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HOW TO ACCELERATE THE FERNALD REMEDIATION

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ABSTRACT

The Fernald Environmental Management Project is unique among Department of Energy (DOE) sites by virtue of successful efforts by the Fernald Environmental Restoration Management Corporation (FERMCO) and DOE-Fernald Area Office (FN) in securing a stakeholder-assisted final site closure vision and all Record of Decisions (ROD) or Interim RODs required to set the stage for final remediation. DOE and FERMCO have agreed in principle on a Ten Year Plan which accelerates all activities to remediate the site in approximately half the target schedule.

This paper presents the path that led to the current Ten Year Plan, the key elements of the plan, and the implementation strategies.

PATH TO THE TEN YEAR PLAN

The Fernald site is divided into five operable units (OUs) pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process. RODs are in hand for all five OUs. These RODs summarize the results of the Remedial Investigation/Feasibility Study (RI/FS) reports and detail the selected remedial actions. The five OUs and the primary remedies are:

OU1 - Waste Pits: excavation, drying and shipment to an off-site disposal facility.

OU2 - Other Waste Units: excavation and disposal in an on-site facility.

OU3 - Former Production Area: Dismantlement of structures and disposal on and off-site.

OU4 - Silos: Vitrification of the waste and disposal at the Nevada Test Site.

OU5 - Environmental Media: excavation of soil and disposal in an on-site facility; pump and treat groundwater.

With the remedies chosen and the RODs in place Fernald is in a position where it has the technical scope, schedule and budget defined for each Operable Unit. The first step in the development of a site remediation plan was the integration of the schedules of the five Operable Units into one comprehensive overall plan, with the duration of the work for the five OUs optimized and with a defined critical path. Once the schedule was defined, the scope and costs were reviewed to put them all on a consistent technical basis and to identify efficiencies which were realized by the integration of the OUs.

Initially, two unconstrained funding scenarios were developed: a seven-year plan and a ten-year plan. The seven-year plan contained many of the same assumptions as the ten-year plan, however, it assumed that some of the DOE Orders, requirements and restraints were removed. Funding for these plans peaked at $351 million and at $331 million for the seven and ten-year plans, respectively (unescalated). The site at the end of either of these plans was completely remediated except for the continuing pump-and-treat operation needed to complete remediation of the aquifer. Nothing was left on site except for the disposal facility, the wells and the treatment facility.

These plans were provided to DOE Headquarters and to stakeholder groups. When challenged by DOE Headquarters to determine how quickly the site could be remediated if the funding from FY97 on was set at $276 million in FY96 dollars and the seven-year assumptions were used, the current Ten Year Plan ($276 Million Case) was developed.

At the time the Ten Year Plan was completed, Fernald was projecting a 25-year remediation schedule and a cost from FY96 to completion of $5.8 billion (escalated), in accordance with the then-current target budgets. The cost estimate for the Ten Year Plan is $3.4 billion. Its shortened schedule and substantial cost savings made it an attractive proposal. In addition, Fernald will be the first DOE site of major consequence to be totally brought to clean closure. Successful implementation of the Ten Year Plan will set benchmarks and pave the way for similar successes at other major DOE facilities simply by showing it can be done if the right approach is used.

Key to acceptance of the Ten Year Plan were the substantial cost savings, the acceptance of the plan by the regulators and public stakeholders and their active support of the plan with DOE and Congress. The regulators involved are the US and Ohio EPAs. Public stakeholders include the Fernald Citizens Task Force and the citizens' group Fernald Residents for Environmental Safety and Health (FRESH). Ohio Congressmen and Senators also supported the adoption of the Ten Year Plan.

Once the Plan was accepted by DOE-HQ, Fernald was requested to undertake detailed FY96 and FY97 planning to support it. The plans for FY98 to FY05 were also requested, at a planning package level of detail. These plans will be completed in February 1996 and will provide the baseline for Fernald's final remediation.

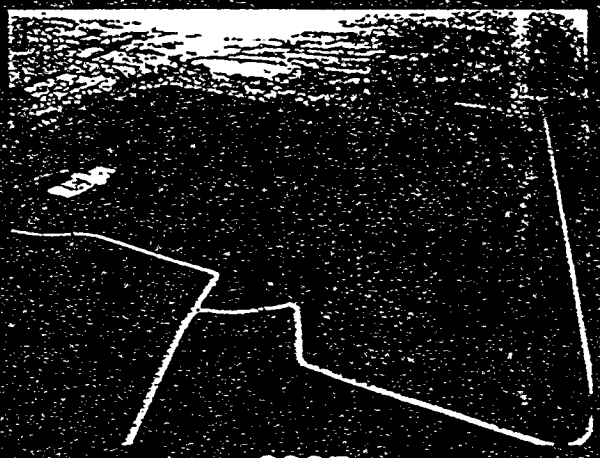
KEY ELEMENTS OF THE TEN YEAR PLAN

Exhibit 1 illustrates the Fernald site in the years 1995 through 2005. The progress of decontamination and dismantlement (D&D) of site facilities and the construction of the on-site disposal facility can be clearly seen. In the year 2005, all that will remain at Fernald is the disposal facility and a groundwater pump-and-treat system. The final land use has not been determined, except that residential or farming use will not be permitted. The final land use will be determined by DOE and the stakeholders with additional public input.

