DEVELOPING THE REPORT TO CONGRESS ON LONG-TERM STEWARDSHIP

Lessons Learned and Recommendations for Future Planning

FINAL DRAFT – June 19, 2001

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I. INTRODUCTION AND BACKGROUND

In January 2001, the U.S. Department of Energy (DOE) published *A Report to Congress on Long-Term Stewardship*, containing the most comprehensive analysis to date of DOE's existing and anticipated long-term stewardship obligations at DOE sites. The request for this report in the *FY2000 National Defense Authorization Act* (NDAA) reflects a continuing Congressional interest in long-term stewardship costs and management and in demonstrating the degree of success achieved by nearly $60 billion of environmental management funding. In particular, Congress requested that the Secretary of Energy identify existing and anticipated long-term environmental stewardship responsibilities for those DOE sites or portions of sites for which environmental restoration, waste disposal, and facility stabilization are expected to be completed by the end of 2006.

The Report to Congress identifies the long-term stewardship activities anticipated by DOE at as many as 129 sites by the year 2006. DOE already performs long-term stewardship activities at 34 sites that have been cleaned up and closed. While the primary focus of the report is on the anticipated scope, schedules, and costs for long-term stewardship activities from now through the year 2006, the report also provides a preliminary glimpse of what DOE's long-term stewardship obligations may be post 2006. The report contains a complex-wide analysis (Volume I), as well as site-specific analyses (Volume II).

Definition of Long-term Stewardship

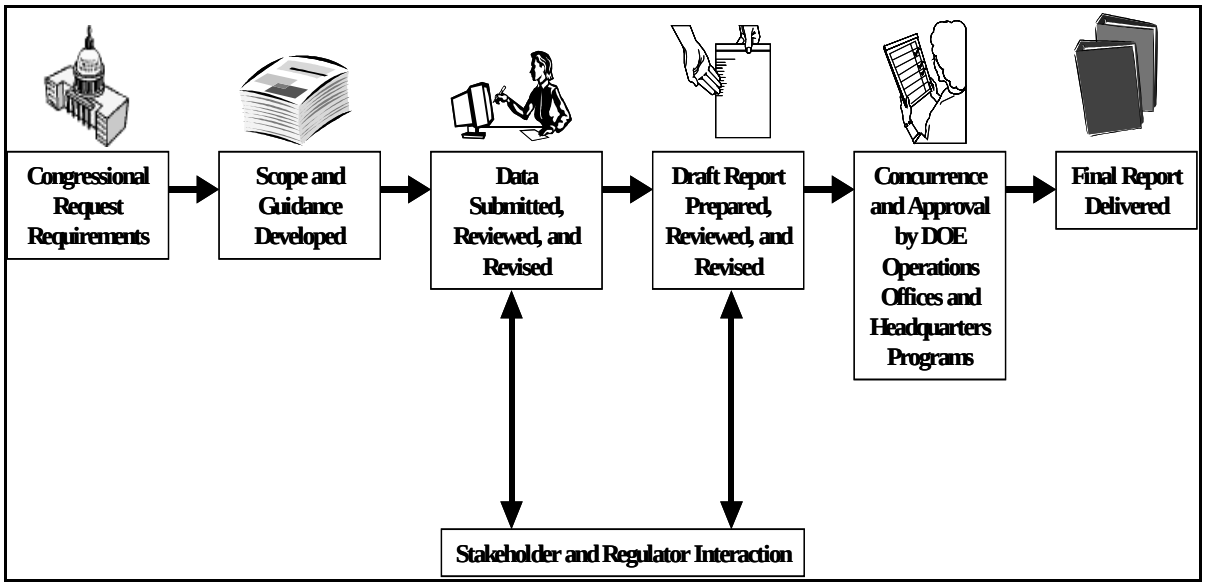
As identified in the Report to Congress, "long-term stewardship" refers to all activities necessary to ensure protection of human health and the environment following completion of cleanup, disposal, or stabilization at a site or a portion of a site. Long-term stewardship includes all engineered and institutional controls designed to contain or to prevent exposure to residual contamination and waste, such as surveillance activities, record-keeping activities, inspections, groundwater monitoring, ongoing pump and treat activities, cap repair, maintenance of entombed buildings or facilities, maintenance of other barriers and containment structures, access control, and posting signs.

The report was developed by the Office of Long-term Stewardship (EM-51) and is based on information provided by Field personnel at all DOE sites, as well as other sites where DOE could ultimately become the long-term steward. (Figure 1 identifies the methodology for preparing the report.) The report also builds upon initial long-term stewardship information contained in previous EM reports (e.g., *Baseline Environmental Management Reports* and *From Cleanup to Stewardship – A Companion Report to Accelerating Cleanup: Paths to Closure and Background Information to Support the Scoping Process Required for the 1998 PEIS Settlement Study*).

In addition to meeting a Congressional requirement, the Report to Congress begins to establish a baseline for more detailed planning for long-term stewardship throughout the DOE complex. Although long-term stewardship is already being implemented at sites managed by DOE's Grand Junction Office and at a few portions of the larger DOE sites and national laboratories, much of DOE's focus at sites is the completion of environmental cleanup and closure of facilities. The level of understanding of DOE's long-term stewardship obligations following site cleanup and closure is still evolving at many DOE sites, particularly those sites that do not yet have final end-states defined. Thus, DOE recognizes the need for more detailed and comprehensive planning and the need to incorporate long-term stewardship planning into end-state decisions.

With completion of the Report to Congress, DOE is now proceeding with more detailed planning so that: (1) all sites have a mature level of understanding of long-term stewardship requirements; (2) all sites will have detailed long-term stewardship plans in place; (3) all sites will have a basis for requesting long-term stewardship funding; (4) long-term stewardship roles and responsibilities will be clearly defined; and (5) implementation of long-term stewardship will be applied using consistent guidance and approaches.

Figure 1. General Methodology for Preparing the Report to Congress



The purpose of this follow-on report is to clarify and document lessons learned during the development of the Report to Congress that can be applied to future planning and management of long-term stewardship. Section II of this report provides an overview of the lessons learned, and Section III provides a discussion of each lesson learned, along with recommendations. In this document, the lessons learned are discussed in terms of areas of confusion among sites or lack of specific guidance or information that likely impacted the ability to compile complete long-term stewardship information for all sites for the Report to Congress -- and that could negatively impact the long-term stewardship program and future long-term stewardship planning efforts if not resolved. Following the discussion of the issues, this document provides recommendations for DOE to pursue in order to provide more specific guidance and direction to the Field in preparing for long-term stewardship.

II. OVERVIEW OF LESSONS LEARNED

The process of collecting and analyzing data from each site and compiling the Report to Congress offered valuable experience and insights that will shape further long-term stewardship planning. First, it is evident that long-term stewardship is becoming more institutionalized and is receiving higher priority within each Field office and at Headquarters than in previous years. Many sites now have organizational entities or individuals responsible for long-term stewardship, and a Field/Headquarters relationship has been established for more detailed planning and implementation.

Second, the process resulted in a comprehensive set of long-term stewardship planning information for the DOE complex (although some sites have more detailed information than others). The information contained in the Report to Congress provides a baseline for more detailed plans and implementation and helped identify areas where more attention needs to be focused.

Third, the process heightened DOE's awareness of potential areas of confusion among sites in addressing long-term stewardship. During development of the Report to Congress, it became apparent that some sites

had differing interpretations of what constituted long-term stewardship activities versus remediation activities, differing approaches to planning and budgeting for long-term stewardship, and other differences in approaching long-term stewardship planning. While some flexibility in planning should be maintained due to unique circumstances of different sites, these inconsistencies and differing approaches among sites made it difficult to collect and analyze data systematically (equalized across the complex) and provide accurate estimates of long-term stewardship scope, schedules, and costs. In addition, there were several questions posed by individual sites during development of the Report to Congress that, while addressed on a site-specific basis at the time, may be of value to address in future planning guidance to the Field. These potential areas of confusion (differing interpretations, differing approaches, and certain questions posed by sites) have been translated into lessons learned and are the subject of this report.

Lessons Learned

The key lessons learned during preparation of the Report to Congress are highlighted below and are discussed in more detail in Section III. They are stated in terms of the problem and what needs to be addressed by DOE as part of future guidance and direction in preparing for long-term stewardship.

- **Lack of a consistent definition of the scope of long-term stewardship** – the need to develop a consistent definition of what activities are within the scope of long-term stewardship versus activities supporting continued missions or site cleanup (to address differing interpretations among sites).

- **Lack of consistent management and planning structures for long-term stewardship** – the need to develop a management structure for managing and planning long-term stewardship activities for all sites and to develop metrics so that performance and progress can be measured.

- **Limitations in estimating costs for long-term stewardship** – the need to develop consistent approaches in itemizing site long-term stewardship activities (dependent on a consistent definition of long-term stewardship), incorporate contingency and uncertainty planning in cost estimates, and develop a single model for estimating future long-term stewardship costs at all sites.

- **Lack of site-specific long-term stewardship plans** – the need to address the varying levels of long-term stewardship planning (scope, schedules and costs) that currently exist among sites through development of Long-term Stewardship Plans for all sites;

- **Inability to break through program barriers among the DOE Program Secretarial Officers** – the need to identify where there are uncertainties/disagreements among Program Secretarial Officers regarding ultimate responsibility for long-term stewardship and to initiate dialogue to determine ultimate responsibility.

