The Fernald Long-Term Stewardship Pilot

Susan R. Brechbill[1] and John C. Bradburne[2]

Abstract:
Long-term stewardship means the activities and use restrictions that are necessary to protect human health and the environment following environmental remediation activities at DOE Environmental Management (EM) sites. Activities and use restrictions include the physical controls, institutions, information, and other mechanisms needed to ensure protection of people and the environment. Scientists and engineers have long understood that much of the waste and other materials managed by DOE cannot be broken down into non-hazardous materials. These materials must be managed by treatment, isolation, and monitoring.

A variety of hazards will remain at many DOE sites after these sites have been cleaned up to agreed upon levels. The four categories of media where residual hazards will remain include engineered units, soil and buried waste, facilities, and water. In some cases, cleanup reduces risk, but may not be able to reduce contaminant concentrations to levels deemed safe for unrestricted use of the site. The need for stewardship at DOE sites results largely from the radioactive contamination that will remain onsite and continue to pose some degree of risk indefinitely after cleanup is complete. Other contaminants of concern that may remain onsite after cleanup is complete include organic and inorganic chemicals. Long-term stewardship involves a wide variety of activities, depending on the nature of the site conditions, and/or the residual hazardous. A case study in long-term stewardship is the Fernald long-term stewardship pilot program.

The Fernald Environmental Management Project (FEMP) is located on a 1050-acre site in southwestern Ohio, approximately 18 miles northwest of Cincinnati. High purity uranium metal products were produced at the FEMP site for the DOE and its predecessor agencies from 1951 until 1989. Thorium was also processed, on a smaller scale, and is still stored on-site. In November 1989, the Environmental Protection Agency (EPA) placed the FEMP site on the National Priorities List, and in April 1990 DOE and EPA entered into a Consent Agreement (since amended) for site remediation. The mission of the FEMP is to remove and dispose of all site nuclear materials, carry out decontamination and decommissioning of all site buildings and facilities, and return as much of the site as possible to public use. The current contract has a target closure date of 2010 with incentives for early closure back to 2006.

The FEMP has been a leader in DOE for the utilization of technologies to accomplish it work. Specifically, FEMP has utilized technologies such as a new inorganic treatment process to treat polychlorinated biphenyl contaminated low-level waste (Tri-Mixed Treatment Demonstration), oxy-

[1]Manager, Department of Energy Ohio Field Office, 1 Mound Road, P.O. Box 3020, Miamisburg, OH 45343-3020, Ph 937.865.3977, Fx 937.865.3426, Susan.Brechbill@Ohio.DOE.Gov (corresponding author)

[2]President and Chief Executive Officer, Fluor Fernald, P.O. Box 538704, Cincinnati, Ohio 45253-8704, Ph 513.648.3311, Fx 513.648.3601, john_bradburne@fernald.gov

gasoline torch cutting, personal ice cooling system suits, vacuum removal of insulation materials, and process piping interior inspection (pipe explorer). Significant cost and schedule savings are being realized through the use of such technologies. As examples, the implementation of a technology demonstration project involving the use of injection of treated groundwater may reduce the groundwater remediation schedule from 27 to 10 years and the deployment of real time *in situ* radiation characterization technologies of soil remediation areas where costs is expected to result in estimated savings of $34,000,000 between FY 1998 and FY 2006.

As the FEMP moves toward closure, the decision has been made to leave behind certain low level radioactive material in an on site disposal facility (OSDF). Currently, the first of seven cells has been constructed, filled and covered with a temporary cap. The second cell is being filled and a third is under construction. It is also expected that there may be groundwater remaining to be treated at the time of site closure. Therefore, DOE will have long-term stewardship responsibilities at the Fernald site long after the projected closure date.

The purpose of the Fernald Post Closure Stewardship Technology Pilot (PCSTP) is to identify and deploy technologies that will provide the regulators and other stakeholders assurance that the site's remedial actions are effective and performing as designed. The project directives are to identify technologies to evaluate disposal facility long-term performance and to deploy real-time, automated, remotely operated technologies. To do this, DOE has put together project participants consisting of representatives from DOE, the site contractor Fluor Fernald, Ohio EPA, the stakeholders, the University of Cincinnati and Florida International University. Their work is supported by the DOE EM-50 Subcontaminants Focus Area.

The Fernald PCSTP has identified six technology areas:

- OSDF cap and cover monitoring;
- OSDF leachate quality monitoring;
- OSDF leachate flow monitoring;
- passive treatment of leachate;
- meteorologic monitoring; and
- long term date repository.

The PCSTP has put together a technology screening process that consists of a review of the following about each technology that will be reviewed: applicability, state of maturity, complexity, risk, history of success, and cost.

For each of the six technology areas listed above, the following has been identified: baseline, need, physical parameters, and ecological parameters (as appropriate for the area).

An example of this can be seen in the work done in the technology area of OSDF cover system monitoring:

- Baseline: routing inspection to evaluate physical change in cover system, ecological system, and institutional controls;

- Need: technologies to assist in the continual and remote assessment of critical indicators of

OSDF long-term performance;

- Physical Parameters: observation (erosion, poor drainage, etc.), hydraulic flux, drainage layer outlet, moisture content, and subsidence; and

- Ecological Parameters: observation (bare areas, woody vegetation), soil temperature, moisture content, leaf area index, root penetration, and evapotransporation.