FERNALD

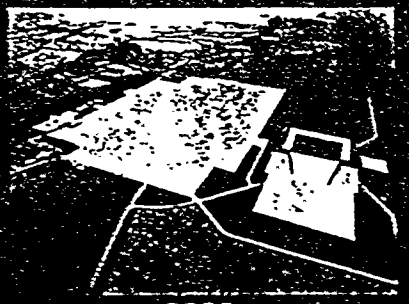
Environmental Management Project

1995

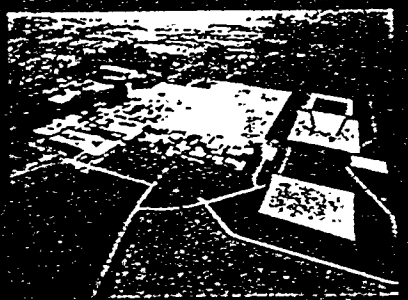


2005

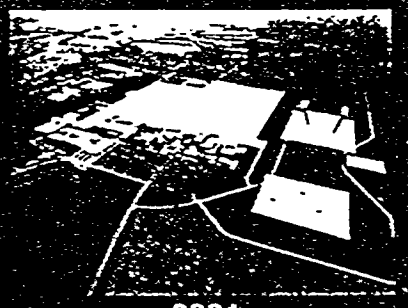
1997



2003



1999



2001

3636.9a

(Place Exhibit 1 here)

EXHIBIT 2

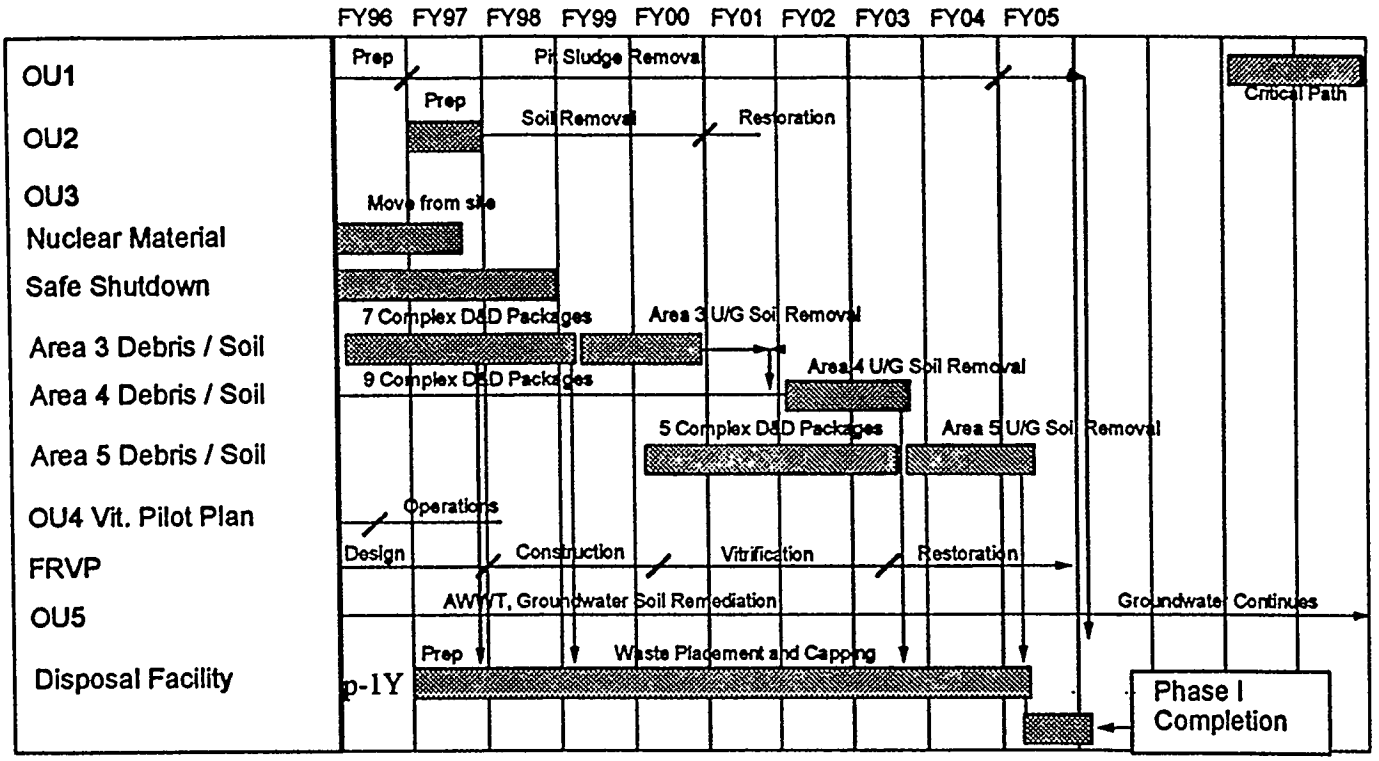


Exhibit 2 depicts the overall schedule and indicates the critical path activities. Once the remaining nuclear materials are removed and the safe shutdown activities (removal of in-process material from lines, tanks and equipment) are completed, the critical path consists of D&D of the buildings, excavating the soil and underground foundations, piping, and utilities and building the on-site disposal facility.

