PLANNING FOR THE TRANSITION TO LONG-TERM STEWARDSHIP AT THREE U.S. DEPARTMENT OF ENERGY-CHICAGO OPERATIONS OFFICE FACILITIES

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ABSTRACT

This paper describes a pilot study that resulted in the generation of draft planning documents for the upcoming transition from remediation construction to long-term stewardship at three national laboratories managed by the U.S. Department of Energy (DOE)-Chicago Operations Office (CH). The remediation construction work at these facilities is being completed under the DOE's Office of Environmental Management (EM) Program. Once the remediation is complete, the responsibility for long-term stewardship (LTS) of the closed waste sites is expected to be transferred to the DOE organization responsible for managing each of the three facilities (i.e., the site landlord). To prepare for this transfer, an extensive planning effort is required. This pilot study utilized the DOE guidance in effect at the time to (1) develop a series of documents identifying applicable requirements that the LTS Programs will need to satisfy, issues that need to be resolved before the transfer can proceed, and criteria to be used to determine when active remediation is complete and a given site is ready for transfer to the LTS Program; (2) examine alternate structures for possible LTS Programs; and (3) develop draft LTS Implementation Plans. This advanced planning effort yielded a number of observations and lessons learned that are applicable to any facility approaching the end of its remediation construction phase.

INTRODUCTION

The U.S. Department of Energy (DOE)-Chicago Operations Office (CH) oversees three facilities that are approaching the end of the implementation phase of their cleanup program (remediation

construction) and will be initiating long-term stewardship (LTS) activities in the next few years. These sites are Argonne National Laboratory-East (ANL-E), Argonne National Laboratory-West (ANL-W), and Brookhaven National Laboratory (BNL). Activities that constitute LTS include the continuation of the operation and maintenance (O&M) of remedial action systems, environmental monitoring and performance assessment, inspection and maintenance of engineered barriers, surveillance and maintenance of former nuclear facilities awaiting final decontamination or demolition, and management of information on residual hazards associated with closed waste sites. Depending on the nature of the LTS Program at a given site, the cost and effort to manage such a program, which will be required for many years into the future, may be significant. Careful preparation for movement into the LTS phase is critical for a smooth transition. The process of preparing for the transition from cleanup to stewardship at these three DOE-CH facilities was initiated in 2002.

The nature of the LTS Program at a given site will vary greatly from site to site, depending on the nature of the remedial actions completed and the intended use of the facility following completion of remedial actions. For sites with an ongoing programmatic mission after cleanup, current DOE policy states that the LTS of sites where remediation construction has been completed will become the responsibility of the DOE organization managing the site (site landlord) rather than the DOE Office of Environmental Management (EM), which funded the initial phases of cleanup. The three DOE-CH sites that are the subject of this paper are such sites. The landlord for BNL and ANL-E is the DOE Office of Science (SC), whereas the landlord for ANL-W is the DOE Office of Nuclear Energy (NE). In fiscal year (FY) 2002, through a project sponsored by the DOE Office of Long-Term Stewardship, DOE-CH began planning for the transfer of sites that were closed or long-term remedial actions initiated under their EM-funded cleanup programs to their respective site landlord organizations. This planning effort was undertaken as a pilot study and utilized draft DOE guidance for LTS planning that was current at the time. The pilot study was intended to accelerate the LTS planning process as well as promote the exchange of information and lessons learned regarding planning for LTS across the DOE complex.

