

MANAGING DATA FOR LONG-TERM STEWARDSHIP



WORKING DRAFT

March 1998

**Working Draft Report Prepared by
ICF Kaiser Consulting Group**

⇨ ICF KAISER

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ACKNOWLEDGMENTS

Managing Data for Long-term Stewardship was prepared by ICF Kaiser Consulting Group for EG&G Technical Services of West Virginia under DOE Prime Contract No. DE-AC-95MC31346. This Working Draft Report was conducted by a diverse team composed of federal and contractor representatives from DOE Headquarters (the EM Office of Strategic Planning and Analysis); the Federal Energy Technology Center; ICF Kaiser Consulting Group; Project Performance Corporation; Pacific Northwest National Laboratory, Washington; Sandia National Laboratory, New Mexico; and JK Research Associates, Inc. Key assistance also was provided by the DOE Rocky Flats Field Office, Kaiser-Hill team, and the Rocky Flats Local Impacts Initiative.

Project direction was provided by Robert E. Hegner, Ph.D of the ICF Kaiser Consulting Group and Steven Livingstone of the EM Office of Strategic Planning and Analysis. For further information, contact: Dr. Hegner at 202-863-7027 (*email: rhegner@icfkaiser.com*) or Mr. Livingstone at 202-586-9874 (*email: steven.livingstone@em.doe.gov*).

ABSTRACT

As U.S. Department of Energy (DOE) sites move beyond active environmental cleanup to long-term stewardship, changes in information needs must be addressed. This report is an initial effort to inform DOE policy makers, advisory boards, and stakeholders about the significance of this issue. Failure to provide for these changes can delay and/or increase the costs of site closure and transfer, and compromise the ability to protect human health and the environment. A project team conducted a preliminary review and analysis to assess whether current requirements and practices clearly identify the data that must be retained to ensure effective long-term stewardship and whether they would remain accessible to future generations.

Findings

1. Most types of information needed for long-term stewardship are already being generated for other purposes.
2. Requirements do not specifically identify what constitutes stewardship data or how to define this discrete subset.
3. Information management requirements and practices are not coordinated with property transfer requirements.
4. Information that has stewardship value is being lost, destroyed, or maintained in formats that may not be useful to future stewards.
5. Some data will not be preserved as long as necessary for stewardship purposes.
6. Some data will be preserved adequately but may not be able to be located, or will not be accompanied by enough descriptive information to be usable.
7. Most records of facilities and site infrastructure are required to be destroyed when facilities are demolished or infrastructure is declared obsolete.
8. DOE has already begun to pay increased cleanup costs because critical data have been lost.
9. Knowledge that archived information about DOE sites exists may be lost.
10. Future users may not know where to search for all relevant information, causing delays in action or the potential for unnecessary risk.
11. Even when such knowledge is preserved, and users know where information is located, it may take too long or be too expensive to gain access to stewardship data.

The findings and other conclusions contained in this report are based on the best professional judgment of the project team. The report has not been formally concurred upon by the U.S. Department of Energy and does not represent official DOE policy or guidance. The Office of Strategic Planning and Analysis (EM-24) is forwarding this contractor's report as a working draft to serve as an information resource to federal employees and stakeholders who are examining stewardship and/or information management issues.

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ACRONYMS

AEA	Atomic Energy Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CROs	Community Reuse Organizations
DOE	Department of Energy
EM	DOE Office of Environmental Management
ERD	Environmental Records Database
FGDC	Federal Geographic Data Committee
FIMAD	Facility for Information Management Analysis and Display
FOIA	Freedom of Information Act
GILS	Government Information Locator Service
GIS	Geographic Information System
IM	Information Management
LANL	Los Alamos National Laboratory
NARA	National Archives and Records Administration
NEDI	National Environmental Data Index
NEPA	National Environmental Policy Act
NOAA	National Oceanic & Atmospheric Administration
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
OAP	Openness Advisory Panel
OSTI	Office of Scientific and Technical Information
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RM	Records Management
SEAB	Secretary of Energy Advisory Board

1.0 INTRODUCTION

Since 1989, the U.S. Department of Energy's (DOE) Office of Environmental Management (EM)¹ has been responsible for managing the environmental legacy of U.S. nuclear weapons research, testing, and production at 137 sites in 31 states and one U.S. territory. Several recent reports have described the magnitude of the environmental problems at these sites and the scope of the planned cleanup effort, which is expected to take more than a decade and cost more than \$100 billion. In this context, the term cleanup refers to the deactivation and decommissioning of all facilities, cleanup of all releases to the environment in accordance with agreed upon standards, containment of groundwater contamination, installation of long-term treatment or groundwater monitoring systems, stabilization and/or safe long-term storage of nuclear material and spent fuel, and disposal of waste produced by past nuclear weapons production activities.²

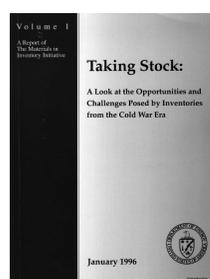
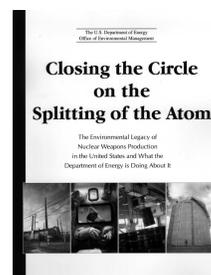
As cleanup plans have become more clearly defined, there is a growing realization that because of the extent of contamination and the types of contaminants present, it is technically and/or economically infeasible to clean up all contaminated lands and waters to allow unrestricted future use of these sites.

Therefore, when cleanup is considered "complete," additional measures may be required to ensure adequate protection of human health and the environment at many DOE sites. These additional measures are referred to as "long-term stewardship," which is defined broadly to encompass all activities required to maintain an adequate level of protection to human health and the environment from the hazards posed by nuclear and/or chemical materials, waste, and residual contamination remaining after cleanup is completed. Long-term stewardship will be required at the majority of DOE sites (and already has begun at some of these sites).

Recent DOE Reports on the Environmental Legacy of Nuclear Weapons Production

Closing the Circle on the Splitting of the Atom (January 1995)

This report describes the environmental, safety and health problems throughout the nuclear weapons complex and what the Department is doing to address them.

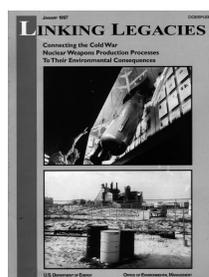
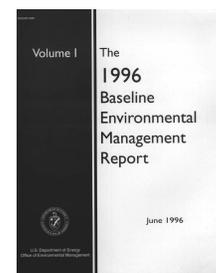


Taking Stock (January 1996)

This report provides a look at the current materials held in inventory by the Department and the opportunities and challenges they pose.

The 1996 Baseline Environmental Management Report (June 1996)

This report provides a life-cycle cost estimate and anticipated schedule for site cleanup.

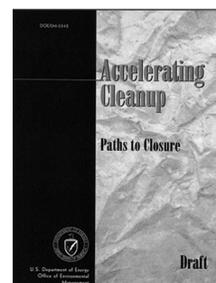


Linking Legacies (January 1997)

This report provides a detailed description of the environmental consequences of each step in the nuclear weapons production cycle.

Accelerating Cleanup: Paths to Closure (February 1998 Draft)

This report provides a proposed strategy for accelerating site cleanup and improving productivity to complete site cleanup at as many sites as possible by 2006.



¹ Formerly called the Office of Environmental Restoration and Waste Management.

² *Accelerating Cleanup: Paths to Closure*, U.S. Department of Energy, Office of Environmental Management, February 1998 Draft.

A companion report provides a comprehensive preliminary view of the sites currently within the responsibility of the EM program that may require stewardship after cleanup is completed. This report notes that, for all practical purposes, it is reasonable to assume that some long-term stewardship activities will be required indefinitely.³

Definition of Key Terms Used in This Report

Long-term Stewardship. All activities required to maintain an adequate level of protection to human health and the environment from the hazards posed by any nuclear and/or chemical materials, waste, and residual contamination remaining after cleanup is completed.

Stewardship Data. Information about past and present conditions and activities at sites that will be needed to ensure continued protection of human health and the environment. These data include information generated prior to and during cleanup as well as during long-term stewardship.

Site Stewards. Entities responsible for conducting long-term stewardship activities at sites. These entities may include a federal, state, or local government agency or a private organization that owns, leases, or subleases a site or a portion of a site.

This report represents a preliminary assessment of how successfully information about the hazards that remain at DOE sites will be preserved and made accessible for the duration of long-term stewardship. The assessment is limited to information that will be publicly available, although reference is made to information that requires special protection (e.g., classified information). This report provides a preliminary response to the following questions:

- What constitutes stewardship data? What are the likely ways in which information about each site will be used for future long-term stewardship activities? What specific types of data will be needed to support these uses? Who will need access to this information?
- How is information about sites currently managed and preserved for future generations? Are these records easily accessible? Are current records retention practices likely to be adequate to support long-term stewardship activities?
- What are the consequences of information loss? What are the current and future costs associated with a failure to identify and retain stewardship information?
- How can sites assess the stewardship value of a given piece of data? What criteria can be used to identify information that should be retained as stewardship data?
- How should stewardship data be organized and referenced? What will future users need to know about each piece of information? Are current data standards sufficient for long-term stewardship purposes?
- What will be required to develop a system for managing stewardship data? What options are available for maintaining and distributing these data?

³ *Moving From Cleanup to Stewardship*, U.S. Department of Energy, Office of Environmental Management, Discussion Draft, September, 1997 (permission to cite granted by EM Office of Policy, Planning and Budget).

1.1 Background

U.S. nuclear weapons production efforts began during the Manhattan Project and continued through the late 1980s. During that time, information about production processes, activities, and infrastructure was generally retained for operational purposes, while information about the environmental and human health impacts was not given similar priority. In 1989, DOE established the EM program to manage legacy waste and address contamination at DOE sites. Over the next several years, responsibility for managing the sites was transferred from Defense Programs, the office responsible for nuclear weapons production, to the EM program.

The EM program initially focused on determining the nature and extent of contamination at each site. To prepare for the physical assessment of conditions at the sites and plan for their cleanup, EM reviewed historical records describing the various production activities and processes. Because generating, preserving, and providing access to information on environmental impacts was not a high priority during the nuclear weapons production mission, accurate and complete records describing the types of waste disposed of, the nature and location of buried waste, past releases, and other aspects of site contamination were not retained. As a consequence, physical characterization often had to proceed on a trial and error basis, consuming considerable time and other resources. Characterization activities represented a significant portion of the EM program budget from 1989 to 1995. Even after most of the characterization was completed, DOE estimated in 1996 that future characterization efforts would consume more than 10 percent of total life-cycle cleanup costs. Although the additional costs associated with information loss cannot be quantified precisely, one can assume that the characterization process could have proceeded much more efficiently had the pertinent records existed.

DOE sites are now going through another transition from a mission focused on cleanup to one focused on long-term stewardship. Like the EM personnel who took on the cleanup mission from Defense Programs at former nuclear weapons production sites nearly 10 years ago, those responsible for long-term stewardship at former EM sites will need specific, accurate information about these sites in a form that is both useful and readily accessible. Other people will need to have this information, including those who use sites or portions of sites for other purposes, those who live and work in the surrounding communities, and those responsible for community planning and development. This information needs to include both environmental impacts as well as appropriate information about nuclear weapons production processes (e.g., locations and composition of production wastes). Without the appropriate data in the public domain about what led to these impacts, it will be difficult, perhaps even impossible, to conduct responsible long-term stewardship activities and make future decisions that adequately protect human health and the environment. The costs of long-term stewardship also will increase to the extent information has to be gathered anew or reconstructed, where possible. It is thus imperative that DOE preserve adequate information, maintain the appropriate data, and provide mechanisms for future access to this knowledge.

1.1.1 IMPORTANCE OF ADDRESSING THE NEED FOR STEWARDSHIP DATA

Without adequate stewardship data, it will be very difficult to carry out effective long-term stewardship at the sites. The importance of actively considering stewardship data needs is based on several observations about the EM program:

- Long-term stewardship has already begun at more than 20 sites and is expected to begin at the majority of DOE sites by 2006.
- When cleanup is considered "complete," responsibility for protecting human health and the environment at DOE sites may be transferred from EM to an entity or entities responsible for

long-term stewardship at the sites (which may or may not include DOE or another federal agency). These "site stewards" will need accurate information about site conditions at the time of transfer (i.e., a stewardship "baseline") and timely access to relevant past records.

- Institutional change may affect the preservation of stewardship information. Downsizing is occurring rapidly at DOE Headquarters and field sites, resulting in the departure of many experienced personnel. Also, as DOE replaces the old "Management and Operation" contracts with new "Management and Integration" contracts, a significant turnover of contractors is expected. The new contracts pose challenges because they result in multiple levels of activity, for example, when second- and third-tier sub-contractors are used.

1.1.2 OTHER RELATED INITIATIVES

Several DOE organizations have developed recommendations to improve the preservation of, and access to, DOE information. Many of these recommendations are relevant and important to the subset of information required for stewardship. The DOE Records Management Quality Improvement Team, created in July 1993, reviewed and evaluated the Department's records management program and its long-range program objective. The Team summarized its findings and provided recommendations for the records management program in its report, Roadmap to the Year 2000. The recommendations focused on improving access to DOE information.

The Secretary of Energy Advisory Board created the Openness Advisory Panel to review and evaluate the de-classification of documents. The Panel developed a set of recommendations to create an electronic records management system to better preserve information (e.g., retain information in a more permanent format, include a comprehensive index system) and allow future access (e.g., improve ability to conduct searches for information), as well as other recommendations to enhance and institutionalize openness throughout DOE and its contractor community. This report seeks to build upon those findings of the Records Management Quality Improvement Team and the Openness Advisory Panel that are relevant to stewardship data.

1.2 Methodology

The assessment outlined in this report was conducted by a diverse team composed of Federal and contractor representatives of DOE Headquarters (the EM Office of Policy, Planning, and Budget); the Federal Energy Technology Center; Pacific Northwest National Laboratory, Washington; and Sandia National Laboratory, New Mexico. The team included experts in long-term stewardship, records management, information management, geographic information systems, data standards, regulatory requirements, DOE's site cleanup program, risk assessment, and policy analysis. The team worked closely with a variety of personnel at the Rocky Flats Environmental Technology Site, including the site Chief Information Officer and contractor staff. In addition, the team provided briefings and held other discussions with the Department's Chief Information Officer, the DOE Historian's Office, and senior management.

A critical element of this assessment was the use of actual examples from one DOE site, Rocky Flats, as a "proof-of-concept" for the evaluations and suggestions developed by the project team. As such, we

Recent Recommendations to Improve Preservation of, and Access to, DOE Information

Roadmap to the Year 2000 (August 1995)

This report provides an evaluation of and recommendations to improve DOE's records management program.

U.S. DEPARTMENT OF ENERGY
RECORDS MANAGEMENT

**ROADMAP
TO THE YEAR
2000**

U.S. DEPARTMENT OF ENERGY
RECORDS MANAGEMENT QUALITY
IMPROVEMENT TEAM
Revision 1
August 1995

Responsible Openness:
An Imperative for the
Department of Energy

Openness Advisory Panel
Secretary of Energy Advisory Board
U.S. Department of Energy
Washington, D.C. 20585
August 25, 1997

Responsible Openness: An Imperative for the Department of Energy (August 1997)

This report provides recommendations to improve DOE's classification and declassification policies and programs, as well as other aspects of DOE's efforts to enhance openness.

will refer to Rocky Flats as the "focus site" for the remainder of this report. The focus site is likely to be the first major DOE site to have cleanup completed. The site is currently being managed under a strict, results-oriented model directed at completing site cleanup as rapidly and efficiently as possible. Because the majority of focus site projects have an anticipated completion date prior to 2006, an effective means to manage stewardship data would help both DOE and stakeholders manage the flurry of activity to be accomplished over the next 10 years, as well as prepare for long-term stewardship of the site. In addition, the focus site management recently expressed its commitment to the effective and efficient capture of key site information through cooperative agreements with local stakeholders.⁴ Implementation of the focus site information management tasks has been linked to existing performance goals for the site's integrating contractor.

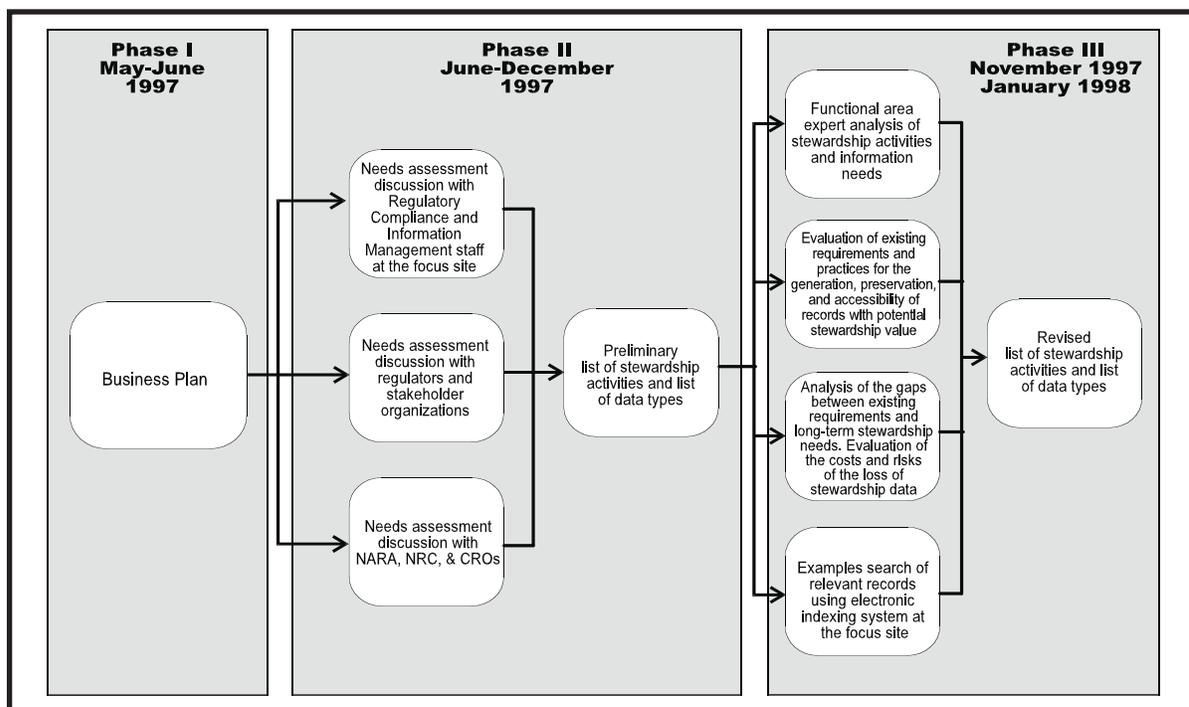
The project team conducted this assessment in three main phases (Figure 1-1). In the first phase, the project team developed a business plan that outlined the rationale for this assessment, identified the potential customers for this report, outlined the tasks and schedule for completing the assessment, and identified the components of an overall system for managing and providing appropriate access to stewardship data. The business plan was later revised to include the results of a needs analysis conducted during the second phase of this project and a series of short discussions of key issues that were raised during the needs analysis. The business plan served to introduce the project and stimulate discussion and was circulated among various DOE Headquarters offices, the focus site staff and contractors, and representatives from key stakeholder groups.

Why Rocky Flats?

Rocky Flats Environmental Technology Site (RFETS) was selected as the focus site for several reasons:

- It is likely to be the first major DOE site to complete cleanup and go through the closure/transfer process.
- High-level management has committed to align information management goals with site closure strategies.
- Past experience in putting together the reports cited on page 1-1 has demonstrated that its information management practices are better than at most DOE sites; therefore, any issues identified at the focus site are probably of equal or greater significance at other sites. In fact, the project team was able to verify that the findings in this report are programmatic in nature.
- Urban sprawl between two major metropolitan areas has already begun to reach site boundaries, suggesting that many people will be living close to the site in the near future.
- Interest exists at the site and in the surrounding communities to develop a cooperative system that would include, either as a subset or a whole, the components needed to develop a system for managing stewardship data.

Figure 1-1. Overview of Methodology



⁴ Rocky Flats Cleanup Agreement (RFCA), Part 23 "Sampling and Data/Document Availability," agreement letter between the DOE, US EPA, Colorado Department of Public Health and Environment, City of Westminster, and City of Broomfield, September, 1996.

In the second phase, the project team conducted a needs analysis for stewardship data. In June 1997, members of the team traveled to the focus site and facilitated two separate needs assessment discussions. One discussion was held with representatives of the focus site staff and contractor organizations involved with regulatory compliance and information management. A separate discussion was held at the offices of the Rocky Flats Local Impacts Initiative⁵ and involved representatives of several local regulators and stakeholder organizations (see box). To conduct these discussions, project staff asked participants to imagine themselves having four types of responsibilities 10 to 20 years from now, as well as more than 100 years into the future, and to assess what information about the site they would need to perform those responsibilities. The four sets of responsibilities were: (1) acting as the site steward (e.g., maintaining active controls to prevent human and ecosystem exposures); (2) emergency response (e.g., discovering and responding to a buried, contaminated pipeline onsite); (3) managing re-use of the site (e.g., leasing an onsite building or facility); and (4) community planning (e.g., determining where to put schools and roads in the areas surrounding the site).

To obtain a broader understanding of potential future information needs, the project team discussed potential stewardship data needs with representatives from a variety of other organizations within and external to DOE. These organizations included the Secretary of Energy's Openness Advisory Panel, the Office of DOE Chief Information Officer; the DOE Historian's Office, the National Archives and Records Administration (NARA), and the Nuclear Regulatory Commission (NRC). The project team also interviewed members of all existing Community Reuse Organizations (CROs)⁶ to evaluate information needs associated with site reuse and property transfer.

In the third phase, the project team evaluated a variety of factors that could affect DOE's ability to preserve and provide for access to stewardship data. First, the project team examined the adequacy of current record retention requirements and practices to meet stewardship data needs. The team also examined the adequacy of existing data standards and records indexing practices to assist future users in finding stewardship data of interest. In addition, a group of functional area experts was assembled to analyze scenarios expected to be encountered during each stewardship activity previously identified, identify decisions that would be made under each scenario, and specify the kinds of information required to support the decisions. The project team also evaluated the costs and financial risks associated with the loss of critical stewardship data and the benefits of a proactive approach for managing these data. An important component of these evaluations was the use of specific practices at the focus site (and other sites to a lesser extent) as a validation for various findings. For example, the criteria for identifying the stewardship value of data sources were developed and tested using an electronic record indexing system in use at the focus site. Selection queries were developed for each functional use and applied to the document index. This limited test evaluated the diagnosticity of the stewardship data selection criteria and identified some barriers to identification of stewardship records. It is critical to recognize that the specific examples cited in this report, from the focus site and other sites, may or may not be representative of the variety of practices and issues across the 137 DOE cleanup sites. In addition, the general conclusions and recommendations may not be appropriate for every site. Clearly, input and review from a wider range of sites is necessary.