- **Lack of integration between technology and long-term stewardship** – the need to identify technology needs as part of the detailed planning process for long-term stewardship and to foster better communication between DOE's science and technology program and personnel responsible for long-term stewardship.

- **Incomplete and varying levels of record-keeping for long-term stewardship** – the need to develop consistent approaches among sites for collecting, cataloguing, storing, and making accessible records pertaining to long-term stewardship activities.

- **Incomplete information on "No Further Action" sites (NFAs)** – the need to collect more descriptive and comprehensive information on NFAs in order to discern long-term stewardship

responsibilities and activities for those sites. Almost no information is currently available regarding NFAs. NFAs include areas where no further cleanup will be conducted for various reasons.

- **Lack of process for transferring sites into, out of, and within DOE for long-term stewardship responsibility** – the need to develop an approach for identifying and tracking potential transfer sites and to develop consistent protocols (criteria and guidance) for site transfers.

III. LESSONS LEARNED DISCUSSION AND RECOMMENDATIONS

A. Lack of a Consistent Definition of the Scope of Long-term Stewardship

Discussion

DOE began in 1996 to analyze the potential long-term stewardship activities at its sites. Since that time, the definition of what those long-term stewardship activities include has changed numerous times (depending on the reporting needs at the time). This lack of consistency in the definition of long-term stewardship has caused difficulties for Headquarters and Field staff attempting to describe the Long-term Stewardship Program and to collect data to support management decisions regarding the program. Whereas this inconsistency may have little impact on a site-specific basis (i.e., sites will be conducting these activities regardless of what they are called), without a consistent definition of activities included in long-term stewardship, program-wide analyses of long-term stewardship scope, schedules, and costs cannot be successfully completed.

This issue became readily apparent during the data collection and analysis efforts for the Report to Congress, where the understanding of the definition of long-term stewardship was often inconsistent and unclear. Although a top-level definition of long-term stewardship exists (provided in the Report to Congress and repeated in text box on page 1), it was evident that different sites interpreted differently what activities should be included in long-term stewardship. The lack of a consistent definition, or interpretation, prohibited an accurate account of long-term stewardship scope, schedules, and costs on both the site-specific and a complex-wide basis.

There are three main concepts of long-term stewardship that need to be agreed upon and further clarified by DOE Headquarters and Field staff, regulators, and stakeholders:

1. Residual contamination and wastes exist onsite that, because of their presence, will prohibit unrestricted use of the site;

2. Site remediation activities have been completed per regulatory requirements; and

3. Long-term stewardship activities are initiated upon completion of cleanup activities.

Each of these three concepts presented some confusion or uncertainty in interpretation among some sites and should be addressed in guidance for future planning efforts. Using selected examples, the paragraphs below elaborate on the three concepts and potential areas of confusion.

Presence of Residual Contamination or Wastes Prohibiting "Unrestricted Use"

According to the definition of long-term stewardship used in the Report to Congress (reprinted on page 1), the activities considered within the scope of long-term stewardship are those activities required because residual contamination or wastes remain onsite following completion of cleanup, and, as such, the sites will not be suitable for unrestricted use from a cleanup standpoint. These activities include all engineered and institutional controls designed to contain or prevent exposure to residual contamination and waste.

The link between what should be considered long-term stewardship and what should be considered other activities becomes difficult to distinguish in some instances, particularly where activities similar to those conducted for long-term stewardship are conducted at sites for reasons other than to protect human health and the environment from the residual contamination. For example, access restrictions to sites with ongoing defense missions may be driven by national security issues rather than residual contamination at the site (i.e., regardless of existence of contamination, the security will still be required). Because these activities are not associated with residual contamination, these activities were not considered within the scope of long-term stewardship.

Other sites have land use restrictions in place because of areas with archeological significance. While these areas have cultural value and, consequently, are important components of land use planning, they are often not residually contaminated. The land use controls are prompted by reasons other than environmental contamination. Therefore, these activities also should not be considered part of DOE long-term stewardship activities. During development of the Report to Congress, some sites questioned whether or not to include these activities within the scope of their long-term stewardship reporting.

Site Remediation Activities Have Been Completed per Regulatory Requirements

Because the Report to Congress represents one of the first efforts to identify sites' "portions" (geographically distinct areas) that are or will be in long-term stewardship, the idea that a site can conduct long-term stewardship in one area while remediating another is a relatively new concept. A narrow interpretation of long-term stewardship would mean that a site is only involved in long-term stewardship activities once site-wide cleanup is completed. In fact, for a single-portion site (e.g., UMTRCA disposal cell) this is the case. However, at most DOE sites long-term stewardship will be a phased approach (i.e., as portions of a site are complete, they can be transitioned). For instance, one portion of a site may contain a waste disposal lagoon. Once remediation is complete and the area is capped, long-term stewardship activities begin, such as monitoring and maintaining the selected remedy. However, the remainder of the site is in various phases of the remedial process. For instance, one site initially reported that there were no long-term stewardship activities occurring at the site prior to 2006. However, once site personnel were interviewed, several long-term stewardship activities were identified within discrete portions of the site that had been occurring for some time. In many cases, sites had not clearly identified areas where long-term stewardship activities were occurring because remediation was taking place in other areas of the site. Similarly, the distinction can be made for different media at a site. In some cases, soil contamination has been remediated but more complex groundwater characterization is ongoing.

Some sites interpreted the definition of long-term stewardship as only including those activities related to final remedies. However, as mentioned in the Report to Congress, long-term stewardship includes all activities necessary to ensure protection of human health and the environment following completion of cleanup, disposal, or stabilization at a site or a portion of a site. Stabilizing a site or a portion of a site can include an interim remedy, such as an interim cap. Consequently, maintaining the protectiveness of an interim remedy should be considered a long-term stewardship activity. For instance, maintaining and repairing interim caps for the material disposal areas is considered a long-term stewardship activity. After

an extended period of time interim caps will be replaced by a final cap; however, the long-term stewardship activities will then be associated with this final remedy.

Long-term Stewardship Activities are Initiated Upon Completion of Cleanup Activities

Related to the transition between ongoing remediation and long-term stewardship is the element of timing -- meaning, "when does long-term stewardship begin?" Since long-term stewardship is the final phase of the environmental restoration process, one of the most problematic aspects of defining long-term stewardship is determining when an activity transitions from a cleanup activity to a long-term stewardship activity. Long-term stewardship is distinguished from other site activities because of the regularity and longevity of activities. As noted during the data collection effort, several long-term stewardship activities have the appearance of being maintenance or remediation activities. Better stated, long-term stewardship activities are all activities required after remediation is complete. Because of the nature of the remedies, long-term stewardship activities will often be required for a very long time.

During the development of the Report to Congress, many sites were uncertain as to when cleanup activities transitioned into long-term stewardship activities. In some instances the distinction is clear, such as when a facility is decontaminated and decommissioned yet has some residual contamination. Long-term stewardship activities, such as maintaining a fence around the residual contamination, begin after decontamination and decommissioning is complete. In other instances, the distinction between cleanup completion and the beginning of long-term stewardship was less clear. For example, many sites have selected pump and treat as the remedial action for groundwater contamination. Pump and treat consists of a system that extracts groundwater and removes contaminating substances before returning the water or disposing of it elsewhere. The pump-and-treat system does remediate contaminated groundwater. However, the system can often be in place for significant periods of time, e.g., 10-20 years or more. Therefore, once a pump-and-treat remedy is selected and put in place, it could be considered a long-term stewardship activity.

Recommendations

Based on some differing interpretations and confusion regarding the definition of long-term stewardship that became apparent during development of the Report to Congress (i.e., during data collection and analysis), and in order to successfully report and track progress, it is clear that a single agreed-upon definition of the scope of long-term stewardship activities is needed. This definition needs to include a description of what activities comprise long-term stewardship, as well as clearly defined points of transition from cleanup completion to long-term stewardship (i.e., start date). After long-term stewardship activities are completely defined and understood, then the Field and Headquarters can consistently measure the performance of long-term stewardship activities and report progress. By clearly defining long-term stewardship activities, planning for scope, schedules, and costs will be vastly improved.

B. Lack of Consistent Management and Planning Structures for Long-term Stewardship

Discussion

One issue in developing a management and planning structure for long-term stewardship is developing a management structure for evaluating long-term stewardship activities. Prior to developing the Report to Congress, the vast majority of DOE sites tracked and managed their long-term stewardship activities for the entire geographic site (e.g., Cheney Disposal Cell, Argonne National Laboratory-East, Pantex Plant). However, Congress mandated that the Report to Congress identify not only "sites" but also "portions of sites" where DOE anticipates to have long-term stewardship responsibilities by 2006 (see text box below). Defining portions of sites represented a major effort to identify long-term stewardship activities on a geographical basis within a site. Although many sites were able to divide their long-term stewardship activities into meaningful geographically-based units for the Report to Congress (where such activities were formerly tracked and managed at the site level), other sites were not able to define their activities below the site level because they do not track or manage according to that level of detail.

Congressional Request

"The conferees direct the Secretary of Energy to provide to the Armed Services Committees of the Senate and House of Representatives, not later than October 1, 2000, a Report on existing and anticipated long-term environmental stewardship responsibilities for those Department of Energy (DOE) sites or portions of sites for which environmental restoration, waste disposal, and facility stabilization is expected to be completed by the end of calendar year 2006..."

