This paper details my experience as an intern with the Technology Programs department at Fluor Fernald, Inc. The report begins with a discussion of the U.S. Department of Energy’s role in the Cold War, followed by an introduction to the Fernald Environmental Management Project. A former uranium processing facility, Fernald is now the focus of a long-term environmental remediation and restoration effort. My role within the managing contractor’s Technology Programs department is explored, along with the department’s overall contribution to the remediation mission at Fernald. The major projects I completed during my tenure are also described. The report concludes with an evaluation of the internship and a discussion of how it complemented the education I received at Miami University.
THE ROLE OF TECHNOLOGY AT THE 

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

An Internship

Submitted to the

Faculty of Miami University

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Master of Environmental Science

Institute of Environmental Sciences

by

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<td>Atomic Energy Commission</td>
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<td>ASTD</td>
<td>Accelerated Site Technology Deployment</td>
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<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act</td>
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<td>Decontamination and Decommissioning</td>
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To Samuel Freeman, my greatest friend: I literally could not have done this without your inspiration and love. Thank you.

This internship report is dedicated to my parents, Joseph and Betty, to whom I owe everything.
CHAPTER 1: INTRODUCTION

When the ideological tensions of the early 20th Century erupted in the Cold War between the United States and the Soviet Union, the U.S. turned to its rapidly developing energy program for assistance. The development and use of the atomic bomb established the United States as a country with immense military capability and prompted other nation-states to strive for comparable power. Harnessing nuclear energy to create weapons of mass destruction became a political and military necessity for “superpower” status in the world arena. The resulting arms race required that participating nations devote tremendous financial and environmental resources to the development of nuclear weapons.

From the 1940s to the 1980s, the U.S. Department of Energy (DOE) and its predecessor, the Atomic Energy Commission (AEC), played a significant role in national defense. Facilities were constructed across the country to extract, process, and fabricate nuclear materials for use in weapons production. In 1945, when nuclear technology was first utilized by the military, the environmental ramifications of weapons production were neither known nor considered by the average American, who was more concerned about the possibility of imminent Soviet attack. As the Cold War drew to a close, scientists and citizens became increasingly aware of the consequences of using radioactive materials on such a grand scale. The fall of the Soviet Union diminished the need for further development of nuclear weapons but not the involvement of the DOE in the complex of facilities that it had created. The Department is now responsible for addressing decades of environmental contamination at more than 100 sites nationwide (Anonymous, 1996).

The DOE’s Office of Environmental Management (EM) manages site cleanup and restoration. EM is currently responsible for 113 sites in the United States (U.S. Department of Energy Office of Environmental Management, 2000). Nuclear weapons development and testing at these sites produced large volumes of radioactive waste, hazardous waste, and spent nuclear fuel. EM is tasked with removing these contaminants from soil, groundwater, and facilities at the former production sites, many of which will require long-term care to ensure the safety of human health and the environment. The total cost of nationwide remediation and site
stewardship is difficult to quantify, but current estimates range in the hundreds of billions of dollars (U.S. Department of Energy Office of Environmental Management, 2000).

In the state of Ohio, EM is responsible for thirteen sites that had been involved in the research and development of nuclear technology and/or weapons production. Cleanup is underway at seven of these sites, including the Fernald Environmental Management Project (Fernald), located approximately eighteen miles from Cincinnati on a tract of land overlapping the boundary of Butler and Hamilton Counties in the southwestern corner of the state (Fig. 1).

Fluor Fernald, Inc., a subsidiary of the California-based Fluor Corporation, is managing facility demolition and environmental cleanup at Fernald. I worked as an intern with the Technology Programs department of Fluor Fernald from September 25, 2000 to September 30, 2001.

This internship report outlines the activities currently being conducted at the Fernald site and details my experiences as an intern with the managing contractor. Chapter 2 summarizes Fernald’s history as a production facility during the Cold War and provides an overview of the environmental remediation activities currently being conducted at the site. Chapter 3 explains the role of Fluor Fernald’s Technology Programs department in the site closure process. Chapter 4 details my contribution to the work of Technology Programs. The fifth and final chapter addresses my thoughts about the internship and the education I received at the Institute of Environmental Sciences (IES).
CHAPTER 2: HISTORY OF THE FERNALD SITE

Throughout the Cold War, U.S. defense programs relied heavily on industry to generate the building blocks for weapons and military equipment. In the early 1950s, the AEC built the Feed Materials Production Center (FMPC) near the rural community of Fernald, Ohio. Several features of the Fernald area made it superior to other potential production sites under consideration at the time: its proximity to Cincinnati and a railroad line, low property values, flat terrain, an abundant water supply, and a pool of skilled labor from which to draw employees (Fluor Fernald, Inc., “Cold War” web page, 2002). The AEC began FMPC construction in 1951 and hired National Lead of Ohio, a subsidiary of National Lead Company, to operate the site under government contract.

The FMPC site consisted of 1,050 acres, 136 of which were used to produce purified uranium compounds and metals for use as “feed materials” by other government facilities that manufactured nuclear weapons for national defense. Through a series of metallurgical and chemical processes, the FMPC converted uranium ore and, eventually, recycled uranium scrap products into uranium metal shapes known as derbies (See Fig. 2). Depending on their application, uranium derbies were either shipped directly to other nuclear defense facilities or melted and poured into graphite molds to form ingots. Some ingots were extruded or rolled to create billets for various uses throughout the defense complex (U.S. Department of Energy, 1998). The FMPC also machined uranium fuel cores for use in production reactors, which produced weapons-grade tritium and plutonium (See Fig. 3). Figure 4
illustrates the uranium conversion processes conducted at the FMPC.

As one of only two feed materials plants in the U.S., the FMPC manufactured uranium products from 1952 through 1989. During this time, the site delivered more than 500 million pounds of uranium products to other DOE sites (U.S. Department of Energy Fernald Field Office, 1999).

Because the FMPC played such a pivotal role in national defense, the U.S. government maintained a shroud of secrecy around its purpose and internal operations. Not only were nearby residents unaware of the activities conducted at the FMPC; employees themselves often did not know what they were helping to produce. Signs like the one shown in Figure 5 warned employees of sharing company information with strangers, family members, and even co-workers.

**The End of Production at Fernald**

In 1986 the DOE awarded management of the FMPC to Westinghouse Material Company of Ohio. By this time the demand for nuclear feed materials in the U.S. had fallen; and the enforcement of environmental laws such as the Comprehensive Environmental Response, Conservation, and Liability Act (CERCLA/Superfund) and the Resource Conservation and Recovery Act (RCRA) shed new light on the environmental impacts of the facility’s production years. Uranium contamination of the Great Miami Aquifer underlying the FMPC was first detected in 1960, and the U.S. Environmental Protection Agency (EPA) began investigating aquifer contamination under CERCLA and RCRA in 1986 (Sidle and Lee, 1996). In response to
growing public concern, media scrutiny, and a class-action lawsuit filed by residents living near
the site, the DOE suspended production operations at the FMPC in 1989 to focus on
environmental remediation of the facility, which was placed on the National Priorities List of
Superfund sites by the EPA that same year.

The FMPC was officially renamed the Fernald Environmental Management Project in
1991 to reflect the shift in site mission from uranium production to environmental remediation.
Westinghouse managed the site until December of 1992, when Fluor Fernald** was awarded the
contract to perform environmental restoration. Fluor Fernald’s mission was clear: to clean up
the site and any offsite contamination in a safe, timely, and cost-effective manner.

Environmental Remediation at Fernald

Before Fluor Fernald could begin environmental remediation of the site, it had to conduct
a remedial investigation and feasibility study (RI/FS) in accordance with requirements of
CERCLA and the Superfund Amendments and Reauthorization Act. The RI/FS involved,
among other research, exhaustive soil and groundwater sampling to determine the extent of
contamination. Results indicated that 400,000 to 1,000,000 pounds of uranium were released
into the environment during the site’s 37 years of active production (U.S. Department of Energy,
2001). The RI/FS also detected other radionuclides, along with hazardous chemicals used to
process uranium, throughout the former production area.

Four general activities comprise the cleanup effort at Fernald: (1) construction and
maintenance of an on-site disposal facility (OSDF), (2) soil and (3) water remediation, and (4)
facility decontamination and demolition.

The Fernald OSDF is a CERCLA-regulated landfill designed to permanently store
radioactive and hazardous waste that meets waste acceptance criteria (WAC). The facility will
consist of seven or eight separate cells, each of which will be lined and covered with a
combination of natural and synthetic barriers. At maximum capacity, the facility is expected to
store 2.5 million cubic yards of waste and demolition debris (U.S. Department of Energy, 1999).

** Fluor Fernald was originally known as the Fernald Environmental Restoration Management Company, changing its name to
Soil within the former production area contains several hazardous constituents, including uranium-238, radium-226, technetium-99, and organic chemicals. Some of this contaminated soil is being excavated for treatment, if necessary, and disposal in the OSDF. Soil that cannot meet the OSDF WAC is being shipped off-site for disposal (U.S. Department of Energy, 1999).

Fernald’s production years severely impacted both surface and ground water supplies. The Great Miami River flows approximately one mile from the site, which was built over the sole-source Great Miami Aquifer. Estimates indicate that more than 2,000 acres of the aquifer, including off-site areas, have been contaminated with radionuclides and other hazardous substances (U.S. Department of Energy, 1999).

Former production facilities at Fernald are currently being decontaminated and razed (See Figure 6). Debris and equipment remaining after demolition will be placed in the OSDF.

Remediation Projects

Once the RI/FS was completed, Fluor Fernald developed a remedial action plan and divided the site into five operable units. The units were established to address the areas of concern described above and to provide corresponding cleanup alternatives. Each major remediation project area is briefly described below:

- Operable Unit 1 – Waste Pits Remedial Action Project: consists of six pits filled with waste chemicals and materials generated during production years
- Operable Unit 2 – Soils and On-Site Disposal Facility Project: includes landfill, lime sludge ponds created from water treatment activities, soils extracted from the South Field Area, and two fly ash piles (created from burning coal in the boiler plant)

Figure 6: Demolition of Plant 5 warehouse, which stored raw materials during Fernald’s production years. Source: Fluor Fernald Photographic Archives, Photo 6401D-496.
- Operable Unit 3 – *Decontamination and Dismantlement*: includes all former processing structures, buildings, and equipment; inventoried hazardous materials; scrap metal piles; and fire training areas within the former production area.

- Operable Unit 4 – *Silos Project*: encompasses the demolition and remediation of Silos 1 and 2, containing radium-bearing wastes; Silo 3, containing dried uranium-bearing wastes; and Silo 4, which is empty.

- Operable Unit 5 – *Aquifer Restoration and Wastewater Project*: focuses on condition of groundwater, surface water, sediments, soil, air, vegetation, and wildlife on the site and within the surrounding area.

**Cleanup Progress and the Role of Technology**

Since 1992, significant progress has been made in the cleanup of Fernald and the surrounding area. Of the 250 above-ground structures scheduled for removal, 150 have already been dismantled (Fluor Fernald, Inc., “D&D” web page, 2002). Groundwater is being treated and re-injected into the Great Miami Aquifer; this treatment is expected to continue through at least 2010 (U.S. Department of Energy, 2001). Contaminated soils and construction debris have been placed in three cells of the OSDF, the first of which was filled to capacity in 2000 and capped in 2001. Figure 7, on the next page, provides an aerial view of the site as of June 2001, while Figure 8 illustrates how Fluor Fernald anticipates the site will look once cleanup and site restoration are complete.

Technological innovation is crucial to timely site closure and environmental remediation throughout the DOE complex, and Fernald is no exception. The work being done at Fernald is made possible by technological advances that allow workers to characterize, isolate, and eliminate contamination from environmental media; rapidly dismantle complex structures and process equipment; and safely dispose of hazardous substances.
Figure 7: Fernald site as of June 2001. Source: Fluor Fernald photographic archives, Photo 7619-4.

Figure 8: Fernald Conceptual Post Remediation Plan. Source: Fluor Fernald Graphics Department, Graphic #6924.1C
CHAPTER 3: FERNALD TECHNOLOGY INITIATIVES

Since project managers generally have little time or opportunity to investigate technological advances in their field, Fluor Fernald developed the Technology Programs department to focus exclusively on identifying and deploying superior technologies. The department, funded primarily by the DOE Office of Science and Technology (OST), works with managers and others at the Fernald site to determine the technology needs of each project area. Once the needs are identified, members of Technology Programs begin the process of finding safe, low-cost, and effective solutions to the various closure challenges. Three separate groups comprise Technology Programs and perform the department’s major activities: the Site Technology Coordination Group (STCG), Technical University Programs, and Technology Application.