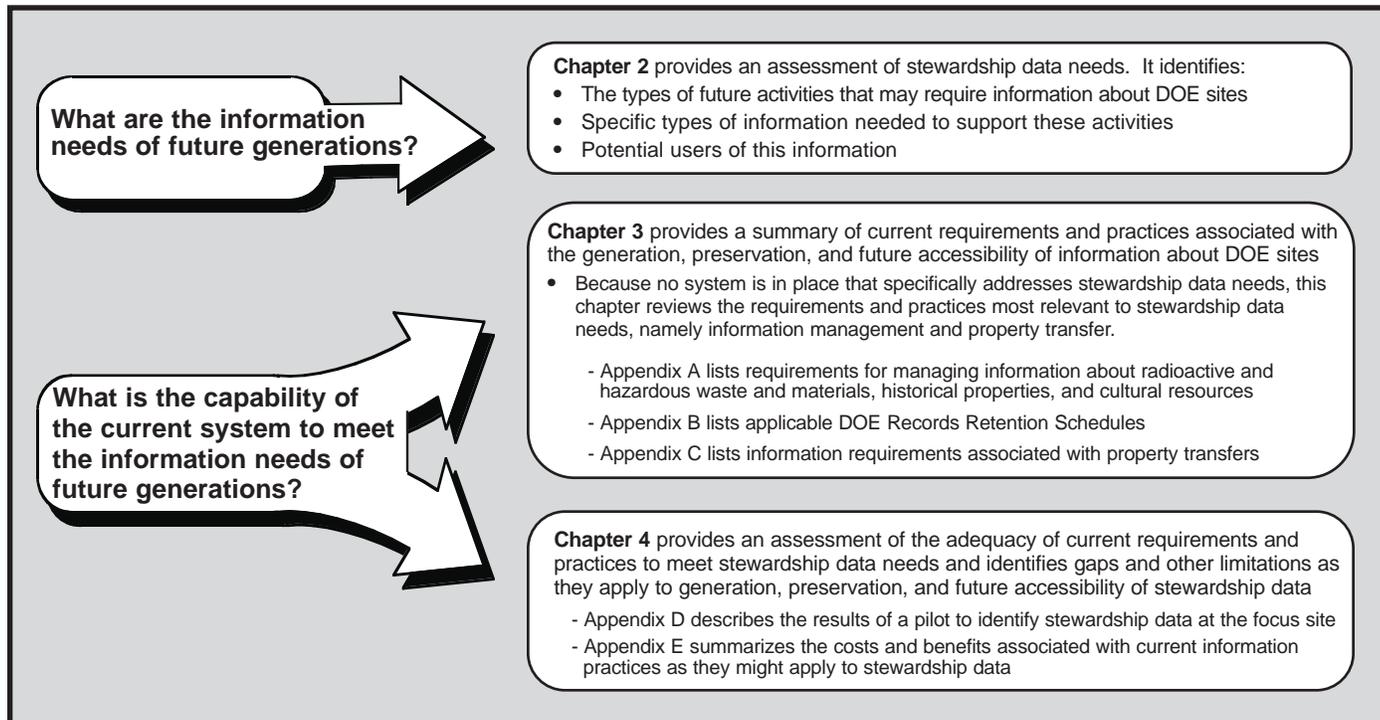
⁵ The Rocky Flats Local Impacts Initiative is the Community Reuse Organization (CRO) established for RFETS.

⁶ CROs have been established by DOE to assist in identifying alternatives for reuse of sites, identifying potential site owners or lessees, and facilitating transfer of property to new owners.

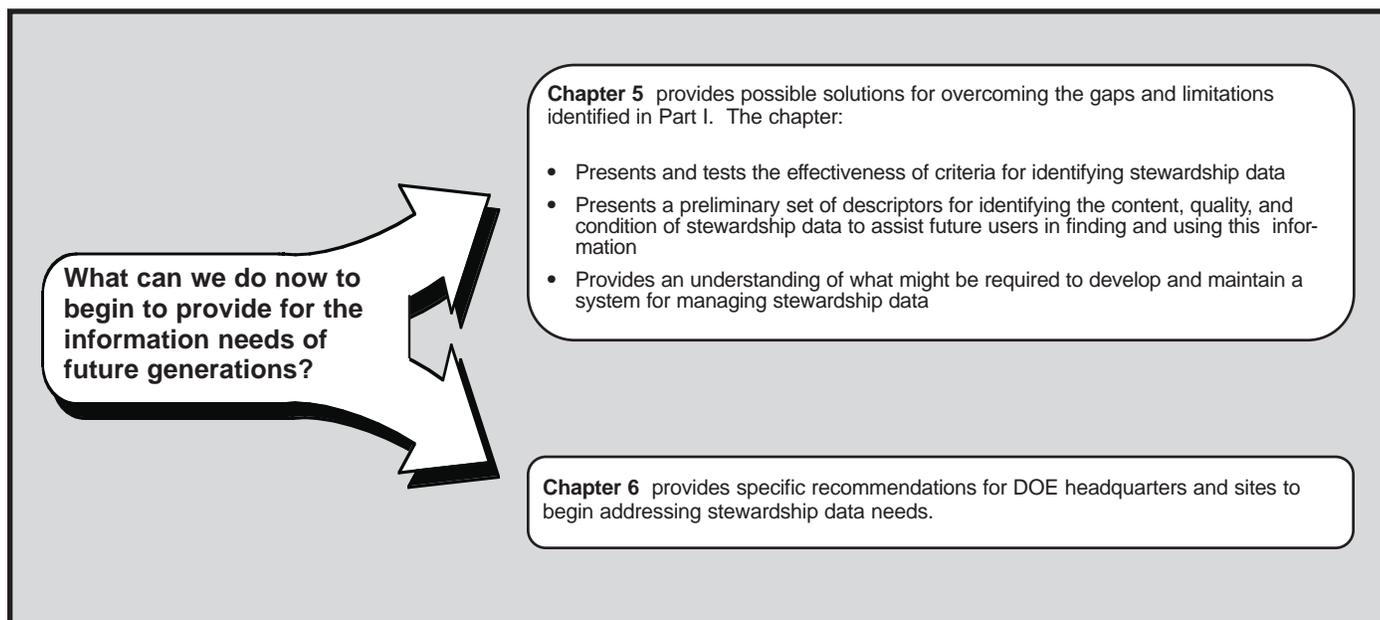
1.3 Organization of the Report

The remainder of this report is organized into two parts.

Part I focuses on identifying stewardship data needs, describing current DOE information management requirements and practices, and evaluating their effectiveness in meeting long-term stewardship needs.



Part II suggests several potential solutions to the gaps and other limitations highlighted in Part I. It also provides specific recommendations for DOE Headquarters and sites to begin addressing stewardship data needs. These suggestions are provided to stimulate wider discussion and debate about the issue of stewardship data; they are not intended as specific guidance, requirements, or directives.

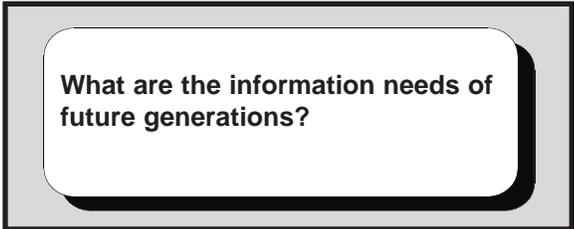


PART I

IDENTIFYING STEWARDSHIP DATA NEEDS

2.0 ASSESSING STEWARDSHIP DATA NEEDS

To protect human health and the environment during long-term stewardship, many different types of individuals will need to know about the hazards that remain on DOE sites. These individuals include those responsible for maintaining barriers and other protective measures onsite (i.e., the site stewards), those who are using the site or portions thereof for other purposes (e.g., businesses, Native Americans, and perhaps residents), those who live or work in offsite areas that might be affected by the hazards that remain at the site, and those such as community planners who are responsible for decisions that may affect the surrounding communities. This chapter provides an assessment of the types of information that these individuals will need, all of which constitutes stewardship data.



What are the information needs of future generations?

Information needs will evolve over the long time frame during which stewardship will be required. It is not possible to predict accurately what specific information will be needed 1,000 or even 100 years from now. While we cannot presume to understand the needs of the distant future, we can and should anticipate the types of information that will be needed to protect human health and the environment over the next 20 or 30 years with some degree of accuracy. We also have the obligation to anticipate, as best we can, the information needed for protection in the distant future on the basis of what we know today. If we fail to address information needs over the next 20 or 30 years, we will not have a sufficient basis for protecting human health and the environment over the longer term.

Section 2.1 identifies the types of future activities requiring stewardship data. Section 2.2 identifies the specific types of data needed to support these activities. Section 2.3 identifies the potential users of this information.

2.1 Future Activities Requiring Stewardship Data

The needs assessment conducted at the focus site and subsequent analyses have identified seven primary types of future activities at DOE sites or in the surrounding communities that may require stewardship data (Table 2-1). All of these activities are directly or indirectly related to protecting human health and the environment. Primary protective activities include monitoring hazards and maintaining protective barriers, emergency response, and compliance oversight. Other related activities include administrative functions such as resource management, planning, and economic development activities. Some of these activities are not likely to be conducted by the site stewards, but rather by others using or concerned about the site. However, the information produced by these activities will remain an integral component of long-term stewardship.

2.2 Types of Data Needed

The needs assessment conducted at the focus site and subsequent analyses have identified 12 distinct types of data needed to support the above seven categories of future activities. Table 2-2 provides a brief description of each type; additional details are provided in Appendix D. These data include specific information about site hazards and their controls (e.g., existing hazards, barriers and other mechanisms for preventing exposures); information about site operations and activities (e.g., onsite operations and infrastructure before and during long-term stewardship); information about the legal and regulatory framework governing site activities (e.g., requirements established in site closure/transfer agreements); and information about onsite characteristics (e.g., cultural and natural resources onsite). Information in all of these categories could support both the primary protective activities as well as the other related activities identified above.

Table 2-1. Future Activities Related to Long-term Stewardship

Primary Protective Activities	Administrative Activities	Planning and Development Activities
<p>1. <i>Monitoring hazards and maintaining protective barriers.</i> Long-term stewardship may include operating and maintaining barriers/control technologies; performing surveillance, monitoring, and reporting associated with onsite hazards; and determining appropriate changes in active/passive controls based on new information or regulations (e.g., changing cancer potency estimates). This activity includes support of dose reconstruction activities.</p> <p>2. <i>Emergency response.</i> Activities may involve responding to incidents onsite or offsite, including fire and rescue responses; responding to spills and other chemical releases; and responding to natural disasters such as earthquakes or tornadoes. Emergencies may directly involve radioactive or chemical hazards onsite (e.g., discovery of new contamination) or may involve such hazards indirectly (e.g., a fire may sweep across onsite areas containing radioactive or chemical hazards).</p> <p>3. <i>Compliance oversight.</i> Oversight activities may include ensuring that standards or early warning "triggers" established in site closure agreements are not exceeded; ensuring that protection of human health and the environment is adequate; and ensuring that monitoring data and other information are being collected and disseminated in accordance with site closure agreements.</p>	<p>4. <i>Resource management.</i> Includes all activities related to managing natural, mineral, and land resources onsite or offsite. In addition to the activities to support the primary long-term stewardship mission, some resources (e.g., endangered species) may require special protection unrelated to the primary long-term stewardship mission.</p> <p>5. <i>Providing administrative support for long-term stewardship activities.</i> Includes annual budget preparation; status reporting to Congress and others; conducting policy or regulatory analyses; and supporting research and development (e.g., for new technologies to address residual radioactive and chemical hazards).</p>	<p>6. <i>Site redevelopment.</i> Involves economic redevelopment of sites after cleanup is complete, including re-use of existing facilities or infrastructure; construction of new facilities or infrastructure; and revising land use restrictions as new information about site hazards becomes available.</p> <p>7. <i>Community planning.</i> Conducted primarily by local governments, these activities may include siting of roads, schools, hospitals, and other important infrastructure; supporting decisions regarding zoning and other land use issues; granting of easements and other "rights of way;" and economic redevelopment activities.</p>

*Table 2-2. Types of Data Needed to Support Future Stewardship Activities***Hazards and Controls**

- A. *Information regarding existing hazards.* Includes the location, type, condition, likelihood to migrate or otherwise move within the site or to offsite areas, and vulnerability (e.g., to fire, rain, earthquakes) of radioactive, chemical, and physical hazards left onsite after cleanup is complete. This information essentially provides a "baseline" of the state of each onsite hazard at the start of long-term stewardship.
- B. *Past and present releases and accidents.* Includes reports and other related data on past and present releases and accidents; radioactive and chemical contaminants or materials released during these events; who or what was known or suspected to be exposed to these contaminants of materials; and any documented or suspected exposure levels.
- C. *Disposition of historical hazards.* This information pertains to site hazards that existed in the past but were removed or otherwise mitigated to a point that allows unrestricted future uses, including legal or other supporting documentation to demonstrate that the hazards are no longer present.
- D. *Information regarding existing barriers and other active or passive mechanisms for preventing exposures.* Includes the location, type, condition, and vulnerability (e.g., to fire, rain, earthquakes) of barriers and other protective mechanisms for each existing hazard. This information also includes schedules for maintenance or other related actions required to ensure adequate protections remain in place.

Operations and Activities

- E. *Process history.* Includes current and historical data on activities that occurred onsite, where and when these activities occurred, what infrastructure was used to support these activities, what materials were used, and the products and wastes produced. This information includes a general history of the site; its historical mission(s); its role in the design, testing, production, and dismantlement of U.S. nuclear weapons; and any post-Cold War missions or activities at the site.
- F. *Historical infrastructure.* Includes what buildings, facilities, pipelines, and other infrastructure that have existed onsite; where they were located; and for what they were used. It also includes how onsite land areas were used.
- G. *Post-closure/transfer operations and infrastructure.* Information pertaining to the operation of the site after closure including policies and procedures, post-closure monitoring data, compliance reports, land use during stewardship, remaining buildings/facilities, processes, pipelines, infrastructure, and effluent monitoring.

Regulatory/Legal Framework

- H. *Regulatory framework (past and present).* Includes any compliance agreements, regulations, site closure agreements, permits, or other legal requirements associated with long-term stewardship activities at the site.
- I. *Requirements specific to transfer/closure and post transfer/closure.* Includes any specific monitoring, maintenance, or reporting requirements established as a part of site closure agreements. This information also includes specific reporting schedules established for monitoring or other data.
- J. *Real Estate records.* Real property records related to acquisition of the site, easements and other access rights onsite and offsite through public/private property, mineral rights, and water rights. This information includes legal agreements and associated documentation to allow appropriate access to offsite monitoring stations, pumps, or other active or passive control systems.

Site Characteristics/Setting

- K. *Information about cultural and natural resources.* Includes the location, type, and condition of onsite natural resources (including minerals, land and water resources, and habitats/species of concern), including resources of particular importance to Native American Tribes. It also includes the vulnerability of these resources to a variety of hazards, including residual radioactive and chemical hazards, other man-made hazards, and natural hazards.
- L. *Geophysical and political information.* This information includes site topography, site hydrogeology, geotechnical hazards, physical hazards, site boundaries, political boundaries, agricultural distribution patterns, and public exposure data.

The needs assessment also identified a potential need to provide information to support litigation. While some of the data types identified in Table 2-2 could also support litigation, information specific to litigation needs is outside the scope of stewardship data. Recognizing that DOE maintains special databases related to litigation, and that these databases may include stewardship data, Chapter 6 includes a recommendation to obtain such stewardship data when it is no longer necessary to maintain their confidentiality.

2.3 Matching Data Types to the Needs of Selected Future Users

Several types of persons and entities may need stewardship information in the future. Primary users are local, state, regional, or national entities who are responsible for performing or overseeing stewardship functions at a site and providing administrative support for those activities. Users external to the site include emergency response personnel and community planners. Table 2-3 presents an initial identification of the potential users and links their associated activities and data needs. It is recognized that a cross-walk of responsibilities, data needs, and future individuals or entities is speculative at present, and Table 2-3 is based largely on the judgment of the project team and the individuals who participated in various needs assessment discussions.

Table 2-3. Relationships Between Data Types and the Needs of Selected Future Users

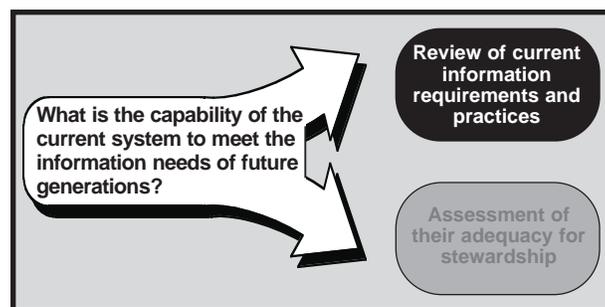
Potential Users	Examples of Potential Activities	Examples of Potential Data Types
Site Stewards	<ul style="list-style-type: none"> Protecting human health and the environment Site redevelopment Emergency response Administrative support 	<ul style="list-style-type: none"> Existing hazards Historical hazards Regulatory framework Transfer/closure requirements Geophysical/political
Native American Tribes	<ul style="list-style-type: none"> Protecting human health and the environment Site redevelopment Resource management Community planning 	<ul style="list-style-type: none"> Existing hazards Historical hazards Existing barriers Cultural and natural resources
Local fire departments Regional response teams	<ul style="list-style-type: none"> Emergency response 	<ul style="list-style-type: none"> Existing hazards Historical infrastructure
Local or state planning agencies	<ul style="list-style-type: none"> Compliance oversight Community planning Site redevelopment 	<ul style="list-style-type: none"> Existing hazards Historical hazards Real estate records
Local, state, or national regulatory agencies	<ul style="list-style-type: none"> Compliance oversight Administrative support 	<ul style="list-style-type: none"> Transfer/closure requirements Existing barriers Post-closure/transfer operations
Local, state, or national natural resource management agencies	<ul style="list-style-type: none"> Resource management Emergency response 	<ul style="list-style-type: none"> Natural resources Real estate records
Local, state, or national public interest groups or non-governmental organizations	<ul style="list-style-type: none"> Compliance oversight Community planning Resource management Site redevelopment 	<ul style="list-style-type: none"> Existing hazards Post-closure/transfer operations

In addition to these users, a variety of entities may also have considerable interest in stewardship data, including:

- People living near the sites
- Researchers (e.g., ecologists wishing to conduct field research onsite, engineers wishing to develop new monitoring or maintenance technologies)
- Commercial enterprises (e.g., developers wishing to construct buildings onsite, vendors wishing to sell new monitoring or maintenance technologies)
- International agencies or foreign governments wishing to establish long-term stewardship programs.

3.0 CURRENT REQUIREMENTS AND PRACTICES

This chapter reviews the existing requirements and practices for information management at DOE sites, focusing on the information needed for long-term stewardship. Because long-term stewardship is an emerging issue, there currently are no requirements or standardized practices that specifically address the management of information to be used in support of future long-term stewardship activities. Some types of stewardship data may be addressed in existing requirements and practices, but not for the specific purpose of supporting future stewardship activities. As a first step in assessing the capability requirements and practices to meet the information needs of future generations, it is necessary to understand generally how information is now managed at DOE sites.



While sites are operating, site personnel create, manage, use, and maintain data about the sites, including site history, current conditions, historical releases, existing contamination, waste management practices, and anticipated cleanup activities. Some of this information is collected to comply with laws and regulations, and some is needed in connection with ongoing operations. Various entities and legal requirements govern how information is managed by DOE, including laws and guidelines that apply to all information management by federal agencies, environmental laws and regulations governing waste and materials management, and internal DOE Orders. This chapter is limited primarily to federal requirements and practices that apply to DOE; specific requirements derived from state or local laws or site-specific compliance agreements are not included. The review also includes a discussion of how information is transferred when property is transferred. Section 3.1 describes the life-cycle of information and provides a framework for later discussions. Section 3.2 describes how information about DOE sites is currently managed throughout its life-cycle. Section 3.3 presents an overview of current requirements and practices that lead to the generation of the types of data identified in Chapter 2 needed to support future information needs. Section 3.4 summarizes current requirements and practices for preserving information about DOE sites. Section 3.5 summarizes current requirements and practices for accessing these data.

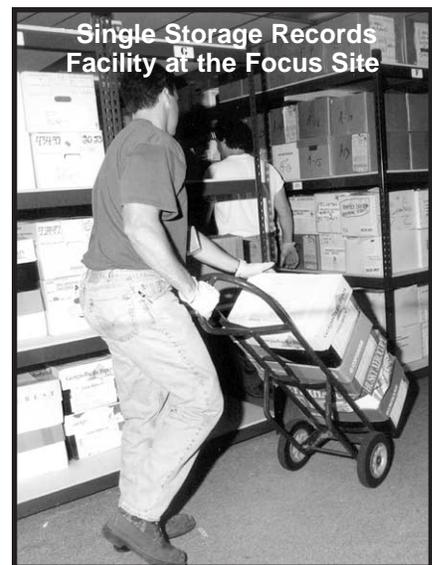
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3.1 The Life-Cycle of Information

The life-cycle of information about conditions and activities at DOE sites includes three distinct phases: (1) generation, (2) preservation, and (3) future access. This life-cycle lays the foundation for understanding current requirements and practices and for evaluating possible gaps that may exist in generating, preserving, and ensuring future access to stewardship data (Figure 3-1). Each of these phases is described below.

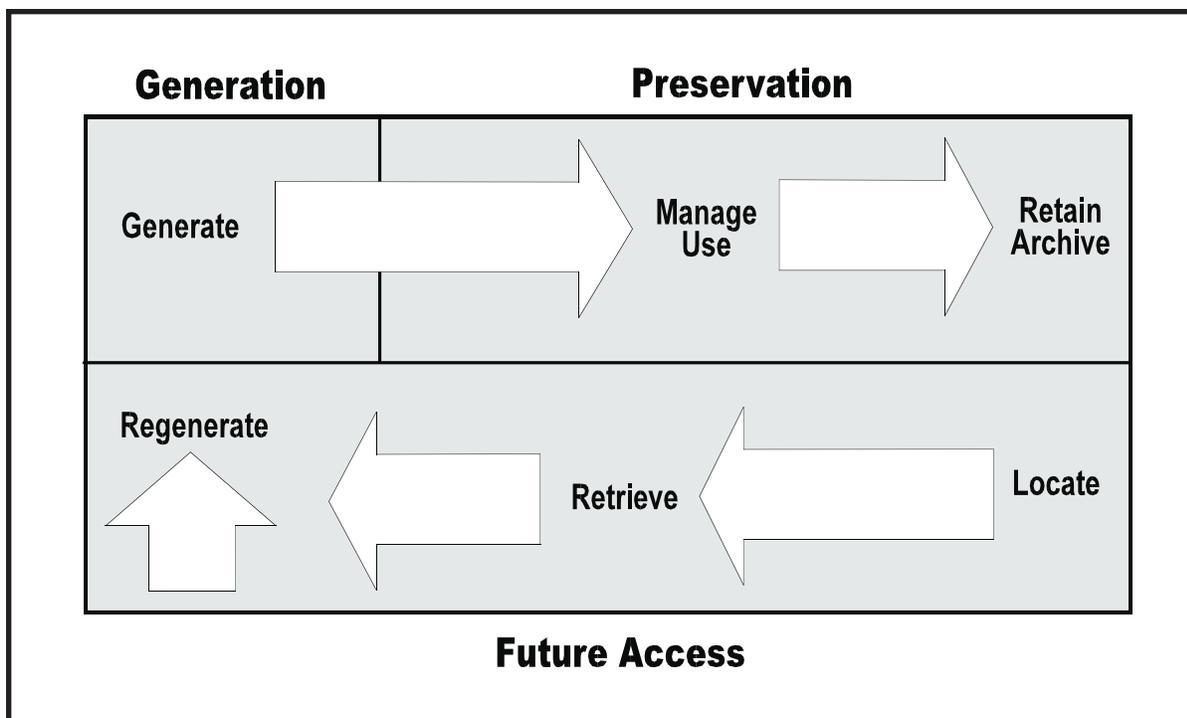
- Generation involves the creation and identification of information about site conditions and activities. Information is created using electronic and/or non-electronic formats in response to regulatory requirements and site operational needs. Some types of stewardship data (e.g., process history, historical hazards) were generated largely during the years in which sites were actively supporting weapons production. Other types of stewardship data (e.g., existing hazards) will be generated between now and when cleanup is complete. Because stewardship activities will continue at sites once cleanup is completed, some types of stewardship data (e.g., post-closure/transfer operations) will be generated in the future.