PILOT STUDY DOCUMENTS

The pilot study was implemented in a series of increasingly detailed phases. The first phase involved identifying all applicable general and site-specific requirements related to LTS for these sites. The second phase involved developing an annotated outline for an LTS Plan exploring potential organizational structures and examining suitable documentation to support a LTS Program. The pilot study also assessed the existing DOE guidance and examined the extent to which each of the three sites currently meets the requirements for an LTS Program (gap analysis). As part of the pilot study, various means of reducing the long term cost of the LTS Program (mortgage reduction) were explored. Finally, draft LTS Implementation Plans were prepared for two of the three sites, ANL-E and ANL-W. Because of the time remaining before the BNL remedial actions will be complete, preparation of a draft LTS Implementation Plan for BNL was deemed to be premature and was not included in the study. The documents generated by this study included:

- Site-Specific Requirements in Support of LTS Transfer,
- Annotated Outline and Gap Analysis for a LTS Implementation Plan,
- Mortgage Reduction Opportunities Descriptions, and

- Draft LTS Implementation Plans (ANL-E and ANL-W only).

Table 1 gives a list of the documents generated by each site. These documents can be viewed at the DOE-CH Internet site www.ch.doe.gov/insidech/ org_offices/pmo/lts.

SITE-SPECIFIC REQUIREMENTS DOCUMENTS

The site-specific requirements documents were designed to identify all requirements relevant to the transfer of the closed waste sites from the EM Program to the landlord and the management of the LTS Program following the transfer. Requirements discussed include the need to (1) identify the waste sites and facilities that will be included in the transfer, (2) develop a complete list of current and future regulatory and technical requirements and associated costs for these sites that will continue once remedial construction is complete, and (3) assess the risk posed by the residual contamination or waste. A number of currently unresolved issues were identified that must be resolved before the transfer can occur, including:

- Determining which work elements will be considered part of the LTS Program and which will stay within the EM Program,
- Identifying the source and amount of funding that will be made available for the LTS Program,
- Identifying which organization will fund and manage future remedial actions that may be beyond the scope of the LTS Program,
- Negotiating specific transfer criteria that determine when remediation is complete and a site is suitable for transfer to the landlord, and
- Developing a schedule for completing the transfer.

The requirements documents also identified the need to update or prepare a number of technical planning documents that are needed to ensure continued successful operation of the remedial actions. The needed plans include O&M plans for operable remedies, environmental monitoring plans, contingency plans, plans for periodic performance assessments, and plans for final closeout of certain remedial actions. Finally, the requirements documents identified the need to clearly define the roles and responsibilities of EM, the landlord, and the site operating contractor during and after the transfer to LTS.

TABLE 1 Documents Generated by the LTS Pilot Study		
Author(s)	**Title**	**Date**
Argonne National Laboratory-East		
Moos, L. P.	Site-Specific Requirements in Support of LTS Transfer for Argonne National Laboratory-East	Final Draft, March 8, 2002
Moos, L. P.	Annotated Outline and Gap Analysis for a Long-Term Stewardship Implementation Plan at Argonne National Laboratory-East	Final Draft, March 15, 2002
Moos, L. P.	Transition Plan for Transfer of Long-Term Stewardship Activities for Argonne National Laboratory-East from the DOE Office of Environmental Management to the DOE Office of Science	Final Draft, July 19, 2002
Moos, L. P.	Program Management Plan for Argonne National Laboratory-East Long-Term Stewardship Program	Final Draft, July 19, 2002
Sullivan, R. G., et al.	Conceptual Design for an Internet-Based Long-Term Stewardship Management System for Argonne National Laboratory-East	July 19, 2002
Quinn, J. J. and Durham, L. A.	Assessment of Continuous Groundwater-Level Monitoring for Long Term Stewardship	July 2002
Argonne National Laboratory-West		
Holzemer, M. J.	Site-Specific Requirements in Support of LTS Transfer for Argonne National Laboratory-West	Final Draft, July 2002
Holzemer, M. J.	Annotated Outline and Gap Analysis for a Long-Term Stewardship Implementation Plan for Argonne National Laboratory-West	Final Draft, July 2002
Holzemer, M. J.	Argonne National Laboratory-West LTS Transition Plan from the DOE Office of Environmental Management to the DOE Office of Nuclear Energy	Final Draft, July 2002
Holzemer, M. J.	LTS Implementation Plan for Argonne National Laboratory-West	Final Draft, July 2002
Brookhaven National Laboratory		
Bennett, D. B.	Site Specific Requirements in Support of Long-Term Stewardship Transfer for Brookhaven National Laboratory	Final Draft, March 25, 2002
Bennett, D. B. and Howe, R.	Annotated Outline and Gap Analysis for Long-Term Stewardship Transfer for Brookhaven National Laboratory	Final Draft, May 15, 2002
Bennett, D. B., et.al.	Assessment of Some Opportunities for Reducing the Long-Term Stewardship Mortgage at Brookhaven National Laboratory	Final Draft, April 29, 2002
Briggs, S.	The Role of an Environmental Management System in Long-Term Stewardship Planning	Final Draft, April 1, 2002