Fluor Fernald’s STCG links Technology Programs with various DOE offices, other DOE cleanup sites, technology providers, Fernald project managers, and stakeholders. The primary function of the STCG is communication, accomplished through the following activities:

- identifying and communicating the technology needs of Fernald projects to technology providers;
- acquiring the information necessary to address technology needs;
- conveying the information to Fernald project representatives; and
- sharing the technology information acquired at Fernald with other DOE sites.

The STCG’s diverse constituency facilitates communication and public involvement. Members of the STCG include: Fluor Fernald and DOE-Fernald personnel, representatives of the U.S. EPA, the Ohio EPA, and stakeholder groups such as the Fernald Citizens Advisory Board (FCAB) and Fernald Residents for Environmental Safety and Health (FRESH). The FCAB was established by the DOE in 1993 to assist site characterization and planning, and FRESH is a grassroots organization of local residents that formed in the 1980s after the public became aware of soil, air, and groundwater contamination in the area surrounding the site (Fernald Citizens Advisory Board, 2001).
Fluor Fernald’s Technical University Programs unit draws on the technical expertise of individuals from colleges and universities to serve Fernald’s remediation goals. Technical University Programs has cultivated a partnership with local universities and minority institutions. The institutions provide counsel in their areas of expertise to assist Fernald with worker training, basic and applied research, evaluation of remediation and post-closure monitoring technologies, public relations activities, and other technical issues (Fluor Fernald, Inc., “Technical University Programs” web page, 2001).

The Technology Application group facilitates the use of innovative technologies at Fernald and across the DOE complex. The mission of Technology Application is to assist remediation projects at Fernald with the demonstration and deployment of innovative technologies. Technologies chosen for deployment either have proven benefits or have the potential to make field work more effective, safer, less expensive, and/or less time consuming. In prior years, most of the team’s projects were related to decontamination and decommissioning (D&D) field challenges. However, due to evolving needs at Fernald, the group has recently expanded its focus to include post-closure monitoring technologies.

The Technology Application group conducts three main kinds of projects. Described below, these projects represent the major avenues through which new technologies are introduced to the site. Each year, Technology Application team members develop a number of proposals for projects in the following areas.

**Large Scale Demonstration and Deployment**

Large Scale Demonstration and Deployment Projects (LSDDPs) are designed to field test innovative technologies and compare their ability to perform D&D work with that of the standard, or baseline, technologies currently being used. The DOE OST controls the LSDDP program, which is intended to reduce the expense of facility D&D by identifying those technologies which are more productive, more cost-effective, and safer than baseline technologies.

**Accelerated Site Technology Deployment**

Accelerated Site Technology Deployment (ASTD) projects, funded by the DOE Office of
Environmental Management, are designed to expedite the deployment of previously demonstrated or commercially proven technologies throughout the DOE complex. DOE-EM created the ASTD program to hasten remediation projects, reduce cleanup costs, improve worker safety, and eliminate obstacles prohibiting the use of new or advanced technologies.

**Long Term Site Stewardship**

The Fernald Post Closure Stewardship Technology Project (PCSTP) was developed in 2000 in response to an emerging need for post-closure monitoring technologies at Fernald. Site closure is scheduled for 2006, so project managers are under increasing pressure to develop a comprehensive plan for the long-term, post-closure care, inspection, and monitoring of site facilities and environmental media. Long-term maintenance and monitoring is needed to ensure that contaminant levels remain within regulatory limits and that site facilities continue to perform as designed. These issues are of primary concern to Fernald’s many stakeholders, particularly the residents living near the former production area. The goal of the PCSTP is to assist project managers and stakeholders in developing a comprehensive maintenance and monitoring plan through the identification, demonstration, and deployment of technologies capable of assessing long-term site stability and facility performance. See Figure 8 for Fluor Fernald’s concept of how the site will appear after cleanup and restoration are complete.

The next section of this report details the contributions I have made to the projects described above and to the Technology Application group in general.
CHAPTER 4: THE INTERNSHIP

In September of 2000, I was offered an internship with the Technology Application group at Fluor Fernald. Although I had originally planned to work in the field of biological conservation after finishing my coursework, the internship seemed like an opportunity to learn about new technologies and gain experience with research and writing. I accepted the position, and I have learned even more than initially expected.

Before I could actively contribute to the Technology Application team, I had to learn about Fernald and the operating procedures at the site. Since my internship duties could have required me to visit radiological control areas, I had to complete a 40-hour HAZWOPER training program. During this week-long training session, I learned about the history of Fernald, the types of activities being conducted on-site, and the procedures that all Fluor Fernald employees are required to follow. I also learned how to work in hazardous and radiological environments and how to use a respirator. After successfully completing the training session, I reported to the Fluor Fernald branch office in Springdale, Ohio, and officially began the internship.

Major Duties

As an intern with Technology Application, I was expected to complete a number of independent projects and to provide general assistance, whenever needed, to the projects led by my teammates. First, I will describe the major tasks assigned to me during my tenure.

Accelerated Site Technology Deployment Feedback Survey Report

The Fernald ASTD Technology Transfer Project was designed to deploy two successfully demonstrated technologies to training institutions and other DOE sites nationwide. With this project Fluor Fernald pioneered an aggressive and unique approach to technology deployment, dubbed the “Fernald approach,” which sought to share the benefits of innovative technology with workers in the field (technology end-users) without any financial risk to project managers at the deployment site. This was achieved by involving workers in hands-on demonstrations using seed units, or functional technology samples, that were provided to the deployment sites free of charge. Fluor Fernald believed that this approach, by connecting end-users directly with
technologies that fulfilled their needs, would be a highly effective way to foster acceptance of
new technologies, many of which tend to fall by the wayside even after being tested successfully.

The success of the Fernald approach relied heavily on the perceptions of end-users and
other deployment site personnel; therefore, the ASTD project team wanted to gauge how its
technique was received by the target audience. Feedback surveys were developed and
distributed to participants of each deployment session. My first project as an intern was to
present these survey results in a report assessing the effectiveness of the Fernald approach to
technology deployment. A former intern had already prepared a draft report, which was given to
me as a basis for my assessment.

Before I could begin to evaluate the survey results, I had to familiarize myself with the
general concept of technology deployment and with Fernald’s ASTD Project, in particular. I
wanted to be thorough, not to just skim over the technical aspects of the project and focus only
on the feedback surveys. My mentor provided me with materials detailing the principles of the
DOE’s ASTD program, but little published information was available about the Fernald ASTD
Technology Transfer Project. To learn more, I met with co-workers who participated in the
technology deployment sessions and developed the feedback survey. I also read fact sheets and
DOE publications about the two technologies deployed: the Personal Ice Cooling System and
the oxy-gasoline torch.

Once I obtained sufficient background information, I began work on the report itself. A
former intern had created and maintained a Microsoft Access database containing survey results
collected through August of 2000. Additional surveys were submitted in September, so my first
order of business was to update the database. A co-worker provided me with the paper surveys,
and I entered the responses into the Access file. Next, I copied the survey results from Access
into Microsoft Excel and created graphs to illustrate the responses. I then read the draft report
written by the other intern and formulated ideas on how I could improve upon the thoroughness,
consistency, and coherence of his report. I also judged whether or not his arguments were
supported by the survey results. As a new addition to the Technology Application team, it was
difficult for me to change or eliminate his ideas in my own analysis at first, but it became easier
as I grew more familiar with the project.
My first draft of the feedback survey report was basically a revision of the former intern’s paper, updated to include the latest survey responses. The entire report was six pages long, and it merely summarized the results of each survey question. When I submitted the draft to my supervisor, he decided that a more comprehensive report could be used to promote the success of Fernald’s deployment project to the DOE and others in the D&D industry. He requested that I develop a stand-alone report based on the survey responses, one that explained how and why the project was conducted. To obtain the necessary background information, I contacted those in the Technology Application group who were directly involved in the project.

After several rounds of review, I submitted the final draft of the feedback survey report, entitled “Users Speak Out on Technology Deployment,” to my supervisor in December of 2000. The report was earmarked for distribution beyond the DOE, so we needed to submit the report for formal review before it could be released to the public. I coordinated the review with assistance from a member of Fluor Fernald’s Technical Information Center, which administers the release of company information. Six individuals from various departments within Fluor Fernald and the DOE had to review and sign off on the report before it could be distributed. Appendix A contains excerpts from the final product approved for release to the public.

Developing the feedback survey report was a formidable yet worthwhile project. It forced me to evaluate the work of someone with more experience and interpret the effectiveness of a project that ended before I even arrived at Fernald. It also required me to interact with my team members and ask others for help, a concept with which I have never been terribly comfortable in the past. On an educational level, the project allowed me to gain familiarity with the practice of technology deployment and the technology needs of the D&D industry. The assignment also taught me that patience is not only a virtue but a necessity when one is working within a multi-tiered bureaucracy. Finalizing the report took approximately two months, but the formal review process lasted another five weeks. By the time the report was approved for distribution, we had already missed the deadline for one of the conferences to which we had planned to send it. Once we were finally able to distribute the report, however, my supervisor and I received many compliments on its content and relevance to the D&D industry. Managers in the Technology Programs department have since used the report many times to represent progress being made at Fernald and the importance of technological innovation in D&D work.
Although the feedback survey report consumed most of my time at the beginning of my internship, I also began several other projects during those first few months. I was asked to create a Power Point presentation based on the feedback survey results, develop a Technology Application Group Book, and update the Technology Programs web pages on the Fernald internet site. I was also expected to make various contributions to the Post Closure Stewardship Technology Project. Each of these major duties is described in the following sections.

**Accelerated Site Technology Deployment Feedback Survey Presentation**

Creating and delivering a computerized presentation was one of the major goals that my superiors set for me at the beginning of my internship. My mentor and supervisor wanted me to learn how to develop an effective presentation and improve my communication skills. They also wanted to assuage my anxiety about speaking to large groups of people. Since I had become so familiar with the user feedback data collected during the Fernald ASTD Technology Transfer Project, my mentor asked me to present the survey results to the rest of the Technology Programs department during one of our weekly staff meetings.

Developing the content of my first Power Point presentation was fairly simple, since it was based directly on the ASTD feedback survey report. I condensed the major sections of the report (Introduction, Methods, Results and Discussion) to communicate the survey’s purpose and significance of the results to the audience. I used graphs to convey the results of each survey question and focused my discussion on the project’s success in reaching its intended audience and sharing the benefits of innovative technologies with them. Approximately one month after beginning my internship, I presented the survey results to my co-workers.

My experience with the feedback survey presentation taught me the importance of impartiality in delivering a credible talk. Because Technology Programs relies on funding from the DOE to finance its projects, there is significant pressure to make each project successful. Consequently, the department takes advantage of any opportunity to publicize its successes in the hopes of securing future funding. It was with this mindset that I developed the feedback survey presentation. When I delivered the presentation to the Technology Programs department, which pioneered the ASTD project, they responded enthusiastically to my positive portrayal of the
technology transfer effort and the technologies deployed. The Technology Programs manager was so pleased with my talk that he asked me to deliver it during an STCG meeting, attended by representatives of the DOE, Fluor Fernald, and stakeholder groups. A member of Fluor Fernald’s Public Affairs division heard my presentation during the STCG meeting and questioned its motivations. She helped me to realize that my job was not to “sell” the innovative technologies or focus only on the positive aspects of the project; it was to report the survey results and let the data speak for itself. With her assistance, I eliminated the subjective elements from my talk without sacrificing its impact.

Technology Application Group Book

As a newcomer to the Technology Application group, I found it difficult to memorize the details of the team’s many projects, personalities, and acronyms. To expedite my familiarization process and provide a reference guide to future team members, my supervisor asked me to prepare a Technology Application Group Book that would briefly explain the purpose and major activities of the group.

In determining the basic layout of the book, I considered how information about our group would logically be presented. I began with an introductory section, starting with a broad description of the Fluor Fernald Technology Programs department and then focusing on the role of the Technology Application group within the department. Much of this information was already obtainable through various departmental documents and material on the Fernald internet site. Following the introduction, I presented the individuals who make up the Technology Application group with an organizational chart and a brief biography of each team member. I continued with a Gantt chart representing the key annual activities of the Technology Application group. Although I did not explain the specific activities in detail, any new employee should become familiar with the terminology, since he or she will be expected to participate in at least some of the tasks. In the next section, I used material developed by our Safety Advocate, a group member who organizes safety meetings and activities, to provide an overview of the Technology Application safety program. I intended these first few sections to familiarize future team members with the group’s main purpose and objectives.
The lion’s share of the Group Book detailed the projects conducted within Technology Application. I described each of the team’s current projects, followed by a brief section on recently completed business and a summary of the group’s most successful endeavors thus far. I ended the book with a glimpse into the future of Technology Application, describing two projects that are currently in the early stages of development. Obtaining material for these four sections was the most trying aspect of this assignment. Project information was, for the most part, not readily available. Technical Task Plans (TTPs), created at the start of each project to detail its purpose and major milestones, were filed for some projects but missing or outdated for others. Even when I managed to locate the TTP for a particular project, there was no guarantee that it would provide the type of summary information I wanted to include in the book. Many TTPs consisted of dry information related to project schedules and funding, but I wanted to focus on the technologies being developed and how their deployment would expedite site remediation. To obtain that particular information, I contacted the manager of each project directly and asked them to prepare a brief summary of their project’s purpose and anticipated benefit to Fernald. I then edited the summary paragraphs for consistency before using them to describe each project. See Appendix B for excerpts from the final version of the Technology Application Group Book.