- *excerpt from Conference Report on S.1059, National Defense Authorization Act for Fiscal Year 2000, Congressional Record, August 5,1999).*

Another management and planning issue that became apparent during development of the Report to Congress is the lack of performance metrics for long-term stewardship. The Report to Congress summarized a variety of information related to long-term stewardship, but no single variable adequately allows for an assessment of progress. Without performance metrics, it is difficult for DOE to measure progress of the long-term stewardship program, adjust plans to improve performance, or communicate successes of the program.

The following discussion will focus on the two issues identified above: the need to develop a management structure for managing and planning long-term stewardship activities for all sites and the need to develop performance metrics so that performance and progress can be tracked and evaluated to demonstrate accountability.

Need to develop a management/planning structure for long-term stewardship activities:

Guidance to the Field for developing the Report to Congress attempted to standardize the definition of a "portion" of a site by utilizing a geographic reference (see the following text box). However, the current management and planning structure for sites is based on projects or existing site activities (e.g., remediation). For some sites, this management and planning structure is geographically based and is appropriate for long-term stewardship management and planning. Other sites define portions based on existing remediation projects, which did not fit the prescribed definition for a portion of a site. Some of the significant challenges

Definition of a Site Portion

A geographically contiguous and distinct area for which cleanup, disposal, or stabilization has been completed or is expected to be completed by approximately the end of calendar year 2006 and where residual contamination remains. A portion may involve any or all of the following media: soil, groundwater, surface water/sediment, a facility, or an engineered unit. A portion can also be an aggregate of a number of facilities, soil sites, or engineered units that meet the following criteria: (1) all have similar contaminants; (2) they are closely located; and (3) all require similar long-term stewardship activities.

- *Guidance for the Development of the FY 2000 National Defense Authorization Act (NDAA) Long-Term Stewardship Repor*t, January 24, 2000.

encountered during the definition of portions were the project baseline summary (PBS) structure, corrective action unit organization, and surface/subsurface distinction. These existing structures support the cleanup program well. However, these may not be the best structures to support long-term stewardship scope, cost, and schedule. For example, when defined areas are too large and have different residual contamination and associated long-term stewardship activities, smaller more geographically-specific portions would provide the ability to track specific activities to these portions. Otherwise, the information gets rolled up into a level that does not provide enough detail.

There are several advantages to creating a specific geographic basis for planning and managing long-term stewardship. Associating specific long-term stewardship activities with distinct portions of sites could be represented in a site's Geographic Information System (GIS). Using GIS to identify and track portions of a site in long-term stewardship would contribute to a better baseline for long-term stewardship planning and management. Furthermore, creating long-term stewardship-based information in a GIS system would afford visual and quantitative data for more credible reporting to regulators, stakeholders, and Congress. Being able to associate long-term stewardship activities with specific portions of the site would also enable the sites to more easily communicate cleanup progress and long-term stewardship responsibility.

Creating Performance Metrics for Managing and Planning Long-term Stewardship Activities

The Report to Congress summarized several statistics related to long-term stewardship (e.g., acreage, cost, number of sites). However, no single category of information provided an adequate assessment of long-term stewardship progress. The focus has been on reporting the status of long-term stewardship and the progress of the cleanup program. The current method for sites to report long-term stewardship information (i.e., that used for developing the Report to Congress) helps to identify the scope of long-term stewardship by providing snapshots of information, but it does not display dynamic information and, consequently, does a poor job of reflecting program progress. For example, an increase in acreage is not really a measurement of site-specific progress related to long-term stewardship, but merely an indication of the transition from cleanup to long-term stewardship. Attention is needed in developing performance metrics that can be used to measure site-specific progress and, therefore, measure long-term stewardship program performance over time.

Recommendations

Sites should develop a management/planning structure, preferably a geographically-based framework, for managing and planning for long-term stewardship with the goal of associating long-term stewardship activities with specific portions of the site. Creating a geographic reference will allow for more specific and illustrative reporting tools (e.g., GIS) for long-term stewardship. Some of the geographical portions that were defined during the Report to Congress are not effective for long-term stewardship management because they

are extremely large and contain areas that are very distinct from one another (i.e., within one portion there are several areas that have different types of residual contamination and predicted long-term stewardship activities). The portions need to be defined to show differences in forecasting long-term stewardship activities. Because each site has unique areas of residual contamination and associated long-term stewardship activities, guidelines for defining portions will have to be flexible and should attempt to maximize the use of existing organizational structures (e.g., Records of Decision), if they are reasonable matches to the definition of a portion of a site.

Creating performance metrics for long-term stewardship will require careful consideration of the nature of long-term care. For example, the most effective measure of progress may not be static information, such as annual cost or acreage, but rather trend analysis of data. To illustrate the maturity of long-term stewardship at a site, information displaying cost stability for a number of years could be an indication of a developed and proven set of long-term stewardship activities for a specific site. A subset of the long-term stewardship working group could serve as a starting point for gathering Field input for useful metrics. Both portion definitions and performance metrics are being considered in the site specific long-term stewardship plan guidance.

C. Limitations in Estimating Cost for Long-term Stewardship

Discussion

During the development of the Report to Congress, DOE attempted to quantify current and estimated future expenditures for long-term stewardship activities at its sites. DOE found that there were several limitations that prevented an accurate, consistent, and comprehensive analysis of the Department's long-term stewardship costs.

The Department identified four cost data limitations, each of which is described in the paragraphs below. These limitations should be addressed by DOE Headquarters and Field staff for the Department to make accurate estimates of its current and future long-term stewardship cost obligations:

- Identifying activities within the scope of long-term stewardship;
- Itemizing site costs by long-term stewardship activity;
- Including contingency costs in long-term stewardship cost estimates; and
- Applying a universally accepted cost model.

Identifying Activities Within the Scope of Long-term Stewardship

Currently, there is no clear guidance from Headquarters on the scope of long-term stewardship activities (see also discussion in Section III.A on defining long-term stewardship). Consequently, activities viewed as long-term stewardship activities vary from site to site, which impacts the ability to project costs for long-term stewardship on a complex-wide basis. For example, the cost data submitted for the Report to Congress for one site did not include long-term stewardship costs for maintaining the industrial land-use designation for residually contaminated soils. The site considered this function as part of maintaining the facility itself and not a long-term stewardship activity. However, at many other sites, maintaining the industrial land-use designation is considered a long-term stewardship activity and is, therefore, captured in the sites' cost estimates.

As described in the definition of long-term stewardship used in the Report to Congress, activities considered within the scope of long-term stewardship are those activities required because residual contamination or wastes remain onsite. Those activities include enforcing all engineered and institutional controls that are designed to contain or prevent exposure to residual contamination and waste. Long-term stewardship activities can begin at portions of a site, well before the entire site is closed, and include all activities necessary to ensure protection of human health and the environment following completion of cleanup, disposal, or stabilization at a site or a portion of a site -- even maintaining the protectiveness of an interim remedy. Initially, data submitted for several sites were predicated on long-term stewardship activities beginning at the site after all cleanup activities were completed. However, at some of these sites, cleanup activities at some portions of the site are expected to end several years before other portions of the site. At thirteen of these sites (e.g., Monument Valley, AZ, and Project Shoal, NV), a distinction was made for surface versus subsurface cleanup activities. For many of these sites, long-term stewardship activities are scheduled to begin for the surface up to ten years before the start of subsurface long-term stewardship.

During the development of the Report to Congress, many sites were uncertain as to when cleanup activities transitioned into long-term stewardship activities. In some cases, the distinction is clear, but in other situations, the distinction between cleanup activities and long-term stewardship activities is less clear. For example, many sites have selected pump and treat as the remedial action for groundwater contamination. However, these systems could be considered a long-term stewardship activity once they are installed and can be demonstrated to be performing as designed. If the scope of long-term stewardship is defined more narrowly so that long-term stewardship activities are not considered to begin until after site-wide cleanup is completed, or so that certain activities are excluded from the scope of long-term stewardship, then the true long-term stewardship costs will be underestimated. For example, one site did not include most of the site's groundwater treatment activities (e.g., pump and treat) in its long-term stewardship cost estimate because the site considers these as "interim" remedies and, therefore, not a long-term stewardship activity. However, other sites did include groundwater treatment activities as long-term stewardship activities, thus resulting in inconsistencies among sites in comparing costs.

Itemizing Site Costs by Long-term Stewardship Activity

Currently, DOE requirements for site cost data lack the specificity to track costs by long-term stewardship activity. Given the early stages of long-term stewardship planning at many sites, detailed cost estimates are not expected. The ability to itemize costs by long-term stewardship activity is important because the itemized costs allow DOE to: 1) determine the primary cost drivers at the site, Field, and Department levels; 2) focus its science and technology investments on increasing the efficiency of those activities that have the largest current costs or largest anticipated costs over time; and 3) increase the effectiveness of long-term stewardship planning for those sites at which long-term stewardship activities have not yet begun, as well as the effectiveness of overall program management.

Including Contingency Costs in Long-term Stewardship Cost Estimates

A majority of the sites did not include contingencies in their long-term stewardship cost estimates. Contingency costs include the replacement or repair of engineered controls, such as caps and groundwater monitoring wells, once failure has occurred or is deemed likely to occur. However, a few sites did include contingency costs in their long-term stewardship cost estimates based on equipment replacement schedules and environmental regulations. Conversely, sites have not included major capital expenditures (e.g., cap replacement or other remedy failures) in their contingency costs.

