in this complex. By waste type of bulked material, the following three types of bulk material will be generated in the largest quantities: 1) approximately 35,000 cubic feet of accessible metals, 2) approximately 100,000 cubic feet of inaccessible metals, and 3) about 35,000 cubic feet of regulated asbestos containing materials (ACM). Nearly 41% of the material mass from the BPWP demolition (2500 tons) is in the form of inaccessible metals. Accessible metals represent over 590 tons of material and concrete and non-regulated ACM represent about 350 tons each.

Foster-Wheeler Environmental Corporation was awarded the sub-contract for this work and are currently performing the decontamination and dismantlement operations. Demolition work has been nearly completed on the WP portion of the complex. These structures were demolished using conventional demolition techniques and equipment. Front end loaders and shears mounted on crawler backhoes have performed the majority of the work on this portion of the plant after Foster-Wheeler completed the typical dismantling steps on the plant internal structures (same process as for all other FEMP plant dismantlements).

As reported in the TAG-23 report on this project, the sub-contractor (Foster-Wheeler Environmental Corp.) had completed the demolition of the Water Plant (WP) portion of the Complex and work was underway on the Boiler Plant (BP) portion of the Complex. During this period, asbestos abatement activities were completed in the facility. Demolition of smaller out buildings was performed including a railroad scale house, fly ash silo, electrostatic precipitators, and clearwell building. Work started in late 1997 on the demolition of the BP with the removal of the transite "outer skin" of the structure. In February, equipment removal was initiated at the BP and following the start of this activity facility demolition was started. The current commitment to the regulatory body (EPA) is to complete demolition by mid-December 1998. This target date may be achieved sooner than that date due to a mild winter allowing for nearly non-stop work at the site and the fact that many of the earlier lessons learned from the demolition of Plants 1, 4, and 7 have been incorporated into this work to optimize the work sequence. The sequence for dismantling is heavily driven by the size and location of the four steam boilers. The alternative selected for dismantling is a "section-by section" pull down, removing equipment as it is exposed and then removal by dismantling for the remaining structure. August 1998 is the current projected completion date for this work.

5.3 Thorium/Plant 9 Complex

The Thorium/Plant 9 Complex processes and operations during the production era of the FEMP included: 1) uranium reduction, casting, and related production support operations in the Special Products Plant (9A), 2) material storage, and 3) equipment/material decontamination systems. These former operations utilized both radiological and chemical constituents and generated a variety of waste materials.

The primary factors that affect the Plant 9 demolition activity are other on-going waste management projects on waste materials stored in the area and facility use considerations. Dismantlement of Building 64 and 65 in the Plant 9 Complex will not begin until completion of: 1) the Thorium Overpacking Project (TOP) - currently scheduled to be completed in late 1997 and 2) the Thorium/Mixed Waste Stabilization Project - currently scheduled to be completed in late 1998.

The current envisioned demolition sequence is Building 81, Building 9A, Building 69, Building 32A and B. Buildings 64 and 65 and 78 will be released after the contractor receives the notice to proceed.

The most significant radiological and chemical characteristics in the Thorium/Plant 9 Complex are:

- the top inch of concrete from both the Enriched Uranium Casting Process Area and the Uranium Machining Process Area in Plant 9, totaling an estimated 1700 cubic feet, contains elevated levels of technetium-99 - requiring that at least the top inch of concrete be removed and disposition off-site;

- potential mixed waste acid brick, totaling an estimated 1440 cubic feet are located in the Zirnlo Decladding process area, Heat Treating process area, and the Briquetting process area in Plant 9 (9A) and will be dispositioned of off-site;

- approximately 950 cubic feet of potential mixed waste acid brick in Building 69 that has been administratively designated for off-site disposition; and

- approximately 15 cubic feet of mixed waste lead flashing exist in Plant 9 (9A), the Thorium Warehouse (64), and the Plant 5 Warehouse (65) and will be treated and dispositioned either off-site, or recycled.

Standard FEMP Materials Management, Handling, and Storage provisions will be used for the removal and interim storage of the demolition wastes/materials. A total of 13 structures comprise this complex within the FEMP. The estimated waste volumes generated as a result of the decommissioning activities are as follows:

- 229,000 cubic feet of bulked materials including the major contributors: 88,000 cubic feet of inaccessible metals, 48,000 cubic feet of accessible metals, 26,000 cubic feet of process related metals, and 26,000 cubic feet of concrete.