Working on the Group Book during the early stages of my internship proved to be beneficial in several ways. It helped me to gain a better understanding of the projects in which my fellow team members were involved. During our weekly staff meetings, I heard about the progress being made on various projects, but I did not fully understand their overall purpose or significance until I began reviewing them in detail. I also gained experience with page layout and design, since I was responsible for arranging the text and photographs used to describe each project. I drew on this experience repeatedly throughout my internship: several of my later projects required that I locate or develop appropriate graphics and manipulate them to convey different concepts. Most importantly, collecting material for the Group Book allowed me to interact closely with the other members of Technology Application. This interaction helped me feel like part of the team and formed a basis for cooperation between myself and fellow group members on subsequent projects.

My work on the Group Book benefited everyone else within Technology Application, as well. The Group Book served as a centralized information source for all of the group’s activities.
Team members no longer had to search through file cabinets for what often turned out to be incomplete information on any particular technology or project. Our manager used the Group Book to demonstrate the scope of work being performed by the Technology Application group to our client, the DOE.

Technology Programs Web Pages

The Fluor Fernald internet site (www.fernald.gov) showcases the site’s history and remediation efforts. Technology Programs is one of the departments highlighted on the web site for its innovative projects and accomplishments in the field of technology deployment. Since priorities at Fernald are constantly shifting and evolving, the projects pursued by Technology Programs change from year to year. Therefore, regularly updating the Technology Programs web pages is an important step in maintaining an open line of communication between Fernald, its stakeholders, and the general public.

In December of 2000, I was assigned to review and update the Technology Programs web pages, which had last been revised almost a year earlier. In the interim, most of what had been posted on the Technology Programs pages had become obsolete. Several projects had been canceled, and a number of new opportunities were being pursued. The basic composition and purpose of some groups within Technology Programs had changed, as well. I realized that a complete overhaul of the web pages was in order.

To gather information for the web site, I turned once again to my co-workers. I asked each project manager to answer a series of targeted questions about his or her project(s). By asking everyone to answer the same questions, I was able to obtain a consistent amount and type of information for each project, even though my sources were varied. After receiving the project summaries, I edited them for style and content.

Because of my initial work on the Group Book, developing a written description of each project was a relatively easy task, but obtaining visual material for the web site was a different story. When I began reviewing the web site, three of the technologies being investigated by Technology Programs had not yet been used at Fernald, so we had no photographs of the equipment in action. Due to copyright issues, we could not use photographs already published
by the technology vendors or manufacturers. Fortunately, two technology demonstrations were
conducted in the time it took me to compile the written material. I contacted Fernald’s Graphics
department and asked them to send a photographer to the demonstrations. The photographer
then provided me with digital files of each photo session, from which I was able to select suitable
images for the web site. A Technology Application project manager photographed the third yet-
to-be-deployed technology during a demonstration in Chicago, Illinois. I collaborated with him
to obtain the photographs, which proved to be useful for both the web site and the Group Book.
The Group Book, in which I had not originally planned to include photographs, was still being
reviewed when I began compiling visual aids for each project. Before the book’s final
publication, I added the photographs to enhance its stylistic appeal.

After gathering the necessary material, I formatted each new web page and submitted the
material to Fernald’s Graphics department, which is responsible for posting information on the
site. I saved each new or updated page as a separate file on a floppy disk, including a legend at
the bottom of each page to show the person uploading the information how the pages should be
linked. The final product, examples of which are attached in Appendix C, is available online at

Designing the Technology Programs web pages was a particularly rewarding experience.
I proved to myself that I could work independently to gather relevant information, overcome
technical problems, and design a series of web pages that are both educational and pleasing to
the eye. I also enjoyed having a tangible product to show my family and friends, who were
always asking me what exactly I did all day at the “radioactive place.”

Fernald Post Closure Stewardship Technology Project Support

Another of my original internship assignments was to provide on-going administrative
support to the PCSTP, a project managed by my mentor. At first, this support consisted of basic
information gathering and coordination. For example, I compiled contact information for each
member of the Integrated Stewardship Technology Team (ISTT), a group of experts, regulators,
and stakeholders selected to provide consulting services and help Fernald team members execute
work related to the PCSTP. ISTT meetings were held regularly to discuss post closure
stewardship issues at Fernald; I was expected to take notes at each meeting and electronically distribute the minutes to everyone else in attendance. Such tasks, while mundane, helped me to familiarize myself with the project’s organization and goals.

By the end of my term, my responsibilities to the PCSTP had progressed well beyond administrative duties. I authored a three-page abstract (attached in Appendix D) and developed the content for a poster presented at the 2001 International Containment & Remediation Technology Conference and Exhibition in Orlando, Florida. I wrote two abstracts – one which provided general/programmatic information about the PCSTP and another which detailed technical information about post-closure monitoring technologies in use at Fernald – for the 2002 Waste Management Symposium (See Appendix E for the technical abstract). I also developed the text and graphical content for a PCSTP fact sheet showcasing progress made in the project as of July, 2001 (See Appendix F).

During the last three months of my term, I was asked to join the team responsible for orchestrating the Fernald Post Closure Stewardship Technology Project Symposium, originally scheduled for October 3 – 4, 2001 and since postponed due to travel restrictions on DOE personnel. This event focused on the steps Fernald has taken to deploy post-closure monitoring technologies at the OSDF and included presentations by regulators, experts in the field of disposal facility design, and representatives of DOE sites nationwide. As part of the planning team, my duties consisted of: organizing and updating the symposium agenda (See Appendix G for partial agenda), preparing invitation letters for symposium participants on behalf of the DOE Ohio Field Office Director (Appendix H), maintaining a timeline of tasks to be completed by each team member prior to the event, and developing the content for “OSDF Technology Needs” posters to be displayed during the symposium.

Of all the tasks I completed as an intern, working with the PCSTP was the most rewarding. I got to see how far a project could advance in the course of one year. When I started my internship, the PCSTP was in its initial stages of development. Within two months experts were hand-picked to participate in the ISTT, and the team’s first meeting was held to identify critical ecological and geomechanical monitoring parameters at the OSDF. By January, the team had prioritized the parameters and identified potential monitoring technologies for each
 Throughout the spring of 2001, the team selected and procured the most viable technologies for installation in the fall of that same year. The complete OSDF Cell 1 cover monitoring system is expected to be fully operational by the spring of 2002.

My experience with the PCSTP also helped to bolster my confidence. I made many contacts through the project, and each of these people consistently welcomed my ideas and contributions, even though I initially felt like “just an intern.” By the end of my term, I felt perfectly comfortable making suggestions during meetings or even questioning my superiors. Such confidence is invaluable to a naturally reticent person like myself.

Of all the tasks I completed as an intern, my work on the PCSTP had the most enduring legacy. My mentor still submits abstracts I wrote to conferences and workshops throughout the country. He continues to borrow from presentations that I prepared, and he still uses my PCSTP fact sheet, with minor updates, to describe the project to external parties.

**Minor Duties**

In addition to the aforementioned projects, I also worked on countless smaller tasks throughout my internship. Some of these tasks, which do not necessarily support any of the previously identified projects, are described below.

One of my long-term duties was to develop and maintain an Access database to store Technology Programs project information. The department needed a searchable database so that project data could be easily updated and retrieved for reporting and administrative purposes. I relied on a Microsoft Access manual, input from other group members, and a great deal of trial-and-error to develop the database and make it user-friendly. General project information and weekly action items were eventually entered into the database, samples of which are presented in Appendices I and J, respectively.

Occasionally, I was asked to assist other team members and outside parties in developing visual aids and presentations. One team member, writing a proposal for a project to investigate an innovative waste disposal technique, asked me to create a “cartoon” showing how the project would ultimately work. I searched the internet for appropriate Clip Art to demonstrate how one
waste disposal option would differ from another; the resulting graphic can be seen in Appendix K. When Susan Brechbill, Director of the DOE’s Ohio Field Office, needed visual aids at a national conference to convey the message that Ohio’s DOE sites are fulfilling their deployment mission, I was directed to prepare the graphics. I used Clip Art to create overheads illustrating the general success of Ohio sites and the partnership between the DOE, Fluor Fernald, and others involved in a particular technology deployment effort. Ms. Brechbill’s enthusiastic response to my work prompted others to contact me when they needed similar technical support. I subsequently prepared Power Point presentations for John Bradburne, President and CEO of Fluor Fernald, Inc.; Dr. Jyh-Dong Chiou, Director of the Soil and On-Site Disposal Facility Project; and Dennis Carr, Vice President and Chief Operating Officer of Fluor Fernald.

Now that I’ve described the activities that filled my days at Fernald, I’d like to share my personal thoughts on the experience. The next and final chapter summarizes what I’ve learned from the internship and how Miami University coursework helped me to prepare for the position.
CHAPTER 5: REFLECTIONS ON THE EXPERIENCE

My internship with Fluor Fernald helped me to strengthen critical business skills that frequently go untested in an academic environment. In school, students generally have one source of authority and clarification when it comes to an assigned task: the professor who assigned it. In the professional world, there is often more than one voice dictating the way a job should be performed. Sometimes these voices dissent, and it is the employee’s responsibility to consider conflicting opinions and decide which course to follow. I faced this challenge several times in the Technology Programs department, where I had to incorporate the ideas and directions of my mentor, my immediate supervisor, and two other managers within the department.

The Value of Interpersonal Relations

Another important difference between academic and professional atmospheres is reflected in the process of information gathering. When students need information, they generally visit libraries, scour the internet, or consult their notes. In a professional environment, other people are frequently the best sources of information. As a person who is most comfortable working independently, this concept was difficult for me to accept at first. I learned through experience that, to do my job effectively, I needed to vastly improve my skills in dealing with others. Luckily for me, this lesson came early in my internship. When I was given the assignment to prepare the Technology Application Group Book, I attempted to glean all of the necessary project information from published materials, fact sheets, and videos. I ended up with a disjointed mishmash of facts that failed to convey the current status of each project or how the new technologies would actually be integrated into site operations. After reading the first draft of the Group Book, I realized that I would have to do what I initially tried to avoid: meet with each project manager and ask them directly for key information. It was the first time I had ever asked someone else to take time from their day and provide me with a product. In the end my request gave the Group Book the cohesiveness and clarity it needed and gave me the confidence I needed to tap my co-workers for crucial information on later projects.
The Necessity of Self-Reliance

While I was able to interact closely with co-workers for projects such as the Group Book and web site update; other tasks left me with nowhere to turn for direction. As a result, my problem solving, organization, and leadership skills were tested repeatedly throughout my internship. In one instance, I was asked to write an article detailing the major accomplishments, past and present, of the Technology Programs department. I received no further instructions from my managers, despite repeated requests for guidance. As the article’s publication deadline approached, I was forced to prepare a rough draft based on past research and information gleaned from articles loaned to me by a co-worker in the Public Affairs department. The day before the article was due, I sat down with two managers to review what I had written, only to discover that they had contrasting ideas about what the article should highlight. I had to negotiate a compromise between the managers and explain what kinds of information were feasible to include in such a short time period. The final article, submitted to the DOE’s *Initiatives Quarterly* and slated for publication in December of 2001, is attached in Appendix L. While frustrating at times, this experience helped me to hone critical communication, organization, and problem solving skills. It also showed me that I am fully capable of taking the lead on a task and bringing it to completion without direction or reassurance from others.

The Contributions of Miami University

The lessons I learned at Fernald may not have emerged in an academic setting, but my coursework at Miami University was essential to my professional development and ability to handle the situations I experienced at Fernald. Core courses within the Institute of Environmental Sciences, such as Environmental Methodology and Environmental Statistics, helped me to develop problem solving and data management capabilities. My Public Service Project experience taught me the importance of communicating with a client and working as a team, two needs that emerged repeatedly during my internship. Principles and Applications of Environmental Science emphasized the importance of stakeholder involvement, an issue of primary importance at Fernald and one that was frequently discussed during post closure stewardship meetings.
Not all of the training I received at Miami was applicable to my internship. My greatest regret about my time at Fernald is that I never got to experience the scientific aspect of site projects or partake in actual field work. My favorite courses at Miami were the ones that opened my eyes to previously unexplored subjects, such as Tropical Marine Ecology and Environmental Measurements. Nothing compares to the hands-on experience provided by such courses, and I was hoping to do similar work at Fernald. However, the nature of my internship required that I spend most of my time at a desk.