- Preservation involves managing information while it is in active use; capturing knowledge about its content, quality, condition, and other key characteristics; retaining the information for a specified period of time; and transferring the information to a more permanent archive. Preservation begins when information is in active use (e.g., to support cleanup or long-term stewardship activities), continues when the information is no longer in use but stored or otherwise maintained onsite, and is essentially complete once the information is transferred offsite to a more permanent archival repository. Different types of information are in active use for different periods of time. For example, monitoring data may be updated on a monthly or quarterly basis, while some environmental reports are updated annually. Similarly, established schedules for retaining information onsite and in an archival repository differ among information types. Preservation also includes recording sufficient contextual information about a data source to understand how to interpret and use the data. The accompanying photograph provides an example of a facility at which records are being preserved at the focus site (Building 441, NQA-1).



- Future Access involves locating, retrieving, and regenerating information that has been sent to an archival repository. Accomplishing this requires knowing that the information exists, having enough knowledge about the information to understand what it contains and how it might be used, knowing where the information is and how to retrieve it, and being able to retrieve the information using the appropriate technology. Future access may be a particular challenge for stewardship data because of the length of time over which this access may need to occur. Once information is regenerated, it may re-enter the life-cycle and need to be preserved and possibly accessed again (see Figure 3-1).

Figure 3-1. Life-Cycle of Information



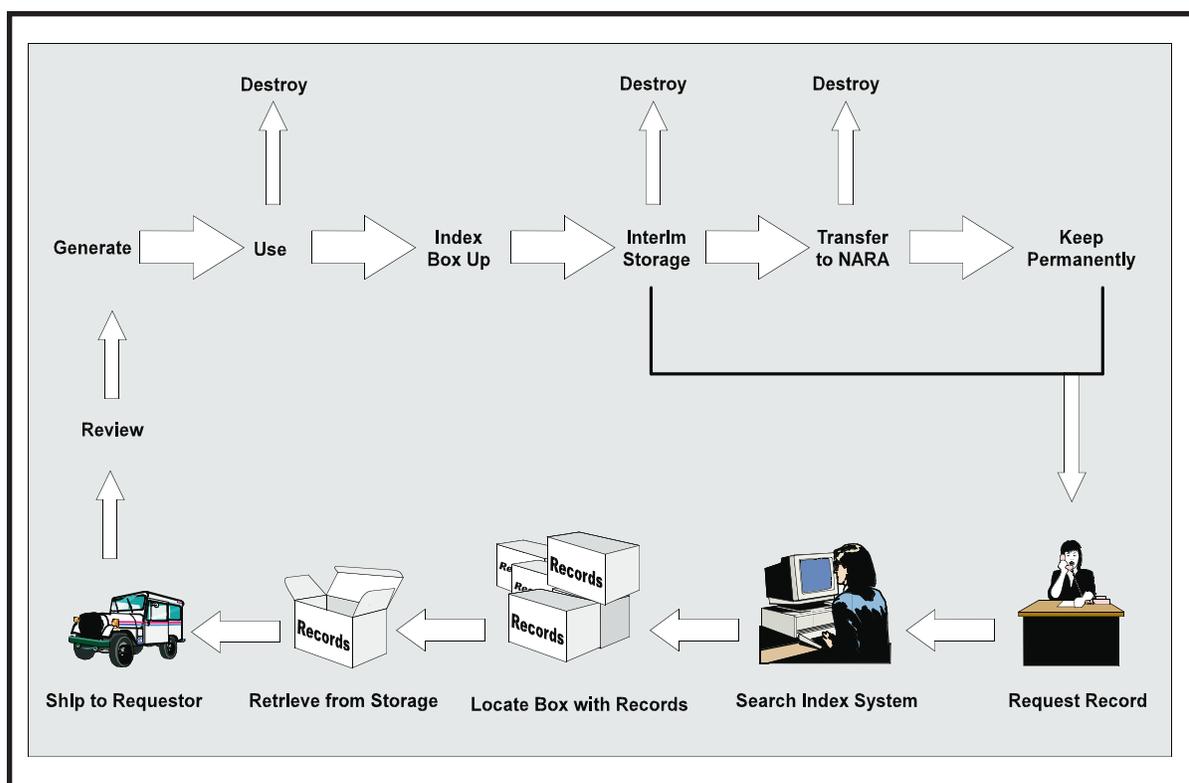
3.2 General Model for Information Management at DOE Sites

As noted above, information is generated at DOE sites to support a variety of regulatory and site mission requirements. Figure 3-2 presents an overview of the path information takes from the time it is generated to the time it is preserved and the steps involved in accessing and retrieving stored material. This is a representation of a wide variety of information management practices within DOE (many specific variants exist at the sites). Figure 3-2 provides a summary framework for understanding current requirements and practices.

What is a Record?

The National Archives and Records Administration defines "records" to include all books, papers, maps, photographs, machine readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency of the United States Government under Federal law or in connection with the transaction of public business and preserved or appropriate for preservation by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the Government or because of the informational value of data in them.

Figure 3-2. Conceptual Model of the Paths Information About DOE Sites Take: Generation, Preservation and Future Access



Once a piece of information is generated, it may become a record as defined by the National Archives and Records Administration (NARA). Records are used for a period of time, and when no longer needed, either preserved permanently or saved for a specified period of time, then destroyed. Hard copy records (e.g., books, reports, maps) are typically preserved by placing them in boxes, indexing the boxes, and shipping the boxes to an interim repository at the site. Large sites such as Oak Ridge and Hanford have dozens of interim repositories. Once records are placed in an interim repository, they are stored for varying periods of time (e.g., 1 year, 25 years, or more) until they are

either destroyed or shipped to one of several archival repositories managed by NARA. NARA either retains the record permanently or for a specified period of time prior to destruction (e.g., 75 or 80 years). Specific requirements for preserving and destroying records are established by a variety of NARA-approved Records Retention Schedules (see Section 3.4). Requirements and practices for preserving electronic material (e.g., databases, word processing documents) are evolving at present. Some electronic material (e.g., electronic copies of reports) are considered identical to their hard-copy counterparts and are preserved in a similar manner. The status of other electronic material (e.g., databases) is unclear at present (see Chapter 4).

Future access to preserved records is achieved by request. Users submit a request to the entity responsible for managing the records repository (either an onsite organization or NARA). Requests for specific records (e.g., a specific report) are fulfilled by locating the box containing the record, retrieving it from storage, extracting the record, and sending a copy to the requester. More general requests (e.g., all reports that cover a given topic area) are fulfilled by first searching indexing systems to identify potentially relevant records, then following the above retrieval and shipping process. More recently, DOE has developed searchable electronic indexes to specific types of records and has made electronic copies of some records available via the Internet (see Section 3.5).

Under current practices, records and indexes may be either electronic or hard copy. Electronic indexing systems are used for both electronic and hard copy records. In addition, hard copy indexing systems are used for hard copy records. It is not clear whether any hard copy indexing systems are used for electronic records, but if so, they are probably uncommon.

3.3 Data Generation

Many of the types of data needed for stewardship are required to be generated under current laws, regulations, or guidelines. Very often, these requirements are prescribed in connection with operating a certain type of site or facility, or monitoring a facility after it is closed. Laws and regulations that apply to radioactive and hazardous waste and materials require that certain data be maintained to demonstrate compliance with statutory provisions. Such laws include the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Atomic Energy Act (AEA), as well as laws dealing with the protection of historic properties and cultural resources. Numerous DOE Orders also contain requirements for generating information. These regulations and orders are listed in Appendix A.

Some of the 12 types of stewardship data identified in Chapter 2 clearly are required to be generated under existing regulations and DOE Orders; however, they are not necessarily identified as data intended for future stewards, as defined in this report. For example, data on existing hazards, a type of data needed for stewardship, are required to be generated pursuant to regulations enacted under the AEA, RCRA, and CERCLA. One such regulation, at 40 CFR 264.73, prescribes that an Operating Record maintained for a facility contain data on the location of each hazardous waste within a facility and the quantity at each location. That same provision also requires that information be kept on historical hazards, specifically the quantities and date of placement for each shipment of hazardous waste placed in land disposal units under certain conditions. Regulations pertaining to radioactive waste (e.g., 10 CFR 61) have similar requirements in connection with obtaining a Nuclear Regulatory Commission (NRC) license for land disposal of such waste.

A limited number of existing regulations identify the generation of data, specifically for the use of future stewards. For example, several provisions of the National Historic Preservation Act identify types of information that have historical value to future generations, including important evidence of the organization, functions, policies, decisions, procedures, and operations of a federal agency and

information of historical and cultural significance. Certain other regulations (e.g., RCRA, CERCLA) and property transfer requirements implicitly recognize information of value to future generations by requiring that such information be included in deeds or administrative records.

3.4 Data Preservation

There are two distinct aspects to data preservation as it relates to stewardship data. The first involves maintaining physical control of the media on which the information resides and ensuring the physical integrity of these media. Reports, electronic databases, photographs, and other types of information must be adequately stored, maintained, and archived. The second aspect involves recording and preserving what we need to know about the information in order to understand enough about it to use it in the future. Sufficient contextual information must be recorded and maintained in order to understand the significance of the reports, databases, photographs, and other types of information present in an archival repository. Federal agencies, including DOE, address physical control and integrity through formal records disposition requirements and practices. Federal agencies address contextual information, at least for electronic records, through metadata standards. Each of these is discussed in a separate subsection below.

3.4.1 PHYSICAL CONTROL OF INFORMATION

As a federal agency, DOE is subject to the guidelines for records disposition established by NARA. Under these guidelines, DOE has established NARA-approved records retention schedules that specify how long records must be retained. Under these schedules, certain records are to be retained for a specified length of time and others may be discarded and destroyed immediately. Records retention periods vary from a few months to many decades (e.g., 75 or 80 years) to permanent retention. Information regarding the records retention schedules that involve the preservation of data potentially useful for stewardship is contained in Appendix B. Records Management personnel at the sites are responsible for evaluating and dispositioning records to offsite locations for long-term preservation. The protocols used in this process determine the types and forms of data retained at sites prior to their closure, and are thus important to the stewardship effort.

The environmental laws and regulations that apply to DOE often address the period over which information must be retained. For example, the closure plans for hazardous waste units under RCRA must include information on steps required for closure, post-closure care requirements, and other matters. Post-closure care is required for 30 years, and the closure report must be placed onto the deed indefinitely (40 CFR 265). In the case of certain NRC-licensed facilities (e.g., Uranium Mill Tailings Remedial Action sites, Battelle Columbus Laboratories, Piqua Nuclear Power Facility), records of the disposal of licensed radioactive materials need only be retained until the NRC license expires. Retention schedules are also addressed in various DOE Orders. DOE may also issue moratoriums on the destruction of particular types of records. The regulations and orders, however, do not necessarily prescribe the form in which they should be retained or the types of information that must accompany the data. At some sites, current practices for preserving information are being reevaluated.

In preserving records, DOE must also meet the requirements of the Paperwork Reduction Act of

Information Management Efforts

Current and planned efforts at the focus site are concentrated on the modernization of key active systems, evaluation of infrastructure needs, and process needs of site closure. Records management efforts are focused on:

- Re-engineering planning and disposition of records for site closure
- Maintaining priority records (e.g., RCRA operating records)
- Retaining consistency in capture processes for cost-effective disposition and retrieval of inactive records
- Removing contaminated and classified records
- Identifying and dispositioning abandoned records
- Providing document production for litigation support
- Providing compliant management and archiving of electronic records.

1995. Designed to minimize the burden of paperwork on federal agencies, this Act requires agencies to evaluate their records management control processes to maximize practical utility and public benefit of the information created, collected, disclosed, and maintained by or for the Federal Government.

As DOE sites complete cleanup, some (or some portions) may be transferred to other entities. Certain data requirements apply if DOE property is to be sold or leased to another entity. Thus, DOE needs to preserve data adequate for these transactions, some of which may not take place until many years into the future.

The property transfer provisions that apply to DOE (see Appendix C) do not necessarily prescribe specific data that must be preserved, but they often require findings or determinations that presume certain data exist. For example, if DOE leases or sells land under the Hall Amendment to the Defense Authorization Act of 1994, the Secretary of Energy is required to determine (in consultation with EPA and the state) that "the environmental conditions of the property...are consistent with safety and the protection of the public health and the environment." To make this determination, DOE must have information about the source, type, and extent of environmental contamination at the site to be transferred. Other examples of information required to be transferred when property is transferred are described in Appendix C.

Historic Mechanisms for DOE Property Acquisition

Acquisition. Obtained through purchase from original owner.

Withdrawal. Property withdrawn from public domain, reserved by the Department of Interior (DOI), for use by the DOE.

Other. Property provided to DOE via grant or some other vehicle.

3.4.2 CONTEXTUAL INFORMATION

As a federal agency, DOE is subject to existing guidelines and standards for recording and preserving sufficient contextual information to allow a user to understand and use data contained in a record. Contextual information is typically preserved in two ways. Indexes are used to preserve contextual information about books, reports, photographs, maps, and other hard copy records. Metadata are used to preserve contextual information about data in electronic databases.

Why do we need contextual information for records that are physically retained and archived? The simple answer is that many records (e.g., maps, photographs, databases) are virtually worthless without sufficient contextual information. Imagine the difficulty in re-using a data set you created six months ago if you have lost your reference notes (e.g., groundwater data includes contaminant concentrations levels with no well location or depth information). You may be able to understand the numbers in the data set and where they came from, but you might not know how each data element is defined and whether this is the original or revised version. Imagine yourself with the same task as above, but this time the data set was created two years ago by someone else who now works for another organization. Imagine someone else trying to find the information contained in the two data sets 15 years into the future. If they knew to look for these data sets, and if they could locate and read them, how would they know what the data really represent? If instead, a structured approach for recording a description of this data set had been followed, it is more likely that the information would be retrievable and usable far into the future.

Contextual information is especially important when the life-cycle of the information contained in the data set will extend many years into the future. More specifically, contextual information is important because the life-cycle of stewardship data will extend beyond the period of time when site cleanup is considered "complete." Long-term stewardship will depend on communication—sharing information about sites between people and organizations, across the years. Contextual information

is necessary to facilitate that communication, so that future stewards will be able to identify and find available information, understand what it represents, and understand its limitations. Without the ability to transfer contextual information to future users, raw records such as maps, photographs, and data archives are of very little use.

3.4.2.1 Indexing

The term "indexing" in this report refers to the process of referencing the content of records through keywords, subject codes, and other identifiers. Without a standard method of indexing, it may be difficult or impossible for future generations to identify and access stewardship data. Although efforts are underway to develop a standard federal index for environmental data, there does not appear to be a Federal regulation or standard that discusses indexing. Also, there does not appear to be any standard indexing system or standard for hard-copy records maintained by DOE. DOE records management guidance¹ provides general conceptual guidance for managing electronic records and developing standard subject codes and other indexing elements but does not establish a standard thesaurus for such elements. (DOE has formally withdrawn this guidance, but sites continue to use it as a working reference). In fact, over the past several years, DOE has not required subject indexing because of its continuing effort to convert its records to a digital format (and thus to use keyword searches to locate information).

The National Performance Review also identified a need to develop indexing standards and has called for the creation of a National Environmental Data Index (NEDI). The NEDI will serve as a standard reference to all government environmental data holdings (i.e., a "yellow pages") and thereby facilitate access to these holdings. NEDI is intended to provide access to existing environmental information locator systems that describe data holdings (metadata databases). Providing one-stop access to these separate indexes for environmental data and information queries is a high priority task in the design and implementation of the NEDI. Phase one implementation will begin with development of a prototype system. DOE plans to include information on global change, energy resources, and renewable energy in the prototype but does not plan to include any information on cleanup. NEDI can be accessed at <http://esdim.noaa.gov>.

DOE's Office of Scientific and Technical Information (OSTI) has developed an online bibliographic database for all DOE-sponsored scientific and technical reports issued since January 1, 1994. Indexers assign terms using a controlled vocabulary (based on the publication International Energy: Subject Thesaurus) to describe the specific technical information contained in the report. Users also can search the database using their own keywords. The database can be accessed at this Internet address: <http://www.osti.gov/html/dra/dra.html>.

3.4.2.2 Metadata

The term "metadata" refers to information about a given set of electronic data—what data are available, what these data represent, and the limitations a user would need to understand to use the information effectively. Many of the basic elements needed to describe a data set are obvious (for example, its name, the name of the person who created it, the date(s) it was created and revised, and a short description of its content). Beyond the basics, however, lie myriad details that can be approached differently. The need for consistent descrip-

Metadata

Metadata describe the content, quality, condition, and other characteristics of electronic data. Metadata are used to organize and maintain investments in data, to provide information to data catalogs and clearinghouses, and to aid data transfers. Metadata records describe data sets in sufficient detail for a user to:

- Know enough about each data set to understand what it contains and how the data might be used
- Have a means of sifting through a series of data sets to find the specific data that the user needs
- Maintain an accessible repository in which data can be preserved and from which they may be accessed.

¹ Implementation Guide for Use with 36 CFR Chapter XII - Subchapter B Records Management, DOE G 1324.5B, July, 1996. DOE G 241. X-I, Electronic Records Management Guide for use with 36 CFR XII - Part 1234, Draft, March 1998

tions of the contents of documents and databases extends well beyond DOE and the concept of long-term stewardship. Metadata standards have long been a national and international priority for professionals in government, information management, and archiving and library communities.

The Federal government has established several sets of metadata standards and required their use under a variety of laws and administrative orders (see Table 3-1). These sets of standards were developed for different purposes and represent a range of complexity. The simpler the metadata standards, the easier they are to implement, but the less information they convey. Three sets of metadata standards provide a good example of the range of available options for stewardship data: the "Dublin Core," the Government Information Locator Service (GILS metadata standards), and the Federal Geographic Data Committee's Content Standards for Digital Geospatial Metadata (FGDC metadata standards).

Table 3-1. Examples of Federal Metadata Standards

Name of Metadata Standard	Purpose
Dublin Core	Established "core elements" that loosely define GILS
Government Information Locator Service (GILS)	Established to assist agencies and the public in locating and sharing government information
Warwick Framework	Defines a protocol for expanding on the Dublin Core
Federal Geographic Data Committee (FGDC) Content Standards	Established to facilitate sharing of geospatial data sets among agencies
FGDC Supplemental Profiles	Established for specific content areas (e.g., biological data)
Z39.50	A protocol for searching/sharing metadata across machines
Machine Readable Cataloging (MARC)	A library data format for exchanging metadata

- The Dublin Core represents a simple set of metadata elements assembled through a series of workshops with experts from libraries, the networking and digital library research communities, and a variety of content specialties. These standards are intended to be used by non-catalogers as well as by those with experience with formal resource description models. Most of the metadata elements can be commonly understood to represent the equivalent of a catalog card for electronic resources. While easy to understand, the Dublin Core is not in itself a sufficiently comprehensive or unambiguous approach to documenting data sets. It is well suited to documenting resources in a form people can read, but not specific enough to facilitate efficient computer-based searching on its own.
- The GILS metadata standards were developed pursuant to U.S. Public Law 44 USC 3511, which requires establishment of "a distributed agency-based electronic Government Information Locator Service ... which shall identify the major information systems, holdings, and dissemination products of each agency." The creation of GILS was a goal of the National Information Infrastructure: Agenda for Action, which called for the establishment of a "virtual card catalog" of government information holdings.² GILS was intended to identify information resources throughout the Executive Branch, describe the information available, and provide assistance in obtaining the information. It was also intended to improve the abilities of agencies to carry out their records management responsibilities. The GILS metadata standards are much more comprehensive than the Dublin Core, but are not specifically designed for geospatial data.

² OMB Bulletin 95-01 (December 7, 1994) established GILS as envisioned in *The National Information Infrastructure: Agenda for Action*, Information Infrastructure Task Force (September 15, 1993).

- The FGDC metadata standards were developed pursuant to Executive Order 12906³, which mandated that all federal agencies adopt these standards for all geospatial data sets created after January 1, 1995, in order to facilitate sharing of geospatial data sets among Federal agencies and with the public. These metadata standards specify the information content of metadata for geospatial data sets like maps, Geographic Information System (GIS) and Computer Aided Drafting (CAD) data sets, and other data files that contain information about where things are located. Metadata meeting these specifications are now required by OMB for any geospatial data disseminated to the public. While not required for non-spatial data, these standards provide a carefully considered approach that can, with minor modifications, be applied for non-spatial data. With 334 metadata elements defined in the current set, the FGDC metadata standards are the most comprehensive Federal metadata standards. Some FGDC metadata elements are mandatory; many more are "mandatory if applicable" or optional. Some fields may be completed with any-typed text ("free text"). Other fields have specifically enumerated values or require index terms to be drawn from an explicit thesaurus; this improves machine readability and searchability of these records.

The FGDC framework does not provide enough information about data sets for all applications. Geologists, for example, may require specific, keyword-searchable information about the types of rock strata that might otherwise be described in a free text field. Biologists might need specific information on species or habitat associations. And stewards of former DOE sites might require specific information on special nuclear materials issues, relevance to litigation, or other issues. The FGDC approach includes a provision to create Supplemental Profiles to be used in conjunction with the existing metadata standards. Rather than re-defining existing elements, this process seeks to narrow the options for filling in the existing data elements to assure that the information that is entered is sufficiently specific, and adding additional user-defined data elements as appropriate to capture the information content of the data set.

The Metadata Content Standard for Biological Resources Data, proposed by the Biological Resources Division of the U.S. Geological Survey, is one such "profile." Others are in various stages of preparation for geologic information, utility information, and facility identification information.

3.5 Future Access

Access to information relevant to stewardship can be obtained in a variety of ways. Some aspects are governed by existing laws and regulations, others by DOE's own practices. Certain laws that apply to all federal agencies set a general framework for access to DOE information. For example, the Freedom of Information Act (FOIA) prescribes procedures for public access to certain information maintained by the federal government. A goal of DOE for the year 2000 is to develop and implement processes to provide access to information addressed by these and related laws, regulations, Executive Orders, and directives.⁴ Efforts to meet these requirements are being addressed by the Secretary of Energy Advisory Board (SEAB) Openness Advisory Panel (OAP). The OAP was convened in July 1996 to advise SEAB regarding the DOE's classification and declassification policies and programs and on improving public access by providing the public with accurate and complete information on DOE activities.⁵ Like the environmental laws references in Section 3.3, these efforts are not necessarily focused on stewardship, although they may be quite useful for that purpose. Certain types of information may not be made available, however, under provisions of the Privacy Act. The AEA also restricts access to information about certain nuclear materials and activities.