Several sites under the Nevada Operations Office used groundwater monitoring well maintenance and replacement schedules (at 25-year intervals) for estimating long-term stewardship costs. These costs

represent a large percentage of overall costs at these sites. However, very few sites incorporated scheduled or anticipated maintenance, repair, and replacement costs in their cost estimates. Including these costs is critical for long-term stewardship planning activities and budget appropriations. Cost estimates should also take into account the potential for unplanned contingency costs (e.g., a catastrophic weather event, unexpected equipment failure, change in environmental regulations) to the greatest extent possible. Guidance to the Field is needed to ensure that unplanned contingency costs are projected consistently across sites (i.e., guidelines on the general types and timing of unplanned contingencies for budgeting projections).

Given that most sites did not include contingency costs in their long-term stewardship cost estimates, the current cost estimates represent very optimistic projections for the next decade and beyond. Therefore, the current cost estimates most certainly underestimate the long-term stewardship costs that may be encountered – even in the relative short term.

"Life-Cycle Costs" Are Not Applicable

DOE often reports life-cycle costs for environmental management projects. However, because of the longevity and, in some cases, infinite period of time for long-term stewardship, life-cycle costs cannot be applied to long-term stewardship. Because life-cycle costs require a clear end date, they cannot be applied to long-term stewardship activities, which often are scheduled to occur in perpetuity. Alternative cost estimating for long-term stewardship could include annual costs or decade costs that will allow for management, planning, and analysis. Utilizing these cost estimates will allow sites to develop baselines for budgetary planning. Additionally, these cost estimates can serve as guides for cost estimating at sites yet to begin long-term stewardship.

Applying a Universally Accepted Cost Model

The Department has not identified, nor has it required, the use of a single cost model for sites to use in estimating their future long-term stewardship costs. The lack of a single cost model makes it difficult for the Department to quantify its long-term stewardship financial obligation and allocate its resources most efficiently. Differences in site assumptions for their cost estimates affect the accuracy of the overall DOE cost projections for long-term stewardship. For example, one site initially utilized a cost model that projected extreme cost increases over time for the long-term surveillance and maintenance of facilities – those that have been closed and stabilized but for which final end-state decisions have not yet been made. In addition, costs were initially estimated for the later years for media portions (e.g., groundwater and soil contamination) that would not have end-state decisions made for many years into the future, thus resulting in further uncertainties in the cost estimates. Because the magnitude of the sites cost estimates far outweighed the cost estimates of other major DOE sites (by using a cost model more inclusive than other sites), their cost estimates were revised for the Report to Congress so that they included projections that applied only to portions that would be in long-term stewardship by the year 2006. That is, this site included costs only where there was a certain degree of certainty. While the site's cost estimates were then brought closer in line with other sites of similar magnitude, there are still differences among sites as to the projection of costs where there are uncertainties (i.e., undefined end-states). Without a universally accepted cost model that would be used by all sites, it is difficult to project and track costs consistently across the complex.

Recommendations

In order for the Department to successfully quantify, track, and project its long-term stewardship costs, a single definition of long-term stewardship scope and associated activities is required, as discussed in Section III.A. For those sites where long-term stewardship activities are ongoing or about to begin, DOE's costs should be itemized by long-term stewardship activity so that the Department can develop a more complete

cost accounting. For those sites that are still in the early stage of long-term stewardship planning, DOE should develop data requirements for the collection of cost data at the activity level and include them in its long-term stewardship planning guidance.

To evaluate methods of incorporating contingency and uncertainty planning, DOE should create a forum to examine how best to include contingencies and address uncertainties in sites' long-term stewardship cost estimates and the Department's environmental budget. Once a viable option(s) is identified, it needs to be clearly articulated to the Field so that the Field understands how it will impact their cost forecasting and how it will be incorporated. The Field can then begin incorporating contingencies and uncertainty planning into their cost planning, which should be mandated by Headquarters. The collection of contingency and uncertainty cost data should be mandated by Headquarters.

DOE should also create a forum for evaluating cost models and identifying/developing a single model for estimating future long-term stewardship costs at all DOE sites. Such a model would depend on the definition of long-term stewardship scope and activities and guidance on incorporating contingency and uncertainty planning, as discussed above. The chosen model needs to: 1) be dynamic; 2) take into account the long time horizon of long-term stewardship activities; 3) capture the unique nature of each site; 4) be flexible enough to apply to all sites; 5) incorporate historical cost data; and 6) and utilize current cost reporting mechanisms (e.g., IPABS). Once an effective cost model is selected, its function, operation, and relevance need to be clearly articulated to the Field and Headquarters so that it is clearly understood and accepted. Headquarters will then need to develop guidance for collecting cost data. After all these cost data limitations are overcome, the Field and Headquarters should be able to report and analyze long-term stewardship costs and estimate future long-term stewardship costs with a greater degree of accuracy.

D. Lack of Site-Specific Long-term Stewardship Plans

Discussion

During the data collection process, Field representatives were asked to provide information on their sites' long-term stewardship scope, schedules, and costs. It became apparent that, in fact, many sites had not planned beyond the cleanup phase. Consequently, analysis for the Report to Congress was impaired, but it also demonstrated the lack of long-term stewardship planning at many sites. Site-specific long-term stewardship plans are valuable not only for long-term stewardship planning at the national level (DOE complex), such as the Report to Congress and budget initiatives, but also for several other reasons, such as: (1) to improve overall site management both before and after cleanup is complete, (2) to facilitate development of a baseline scope, schedules, and costs for long-term stewardship, and (3) to provide a mechanism for demonstrating DOE accountability to the public. During the development of the Report to Congress it was clear that most sites had not developed or were only beginning to develop a long-term stewardship plan.

Given the unique nature of DOE sites, each plan should take into account site-specific conditions, local stakeholder concerns, and requirements resulting from the agreed upon site end state. Details and contents of plans will vary based on sites' status. Regardless, long-term stewardship plans are key components in communicating with stakeholders. It is the responsibility of the site to keep stakeholders and other relevant parties informed of long-term stewardship activities, which can be communicated through a long-term stewardship plan.

During the decision making process it is important to involve all necessary parties and document those decisions in the long-term stewardship plan. There is a clear need to document decisions, assumptions, the

final end state of the site, and the activities necessary to maintain that end state as a site moves into long-term stewardship. Planning for long-term stewardship will involve key decision makers and responsible parties so that future stewards have all necessary information regarding site conditions. Long-term stewardship planning should occur early in the remediation phase so that the site can appropriately plan for onsite residual contamination and associated long-term stewardship activities. Ideally, long-term stewardship planning should be included from the start of the remediation process. However, this has not been the case historically due to the focus on other missions at the time. Given this circumstance, long-term stewardship plans should be initiated now for sites that anticipate to have residual contamination remaining after cleanup. Although many sites' plans would be incomplete at this time (because final end states are not yet known), they would be further developed and refined over time as final end states are determined. At a minimum, long-term stewardship activities must be identified to provide for proper evaluation of cost and effectiveness when evaluating the feasibility of potential remedies.

Recommendations

As stated above, all sites anticipating to have residual contamination following cleanup should begin now to develop long-term stewardship plans. As identified in a memo to the Field from the Deputy Secretary of Energy (T.J. Glauthier, 12/00), the Department is committed to developing "proper planning, management and execution of long-term stewardship activities." At the direction of Carolyn Huntoon, Assistant Secretary for Environmental Management, all sites where Environmental Management is the landlord have been asked to prepare long-term stewardship plans by fiscal year 2004, or sooner when practicable. Essentially, these long-term stewardship plans will provide the basis for establishing the long-term stewardship operating baseline. Therefore, developing these long-term stewardship plans will assist future decision-makers in planning, budgeting, and managing long-term stewardship activities. The challenge in creating a long-term stewardship plan will be to clearly articulate the best management strategy for the long term. Planning is even more critical given the fact that the scope of long-term stewardship may change as sites transfer from a private entity to DOE in the future. By developing long-term stewardship plans DOE can prepare for transfers as well as determine scope, schedules, and costs.

In order to develop long-term stewardship plans, sites need clear guidance on the scope, format and content of such plans. This guidance should be developed by Headquarters, with Field and stakeholder input. (The Office of Long-term Stewardship is now initiating this effort.) Not only do the key components of a long-term stewardship plan need to be articulated as part of the guidance, but procedures for evaluating a site's long-term stewardship plan need to be developed.

E. Inability to Break Through Program Barriers

Discussion

Volume II of the Report to Congress contains site-specific summaries on long-term stewardship activities (scope, schedules, and costs). During the preparation of these site summaries, debates occurred over who within DOE was actually responsible for long-term stewardship activities (currently or in the future) and who was responsible for the cost of such activities. Although preparation of the Report to Congress represented the first step in complex-wide planning for long-term stewardship, the primary purpose of the report was to document anticipated long-term stewardship activities for Congress -- at the request of Congress. For the intended audience, it was less consequential as to which DOE program was responsible -- rather, Congress wanted documentation of anticipated long-term stewardship activities to be performed by DOE as a whole. Yet, several sites were unable to remove themselves from the programmatic structure and respond to the request for information on their anticipated long-term stewardship activities. In many cases, disputes on a

particular site's programmatic responsibility for long-term stewardship (e.g., Office of Environmental Management, Office of Science, Office of Defense Programs, etc.) hampered the ability to collect and analyze long-term stewardship information and projections.