Exhibits 3 through 10 provide the key indicators or performance measures for the remediation of Fernald. They are:

EXHIBIT 3

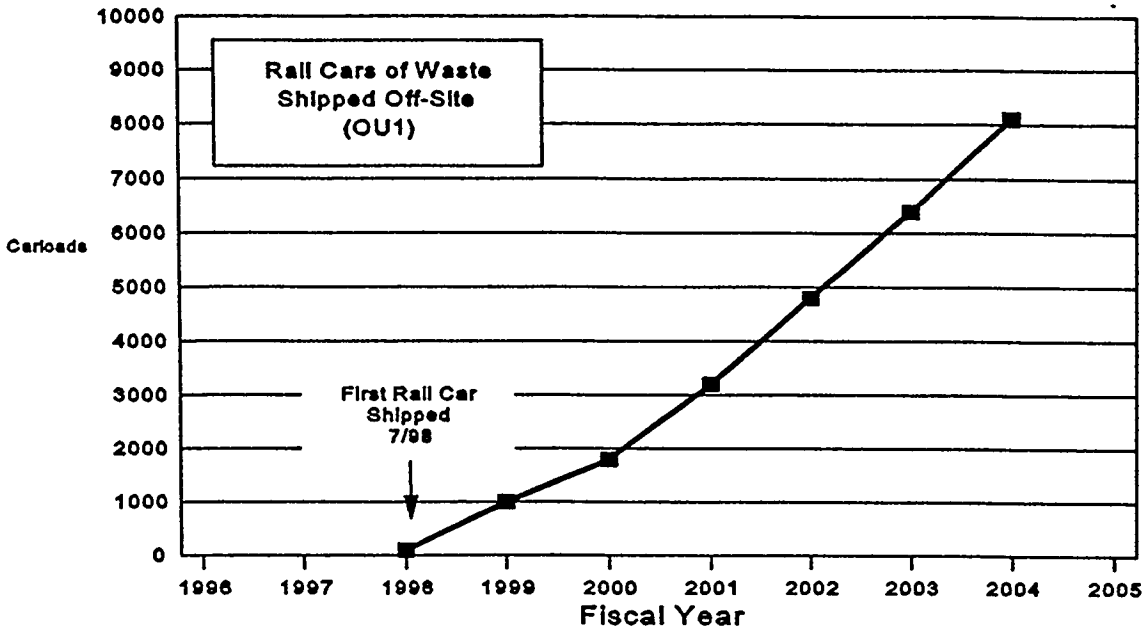


Exhibit 3: OU1: shipment of rail cars of waste to the off-site disposal facility. More than 8000 carloads will ultimately be shipped, with the first carload scheduled to be shipped in July 1998.

EXHIBIT 4

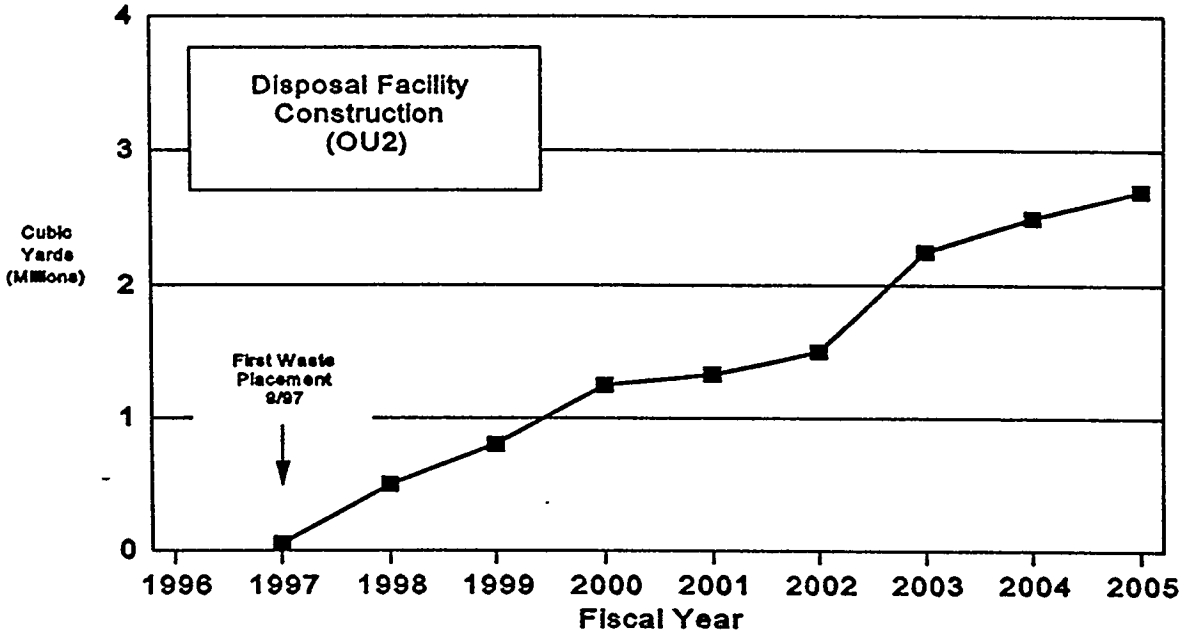


Exhibit 4: OU2: the building of the on-site disposal facility, which will contain about 2.5 million cubic yards of waste, with the first waste placement scheduled for September 1997.