A part of me occasionally wishes I had pursued a more research-oriented internship, one that would have supported my interest in conservation while developing my technical proficiency. Then I stop to consider the lessons I’ve learned at Fernald: team work, confidence, communication with a large and varied audience, leadership, independence. These are skills I can use anywhere. I’m not sure I could have strengthened them in a lab or standing in a stream collecting water samples day after day. They are the skills that should be well-developed by a Master’s-level education, and I am grateful to the Institute of Environmental Sciences and to all of my teachers at Miami University for helping me to grow as a professional and as a person.
WORKS CITED


APPENDIX A

FERNALD ASTD TECHNOLOGY TRANSFER PROJECT REPORT
Users Speak Out on Technology Deployment

Fluor Fernald
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Executive Summary

This report summarizes user feedback data collected during a recent Accelerated Site Technology Deployment (ASTD) project: the Fluor Fernald ASTD Technology Deployment Project from May, 1999 through September, 2000. The main goal of the ASTD project was to use the “Fernald approach” to expedite the deployment of new or innovative technologies with superior safety, cost, and/or productivity benefits to Department of Energy (DOE) facilities. The Fernald approach targets technology end-users and their managers and directly involves them with hands-on demonstrations of new or innovative technologies during technology transfer sessions. The two technologies deployed through this project were the Personal Ice Cooling System (PICS) and the oxy-gasoline torch. Participants of technology transfer sessions were requested to complete feedback surveys. Surveys evaluated the effectiveness of the Fernald approach to technology deployment and assessed the responsiveness of employees to new technologies. This report presents the results of those surveys.

In total, 249 surveys were completed and analyzed for this report. Survey questions were designed to address the following aspects of the ASTD project: 1) determine whether the target audience was reached; 2) evaluate the effectiveness of the technology transfer presentations; 3) estimate the need for PICS and oxy-gasoline torch technologies; 4) learn about competing technologies; 5) identify valuable learning tools for employees; and 6) identify obstacles which delay the widespread use of new technologies.

Based on the data collected, the target audience (technology end-users and their managers) was reached through Fernald’s technology transfer session. Those who attended the session found it to be a worthwhile and effective learning tool. Results suggest that PICS technology would benefit most sites throughout the DOE complex, while a smaller market exists for the oxy-gasoline torch. Several alternative techniques are currently used to combat heat stress, while the main competitor for the oxy-gasoline torch appears to be the oxy-acetylene torch. Respondents generally utilize tools such as web sites and fact sheets to learn about new technologies; these resources can supplement hands-on presentation methods. Lastly, survey results indicate that management and funding are viewed as major obstacles to the deployment of the PICS and oxy-gasoline torch.

The trends that emerged through analysis of these surveys can prove beneficial to future deployment efforts. DOE/Fernald can use this feedback to improve its presentation methods and address specific employee concerns, though survey results suggest that the DOE/Fernald technology deployment projects have already achieved considerable success. An overwhelming majority (> 91 percent) of respondents rated the presentation methods employed in technology transfer sessions to be above average or excellent, and nearly 99 percent of respondents would attend a similar presentation on other technologies. These figures indicate that Fernald’s innovative and active approach should be replicated in future deployment efforts. The overall success of Fernald’s deployment effort is best summed up by one respondent who said, “Keep up the good work – more tech transfer!”
1.0 Introduction

This report summarizes data collected from technology end-users who participated in the Fernald ASTD Technology Deployment Project. The project’s main goal was to expedite the deployment throughout the DOE complex of new or innovative technologies that were determined to have superior safety, cost, and/or productivity benefits. Using the Fernald approach, the ASTD project targeted PICS/oxy-gasoline torch end-users and their managers, involving them in a hands-on demonstration of each technology. This project also furnished them with technology-specific training and provided end-users with technology seed units, when applicable. Figures 1 and 2 illustrate activities conducted during technology transfer sessions.

During technology transfer sessions, participants were requested to complete surveys for evaluation of the project’s effectiveness. The main purpose of this report is to summarize survey results and identify trends in the data. This information can be used, in part, to evaluate the success of past presentations, to assess the responsiveness of employees to new technologies and to improve Fernald’s technology deployment approach for future deployments.
### 3.0 Results and Discussion

Questions 1 and 2 asked for the employee’s job classification and description (See Figs. 3 and 4). The individual percentages indicated a relatively even distribution of respondents, particularly hourly employees, field line supervisors and their direct managers, who were the main targets of the presentation. However, it should be noted that the sites surveyed are not homogenous: they vary by factors such as size, number of employees, and duties being performed. Based on these results, it is apparent that the target audience has been reached through the technology transfer sessions.

![Job Classification](image1)

**Figure 3:** General employee classification of survey respondents.

![Job Description](image2)

**Figure 4:** Job description of survey respondents.
Questions 3 through 5 targeted the respondents’ opinion of the presentation. As illustrated by the graphs below, responses were positive. Analysis of question 3 indicates that over 90 percent of respondents believed the presentation to be well worth their time (See Fig. 5). Though responses to question 4 are not represented pictorially, results showed that nearly 99 percent of respondents would attend a similar presentation on other technologies.

Respondent Opinion of Presentation

![Graph showing respondent opinion of presentation](image)

Attendants also favored the Fernald approach as a way of learning about technologies, as evidenced by responses to question 5 (See Fig. 6). Once again, over 90 percent believed the interactive presentation method to be above average or better. The results of these three questions support the idea that the Fernald approach to technology deployment is beneficial to the DOE, workers in the field, and site contractors.

Effectiveness of Learning Method

![Graph showing effectiveness of learning method](image)
Comparing the results of questions 11 and 11(a) uncovers several potentially important issues. Question 11 asked respondents to identify the foremost challenges to PICS implementation, while question 11(a) asked the same with respect to the oxy-gasoline torch. Management is considered to be one of the two major obstacles to torch implementation, but only the third most significant impediment to PICS use. In both cases, management is considered to be a greater obstacle than workers. This result was somewhat surprising, since one might predict that workers would be more reluctant to adopt new technologies than managers, who should favor the most efficient processes. These observations could mean that managerial attitudes are based on misconceptions about new technologies. Concerns about the hazards of gasoline, for example, might prevent some project managers from using the oxy-gasoline torch, even though the oxy-gasoline torch is actually safer than the industry standard oxy-acetylene torch. Alternatively, the perceptions of survey respondents might not be entirely accurate. Workers, for example, might be reluctant to consider themselves a “challenge” to new technology implementation; far more surveys were completed by workers than by managers. It should also be noted that while 207 people responded to question 11, only 20 responded to question 11(a), since the PICS was deployed on a much wider scale than the torch.

4.0 Conclusions

Overall, analysis of the feedback survey data collected from this ASTD project indicates that people are receptive to learning about new technologies. Those surveyed particularly favor the “hands-on,” seed unit approach pioneered by Fernald. It can be concluded that the Fernald approach can be profitable to all parties involved. The risk of heat stress is a potential problem common to DOE sites across the nation. Furthermore, because many sites throughout the country are in the D&D phase, there is a high demand for inexpensive, safe, and expeditious steel cutting technology. The trends that emerge through analysis of these surveys can be quite beneficial to future deployment efforts. DOE/Fernald can use this feedback to develop more effective presentation methods and to address the particular needs of a given audience.

5.0 Future Recommendations

In general, survey questions effectively targeted the critical aspects of the ASTD project. However, there is room for improvement in future efforts. Survey designers should pay particular attention to the wording of questions in order to avoid influencing responses. For example, question 9 in this survey asks, “Is there resistance to technologies that improve productivity?” Respondents may be reluctant to answer in the affirmative, simply to avoid the perception that their peers are unconcerned with productivity. A more neutral question 9 would read, “Is there resistance to new or alternative technologies?” Question 6 should be reworded to obtain more concise information. The question currently reads, “Estimate the number of employees at your site that need help with mitigating heat stress.” A less ambiguous version of Question 6 would read, “Estimate the number of employees at your site that may be at risk for heat stress while performing work.”

Survey planners would also benefit by ensuring that multiple choice selections are appropriate,
comprehensive and congruent with the questions. Planners should restructure the answer selection in Question 3 to fit the question. Question 3 asks, “Was the presentation worth your time?” Possible answers range from “Excellent” to “Poor.” The selections do not relate to the question, which could be answered with a simple yes or no. Another option might be to reword the question to fit the original selections. A better question might be, “How would you rate the quality of the presentation?” Questions 10, 11 and 11(a) ask the respondent to select from a list of items. However, no “Other” option is provided. Including an “Other” field may have prompted responses that could not have been predicted by the survey designer.

Minor modifications such as those described above can improve the quality of survey results. Carefully designed questions and prudent analyses will allow survey data to become an integral part of technology deployment projects in the future.
APPENDIX B

TECHNOLOGY APPLICATION GROUP BOOK
Technology Application

Who we are...
What we do...
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Section I: INTRODUCTION

Fluor Fernald Technology Programs supports the mission at the Fernald Environmental Management Project (FEMP) by seeking out, identifying, demonstrating, and facilitating the deployment of innovative technologies. The goal is to find, demonstrate and deploy proven technologies for “safer, better, faster, and cheaper” remediation and monitoring of the FEMP and other Department of Energy (DOE) sites. Technology Programs is partially funded by the DOE’s Fernald site budget, with the majority of the funding provided by the DOE’s Office of Science and Technology (OST, EM-50). Technology Programs has established itself as a leader and center of excellence in the use of innovative, improved, and cost-effective remediation and monitoring technologies applied to existing field challenges.

This Group Book details the organization and activities of the Technology Application group, a subset of Technology Programs. Technology Application contributes to Fernald’s mission by initiating deployment projects at the FEMP and across the DOE complex. The primary mission of Technology Application is to assist remediation projects at the FEMP with the demonstration and deployment of new or innovative technologies that either have proven benefits or have the potential to make the work at hand more effective, safer, less expensive, and/or less time consuming. In previous years, many of the team’s projects have been related to Deactivation and Decommissioning (D&D) field challenges. However, due to evolving needs at the FEMP, the team has recently expanded its focus to include post-closure monitoring technologies.

The following three sections introduce the members of Technology Application, along with the major activities of the group. Within Technology Application and throughout the Fernald organization, the health and safety of workers, the public, and the environment remain the highest priorities. Section V illustrates the efforts made by Technology Application to ensure the safety of its team members. Section VI presents the team’s current projects, and Section VII elaborates on a recently completed project. Section VIII describes some of the group’s major achievements in recent years, while Section IX features a glimpse into the future of Technology Application.

Specific technology needs at the FEMP may change, but the projects conducted by Technology Application will remain vital to the remediation and monitoring process for many years to come.

Revised 3/12/01 JZ
Section III: TEAM MEMBERS

Mark Peters is the Manager of the Technology Application department. Mark is responsible for six Accelerated Site Technology Deployment (ASTD) projects totaling over $4 million. Mark was also the Project Manager of the successful Fernald Plant 1 Large Scale Technology Demonstration and Deployment Project, which screened over 180 technologies, demonstrated 13 innovative technologies, and identified 5 winning technologies (2 of which have been subsequently deployed to more than 20 DOE sites and training institutions). Prior to his Fluor Fernald experience, Mark served as a Project Engineering Manager for Westinghouse at Savannah River. Mark has a Bachelor of Science in Chemical Engineering from Penn State University and has more than 20 years experience in the DOE arena.

Paul Cromer has worked with Technology Programs since December 1997. Currently, Paul is the technical lead for the Fernald ASTD Technology Deployment Project, which seeks to promote the use of proven technologies across the DOE Complex. Conducting technology deployment sessions at other DOE sites and a variety of training organizations/institutions continues to be the primary focus of the ASTD project. As the ASTD project nears completion, preparations for the Final Project Report and the financial closeout of the project are underway.

Paul’s prior successes include his contributions to the Fernald Large Scale Demonstration and Deployment Project (LSDDP). During the LSDDP, Paul participated in field technology demonstrations of the Centrifugal Shot Blasting system (OST Tech ID: 1851), used for in-situ concrete removal, and the Mobile Work Platform (OST Tech ID: 2243), a remotely operated pipe shearing device. Both of these demonstrations were conducted safely within former production areas at the FEMP and performed "real cleanup work." Paul also assisted with the preparation of Innovative Technology Summary Reports (ITSRs) for both technology demonstrations, and he completed the Final Report for the LSDDP.
Section IV: SAFETY PROGRAM

FY01 Safety Goals

The goal of Technology Application is to safely develop, from the concept stage, investigative studies, demonstrations and deployments of technology that benefit Fernald’s remediation and Long-Term Post-Closure Stewardship efforts. To promote a safe working environment, each member of Technology Application is committed to achieving the following goals:

(1) Actively participate in monthly safety work group meetings.

