

Fernald – Developing and Executing an Accelerated Closure Plan

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ABSTRACT

In November 2000 the Department of Energy (DOE) and Fluor Fernald entered into a closure contract that incentivized Fluor Fernald to reduce the cost and schedule of the Fernald site cleanup. The contract established a target schedule and target cost and how Fluor Fernald performs against these targets determines the amount of fee the company earns. In response to these new challenges, Fluor Fernald developed a 13-part strategy to safely accelerate work and more efficiently utilize the available funding. Implementation of this strategy required a dramatic culture change at Fernald – from a “government job mindset” to an entrepreneurial/commercial model. Fluor Fernald’s strategy and culture change has proved to be successful as the company is on track to close the site ahead of the target schedule at a total project cost less than the target cost. The elements of Fluor Fernald’s strategy and the lessons learned during implementation provide valuable information that could be utilized by other DOE sites that will be undergoing closure over the next decade.



THEN



NOW

Fig. 1. Fernald – then and now

INTRODUCTION

DOE began operating the Fernald Feed Materials Production Center in 1952. Fifty-four years later, DOE, Fluor Fernald, the regulators, and the local stakeholders will witness the closure of the site and its transition to an undeveloped park. This paper will present the closure challenge that DOE presented and the aggressive strategy that Fluor Fernald developed and implemented to meet DOE’s challenge.

FERNALD CLOSURE PROJECT OVERVIEW

In 1952 Fernald began its uranium production mission as the Feed Materials Production Center in support of the nation's weapons program. During 37 years of operation, 462 million pounds of pure uranium metal products were produced for use in the production reactors at DOE's Hanford and Savannah River facilities. When operations ceased in 1989, there were 31 million pounds of uranium product present on site, 2.5 billion pounds of waste, and 2.75 million cubic yards of contaminated soil and debris. In addition, a 223-acre portion of the underlying Great Miami Aquifer was found to be affected by uranium at levels above drinking water standards.

In 1992 the site was renamed the Fernald Environmental Management Project and the mission was formally changed to environmental restoration under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). To facilitate restoration, the CERCLA work scope for the 1,050-acre facility was divided into five operable units: the waste pits (Operable Unit 1); other waste units (Operable Unit 2); the Production Area facilities and legacy-waste inventories (Operable Unit 3); Silos 1 through 4 (Operable Unit 4); and contaminated environmental media, including soil, sediment, and groundwater (Operable Unit 5). Since 1992, CERCLA remedial investigations and feasibility studies have been completed for each of the operable units, and final Records of Decision to establish cleanup levels and document the cleanup remedies have been signed for each by DOE, U.S. Environmental Protection Agency, and Ohio Environmental Protection Agency.

The final remedial actions include: facility decontamination and dismantlement (D&D); on-site disposal of the majority of contaminated soil and D&D debris; off-site disposal of the contents of the two K-65 Silos (Silos 1 and 2), Silo 3, waste pit material, nuclear product inventory, low-level waste, mixed waste, and limited quantities of soil and D&D debris not meeting on-site waste acceptance criteria; and treatment of contaminated groundwater to restore the Great Miami Aquifer.

Ultimately, approximately 950 acres of the 1,050-acre property will be restored to beneficial use as an undeveloped park, and approximately 100 acres will be dedicated to the footprint of the On-Site Disposal Facility. Contaminated portions of the aquifer will be restored to beneficial use as a drinking water supply, and long-term stewardship actions will be put in place consistent with the final land use.

Significant progress has already been made in remediating the Fernald site. To date, the Fernald team has dismantled 218 structures out of a total of 255, including all major former production plants and administrative buildings.

Fernald's eight-cell engineered On-Site Disposal Facility has received 2.75 (of 2.9) million cubic yards of soil and debris to date. Liners and caps have been constructed for seven of the eight cells. Final waste placement and capping of Cell 8 will be complete in early 2006.

Over 70 percent of the site area has been certified as meeting radiological and chemical cleanup levels. Nine of thirteen natural resource restoration subprojects have been completed, including construction of a 12-acre wetland mitigation subproject and an 18-acre forest restoration subproject.