- 93,000 cubic feet of unbulked materials including the following major contributors: 34,000 cubic feet of process related metals, 20,000 cubic feet of concrete, and 18,000 cubic feet of miscellaneous materials.

- Of over 3200 tons of material estimated to be produced in the demolition activity, approximately 1900 tons is metal waste and over 800 tons is concrete waste.

The Plant 9 complex has already undergone inventory removal and other safe shutdown related activities. Therefore, with the exception of Building 9A, all of the remaining structures in this complex will require either abatement for asbestos containing materials and above-ground dismantlement or only conventional above-ground dismantlement activities. All 12 of the smaller structures supported the Building 9A operations. The Building 9A contain over 52,000 square feet of space formerly used by the nine historical process areas which had operated in the building.

The selected sub-contractor, NSC Corporation, was awarded the contract for the decontamination and demolition of the facility through a fixed price competitive bidding process. The contractor was issued a "Notice to Proceed" in October 1997 and initiated the set-up of on-site offices, work areas, work zone boundaries, and preparation of Safe Work Permits in the November - January time frame. Asbestos abatement was initiated and some scrap metal size reduction work was completed in January. All required preparatory activities were completed in January. Asbestos removal continued in February and March. The latest schedule for this overall activity is to complete the demolition in about December 1998.

5.4 Large Scale Technology Demonstration

A Large Scale Technology Demonstration (LSTD), with funding from the DOE-EM Office of Science and Technology, was conducted concurrent with Plant 1 D&D activities at the FEMP site. The first objective of the LSTD was to identify existing D&D technologies that appear to be able to perform better than baseline technologies, but are unproven in actual field applications. Following several screening stages and review, the most applicable technologies for demonstration at the Plant 1 complex were approved for demonstration and integrated into the ongoing D&D effort.

The second objective of the LSTD was to quantify and document the derived benefits (i.e. cost reduction, schedule acceleration, safety improvements), that could be achieved through the use of the new technology. The derived benefit was determined from a side-by-side comparison of the new technology with the current baseline approach that had already been defined within the Plant 1 D&D schedule.

The major needs targeted for improvement are those that address objectives for future FEMP D&D projects. This includes lessons learned from previous D&D projects as well as worker health and safety, productivity improvement, waste volume reduction, and the recycle/reuse of materials.

Table 2 Status of Approved Technologies

STATUS OF TECHNOLOGIES APPROVED BY THE IC TEAM FOR INCLUSION IN THE PLANT 1 LSTD				
No. #*	**Technology**	**IC Team Status**	**Demo Location**	**Demo Date**
01A	Vacuum Removal of Insulation	Demonstrated	Bldg. 1A Multiple Walls	August 1996
02A	Steam Cleaning of Equipment	Demonstrated	Bldg. 1A Equip.	August 1996
03A	Sponge Cleaning of Equip.	Demonstrated	Bldg. 1A Equip.	August 1996
04A	Raman Spectroscopy	Demonstrated	Bldg. 72	November 1996
05B	Laser Induced Fluorescence (LIF)	Demonstrated	Bldg.1A	November 1996
06B	PAG	Cancelled		Cancelled
07B	Foam Void Filling	Demonstrated	Bldg. 1A Equip.	February 1997
08B	Low-Density Grout Void Filling	Demonstrated	Bldg. 1A Equip.	January 1997
09B	PPE Cool Suit	Demonstrated	Plant 6 Sample Line	August 1997
10C	Oxy-Gasoline Torch	Demonstrated	Bldg. 1A & Bldg. 66	October 1996
11C	Pipe Inspection	Demonstrated	Inside Plant 9	November 1996
12C	Transite Pulverizer/Transfer System	Cancelled		Cancelled
13C	Centrifugal Shot Blasting Scabbling	Demonstrate	To be Determined	May 1998
14C	Mobile-Work Platform	Demonstrate	Tank Farm & Building 6G	April 1998

All but two of the 12 selected technology demonstrations shown in Table 2 have been completed and these two demonstrations are scheduled for testing in April and May of this year. These are a centrifugal shot blast device for concrete decontamination and a mobile elevated work platform for work in elevated areas (at heights over 15'). All 10 of the other technologies have Detailed Technical Reports in various stages of preparation for each technology and will be available in final form shortly. Work is underway on an overall Final Report for the Plant 1 LSTD. Also, work is on-going on transferring some of these same technologies to other sites for deployment.