ANNOTATED OUTLINES AND GAP ANALYSES

The second product of this pilot study was the Annotated Outline and Gap Analysis for each of the three sites. These documents considered the scope of the LTS Programs for each site and examined possible structures for an LTS organization that would satisfy the LTS requirements. The nature of the LTS Implementation Plan to support such an organization was examined and an outline proposed.

This closer examination of LTS work scope and requirements resulted in a more complete understanding of the activities to be included under a LTS Program. Routine activities that were considered part of an LTS Program included the following:

- Inspection of remedial systems, engineered barriers, fences, signs, etc;
- Operation of remedies that rely on mechanical systems (operable remedies);
- Maintenance of remedial systems, engineered barriers, access controls, etc.;
- Environmental monitoring, performance measurement, and reporting;
- Surveillance and maintenance of former nuclear facilities;
- Management of historic and contemporary LTS information;
- Maintenance of institutional controls, including land use restrictions and management of materials containing residual contamination;
- Periodic performance assessment; and
- Contingency planning.

In addition to the routine tasks, a number of other one-time tasks associated with these units that must be addressed by the LTS Program were identified. These include:

- Completion of incomplete remedial actions;
- Future decontamination and decommissioning (D&D) of nuclear facilities or remediation of currently operational waste management units;
- Remediation of newly discovered contamination not currently subsumed under the EM Program;
- Repair or upgrade to existing remedial systems;
- Upgrade or replacement of remedial systems resulting from the imposition of new requirements or more restrictive remediation objectives; and
- Final closeout of operating remedial actions.

One of the most important considerations at all three facilities was integration of the LTS requirements into existing organizations and management systems. Since these facilities will remain in operation after remediation construction is complete, it was assumed that LTS requirements will be integrated into existing ongoing organizations that are already responsible

for similar environmental stewardship operations. Likewise, the LTS Implementation Plans were developed such that they could be integrated into existing or planned management systems, such as the International Standards Organization (ISO) 14001-compliant environmental management system (EMS) that BNL has had in place for several years. However, integrating LTS activities in a way that will ensure sufficient visibility, management attention, funding and long-term stability was found to be a major concern.

During the pilot study, it was discovered that the requirements for transferring the LTS Program from EM to the landlord can best be addressed by generating more than one type of written plan. At two sites, a separate transition plan was proposed that would define the process of transferring the LTS responsibilities from EM to the landlord. At the third site, such information was assumed to reside in a Memorandum of Agreement (MOA) rather than a separate plan. The technical and administrative elements of the LTS Program would then be described in the LTS Implementation Plans.

The three sites developed different structures for their draft LTS Implementation Plans. These structures ranged from a relatively simple written plan for ANL-W that summarizes LTS Program requirements and describes how ongoing Comprehensive Environmental Responses, Compensation, and Liability Act (CERCLA) requirements satisfy the majority of these requirements, to a relatively complex Internet-based electronic document for ANL-E that integrates numerous existing project documents and historical records rather than generating a new written plan. A separate program management plan was proposed for ANL-E that would describe internal administrative, organizational, and financial aspects of the LTS Program. The BNL outline described its LTS Implementation Plan as a more extensive written plan than that of ANL-W, but one that would contain only summary-level information. Detailed information would be incorporated into the plan by referring to specific project documents.