One instance where this occurred was at a site, which has a contaminated facility that is being remediated but is expected to have residual contamination and require long-term stewardship activities. Because of a disagreement between the Office of Science and the Office of Environmental Management as to who is responsible for funding the long-term stewardship activities, the required information from the initial data call was not provided by the laboratory. Neither DOE office is willing to claim responsibility and, therefore, accept the cost of maintaining the selected remedy.

Another example is where DOE has been involved in the remediation of a site, which is not expected to be completed until 2014. Consequently, the nature and extent of long-term stewardship activities are unknown at this time. However, information regarding the potential long-term stewardship activities, if any, was not forthcoming. In fact, the DOE Office of Naval Reactors, which is the current landlord, assumes that it is separate from DOE and, therefore, not subject to a DOE report on long-term stewardship activities. These programmatic divisions resulted in unnecessary hurdles in compiling the long-term stewardship related information into the Report to Congress.

Recommendations

The Office of Long-term Stewardship needs to identify sites where multiple DOE programs may share long-term stewardship responsibility and identify sites where there is uncertainty regarding who is responsible for long-term stewardship. This effort would target the Office of Environmental Management, Office of Science, Office of Defense Programs, and possibly the Office of Naval Reactors. Creating an open dialogue about the long-term planning and stewardship of these sites is not only in the best interest of the entire Department but also all future users of these lands.

To support development of long-term stewardship operating baselines for all sites in the Environmental Management program (consistent with recent guidance memoranda from Deputy Secretary Glauthier and Assistant Secretary Huntoon), the Office of Long-term Stewardship should develop checklists and other document formats to facilitate site transfer documentation. For instance, DOE should establish "site acceptance criteria" that must be met before a site can be transferred from closure to long-term stewardship. This would set a standard that must be met before a site can be transferred and would clarify when a site could be transferred either within DOE (i.e., to another DOE program), outside of DOE, or to DOE.

F. Lack of Integration Between Technology and Long-term Stewardship

Discussion

Technical and scientific advances can improve the reliability of engineered solutions and reduce the life-cycle cost of conducting long-term stewardship. Emphasizing the integration between technology and long-term stewardship is particularly important as sites with more complex challenges transition from cleanup to long-term stewardship. As part of the data collection effort for the Report to Congress, site personnel were asked to provide information about long-term stewardship technology development and deployment efforts at their sites. Very few sites were able to provide any information. Of the sites that submitted technology development and deployment data, most addressed the broader site technology needs (i.e., to support

remediation) rather than needs pertaining to long-term stewardship. At this time, it appears that the lack of information provided on long-term stewardship technology development and deployment activities is the result of three issues:

- Many sites are in the very early stages of developing their long-term stewardship program.
- Resources for pursuing long-term stewardship technology development and deployment do not exist at the site level.
- Most sites have not conducted performance assessments for residual contamination and have not identified the nature of the failures that may occur, let alone their consequences.

These issues are discussed below.

Many Sites Are in the Very Early Stages of Developing their Long-term Stewardship Program

Currently, many site personnel are focused on completing cleanup activities before considering long-term stewardship activities. Consequently, many Field and site staff are only in the early stages of defining the scope of long-term stewardship commitments at their site. Until a site's long-term stewardship scope is well defined, site personnel cannot determine the schedule and cost of long-term stewardship activities. Once the site's cost profile is known, site personnel can then identify and prioritize long-term stewardship activities that could potentially benefit from new or improved technologies (e.g., technologies resulting in less maintenance, automated/remote information gathering/monitoring). Site personnel can evaluate the new or improved technologies that address the site's needs and ascertain how these technologies can be integrated into the site's ongoing long-term stewardship program. As DOE begins conducting long-term stewardship activities at an increasing number of sites, there will be a growing interest in deploying technologies that reduce long-term stewardship costs.

Resources for Pursuing Long-term Stewardship Technology Development and Deployment Do Not Exist at the Site Level

Site long-term stewardship budgets usually do not include funds for technology development. Technology design and development is not a site activity, and resources for this activity are not dedicated at the site level. Technology development is generally performed by national laboratories, private companies, and other entities. The challenge is to make sure research and development is focused on site long-term stewardship needs and to ensure there is frequent communication between technology developers and those responsible for implementing and conducting long-term stewardship activities. Site personnel should keep apprized of technology developments so that they can recognize cost-saving applications pertaining to long-term stewardship.

Some of the DOE laboratories are developing technologies with long-term stewardship applications that are targeted to the needs at particular sites (i.e., the Remote Sensing and the Special Technologies Laboratories are addressing some of the Nevada Test Site's technology needs). However, the laboratories' focus has been on developing and improving technologies that enhance site remediation, not long-term stewardship. As the number of sites at which DOE is conducting long-term stewardship activities increases, laboratories will need to redirect their research efforts to addressing long-term stewardship technology needs that are common to multiple sites.

Most Sites Have Not Conducted Performance Assessments for Residual Contamination and Have Not Identified the Nature of the Failures That May Occur, Let Alone Their Consequences

Low-level waste management, as prescribed under DOE Order 435.1, requires performance assessments and composite analyses to determine potential impacts in the future and establish a baseline of performance expectations. Similar requirements are not in place for low-level contaminant or hazardous chemical residues. As a consequence, many sites do not have quantitative projections for how containment will perform and what the early signs of failure may look like. Rather, the typical practice is to assume performance meets objectives and no corrective actions are required. This default position leaves little room to evaluate the efficacy of better technology to reduce life-cycle costs of long-term stewardship other than alternatives that would produce the same results for less cost. Moreover, it masks the details of failure modes that are diagnostic with respect to where advances would be of greatest utility.

If performance assessments were routinely performed, they would serve to prioritize the technical needs relative to where the greatest benefit from improvement would accrue and the nature of those benefits. For instance, it may become clear that earlier identification of releases (e.g., monitoring with lower detection levels) is of little benefit if the primary cost is corrective action and the same response is required once a release has occurred at any level.

Recommendations

In order to resolve the current deficiency in integration of technical needs, it will be necessary to first identify the range of activities that will be conducted within the long-term stewardship program and then to develop programmatic activities that foster the interchange between stewards and the research and development community. At present, the first of these steps is underway by virtue of two distinctly different efforts. The first is the technology survey that has been initiated by the Idaho National Engineering and Environmental Laboratory (INEEL) to identify technology needs as perceived by Field sites. An initial cut has been made with plans to extend the work over the next year. The second is the development of long-term stewardship implementation plans for the sites. Those plans will be the single most complete source of information of what long-term stewardship requirements are across the DOE complex. Hence, the latter will define what is planned now, while the former will stretch into what Field sites would like to have available regardless of what is feasible now. These then define the immediate list of needs for development.

In response to comments received on DOE Order 435.1 from the Defense Nuclear Facilities Safety Board, the Department has developed a formal procedure for linking low-level waste management needs to the science and technology providers. This has direct applications to the long-term stewardship needs. The science and technology interface process is driven by use of performance assessments to prioritize where the greatest reduction in uncertainty can be gained from scientific and technological advances. If cost elements are included, it serves the long-term stewardship program as well. Much of that concept has been embraced with the current draft of the Department's five-year review guidance. Since five-year reviews are an integral part of the long-term stewardship program, it would be logical to evaluate the draft guidance in light of stewardship technology needs and ensure that it provides a framework that will encourage prioritization of needs and review and acceptance of technological advances when reliability and cost can be improved in the process.

In tandem, the Department should utilize its relationships with other agencies (e.g., EPA) to jointly pursue solutions that meet the Department's long-term stewardship technology needs. Headquarters should regularly track Department long-term stewardship research and development activities not only within other government agencies, but also more broadly in the private sector and internationally. The Department should then evaluate the available technologies and ongoing research for applicability to the Department's long-term

stewardship technology needs. Results of these reviews and joint efforts should be made available to the sites as they conduct their five-year reviews.

The Department needs to communicate the results of its research and development efforts to the site personnel via the Field Offices. It is important that site personnel be kept apprized of the latest technology developments -- when new or enhanced technologies are developed and are ready for deployment, site personnel need to know how and where they should be deployed to minimize their technology investments and maximize the technologies' benefits (reduced long-term stewardship costs). Site personnel also need to be aware so that they can plan for and incorporate the technology investments (purchase and installation costs) into their near-term cost estimates/budget requests.

G. Incomplete and Varying Levels of Record-keeping on Long-term Stewardship

Discussion

Maintaining site information is a critical element for long-term stewardship planning and management. Data are needed not only for near-term decision making but also for maintaining long-term awareness of hazardous residual contamination. Poor record-keeping practices can generate unnecessary costs for recharacterization of areas already remediated and can result in redundant cleanup and long-term stewardship efforts, all of which affect scope, schedules, and costs of long-term stewardship. When the Field submitted data for the Report to Congress on the record-keeping activities for each site, it was apparent that there was little consistency in data collected by sites on long-term stewardship, data storage, and data availability to the public. The causes of incomplete and inconsistent records should be addressed by DOE Headquarters and Field staff so that site information on cleanup, residual contamination, and long-term stewardship can easily be accessed and maintained indefinitely. The issues that should be addressed are:

- Identifying the types of information needed for planning and management;
- Identifying the appropriate data collection tool/method;
- Implementing methods to catalogue and store information; and
- Implementing mechanisms to make information available to users.