EXHIBIT 5

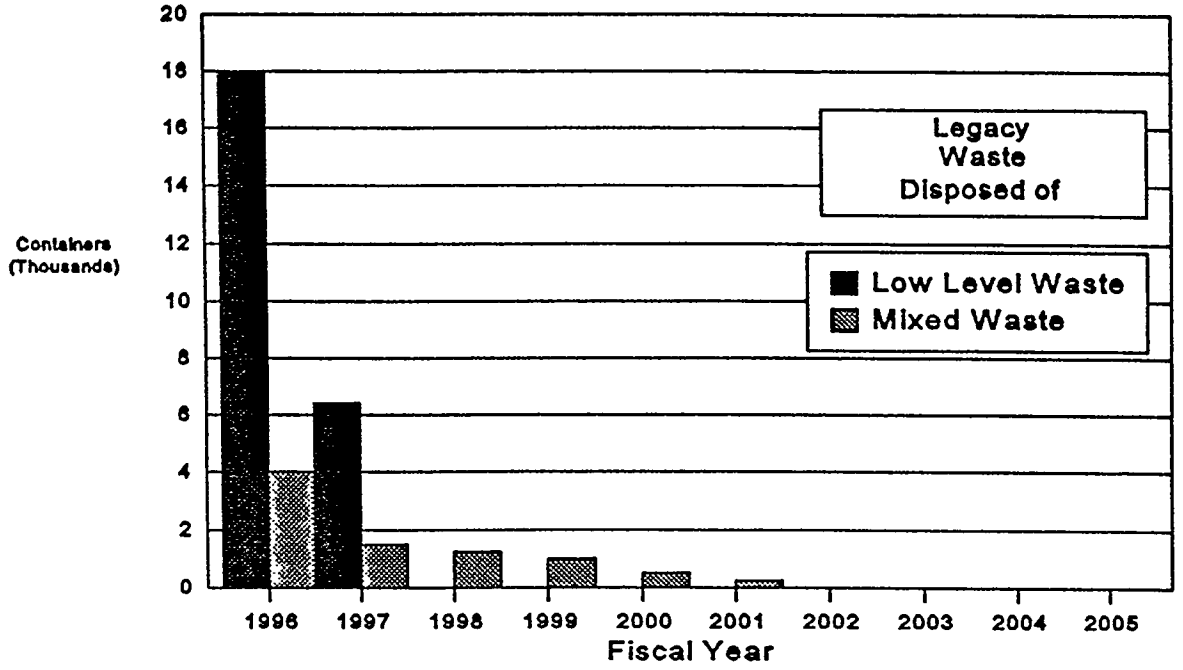


Exhibit 5: The removal of the remaining legacy low-level and mixed waste (legacy waste is the waste which remained at the site after production ceased in 1989). The low-level waste will be disposed of over the next couple of years; the mixed waste will take longer to dispose of due to treatment requirements.

EXHIBIT 6

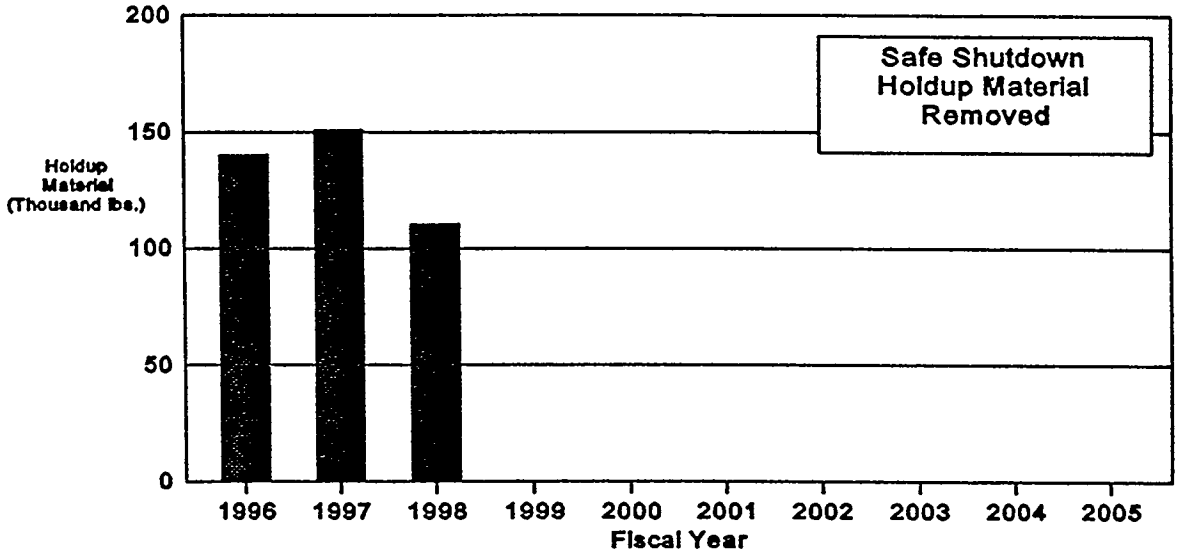


Exhibit 6: the removal of the material held up in process facilities by the Safe Shutdown group.