Each site completed a Gap Analysis, identifying instances where required information is incomplete or does not yet exist, or where needed decisions have not yet been made. Some examples of common gaps include:

- DOE policy and requirements for a LTS Program have not yet been finalized, leading to confusion and reluctance to proceed with LTS planning;
- The source and amount of funding that will be made available for LTS activities are not yet known;
- The site landlords have not yet become engaged in the process of planning for LTS activities, thus limiting input from that critical group;
- Existing historic information focuses mainly on the remedial actions put in place and to a lesser degree on the condition of the units following completion of remedial actions, thus existing documents may not satisfy all of the LTS information requirements;
- Organizational responsibility for developing the necessary LTS plans, transition plans, and baseline documents, and implementing these plans, has not yet been assigned, making the description of the LTS Program difficult.

Opportunities for reducing the long-term cost of the LTS Program (mortgage reduction) were also investigated at ANL-E and BNL. Some of the ideas examined and discussed included:

- Integration of the routine site environmental surveillance program with the environmental restoration environmental monitoring program;
- Utilizing the data quality objective (DQO) process to refine long-term monitoring objectives and program requirements;
- Streamlining regulatory report preparation;
- Improving management of information related to land use control using a Web-based information management system;
- Reassessing information needs and information management tools to optimize information management; and
- Utilizing appropriate real-time sensors and automated data collection systems to improve data collection and reduce cost.

On the basis of information developed for the site-specific requirements documents and the annotated outlines, draft LTS Implementation Plans were prepared for ANL-E and ANL-W. Because BNL will not complete remedial actions for several more years, the preparation of the LTS Implementation Plan for this site was deferred. These LTS Plans address three main elements critical to a smooth transition and program initiation: transition planning, LTS program structure and management, and information management.

TRANSITION PLANS

The transition plans discuss the work scope being transferred and the process of transferring responsibility from EM to the landlord. In the case of ANL-W, the transition of the entire EM program to NE, the site landlord, was expected in late FY 2002 or FY 2003. This anticipated transfer would involve several units where remedial actions had not yet been initiated. Thus, one of the major issues in the ANL-W Plan is completion of ongoing remedial actions that are not expected to be complete at the time the program transfers to NE. In effect, the ANL-W transfer involves two separate programs; one is the continuation of ongoing remedial construction until the actions are fully implemented, and the other consists of LTS activities of completed actions (long-term monitoring, O&M, and information management).

At ANL-E, the transfer is assumed to occur after all planned remedial construction is complete in late 2003 or 2004; however, three incomplete D&D projects, which were temporarily halted in early 2002, are also discussed in the transfer plan. The responsibility for completing these three projects is an important part of the plan.

Dealing with unfinished remediation work, as well as known or probable future remediation or D&D work, was one of the most difficult issues to address in planning the LTS Program. The roles, responsibilities, financial resources, personnel requirements, and other factors are very different for remedial construction or D&D work in comparison to long-term monitoring and O&M. In addition, anticipated funding levels for the LTS Program may not be sufficient to permit significant amounts of D&D or remediation work.

Both the ANL-E and ANL-W transfer plans provide schedules for the transition and a list of circumstances that could lead to the renegotiation of the transfer agreement, termed renegotiation

triggers. Both plans also contain a set of transfer criteria that must be met before individual sites will be accepted into the LTS Program by the landlord. Examples of these criteria are:

- All planned remedial action construction must be complete (with the definition of "complete" carefully crafted) and the work approved by the regulatory agency;
- Remedies must be operating successfully with enough operating experience to allow for accurate estimates of operating costs;
- Full, up-to-date documentation of completed actions and site conditions following completion of construction and restoration of the site needs to be available to the landlord;
- Full documentation of O&M and environmental monitoring plans, schedules, procedures, and costs needs to be made available to the landlord;
- Institutional controls, including land use restrictions, access controls, warning signs, modification of real estate records, agreement with effected off-site land owners, etc. need to be in place;
- Sufficient funding needs to be identified for completing ongoing remedial actions and conducting required O&M, monitoring, and information management; and
- Contingency planning needs to be completed.