Each of these issues is discussed in more detail below.

Identifying the Types of Information Needed for Planning and Management

Data needs are based on two different issues: (1) the user group, and (2) the type of site. The data call for the Report to Congress was a specific information request based on a Congressional mandate. The intent of the Report to Congress was to answer specific questions about the status of long-term stewardship at DOE sites. Future information needs will not be solely based on Congressional mandates. There are different groups of information users which include the general public, regulators, local government officials, other federal agencies, stakeholders, future land owners, and DOE Headquarters personnel. Each user group has different informational needs which are highlighted in the table below. For example, the general public is interested in knowing events and cleanup actions, historical functions, and possible contamination threatening human health and the environment. However, future land owners may require information more specific to property transfer and leasing arrangements, including past and current site conditions, as well as

remedial action records.

There will need to be a core set of required data that all sites must provide for complex-wide comparative analysis. However, it may be necessary to distinguish types of sites by recognizing different informational needs. For example, a site with an ongoing mission may require different data than a closed site. Similarly, a site that is closed and is scheduled to have ownership transfer to a different entity may require specific data to ensure a smooth property transfer.

Information User Group	*General Information Needs*
General Public	Needs information on events and cleanup actions, historical functions (programs and operations performed onsite), and possible contamination threatening human health and the environment.
Land Owners	Needs access to all information related to property transfer and leasing arrangements; including information associated with availability, characteristics, conditions, and legal requirements of parcels of property/buildings from preparation for transfer through post-transfer.
Regulators	Needs monitoring data to ensure compliance with permits, CERCLA regulations, state regulations, and other Environmental Protection Agency (EPA)-mandated monitoring/documentation requirements. This group also needs to be informed of any significant changes in site conditions, such as soil movement offsite, spikes in monitoring data, or discovery of additional contamination.
Local Government	Needs general information on cleanup status, existing contamination, ongoing DOE operations, stored chemicals, and infrastructure. This information is required to communicate to the public and local/state authorities and respond to emergencies, should they occur onsite.
DOE Headquarters	Need data that is comparable among sites to adequately plan and manage scope, schedules, and costs of Department-wide long-term stewardship activities.

Identifying the Appropriate Data Collection Tool/Method

Information related to long-term stewardship is contained in many existing databases (e.g., NDAA, IPABS-IS, FIMS). However, each of these databases not only captures different fields of information but also has a different scope and purpose for the data that is collected. Therefore, it is very difficult to create an additive relationship between existing information sources because the sites do not align. Furthermore, these data sources may not contain a complete set of information necessary for adequate planning and management of long-term stewardship.

Implementing Methods to Catalogue and Store Information

The time span for which records must be maintained under current environmental compliance regulations is relatively short (e.g., for CERCLA, approximately 50 years counting from 1980, but a site can apply to have the requirement expire sooner). However, the Department is already faced with incomplete site data from only twenty to thirty years ago. Given the nature of residual contamination at sites under DOE's purview, the Department will have to maintain site cleanup, closure, and long-term stewardship records for much longer – in many cases, forever. For example, if regulatory cleanup levels change in the future, the

Department will have to know the cleanup levels to which sites were originally remediated and the locations of residual contamination.

Properly maintaining records is also an issue. Some of the more recent data are available electronically, but historical data for most sites are available only in hard copy. For example, the Department found that the data for all the sites that were considered for inclusion in the Formerly Utilized Sites Remedial Action Program (FUSRAP) were available only in hard copy. However, these data are not completely catalogued, and are spread among various locations in the country.

While developing the Report to Congress, the Department found that multiple site characterizations have taken place over the past few decades at some of the FUSRAP sites that were transferred to the U.S. Army Corps of Engineers for cleanup. A primary reason for the multiple characterizations at these sites was that complete records were not kept by the owner and, in some cases, DOE. DOE was forced to research hard-copy records to find historical information on all the sites that were considered for inclusion in FUSRAP. The Department found that many important site records (many from as recent as the 1970s) were: 1) missing, 2) incomplete, or 3) did not contain justifications for cleanup and other decisions that were made regarding the site. Several other sites (e.g., the Central Facilities Area landfills at INEEL) do not have historical data on types of onsite waste, their volumes, and their hazardous characteristics. Incomplete information prohibits site personnel from adequately planning and implementing long-term surveillance and maintenance activities and makes environmental, economical, and risk analyses difficult, if not impossible.

Implementing Mechanisms to Make Information Available to Users

The Department is committed to including stakeholders in the cleanup and long-term stewardship decisions at its sites and making Department-level and site-level information accessible to the general public. The Department affirmed its commitment in the most recent draft version of the Long-term Stewardship Implementation Plan Guidance.[1] In the draft Guidance, DOE states that "it is the role of stewardship to ensure that the requisite management takes place and that future stakeholders have access to the information necessary for them to evaluate the consequences of events and propose changes over time." However, in a recent benchmarking study, DOE found that most available documentation contained insufficient information concerning long-term stewardship, and for the most part, consideration of long-term stewardship in these decisions could not be directly assessed.[2]

However, there is a great deal of variation in the vehicles used to make cleanup and long-term stewardship information accessible to the public. For example, the Grand Junction Office makes selected site information (e.g., Long-term Surveillance Plans, Annual Inspection Reports) available to the public via local libraries and its website, and in response to individual requests. Other Field offices do not provide selected site information via a website, and sometimes this information is only available at DOE reading rooms.

Similar to determining data requirements, mechanisms for making information available to users should be determined largely by user groups. It is likely that different user groups will have varying preferences for the informational format. For example, future land owners may prefer that information be made available on maps to illustrate current site conditions and historical activities. The general public, on the other hand, may be less specific, preferring that site information be made available in different formats for people with varying abilities to access information (e.g., hard copies at local libraries and site reading rooms as well as electronically via a website).

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[1] "Long-term Stewardship Implementation Plan Guidance" (Draft). U.S. Department of Energy, January 18, 2001.

[2] Long-term Stewardship Benchmarking Study Report, Preliminary Draft, February 16, 2001.

Recommendations

Headquarters (led by the Office of Long-term Stewardship) should form an interoffice committee to analyze the site information that has been collected or is currently collected for both cleanup and long-term stewardship planning and implementation. The Department should take several steps to ensure that all the data necessary for making future decisions about sites are: 1) collected, 2) catalogued, 3) stored, and 4) made accessible in a manner that is efficient and will survive the test of time.

Identifying the Types of Information Needed for Planning and Management

First, DOE must decide what data requirements are needed for planning and management of long-term stewardship. A needs assessment should be conducted to adequately understand the different types of information required by different information users. The assessment may require face-to-face interviews with DOE Headquarters personnel, EPA officials, Department of Interior representatives, as well as local user groups, such as stakeholders, regulators, and the general public. DOE could also look at what other agencies and organizations are doing for long-term record-keeping. For example, the American Society for Testing and Materials has data collection standards for site closeout. After new data elements are implemented into a functional collection system and data is received, the collected data should be reviewed to ensure informational needs are not only being addressed for Department-wide reporting but also for site-specific communication needs. DOE should also consider whether some data requirements are immediate regulatory and stakeholder needs and whether all or part of this set of information is needed for long-term use (100 years and more).

Identifying the Appropriate Data Collection Tool/Method

After data requirements are determined, DOE must identify the scope of sites where long-term stewardship activities are expected. With this information, a decision can be made to restructure existing data tools or create new data collection methods. In deciding the appropriate data collection method, DOE must consider whether existing Office of Environmental Management data sources can adequately capture information from other Program Secretarial Officers. This information would include issues such as budget targets and environmental liability. Moreover, DOE will have to revise or create a database to capture all necessary long-term stewardship information. Support for this data collection effort must go beyond the Office of Environmental Management to include the Office of Science, Office of Defense Programs, Office of Nuclear Energy, and the Office of Fossil Energy.

Implementing Methods to Catalogue and Store Information

Some types of site information will be static and can be archived (e.g., historical site missions/ activities) while other data will be updated continually (e.g., monitoring data). Regardless of the method chosen to catalogue and store information, there will need to be a mechanism to update information. One option for DOE in organizing and storing information would be to create one or more central data repositories across the complex.

A central repository will facilitate information storage, retrieval, and sharing. The Department data repository should catalogue and store site data electronically, as well as in hard copy in a format(s) that will remain useful in the future. Headquarters should determine, with consensus from the Field, at what level this hard-copy information should be stored. A large amount of the stored information can also be made available to remote users via the Internet. The repository should conform with relevant Department policy and guidance under the Offices of the Chief Information Officer and Scientific and Technical Information. The

repository should be updated annually and maintained regularly. It is essential that there is accurate documentation on what information is stored and where it is located.

Implementing Mechanisms to Make Information Available to Users

DOE should conduct a needs assessment to determine what formats are preferable for the various user groups. Various user groups should be interviewed to ensure that information is provided in the most user-friendly format for all interested parties. In cases where hard copy formats are preferred, DOE must also identify the locations for various printed documents. For example, site-specific documents may be needed at local onsite rooms.

In summary, there are many components that need to be addressed to adequately plan and manage long-term stewardship record-keeping. These components are co-dependent and, consequently, rely on proper implementation of each element to ensure successful record keeping. For instance, the type of data collection tool utilized is dependent on the nature of the information requirements and the scope of sites. The ability to deliver information requests to user groups will be dependent upon the quality of the data collection mechanism. Overall, the record-keeping approach needs to be system-based by taking into account each component from the beginning to the end of the record-keeping process. This will enable the Department to ensure that quality information is available both in the immediate and long term.