5.5 Maintenance/Tank Farm Complex

The next facility slated for dismantlement at the FEMP is the Maintenance/Tank Farm Complex. As the name implies these facilities were parts of a small tank farm complex and a general facility maintenance complex. A total of 15 structures or components comprise this work package:

- Component 12A - Main Maintenance Building;
- Component 12B - Cylinder Storage Building;
- Component 12C - Lumber Storage Building;
- Component 12D - Maintenance Building Warehouse;
- Component 24B - Railroad Engine House;
- Component 38A - Propane Storage;
- Component 38B - Cylinder Filling Station;
- Component 19A - Main Tank Farm;
- Component 19C - Tank Farm Control House;
- Component 19D - Old North Tank Farm;
- Component 19E - Tank Farm Lime Slitter Building;
- Component 20A - Pump Station and Power Center;
- Component 20H - Process Water Storage Tank;
- Component G-001 - Rail Road Locomotive; and
- Component G-008 - Pipe Bridges.

The major activities are:

- asbestos abatement/removal;
- surface decontamination;
- above-grade component dismantlement;
- material management; and,
- environmental monitoring.

The tank farm complex (12A-D) portion of this work will be addressed first, then the maintenance structures (19A-E) followed by the remaining structures/components. The largest waste producing demolition activity in this project will be the dismantling of the Main Maintenance Building - Component 12A (54,000 sq. ft.). The components located in this area will generally require only safe shutdown verification and then above ground dismantlement of the component. Several of the structures do have asbestos in them and this will require removal of this material prior to their demolition. Tables 3 - 5 show the estimated material waste quantities. Several tanks located in the tank farms were never placed in service and will be surveyed, released, and sold for scrap.

Radiological release cleaning requirements for this project are:

- All non-porous surfaces (such as steel decking or columns) within the structure shall be below 5,000 dpm/100 cm^2 beta-gamma removable radiological contamination and all porous surfaces (such as concrete decking or wood) shall be below 1,000 dpm/100 cm^2 beta-gamma removable, 5,000 dpm/100 cm^2 average beta-gamma fixed plus removable, and 15,000 dpm/100 cm^2 maximum beta-gamma fixed radiological contamination. The average beta-gamma fixed plus removable radiological contamination limit is the average

of the radiological contamination levels that exist within an individual 20 ft x 20 ft area (generally defined by plant column locations) and the maximum beta-gamma fixed radiological contamination limit is the highest permissible contamination levels within the 20 ft x 20 ft area.

Radiological contaminants are either absent or present at only slightly elevated above background in very localized areas.

Equipment removal will be performed using methods such as reciprocating saws, portable band saws, and shears. Any equipment which is identified as containing, "process related debris" will be segregated for off-site disposal. All other materials will be staged for eventual placement in the OSDF. Those facilities having transite siding will have this removed after it is encapsulated with an appropriate fixative. Hydraulic shears and oxy-acetylene torches will then be used to dismantle the remaining steel structures.

Work on this complex of structures is scheduled to start in July 1998 and be completed in February 2000.

TABLE 3 Bulked Material Estimates (ft^3)

Component Designation	Accessible Metals	Inaccessible Metals	Process Related Metals	Painted Light-Gauge Metals	Lead Flashing	Concrete	Brick	Non-Regulated ACM [10]	Regulated ACM [1]	Misc. Materials [2]	Component / Complex Totals
12A	43,759	12,261	0	1,158	1	43,889	0	3,018	8,197	2,006	114,289
12B	300	521	0	22	0	3,005	0	0	0	365	4,213
12C	2,025	135	0	43	0	0	0	0	0	5	2,208
12D	5,468	254	0	119	0	11	0	0	0	0	5,852
24B	446	146	0	0	0	2,759	0	0	330	332	4,013
38A	413	12,123	0	24	0	1,860	0	0	92	24	14,536
38B	62	1,485	0	0	0	0	0	6	1	0	1,554
19A	5	16,696	0	0	0	27	0	0	0	851	17,579
19C	381	491	0	49	0	1,544	0	0	0	378	2,843
19D	0	4,452	0	0	0	4	0	0	0	200	4,656
19E	2	1,113	0	12	0	0	0	0	0	50	1,177
20A	1,312	713	0	49	0	0	0	343	610	46	3,073
20H	32	38	0	0	0	4,706	0	0	81	0	4,857
Miscellaneous [8]	12,056	8,805	0	0	0	0	0	0	1,296	32	22,189
Complex Total	66,261	59,233 [11]	0	1,476	1	57,805	0	3,367	10,276	4,287	202,709
Container/ Quantity [3]	ROB/90	ROB/70	None	ROB/4	B-25 [6]/1	ROB/147	None	Skid/42	ISO [5]/14	ROB [5]/10	
Interim Storage Config [4]	Plant 1 Pad	ROB/Plant 1 Pad	None	ROB/Plant 1 Pad	Plant 1 Pad	ROB/Plant 1 Pad	None	Skid/Plant 1 Pad	ISO/ Plant 1 Pad	ROB/ Plant 1 Pad	
Disposition	OSDF [7]	OSDF	None [9]	OSDF	PCDF [7]	OSDF	None	OSDF	OSDF	OSDF	