LTS IMPLEMENTATION PLANS

The two LTS Implementation Plans reflect different approaches to LTS planning. Because the ANL-W LTS Program is relatively small, the required information to implement it was included in a single conventional paper plan. This plan describes both the ongoing and planned remedial actions as well as the LTS work elements of institutional control, O&M, surveillance and maintenance, and information management. The information included is summary-level, with references made to project reports with detailed information. It also includes summary-level cost information and elements of program management planning. It is a single self-contained plan that covers the basic information for the entire LTS Program. The draft version did not contain a baseline for the program, however.

In contrast, the ANL-E Implementation Plan consisted of three interrelated but separate documents, a Program Management Plan, a Baseline for the LTS Program, and an Internet-based information management system. These documents were prepared for different purposes, thus allowing each one to be designed in a way that maximizes the effectiveness of each component. The primary tool for establishing and managing the program is the Program Management Plan, which describes the scope and management structure of the program, and the roles and responsibilities of the various parties involved in the program. It describes the program organization, the Work Breakdown Structure (WBS), the change control process, and other elements of effective program management. The Baseline is an appendix to the Program Management Plan. These documents are expected to be the primary tools DOE uses to fund and oversee the program. The baseline was constructed similarly to the current EM Baseline and, in many respects, represents a continuation of that Baseline. It includes descriptions of the technical scope of each WBS element (contained in a WBS Dictionary) and two schedules and associated

cost plans; one for a five-year planning window and a less detailed life cycle schedule and cost plan based on assumed durations and expected treatment performance. The cost estimate was a preliminary bottoms-up estimate based on current O&M and environmental monitoring procedures and costs. Some cost elements had not yet been estimated, thus the draft Baseline cost estimate is not yet complete.

The most unique part of the ANL-E Implementation Plan is the information management system. This system, for which only the preliminary design was begun, is envisioned as an electronic document that would be an integrated source of all pertinent information about the LTS sites. It would provide instant access to summary level information about each LTS site and former nuclear facility and electronic access to many key project documents that contain detailed information. When fully functional, it would provide access to recent and historic environmental monitoring data and performance data generated by the monitoring program. The site would be linked with the sitewide environmental monitoring program as well. It would be Internet and Intranet accessible and would be used by on-site and off-site stakeholders to monitor the progress or remedial actions and to identify any ongoing use or disposal restrictions associated with closed sites. It is envisioned as a publicly available Web site; however, security concerns may result in the generation of two sites, one designed for ANL-E Intranet use only and one that is publicly available. It would be designed as a robust system that is easily upgraded as information technology changes in the future and modified to suit the needs of the program.

These two different approaches to the LTS Implementation Plan illustrate the site-specific nature of the LTS Program and the variety of ways in which LTS requirements can be met. Each facility transitioning into the LTS phase will need to identify the most suitable and effective program, given the magnitude of the effort and the nature of the LTS requirements at each site.

PILOT STUDY CONCLUSIONS AND LESSONS LEARNED

The generation of these planning documents resulted in a number of observations pertaining to developing an LTS Program that are applicable across the DOE complex, particularly for smaller sites with an ongoing mission after cleanup is complete. Some of the more significant observations and lessons learned include the following.

- In many cases, the transition of the cleanup program from EM to the landlord and moving from remediation construction to LTS will not be a simple process. In some cases, sites that have moved into the long-term stewardship phase will still require additional remedial construction. For example, in the future, an existing remedial action may require construction of additional phases of the remedial technology, such as deployment of phytoremediation after active treatment of a source area is complete. Many remedial actions will require periodic performance assessments that could result in significant upgrades to the existing system. Many facilities that are currently in use will require decontamination and remediation when they are no longer needed. Areas with legacy contamination could still be discovered, which would require new remedial actions. Active remedial actions will need to be closed after the remedial objectives have been met. Such nonroutine elements could be more costly and difficult to deal with than the actual routine LTS requirements such as long-term monitoring and information management. Careful planning for these ongoing or future remedial actions is needed.