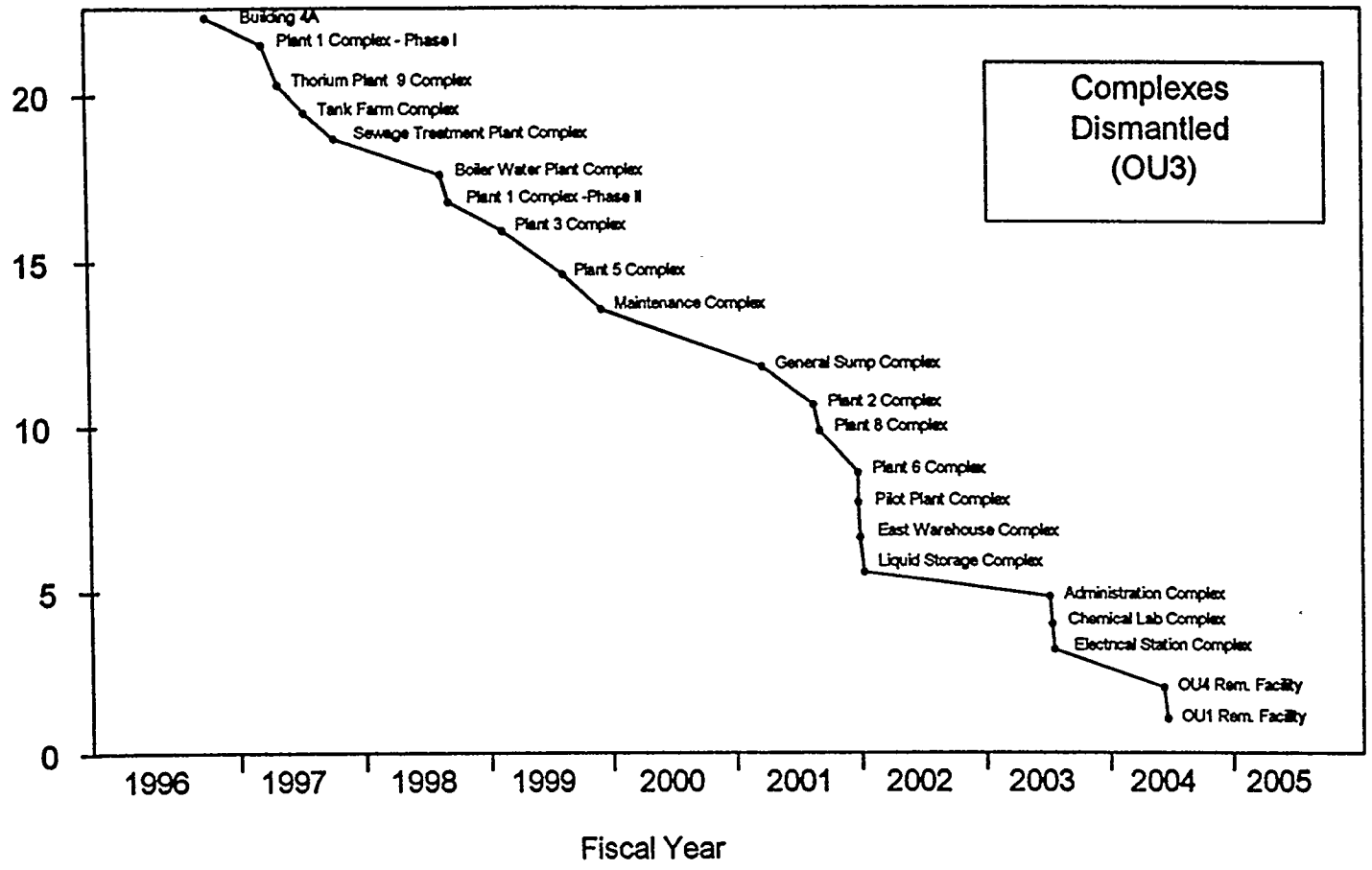


Exhibit 7: OU3: The D&D of the 20 site complexes plus the two remediation facilities. All facilities except for the water treatment plant will be taken down. Work is underway on the Plants 4 and 1 complexes at the present time.