(2) Actively participate in monthly All-Hands meetings.

(3) Actively participate in monthly “stand downs” (may include team safety building activities such as work area safety walks, work area clean ups, first aid training, CPR and/or First Responder training and certificates or other activities that promote a 24-hour safety mentality).

(4) Actively work to improve, on an ongoing basis, his or her safety environment and conditions on a “24 Hour Safety Culture” basis (work and home).

(5) Conduct at least two Safety walk-throughs each month. Safety walk-throughs consist of walking throughout a team’s work area and observing, documenting, and reporting safety issues to a Safety Advocate.

Each team member is encouraged to submit safety topics, and each safety meeting or activity is thoroughly documented. Many meetings are shared within the division.
Springdale Safety Meetings
Closure Project Management / Group #219

Meetings: Scheduled every second Tuesday of each month.
Time: 8:00 – 9:00 a.m.
Place: Conference Room 4 / Springdale Office

Meetings are documented by attendance sheets and minute notes. Reminders of future meetings and topics are sent out by e-mail prior to meeting dates. Meetings are organized and conducted by the Co-Safety Advocates for Group #219: Tim Miller and Nat Politi.

<table>
<thead>
<tr>
<th>Monthly meetings</th>
<th>Topic</th>
<th>Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 19, 2000</td>
<td>Halloween Safety</td>
<td>Tim Miller</td>
</tr>
<tr>
<td>November 17, 2000</td>
<td>Safety First Presentation</td>
<td>Nat Politi</td>
</tr>
<tr>
<td></td>
<td>Holiday/shopping safety</td>
<td></td>
</tr>
<tr>
<td>December 19, 2000</td>
<td>Coping with winter emergencies / Red Cross</td>
<td>Tim Miller</td>
</tr>
<tr>
<td>January 18, 2001</td>
<td>Stress relief – how to cope with situations creating stress</td>
<td>Nat Politi</td>
</tr>
<tr>
<td>February 15, 2001</td>
<td>Dreams into nightmares – video/books</td>
<td>Tim Miller</td>
</tr>
<tr>
<td>March 13, 2001</td>
<td>Motor vehicle safety – Motorcycles and cars</td>
<td>Nat Politi</td>
</tr>
<tr>
<td>April 10, 2001</td>
<td>Household hazards – biological &amp; chemical</td>
<td>Tim Miller</td>
</tr>
<tr>
<td>May 8, 2001</td>
<td>Upper level management explains “Why Safety at Fermald”</td>
<td>Nat Politi</td>
</tr>
<tr>
<td>June 12, 2001</td>
<td>Anger management with a sports perspective for fans and/or parents</td>
<td>Tim Miller</td>
</tr>
<tr>
<td>July 10, 2001</td>
<td>What parents should know about protecting kids from the Internet</td>
<td>Nat Politi</td>
</tr>
<tr>
<td>August 14, 2001</td>
<td>Exercise safely, avoiding injuries and using proper techniques</td>
<td>Tim Miller</td>
</tr>
<tr>
<td>September 11, 2001</td>
<td>Ergonomics</td>
<td>Nat Politi</td>
</tr>
</tbody>
</table>

Topics, times and dates are subject to change as required to meet the speaker’s schedule and availability or to accommodate requests for other topics.

Revised 3/12/01 JZ
Section V: CURRENT PROJECTS
PROJECT DESCRIPTION:

Facility demolition at the FEMP requires the destruction of materials that can be difficult to disassemble. This ASTD project will procure and deploy a Universal Demolition Processor capable of performing two major tasks at the FEMP: (1) processing concrete into aggregate that is used for road construction within the On-Site Disposal Facility (OSDF), and (2) segmenting large, difficult to cut, tanks and steel.

The universal processor technology is essentially three different technologies in one. The universal processor, via exchanging jaw sets, can be a concrete pulverizer, concrete cracker, or a shear capable of cutting thick steel. The concrete pulverizer is designed to demolish and process concrete buildings, slabs, foundations and other concrete structures, separating the reinforcing steel bar from the concrete and leaving valuable, reusable aggregate. The concrete cracker technology is designed to cut and remove concrete sections, with the reinforcing bar intact, for either future pulverization or direct placement into the site’s OSDF. The shear is specifically designed to segment thick steel of the type found in many tanks at the FEMP and across the DOE complex. Cost, safety, and efficiency benefits are anticipated from the implementation of the UDP at the FEMP.
PROJECT DESCRIPTION:

This ASTD project provides for the deployment of three innovative technologies at the FEMP to reduce personnel exposure, enhance worker safety, reduce cleanup costs and/or accelerate site closure. The technologies are described below:

Remote Physiological Monitoring System (RTPMS) – Remediation of waste stored in Fernald’s silos may include work activities in enclosed, unventilated areas during the summer, when ambient temperatures can easily exceed 90°F. Due to the health risks posed by wastes stored in the silos, workers may be required to wear multiple layers of Personal Protective Equipment (PPE), hampering the body’s cooling mechanism and preventing co-workers from visibly detecting each other’s physical condition. The RTPMS has the capacity to accurately measure and collect vital signs from several workers simultaneously and the ability to provide real-time data for personnel monitoring. The system’s return on investment is in worker health and safety.
Section VII: MAJOR ACHIEVEMENTS

Recent accomplishments of the Technology Application group include:
- Plant 1 Large-Scale Demonstration and Deployment Project
- DOE OST Accelerated Site Technology Deployment Project – D&D Technologies
- Fernald Accelerated Site Technology Deployment Project – PICS/Oxy-Gasoline Torch
- Technology Transfer Map
- Performance Objectives Criteria 12 and 13

➢ PLANT 1 LARGE SCALE DEMONSTRATION AND DEPLOYMENT PROJECT

The Fernald Plant 1 LSDDP was conducted during the period from February 1996 to March 1999. The purpose of this project, conducted mainly at Fernald Plant 1, was to evaluate selected decontamination and decommissioning technologies.

A team of experienced D&D personnel, known as the Integrating Contractor Team, was charged with screening, selecting and demonstrating technologies for this project. Five types of D&D technologies were chosen for demonstration: disassembly, personal protective equipment, decontamination, scabbling, and characterization. Over 200 technologies were screened from these categories; and thirteen were selected for comparison against current baseline technologies in the areas of performance, application, and cost. The technologies chosen for demonstration are listed below:

- Spray Vacuum Cleaning Technology
- Soft Media Blast Cleaning Technology
- VecLoader HEPA Vac
- Oxy-Gasoline Torch Cutting
- Raman Spectroscopy
- Laser Induced Florescence
- Process Piping Inspection using the BTX-II
- Low Density Cellular Concrete Void Filling
- Foam Void Filling
- Personal Ice Cooling System
- Centrifugal Shot Blasting
- Mobile Work Platform
- Process Piping Inspection using the PipeCrawler
Section VIII: A LOOK AHEAD Future Projects

The Technology Application group is currently pursuing projects that may be conducted in upcoming years. Two potential projects – the Model A LSDDP and Model B LSDDP – are summarized below.

Model A LSDDP:

The contaminated material disposition demonstration project proposal is a joint INEEL/FEMP D&D Focus Area (DDFA) project to demonstrate and deploy technologies that enable beneficial disposition of D&D materials. This project, if implemented, has the potential to result in substantial life cycle cost savings, as well as a reduction in radioactive waste volumes and health and safety risks. The goal is to demonstrate eight to twelve new or innovative technologies and subsequently deploy at least five technologies to DOE sites other than the demonstration site. A total demonstration project cost of $3.96 million over 30 months has the potential to reduce life-cycle DOE D&D costs by over $20 million.

At the FEMP, the new or innovative technologies will be demonstrated at five D&D facilities: Plant 2 Complex, Plant 3 Complex, Plant 8 Complex, General Sump Complex, and Liquid Storage Complex. The Plant 2 Complex is composed of an Ore Refinery Plant and associated facilities.

Model B LSDDP:

If awarded by the DDFA, this LSDDP would begin in FY02 (October 2001) and run through FY03 (September 2002). The total project funding request is $3.75 million ($1.5 million in FY02 and $2.25 million in FY03). The FEMP is partnering with the West Valley Demonstration Project, the Miamisburg Environmental Management Project (MEMP), and Hanford for this project. It is anticipated that five to ten underutilized technologies will be deployed during this project.

The following FEMP facilities are available for potential inclusion in this LSDDP: Plant 6 Complex, the Lab/Pilot Plant Complex, Plant 2, Plant 3 and Plant 8.

Revised 3/12/01 JZ
APPENDIX C

TECHNOLOGY PROGRAMS WEB PAGES
Technology Programs

Fluor Fernald Technology Programs supports the cleanup mission at Fernald by identifying, demonstrating, and deploying innovative technologies.

Technical University Programs links Fluor Fernald with institutions of higher education, initiating partnerships valuable to universities and Fernald. university programs

Site Technology Coordination Group meets quarterly to assist DOE and Fluor Fernald in identifying and communicating technology needs to technology providers and the DOE complex. STCG

Technology Application contributes to Fluor Fernald's mission by investigating new technologies, conducting technology demonstrations, and organizing deployment projects at Fernald and across the DOE complex. technology application

For More Information
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Accelerated Site Technology Deployment

Background
In 1997 the DOE Office of Environmental Management (EM) created the Accelerated Site Technology Deployment (ASTD) program, originally known as the Technology Deployment Initiative, to facilitate the deployment of previously demonstrated or commercially proven technologies. The program’s intent is to accelerate remediation projects, reduce cleanup costs, enhance worker safety, break down barriers that prohibit the implementation of new or innovative technologies or processes, and make these technologies the baseline throughout DOE-EM organizations. Fluor Fernald and DOE have significantly benefited from current and past ASTD projects. To learn more about the DOE-EM ASTD program, visit the ASTD home page.

Fluor Fernald developed the “Fernald Approach” to enhance the value of technology deployments. The Fernald Approach provides technology end-users with a risk-free opportunity to learn about and work directly with innovative technologies. Fluor Fernald’s deployment efforts thus far have been extremely successful, targeting worker training organizations and cleanup sites throughout the DOE complex. Fluor Fernald’s investment in technology deployment illustrates the need for aggressive marketing of new or innovative technologies.
The following graph illustrates how a Fernald ASTD project greatly increased the client base of the oxy-gasoline torch several years after the technology was initially demonstrated.

The following links describe the ASTD projects conducted by Fluor Fernald:

**Current Projects:**
- Universal Demolition Processor
- Wireless Integrated Radon Monitoring System
- Remote Prismless Total Station
- Remote Physiological Monitoring System
- Integrated Excavation Control System

**Past Projects:**
- Groundwater Re-injection
- Long Term Post Closure Monitors
- Soils Remediation
- Technology Transfer - Personal Ice Cooling System & Oxy-Gasoline Torch
- ASTD Project – D&D Technologies

**Potential Projects:**
New ASTD projects are currently in early stages of development. Additional information will be provided as project plans evolve.
Mission
The goal of the Post Closure Stewardship Technology Project (PCSTP) is to assist Fernald project management and stakeholders in developing a comprehensive, long-term post-closure care, inspection, and monitoring plan. The PCSTP will contribute to this effort by identifying, demonstrating, and deploying technologies capable of monitoring site facilities after remediation is complete. Long-term monitoring will ensure the DOE, stakeholders, and regulators that the site and its facilities are secure and performing as designed. The primary focus of the PCSTP is Fernald’s On-Site Disposal Facility (OSDF). The PCSTP will apply advanced technologies to cost-effectively fulfill the long-term stewardship and monitoring needs of the OSDF so that the Facility will continue to perform as designed and the environment will be protected in perpetuity.

Objectives

- Identify critical focus areas/monitoring needs
- Research viable technologies, focusing on those which are reliable.
serviceable/replaceable, remote, self-sustainable, and capable of providing real-time data

- Demonstrate innovative monitoring technologies and deploy those which facilitate post-closure stewardship at Fernald (upon DOE approval)
- Minimize long-term stewardship costs and labor requirements
- Establish Fernald as a pioneer of stewardship efforts within the DOE complex

**ISTT**

The Integrating Stewardship Technology Team (ISTT) has been developed to help carry out the objectives of the PCSTP. For more information on the ISTT, visit the [Integrating Stewardship Technology Team page](#).

**Current Activities**

At this time, the PCSTP is focusing on the identification of monitoring technologies for the OSDF and its associated components, such as the Leachate Conveyance System. The OSDF is an engineered waste disposal facility composed of a multi-layer cap and liner system. Mildly contaminated soil and debris generated during remediation will be stored inside the OSDF. If the facility fails or its security is compromised, contaminants could be released into the environment. Therefore, successful long-term maintenance of the OSDF is of primary importance to the DOE, Fernald and stakeholders.