Waste Pit Remediation was completed last summer with 979,000 tons of material safely shipped off-site via rail to Envirocare in Utah. Disposition of Fernald's inventory of nuclear material product is also complete. All 10,000 tons of material has been removed from Silos 1 and 2 and stored in the Accelerated Waste Retrieval Facility. The concrete Silos were decontaminated and dismantled thus eliminating one of the most notorious elements from the Fernald skyline. The Silos 1 and 2 Remediation Facility has been operating since May 2005. Fluor Fernald workers have produced over 2,400 canisters of silo material blended with flyash and concrete. Approximately 3,400 canisters total will be needed to complete the project. The Silo 3 Project is over 90 percent complete with heel removal operations now underway. Plant operators expect 250 additional 3-cubic yard soft-sided containers will be required before the silo can be turned over to demolition crews. Over 17.6 billion gallons of uranium-contaminated groundwater have been extracted from the Great Miami Aquifer. Based on the approved Fernald closure baseline, the Fernald team has completed more than 89 percent of the Fernald site cleanup – including, most notably, the removal of all legacy nuclear materials from the site.

CLOSURE CONTRACT

In November 2000, the Department of Energy (DOE) and Fluor Fernald entered into a cost plus incentive fee closure contract that incentivized Fluor Fernald to reduce the cost and schedule of the cleanup activities at Fernald. Prior to implementation of the closure contract, schedules showed remediation work continuing past 2010. In 2002, DOE renegotiated the Fernald contract with an emphasis on completing the cleanup by December 2006. In order to achieve these results, DOE linked fee with cost and schedule performance and provided significant monetary incentives to accelerate the closure schedule while at the same time minimize costs.

In accordance with the contract, the following activities must be completed to achieve site closure:

- Physical completion of the work defined in the Records of Decision in a phased approach to minimize remaining authorizations of physical completion
- Restoration of the site in accordance with the 2002 Draft Natural Resources Restoration Plan
- Installation of the long-term stewardship infrastructure
- Closure strategy is submitted to DOE in the final ROD documentation in phased turnovers and approaches

The closure contract identifies a target cost of \$1.911 billion and a target schedule date of December 31, 2006 for closure of the Fernald site. The incentive fee structure is based on these target cost and schedule. If Fluor meets both the cost and schedule targets, the company will earn \$215 million in fee. For each month of schedule acceleration or delay, the fee will increase or decrease (as applicable) by \$8.1 million with maximum schedule fee earned by closing the site by March 31, 2006 and minimum schedule fee earned by closing the site on or after December

31, 2007. Similarly, the cost incentive fee is adjusted up or down with Fluor gaining or losing 30 percent of the difference between final cost and the target cost. The maximum fee that can be earned (cost and schedule incentives combined) is \$288 million and the minimum is \$63 million.

STRATEGY TO ACHIEVE ACCELERATED SITE CLOSURE

To meet this accelerated schedule for DOE and to maximize fee for the company, Fluor is relying on the experience and excellent safety culture of its skilled and seasoned employees. In addition, Fluor developed and is implementing a detailed plan to carefully track progress and to change the culture at the site from a “government job mindset” to an entrepreneurial/commercial model. During development of the commercial model for closure, the following 13 areas/activities were identified that were key to the success of the project:

- Project controls/estimating
- Funding
- Austerity program
- Risk management
- Manpower planning
- War room
- Work authorization
- Claims management
- Exit/transition planning
- Footprint reduction
- Space management
- Property disposition
- Records disposition

Each of these areas provides an opportunity to plan or manage the work more effectively, accelerate the schedule, and/or minimize the total cost. The combination of these improvements has placed Fluor Fernald on track for closure in March 2006 at a total cost less than the contract

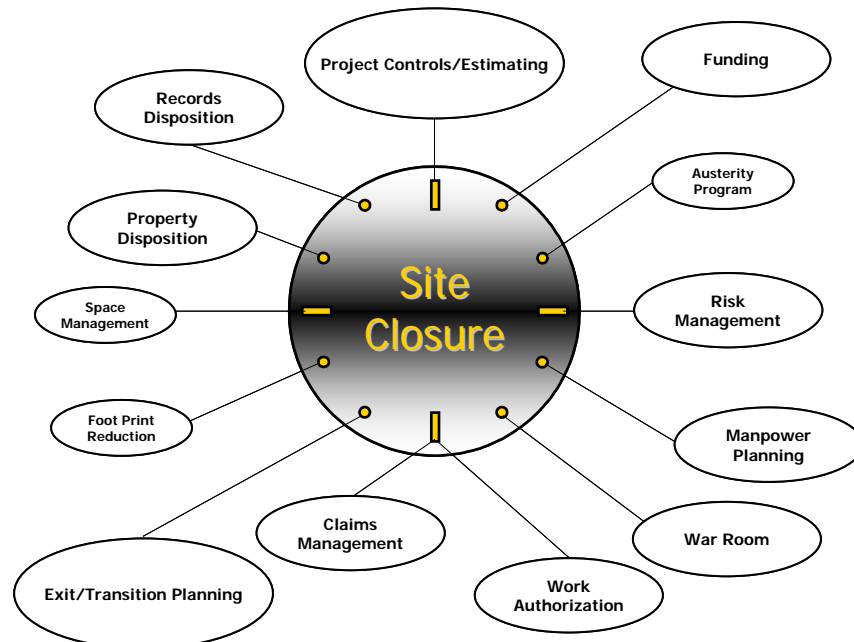


Fig. 2. 13 areas key to project success

target cost. The remainder of this paper will discuss each of these areas in detail and then present a summary of lessons learned from Fluor Fernald's experience implementing an aggressive closure contract.