(1) Excludes gutter cleanout which will be placed in drums (volume estimated at less than one drum).
(2) Excludes compactibles which will be placed in dumpster for compaction. Miscellaneous materials can be containerized with Non-regulated ACM.
(3) Individual Roll-Off Boxes may contain commingled debris based on the following segregation groupings, which are consistent with On-Site Disposal Facility Impacted Material categories:
a) OU3 Debris Categories A, B, D, and E (OSDF Impacted Material Category 2).
(4) Locations identified are based on current planning projections.
(5) Container is volume restricted.
(6) Container is weight restricted.
(7) OSDF: On-site Disposal Facility; PCDF: Permitted Commercial Disposal Facility.
(8) Miscellaneous component includes pipe bridges and railroad locomotive.
(9) In the event Process Related Metals are encountered, it will be dispositioned for PCDF and described in the project completion report.
(10) This category includes transite which is segregated from other nonregulated ACM; sprayed with encapsulated; banded in 18 inch bundles and palletized; and, stockpiled.
(11) Total includes unused steel horizontal tank (234 cubic feet) from Component 19A which is considered salvageable equipment and will be size reduced for possible recycling..

TABLE 4 Unbulked Material Estimates (ft^3)

Component	Accessible Metals	Inaccessible Metals	Process Related Metals	Painted Light-Gauge Metals	Lead Flashing	Concrete	Brick	Non-Regulated ACM	Regulated ACM	Misc. Materials	Component/ Complex Total
12A	21,864	6,493	0	2,228	1	29,268	0	2,511	5,468	1,380	69,213
12B	151	346	0	11	0	2,003	0	0	0	243	2,754
12C	1,013	68	0	22	0	0	0	0	0	5	1,108
12D	2,732	154	0	57	0	19	0	0	0	0	2,962
24B	224	92	0	0	0	1,839	0	0	220	224	2,599
38A	212	6,750	0	11	0	1,239	0	0	62	22	8,296
38B	26	81	0	0	0	0	0	5	1	0	113
19A	2	8,343	0	0	0	0	0	0	0	567	8,912
19C	192	243	0	100	0	1,029	0	0	0	257	1,821
19D	0	2,223	0	0	0	0	0	0	0	67	2,290
19E	3	554	0	5	0	0	0	0	0	33	595
20A	656	392	0	24	0	0	0	286	408	41	1,807
20H	16	22	0	0	0	3,137	0	0	54	0	3,229
Miscellaneous [1]	6,026	5,424	0	0	0	0	0	0	864	22	12,336
Complex Total	33,117	31,185 [2]	0	2,458	1	38,534	0	2,802	7,077	2,861	118,035

(1) Materials from Component G - 008, Pipe Bridges and G -001, Rail Road Locomotive.

(2) Total includes unused steel horizontal tank (124 cubic feet) from Component 19A which is considered salvageable equipment and will be size reduced for possible recycling.

TABLE 5 Material Weight Estimates (Tons)

Component Designation	Accessible Metals	Inaccessible Metals	Process Related Metals	Painted Light-Gauge Metals	Lead Flashing	Concrete	Brick	Non-Regulated ACM	Regulated ACM	Misc. Materials	Component/ Complex Total
12A	328	90	0	12	0	1,454	0	141	12	33	2,070
12B	2	1	0	0	0	150	0	0	0	5	158
12C	15	2	0	5	0	0	0	0	0	0	22
12D	41	10	0	11	0	1	0	0	0	0	63
24B	3	2	0	0	0	92	0	0	1	5	103
38A	4	109	0	0	0	62	0	0	0	0	175
38B	0	2	0	0	0	0	0	0	0	0	2
19A	1	125	0	0	0	0	0	0	0	1	127
19C	7	2	0	0	0	51	0	0	0	10	70
19D	0	33	0	0	0	0	0	0	0	0	33
19E	0	8	0	2	0	0	0	0	0	0	10
20A	10	11	0	0	0	0	0	16	1	1	39
20H	0	1	0	0	0	235	0	0	0	0	236
Miscellaneous [1]	90	218	0	0	0	0	0	0	2	1	311
Complex Total	501	614 [2]	0	30	0	2,045	0	157	16	56	3,419

(1) Includes materials from Component G - 008, Pipe Bridges and G - 001, Rail Road Locomotive.