The PCSTP is currently concentrating on the following OSDF-related monitoring needs:

*OSDF Leachate Quality Monitoring Need*
*OSDF Flow Monitoring Need*
*Meteorological Monitoring Need*
*Passive Leachate Treatment and Monitoring Need*
*Long-Term Data/Image Repository*
*OSDF Cover System Monitoring Need*

**For More Information**

Contact Marty Prochaska, Project Manager, (513) 648-6555, e-mail: marty.prochaska@fernald.gov; or
Kathleen Nickel, DOE Technical Program Officer, (513) 648-3166, e-mail: kathi.nickel@fernald.gov.
APPENDIX D

2001 INTERNATIONAL CONTAINMENT & REMEDIATION TECHNOLOGY CONFERENCE ABSTRACT
**Abstract:** Environmental remediation at the Fernald Environmental Management Project (Fernald) is nearing completion, but technology needs are still emerging at the site. Long-term post closure monitoring technologies are needed to observe the site and its facilities once cleanup is complete. This effort seeks to deploy technologies and integrated systems that can provide “real-time” monitoring to remote locations autonomously. The remote, real-time, autonomous function of the technologies has at least three key benefits: 1) it will show whether remedy systems are functioning as designed; if they are not, it will notify personnel when a problem may be developing; 2) real time systems can provide the public, stakeholders, and regulators with up-to-date access to information on the performance and conditions of the site and its facilities; and 3) it will lower the long-term mortgage costs associated with monitoring site facilities. This poster will describe the impetus for the PCSTP, its mission, the post closure stewardship technology needs identified at Fernald, the Integrating Stewardship Technology Team (ISTT) concept designed to execute the work scope for this project, and progress made to date.

The PCSTP was developed to fulfill post-closure stewardship technology needs at Fernald. A former uranium processing facility, Fernald has been the site of environmental remediation for over a decade due to residual contamination of soil and groundwater by chemicals and radionuclides. Significant progress has already been made in the environmental cleanup of Fernald and the surrounding area; however, long-term post-closure monitoring is necessary to ensure that the OSDF is performing as designed. Technologies capable of monitoring environmental media will be investigated, demonstrated, and deployed through the PCSTP.

A permanent structure, called the On-Site Disposal Facility (OSDF), is currently being built to store low-level contaminated soil and construction debris. The waste streams designated for the OSDF are not hazardous enough to require off-site shipment to a radioactive material disposal facility; however, they still pose a contamination risk if the OSDF does not operate properly. Remotely-operated monitoring technologies are needed to monitor the integrity of the OSDF and associated components and to predict any potential problems.

The goal of the Fernald PCSTP is to assist Fernald project management and stakeholders in developing a comprehensive long-term post closure care, inspection and monitoring plan through the identification, demonstration, and deployment of technology that will assure the DOE, regulators, and stakeholders that the site is secure. Currently, the PCSTP is focusing on the application of advanced technologies to cost-effectively fulfill the long-term stewardship and monitoring needs of the Fernald OSDF and its associated components. The OSDF is an engineered waste disposal facility composed of a
multi-layer cap and liner system. Successful long-term maintenance and monitoring of the OSDF is of primary importance to the DOE, Fernald, and stakeholders. The timeline for identification of initial OSDF monitoring technologies is short, since construction of the cover system for Cell 1 of the facility is scheduled to begin in 2001.

A number of technology needs have been identified for the OSDF in the areas of monitoring, leachate management, and data reporting. The PCSTP will seek out and evaluate reliable, remote, serviceable/replaceable, self-sustainable, real-time technologies that can: 1) accurately measure the key parameters selected as indicators of long-term performance of the OSDF; 2) provide passive treatment of OSDF leachate flow; and 3) facilitate efficient data collection, integration, management, interpretation, and reporting efforts. Selected technologies will be deployed as appropriate to provide long-term monitoring, leachate treatment, and reporting capabilities as described below:

**Monitoring**

**Cover System Integrity**
Warning signs of uneven subsidence, surface erosion, burrowing animals, and slope failure or plugged drainage layer in the cover system, using technologies such as satellite imaging, ground-penetrating radar (GPR) scan, fly-over survey and imbedded water pressure transducers and thermocouples.

**Leachate Flow and Quality**
Cell-specific leachate flow rates and water quality indicators, using technologies such as remote flow meters and radiological/chemical sensors to be installed inside the OSDF Leak Detection System, Leachate Collection System, and Enhanced Permanent Leachate Transmission System.

**Ground Water Quality**
Underlying perched groundwater and Great Miami Aquifer quality, using a network of horizontal and vertical monitoring wells with remote sensing capabilities for radiological and chemical parameters under and around the OSDF.

**Health of the Ecological Environment**
Wildlife habitat and general health and diversity of vegetation, using technologies such as scheduled satellite imaging, fly-over survey, and others.

**Effectiveness of Institutional Controls**
Conditions of access roadways, fences, signs, storm water management structures/channels, and other facilities accessible to the public, using technologies such as fly-over survey and remote/web-based camera.

**Weather**
Precipitation, temperature, wind, and seismic conditions, using technologies such as on-site solar/battery-powered remote sensing meteorological/seismic stations.

**Leachate Management**
Develop and implement a long-term passive treatment system for a reduced leachate flow from
the OSDF using geo-chemical and/or biological treatment technologies, after the current waste water treatment facility is no longer available.

**Reporting**

Establish an integrated data and record repository that can provide timely, easy, and complete access to/interpretation of all the historical information regarding OSDF design and construction, as well as any new monitoring data, using the latest information management technologies. The repository will be accessible by DOE, regulatory agencies, and all other stakeholders.

The Fernald Integrating Stewardship Technology Team (ISTT) is a group of experts, regulators, and stakeholders selected to help Fernald team members execute work related to the PCSTP. ISTT members include leading experts in landfill design, engineering, and construction from DOE national labs, other DOE sites, University of Illinois, University of Cincinnati, University of Wisconsin, Florida International University, DOE-Fernald, Fluor Fernald Inc., and regulatory agencies.

The ISTT represents a broad-based, independent, and objective approach to the evaluation and deployment of innovative technologies at Fernald and is modeled after the highly successful Fernald Large Scale Demonstration and Deployment Project team. The ISTT is responsible for researching, screening, demonstrating, and deploying post-closure stewardship technologies that meet site-specific needs.

The first major task of the ISTT is to identify, demonstrate, and deploy post-closure monitoring technology for the OSDF Cell 1, due to the imminent construction of the Cell 1 cover system. Collaboration among team members is crucial to the success of the ISTT; meetings are held to facilitate the process. Since its initial meeting in November of 2000, the ISTT has developed a list of critical monitoring parameters and technologies available for implementation during Cell 1 construction. Critical parameters are listed in the table below. Procurement and demonstration options are currently being evaluated for the following technologies: pressure transducers and thermocouples, plate and rod systems, GPR targets, and remote sensing benchmarks.

<table>
<thead>
<tr>
<th>Critical Monitoring Parameters</th>
<th>Selected Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Layer</td>
<td>Submersible Pressure Transducers</td>
</tr>
<tr>
<td>- Head measurement</td>
<td></td>
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<tr>
<td>Settlement / Subsidence</td>
<td>Topographic Surveys</td>
</tr>
<tr>
<td>- Seismic / Surface</td>
<td>Plate &amp; Rod</td>
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<tr>
<td></td>
<td>Ground Penetrating Radar (GPR) targets</td>
</tr>
<tr>
<td>Soil Moisture / Soil-Water Potential</td>
<td>Water content sensors employing a dielectric method</td>
</tr>
<tr>
<td>Soil Temperature</td>
<td>Thermal conductivity based matric potential sensors (MPS)</td>
</tr>
<tr>
<td>Regular Visual Observation of the cell and its components</td>
<td>Topographic Survey</td>
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<tr>
<td></td>
<td>Visual and/or remote sensing Web Cam</td>
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</table>
DEVELOPMENT OF LONG-TERM MONITORING SYSTEM TO EVALUATE COVER SYSTEM PERFORMANCE
Uday Kumthekar – Fluor Fernald; Dr. J. D. Chiou – Fluor Fernald;
Jennifer A. Zewatsky – Miami University; Martin J. Prochaska – Fluor Fernald

The Fernald On-Site Disposal Facility (OSDF) is an engineered waste disposal facility designed to permanently store low-level radioactive waste at the Fernald Environmental Management Project located near Fernald, Ohio. Long-term maintenance and monitoring of this facility is a priority of the Department of Energy, regulators, stakeholders, and the site’s managing contractor, Fluor Fernald, Inc. The Fernald Post Closure Stewardship Technology Project (PCSTP) is designed to identify, demonstrate, and deploy technologies capable of monitoring the OSDF and any other facilities that will remain at Fernald after site remediation is complete to ensure they are functioning properly and to provide early warning. Through the work of a team of experts, regulators, and stakeholders known as the Integrating Stewardship Technology Team (ISTT), the PCSTP is tasked with: implementing innovative, automated, and low maintenance monitoring technologies; designing an integrated system; formulating an implementation plan including monitoring and testing methods, long-term maintenance schedules, and other requirements; developing a long-term monitoring data collection and reporting system; and preparing cost information. This paper will explore the monitoring requirements of the OSDF, the parameters selected as critical for comprehensive long-term monitoring of the facility, and the process by which technologies were chosen to monitor those parameters.

The OSDF will eventually span 70 acres and store 2.5 million cubic yards of radioactively contaminated soil and construction debris. Project managers anticipate that eight individual storage cells will be constructed, three of which are currently active. The facility is designed to isolate impacted material for at least 200 years and, to the extent reasonably achievable, for 1,000 years. The OSDF is also designed to withstand a storm event of 2,000 years and an earthquake event for 2,400 years. Resistance to biointrusion and slope stability are additional design criteria for the facility.

To properly isolate impacted material, several types of controls are needed: external hydrological, internal hydrological, pedogenic, and ecological. These controls are built into the multi-layered liner system installed within each cell. The 7-foot-thick liner is comprised of the following layers (from bottom to top): subgrade, compacted clay liner, secondary geosynthetic clay liner, secondary geomembrane liner, geotextile cushion, supplemental geotextile cushion, Leak Detection System (LDS) pipe, LDS drainage corridor, primary geosynthetic clay liner, primary geomembrane liner, geotextile cushion, supplemental geotextile cushion, Leachate Collection System (LCS) pipe, LCS drainage corridor, geotextile filter, and a protective layer.

After each cell is filled to capacity, a cover system, or cap, is installed. The cap is designed to: minimize infiltration into closed cells, promote drainage to minimize erosion and abrasion of the cover, and accommodate settling and subsidence to maintain the integrity of the cover. The permeability of the cap must be less than or equal to the permeability of the liner system or natural sub-soil present. The cover system is 8.75 feet thick and consists of the following layers (from bottom to top): compacted clay cap, geosynthetic clay cap, geomembrane cap, geotextile cushion, cover drainage layer, biointrusion barrier, granular filter, vegetative soil layer, topsoil, an erosion mat, and vegetation.

To ensure that the OSDF and its associated components are performing as designed, long-term monitoring will be necessary. The cover system for OSDF Cell 1 is currently being installed.
Therefore, the ISTT is initially focusing on developing and implementing a monitoring plan for the OSDF cover system. Technologies are needed to monitor 1) ecological systems associated with the vegetative layer and buffer area, 2) physical changes in the cover system, and 3) the effectiveness of institutional controls. Monitoring needs are dictated by four main drivers: regulatory requirements, OSDF design criteria, the Post-Closure Care and Inspection Plan, and the Fernald Environmental Management Project Final Land Use Plan.

Critical cover system monitoring parameters were identified through the collaboration of ISTT members. During the team’s first meeting in November 2000, participants held separate breakout sessions to identify and prioritize ecological and geomechanical monitoring parameters. The breakout sessions were also used to identify potential monitoring technologies associated with each parameter. During the ISTT’s second meeting in January 2001, the team re-evaluated the parameters identified in November and narrowed the list to five critical items. The parameters, along with technologies selected to measure them, are displayed in the table below.