³ Executive Order 12906, Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure (11 April 1994) requires federal agencies to ensure that all geospatial data are collected in a manner that meets all relevant standards adopted by the Federal Geographic Data Committee (FGDC), an interagency committee established by the Office of Management and Budget.

⁴ *Roadmap To the Year 2000*, U.S. Department of Energy, Records Management Program, Revision 1, August 1995.

Existing record management procedures instituted by DOE are primarily designed to ensure access to information over the active use of the data and the site. Practices within the Department are beginning to account for changes in its missions and operations in planning for life-cycle management of information. Public access to information is also prescribed in connection with specific legally required processes, such as the preparation of Environmental Impact Statements under the National Environmental Policy Act (NEPA).

For DOE property that is transferred or reused, there are various mechanisms for accessing information. During the transfer process, the future property owner or lessee identifies the information that should be obtained by DOE or requests the appropriate records. As described in Appendix C, site Community Reuse Organizations (CROs) may also request certain types of information as they work with DOE to develop a Community Transition Plan, which can involve transfer, reuse, or other disposition of sites and property. Some information about a site also must be referenced in deeds, particularly when certain use restrictions apply due to environmental conditions. Any documents developed under NEPA that describe environmental conditions at the site are also publicly available. Some sites also have public reading rooms that contain a variety of site-related documents that future stewards may access.

Recommended Stewardship Data From Property Reuse Guidance

- Nature and extent of contamination
- Environmental status of property
- Information on completed or planned decontamination activities including cleanup levels, schedules, and costs
- Natural resources, including wetlands, aquifers, floodplains, endangered or threatened species and habitats, migratory bird routes, mineral deposits, pristine areas, etc.
- Cultural resources
- Marketability analyses that include facility characteristics

Source: *Resourceful Reuse: A Guide to Planning Future Uses of DOE Sites*, May 1996, DOE/EM-0285

Approximately 3.2 million cubic feet of DOE records survive in dozens of locations across the United States. A limited number of these records have been electronically scanned and/or indexed and thus are relatively easy to locate and retrieve. Many other records exist only in hard copy and are poorly cataloged, if at all. At the national level, there are three primary means to access these records:

- DOE maintains reading rooms at various sites around the United States. Holdings at each reading room range from approximately 500 to more than 300,000 documents. DOE receives approximately five to eight thousand requests each year for documents at these reading rooms.
- Each year, DOE receives approximately 3,000 requests for information under the FOIA. DOE is required to respond to each FOIA request within 10 days. However, the average response time to complete the request is considerably longer. In 1991, average response time was nearly 3.5 years. By 1995, this was reduced to approximately 16 months.
- In recent years, DOE has developed electronic indexing systems for a variety of hard copy records. These systems allow users to identify documents of interest via electronic keyword searches (e.g., over the Internet). In some cases, the user must order (and pay for) a hard-copy version of each document of interest. In other cases, the documents are available electronically via the Internet. Examples of such systems include:
 - DOE's Office of Human Radiation Experiments has located and identified approximately 13,000 documents related to Cold War radiation experiments on human subjects. These documents are available in electronic format via the Internet (<http://hrex.dis.anl.gov/>). The information is fully searchable by personal name, location, and many other keywords.

⁵ *Responsible Openness: An Imperative for the Department of Energy*, Openness Advisory Panel, Secretary of Energy Advisory Board, U.S. Department of Energy, August 1997.

- The DOE Reports Bibliographic Database provides an electronic index to all technical and scientific reports produced by DOE since January 1994.
- DOE's Office of Science and Technology Information (OSTI) manages several other programs to disseminate scientific and technical information electronically, including a repository of all documents published by DOE.

DOE sites also maintain repositories of hard copy records and have developed electronic indexing systems. In some cases, sites have recorded information contained in these records electronically and have made this information available via electronic search and retrieval methods. For example:

- Los Alamos National Laboratory (LANL) maintains the Facility for Information Management Analysis and Display (FIMAD) database containing the results of several million environmental samples conducted to support cleanup at LANL. Users include the cleanup program as well as other programs at LANL, and state and federal regulators.
- The Oak Ridge site has consolidated documents from 10 records centers at the K-25 plant into two records repositories. These records are searchable via an electronic index using a proprietary document management system known as Documentum. The Savannah River Site also uses the Documentum system.
- The focus site maintains the Environmental Records Database (ERD), which is a compilation of more than 30 records indexing databases from across the site. ERD currently contains more than 400,000 records related to environmental data through 1995. These records are indexed and searchable. (See Appendix D for more information regarding the ERD.)

The options available to persons or organizations outside of DOE who wish to access a particular record or set of records include the following:

1. Visit a DOE public reading room.
2. Search the DOE Internet site, which includes a variety of information such as the published documents available from OSTI.
3. Submit a request to DOE under the FOIA.
4. Visit a NARA archive that contains DOE records.
5. Submit a request to the appropriate field office, where a previous arrangement has been made to provide information directly to the requester (e.g., when property is to be transferred to another entity there may be an agreement to provide any information useful to the future user).

This is not an exhaustive list and other information resources are available (e.g., citizen groups, DOE contractors).

Within DOE, the process to search and retrieve records varies from site to site. There may be multiple records control processes at a site, reflecting the variety of programs and offices. To search for a particular record, a records manager in one program will identify whether the record is in his/her records management program. If the record is not in the manager's program, she/he will work with other records managers at the site to identify where the record is likely to be located. Once the appropriate records management program is identified, the manager will search the records management system (e.g., electronic indexing system) for the record. The manager will then be able to identify where the record is located, as well as the size and complexity of the record (e.g., whether

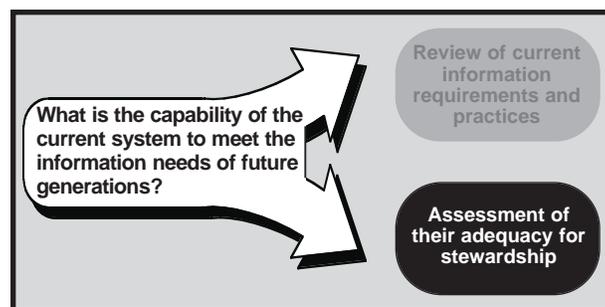
the record is a specific document or is an entire project file). The records manager can then work with the requester to obtain the portion or portions that are most relevant to the request.

It is possible that the record requested is not contained in any records management program at the site. For example, the record may still be in active use. If the records manager determines that the record is not contained in any records management program and it is in active use, the records manager will work with other managers at the site to identify the office and/or personnel that are most likely to have the record.

Costs associated with locating and retrieving past records are significant. For example, DOE currently spends approximately \$5-6 million each year responding to FOIA requests, and maintenance costs for site-specific systems such as the FIMAD database at LANL and the document management system at K-25 at Oak Ridge are approximately \$1.5-2 million per year. Processing costs per record also are significant. For example, the current costs involved in retrieving, scanning, and disseminating OSTI's holdings currently costs approximately \$25 for each paper copy record and approximately \$3 for each electronic record. It is also extremely costly to locate, retrieve, and make available past records. For example, to assemble the repository of documents related to Cold War radiation experiments on human subjects, more than 200 staff in Washington, D.C. and around the country spent most of their time in 1994 to locate, declassify, and evaluate these records and make more than 13,000 documents available to the public via the Internet. Some of these records were in the custody of private institutions rather than DOE, which complicated retrieval of the records. Details regarding these and other related costs are provided in Appendix E.

4.0 GAPS AND RESULTING CONSEQUENCES

Current requirements and practices for generating, preserving, and providing access to data are probably sufficient to support regulatory compliance, cleanup, and other current site operations. This chapter does not assess how well existing requirements are implemented at individual DOE sites, but rather how well the requirements and practices will support long-term stewardship data needs, a function for which they were not specifically developed. Ultimately, a failure to effectively generate, preserve, and provide access to stewardship data will diminish the ability of future generations to protect human health and the environment.



The discussion focuses around a series of findings that summarize gaps and other limitations of these requirements and practices with respect to the generation, preservation, and future accessibility of stewardship data. These findings are illustrated and supported by a variety of observations and examples from selected DOE sites.

4.1 Generation of Stewardship Data

FINDINGS

- Most types of information needed for long-term stewardship are already being generated for other purposes.
- Requirements do not specifically identify what constitutes stewardship data or how to define this discrete subset.
- Information management requirements and practices are not coordinated with property transfer requirements.

DOE's existing data generation requirements were established primarily to support current site operations and ensure compliance with existing regulations. These data will also have some value for stewardship purposes. However, there is no consensus on what constitutes stewardship data or what means should be employed to define this discrete subset of data.

Moreover, current practices tend to identify future data needs near the end of DOE's cleanup activities rather than throughout the cleanup process. For example, there is no systematic approach to ensure that all data required for property transfer are generated and identified until the transfer process has begun. Also, some current require-

ments and practices (e.g., property transfer regulations, DOE Orders) apply only to federal agencies in general or DOE in particular. If properties are transferred to non-federal entities (e.g., state or local governments) or other federal agencies (e.g., the Bureau of Land Management), it is not clear what information will be required to be generated during long-term stewardship activities.

- **Current laws and regulations require generation of a wide variety of data.** A review of current laws and regulations has indicated that most, if not all, of the specified type of data identified as stewardship data in Chapter 2 are required to be generated.
- **DOE efforts to identify stewardship data are in their infancy.** At the national level, DOE has issued the *Roadmap to the Year 2000* report that identifies information management activities and policies that may have impacts on future generations. Discussions related to the issues raised within the Roadmap document have just recently started across DOE.
- **Identification of stewardship data is not keeping pace with the rapid movement toward site closure.** The number of records dispositioned at some DOE sites is increasingly rapidly as sites are accelerating efforts to close. For example, at the focus site, the number of records sent to the Federal Records Center has been increasing at an average rate of over 29

percent per year during the last five years, with significantly higher rates over the last two years. Yet, the process of identifying stewardship data has not begun.

- **Information management requirements do not appear to be coordinated with property transfer requirements.** Information management (IM) efforts currently focus primarily on the dispositioning and archiving records that exist at a site. Many of the information needs of future users, which will depend on the records archived by IM efforts, are determined at the time of property transfer, not during the archival process.
- **Transfer of site stewardship has already begun.** Community Reuse Organizations (CROs) have been established by DOE to assist in identifying alternatives for reuse of sites, identifying potential site owners or lessees, and facilitating transfer of property to new owners. Although a survey of CROs did not uncover any major issues associated with stewardship data identification, at least one CRO relies upon retired site personnel to fill existing data gaps; the long-term sustainability of this practice is weak at best.

There are four primary consequences of a failure to identify stewardship data. First, information critical for long-term stewardship may be lost or abandoned. This may require sites to spend enormous resources to cull through volumes of documents, files, and computer drives to catalog abandoned records and assess their stewardship value. It is likely that such searches will be unable to fill all critical data gaps, resulting in the need for DOE to re-create missing data. Some of the costs associated with such attempts are detailed in Section 4.2.

Second, a failure to identify stewardship data may result in inconsistency in the form or format of information preserved for future generations. Information with stewardship value currently exists in a variety of forms, including hard copy reports, maps, electronic databases, electronic reports, and deeds. This lack of consistency will hinder efforts to preserve and provide future access to this information.

Third, some of the data required for property transfer and long-term stewardship may not be readily available at the time sites are to be transferred. This may cause unnecessary delays in the transfer process and additional expenses to locate and retrieve the information from existing archives. Some of the costs associated with property transfer delays are detailed in Section 4.2.

The final consequence will be an increased tendency to save more information than needed. This will make it more difficult to isolate and locate stewardship data and increase costs for information preservation and retrieval.

Potential Consequences of a Failure to Identify Stewardship Data

- Critical data may be lost, thereby endangering human health and the environment.
- Preservation and accessibility of stewardship data may be hindered due to inconsistent formats.
- Some data required for property transfer and long-term stewardship may not be available at time of property transfer.
- DOE may incur higher preservation and retrieval costs if stewardship data are not separated from other data.

4.2 Preservation of Stewardship Data

DOE's existing data preservation requirements and practices have focused primarily on maintaining physical control of hard copy and electronic records. These requirements and practices were developed to support data preservation needs when site missions and staff were relatively stable over time. The rapidly changing missions at many sites (e.g., from cleanup to stewardship), coupled with workforce instabilities associated with reduced budgets and alternative contracting strategies, have already resulted in the loss of some stewardship data. Many records have also been abandoned

without being adequately indexed and archived. These abandoned records are also in jeopardy of being lost.

Current preservation requirements and practices for paper and electronic records also may be inadequate for stewardship data needs. Because they were developed for different purposes, many of the current requirements for data retention are shorter than the lengthy or even indefinite period needed for stewardship purposes. For example, the DOE records retention schedules require some records to be archived permanently, but others to be destroyed after periods of time that range up to 80 years. Records of facilities and site infrastructure (e.g., process lines) are particularly vulnerable because they are generally required to be destroyed when facilities are demolished or infrastructure is declared obsolete. Some stewardship data generated in the past may already have been destroyed in accordance with the records retention schedules. In addition, descriptive information that provides sufficient context for understanding archived material may not be adequate. Not all indexing or metadata standards are the same, and existing standards may not include all the information needed by future generations. There is no single place where one can determine the kinds of information about a site that may exist and where this information is located. Information that may be needed by future generations is not distributed to places and the people most likely to use it. Finally, no clear mandate requires DOE to transfer indexes and other finding aids to future site owners. The following illustrations and observations support these findings:

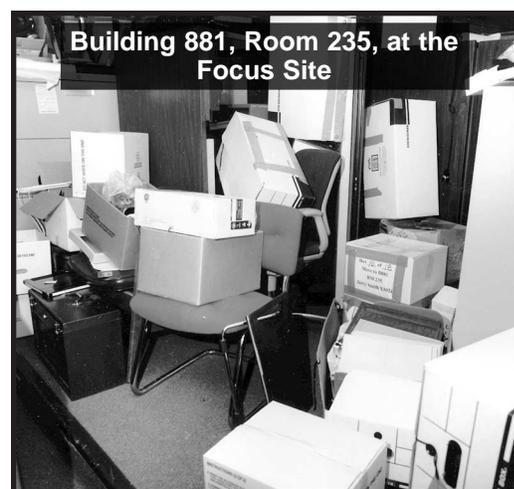
- Abandoned records increase information management costs.** At the focus site, with the transition of the site contractor in 1995, the Research & Development (R&D) department was reduced from 200 personnel to three. These former R&D employees had been responsible for developing stabilization, treatment, and measuring technologies for multiple purposes at the site. When these employees left suddenly, large quantities of records, both paper and electronic, were abandoned. These records are required to be treated as permanent records according to NARA guidelines. Estimated costs to preserve this information is \$2 million.
- Paper records may be fragile.** Many old records are preserved as carbon copies. These have proven difficult or impossible to scan electronically. Also, paper records decay over time, particular records preserved on acid-based paper.
- Production records have been lost.** At the focus site, in preparation for decommissioning of a former nuclear production facility, production records for component testing were identified by records management personnel for long-term retention. Initially, these records could not be archived immediately because they were slightly contaminated. Before they could be archived, the records were inadvertently boxed up in crates and disposed of as low-level waste. These records were intended for transfer to Los Alamos National Laboratory. No one has estimated the cost impacts associated with the loss of these quality assurance documents.

FINDINGS

- Information that has stewardship value is being lost, destroyed, or maintained in formats that may not be useful to future stewards.
- Some data will not be preserved as long as necessary for stewardship purposes.
- Some data will be preserved adequately but may not be able to be located, or will not be accompanied by enough descriptive information to be usable.
- Most records of facilities and site infrastructure are required to be destroyed when facilities are demolished or infrastructure is declared obsolete.
- DOE has already begun to pay increased clean-up costs because critical data have been lost.

As sites reconfigure or are closed altogether, the problems of locating, transferring, and protecting records loom large.

Roadmap to the Year 2000



- **Information on facility characterization has been lost.** During facility closure it is necessary to gather data regarding existing facility hazards. At the focus site, a facility characterization and inventory was performed in 1993, 1994 and 1995 that identified the nature and extent of hazardous and radioactive contamination within several major facilities. Because of a change in the operating contractor and reductions in force, recorded characterization and inventory data were lost. In later efforts to prepare a major facility for demolition, these data were recovered only because a former site employee was available to return and search through a stack of computers that were pending property disposition. Recovery of the data saved DOE nearly \$1.5 million.
- **DOE may no longer possess important records.** On June 6, 1989, the Federal Bureau of Investigation (FBI) began an investigation of the focus site. Unannounced, FBI investigators targeted particular offices in which they knew specific documents were located, and began taking them offsite. On the first day of the investigation, there were no records of which documents the FBI had seized and removed from the site. By the second day, the records management office developed a process for cataloging and copying the documents before the FBI removed them. When requested, the FBI returned the documents seized on the first day for cataloging and photocopying by the records management office. However, it is unknown whether all of the documents seized were returned; it is possible that some documents, potentially including vital records and/or original records (i.e., records for which DOE does not have a copy), may not have been returned.
- **Information sufficient to determine the stewardship value of a record is not being preserved.** A pilot test at the focus site showed that data are often not accompanied by information that would help a user identify its value for stewardship. For example, information accompanying the data may describe its content (e.g., groundwater sampling results) but not its pedigree (e.g., whether the data were reviewed for quality). This increases the difficulty of identifying data with stewardship value. Appendix D contains more information regarding the pilot test and its results.
- **Ownership of records during contract transition is often unclear.** Before there was a change in the operating contract, the environmental records center for the focus site was maintained at an offsite location. During the contract transition period, ownership of these records was not clearly established, and funding to bring these records back under site control was not accounted for in the site budget. Currently, the effort to preserve these records is unfunded. Clear guidance from DOE regarding contractual provisions for record continuity and transfer during changeover of the contract could have avoided these problems.
- **The Integrating Management Contractor (IMC) approach creates information management challenges.** The focus site was one of the first DOE facilities to change to the IMC approach. Overall, the IMC has resulted in savings over previous management configurations, but has created several smaller information challenges: larger transient work forces make records management control more difficult, work directly associated with performance incentives tends to have higher priority than records management activities, emphasis to reduce requirements has undermined efforts for comprehensive standards, and a greater number of subcontractors make enforcement of standard practices difficult.
- **DOE is not fully involved with federal efforts to improve data preservation.** There are several efforts in progress at the national level for the generation, identification, and creation of databases and/or locators. However, there is no clear connection between DOE initiatives and these other efforts.¹

¹ National efforts reviewed include the National Environmental Data Index (NEDI) as well as other agency initiatives. NEDI is a data index that is intended to provide direct access to environmental data and information descriptions primarily within the United States. Agencies involved with NEDI include the Departments of Agriculture, Commerce, Defense, Energy, and Interior as well as the Environmental Protection Agency, the National Aeronautics and Space Administration, and the National Science Foundation.

- **DOE currently stores large numbers of photographic records at multiple locations.** Photographic records of facilities, property, processes, and products have existed at DOE sites since their inception and require handling and storing techniques that are different from techniques typically used for documents. At the focus site, more than 1.2 million negatives, nearly 25 percent of which are classified, are stored within secured areas at the site. With current photographic cataloging efforts from decommissioning activities, these quantities will increase rapidly over the next several years. It is not certain which of these photographs are important for stewardship purposes. Efforts are underway to locate suitable offsite storage for both the classified and non-classified negatives. Currently, there is no single location for DOE to consolidate photographic records.
- **Costs for generating, preserving, and accessing stewardship information are significant, and generally budgeted as indirect costs within DOE.** Several DOE sites are addressing the need to establish cost accountability but are placing much of the burden for the preservation of data on those who generate data. These include establishing charge-back systems on information generators and budgeting of information management services as a direct activity within project baselines. At the focus site, current records management costs are estimated at slightly less than 1 percent of the total site budget for fiscal year 1998.² Records management services are currently funded mainly (80 percent) as an indirect activity. Implementation of the Integrating Management Contractor at the site has reduced records management (RM) costs. This has made the use of RM personnel more attractive for project managers and led to minor improvements in the RM problems at the site. Indirect costs for RM activities at other DOE sites (i.e., Los Alamos National Laboratory, Yucca Mountain) and for other federal agencies are similar.
- **Costs for archiving records are only a small portion of site information management costs.** Costs associated with information management account for about 8 to 12 percent of the budgets at DOE sites. Information management includes all document control and delivery systems, computers, electronics, and software, and other aspects of managing information at the site. Of the 8 to 12 percent, nearly one-quarter of the funds are allocated for document management, which includes activities to manage documents while they are active, including document control systems. An even smaller percentage of site budgets is spent on archiving of records. For example, at the focus site, only 0.3 percent of the site budget is used for archiving records, which includes all activities needed to retain information for future site stewards.
- **Changes in technology have historically created problems for record preservation.** DOE is moving from a management system that is largely oriented to paper records toward a greater reliance on electronic record-keeping. Historically, many problems have been associated with a radical change in basic technologies.³ As the number of critical stewardship data sources that are retained electronically increases, DOE will likely expect to provide initial and continuing access to electronic archives; encounter more concern about the adequacy of documentation; and be under increased pressure for multi-agency cooperation to link archive services.
- **DOE will face increased pressure for multi-agency cooperation.** Regulators are increasingly likely to require sites to integrate various data collection efforts to support their oversight activities. At the focus site, regulatory provisions requiring multi-agency cooperation are included within the Rocky Flats Cleanup Agreement (RFCA). These provisions require the creation of a RFCA database to improve the availability of sampling and related documents. The purpose

² Based on the Rocky Flats Closure Project Life-Cycle Baseline. Activities included in the records management totals included records storage/retrieval, litigation support, library services, imaging services, record oversight, document control, correspondence control and several other associated RM services.

³ *Playing for Keeps*, Electronic Records Management Conference Proceedings, Hedstrom, Margaret, Canberra, Australia, November 1994.

of the database is to improve the effectiveness and efficiency of current monitoring programs conducted by DOE, the Colorado Department of Public Health and Environment, and the surrounding cities of Broomfield and Westminster. The long-range goal for the database is to integrate all environmental and natural resource monitoring at the site.⁴

- **Site transfer can be significantly delayed if relevant data are not readily available.** Property transfer of the Oxnard facility in 1997 was delayed while final record verification was completed. Record verification involved the rectification of waste manifests with the Environmental Protection Agency. It took approximately three weeks, at an estimated cost of \$50,000, to locate and retrieve relevant documents concerning this small, former metal forging site.
- **Lack of stewardship information increases cleanup costs.** At the focus site, remediation of "Trench 1" was slowed because of incomplete information regarding the burial of 90 to 125 barrels of "special" or "miscellaneous" wastes. DOE spent more than \$50,000 in an unsuccessful search for the missing information. Because this information could not be found, the precautionary measures for the cleanup were based on an assumption of the highest level of risk to the workers and the environment, resulting in higher remediation costs.

There are at least three likely consequences of a failure to adequately and efficiently preserve stewardship data. First, site closure or transfer may be delayed, putting many of the critical objectives of the EM plan to accelerate cleanup in jeopardy. Funding that could be devoted to the primary site cleanup mission may be diverted to storing and sifting through abandoned records, re-creating lost information, and maintaining the infrastructure necessary to support records use and retention needs. Also, if there is not sufficient information to fully characterize a contaminated area and additional precautionary measures must be taken to address the high level of uncertainty, the cost of cleanup will increase.