(2) Total includes unused steel horizontal tank (30.5 Tons) from Component 19A which is considered salvageable equipment and will be size reduced for possible recycling.

5.6 Waste Management

A summary of the FEMP off-site low level radioactive waste shipped to the Nevada Test Site (NTS) is presented in Table 6. A total of over 600,000 cubic feet of this material was shipped off-site - the largest component of this was the Process Area Scrap which amounted to about 325,000 cubic feet.

In December, a waste container was found to have lost its structural integrity while in transit to the NTS. A hairline crack was discovered on the bottom of the waste container. This has caused a temporary prohibition of further waste shipments. A formal investigation of the cause of this incident is underway. All other waste that meets the OSDF Acceptance Criteria are being staged on-site for eventual placement in the OSDF.

Table 6

Fiscal Year 1997 Low-Level Waste Shipments to NTS

The volume of low level waste materials shipped to the DOE NTS in FY 1997 (ending September 30, 1997) per waste stream is as follows:

Waste Stream	Volume (cubic feet)
Process Area Scrap	325,522
Thorium	106,523
Residues	68,062
Contaminated Trash	15,344
Stabilized Mixed Waste	9,690
Asbestos	26,542
Construction Waste	60,462

*External volumes are equivalent to NTS burial volumes and are based upon the exterior dimensions of the container plus runners and associated void space between runner. (Runners are pieces of metal that are placed on the bottom of the boxes. The runners provide a 3-inch platform which keeps the box from having direct contact with the ground. The runners also enable forklifts to move the boxes.)

5.7 On-Site Disposal Facility

When fully completed, the On-Site Disposal Facility (OSDF) will contain 2.5 million cubic yards of soil and debris from the remediation of the U.S. Department of Energy's (DOE's) Fernald Environmental Management Project (FEMP) and is located in the northeastern portion of the FEMP site.

Balanced Approach

The OSDF is part of the "balanced approach" to waste management at the FEMP. Through the Record of Decisions for the clean-up of each of the five FEMP operable units, it was decided that the smaller volumes of highly-contaminated material would be transported off site for disposal and the larger volumes of material with low levels of contamination that could be safely contained at the FEMP would be disposed on site. Approximately 85 percent of the material destined for the OSDF will be soil from Operable Units 2 and 5 and the remaining 15 percent will be debris from the demolition of the site buildings or OU3.

OSDF Design and Construction

The OSDF is an engineered disposal facility with a multi-layer cap and liner system. When completed, it will be approximately 800 feet wide, 3700 feet long, and 65 feet high. Construction of the OSDF will proceed in phases from north to south with eight waste cells planned and room for a ninth contingency cell, if needed. At any given time during OSDF construction, one cell may have the cap being constructed, one or two cells may have waste being placed, and one cell may have the liner being constructed. The 8.75-foot thick cap and the 5-foot thick liner will be constructed of both natural materials (such as clay and gravel) and man-made materials (such as plastic liners) and will consist of the following layers (from top to bottom):

CAP	LINER
vegetative/topsoil layers	
granular filter layer	leachate collection system layer
biointrusion barrier	primary liner
cover drainage layer	leak detection system layer
geosynthetic clay cap	secondary liner
compacted clay layer	compacted clay layer
contouring layer	

The geosynthetic clay cap layer and the primary and secondary liners each consist of a geosynthetic clay layer (bentonite clay between two layers of geotextile) under a high-density polyethylene (HDPE) layer (thick plastic sheet).

Waste Acceptance Criteria

Waste acceptance criteria for the OSDF were established in the Operable Unit 2, Operable Unit 5, and Operable Unit 3 Record of Decisions. The waste acceptance criteria include concentration limits on specific radionuclides and chemicals, size criteria, and a list of prohibited items. The waste acceptance criteria were developed to protect the underlying Great Miami Aquifer.

Impacted Material Placement

Following completion of the liner system for Cell 1, the first waste was placed into the cell starting on December 23, 1997. This waste was soil from the remediation of the East Field area of the FEMP (the area where the OSDF is now being constructed). One foot of the soil was placed to form the protective layer over the liner system. Beginning in Spring and Summer 1998, soil and debris from the Southern Waste Units and the Decontamination and Dismantlement (D&D) Project will begin to be placed in the OSDF.