<table>
<thead>
<tr>
<th>CRITICAL MONITORING PARAMETERS</th>
<th>SELECTED TECHNOLOGIES</th>
</tr>
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</tbody>
</table>

As of June 2001, procurement and fabrication plans have been developed for soil water status nests, GPR targets, settlement plates, and pressure transducers. Installation of these technologies is currently underway, and the Cell 1 monitoring system is expected to be fully operational by Spring 2002. Once the system is installed, data will be collected according to the following monitoring schedule developed by ISTT experts. Presently, the Post Closure Care and Inspection Plan states that monitoring will occur:

- Monthly – At completion of each cap for at least two years
- Quarterly – During remaining construction period and for additional three years
- Annually – Three years after completion of OSDF construction

Fernald’s progress and accomplishments in stewardship planning and monitoring technology application establish the site as a pioneer within the DOE complex, which has thus far focused primarily on site closure and remediation. Long-term stewardship is becoming an increasingly important issue to DOE closure sites, many of which will soon face their own post-closure monitoring and maintenance challenges. Fernald’s experience with the OSDF and monitoring technologies will benefit sites which have not yet begun planning for long-term stewardship, as well as those which are beginning to encounter similar challenges.
APPENDIX F

POST CLOSURE STEWARDSHIP TECHNOLOGY PROJECT
FACT SHEET
Fernald Environmental Management Project

FERNALD POST CLOSURE STEWARDSHIP TECHNOLOGY PROJECT

INTRODUCTION
While remediation efforts at the Fernald Environmental Management Project are underway, long-term technology needs exist and continue to emerge at the site. The goal of the Post Closure Stewardship Technology Project (PCSTP) is to assist Fernald project management and stakeholders in developing a comprehensive post-closure care, inspection, and monitoring plan through the identification, demonstration, and deployment of technologies capable of monitoring any remaining site facilities after remediation in complete. In collaboration with the Subsurface Contaminants Focus Area, the PCSTP was designed to achieve the following objectives:

- Identify critical focus areas/monitoring needs
- Research viable technologies, focusing on those which are reliable, serviceable or replaceable, self-sustainable, remote, and capable of providing real-time data
- Demonstrate innovative monitoring technologies and deploy those which facilitate post-closure stewardship at Fernald, concentrating on proving the functional application of innovative technology
- Minimize labor requirements and long-term stewardship costs

PROJECT FOCUS
The Fernald On-Site Disposal Facility (OSDF) is an engineered waste disposal facility composed of a multi-layer cap and liner system. Cell 1 of the OSDF was completely filled in 2001 and is now being capped. Since the OSDF is a permanent structure which will remain on-site after remediation is complete, successful long-term maintenance and monitoring of the facility is of primary importance to regulators and Fernald stakeholders. To address their concerns and accommodate the facility’s construction schedule, the PCSTP is initially focusing on the long-term stewardship needs of the OSDF and its associated components, such as the final cover system and leachate collection system.

TECHNICAL SUPPORT
The Fernald Integrating Stewardship Technology Team (ISTT) is a group of experts, regulators, and stakeholders selected to provide consulting services and help Fernald team members execute work related to the PCSTP. ISTT members include leading experts in landfill design, engineering, and construction, such as Dr. Craig Benson from the University of Wisconsin and Dr. David Daniel from the University of Illinois, along with representatives...
from other DOE sites, national labs, educational institutions, and regulatory agencies. The team represents an independent, broad-based, and objective approach to the identification of stewardship technology needs and to the evaluation and deployment of innovative technologies at Fernald.

The ISTT work process is summarized in the following steps:

1. **Identify** long-term monitoring needs
2. **Prioritize** needs
3. **Research** viable monitoring options
   - Screen options for applicability, state of maturity, cost, and compatibility with construction schedule
4. **Select** technologies capable of fulfilling needs
5. **Procure** selected monitoring technologies
   - Prepare cost estimate, demonstration work plan, health and safety plans, etc.
6. **Demonstrate** technologies at Fernald
7. **Evaluate** technologies based on performance, cost, and reliability
8. **Deploy** successful technologies

**INITIAL MONITORING PARAMETERS**

The ISTT has identified several crucial OSDF monitoring needs during fiscal year 2001. These initial needs are related to OSDF final cover system monitoring, due to the imminent construction of the Cell 1 cap. Critical parameters to be measured, along with the technologies selected to measure them, are listed below.

- **Drainage layer head measurement** – Submersible pressure transducers
- **Surface settlement/subsidence** – Topographic survey; Plate & rod; Ground Penetrating Radar (GPR) targets
- **Soil moisture/Soil-Water Potential** – Water content sensors (dielectric); thermal conductivity-based matric potential sensors (MPS)
- **Soil temperature** – MPS with thermocouple
- **Visual observation of cell/components** – Topographic survey; Visual and/or remote sensing (e.g., satellite imaging); Web Cam

**CURRENT STATUS**

As of June 2001, procurement and fabrication plans have been developed for soil water status nests, GPR targets, settlement plates, and pressure transducers. Installation of these technologies is currently underway, and the Cell 1 monitoring system is expected to be fully operational by Spring 2002.

**ADDITIONAL TECHNOLOGY NEEDS**

The following technology needs will be addressed by the ISTT once cover system monitoring technologies are in place:

- OSDF Flow Monitoring (Leachate Collection and Leak Detection System)
- OSDF Leachate Quality Monitoring
- OSDF Passive Leachate Treatment
- Meteorological Monitoring
- Long-Term Data/Image Repository and Retrieval System

**CONTACTS**

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E-mail: marty.prochaska@fernald.gov

Kathleen Nickel, DOE Technical Program Officer
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E-mail: kathi.nickel@fernald.gov
APPENDIX G

FERNALD POST CLOSURE STEWARDSHIP TECHNOLOGY PROJECT SYMPOSIUM AGENDA
Moderator: Steve McCracken – Director, DOE-Fernald

5:30 P.M. - 6:30 P.M.  Registration / Reception  
(catered hors d’oeuvres, beverages served)  
- View 12-minute safety video

6:30 P.M. - 6:45 P.M.  Opening remarks  
Jim Bierer – Chair, Fernald Citizens Advisory Board  
(Objective: State purpose of/reason for symposium, the “vision” of long-term stewardship)

6:45 P.M. - 7:20 P.M.  Introduction  
6:45 P.M. – 6:55 P.M.  Jeff Short – DOE Office of Long Term Stewardship  
(Objective: Present national DOE perspective on stewardship)

6:55 P.M. – 7:05 P.M.  John Bradburne – Chairman and Chief Executive Officer, Fluor Fernald, Inc.  
(Objective: Welcome participants; state support of project)

7:05 P.M. – 7:20 P.M.  Jim Wright – DOE Senior Program Manager, Subsurface Contaminants Focus Area  
(Objective: Explain SCFA role; introduce functional application of innovative technologies)

7:20 P.M. - 8:50 P.M.  Post Closure Stewardship Technology Project Approach  
7:20 P.M. – 7:25 P.M.  Dr. J. D. Chiou – Fluor Fernald, Project Director, Soil & On-Site Disposal Facility Project  
(Objective: Explain to audience why Fernald is placing a high priority on post closure stewardship technologies)

7:25 P.M. – 7:45 P.M.  Break – Exhibits  
Exhibit A: Theme display showcasing old and current technologies  
Exhibit B: Instrumentation nest models  
Exhibit C: Animated presentation  
Exhibit D: PCST Needs poster  
(Objective: Participants will gain a comprehensive, detailed perspective of monitoring systems, design, and function)
7:45 P.M. – 8:05 P.M.  Dr. Craig Benson – University of Wisconsin, Professor, Department of Civil & Environmental Engineering
(Objective: Present big picture to participants, state-of-the-art/practice in the industry regarding closure sites and disposal facilities; explain what is different about Fernald)

8:05 P.M. – 8:15 P.M.  David Daniel – University of Illinois, Dean, School of Engineering
(Objective: Present project vision and approach, general nationwide perspective)

8:15 P.M. – 8:25 P.M.  Graham Mitchell – Chief, Office of Federal Facilities Oversight, Ohio Environmental Protection Agency
(Objective: Emphasize OEPA support for project; why the project is beneficial)

8:25 P.M. – 8:30 P.M.  Marty Prochaska – Fluor Fernald, Principal Investigator, Post Closure Stewardship Technology Project
(Objective: Discuss the Integrating Stewardship Technology Team approach, the strategy utilized, and a breakdown of each step)

8:30 P.M. – 8:35 P.M.  Bob Tabor – Labor Representative, Fernald Atomic Trades and Labor Council

8:35 P.M. – 8:50 P.M.  Question and Answer Session

8:50 P.M. – 8:55 P.M.  **Wrap-up**

Dr. Paul Pettit – Fluor Fernald, Technology Programs Manager
(Objective: Set stage for second day; remind audience of outside meeting at OSDF)
APPENDIX H

PCSTP SYMPOSIUM
GENERAL INVITATION LETTER
Fernald Post Closure Stewardship Technology Project Symposium

I am pleased to invite you and your colleagues to the 2nd Annual Fernald Post Closure Stewardship Technology Project Symposium. The event, sponsored by the Subsurface Contaminants Focus Area of the DOE Office of Science and Technology, the DOE Ohio Field Office, and Fluor Fernald, Inc., is planned for Oct. 3 – 4, 2001 at the Fernald Environmental Management Project in Cincinnati, Ohio.

The symposium will focus on Fernald’s accomplishments and approach to post-closure stewardship and will showcase the identification and deployment of innovative technologies used to monitor the long-term integrity of Fernald’s On-Site Disposal Facility. Application of these advanced technologies is intended to ensure that remaining site facilities are safe and performing as designed.

Last year I directed the Ohio sites to develop post-closure monitoring systems designed to guarantee that the level of human and environmental health and safety achieved through site remediation is maintained after cleanup is complete. Beginning with a reception on the evening of Oct. 3, 2001, the symposium will review Fernald’s response to this directive through progress made by the Fernald Post Closure Stewardship Technology Project. Participants will hear Fernald’s vision of stewardship, tour the On-Site Disposal Facility, learn the approach utilized to find technology solutions, observe the application of innovative technologies, gain hands-on experience with actual instruments, and discuss monitoring plans with experts in the field.

I encourage all interested parties, especially those within the DOE complex who have similar technology needs and stewardship issues, to be a part of this important effort. For further information, please contact Kim Lahman, Fluor Fernald, at 513-648-5111 (voice), 513-648-4011 (fax), or kim.lahman@fernald.gov (e-mail). Additional information can be found in the enclosed flyer.

Susan R. Brechbill
Manager, DOE Ohio Field Office
APPENDIX I

TECHNOLOGY PROGRAMS GENERAL PROJECT
INFORMATION DATABASE
Technology Application Projects/Activities

**TTP Number/Activity** OH19DD61

**TTP Title** Mobile Work Platform Completion / Integrated Excavation Control System

**Date Of TTP Submission** 10/3/00

**TTP Submitted to** Robert Bedick

**Signed TTP returned to Site (Yes / No)** No

**DOE Crosscutting Program**

**DOE Focus Area** Deactivation & Decommissioning

**DOE Focus Area Contact** Harold Shoemaker

**DOE Focus Area Contact Phone #** 304-285-4715

**DOE Focus Area Contact E-mail** harold.shoemaker@netl.doe.gov

**DOE Technical Program Officer Name** Kathleen Nickel

**DOE Technical Program Officer Phone #** 513-648-3166

**Work Scope/Description**

See “Adjustments to Work Scope” below

**Milestones**

A1-01 / Commerce Business Daily Announcement (CBD) / Complete / TTP

B1-01 / Bring "Task B" Scope of Work for the MWP to a logical ending point / 11/31/00 / Complete / TTP

This scope of work is complete. See TTP# OH11DD31 for new milestones

**Current Status**

Control Accounts and charge numbers are currently being revised for the new TTP#OH11DD31 to support the new scope of work. The new Control Account and budget moves the remaining $550,000 from OH19DD61 to OH11DD31.

**Total Project Cost (Funded)** $685,000.00

**Budget FY01** $2,000.00

**Amount Spent to Date** $135,000.00

**Date of Amount Spent to Date** April 2001

**Amount spent this FY** $36,000.00

**Amount Remaining** $550,000.00

**Schedule**

The schedule involves closing the control accounts and charge numbers associated with PAST.