H. Incomplete Information on "No Further Action" Sites

Discussion

The term "No Further Action" (NFA) is used to describe release sites requiring no further remedial activity. However, NFA does not necessarily mean release sites are cleaned up to levels allowing for unrestricted use. In fact, an NFA release site (referred to as NFAs) could potentially require long-term stewardship. Because NFA is only an indication of no further remediation activities, it is possible that residual contamination may be left in place, thus requiring long-term stewardship. During the data collection process for the Report to Congress, DOE Field personnel were asked to provide information regarding the long-term stewardship activities at the site level or, in some cases, at portions of the site. Portions of sites are often composed of multiple release sites. Although the NDAA language did not specifically request information on NFAs, sites were informally asked to provide data on these NFAs. Many sites were able to determine how many NFAs existed; however, they were unable to specify whether the NFAs would require long-term stewardship.

In general, there are three classifications of NFAs: (1) administrative NFAs; (2) risk-based NFAs; and (3) risk-based correction action NFAs. The first classification, "administrative NFAs," includes some release sites that were initially thought to be contaminated but were found, upon further investigation, not to be contaminated. These release sites are categorized as such in cases where: a release site identified on paper (i.e., during preliminary assessment/site investigation) was found to have never existed in reality; a release site was double-counted; there was never any potential for contamination; or no contamination was found after being investigated.

The second classification, "risk-based NFAs," includes release sites where investigators discovered contamination existing at levels that did not warrant remediation, based on the expected land use for the site. At some of these NFAs, no land-use restrictions are required, as the levels of contaminants are appropriate for residential use. However, land-use controls are necessary at those release sites left at industrial land-use levels to ensure continued protection of human health and the environment.

The third category of NFAs, "risk-based corrective action NFAs," includes release sites where DOE has performed remediation to a regulatory standard based upon a risk analysis and assessment.

The two types of NFAs that have potential for long-term stewardship obligations are "risk-based" and "risk-based corrective action." For release sites where residual contamination was left in place, preventing unrestricted use, long-term stewardship activities are already occurring. Furthermore, if the expected land use for the site changes, then additional remediation or long-term stewardship activities could be required to ensure continued protection of human health and the environment. Record-keeping activities are an essential component for maintaining information on investigations, samplings, and past actions, including decisions related to the NFAs and their locations.

Recommendations

Currently, NFA information is collected in a record-keeping system (e.g., IPABS) for each Environmental Management site. However, the information is not collected in such a way that one can discern long-term stewardship responsibilities and activities. In fact, the term "NFA" can be misleading because it implies no long-term stewardship responsibility when, in fact, long-term stewardship responsibilities are required for NFAs with residual contamination left in place. In order to avoid confusion and to effectively manage and plan for long-term stewardship, DOE should collect more descriptive and comprehensive information on NFAs at the site-level. Understandably, some sites will be able to provide more detailed information on their respective NFAs than others, depending on the given stage of the remedial process. However, the information collected on NFAs must be comprehensive enough to distinguish unrestricted use sites from sites requiring long-term stewardship.

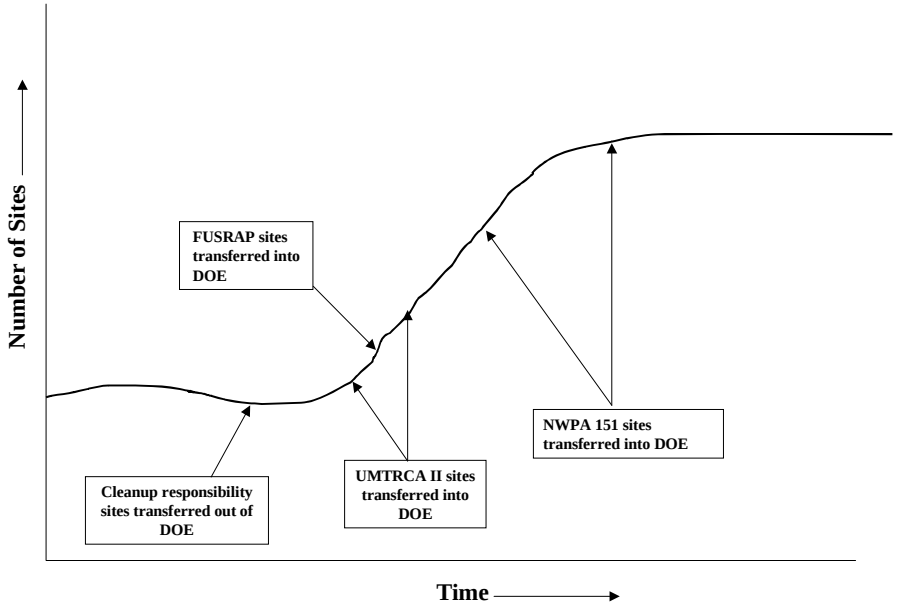
I. Lack of Process for Transferring Sites Into, Out of, and Within DOE for Long-term Stewardship Responsibility

Discussion

As stated in the Report to Congress, DOE is conducting or expects to conduct long-term stewardship activities at up to 129 sites. Of the 129 sites, DOE has identified 32 sites owned by other entities (private or other federal agencies) where DOE may be responsible for long-term stewardship. Once cleanup activities are complete at these sites, they will be transferred to DOE. During preparation of the Report to Congress, DOE found it difficult to identify the scope of long-term stewardship activities for sites that have not yet been transferred to DOE, as well as for sites that will be transferred out of DOE (i.e., to another federal entity) and sites that will need to be transferred from one DOE office to another (i.e., from the Office of Environmental Management to the Office of Science). In general, these transfers can be grouped under two different categories: (1) transferring property for long-term stewardship, and (2) transferring responsibility for long-term stewardship. Each category of transfer represents different issues that DOE needs to address. Clearly, the transfer of sites from one agency to another will involve a lot of activity. Regardless of who the transferring and receiving entity is, there needs to be a clear understanding of long-term stewardship. From DOE's perspective, this means that EM needs to do a better job of establishing the scope, schedules, and costs for sites: coming into DOE (i.e., set expectations for what DOE is willing to accept as a site arrives from another agency); going out of DOE; and transferring within DOE (i.e., the receiving office needs to know what will be coming under its responsibility, and the transferring and receiving offices need to agree to such). The Department has not clearly developed or implemented a process for all sites transferring responsibility.

As discussed below, the type of transfer is unique depending on the status of the site. The paragraphs below elaborate on the transfer issues within each category for: (1) transferring a site to DOE (from a private entity or other federal agency) for long-term stewardship; (2) transferring a site (and associated long-term stewardship responsibilities) out of DOE (to a private entity or other federal agency); and (3) transferring a site within DOE (from one Program Secretarial Office to another).

Figure 2. Timeline for the Number of Sites Where DOE Potentially has Responsibility



Transferring Property

Transferring property means that the site changes ownership. Transferring property that requires long-term stewardship to another Federal, State, Tribal, local, or private entity presents challenges to long-term stewardship implementation. As part of the transfer process, DOE and affected parties will need to identify: the parcels for which long-term stewardship is required; types of management or use restrictions that are necessary; procedures for overseeing restrictions or limits; and funding and responsibility for long-term stewardship activities. For transfers within the federal government, DOE and/or Congress will need to decide whether funding/budget authority required to conduct long-term stewardship activities transfers with the parcel or remains with the program that transferred the parcel.

Transferring a Site to DOE

When sites are transferred to DOE, a licensing process is often required depending on the type of site and the applicable regulation. For example, in order for DOE to accept long-term stewardship responsibility for a former uranium processing site, the private entity owning the site must first apply for licensing by the U.S. Nuclear Regulatory Commission (NRC), pursuant to NRC's general license provisions in 10 CFR Part 40. The site can only be transferred to DOE after NRC has accepted the site under its general license. Other transfer requirements apply to sites that fall under the Formerly Utilized Sites Remedial Action Program and

sites that fall under certain provisions of the Nuclear Waste Policy Act, as amended. These sites, which DOE anticipates to be transferred to DOE for long-term stewardship, are discussed below:

- **Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II Sites**. These are privately owned and operated sites that were active when UMTRCA was passed in 1978, or thereafter. The majority of the mining and milling conducted at these sites was for private sale of uranium, but a portion of the uranium was sold to the U.S. Government. Under UMTRCA Title II, DOE is responsible for long-term stewardship activities, but not for site remediation. Upon completion of remediation work and acceptance of the site by NRC under its general license, DOE will maintain records and conduct maintenance and monitoring to ensure continued appropriate land use. Currently, there are 11 sites that are expected to be transferred to DOE in accordance with UMTRCA Title II. DOE expects it will assume ownership of and responsibility for long-term stewardship at these sites some time after 2006, following completion of remediation activities. However, DOE anticipates that there may be more sites transferred in to DOE (from their private owners) in the future under UMTRCA Title II. The extent of DOE's long-term stewardship responsibilities will depend on the final cleanup decisions made for each site and are uncertain at this time.