Potential Consequences of a Failure to Preserve Stewardship Data

- Cleanup costs may increase and site closure may be delayed.
- Protection of human health and the environment may be jeopardized because future stewards may not have the information they need.
- Even if data are provided they may not be usable.

Second, future stewards may not have the information they need because it had been destroyed or lost and is impossible or too expensive to regenerate. Under some circumstances, protection of human health and the environment may be jeopardized. For example, incomplete information may result in the breaching of abandoned process lines and exposures to radioactive substances, or the discovery of previously unknown sources of contamination, during long-term stewardship. Inappropriate future uses of lands or facilities may occur because residual contamination is undetected. On the other hand, incomplete information may result in unnecessary restrictions on the future use of facilities, or lands or the use of control measures that are more stringent than necessary, because the true nature of residual hazards cannot be determined.

Even if stewardship information is available when needed, it may not be usable because it is not accompanied by sufficient descriptive information. The lack of clear indexing and metadata standards for long-term stewardship makes it likely that critical contextual information for many records will not be available. The extent to which this may hinder data usability is difficult to assess at present.

4.3 Future Access to Stewardship Data

During the weapons production era, access to information about site conditions was closely restricted for national security reasons. In the future, the challenge will be to ensure that stewardship data are readily accessible. Current requirements and practices are moving toward that goal. Access to

⁴ Final Rocky Flats Cleanup Agreement, Part 23, "Sampling and Data/Document Availability," July 19, 1996.

information about past site conditions is primarily through two mechanisms. Some information is conveyed to future users through deeds and related property transfer documentation, while access to archived records is provided primarily through a formal request process. In the latter process, users request information and it is retrieved from archive repositories and sent to the requestor. The process is not particularly rapid, and successful retrieval depends considerably on knowing that a particular archived record exists. Because there is no systematic approach to indexing and other search tools specific to stewardship data needs, over time it is likely that knowledge of the existence of particular records will be lost.

FINDINGS

- Knowledge that archived information about DOE sites exists may be lost.
- Future users may not know where to search for all relevant information, causing delays in action or the potential for unnecessary risk.
- Even when such knowledge is preserved, and users know where information is located, it may take too long or be too expensive to gain access to stewardship data.

While the right to gain access to certain information is provided by law, users may not know certain information exists and they will not obtain meaningful results from data searches. Moreover, because existing records are not archived in a single place, future users may not know where to look for particular information. For example, information may be accessible through a variety of sources, including NARA, EPA, agencies responsible for NEPA implementation, states, and local communities. Even if future users know where to look, the current retrieval process may take too long and be too expensive to be useful, particularly when information is not stored in one location. Also, the costs to access the information may serve as a barrier to information retrieval. Federal agencies do not always charge users for records retrieval costs; states and local communities, however, often require users to pay for such services. In addition, changes in technology may create particular challenges for information retrieval, particularly electronic data. Because many current requirements and practices apply only to federal agencies, it is unclear whether stewardship data generated and preserved by non-federal entities (e.g., states or local communities vested with long-term stewardship responsibilities) will be accessible through current mechanisms. For example, states may maintain their own information archives and may not be required to provide copies to NARA. These findings are supported by the following illustrations and observations:

- **Changes in information technology have historically created problems for locating, retrieving, and regenerating archived information.** Predicted problems include an increase in emphasis on access to, rather than physical control of, data; and an increase in the need for rapid, efficient, locator mechanisms to assist in the identification of electronic data.⁵
- **Significant costs are associated with the retrieval of data that span several decades.** DOE's Office of Human Radiation Experiments was established in March 1994 to catalog Cold War radiation experiments on human subjects. Relevant historical documents were identified from an estimated 3.2 million cubic feet of records. These records were distributed throughout the United States, many of which were cataloged poorly, if at all. This effort required more than 200 person-years of DOE staff time.
- **Records searching comprises the majority of information retrieval costs.** During Phase I of a dose reconstruction project at the focus site, records, many of which were not indexed, were searched at both on and offsite locations over the course of three years. During Phase II of the study, classified records at the site were reviewed. Review of the files led to the discovery that many data gaps existed, forcing an extrapolation of the team's results through months of missing records. It was estimated that with a comprehensive data and records management system, up to 75 percent of the labor hours spent on Phase II of the project would have been unnecessary. The entire cost of Phase I was associated with the records search. In general, the study team reported that data retrievability was not a priority of the

⁵ *Playing for Keeps*, Electronic Records Management Conference Proceedings, Hedstrom, Margaret, Canberra, Australia, November 1994.

Department; to the extent that records management was practiced, the driving force was regulatory scheduling requirements.

- **Abandoned records pose the largest problem facing the focus site litigation support office.** Much of the cost for litigation support at the focus site can be attributed to document identification and retrieval. During the litigation process, the production of documents can consume up to 100 percent of the time of the litigation support personnel. At other times, the production may require as little as 5 percent of their time. For example, several years of work by legal support personnel have been required to produce documents for a legal case (the *Cook* case). Most of the documents required for the *Cook* case and others are historical and may no longer be in use. If a particular document was not in the records management control system, as was often the case, it was difficult to determine if the document even existed. The consequence of failing to produce a document is that the litigation support office is not able to fully support the principals in making their case.
- **Assessment of a document index indicates that not all records currently being archived are needed for stewardship.** An evaluation of the current document indexing contents, discussed in detail in Chapter 5, was performed on current indexing systems maintained at the focus site. The purpose of this evaluation was to assess the ability of future stewards to locate potential stewardship documents based upon search criteria, or attributes of information, likely to be used in the future. Results of the assessment suggested that nearly 75 percent of the indexed records might not meet the definition of stewardship data. Of the remaining documents, roughly 21 percent had potential, and 4 percent definite, stewardship value. This assessment was performed on over 400,000 records maintained in the Environmental Restoration Database (ERD).⁶ Results of this exercise also indicated that the document index maintained within the ERD was not sufficiently consistent or rich enough in content to identify the potential stewardship value of many records indexed by the system.
- **Responding to Freedom of Information Act requests is expensive.** Enacted in 1966, the Freedom of Information Act (FOIA) provides any person a statutory right, enforceable in court, to access federal agency records.⁷ Both DOE Headquarters and field offices receive thousands of FOIA requests per year; DOE spent over \$5.5 million processing FOIA requests in 1996. The numbers of requests do not include the thousands of requests for documents received at the 14 DOE Reading Rooms located across the nation.
- **Electronic information management systems reduce costs.** The Nuclear Regulatory Commission (NRC) manages large volumes of records associated with policies, decisions, and bases for regulatory action. The annual cost of records management at the NRC was approximately \$7 million, about 1.5 percent of the total NRC budget, before modernization. Recently, the NRC was faced with the issue of updating its 1978-based index system. A cost-benefit study led to the installation of a new NARA-approved electronic system. Benefits obtained from the system included improvements to the business process for regulatory activities, assistance to compliance efforts with the Paper Reduction Act and the Electronic Freedom of Information Act, reduction of personnel needed for records management, and the ability to ensure complete and accurate retention of NRC records. Commercial benchmarks have shown reported cost savings of up to 33 percent based on the reduction in the overhead costs of space and personnel required for maintaining a traditional document repository when electronic information repositories are available.
- **Former site employees are required to fill stewardship data gaps.** It is a common practice for Community Reuse Organizations to hire former employees of the site to fill existing gaps

⁶ The Environmental Restoration Database (ERD) is a records database in use at the focus site that consists of over 30 record indexing database with over 408,00 records. The primary focus of the ERD is on environmentally related data.

⁷ Freedom of Information Act Guide & Privacy Act Overview, U.S. Department of Justice, Office of Information and Privacy, September 1996 Edition.

in stewardship data, especially where site historical and infrastructure documentation is missing. This practice appears to be largely successful to date, but its long-term viability is tenuous.

- **A lack of data increases stewardship costs today.** Organizations currently responsible for long-term stewardship have faced unexpected increases in maintenance and operating costs due to the lack of complete and accurate utility drawings. At one site, for example, utility maintenance and replacement costs increased 15 percent above budgeted costs because information about obsolete infrastructure was missing.
- **Lost data may limit future use options.** At one DOE site, complete and accurate environmental information regarding remaining hazards was lacking when property was transferred to a non-DOE entity. During their development efforts, the non-DOE entity discovered additional contamination that unexpectedly restricted future property uses.
- **Local communities do not have access to critical planning data.** Many communities surrounding DOE sites do not have spatial planning data related to the physical topography and environment across the property. Several community stakeholders have expressed concern regarding the loss of data or data integrity prior to transfer of the sites to the communities. One important concern is that land use decisions can change until the time that the Record of Decision is issued, and therefore access to key planning data is critical early in the process.

There are five primary consequences of a failure to adequately provide for timely and efficient access to stewardship data. First, future generations may not seek access to stewardship information because they do not know it exists or the information exists outside the boundaries in which they work. For example, it may not occur to scientists or engineers working on a site to look for information about onsite hazards on property deeds.

Second, future stewards may not be able to gain access to existing information in time to adequately protect human health and the environment. Current retrieval times for information obtained through FOIA requests (i.e., more than one year) will not be helpful if future site stewards uncover drums or other potential sources of contamination previously unknown to exist and need to access specific site information quickly.

Third, future generations may incur excessive costs to obtain or re-create needed information. Unplanned costs of this nature may put pressure on site budgets, perhaps leading to delays or other negative impacts to site activities.

Fourth, future generations will be unable to re-create stewardship information even if records are accessible because sufficient contextual information such as metadata is not preserved. To the extent this becomes relatively commonplace, users may even stop attempting to retrieve archived information because the costs to obtain such information may exceed the benefits from retrieving the data.

Finally, future entities responsible for long-term stewardship may be subject to civil and/or criminal penalties because they do not have enough information to adequately maintain institutional controls. They also may have to pay damages for the restoration of natural resources because they do not have enough information to prevent injury to those resources.

Potential Consequences of a Failure to Ensure Accessibility of Stewardship Data

- Future generations may not know that critical data exist.
- Protection of human health and the environment may be jeopardized because future generations cannot obtain critical data quickly enough.
- Future generations may spend unnecessary resources re-creating lost data.
- Future generations will be unable to re-generate some critical data.
- Future entities responsible for long-term stewardship may face civil and/or criminal penalties because they do not have the information needed to protect human health and the environment.

4.4 Summary

The analysis of current requirements and practices has identified a series of gaps and issues associated with generation, preservation, and future access to stewardship data, illustrated and supported by a variety of observations across the DOE complex. Some of these appear to result from recent changes in DOE's mission and from efforts initiated to gain cost control and improve performance on work directly related to site cleanup. Others appear to result from the fact that current requirements and practices were developed to support missions other than long-term stewardship. These gaps and issues are summarized by information type in Table 4-1.

Current requirements and practices appear to result in the generation of most types of stewardship data. Generation of stewardship data is required under various laws and regulations that appear to apply broadly across the 12 types of stewardship data identified in Chapter 2. However, these requirements may not apply to the generation of stewardship data after site closure or transfer if long-term stewardship activities are conducted by entities that are not agencies of the federal government. Although generation of additional data is not needed for stewardship purposes, few requirements and practices directly address the issue of identifying stewardship data. Therefore, it is likely that data preservation efforts will not be focused on retaining information with high stewardship value.

Under current requirements and practices, preservation of stewardship data is uneven and the focus is primarily on physical retention of information records. Some types of stewardship information are required to be preserved permanently; others are required to be preserved for the near future (up to 80 years); others are required to be destroyed even before long-term stewardship begins. The lack of stewardship information already has resulted in increased costs at some DOE sites, both during and after cleanup. Stewardship information is preserved in a number of different places (including the National Archives) and via several different mechanisms. Most records are packaged and sent to interim or permanent repositories. Some records are maintained through deed restrictions and other legal processes. Others are maintained by EPA, NRC and other regulatory agencies. Current requirements and practices do not appear to address the preservation of contextual information very well. Federal metadata standards apply to some types of electronic records, but no federal indexing standards, or other mechanisms to provide pointers to information, appear to exist.

Accessibility appears to be a major issue associated with stewardship data. Under current requirements and practices, access to archived information is provided primarily by request. Users submit a request for information either directly to NARA or to DOE through a FOIA request and must wait for records to be sent to them. It may take more than a year to obtain pertinent records. Because information is preserved in a number of places and in a variety of ways, it is difficult for users to know where to look for all pertinent information. The lack of adequate indexes, metadata standards, and other pointers makes it difficult for users to find information, even if they know where to look for it. The lack of sufficient contextual information may make it difficult or impossible to use any information that is retrieved.

Table 4-1. Overview of How Well Existing Requirements and Practices Address Generation, Preservation, and Accessibility of Stewardship Data

Information Type	Generation	Preservation	Accessibility
A. Existing Hazards	<ul style="list-style-type: none"> • Most, if not all, stewardship data appear to be generated based on current requirements. 	<ul style="list-style-type: none"> • Post-closure notices for hazardous waste units at interim status facilities must be recorded on deed to facility property indefinitely. Regulatory requirements for preservation of other data are limited (e.g., RCRA records preserved for 30 years after unit/site closure). • Preservation based on DOE records retention schedules is required for some types of data for 5 to 80 years (e.g., environmental contamination measurement records, radioactive waste disposal records). Records preserved permanently are limited (e.g., general procedures; data gathered to measure residual contamination; some records pertaining to radioactive waste disposal or unplanned disposition). • Some data are preserved in NEPA documents and/or environmental baseline surveys developed at time of site closure. 	<ul style="list-style-type: none"> • Transfer of some information to future stewards is via NEPA documents and/or environmental baseline surveys and conveyance of property transfer. • For data that are preserved, access is available via FOIA and requests to NARA. • Some information must be available to the public directly (e.g., EPCRA inventory forms). • Post-closure notices for hazardous waste units at interim status facilities can be found on property deeds. • Some records are transferred to local and/or state entities as appropriate (e.g., licenses for land disposal of radioactive waste is transferred after license is terminated). • Records regarding radioactive waste geologic repositories must be preserved for useability by future generations.
B. Past/Present Releases	<ul style="list-style-type: none"> • Most, if not all, stewardship data appear to be generated based on current requirements. 	<ul style="list-style-type: none"> • Preservation based on regulatory requirements is limited (e.g., some records preserved until NRC license terminated). • Preservation based on DOE records retention schedules is required for most types of data up to 75 years. Records preserved permanently are limited (e.g., standards, operating guides, procedures; data gathered to measure residual contamination; unplanned disposition records of radioactivity; and records of radioactive waste discharges). • Some data are preserved in NEPA documents and/or environmental baseline surveys developed at time of site closure. 	<ul style="list-style-type: none"> • Transfer of some information to future stewards is via NEPA documents and/or environmental baseline surveys and conveyance of property transfer. • For data that are preserved, access is available via FOIA and requests to NARA.
C. Disposition of Historical Hazards	<ul style="list-style-type: none"> • Most, if not all, stewardship data appear to be generated based on current requirements. Generation of stewardship data in the past may have been limited. 	<ul style="list-style-type: none"> • Some data preserved in RCRA TSDf Closure Plans and CERCLA RODs. Preservation of some data may be required for up to 50 years (e.g., released substances). Remaining regulatory requirements regarding the preservation of records is limited (e.g., one year). • Preservation based on DOE records retention schedules is required for some types of data for up to 5 years (e.g., environmental contamination measurement records; radioactive waste disposal records) or more 	<ul style="list-style-type: none"> • Transfer of some information to future stewards is via NEPA documents and/or environmental baseline surveys and conveyance of property transfer. • For data that are preserved, access is available via FOIA and requests to NARA. • Some data (e.g., RCRA TSDf Closure Plans and CERCLA RODs) may be accessed via EPA. Also, notification of RCRA Closure Plan must be placed on the deed for the property indefinitely.

Table 4-1. Overview of How Well Existing Requirements and Practices Address Generation, Preservation, and Accessibility of Stewardship Data (continued)

Information Type	Generation	Preservation	Accessibility
C. Disposition of Historical Hazards (continued)		<p>(e.g., hazardous material transportation records are retained longer if renewed use is anticipated). Some records are preserved permanently (e.g., general procedures regarding environmental contamination measurement records, data gathered to measure residual contamination; and some records pertaining to radioactive waste disposal or unplanned disposition).</p> <ul style="list-style-type: none"> • Some data are preserved in NEPA documents and/or environmental baseline surveys developed at time of site closure. 	
D. Existing Barriers and Other Mechanisms	<ul style="list-style-type: none"> • Some stewardship data appear to be generated. 	<ul style="list-style-type: none"> • Preservation based on DOE records retention schedules is required for limited types of data, such as safety management records, which are preserved up to 80 years. • Some data may be preserved in RCRA TSDF Closure Plans and CERCLA RODs. • Some data are preserved in NEPA documents and/or environmental baseline surveys developed at time of site closure. 	<ul style="list-style-type: none"> • Transfer of some information to future stewards is via conveyance of property transfer, including terms, conditions, and restrictions on the property. • For data that are preserved, access is available via FOIA and requests to NARA. • Some data (e.g., RCRA TSDF Closure Plans and CERCLA RODs) may be accessed via EPA. Also, notification of RCRA Closure Plan must be placed on the deed for the property indefinitely.
E. Process History	<ul style="list-style-type: none"> • Most, stewardship data appear to be generated based on current requirements. Generation of stewardship data in the past may have been limited. 	<ul style="list-style-type: none"> • Preservation based on regulatory requirements is limited (e.g., five years). • Preservation based on DOE records retention schedules is required for some types of data for 5-20 years (e.g., project planning and design records). Only limited records are retained permanently (e.g., records selected for their architectural, historical, and technological significance). 	<ul style="list-style-type: none"> • Transfer of some information to future stewards is via NEPA documents and/or environmental baseline surveys and conveyance of property transfer. • For data that are preserved, access is available via FOIA and requests to NARA.
F. Historical Infrastructure	<ul style="list-style-type: none"> • Some stewardship data currently appear to be generated. Generation/preservation of past data may have been limited. 	<ul style="list-style-type: none"> • Preservation based on DOE records retention schedules is required for some types of data, such as planning and design records to be preserved through project completion or five to 20 years afterwards. Only limited records, such as records selected for their architectural, historical, and technological significance, are maintained permanently. 	<ul style="list-style-type: none"> • Transfer of some information to future stewards is via communications with future steward at time of property transfer. • For data that are preserved, access is available via FOIA and requests to NARA.
G. Post-Closure/ Transfer Operations and Infrastructure	<ul style="list-style-type: none"> • Generation of stewardship data is unclear; some may be required if permits or licenses are transferred to new stewards. 	<ul style="list-style-type: none"> • Preservation of closure requirements does not appear to be addressed by current requirements, except for information preserved in the transfer of permits and/or licenses to the new owner or operator. 	<ul style="list-style-type: none"> • Access to data unclear since future stewards may not be DOE and different access requirements may apply. If DOE is future steward, information may be accessed via FOIA and requests to NARA (for data that are retained).

Table 4-1 Overview of How Well Existing Requirements and Practices Address Generation, Preservation, and Accessibility of Stewardship Data (continued)

Information Type	Generation	Preservation	Accessibility
H. Regulatory Framework (Historical and Present)	<ul style="list-style-type: none"> Some stewardship data appear to be generated. 	<ul style="list-style-type: none"> Information regarding permits (e.g., CAA, NPDES, UIC, and RCRA) must be maintained while permits are active. Information regarding standards, operating guides, and procedures for some data (e.g., radiation-contamination control program records, environmental contamination measurement records) are preserved permanently based on DOE records retention schedules. Preservation for other data is required for up to 5 years or more (e.g., hazardous material transportation records are retained longer if renewed use is anticipated). 	<ul style="list-style-type: none"> Information regarding active permits to future stewards is transferred to future stewards in agreements. For data that are preserved, access is available via FOIA and requests to NARA.
I. Requirements Specific to Site Transfer/Closure	<ul style="list-style-type: none"> Some stewardship data appear to be generated as property is closed and transferred. All data generated will be difficult to determine until all closure requirements are identified. 	<ul style="list-style-type: none"> Preservation of closure requirements does not appear to be addressed, except for information preserved in the transfer of permits and/or licenses to the new owner or operator. Data may be contained in NEPA documents and/or environmental baseline surveys at closure. 	<ul style="list-style-type: none"> Transfer of some information to future stewards is via NEPA documents and/or environmental baseline surveys and conveyance of property transfer. For data that are preserved, access is available via FOIA and requests to NARA.
J. Real Estate Records	<ul style="list-style-type: none"> Most, if not all, stewardship data appear to be generated based on current requirements. 	<ul style="list-style-type: none"> Prior to closure, real estate records are preserved onsite. Unclear how preserved after closure. 	<ul style="list-style-type: none"> Transfer of some information to future stewards is via NEPA documents and/or environmental baseline surveys and conveyance of property transfer. For data that are preserved, access is available via FOIA and requests to NARA.
K. Cultural and Natural Resources	<ul style="list-style-type: none"> Most, if not all, stewardship data appear to be generated based on current requirements. 	<ul style="list-style-type: none"> Preservation of information does not appear to be addressed in DOE records retention schedules. Preservation may be addressed by the National Historic Preservation Act and the Archeological Resources Protection Act. Some data are preserved in NEPA documents and/or environmental baseline surveys developed at time of site closure. 	<ul style="list-style-type: none"> Transfer of some information to future stewards is via NEPA documents and/or environmental baseline surveys and conveyance of property transfer. For data that are preserved, access is available via FOIA and requests to NARA.
L. Geophysical/political	<ul style="list-style-type: none"> Some stewardship data appear to be generated. 	<ul style="list-style-type: none"> Preservation of information appears to be somewhat limited. Information regarding standards, operating guides, and procedures for some data (e.g., radiation-contamination control program records, environmental contamination measurement records) are preserved permanently, according to DOE records retention schedules. 	<ul style="list-style-type: none"> Transfer of some information to future stewards is via conveyance of property transfer. For data that are preserved, access is available via FOIA and requests to NARA.

PART II

POTENTIAL SOLUTIONS

5.0 POTENTIAL SOLUTIONS

This chapter provides potential solutions for overcoming the gaps and limitations associated with current practices as they pertain to the generation, preservation, and future accessibility of stewardship data (summarized in Table 5-1).

Section 5.1 presents suggestions for developing criteria to identify stewardship data. Section 5.2 presents some suggested revisions to DOE records retention schedules to ensure preservation of stewardship data.

Section 5.3 presents a preliminary set of metadata descriptors for preserving information on the content, quality, condition, and other characteristics of stewardship data. Section 5.4 provides an understanding of what might be required to develop and maintain a system for providing future access to stewardship data.

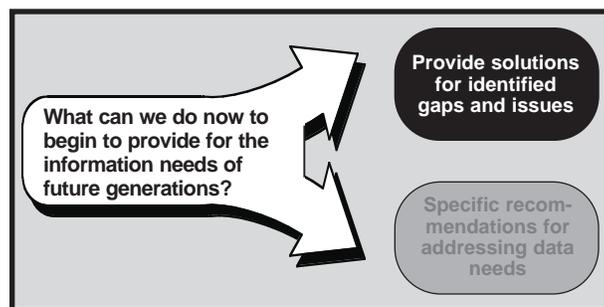


Table 5-1. Gaps, Issues, and Potential Solutions

Gaps and Issues	Potential Solutions
Data are generated, but not necessarily identified as stewardship data.	Develop criteria for identifying stewardship data.
Very few types of stewardship data are permanently preserved.	Modify existing records retention schedules.
Sufficient contextual information is not always preserved.	Develop metadata standards for stewardship data.
Preserved data are not readily accessible.	Develop a system to access stewardship data.