EXHIBIT 8

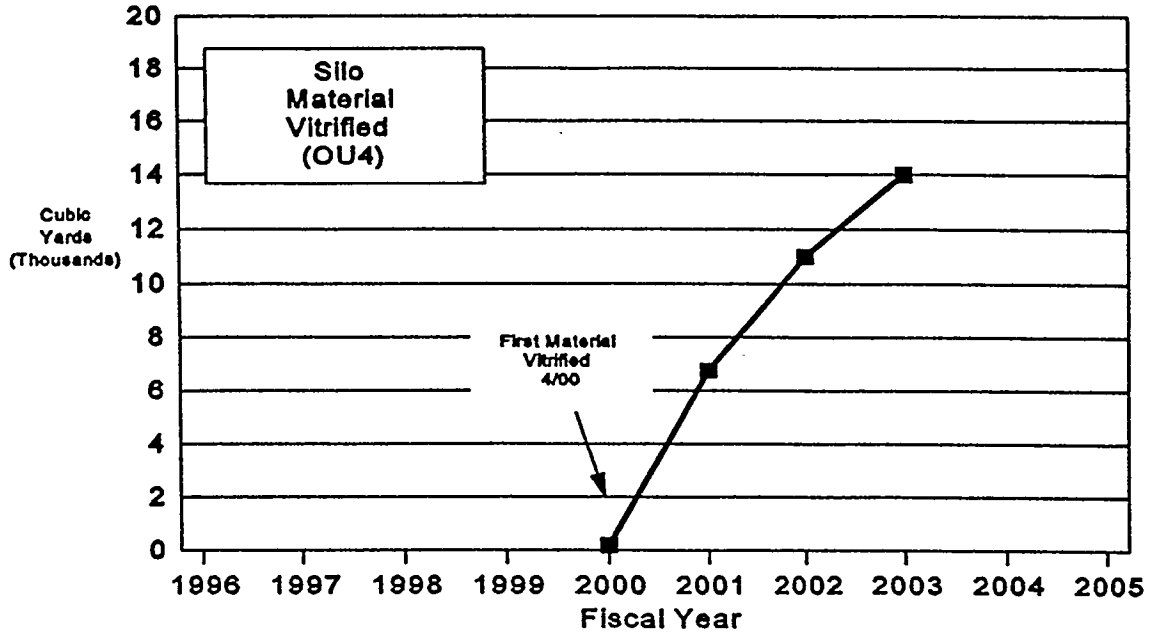


Exhibit 8: OU4: The vitrification of the silo material, with the first material scheduled to be vitrified in April 2000. A vitrification pilot plant is currently undergoing testing prior to operation. The parameters for the main vitrification plant will be developed in the pilot plant.