- **Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites**. As stated in the Report to Congress, the Energy and Water Development Appropriations Act for Fiscal Year 1998 transferred responsibility for cleanup of 21 sites being managed as part of FUSRAP from DOE to the U.S. Army Corps of Engineers (Corps). Subsequently, DOE and the Corps signed a Memorandum of Understanding (MOU) requiring that DOE take responsibility for sites after cleanup (beginning two years following "closure" of the cleanup project) to conduct required long-term stewardship activities, if any. DOE and the Corps have discussed a protocol that will include written approval of the cleanup by the appropriate Federal and State agencies and transfer of post-closure documents, including adequate and acceptable radiological surveys. The extent of DOE's long-term stewardship responsibilities will depend on the final cleanup decisions made for each site. Many of the cleanup decisions have not yet been made.

- **Nuclear Waste Policy Act (NWPA) Section 151 Sites.** An uncertain number of low-level radioactive waste sites (maybe as many as 100 sites) under Section 151 (b) and (c) of the NWPA, as amended, were excluded from the Report to Congress, as discussed below. These sites present uncertainties in transfer because these sites are presently owned by private entities and it is unclear whether or not DOE will accept long-term stewardship responsibility for these sites.

  - **NWPA Section 151(b) Sites**. Section 151(b) provides "authority," but not a requirement, for DOE to take responsibility for long-term stewardship at low-level waste disposal sites after cleanup is complete (provided certain conditions are met, e.g., financial arrangements and compliance with NRC closure, decommissioning, and decontamination requirements). DOE's current policy is that it does not intend to accept responsibility for the 151(b) sites. Consequently, these sites were not included in the Report to Congress. However, it is possible that at some later date the 151(b) sites may ultimately become the responsibility of DOE, and, hence, increase the number of sites that fall within the scope of DOE's long-term stewardship program.

  - **NWPA Section 151(c) Sites**. Section 151(c) of the NWPA provides that if the low-level radioactive waste involved is the result of a licensed activity to recover zirconium, hafnium, and rare-earth from source materials, DOE shall assume title and custody of the waste and land, upon request of the owner of the site, when the site has been decontaminated and

stabilized in accordance with NRC requirements and has made financial arrangements for long-term maintenance and monitoring. At present, only one such site (Parkersburg Site in West Virginia) has been transferred to and is being managed by DOE, pursuant to Section 151(c). Similar to the 151(b) sites, it is uncertain whether additional 151(c) sites will be transferred to DOE for long-term stewardship.

Transferring Long-term Stewardship Responsibility

There are cases where a site does not change ownership but there is a change in terms of who is responsible and for what activities. For example, under some existing agreements, DOE is responsible (or partly responsible) for cleanup of some sites, although DOE is not the owner of the site (nor has there been a transfer of ownership to DOE). DOE may not have responsibility for long-term stewardship of the site following completion of cleanup. Because, in general, site responsibility belongs with the non-DOE owner, the transfer of responsibility back to the non-DOE owner coincides with the beginning of long-term stewardship for the site as a whole. At other DOE sites, DOE's Office of Environmental Management (EM) may complete cleanup of a site and then transfer long-term stewardship responsibility to another program within DOE. These cases are addressed further below.

Transferring Responsibility of a Site Out of DOE

In order for responsibility of a site to be transferred out of DOE, an agreement must be drawn up between DOE and the responsible entity. The agreement would release DOE of responsibility but would contain the caveat that in the event of future discoveries of contamination or changes in regulations, then DOE is responsible. Currently, the only type of site that DOE is transferring out of its responsibility is where DOE was considered one of many parties responsible for remediation. At this time, there are 11 sites (owned by non-DOE entities) where, upon completion of cleanup, DOE does not currently anticipate being responsible for long-term stewardship activities. The 11 sites only represent a transfer of responsibility. These are sites where DOE is involved (specifically EM) in remediation, and once DOE has fulfilled that role, then DOE will no longer be responsible (caveat notwithstanding).

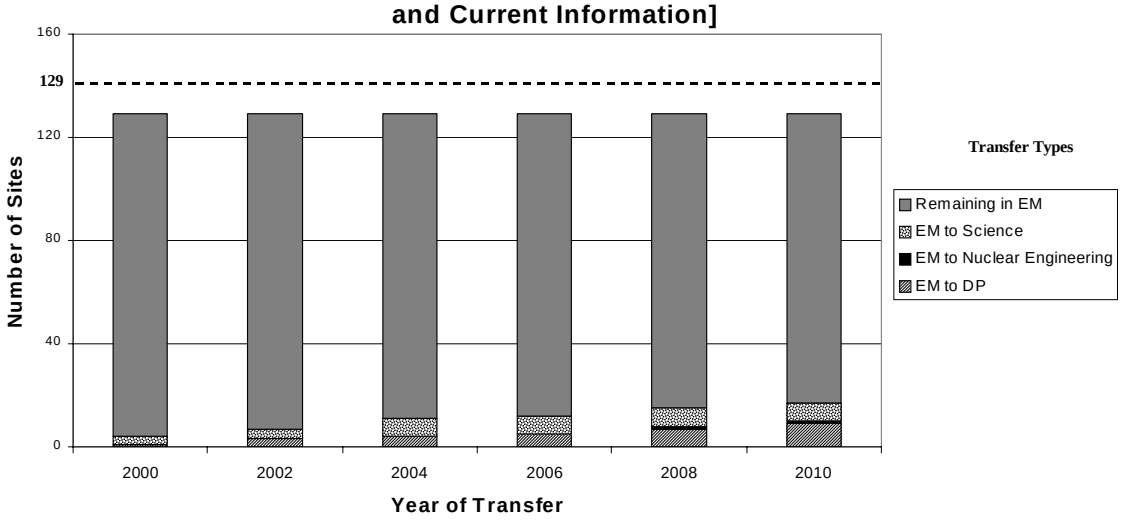
Transferring Responsibility of a Site Within DOE

At the time of the development of the Report to Congress, DOE identified 21 sites with ongoing DOE missions that would be transferred from EM to other DOE programs (e.g., Office of Science, Office of Defense Programs, Office of Nuclear Energy). At the time, the Department did not have a clear process for transferring sites from one DOE program to another. Recently, the Department has developed a policy for sites which will be transferred from EM to other program offices within DOE. As specified in a recent memorandum from Deputy Secretary T.J. Glauthier (S-2), acting as the Department's Chief Operating Officer, the landlord Program Secretarial Officers (PSOs) will assume responsibility for conducting long-term stewardship activities after EM completes cleanup at those sites with a continuing non-EM mission. The S-2 Policy Memorandum focuses on three key elements in the process of transferring long-term stewardship responsibilities: (1) developing a technical planning document to establish the long-term stewardship operating baseline and describing the scope and operating costs for future long-term stewardship activities; (2) transferring the budget authority and budget target to the receiving PSO for the amount equivalent to the operating costs for long-term stewardship activities; and (3) coordinating and signing a formal transfer agreement for long-term stewardship, that includes post-transfer responsibilities, for each site.

In a follow-up memorandum, Carolyn Huntoon, Assistant Secretary for Environmental Management, elaborated on the long-term stewardship responsibility that must be addressed independently for each site. To document these responsibilities, a detailed Memorandum of Agreement (MOA) will be drawn-up between

EM and the receiving PSO to identify transfer issues and their resolution. In general, these MOAs will address the following issues: (1) EM responsibilities in the transfer of long-term stewardship program activities; (2) the definition of the point where EM is no longer responsible for long-term stewardship and transition will occur; (3) how activities associated with the long-term stewardship program are paid for at sites owned by landlords; and (4) EM or landlord responsibilities if additional remedial actions are required for the site.

Figure 3. Site Transfers Within DOE
[Transfer Years Based on Report to Congress and Current Information]



Recommendations

DOE needs to determine the likelihood and potential number of sites under each transfer type to adequately plan and manage future long-term stewardship responsibility. Currently, there is a high degree of uncertainty, not only for the number of sites expected to transfer into, out of, and within DOE but also for the expected schedules of transfers. This is important because DOE needs to be prepared for the scope and costs of long-term stewardship activities as they become a responsibility. For example, it is clear that DOE will be accepting responsibility for the FUSRAP sites, and the UMTRCA Title II sites will probably be transferred in years to come. However, it is still unclear when or if the NWPA Section 151 sites will be transferred to DOE.

For the UMTRCA Title II sites, the Department began a program in September 2000 to develop a database that will improve the efficiency with which these sites are tracked. However, DOE should create a database of all potential site transfers and evaluate the likelihood of each transfer based on site characteristics and

existing legislation. For example, a change in law could transfer long-term stewardship responsibility of some sites to another governmental, Tribal, or private entities.

Once the likelihood and potential number of transfer sites are identified and evaluated, then DOE should develop a protocol for transference. DOE should determine the criteria that must be met before a site can be transferred into DOE, out of DOE, or within DOE. The Department has developed guidance outlining the information required on the past and current environmental history and condition of the parcel before a property can be transferred (*Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*). However, DOE has not developed explicit guidance focusing on all issues related to transferring sites (into, out of, and within DOE). For related information, DOE can refer to the existing mechanisms in place, such as the transfer of excess facilities from Program Secretarial Officers back to EM. DOE could also look to other federal agencies for examples of how they implement their respective transfer process. For example, the Department of Defense has experience in property transfer through implementing the Base Realignment and Closure (BRAC) Program. By developing a clear transfer protocol and providing guidance on the transfer process, DOE can better plan and manage future long-term stewardship responsibility.