5.1 Develop Criteria for Identifying Stewardship Data

As noted in Chapter 4, it appears that current requirements and practices, if continued into the future, will be sufficient to generate stewardship data. However, there does not appear to be a clear requirement to identify the specific types of information that will be needed by future generations. Discriminating criteria must be applicable to two main types of information, each of which poses a different challenge in terms of identification:

- Historical records, abandoned records, and other information on the site that were generated and used in the past.
- Information, data, and other records that are currently in use at the site, are being generated, or will be generated in the future.

Identification criteria applicable to historical records will need to account for the varying types and amount of contextual information available for these records. Some historical records will have only minimal information available from which to determine stewardship value (e.g., title of document, one-line description of document or data). Other historical records will have an abstract or summary; however, these will most likely have been written from a perspective other than long-term stewardship and thus may not contain sufficient information for determining their stewardship value. Identification criteria applicable to present and future information can be more comprehensive and prescriptive, but will depend on the timely development of a broad consensus on stewardship data needs.

Identification criteria also will need to be comprehensive to meet the needs of the future activities related to long-term stewardship that were identified in Chapter 2. While some types of information will support most or all of these future activities, others may require unique types of data. For example, different information is needed to support emergency response activities than to conduct compliance oversight or to do community planning. Because the emphasis of work differs among these areas, criteria to identify necessary information to support the work may also differ.

To assist in the development of preliminary criteria for identifying stewardship data, a group of functional area experts was asked to identify a set of criteria for each of the 12 types of stewardship data identified in Chapter 2. These experts also were asked to test these criteria against existing data to examine the effectiveness of the criteria in identifying records of value for stewardship. (See Appendix D for a more complete description.)

General criteria that can be used for screening information include:

- Content information: Did the document, record, or data contain the necessary information?
- Vintage: Did it cover the period of interest?
- Currency: Was it the most recent edition of the work?
- Stature: Was it used for site decision making, such as a federal facility agreement?
- Administrative pedigree: Has it received the necessary reviews for release of information?

Functional area criteria varied among the 12 types of stewardship data and often focused on content issues. For example, criteria for the existing hazards data type included the following:

- The record should contain scientifically accurate descriptions of particular information.
- The record should have been developed by a site contractor or a credible scientific organization (e.g., EPA, NRC, a national laboratory).
- If the record is a map, it should contain an accurate representation of site facilities and boundaries over time, should be referenced to a commonly applied coordinate system (e.g., USGS), and should reference regional or state landmarks.

Additional criteria apply across all of the individual data types:

- Information should be available in lay terms, with summaries suitable for use by a nonscientific audience or someone not familiar with site and DOE terminology.
- Underlying data should be available to allow independent verification of conclusions and additional analysis as needed.
- Information should be in final form (i.e., approved by information release processes that were active onsite at the time the information was generated, including peer review, line management review, and classification review as appropriate).

To help sites identify stewardship data, DOE may need to provide policy-level guidance that defines stewardship data, describes its importance to DOE, and outlines how to recognize data with stewardship value. The guidance could further describe:

- The types of information to be kept, including record materials, samples, documents, original data, electronic media such as video and audio tapes, and Internet sites.

- How to provide for ownership of records, including responsibilities for generation, retention, and maintenance of retrievable data.
- A comprehensive set of requirements for information format (e.g., electronic, hard copy), consistency among sites, and information controls (e.g., access, availability).
- How to evaluate existing records retention schedules with respect to stewardship data needs.
- How to identify necessary information that may already have been sent elsewhere (e.g., Office of Scientific and Technical Information, National Archives). The Office of Scientific and Technical Information (OSTI) currently is holding many DOE records but is in the process of divesting itself of this responsibility. Some sites have destroyed records assuming the information is being preserved by OSTI. If OSTI destroys the only copy of materials, these records would be lost.
- How to incorporate classified information and otherwise sensitive information of stewardship value (e.g., export controlled, unclassified nuclear, applied technology, litigation sensitive) when special protection for this information is no longer needed.
- How to ensure appropriate stakeholder involvement in identifying stewardship data.

Criteria for identifying stewardship data should be developed as soon as possible to prevent their future loss.

5.2 Modify Existing Records Retention Schedules

As noted in Chapter 4, many of the current requirements and practices for data retention are shorter than the long time periods needed for stewardship purposes. For example, DOE records retention schedules require some records to be archived permanently; others to be destroyed after periods of time that range up to 80 years; and others to be destroyed even before cleanup is complete. Data preservation practices are governed by a variety of laws and regulations, each of which applies to some, but not all, types of stewardship data. While it would be advantageous to attempt to modify data preservation requirements under federal laws such as RCRA, CERCLA, and AEA, DOE has more flexibility in modifying existing records retention schedules.

Existing DOE records retention schedules do not appear to cover all of the 12 stewardship data types (see Appendix B). Even within a particular data category, it does not appear the records schedules require all relevant stewardship data to be preserved permanently. While some of this information will be preserved permanently pursuant to other requirements (e.g., property transfer), stewardship data preservation would be greatly enhanced by:

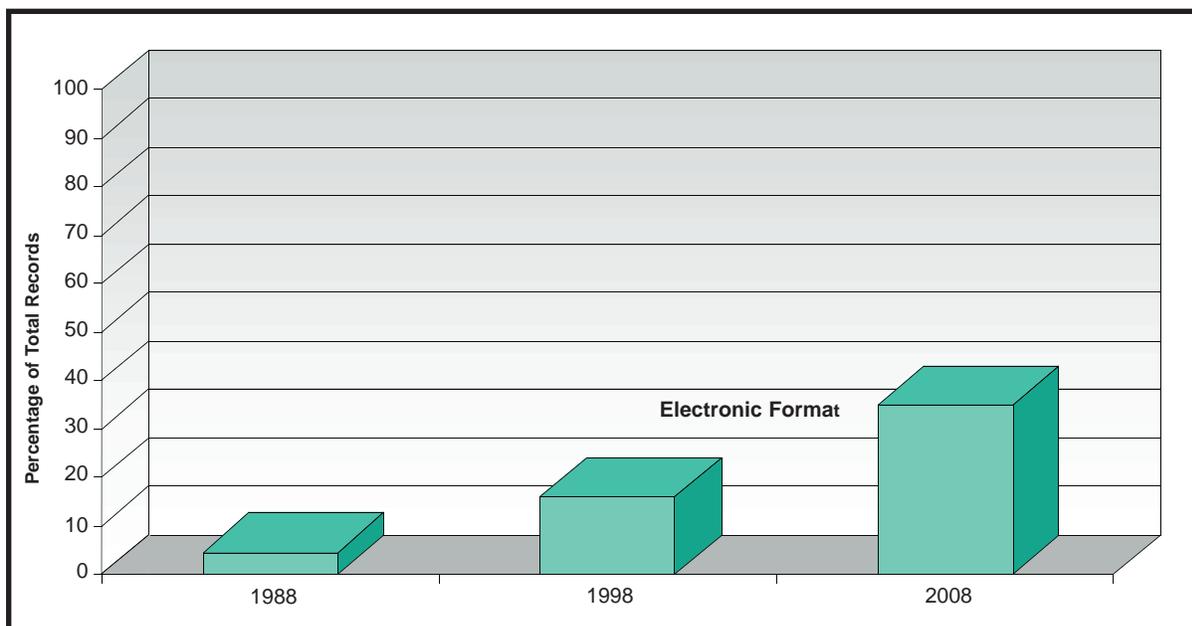
- Modifying the DOE records retention schedules to cover all stewardship data types.
- Ensuring that all stewardship data are required to be permanently preserved.

Records retention schedules should be revised as soon as possible to prevent the future loss of stewardship data. It will be important to couple any attempts to modify the records schedules with the development of clear criteria for identifying stewardship data. Simply increasing the number of data types to be permanently archived without corresponding criteria to identify the subset of data required for long-term stewardship would lead to an unworkable situation in which nearly every piece of information was permanently archived.

5.3 Develop Metadata for Stewardship Data

As noted in Chapter 4, current requirements and practices do not seem to require the preservation of sufficient contextual information to allow future generations to be able to understand the nature and context of stewardship data that are preserved. For hard copy records, much of this contextual information is provided by indexes and other finding tools, but there do not appear to be any requirements for the use of standardized indexes or pointers. Several types of federal metadata standards apply to some types of electronic records (e.g., geospatially referenced information), but not all types of electronic records appear to be covered by these requirements. As DOE sites move toward electronic-based information management systems (see Figure 5-1), improved metadata standards will become more important for stewardship data. Metadata standards also are an appropriate focus because geospatial referencing may be an effective tool for users to locate stewardship data.

Figure 5-1. Estimated Percentage of Records Created and Stored in Electronic Format



Much of the information required to support long-term stewardship activities involves spatially referenced data. For example, future users may wish to know:

- Where were the buildings located in Operable Unit 3?
- Where were the drain pipes located from Building 79 in 1965?
- What is buried in this spot?
- What activities occurred in room 23 of this building?
- What uses are proposed or planned for each portion of the site?

The metadata standards developed for spatial data are a logical starting point for preserving the essential contextual information about stewardship data. The existing Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata primarily describe published data sets, describing their structure, content, and data quality issues without making specific refer-

ence to the particular needs of stewardship for DOE facilities. For stewardship purposes, DOE needs to develop metadata standards that are well-suited to describing both published and non-published data. DOE also will require additional stewardship-specific information not explicitly referenced in the generic FGDC standards.

DOE needs at least two different types of metadata standards. First, in the near term, there is a need to screen a broad range of data sets for their potential stewardship value. By necessity, this screening must be a rapid process and may often need to depend on comparatively sketchy information in existing indexing systems or on documentation prepared by individuals who are not subject matter experts. Second, once a data set is identified as having stewardship value, the content, quality, condition, and other characteristics of the data set need to be documented sufficiently to ensure the long-term usability of the data.

The FGDC core metadata elements (i.e., the mandatory elements) are an appropriate starting point for rapid screening of data sets for stewardship value. These elements are relatively easy to complete for a data set, and if formal records of the data sets already evaluated have been maintained, the amount of detail provided by the core metadata elements should be sufficient to avoid repeatedly re-evaluating the stewardship potential of the same data sets. Moreover, providing the amount of detail required by the full FGDC structure can take substantially more time, particularly when creating after-the-fact documentation for existing data sets. Therefore, the full FGDC metadata elements do not appear appropriate during the screening process. Table 5-2 lists the data fields included as sets of metadata elements whose output meets the minimum data collection requirements of the FGDC core elements.

Table 5-2. Data Fields Included in a Metadata Form that Meet FGDC Core Elements

Data Fields	
Identity of this entry (for future tracking and updating)	Theme keywords
Originator	Theme keywords reference
Publication date	Place keywords
Title of data set	Place keywords reference
Edition	Limits on data accessibility
Presentation form (e.g., map, atlas)	Limits on use of data
Publication place	Browse graphic URL
Publisher	Browse graphic caption
Online linkage (URL)	Browse graphic file type
Abstract	Spatial data type
Purpose	Distribution organization
Supplemental information	Distribution contact position/person
Beginning and ending dates	Address type
Currentness reference	Street address, city, state or province, postal code, country, phone, fax, e-mail
Progress	Data set name as known by distributor
Intended data set maintenance and update frequency	Liability held by distributor
Bounding coordinates (West, East, North, South)	Date of last metadata entry or update (year, month, date)
On-screen forms are available on the Internet at: http://www/fgdc/gov/Clearinghouse/MetadataESystem/metaform.html	

Although data sets can be documented comparatively quickly using only the mandatory data fields, the full FGDC structure is designed to describe fully the characteristics of a data set and would be required for future use of the data. Data sets with likely stewardship value merit published descriptions sufficient to let potential users identify the suitability of a data set to their purpose, obtain the information, and contact the creators of the data for further information if necessary. This is the essence of the FGDC and Government Information Locator Service (GILS) approaches outlined above. However, the original creators of the data will not be available over the long life-cycle of stewardship data, so it will be important to complete metadata documentation sufficiently to ensure utility of the data over decades or centuries. Therefore, even the full set of FGDC metadata standards may not be sufficient for stewardship data.

To document key data sets for future stewardship use, it will be necessary to go beyond the existing FGDC metadata standards. The FGDC process provides a suitable framework, because supplemental profiles tailored to a specific type of data can be formally proposed and approved. However, additional information to be documented for stewardship may include:

- Factors regarding the overall quality or importance of information in the data set that will preserve information on the relative importance of data sources for future users:
 - Whether the metadata author is a subject matter expert, or whether the author was able to consult the original data set creators.
 - How the data set compares to others with information for the same category or categories of stewardship data.
 - Description of the importance of the information in the data set.
 - Information on the priority of this data set for inclusion in a permanent archive.
- Factors to assist future users in locating pertinent stewardship data include:
 - Which types of stewardship data are covered by the data set.
 - Whether the data set includes onsite and/or offsite information.
 - Whether there are any restrictions on the public release of information in this data set.
- Factors to assist in preserving stewardship data in the near term until the data sets are transferred to a permanent repository include:
 - Whether the data set is presently housed in an environment where it is likely to be safely preserved.
 - A date, if any, when the current location at which the data set is housed is scheduled to be shut down.
 - Contact information for the person currently responsible for preserving the data set.
 - Whether the physical media or computers holding this data set have been tagged as containing stewardship data.
 - Specific data set tracking information to document the screening process for identifying data sets with stewardship value.

Depending on the eventual design of a system to manage stewardship data, several other types of metadata elements may be required. The FGDC standards, for example, would allow a user to identify and obtain all records that pertain to a given building at a site for a particular time period. However, the standards by themselves would not ensure that the user would be able to merge the data from a variety of sources into a single data set. If a decision is made to merge a number of stewardship data sets together into a unified data set, then additional information will need to be col-

lected and preserved. This would include the complete specifications defining the information content of the data set together with the transformation rules used to incorporate the source data into the unified data set. A stewardship archive could take this approach or preserve the source data sets in their original form.

5.4 Develop a System to Access Stewardship Data

As noted in Chapter 4, perhaps the most difficult challenge involving stewardship data is their accessibility. Under current requirements and practices, people get access to archived information primarily by request. Information is preserved in a number of places, so it is difficult for users to know that relevant data may exist and where to look for these data. When information is located, it may take more than a year to retrieve it. The lack of adequate contextual information may make it difficult or impossible to use any information that is retrieved.

This discussion outlines the elements of a system DOE could adopt to deliver stewardship data to appropriate users. The discussion considers both the requirements of an overall system to manage stewardship data and the types of roles, responsibilities, and other practices that need to be established to manage and operate such a system.

5.4.1 ELEMENTS OF A STEWARDSHIP DATA SYSTEM

Any system for managing stewardship data must be able to perform two key functions: (1) maintain physical control of stewardship data from the time they are identified until they are no longer needed (if such a time can be identified); and (2) enable appropriate users to find and retrieve these data in a timely manner. The first requirement is essentially an inventory or asset control problem; the system must be able to track the location and status of all physical and electronic units of stewardship data and ensure that these data are being adequately preserved. The second requirement is essentially an accessibility problem; the system must allow appropriate users to identify, find, and obtain all units of stewardship data that may be of interest.

Both physical control and accessibility must be maintained throughout the full life-cycle of stewardship information. One of the unique challenges for stewardship data is maintaining accessibility even when physical control is transferred from one entity to another. There are five key elements to include in a stewardship data system:

1. **Electronic archive.** All records that have stewardship value would be scanned or otherwise preserved in an electronic format and included in the electronic archive. Hard-copy versions of these records would continue to be archived under the existing requirements and practices (e.g., through NARA). Some design principles for electronic archives stress a need to "plan for chaos" (i.e., distribute copies of records to many repositories) to maximize the likelihood long-term survival.
2. **Electronic index.** An electronic index would include a standard outline/format, a uniform set of metadata (with appropriate standards), a system for geospatially referencing all holdings, and a standard thesaurus of index terms. The index would allow users to know what data are available, sort through these data in a preliminary manner, and find and retrieve all records of interest. The index also would include "pointers" to records that were reviewed for stewardship value but not included in the electronic archive. These might be records with no stewardship value (e.g., records of parking permits) or records that had potential stewardship value but were superseded by more accurate or up-to-date records (e.g., draft reports where a final report was issued, documents that contain secondary references or reproductions of primary sources).

3. **Delivery system.** A delivery system would provide users with electronic copies of records contained in the electronic index upon request and would allow users to request hard copies of material, if needed. A key requirement would be rapid response; users would need to obtain electronic materials in a matter of minutes or hours.
4. **User interface with a search engine.** A user interface would enable users to access the stewardship data system, search for stewardship data, and retrieve electronic materials from the stewardship archive. The interface would need to facilitate searches to be conducted at varying levels of geographic detail (e.g., at the national level, for a state or region, for a particular site, and for a particular facility or portion of a site).
5. **Maintenance system.** A maintenance system would be necessary to ensure that formats for maintaining electronic information, search engines, user interfaces, and all system components remained current with existing technologies. Without a systematic approach to maintenance, obsolescence would pose a significant risk to the long-term viability of stewardship data.

Two systems under development may be useful to consider when designing a stewardship data system. First, the National Environmental Data Index (NEDI) is being developed to assist in integrating a diverse set of environmental data generated by several federal agencies. The design principles for this index may provide guidance for how to integrate a diverse set of stewardship data, currently in multiple formats, across all DOE sites. Second, DOE has begun to develop a data repository and retrieval system for the proposed geologic repository at Yucca Mountain, Nevada. This system is designed to improve the accessibility, traceability, and transparency of data critical for decisions related to granting permits for the proposed geologic repository. The system includes an electronic archive, indexing system, interface, and search engine, and currently handles requests for about 15,000 pages of information per month. The Openness Advisory Panel of the Secretary of Energy's Advisory Board concluded that existing technologies and expertise are sufficient to extrapolate experience at Yucca Mountain to the entire Department.¹

Design Principles for the National Environmental Data Index (NEDI):

- Support multiple metadata standards
- Use Internet and other communication links, as needed
- Develop the system as a distributed data index
- Support distributed searches (through FIPS 192/Z39.50)
- Use existing standards and off-the-shelf software
- Support multiple interfaces to span the range of user needs
- Allow for multiple access points to NEDI

5.4.2 PRACTICES AND PROCESSES

A system for managing stewardship data will need to establish and codify practices to ensure physical control and accessibility of all information from the time it is identified as stewardship data until it is no longer needed for stewardship purposes, or indefinitely. These practices must be clear and simple enough to be followed by DOE and current contractors as well as future site stewards, particularly when responsibility for a given activity shifts from one entity to another. These practices also need to ensure that appropriate users can access stewardship data for decades or centuries. Any system for managing stewardship data must establish a process for:

- Approving the release of information into the system for managing stewardship data during cleanup and long-term stewardship.
- Determining who retains responsibility for data identification, preservation, and accessibility during cleanup and long-term stewardship.

¹ *The Prospects for Introducing a Comprehensive Electronic Records Management System into the Department of Energy.* Secretary of Energy Advisory Board, Openness Advisory Panel, Draft Subgroup Preliminary Assessment Report, November, 1997.

- Ensuring adequate geospatial referencing of stewardship data.
- Determining the extent to which hard or electronic copies of records should be preserved in locations other than NARA archives.
- Preserving a directory that points to the locations of all available data, including those preserved electronically and those preserved in hard copy.
- Determining who retains responsibility for developing and maintaining user interfaces that allow access to stewardship data during cleanup and long-term stewardship, and ensuring that the user interface remains intuitive and easily understood by non-DOE entities.
- Ensuring that existing standards, protocols, and requirements are being met, particularly when non-federal entities are involved.
- Determining formats that are appropriate for the long-term preservation and accessibility of electronic data, particularly with regard to the eventual obsolescence of hardware and software.
- Determining technology solutions that can ensure adequate infrastructure for data transfer/distribution, user interfaces, and data integration/conversion software.
- Ensure adequate funding for stewardship data needs.

5.4.3 INSTITUTIONAL FRAMEWORK FOR STEWARDSHIP DATA

Although DOE sites can take many steps now to begin implementing practices and processes for addressing stewardship data needs, a more systematic approach is needed to coordinate and focus efforts across all DOE organizations and sites. To do this effectively, DOE needs to develop an institutional framework to generate, preserve, and provide access to stewardship data. Since the stewardship mission differs significantly from missions of existing organizations within DOE, a specialized stewardship data entity would likely be the most effective means of providing for stewardship data needs. A distinct stewardship data entity also would mean that funding for long-term stewardship can be addressed directly through the annual budget process, rather than dispersed as an indirect cost in a variety of DOE offices.

It is impossible to determine how many entities might be involved in stewardship at the local, state, regional, and/or national levels or whether these would be government agencies, non-governmental organizations, or commercial enterprises. A variety of options exist for developing an institutional framework and for distributing responsibilities associated with managing stewardship data among current and future stewardship entities. The following three options for managing stewardship data describe the range of possibilities for designing such a framework:

1. **The dispersed option.** In this option, numerous entities would be responsible for identification, preservation, and accessibility of stewardship data. The primary advantage of such an option is its flexibility. Sites would be allowed to establish agreements with a variety of entities so that responsibilities could be matched with site-specific needs and circumstances. The primary disadvantage would be coordination. It would be difficult to ensure that existing and future requirements, standards, and protocols are followed adequately, particularly when governmental and non-governmental entities are involved.
2. **The concentrated option.** In this option, a single, national entity would be responsible for identification, preservation, and accessibility of stewardship data. The primary advantages of such an option are efficiency and continuity. A single entity would make it easier to maintain standards and practices and could function much like a library does today. Needed modifica-

tions such as hardware/software upgrades could be accomplished in a coordinated and systematic manner. The primary disadvantage would be inflexibility. A "one size fits all" approach to managing stewardship data may not be the most appropriate response to the needs of a specific site. For example, stakeholders have expressed a strong desire to maintain permanent archive repositories near the sites, which might be difficult under this option.

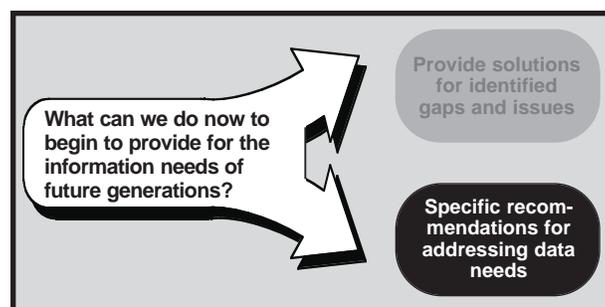
- 3. The hybrid option.** In this option, some responsibilities would be concentrated in a single entity, while others would be dispersed among multiple entities. For example, several entities might be responsible for maintaining data archives, while a single entity might be responsible for identifying stewardship data, ensuring they are preserved in data archives, and ensuring data accessibility and re-distribution. This option would be intermediate in terms of flexibility, efficiency, and the need to maintain coordination. Under this option, DOE could establish a stewardship data entity that maintained the overall responsibility for stewardship data but retained the ability to distribute specific responsibilities to other entities (e.g., the Department of Interior could maintain an archive for all records related to endangered/threatened species).