EXHIBIT 9

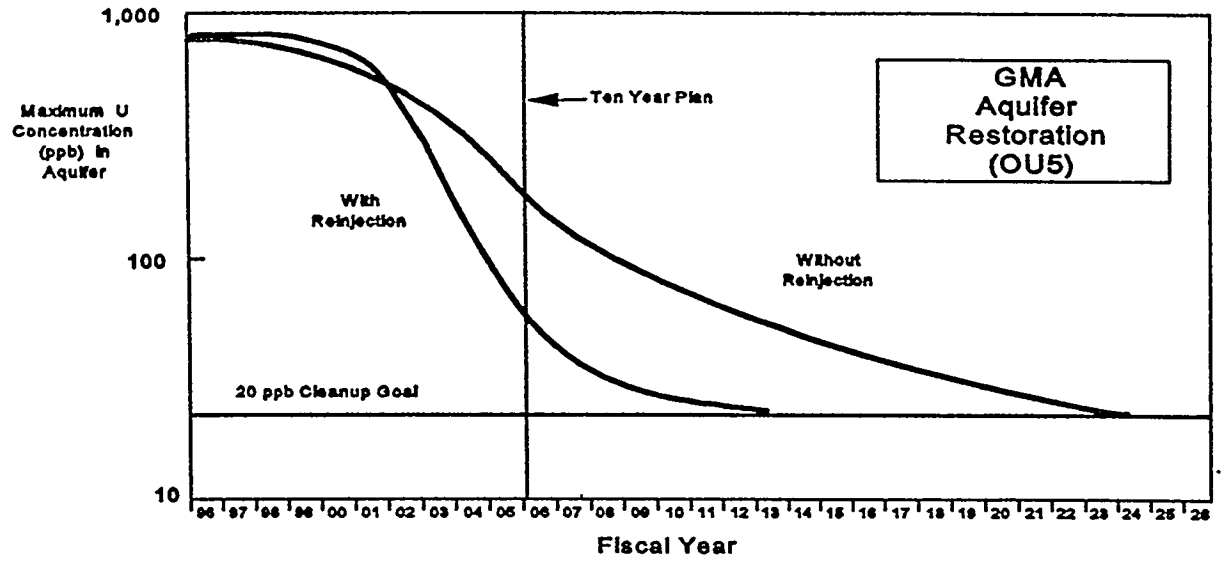
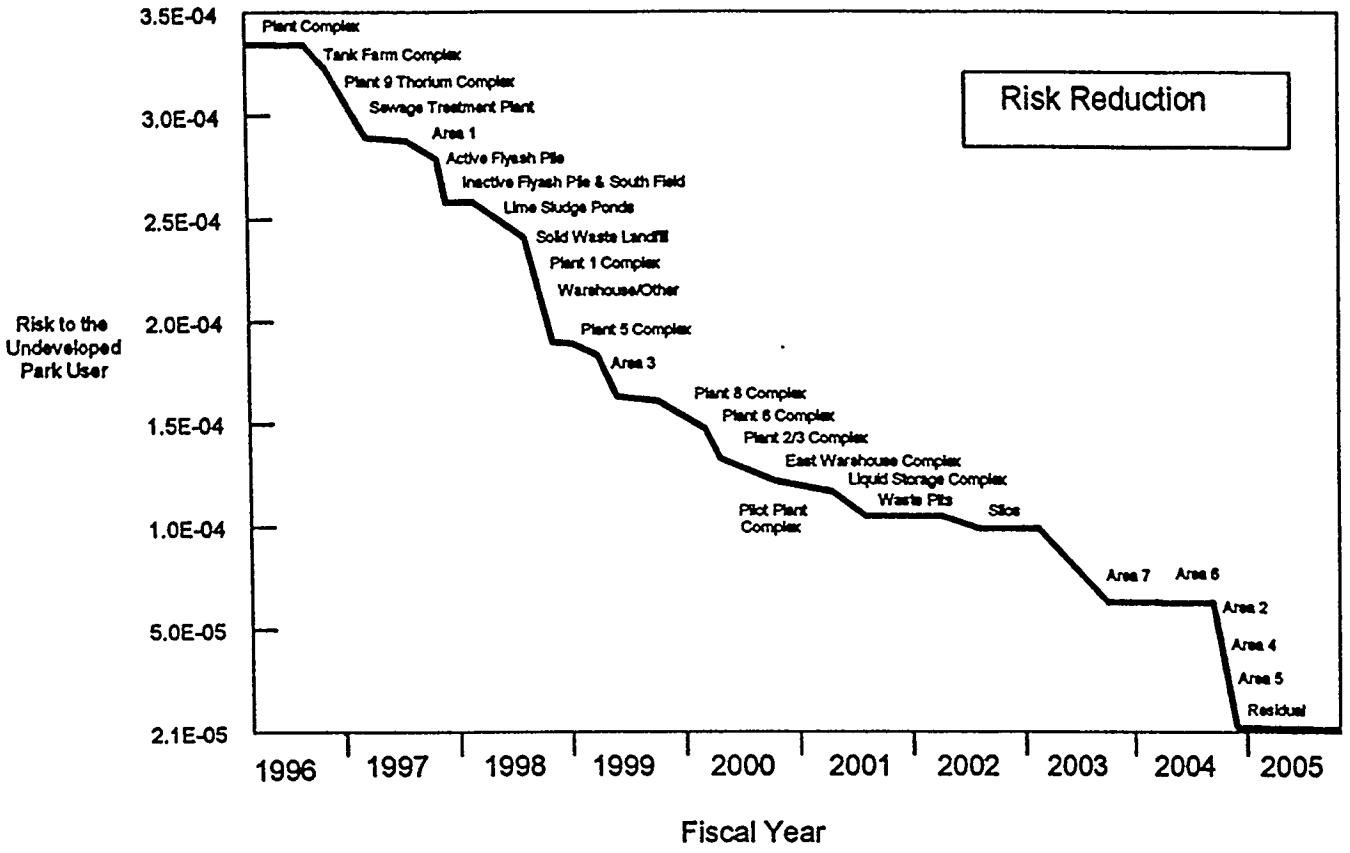


Exhibit 9: OU5: The restoration of the aquifer will be complete when the maximum concentration of uranium in the groundwater is below 20 ppb. This is expected to be accomplished in about 25 years if only extraction is used, and in about 15 years if both extraction and reinjection are employed. A reinjection test is planned that will give better definition of this process.



Finally, Exhibit 10 illustrates the goal of all of these activities, the reduction to the risk to a user of Fernald as a function of time as the remediation progresses. A future use as an undeveloped park was employed for the purpose of facilitating this comparison.

TEN YEAR PLAN IMPLEMENTATION STRATEGY

Several changes have been made or are being implemented to streamline project operations, procedures or requirements to allow the Ten Year Plan to proceed within its schedule and budget constraints. They include projectization of the work, streamlining the DOE requirements which apply to the work, the use of innovative ways of working to achieve accelerated results, and the adoption of the performance-based fee approach.

Projectization

The five Operable Units as originally defined included all remediation within their physical boundaries. For example, OU4 included both vitrification of the silo materials and the remediation of the underlying soil. However, now that all RODs are in place, it is more efficient to handle OU4 soils under a Soil Remediation Project and to have this Project manage the soils from the other four OUs as well. The Soil Remediation Project will define the excavation parameters, contract for the excavation, and select the parameters that verify that the soil remaining is below the action levels. They also have the burden of defending these items to the regulators. There are other items within the five OUs that could be more efficiently handled by a single Project as well, such as the D&D of the remediation facilities and off-site shipment of waste to a commercial disposal facility. Therefore, these items were transferred to single Projects after consultation with the regulators. Five Projects were set up, each one containing the primary work in the OU, with the peripheral work transferred to the relevant Project. The five Projects are:

Waste Pits Remedial Action Project
Facilities D&D Project
Fernald Residues Vitrification Plant Project
Soil Remediation Project
Aquifer Restoration Project

In addition to the scope movements, the projectization of the OUs was completed by changing their internal organization to a well defined project structure instead of a functional structure, defining various subprojects and naming project managers responsible for the subprojects and projects. In addition, the support groups Cost/Schedule Control, Procurement and Document Control were reorganized and aligned to this project structure.