The assignment of responsibility for funding and managing these future actions will be critical to ensuring a smooth transition.

- The LTS Program for most sites will be a dynamic program that will change in nature and substance as sites complete ongoing remedial actions, currently active facilities are decommissioned, and contaminated facilities are demolished. As a result, the Baselines will be characterized by a high degree of uncertainty. To manage this uncertainty, detailed planning and cost estimating should be limited to a reasonable window of time when the technical scope and cost can be reliably estimated. A planning window of five years was recommended in the pilot study. Each year the planning window will advance one year, and the detailed schedules and cost estimates will be revised. With this approach, only events expected to occur within the planning window will be examined in detail. A long-term schedule and cost plan may also be needed for long-term budgeting purposes.
- The early and effective involvement of EM top management, the site landlord, and the site operating contractor is critical to the success of the transfer and to establishing a viable LTS Program. All parties to the transition need to participate in advanced planning and the negotiation of future roles and responsibilities.
- Early identification of an appropriate organizational structure and management approach, in keeping with the magnitude of LTS activities, is critical to the success of the transition. The LTS Program is unique in that it must remain in place for a very long time; indefinitely in cases where persistent chemical or radioactive materials are involved. The structure should be one that encourages the long-term viability and stability of the LTS Program. Integration of LTS functions into other similar environmental stewardship activities, wherever possible, would enhance the cost effectiveness and long-term viability of the LTS Program.
- Managing the large amount of information generated during the remediation phase, in a way that will make it easily available for many decades into the future, is a critical part of the LTS Program. The information needs, both now and in the future, should to be carefully assessed and a robust information management system developed. Means of ensuring that the necessary information is available and easily accessed for many years in the future is important. Redundant management systems, such as electronic copies of documents backed up by at least two full sets of project documents in separate libraries, will be needed. Information management tools, such as specifically designed Web sites, should be considered; however, the long-term cost of maintaining the Web site should be taken into consideration.
- Even when a site has met its cleanup objectives and has been declared “clean,” ongoing stewardship requirements remain, including proper management of residual materials generated by excavation of soil from a closed waste site or demolition of a former D&D facility. Such materials may need to be managed as wastes rather than normal soil because of the presence of low levels of waste or residual contamination. Future use of land where remedial actions have been completed may need to be controlled so that engineered barriers or remedial systems are protected and usage of the land remains consistent with the assumptions used to develop the remedial objectives. Of particular concern is the transfer of property from the federal government to another future landowner who might not appreciate the need for proper land use controls. All necessary

legal vehicles, such as deed restrictions or easements needed to prevent unauthorized uses of the land, should be in place prior to transferring the property.

- Many opportunities exist for reducing the cost of LTS activities, including integrating LTS monitoring activities into other environmental monitoring programs, optimizing groundwater monitoring activities, utilizing Internet-based information management tools, and integration of LTS planning documents into existing management tools such as the site's EMS. Because of the length of time LTS will be required, attention to reducing the annual cost of the program will yield significant reductions in the life cycle cost of this program.
- Until DOE decides upon final direction regarding LTS and issues guidance and formal directives, and until the issue of funding is resolved, the final scope and structure of the LTS Programs will not be known. Funding limitations could force a reduction in the scope of some of the LTS elements discussed in the pilot study, particularly regarding voluntary elements such as Internet-based information management tools and voluntary periodic performance assessments.

The DOE-CH pilot study was a valuable exercise in advanced planning that yielded results that should be beneficial to many DOE facilities nearing the completion of the active remediation phase of their cleanup program. It is anticipated that the draft plans developed will be revised as DOE policy evolves, the site landlords become more involved in the LTS planning process, stewardship requirements and funding levels are more clearly understood, and efforts to integrate LTS requirements into existing organizational entities progress.

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