Project Controls/Estimating

Fluor Fernald's Project Controls System is a fully integrated cost, schedule, and estimating system that allows the Fernald team to perform needs assessments, manage resources, and evaluate the impact of proposed changes on a real-time basis. It also promotes work efficiency by providing the means to manage project inter-relationships, resource demands, and complex day-to-day project logistics. The Project Controls System incorporates a "tool box" of business systems software that interfaces directly with the site's accounting and human resources systems to ensure that project status and planning decisions are made using complete and up-to-date information.

Funding

As part of the closure contract, DOE provides a consistent funding level of \$324 million per year, which allows greater certainty in the planning of future work. Fluor Fernald has developed and now oversees the funds management process that allocates the available funds to the various ongoing projects at the site. Funding priority is given to those projects that are on the critical path schedule to meet the target schedule for closure. Monthly project meetings are conducted to review projected funding forecasts. If available funding is identified, a prioritized "Wish List" is already in place so that any available funding can be quickly allocated to accelerate field work.

Austerity Program

Fluor Fernald has implemented an austerity program that established a single point of contact for all site purchases and expenditures. This person scrutinizes all requisitions to separate needs versus luxuries and disapproves expenditures that do not directly contribute to the safe, least cost, accelerated closure of the site. As a result of the Fiscal Year 2004 austerity program, \$36.6 million of work that had been scheduled for performance in Fiscal Year 2005 was accelerated into 2004.

Risk Management

Contingency funding and cost and schedule risks were quickly identified as obstacles to accelerated closure. Money being held in a contingency account was not available for use by the projects while inadequate risk analysis may place too much importance on certain risks while underestimating the potential impacts of others. To address this issue, Fluor Fernald developed a graded approach to identify various risk associated with scopes of work and the level of mitigation appropriate for each risk. Utilizing a variety of tools, Project/Program Teams first identified, quantified (with a rough order of magnitude cost estimate), and established the probability of occurrence of all potential risks to their area of responsibility. These project/program risks were then rolled up and reviewed on a sitewide basis to identify those risks that were critical to closure cost and schedule. Based on this overall review, contingency funding and mitigative actions were assigned.

Manpower Planning

In case any employees were still in denial, implementation of the closure contract confirmed that Fernald employees are working themselves out of a job. The challenge to Fluor Fernald management was ensuring not only that the total number of employees were reduced but also that the right employees were let go. To address this problem, Fluor Fernald developed the Manpower Planning System, a forecasting tool that is used by project managers, human resources, project controls, and space management to determine the necessary number of employees, the proper employee skills, and the support requirements on a time-phased basis. Project managers use the Manpower Planning System to determine the proper skill mix and requirements to support activities within a certain project over a period of time. The project input is then rolled up to human resources where it is used to manage organization changes, employee reductions, and to track planned versus actual headcounts

War Room

To facilitate information sharing and communication between the projects and Fluor Fernald upper management, a War Room was established. As a physical space, the War Room includes the latest cost and schedule information displayed on the walls so that any interested person (including the client) can walk into the room and know that they are looking at the most recent available data. As a concept, the War Room is a bi-weekly meeting between upper management and project representatives to discuss past performance, current status, and future plans. There were five specific objectives for the development and use of the War Room:

1. To provide and continue implementing a highly disciplined project management culture across the site with an emphasis on personal accountability
2. To provide a management tool that measures cost, schedule, and physical progress to determine performance
3. To identify the sequence of activities and interfaces between projects
4. To promote project integration
5. To identify the detailed plan for each project to meet closure and provide short-term implementation plans to assure that work is performed on time and within schedule

Work Authorization

In order to control spending and accelerate schedule, authorization of work needed to be tightly controlled. This process starts by developing a fiscal year work plan that outlines the work planned for the year, the associated costs, the schedule, and the applicable milestone deadlines. This list is compared to the available to decide what work will be authorized for that fiscal year. Activities that do not receive work authorization are put on a prioritized "Wish List" so authorization can be quickly granted if additional funding becomes available. The status of authorized work versus available funding is reviewed monthly through the Funds Utilization Report.