**Issues / Concerns**

None

**Cost Account Manager (CAM)** Tim Miller

**CAM Phone Number** 513-648-6369

**Control Account** PAST

**Charge Numbers** PAST1, PAST5

**Project Lead** Tim Miller

**Project Lead Phone #** 513-648-6369

**Site Project User Contact** N/A

**Demonstrations/Deployments**

A successful demonstration was performed using the MWP at Fernald as part of the Fernald Plant 1 LSDDP in November of 1998.
APPENDIX J

TECHNOLOGY PROGRAMS WEEKLY ACTION ITEMS
DATABASE
<table>
<thead>
<tr>
<th>Item #</th>
<th>Task Detail</th>
<th>Task Lead</th>
<th>Target End Date</th>
<th>Actual End Date</th>
<th>Status / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Process 10D pad into usable aggregate. Activities included concrete saw cutting, lifting precut section of concrete out of the area and then pulverizing the concrete into usable aggregate.</td>
<td>TM</td>
<td>6/26/01</td>
<td>6/26/01</td>
<td>Complete. The target completion date was pushed back from the date listed on the estimate to allow for more efficient use of the UDP. The pulverizing of the 10D concrete pile was used as “fill time” for the UDP so that work could continue on other pads. Volume of concrete = 132 yd³.</td>
</tr>
<tr>
<td>02</td>
<td>Process 10B pad into usable aggregate. Activities included using the concrete saw to cut through the 6” pad and then using the UDP to peel back the pre-cut sections. These sections were then crushed into usable aggregate using the UDP’s pulverizing jaw set.</td>
<td>TM</td>
<td>7/5/01</td>
<td>6/28/01</td>
<td>Complete. The UDP did a great job peeling back the pre-cut concrete sections of the slab and processing into aggregate. It also performed well on the foundation walls with help from an excavator w/bucket attachment. Target date for completion was 2 weeks after start. Volume of concrete = 82 yd³.</td>
</tr>
<tr>
<td>03</td>
<td>Process 19D pad into usable aggregate. Activities included crushing piers out of the area and then pulverizing the concrete into usable aggregate.</td>
<td>TM</td>
<td>6/14/01</td>
<td>6/25/01</td>
<td>Partially Complete. The UDP performed well on the piers &amp; footers of the old N. Tank Farm, however there is a large stabilizer pad that spans the length of the area and measures ~80′ x 40′ x 3′. The UDP and excavator w/bucket were not able to dig out &amp; remove the large underground footer. A decision was made to leave it in place for now until other equip. can be brought in to assist. The target date was one week from start but took longer due to efforts to remove the large footer. Volume of concrete = ~110 yd³.</td>
</tr>
<tr>
<td>04</td>
<td>Process 20H pad into usable aggregate. Activities will include concrete saw cutting &amp; digging with the excavator w/bucket to expose &amp; remove the pad for processing.</td>
<td>TM</td>
<td>7/17/01</td>
<td>7/30/01</td>
<td>Processing of the 20H pad started 07/02/01. Volume of concrete = 133 yd³.</td>
</tr>
<tr>
<td>05</td>
<td>Process the East Reactor pad into useable aggregate.</td>
<td>TM</td>
<td>7/16/01</td>
<td>8/1/01</td>
<td>Concrete saw cutting and excavation activities had limited success. The E. Reactor pad is ~2.5′ thick at the edges. The UDP &amp; excavator w/bucket alone could not to access. A Hoe-Ram was brought in to break apart the thick foundation base. Volume of concrete = 100 yd³.</td>
</tr>
<tr>
<td>06</td>
<td>Process West Reactor pad into usable aggregate.</td>
<td>TM</td>
<td>7/16/01</td>
<td>7/18/01</td>
<td>Completed. Concrete saw cutting and excavation activities had limited success. The W. Reactor pad is ~4′ thick at the edges. The UDP &amp; excavator w/bucket alone could not to access. A Hoe-Ram was brought in to break apart the thick foundation base. Volume of concrete = 157 yd³.</td>
</tr>
</tbody>
</table>
APPENDIX L

INITIATIVES QUARTERLY ARTICLE
Fernald Pursues Aggressive Deployment Strategy

by Jennifer Zewatsky

The Fernald Environmental Management Project (Fernald) has taken a leadership role in the demonstration and deployment of innovative technologies throughout the DOE complex. Since 1992 the 1,050-acre site, located in southwestern Ohio and managed by Fluor Fernald, Inc., has deployed over 20 innovative technologies in the field. The DOE Office of Science and Technology (OST), which sponsors Fernald’s technology projects, estimates that the deployments have saved Fernald and other DOE sites more than $100 million while significantly improving worker safety and shortening project schedules.

Fluor Fernald’s goal, to achieve site closure by 2006, depends upon the thorough cleanup of Fernald and the surrounding area. DOE sites across the country are addressing similar D&D and environmental remediation needs, which can be expedited by the application of new or innovative technologies to site projects. The OST initiated the Accelerated Site Technology Deployment (ASTD) program in 1997 to stimulate the deployment of innovative technologies throughout the DOE complex.

Fluor Fernald’s Technology Programs department took the ASTD concept one step further by asserting that “business as usual” would not serve the OST technology deployment mission. A more focused, proactive, and hands-on approach to deployment would be needed to accelerate cleanup schedules, reduce costs, and improve worker safety. Technology Programs supports the ASTD program and the site closure mission by identifying, demonstrating, and deploying technologies that are more effective, safer, faster, and/or less expensive than “baseline” technologies. The department has aggressively pursued the goal of technology deployment at Fernald and has shared its accomplishments with DOE closure sites and training institutions throughout the United States.

Tangible proof of Fernald’s accomplishments comes in the form of results. The on-site deployment of real-time soil characterization equipment and the ASTD project to deploy the oxy-gasoline torch and Personal Ice Cooling System (PICS), along with several projects currently underway, illustrate Fernald’s commitment to accelerated site closure.

Real-Time Soil Characterization

Fernald project managers in charge of soil remediation were faced with a daunting task: to find and deploy technology that accurately characterized the radiological constituents of soil, quickly identified areas needing remediation, and presented the information in a manner that clearly communicated soil excavation directions to site contractors. Conventional methods of soil characterization through laboratory analysis are time-consuming, slowing the excavation process and leading to increased remediation costs. Fluor Fernald overcame these obstacles by deploying an integrated technology suite capable of providing accurate results in real time.

Three main pieces of real-time radiation equipment comprise the technology suite: the mobile radiation tracking system (RTRAK), the radiation scanning system (RSS), and high purity germanium (HPGe) detectors. The RTRAK is an agricultural tractor outfitted with a sodium iodide detector, a computer, and a Global Positioning System (GPS). The RSS, a smaller version of the RTRAK, allows for analysis of areas that are inaccessible to the large tractor. The HPGe detector employs most of the same software and hardware as the RTRAK and RSS but...
utilizes a different detector crystal [Ge as opposed to sodium iodide (NaI)]. The HPGe detector has a higher resolution than the NaI systems, allowing it to better differentiate between gamma-emitting radionuclides. Therefore, the HPGe detector can be used to support and refine decisions made with the RTRAK or RSS. HPGe detectors are also used to confirm that soils above the action level have been removed and that soils remaining in place meet final soil remediation criteria.

The equipment described above, combined with software designed to gather, transmit, and interpret the data, provides instantaneous data analysis, display, and mapping of the results, accelerating the excavation decision-making process and minimizing excavator “down time.” As of July 2001, the suite has been used to characterize over 50% of Fernald’s soil, generating cost savings in excess of $15 million.

**Deployment of Personal Ice Cooling System and Oxy-Gasoline Torch**

In 1998 Technology Programs launched the Fernald Accelerated Site Technology Deployment Project to expedite the deployment of winning technologies throughout the DOE complex. The PICS and oxy-gasoline torch were successfully demonstrated in 1997 during the Fernald Plant 1 Large Scale Demonstration and Deployment Project. The technologies were deemed “winning” because of their superiority, in terms of worker safety, productivity, and cost-effectiveness, compared to baseline heat stress control and steel segmentation methods. Fluor Fernald believed that simply identifying the technologies as superior was not enough: a concentrated deployment effort was needed to convey the benefits and widespread applicability of each technology.

What made the Fernald ASTD Project unique was its innovation and application of the “Fernald Approach” to technology deployment. The Fernald Approach targeted technology end-users and project managers at each deployment site, directly involving them with hands-on demonstrations of each technology (See Fig. 1). A knowledgeable deployment team used technology “seed units” to illustrate how the oxy-gasoline torch and/or PICS could serve site-specific needs, typically leaving the seed units behind to perform real field work (See Fig. 2).

Another key aspect of this project was its inclusion of training institutions, which educate thousands of future D&D workers each year. At the Volpentest Hazardous Materials Management and Emergency Response (HAMMER) Training and Education Center in Richland, Washington, over twenty lead instructors attended a technology transfer session on the PICS and oxy-gasoline torch. These new instructors are subsequently training federal employees and contractors performing work at the DOE Hanford site.

![Figure 1: “Training the Trainers” – National Ironworkers Union Instructor receives training on the PICS](image1)

![Figure 2: Workers marvel at the sight of a completed D&D job made possible by the oxy-gasoline torch (6429-145)](image2)
Between March 1998 and December 2000, the PICS and/or oxy-gasoline torch were deployed to 24 closure sites and training institutions nationwide. Many of those sites have since purchased additional units and shared the technologies with others in the DOE complex. The impact of the Fernald ASTD Project on overall deployment activity is illustrated by Fig. 3, which depicts oxy-gasoline torch deployments since the technology’s initial demonstration at Fernald in 1997.

![Figure 3: Oxy-gasoline torch deployments soar with the “Fernald Approach” to technology deployment.](image)

**Current ASTD Projects and Site Deployments**

The Technology Programs department, in conjunction with OST, is continuously investigating advanced technologies to meet site needs; several innovations which have recently demonstrated great potential include Gubka, the Remote Prismless Total Survey Station (RPTS), the Wireless Integrated Radon Monitoring System, and the Universal Demolition Processor (UDP).

**Gubka**

Fernald’s search for technology to dispose of radioactive liquid wastes led all the way to Russia, where researchers have developed an innovative product known as “Gubka.” The researchers transformed fly ash waste from Siberian coal power plants into a porous crystalline material that stabilizes actinide residue solutions. Gubka, which means “sponge” in Russian, absorbs metal salts, including radionuclides, from waste and acidic liquid residues at room temperature. The Russians recently observed their creation at work in Fernald’s lab, where technicians used it to stabilize liquids that would later be shipped to the Nevada Test Site for disposal (See Fig. 4).

![Figure 4: (From left) Albert Aloy, Olga Sharanova, Alexandre Tretyakova, Dieter Knecht, and Serguei Silichtchev listen as Terry Daniels (far right) explains how Fernald has deployed the Gubka technology (6810D-0540).](image)
The exchange was successful and will likely lead to further collaboration with Russian industry. “Working cooperatively with two entities like this is unquestionably beneficial for both parties,” said Dennis Carr, Fernald Executive Project Director. “DOE and Fluor Fernald would like to see continuation of these types of partnerships.”

Remote Prismless Total Survey Station
Land survey measurements are vital to engineering, construction, and remediation activities at Fernald; the Remote Prismless Total Survey Station plays a key role in the acquisition of accurate survey measurements. The instrument, with its coaxial automatic target recognition system, is capable of providing prismless measurement of more than 500 feet. Since its deployment in February 2001, the RPTS has achieved safer work practices, reduced worker exposure to hazardous environments, and significantly reduced personnel costs. The RPTS provides daily support to construction of the Fernald On-Site Disposal Facility (OSDF). The technology is also used to monitor erosion problems along Paddy’s Run and to verify the amount of materials excavated from Fernald’s waste pits.

Wireless Integrated Radon Monitoring System
Fernald is also deploying a wireless integrated radon monitoring system to continuously and automatically collect radon data in real-time from monitoring locations at the property boundary and the K-65 Silos area. Wireless technology is an improvement over the former system, which relies on phone lines and cables to transmit radon data and is susceptible to accidental disruption from severe weather and construction activities.

In May 2001, the wireless hardware was installed and successfully tested at ten monitoring locations, and data management software is now under development. Once the system is fully operational, Fernald plans to expand the technology to all 34 radon monitoring locations. This deployment will improve data quality and generate cost savings by reducing the manpower needed for field inspections of equipment and data downloads.

Universal Demolition Processor
Decades of uranium production have left behind numerous steel tanks and an estimated 239,000 cubic yards of concrete slabs, foundations, footers, I-beams and other structures to be demolished. The Universal Demolition Processor is making safe, efficient concrete recycling a reality at Fernald. The UDP is actually three technologies in one: its exchanging jaw sets allow it to be used as a concrete pulverizer, a concrete cracker, or a shear capable of cutting thick steel.

Since the UDP’s initial deployment in May, the durable, multi-functional technology has been used to demolish several concrete pads at the site, excavating concrete up to 3 feet thick and leaving piles of crushed material. The UDP’s pulverizer attachment is reducing the size of this material to aggregate for reuse in temporary support roads around the OSDF. Using recycled concrete significantly diminishes the need to purchase and import aggregate for road construction and reinforcement.

Equipped with the plate shearing jaws, the UDP will enable safe and efficient segmentation of thick steel tanks by a single operator in an enclosed cab. The size-reduced steel will then be placed in the OSDF for disposal.

Conclusion
Through its partnership with OST, Fluor Fernald is making great strides in the deployment of innovative technology solutions. By collaborating with remediation project managers to understand their needs and taking a hands-on approach to the deployment effort, Technology Programs has identified winning technologies capable of accelerating closure not only at Fernald, but at DOE sites throughout the nation. The success stories described above represent Technology Programs’ commitment to the Fernald closure mission and an eagerness to explore new, proactive approaches to meeting technology needs. With OST support, Fernald will continue to bolster its reputation as the “Deploymentville of the DOE.”