One of the key functions of a stewardship data entity would be coordination of stewardship information management activities at all the sites for which DOE is responsible as they complete cleanup and other missions and prepare for closure or transfer and for long-term stewardship. Another key function would be to maintain the electronic archive and indexing/metadata system critical for data accessibility. This entity or function could be located at the field level, preferably at a site with a well-defined long-term mission. Ideally the site would already have the resources, personnel, expertise, and technologies needed for the stewardship data functions.

Establishing a new data function in a central facility would require some investment of effort and funds. Funds are currently being spent on data retention with no assurance that the systems and data needed by long-term stewards will be available. Given the findings cited in Chapter 4, a single, effective data preservation system would reduce costs because it would prevent the loss of records, eliminate the need to regenerate information, and possibly help avoid site closure delays.

6.0 RECOMMENDATIONS

The transition from a mission focused on cleanup to one focused on long-term stewardship at DOE sites has begun. During this transition process, contracting processes are changing, workforces are being reduced, and responsibilities are being redefined. As sites contend with the changes and uncertainties associated with this transition, it is important not to lose sight of the fact that hazards will remain at these sites and specific information will be required to protect human health and the environment from these hazards, both now and hundreds of years from now.



As noted in the preceding chapters, the requirements for identifying, preserving, and providing access to data relevant to stewardship are not comprehensive and should be evaluated carefully to determine how the gaps can best be filled. Further, better mechanisms are needed for carrying out existing and future requirements, particularly as DOE sites complete their cleanup and are transferred to other owners.

This chapter provides specific recommendations for DOE and sites to begin addressing stewardship data needs. Where appropriate, similar recommendations from DOE's Openness Advisory Panel and Records Management Quality Improvement Team are called out.

Section 6.1 presents several general recommendations. Sections 6.2, 6.3, and 6.4 present recommendations specific to data generation, preservation, and accessibility, respectively.

Section 6.5 provides recommendations regarding the establishment of a stewardship data entity within DOE.

As sites reconfigure or are closed altogether, the problems of locating, transferring, and protecting records loom large. Efforts to speed up declassification and to make records relating to the environment and to worker and community health available to the public require an in-depth knowledge of the records in DOE custody that can only come through a vital and well-supported records management program.

Roadmap to the Year 2000, U.S. Department of Energy Records Management Quality Improvement Team, Revision 1, August 1995

6.1 General Recommendations

When the cleanup mission comes to an end, responsibility for DOE sites may be transferred to entities other than EM and, in some cases, other than DOE. These entities, and the people who live and work in the surrounding communities, will need sufficient information about the sites to ensure the continued protection of human health and the environment. Some of this critical information has been lost, and more is being lost every day. DOE needs to begin planning for the eventual transfer of this information now, to prevent it from being lost. DOE also needs to begin identifying who will need this information, what

Work with the Records Management Division, DOE's records management officers, the Office of Procurement, Assistance, and Program Management, and the Office of General Counsel to develop and distribute contract language that clearly addresses information ownership and management requirements in all DOE contracts.

...[I]t is important to exchange concepts, approaches, and success in implementing the recordkeeping requirements regulations with other agencies.

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Openness should be established as a core value of the Department through incorporation in performance reviews, program plans, and contracting activities.

Responsible Openness: An Imperative for the Department of Energy, Openness Advisory Panel, Secretary of Energy Advisory Board, August 25, 1997 (Recommendations 5,33)

specific data will be needed, and how the appropriate information will be preserved. The following specific actions are recommended to achieve these objectives:

1. Sites should evaluate the potential gaps in current information management requirements and practices as they pertain to stewardship data and develop and implement strategies for addressing these gaps.
2. DOE should train site personnel to identify stewardship data and ensure their preservation.
3. DOE should provide for adequate funding to ensure sites can identify and preserve stewardship data. The potential return on investment through accelerated site closure and avoided future costs could well justify any additional costs associated with stewardship data efforts.
4. DOE should identify appropriate entities that would manage or use stewardship data, identify their roles and responsibilities with regard to these data, and actively coordinate stewardship data efforts with each entity.
5. DOE should establish a core value to provide for stewardship data needs and incorporate this value into performance reviews, program plans, and contracting activities.

6.2 Recommendations for Data Generation

A large amount of information was generated at DOE sites during the nuclear weapons production era and continues to be generated during cleanup. The challenge facing DOE as sites transition to long-term stewardship is to develop a systematic approach for determining how to distinguish stewardship data from the universe of available information. This determination is necessary to ensure that any new information management procedures are directed only to that information necessary to protect human health and the environment now and into the future. The following specific actions are recommended to achieve these objectives:

A successful records management program begins with having good information management practices at the creation of the information and using those practices throughout the life-cycle of the information. This is critical because the manner in which the records are created and information collected impacts upon their (its) maintenance, use, and disposition.

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1. DOE should develop a consensus on stewardship data needs and the types of information that are required to meet these needs. This report provides a starting point for identifying stewardship data needs, the information that can support these needs, and criteria for identifying the stewardship value of specific information. A broader effort involving DOE Headquarters, sites, stakeholders, and potential stewardship entities is required to define adequately the subset of information that will be critical for stewardship.
2. DOE should develop guidance for establishing a clear stewardship baseline at site closure. The guidance should define baseline data needs and provide data quality objectives for fulfilling those needs. The baseline should be sufficient to understand fully the location, condition, and status of all former and residual hazards remaining on the site at the time of site closure or transfer and the history of site activities as they pertain to these hazards. Such a baseline would represent the core information required for long-term stewardship.
3. DOE should establish a process for assessing the stewardship value of data to which access is currently restricted (e.g., classified or litigation-sensitive records) so that relevant portions of these can be merged with other stewardship data when such restrictions no longer apply.

6.3 Recommendations for Data Preservation

Given the absence of clear criteria and guidance for identifying stewardship data, some information critical to the long-term ability to protect human health and the environment has been and is being lost. As sites continue the transition from cleanup to long-term stewardship, it is important to implement procedures to minimize additional data losses. An important first step would be to evaluate the stewardship value of all records being created currently and ensure that those with stewardship value are adequately preserved. This would entail recording critical contextual information (e.g., metadata) in terms that people are likely to understand in the future, and expediting the transfer of stewardship data to appropriate information stewards, while sites are in the cleanup phase. Once procedures are in place to identify and preserve stewardship data generated between now and when the site transitions to long-term stewardship, more attention can be focused on reviewing information generated in the past. The following specific actions are recommended to achieve these objectives:

1. Sites should focus on identifying and preserving stewardship data from the present and into the future. DOE can avoid many of the potential costs and delays associated with having to re-create necessary data at site closure or transfer by highlighting the potential problem and developing guidance to assist sites in identifying and preserving all stewardship data that will be generated in the future.
2. With regard to present and past records, sites should focus initially on identification and preservation of stewardship data that exist among active records because the marginal cost of their preservation should be relatively low. Active records are more likely to be used on a regular basis and hence readily available. The individuals who know the most about these records are likely to be still involved in their maintenance and would be important players in determining their stewardship value. Metadata and other contextual information for active records should be readily available or could be developed with relatively little effort.
3. Inactive records generally should be a relatively low priority because of the high cost associated with their identification, retrieval, and re-generation. A reasonable approach for evaluating these records would be to preserve them on an as-needed basis. If there were a reason to investigate some inactive records unrelated to long-term stewardship needs, or to meet a specific need such as establishing a site baseline, it would make sense to simultaneously determine whether they had stewardship value.
4. Sites should transfer stewardship information to an offsite stewardship entity(ies) as rapidly as possible. The benefits of a rapid transfer of information include reducing site overheads,

Establish and implement standards and procedures for subject classifying, indexing, and filing of records for all media.

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DOE's contractors should be obliged to support declassification, records maintenance, and accessibility activities that further DOE's openness initiatives. All new contracts should contain explicit language covering these obligations and existing contracts should be amended to the extent feasible.

Responsible Openness: An Imperative for the Department of Energy (Recommendation 35)

DOE should undertake several initiatives in the area of developing "finding aids:"

1. Compile a centralized directory of all currently available "finding aids" for its records.
2. Continue efforts to make finding aids available to the public by placing them on OpenNet and expanding beyond (current) health and safety topics.
3. Develop a uniform format and content standard for new finding aids.
4. Experiment with preparation of finding aids for important topical areas.
5. Use the ongoing Large-Scale Review to develop finding aids to both declassified and still-classified documents.

Responsible Openness: An Imperative for the Department of Energy (Recommendations 24-28)

ensuring that adequate baselines are established, and ensuring that data transfer protocols are established early in the process.

5. DOE should evaluate current information management requirements at sites to ensure that stewardship data are preserved in a manner that will allow future users to access these data in a timely manner. DOE should develop specific metadata and indexing standards for stewardship data (including adequate geospatial referencing). These metadata and indexing standards should be applied at the time the data are captured to ensure the information is complete, accurate, and consistent. DOE also should ensure that stewardship information is adequately stored and transferred when information management responsibility shifts from one contractor to another. This should include clear guidelines that assign responsibility for updating stewardship data (e.g., ensuring metadata are current).
6. DOE should re-evaluate its records retention schedule to ensure that stewardship data are preserved permanently.

6.4 Recommendations for Future Access

Ensuring adequate preservation of stewardship data is necessary but not completely sufficient; ensuring timely access to this information also requires serious consideration. Given the variety of locations where information about DOE sites is archived today, there currently is no single starting point where someone can begin a search for information required to meet stewardship requirements. Also, there are no indexing or metadata standards for stewardship data. As a result, there is no common or consistent reference system for describing the types of stewardship data that are available. It is important to begin to develop a systematic approach for managing and providing access to stewardship data now, while sites are transitioning from cleanup to long-term stewardship. The following specific actions are recommended to achieve these objectives:

The bulk of documents under DOE's control are unclassified, but many are effectively unavailable because of poor document management. The Department must improve its document control systems and its methods of information dissemination.

DOE should seek to enhance efficiency through the use of technology:

1. Modern computer capability should be harnessed to assist in the classification process for future documents.
2. Test the effectiveness of electronic document management systems.
3. DOE should seek proposals from the laboratories and the private sector for a document management system tailored to the Department's needs, and fund one or more pilot tests.
4. Pursue the use of artificial intelligence to assist in declassification reviews.

Responsible Openness: An Imperative for the Department of Energy (Recommendations 20, 29-31)

1. DOE should archive information in a user-friendly way. This means that a person without an intimate knowledge of the site or the technical terminology used during weapons production and site cleanup can understand how to search for and find the necessary information. Employing common terminology will increase the utility of stewardship data for the long-term.
2. DOE should begin developing an electronic reference system for stewardship data records. Its primary function would be to allow users to: (1) identify records that are available for a given geographical location, subject matter, or stewardship activity; (2) understand the content, quality, condition, and other contextual characteristics of each record; (3) locate and retrieve any records of interest. Descriptive information (e.g., indexes and metadata) must clearly delineate the type of medium in which data are preserved (e.g., report, journal article, letter, data file); where the record falls within the information taxonomy (e.g., original data, summary of data, analysis of data, transmittal of data); and how to access the record (e.g., electronically or by paper request). Full-text keyword searching of the information is also a likely requirement for any electronic reference or retrieval system.

3. DOE should develop a conceptual design for a system to manage and provide access to stewardship data. This report provides a starting point for such a system, but a broader effort involving DOE Headquarters, sites, stakeholders, and potential stewardship entities will be required to adequately understand the requirements for such a system.

6.5 Recommendations for Establishing a New Stewardship Data Entity

Even if all necessary requirements for identifying, preserving, and providing access to stewardship data are put in place and followed, an institutional structure focused on data management is needed. Thus, a final recommendation of the project team is that a new stewardship data entity be established for the entire Department. The new entity would cut across, but be independent of, offices with existing programmatic missions. The new entity would perform and integrate stewardship data functions and encompass the following elements:

Establish a DOE National Records Center that would store the majority of inactive DOE records.

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- As sites go through closure, ensure that information needed for stewardship is retained in a manner that makes it readily accessible to future stewards.
- Maintain an information repository with electronic control over all stewardship data.
- After closure, ensure that all data generated by stewardship activities (e.g., long-term monitoring data) are integrated with the baseline.
- Ensure that all information is distributed to those who need it.
- Ensure that over time the system remains current and compatible with new technology.
- Solicit and integrate recommendations from other agencies, such as the National Archives and Records Administration.

The entity would have electronic control of all stewardship information, maintain electronic records where appropriate, and develop electronic indexes to information. It would deal with other sites, probably through the site chief information officers, and have oversight of the stewardship data identification and preservation process at the sites. Some of its representatives could be detailed to various sites for periods of time to be sure that stewardship data are retained and go to the appropriate location after the site performs initial data review and indexing. This entity would perform a quality analysis before putting the data into the system to ensure that only data with stewardship value are retained.

There are many different ways of setting up the new entity. One logical approach would be to locate the new entity in a center of excellence at a field site with a well-defined, long-term mission. This center would report to the Undersecretary, possibly within the office of the DOE Chief Information Officer. Making the entity independent of current programs would help its focus on long-term stewardship data remain viable.

APPENDIX A: LIST OF REQUIREMENTS REGARDING DATA GENERATED, PRESERVED, AND ACCESSED

Many of the types of data needed for stewardship are required to be generated, preserved, and accessed under current laws, regulations, orders, or guidelines. Laws and regulations that apply to radioactive and hazardous waste and materials require that certain data be maintained to demonstrate compliance with the statutory provisions. These include the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Atomic Energy Act (AEA). Other laws and regulations address the protection of historic properties and cultural resources. In addition, numerous DOE Orders and guidelines also contain requirements for generating, preserving, and providing access to information.

Table A-1 provides a summary of the requirements regarding the generation, preservation, and/or accessibility of stewardship data at DOE sites, based on many of the laws, regulations, orders, and guidelines that are applicable to some or all of the DOE sites. Table A-1 presents the requirements by the stewardship data type. Similarly, all requirements regarding data for operations and activities are presented together. Table A-1 also indicates whether each requirement addresses the generation, preservation, and/or accessibility of stewardship data. It is important to note that Table A-1 does not contain a comprehensive list of all requirements. Table A-1 includes key national laws and regulations and some DOE Orders and guidelines; however, it does not include state and local requirements and all DOE Orders and guidelines. Refer to Appendix B of the *Roadmap to the Year 2000* for additional information regarding DOE recordkeeping requirements.¹

Table A-1. List of Requirements

Data Type	Requirement	Source	Category
Hazards and Controls			
A. Existing Hazards	Information on hazardous constituents is generated through RCRA permits and operating records. Information on radioactive waste at NRC licensed facilities is generated through waste disposal and materials handling licenses.	RCRA	Generation
	RCRA records must be kept for 30 years after the unit/site closure, a copy of the RCRA closure document must be placed on the deed indefinitely.	RCRA	Preservation
	Radioactive waste records must be maintained in compliance with requirements in this DOE Order.	DOE Order 200.1	Preservation
	Information regarding the total amount of each substance and mixture manufactured or processed; a description of the byproducts resulting from the manufacture, processing, use, or disposal of each such substance or mixture; all existing data concerning the environmental and health effects of such substance or mixture; and the manner or method of its disposal must be reported and maintained, as required by the Administrator.	TSCA	Generation Preservation
	Emergency and hazardous chemical inventory form, which includes chemical name, location, and maximum levels, and material safety data sheets is required and made publicly available.	EPCRA	Generation Preservation
	Requires records of the location, title, condition of a facility, and the identity, characteristics, quantity, origin, or condition (including containerization and previous treatment) of any hazardous substances contained or deposited in a facility to be retained for fifty years after the date of establishment.	CERCLA	Generation Preservation

¹ *Roadmap to the Year 2000*, August 1995 (Revision 1), DOE Records Management Quality Improvement Team.

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
A. Existing Hazards (continued)	Records of the disposal of licensed materials will include a description of the waste, including physical and chemical properties, pertinent information on the nature of the environment, the nature and location of potentially affected facilities, and procedures to ensure that doses are maintained. Records retained until NRC license is terminated.	10 CFR 20.2108	Generation Preservation
	Records are required for any defects or instances of noncompliance with the regulations set forth in 10 CFR Parts 31, 34, 35, 39, 40, 60, 61, 70, or 72. These regulations cover the use, storage, transfer, and disposal of byproduct material, source material, special nuclear material, spent fuel, and high-level waste, among other things.	10 CFR 21.51	Generation Preservation
	Rules of General Applicability to Domestic Licensing of Byproduct Material requires recording test results for leakage of radioactive material from measuring, gauging, or controlling devices. Retention period is 3 years after performing next required leak test, or until transferring or disposing of sealed source.	10 CFR 31.5	Generation Preservation
	Source Material Licensing requires NRC Form 314, "Certificate of Disposition of Materials," on or before expiration of license; a report of results of radiation surveys, and a certification of disposition of accumulated wastes from decommissioning — including a list containing the location and description of all equipment to remain onsite after termination of license due to contamination. Report to be generated with the final step of NRC licensing approval of decommissioning plan.	10 CFR 40.42	Generation Preservation
	Licenses for land disposal of radioactive waste require records for many aspects of land disposal including: the location and quantity of radioactive waste contained in the disposal site, unit performance objectives, design and technical requirements, assurances for institutional controls, and public participation. Retention period is until license is terminated, after which time the record will be transferred to chief executive of nearest municipality, chief executive of county in which facility is located, county zoning board, state governor and other state, local and federal agencies, as designated.	10 CFR 61	Generation Preservation Access
	Post-closure notices for hazardous waste units at interim status facilities must be submitted to the local zoning authority or the authority with jurisdiction over local land use. A record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility must go to the Regional Administrator; and, in accordance with State law, a notation on the deed to the facility property must be recorded. Report must be generated no later than 60 days after certification of closure, and must be placed onto deed indefinitely.	40 CFR 265.110-120	Generation Preservation Access
	The RCRA Part A and Part B permits must include information concerning, among other things, facility drawings and photographs, description, waste characterization, groundwater monitoring, procedures to prevent hazards, closure and post-closure plans, corrective actions, and a discussion on other federal laws.	40 CFR 270.13-26	Generation Preservation
	Information on the type and quantity of each hazardous substance, hazardous waste, and petroleum product known to have been managed on the real property; underground storage tanks; radioactive substances and contamination; polychlorinated biphenyls (PCBs) and any equipment with PCBs; and asbestos to be included in NEPA document and/or environmental baseline survey for future stewards. Appropriate information should also be included in the conveyance of the property transfer and provided to the federal agency overseeing the property transfer, if not DOE. If leaving property, information should be provided to appropriate State officials.	Cross-Cut Guidance	Generation Preservation
	Requirements for groundwater monitoring wells include concentrations for each well; results of groundwater surface elevations; quality assessment programs; and rate of migration of hazardous waste or hazardous waste constituents in the ground water during the reporting period. The results of the evaluations of groundwater quality surface elevations should be reported no later than March 1 following each calendar year.	40 CFR 265	Generation
	The license requirements for general long-term care of residual radioactive material disposal sites include information on the monitoring, maintenance, and emergency measures needed to protect receptors from UMTRCA title I and II disposal sites. This information includes a legal description of the disposal site; site ownership, land holding interests, and waivers; final disposal site conditions; and a description of the long-term surveillance program including frequency and reporting.	10 CFR 40.27-28	Generation Preservation

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
A. Existing Hazards (continued)	Facilities licensed to manage nuclear material are required to submit a NRC Form 314, "Certificate of Disposition of Materials" that details the final disposition/disposal of special nuclear materials. The report will include information on levels of radiation, planned decommissioning, physical security plan, the location and description of all equipment to remain onsite after termination of license, and institutional controls required. The form is to be completed on or before expiration of license.	10 CFR 70.38	Generation Preservation
	The Independent Storage of Spent Nuclear Fuel and High Level Waste License termination application requires a terminal radiation survey and associated documentation that the site are suitable for release for unrestricted use, including a list containing the location and description of all equipment to remain onsite after license termination. A report must be generated following the final step of NRC-approved decommissioning plan.	10 CFR 72.54	Generation Preservation
	The Operating Record requires a description and quantity of each hazardous waste received; the method(s) and date(s) of its treatment, storage, or disposal at the facility; the location of each hazardous waste within the facility and the quantity at each location; records and results of waste analyses and waste determinations; summary reports and details of all incidents that require implementing the contingency plan; records and results of inspections; monitoring, testing or analytical data, and corrective action; all closure cost estimates and post-closure cost estimates. Records of the quantities (and date of placement) for each shipment of hazardous waste placed in land disposal units under an extension to the effective date of any land disposal restriction, to be furnished upon request. A copy of records of waste disposal locations and quantities must be submitted to the Regional Administrator and local land authority upon closure of the facility.	40 CFR 264.73	Generation Preservation Access
	The operating records for landfills require maintaining the following items: the exact location and dimensions of each cell with respect to permanently surveyed benchmarks; the contents of each cell and the approximate location of each hazardous waste type; an implementation schedule; a detailed description of sampling and monitoring procedures; the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal at the facility; the location of each hazardous waste within the facility and the quantity at each location--for disposal facilities, the location and quantity of each hazardous waste must be recorded on a map or diagram of each cell or disposal area; records and results of waste analyses and waste determinations; summary reports and details of all incidents that require implementing the contingency plan; records and results of inspections, monitoring, testing or analytical data, and corrective action; all closure cost estimates and post-closure cost estimates; records of the quantities (and date of placement) for each shipment of hazardous waste placed in land disposal units under an extension to the effective date of any land disposal restriction. Report must be up to date and available at all times (upon request) and be maintained in operating record.	40 CFR 265.73	Generation Preservation
	Records covered by this schedule include the following classes: (a) safety management; (b) medical and health research; (c) operational records for health units, fire units, and biological laboratories; (d) individual case files of employees exposed to hazardous or toxic substances, or radioactivity; and (e) records of DOE-controlled activities reflecting the protection provided to employees, the public, property, and the environment during the conduct of the activity. Some of these records must be preserved 5 to 80 years, depending upon the type of record. Others must be preserved permanently (e.g., files on occurrences that were of widespread public and Congressional interest).	DOE Records Retention Schedules	Preservation
	This schedule includes approved disposition standards for hazardous material (radioactive and fissile material); shipping packaging records, including Certificates of Compliance; Safety Analysis Reports for Packaging (SARPs); evaluation of SARPs; amendments to licenses; and quality assurance records documenting packaging design, fabrication, maintenance, and use. Records are destroyed five years after Certification of Compliance is terminated, unless renewed use of records is definitely anticipated.	DOE Records Retention Schedules	Preservation
	Records of generation, storage, and disposal of radioactive wastes at a geologic repository shall be preserved by DOE that ensures their usability for future generations in accordance with 8560.51(a)(2).	AEA	Preservation Access