Leachate Conveyance System

Water that infiltrates through the waste is called leachate. Leachate is collected in the OSDF and routed through the Leachate Conveyance System to the Biodenitrification Surge Lagoon for eventual treatment at the Advanced Waste Water Treatment (AWWT) facility. The leachate is conveyed through leak-tested, double-contained pipes. Leachate collection and treatment began with first waste placement into the OSDF.

Haul Road

The Haul Road was constructed to carry waste from the Southern Waste Units (South Field, Inactive Flyash Pile, and Active Flyash Pile) to the OSDF. This road will be dedicated to trucks hauling impacted soil and debris and will not be open to general site traffic. Construction of the Haul Road was completed in December 1997.

Schedule

Phased construction of the OSDF is expected to continue through 2006. This time frame is dependent on the schedule for soil excavation and building dismantlement. Work to be performed during the 1998 construction season includes installation of the Cell 2 liner and continued placement of waste into Cell 1.

Use of New Technologies

Petro Environmental Technologies, Inc., the company hired to construct the first phase of the OSDF, used laser technology to perform soil grading during construction of the OSDF compacted clay liner. This technology uses a laser transmitter to generate a plane of light above the construction site. This plane of light provides a stable and accurate reference which allows a level surface or a specific steepness of slope to be constructed. After the desired final grade of the soil is programmed into the bulldozer, two laser receivers mounted on the blade of the bulldozer lock onto the laser signal from the transmitter, which is positioned nearby. As the bulldozer works, the lift and tilt of the blade are automatically adjusted to meet the programmed grading requirements. These automatic adjustments are performed up to 10 times per second and are based on the bulldozer blade's position relative to the plane of light created by the laser transmitter.

The traditional method of grading involves placing stakes every 10 to 100 feet (depending on the precision of grading required) and having workers take levels readings at and between each stake to determine if the surface has reached final grade or needs additional work. Use of the laser technology provides greater accuracy on the grade, reduces the manpower necessary to perform the job, and increases the speed in which the grading can be done. The laser bulldozer system allows the operator to fine grade the OSDF cell to very close tolerances in a matter of hours as opposed to days.

6. FUTURE PROGRAM

Upcoming OU3 related activities at FEMP in addition to BP/WP and Thorium/Plant 9 Complex decontamination and demolition work includes:

- Continue scheduled Safe Shutdown activities.
- Finalize reports for Plant 1 LSDP and issue innovative technology summary reports (ITSR) on tested technologies.
- Initiate Maintenance/Tank Farm Complex Dismantlement.

7. ACKNOWLEDGMENTS

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APPENDIX A

OU3 Material Categories/Descriptions

Category A Accessible Metals	Category B Inaccessible Metals	Category C Process-Related Metals	Category D Painted Light-Gauge Metals	Category E Concrete	Category F Brick	Category G Non-Regulated Asbestos Containing Materials (ACM)	Category H Regulated ACM	Category I Miscellaneous Materials	Category J Product, Residues, and Special Materials
Structural and Miscellaneous Steel	Doors	Electrical Equipment	Ductwork	Asphalt	Acid Brick	Ceiling Demo.	Ductwork Insulation	PVC Conduit	Coal Pile
	Conduit/Wire/ Cable Tray	HVAC Equipment	Lead Flashing	Slabs		Feeder Cable	Piping Insulation	Basin Liners	Gravel Pile
	Electrical Wiring and Fixtures	Material Handling Equipment	Louvers	Columns		Fire Brick	Personal Protective Equipment	Fabric	Hazardous/Mixed Waste
	Electrical Transformers	Process Equipment	Metal Wall and Roof Panels	Beams		Floor Tile	Copper Scrap Metal Pile	Drywall	Low-Level Waste
	Miscellaneous Electrical Items	Miscellaneous Equipment		Foundations		Transite Wall and Roof Panels		Building Insulation	Marketable Nuclear Material
	Electrical Equipment	Process Piping		Walls				Miscellaneous Debris	Outside Equipment Storage Area
	HVAC Equipment		Masonry					Personal Protective Equipment	Rock Salt Pile
	Material Handling Equipment			Clay Piping				PVC Piping	Sand Piles
	Process Equipment							Roofing Build-Up	Thorium Inventory
	Miscellaneous Equipment							Process and Non-Process Trailers	Scrap Metal Pile
	Piping							Windows & Wood	