DOE Requirements

The Fernald site was the first DOE site to have it Standards/Requirements Identification Documents (SRIDs) approved. These SRIDs define the DOE Orders and Requirements that apply to the Fernald Project. After completing the basic document, FERMCO has been active in streamlining these requirements to shorten schedules and reduce costs. Examples of these requirements are the request for waiving the requirement for a Performance Assessment for the on-site disposal facility, by showing equivalence through the CERCLA process, and waiving the requirement for disposal of waste in DOE off-site facilities. Eliminating these two requirements allows the shortening of the schedule and substantially reduces costs. FERMCO is actively pursuing the waiver or reduction of numerous other requirements, many of them administrative in nature and applying more to an operating facility than a remediation site. The inclusion of standard commercial procurement practices is one of the areas being pursued.

Innovative Ways of Working

Fernald is exploring new ways of working on site that maximizes the use of off-site expertise. Recently Chem-Nuclear Systems Inc. (CNSI) was contracted to stabilize 6,000 gallons of thorium nitrate as a CERCLA removal action on-site. By using an off site subcontractor with experience in the treatment of significant quantities of thorium nitrate, a fully-trained work force and a proven "off-the-shelf" mobile treatment system were brought together as a unit, resulting in a highly successful remedial action. Use of experienced technicians to operate the system expedited training and increased safety. The entire project was completed less than six months after FERMCO contracted with CNSI to perform the work. Project costs were reduced by over 40 percent and the schedule accelerated by one year from the original plan which was based on design, construction, and operation of a treatment system in-house.

The accelerated schedule was possible because FERMCO used CNSI's Nuclear Regulatory Commission (NRC) field license to meet DOE requirements for handling radioactive material. DOE requirements and NRC requirements implemented by CNSI during the project were shown to be equivalent for project management systems; the quality assurance program; environmental, safety and health programs; training; and conduct of operations. Demonstrating that DOE and NRC requirements were equivalent provided the following benefits:

- Eliminated review of CNSI engineering, design, quality assurance, procedures, and training programs during readiness assessment. CNSI's experience and attainment of an NRC license demonstrated their ability to conduct the operation.

- Use of an "off-the-shelf" mobile treatment system tailored to meet the requirements of thorium nitrate treatment eliminated extensive design documentation and reviews and reduced the planning and design phase by approximately 10 months from the original plan.

Operation and control of the solidification process equipment was solely CNSI's responsibility under their NRC license. The project site was designated an "NRC compound" for processing thorium nitrate. CNSI's license requirements

applied in this compound in conjunction with the DOE requirements. Extensive coordination was required to ensure that both DOE and NRC requirements for radiological protection were met.

The FERMCO on-site union personnel worked along side CNSI technicians in the NRC area. It was the first time such joint operations had been conducted at this DOE nuclear facility. To address the union issues, roles and responsibilities of FERMCO and CNSI were established early in the planning process, with support from Industrial Relations and input from the union. These roles were incorporated into the subcontract. Ultimately, the relationship was successful because CNSI made the union workers an integral part of the project team and listened to their suggestions and concerns for safety and the operation. The team produced outstanding productivity and safety records with operations completed without safety incidents and with radiation exposures below expected levels.

Another area of innovation under consideration at Fernald is the privatization of some of the project activities. Two that are being considered now are the privatization of OU1 and the treatment of mixed-waste residue from production processes. Benefits expected to be derived from these efforts are reduced up-front cash flow and thus funding requirements to the project as the contractors will amortize their capital costs over the term of the work; utilization of off-site expertise in allowing contractors maximum flexibility applying their skills and methods to solve the problem; and lower overall costs due to the conversion of the efforts from cost reimbursable to fixed price/unit rate efforts. Studies are underway to work out the funding, contractual, technical, regulatory and other considerations of privatization. Decisions will be made in the first half of 1996 on whether to pursue the privatization of these two efforts.

Performance-Based Fee

Fernald was the first site to adopt the contract reform principles of performance-based fee contracting. In this concept, as described in detail in **Ref. 1.** the basic objectives are set for each six month period in alignment with the Ten Year Plan and include hard milestones linked to key deliverables where quality, safe work is required to maintain the schedule and soft objectives set to measure progress on procurement, safety, stakeholder involvement and other measures. By aligning both DOE and FERMCO personnel to the fee plan, a win-win situation is produced. Both DOE and FERMCO benefit if excellent performance is achieved in accordance with the fee plan. The use of this plan will keep the achievement of Ten Year Plan in focus and a high priority for all parties.

CONCLUSION

All of the prerequisites are in place to allow the Fernald site to proceed at an accelerated pace of remediation. The basic elements of the Ten Year Plan are laid out and are being detailed. Performance Measures have been selected to monitor the progress, and changes in project structure, organization, and requirements are being implemented to allow the Ten Year Plan to succeed.

Ref. 1: "Contract Reform: It's Working at Fernald", by Jack Craig, Director, USDOE Fernald Area Office and Arlen Hunt, Executive Vice President, Fernald Environmental Restoration Management Corporation. (*FEMP-2457*)