Claims Management

Strict adherence to the closure contract is vital to accelerating closure and earning fee. As part of the change from a government culture to an entrepreneurial/commercial model, Fluor Fernald conducted special training sessions to brief managers at all levels on the details of the closure contract and how the day-to-day work would have to change to complete the contract successfully. A claims management process was developed to help the managers analyze the cost and schedule impacts of directed changes, notify DOE in a timely fashion when they are impacting the contractual scope, insure that Fluor Fernald is compensated adequately for scope changes, modify cost and/or schedule targets as appropriate, and generally assist management in avoiding unrecognized scope creep and fee leakage.

Exit/Transition Planning

At closure, Fluor Fernald must be ready to hand over all remaining functions, systems, procedures, and requirements to DOE. In order to ensure that this transition goes smoothly, Fluor Fernald has developed a Site Closure Plan with the following five key objectives:

1. Develop a program to achieve the four requirements for site closure
2. Develop a long-term stewardship plan to include a Legacy Management Plan and Post-Closure Institutional Controls Plan
3. Develop a "Going Out of Business Plan" for each project
4. Develop a "Going Out of Business Plan" for each functional organization
5. Implement a management turnkey system to ensure timely completion of these requirements and track progress in the War Room.

Completion and DOE approval of the Site Closure Plan and well ahead of the target closure date ensures that there are no unexpected requirements or commitments that would delay closure or increase the cost of the handoff from Fluor Fernald to DOE.

Footprint Reduction

Reducing the size of the actively utilized footprint at Fernald will decrease infrastructure costs and allow general cleanup and disposition of miscellaneous debris that has accumulated during the life of the site. Reducing the size of the footprint involves accelerating the D&D of miscellaneous structures (including vacated office trailers) and ensuring that complete demobilization and cleanup is performed as activities are completed.

Space Management

In order to complete soil remediation at Fernald, all office trailers must be vacated, undergo D&D, and be dispositioned. To accomplish this, Fluor Fernald is aggressively moving all non-field-related staff to off-site locations as soon as possible, and by May 2005 at the latest. This disperses employees to separate office buildings, and sometimes separate parts of the city, at a time when communication and cooperation between project groups is essential to perform work safely while accelerating the schedule. To mitigate this physical distance, integration and communication will be addressed heavily in the War Room meetings.

Property Disposition

Because the Federal government owns much of the property at Fernald, there are strict procedures that must be followed for reuse and disposition of everything from large equipment to desktop computers. Fluor Fernald has streamlined this process to expedite the identification and disposition of excess property in order to ensure that we meet site closure objectives. In addition, when new property is purchased, a site property management system (including property control, property accountability, property disposition, and compliance with applicable orders, regulations, and procedures) is implemented at acquisition and continues until the property is dispositioned. In this way, there are accurate data on the amount and status of currently held property and appropriate planning can be performed so that property disposition does not delay site closure.

Records Disposition

Like property disposition, records disposition is subject to Federal government and environmental regulations and record retention requirements. Fluor Fernald is ensuring compliance with these requirements, while still meeting the accelerated closure target, by maintaining sitewide Record Inventory Databases, assigning a liaison to coordinate between Record Management Services and the projects/programs, managing an off-site record center, maintaining an on-site CERCLA administrative Record and Post Record of Decision Files, and maintaining a DOE public reading room. Responsibility for on-going records management and compliance with the requirements will be transitioned to DOE at closure.

CONCLUSION

Since signing the closure contract in 2000, Fluor Fernald has worked to change the culture and mindset of the Fernald workforce to support safe, least cost, accelerated closure of the site. Development and implementation of the 13 key areas discussed above has produced important lessons learned that are applicable to other DOE sites that will be undergoing closure over the next decade. The following list summarizes those lessons learned:

- Incentive based contracts work.
- Demonstrate your commitment to excellence in safety performance.
- Work to clearly define the end state. Align with workers and organized labor on the vision.
- Align with regulators and stakeholders on their expectations and level of involvement.
- Focus resources on continuous improvement of work methods/procedures.
- Offer incentives to retain key workers and critical skills.
- Establish waste disposition pathways. Focus a team early on those waste streams without an obvious disposition pathway.
- Establish the most aggressive schedule for completion to challenge the project teams.
- Select the right tools and systems to measure and manage the job.
- Apply disciplined project management practices throughout execution
- Project teams develop estimates with independent peer reviews

- Project risks should be identified early and mitigation plans developed
- Continually analyze the execution strategy to identify risk/mitigations and acceleration opportunities
- Apply aggressive austerity measures and manpower planning
- Reward teams for safe, on-time completion of project activities
- Continuous scrutiny of cost, schedule, and safety performance
- Develop “Going Out of Business Plans” for institutionalized functions