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
A. Existing Hazards (continued)	Annual assessments of nuclear materials inventories must be developed, including current inventories and plans for reducing inventory levels. Assessments address active materials, which are materials that are actively used in DOE programs, and inactive materials. The circumstances related to all inactive usable materials should be clearly identified, as well as the rationale for continued storage, and the final disposition plan, if known. Information may also include data from Nuclear Materials Management and Safeguards System reports, which include project inventories, inventory composition, and assays.	DOE 5660.1	Generation Preservation
B. Past and Present Releases and Accidents	The RCRA and CERCLA processes for hazardous waste include the generation and preservation of some of these data.	RCRA CERCLA	Generation Preservation
	Some information required in the final survey documentation from DOE <i>Implementation Guide For Radioactive Survey Procedures</i> and in the reporting requirements.	DOE Order 5400.5	Generation
	Each licensee shall maintain records showing all radiation exposures. Records shall be kept until the Commissioner authorizes disposition.	AEA	Generation
	If a release affects the health of an employee, the record must be kept for 30 years. If a release does not affect the health of an employee, the record must be kept for 5 years.	AEA	Preservation
	This requires that a record of an individual's occupational dose received during the current year be recorded in a written statement disclosing the nature and amount of any occupational dose that an individual may have received. Retention period is 3 years.	10 CFR 20.2104	Generation Preservation
	Records of planned special radiation exposures must be maintained, including details of the exceptional circumstances, the actions taken and the individual and collective doses expected. Records must be retained until the NRC license is terminated.	10 CFR 20.2105	Generation Preservation
	Records of individual monitoring results for occupational doses received during planned special exposures, accidents, and emergency conditions must be retained until the NRC license is terminated.	10 CFR 20.2106	Generation Preservation
	Records sufficient to demonstrate compliance with dose limits for individual members of the public. Records retained until NRC license is terminated.	10 CFR 20.2107	Generation Preservation
	Rules of General Applicability to Domestic Licensing of Byproduct Material requires recording test results for leakage of radioactive material from measuring, gauging, or controlling devices. Retention period is 3 years after performing next required leak test, or until transferring or disposing of sealed source.	10 CFR 31.5	Generation Preservation
	Source Material Licensing requires NRC Form 314, "Certificate of Disposition of Materials," on or before expiration of license, a report of results of radiation surveys, and a certification of disposition of accumulated wastes from decommissioning—including a list containing the location and description of all equipment to remain onsite after termination of license due to contamination. Report to be generated with the final step of NRC licensing approval of decommissioning plan.	10 CFR 40.42	Generation Preservation
	Standards for Protection against Radiation require records of radiation surveys and instrument calibrations made pursuant to 20.1501 and 20.1906(b). Retention period is 3 years.	10 CFR 20.2103	Generation Preservation
	The occurrence and duration of each startup, shutdown, or malfunction of operation of air pollution control equipment; all maintenance performed; actions taken during periods of startup, shutdown, and malfunction; all information necessary to demonstrate conformance with the affected source's startup, shutdown, and malfunction plan. Report must be available at all times, and must be retained for at least 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record on site; and 3 years of data may be retained off site.	40 CFR 61	Generation Preservation Access
	The Operating Record requires a description and quantity of each hazardous waste received; the method(s) and date(s) of its treatment, storage, or disposal at the facility; the location of each hazardous waste within the facility and the quantity at each location; records and results of waste analyses and waste determinations; summary reports and details of all incidents that require implementing the contingency plan; records and results of inspections; monitoring, testing or analytical data, and corrective action; all closure cost estimates and post-closure cost estimates. Records of the quantities (and date of placement) for each shipment of hazardous waste placed in land disposal units under an extension to the effective date of any land disposal	40 CFR 264.73	Generation Preservation

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
B. Past and Present Releases and Accidents (continued)	restriction, to be furnished upon request. A copy of records of waste disposal locations and quantities must be submitted to the Regional Administrator and local land authority upon closure of the facility.	40 CFR 264.73	Generation Preservation
	Information on the type and quantity of each hazardous substance known to have been released on the real property is to be included in NEPA document and/or environment baseline survey for future stewards.	Cross-Cut Guidance	Preservation Access
	The operating records for landfills require maintaining the following items: the exact location and dimensions of each cell with respect to permanently surveyed benchmarks; the contents of each cell and the approximate location of each hazardous waste type; an implementation schedule; a detailed description of sampling and monitoring procedures; the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal at the facility; the location of each hazardous waste within the facility and the quantity at each location--for disposal facilities, the location and quantity of each hazardous waste must be recorded on a map or diagram of each cell or disposal area; records and results of waste analyses and waste determinations; summary reports and details of all incidents that require implementing the contingency plan; records and results of inspections, monitoring, testing or analytical data, and corrective action; all closure cost estimates and post-closure cost estimates; records of the quantities (and date of placement) for each shipment of hazardous waste placed in land disposal units under an extension to the effective date of any land disposal restriction. Report must be up to date and available at all times (upon request) and be maintained in operating record.	40 CFR 265.73	Generation Preservation
	Emergency Operating Records: These records are essential to the continued functioning or reconstitution of an organization during and after an emergency. They include: emergency plans and directives, staffing assignments, program records needed for the most critical Departmental operations, policy and procedural records that assist staff in conducting operations under emergency conditions. These records must be available as needed at or in the vicinity of Emergency Operations Centers (EOCs). Additional records included are general management records, lists of key personnel, emergency mission records, and industrial records.	DOE G 1324.5B	Generation Preservation
	Records covered by the schedules include the following classes of records: (a) safety management; (b) medical and health research; (c) operational records for health units, fire units, and biological laboratories; (d) individual case files of employees exposed to hazardous or toxic substances, or radioactivity; and (e) records of DOE-controlled activities reflecting the protection provided to employees, the public, property, and the environment during the conduct of the activity. Some of these records must be preserved 10 to 80 years, depending upon the type of record. Others must be preserved permanently (files on occurrences that were of widespread public and Congressional interest).	DOE Records Retention Schedules	Preservation
	For each such substance and mixture manufactured or processed, information regarding the number of individuals exposed, and reasonable estimates of the number who will be exposed in their places of employment and the duration of such exposure must be reported and maintained, as required by the Administrator.	TSCA	Generation Preservation
C. Disposition of Historical Hazards	Information is required to be generated in RCRA Treatment, Storage, and Disposal Facility (TSDF) Closure Plans and CERCLA Record of Decision (RODs). Notification of RCRA Closure Plan must be placed in the deed for the property indefinitely.	RCRA CERCLA	Generation Preservation Access
	Records of generation, storage, and disposal of radioactive wastes at a geologic repository shall be preserved by DOE so as to ensure their usability for future generations in accordance with 8560.51(a)(2).	AEA	Preservation Access
	Requires records of the location, title, condition of a facility, and the identity, characteristics, quantity, origin, or condition (including containerization and previous treatment) of any hazardous substances contained or deposited in a facility to be retained for fifty years after the date of establishment.	CERCLA	Generation Preservation
	Records are required for any defects or instances of noncompliance with the regulations set forth in 10 CFR Parts 31, 34, 35, 39, 40, 60, 61, 70, or 72. These regulations cover the use, storage, transfer, and disposal of byproduct material, source material, special nuclear material, spent fuel, and high-level waste, among other things.	10 CFR 21.51	Generation Preservation

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
C. Disposition of Historical Hazards (continued)	Rules of General Applicability to Domestic Licensing of Byproduct Material requires recording test results for leakage of radioactive material from measuring, gauging, or controlling devices. Retention period is 3 years after performing next required leak test, or until transferring or disposing of sealed source.	10 CFR 31.5	Generation Preservation
	Source Material Licensing requires NRC Form 314, "Certificate of Disposition of Materials," on or before expiration of license, a report of results of radiation surveys, and a certification of disposition of accumulated wastes from decommissioning—including a list containing the location and description of all equipment to remain onsite after termination of license due to contamination. Report to be generated with the final step of NRC licensing approval of decommissioning plan.	10 CFR 40.42	Generation Preservation
	Licenses for land disposal of radioactive waste require records for many aspects of land disposal including: the location and quantity of radioactive waste contained in the disposal site, unit performance objectives, design and technical requirements, assurances for institutional controls, and public participation. Retention period is until license is terminated, after which time the record will be transferred to chief executive of nearest municipality, chief executive of county in which facility is located, county zoning board, state governor and other state, local and federal agencies, as designated.	10 CFR 61	Generation Preservation
	Post-closure notices for hazardous waste units at interim status facilities must be submitted to the local zoning authority or the authority with jurisdiction over local land use. A record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility must go to the Regional Administrator; and, in accordance with State law, a notation on the deed to the facility property must be recorded. Report must be generated no later than 60 days after certification of closure, and must be placed onto deed indefinitely.	40 CFR 265.110-120	Generation Preservation Access
	The Operating Record requires a description and quantity of each hazardous waste received; the method(s) and date(s) of its treatment, storage, or disposal at the facility; the location of each hazardous waste within the facility and the quantity at each location; records and results of waste analyses and waste determinations; summary reports and details of all incidents that require implementing the contingency plan; records and results of inspections; monitoring, testing or analytical data, and corrective action; all closure cost estimates and post-closure cost estimates. Records of the quantities (and date of placement) for each shipment of hazardous waste placed in land disposal units under an extension to the effective date of any land disposal restriction, to be furnished upon request. A copy of records of waste disposal locations and quantities must be submitted to the Regional Administrator and local land authority upon closure of the facility.	40 CFR 264.73	Generation Preservation
	The operating records for landfills require maintaining the following items: the exact location and dimensions of each cell with respect to permanently surveyed benchmarks; the contents of each cell and the approximate location of each hazardous waste type; an implementation schedule; a detailed description of sampling and monitoring procedures; and the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal at the facility; the location of each hazardous waste within the facility and the quantity at each location--for disposal facilities, the location and quantity of each hazardous waste must be recorded on a map or diagram of each cell or disposal area; records and results of waste analyses and waste determinations; summary reports and details of all incidents that require implementing the contingency plan; records and results of inspections, monitoring, testing or analytical data, and corrective action; all closure cost estimates and post-closure cost estimates; records of the quantities (and date of placement) for each shipment of hazardous waste placed in land disposal units under an extension to the effective date of any land disposal restriction. Report must be up to date and available at all times (upon request) and be maintained in operating record.	40 CFR 265.73	Generation Preservation
	Information on the type and quantity of each hazardous substance, hazardous waste, and petroleum product known to have been managed on the real property; underground storage tanks; radioactive substances and contamination; polychlorinated biphenyls (PCBs) and any equipment with PCBs; and asbestos is to be included in NEPA document and/or environmental baseline survey for future stewards. Appropriate information should also be included in the conveyance of the property transfer and provided to the federal agency overseeing the property transfer, if not DOE. If leaving property, information should be provided to appropriate State officials.	Cross-Cut Guidance	Preservation Access

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
C. Disposition of Historical Hazards (continued)	Records covered by this schedule include the following classes of records: (a) safety management; (b) medical and health research; (c) operational records for health units, fire units, and biological laboratories; (d) individual case files of employees exposed to hazardous or toxic substances, or radioactivity; and (e) records of DOE-controlled activities reflecting the protection provided to employees, the public, property, and the environment during the conduct of the activity. Some of these records must be preserved 5 to 80 years, depending upon the type of record. Others must be preserved permanently (e.g., files on occurrences that were of widespread public and Congressional interest).	DOE Records Retention Schedules	Preservation
	The schedules include approved disposition standards for hazardous material (radioactive and fissile material) shipping packaging records, including Certificates of Compliance; Safety Analysis Reports for Packaging (SARPs); evaluation of SARPs; amendments to licenses; and quality assurance records documenting packaging design, fabrication, maintenance, and use. Records are destroyed five years after Certification of Compliance is terminated, unless renewed use of records is definitely anticipated.	DOE Records Retention Schedules	Preservation
	Annual assessments of nuclear materials inventories must be developed, including current inventories and plans for reducing inventory levels. Assessments address active materials, which are materials that are actively used in DOE programs, and inactive materials. The circumstances related to all inactive usable materials should be clearly identified, as well as the rationale for continued storage, and the final disposition plan, if known. Information may also include data from Nuclear Materials Management and Safeguards System reports, which include project inventories, inventory composition, and assays.	DOE 5660.1	Generation Preservation
D. Existing Barriers and Mechanisms for Preventing Exposures	Information required to be generated in RCRA TSDF Closure Plans and CERCLA RODs.	RCRA CERCLA	Generation
	Notification of the Closure Plan must be placed on the deed for the property indefinitely.	RCRA	Preservation
	Radioactive Waste records must be maintained in compliance with requirements of this Order.	DOE Order 200.1	Preservation
	The RCRA Part A and Part B permits must include information concerning, among other things, facility drawings and photographs, description, waste characterization, groundwater monitoring, procedures to prevent hazards, closure and post-closure plans, corrective actions, and a discussion on other federal laws.	40 CFR 270.13-26	Generation Preservation
	Extent to which land is decontaminated or measures are being taken to protect public from the contamination; any terms and conditions DOE may deem necessary to incorporate in any further disposition of the land to protect the public interest; and all exceptions, reservations, conditions, and restrictions relating to the title acquired is to be included in information provided to federal agency overseeing property transfer, if not DOE, and included in conveyance of property as appropriate.	Cross-Cut Guidance	Generation Preservation Access
	The license requirements for general long-term care of residual radioactive material disposal sites include information on the monitoring, maintenance, and emergency measures needed to protect receptors from UMTRCA title I and II disposal sites. This information includes a legal description of the disposal site; site ownership, land holding interests, and waivers; final disposal site conditions; and a description of the long-term surveillance program including frequency and reporting.	10 CFR 40.27-28	Preservation
	Records covered by these schedules include the following: (a) safety management; (b) medical and health research; (c) operational records for health units, fire units, and biological laboratories; (d) individual case files of employees exposed to hazardous or toxic substances, or radioactivity; and (e) records of DOE-controlled activities reflecting the protection provided to employees, the public, property, and the environment during the conduct of the activity. Some of these records must be preserved 10 to 80 years, depending upon the type of record. Others must be preserved permanently (files on occurrences that were of widespread public and Congressional interest).	DOE Records Retention Schedules	Preservation

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
Operations and Activities			
E. Process History	DOE practice is for the DOE or site historian to generate and maintain this information. Some of this information is available in the site mission statement and revisions for each site.		Generation
	Some information on process history generated through NEPA, RCRA, and CERCLA site documentation and permits.	NEPA RCRA, CERCLA	Generation
	Information generated through the Historical Context Document required for federal facilities.	National Historic Preservation Act	Generation
	The RCRA Part A and Part B permits must include information concerning, among other things, facility drawings and photographs, description, waste characterization, groundwater monitoring, procedures to prevent hazards, closure and post-closure plans, corrective actions, and a discussion on other federal laws.	RCRA	Generation Preservation
	The federal government must preserve information that an agency or its legitimate successor deems as important evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the government including "all books, papers, maps, photographs, machine readable materials, or other documentary materials".	36 CFR 1220.14	Generation Preservation
	Records covered by these schedules include the following: (a) safety management; (b) medical and health research; (c) operational records for health units, fire units, and biological laboratories; (d) individual case files of employees exposed to hazardous or toxic substances, or radioactivity; and (e) records of DOE-controlled activities reflecting the protection provided to employees, the public, property, and the environment during the conduct of the activity. Some of these records must be preserved 10 to 80 years, depending upon the type of record. Others must be preserved permanently (files on occurrences that were of widespread public and Congressional interest).	DOE Records Retention Schedules	Preservation
	The schedules provide guidelines for the disposition of design and construction drawings and related records that have been created or received by DOE or DOE management and operating contractors in connection with official activities. Drawings refer to the graphic or engineering records that depict conceptual as well as precise measured information essential for the planning, design, and construction of facilities such as buildings, structures, plants, utilities, and other public work projects, as well as miscellaneous engineering and fabrication projects such as machinery and equipment. Related records include engineering studies, design calculations, project performance documentation, indexes and finding aids, specifications, and three dimensional models. Preservation of records may range from until project completion (e.g., initial design planning records), five to 20 years after completion (e.g., other planning and design records), or may be permanently preserved (e.g., records selected for architectural, historical, and technological significance).	DOE Records Retention Schedules	Preservation
F. Historical Infrastructure	Good business practices routinely generate this information through engineering and as-built drawings.		Generation
	The schedules provide guidelines for the disposition of design and construction drawings and related records that have been created or received by DOE or DOE management and operating contractors in connection with official activities. Drawings refer to the graphic or engineering records that depict conceptual as well as precise measured information essential for the planning, design, and construction of facilities such as buildings, structures, plants, utilities, and other public work projects, as well as miscellaneous engineering and fabrication projects such as machinery and equipment. Related records include engineering studies, design calculations, project performance documentation, indexes and finding aids, specifications, and three-dimensional models. Preservation of records may range from project completion (e.g., initial design planning records), five to 20 years after completion (e.g., other planning and design records), or may be permanently preserved (e.g., records selected for architectural, historical, and technological significance).	DOE Records Retention Schedules	Preservation

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
G. Post-Closure Operations and Infrastructure	Type of information generated will be determined by the steward. Information generated will be governed by the appropriate federal, state, local regulations, and the steward's policies and procedures.		Generation
	A transfer of license requires any records necessary for care to be transferred to the disposal site owner.	AEA	Preservation Access
	Records of the disposal of licensed materials generated will include a description of the waste, including physical and chemical properties, pertinent information on the nature of the environment, the nature and location of potentially affected facilities, and procedures to ensure that doses are maintained. Records are retained until NRC license is terminated.	10 CFR 20.2108	Generation Preservation
	The closure plan for all hazardous waste TSDF units must include information on steps required for closure, independent certification that closure plan was met, survey plat, post-closure care requirements- which must be conducted for at least 30 years - and a written post-closure plan. Report must be generated no later than 60 days after certification of closure, and the retention period will be placed onto deed indefinitely.	40 CFR 264.110-120	Generation Preservation Access
	Post-closure notices for hazardous waste units at interim status facilities must be submitted to the local zoning authority, or the authority with jurisdiction over local land use. A record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility must go to the Regional Administrator; and, in accordance with State law, a notation on the deed to the facility property must be recorded. Report must be generated no later than 60 days after certification of closure, and must be placed onto deed indefinitely.	40 CFR 265.110-120	Generation Preservation Access
	The RCRA Part A and Part B permits must include information concerning, among other things, facility drawings and photographs, description, waste characterization, groundwater monitoring, procedures to prevent hazards, closure and post-closure plans, corrective actions, and a discussion of other federal laws.	40 CFR 270.13-26	Generation Preservation
	The license requirements for general long-term care of residual radioactive material disposal sites include information on the monitoring, maintenance, and emergency measures needed to protect receptors from UMRCA title I and II disposal sites. This information includes a legal description of the disposal site; site ownership, land holding interests, and waivers; final disposal site conditions; and a description of the long-term surveillance program including frequency and reporting.	10 CFR 40.27-28	Preservation
	Facilities licensed to manage nuclear material are required to submit a NRC Form 314, "Certificate of Disposition of Materials" that details the final disposition/disposal of special nuclear material. The report will include information on levels of radiation, planned decommissioning, physical security plan, the location and description of all equipment to remain onsite after termination of license, and institutional controls required. The form is to be completed on or before expiration of license.	10 CFR 70.38	Generation Preservation
Regulatory/Legal Framework			
H. Regulatory Framework (Historical and Present)	Facilities licensed to manage nuclear material are required to submit a NRC Form 314, "Certificate of Disposition of Materials" that details the final disposition/disposal of special nuclear material. The report will include information on levels of radiation, planned decommissioning, physical security plan, the location and description of all equipment to remain onsite after termination of license, and institutional controls required. The form is to be completed on or before expiration of license.	10 CFR 70.38	Generation Preservation
	If permit transferred to new owner or operator, notification and written agreement (containing a specific date for transfer of the permit responsibility, coverage, and liability) should be made between DOE and new permittee. Permits may include CAA, NPDES, UIC, and RCRA permits.	Cross-Cut Guidance	Preservation Access
	Records covered by these schedules include the following: (a) safety management; (b) medical and health research; (c) operational records for health units, fire units, and biological laboratories; (d) individual case files of employees exposed to hazardous or toxic substances, or radioactivity; and (e) records of DOE-controlled activities reflecting the protection provided to employees, the public, property, and the environment during the conduct of the activity. Some of these records must be preserved 10 to 80 years, depending upon the type of record. Others must be preserved permanently (files on occurrences that were of widespread public and Congressional interest).	DOE Records Retention Schedules	Preservation

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
H. Regulatory Framework (Historical & Present) (continued)	A transfer of license requires any records necessary for care to be transferred to the disposal site owner.	AEA	Preservation Access
	These schedules include approved disposition standards for hazardous material (radioactive and fissile material); shipping packaging records, including Certificates of Compliance; Safety Analysis Reports for Packaging (SARPs); evaluation of SARPs; amendments to licenses; and quality assurance records documenting packaging design, fabrication, maintenance, and use. Records are destroyed five years after Certification of Compliance is terminated; unless renewed use of records is definitely anticipated.	DOE Records Retention Schedules	Preservation
I. Requirements Specific to Transfer & Closure	A transfer of license requires any records necessary for care to be transferred to the disposal site owner.	AEA	Preservation Access
	If permit transferred to new owner or operator, notification and written agreement (containing a specific date for transfer of the permit responsibility, coverage, and liability) should be made between DOE and new permittee. Permits may include CAA, NPDES, UIC, and RCRA permits.	Cross-Cut Guidance	Preservation Access
J. Real-Estate Records	Information required to be included in property transfer process includes citation of order withdrawing or reserving the land for DOE use; legal description and acreage of land; description of improvement(s); description of easements or other rights and privileges (leases, encumbrances) burdened on the land; and any terms and conditions DOE may deem necessary to incorporate in any further disposition of the land to protect the public interest.	Cross-Cut Guidance	Preservation Access
	Real estate records must be created and preserved, including those regarding fee acquisition; withdrawal from public domain; permanent easements; permanent full/partial disposals; jurisdictions; outgrants; ingrants; and other items. Real estate records should be labeled and sequentially organized by facility and type of action. Real estate records are required to be preserved throughout the ownership of the property, and retained and disposed of according to DOE 1324.2A. If property is disposed of through GSA or transferred to another federal agency, original documents shall be forwarded to the agency. If property is disposed to a non-federal entity, no title documents need to be furnished.	DOE Order 4300.1C	Generation Preservation Access
Site Characteristics/Setting			
K. Cultural and Natural Resources	Information must be maintained on the location, condition, and vulnerability of threatened and endangered species.	Endangered Species Act	Generation Preservation
	All federal facilities must develop a site or program specific Cultural Resources Management Plan. Information about the property is required if it is to be placed on the National Registry of Historic Places.	National Historic Preservation Act	Generation Preservation
	Information on historic properties, burial grounds, sacred sites, and access routes to sacred sites is to be included in NEPA document and/or environmental baseline survey for future stewards. Appropriate restrictions on historic properties, burial grounds, sacred sites, and access routes to sacred sites are to be included in conveyance of property transfer.	Cross-Cut Guidance	Preservation Access
	Information on paleontological specimens is required.	Archeological Resources Protection Act	Generation Preservation
	Information on the extent to which land and resources have been disturbed and measures to recondition property is to be given to the federal agency overseeing the property transfer, if not DOE. Information regarding federally-listed or proposed species, state-listed species, and the habitats of threatened and endangered species, and other environmentally sensitive natural resources; flood hazards, floodplains, or wetlands and restricted uses is to be included in NEPA document and/or environment baseline survey for future stewards. If property is transferred via an outgrant, the conveyance must include information on restrictions of floodplains and wetlands and responsibilities for obtaining necessary permits. Future owner must also be informed if there is a potential need for biological assessment and formal consultation with the U.S. Fish and Wildlife Service regarding threatened or endangered species and critical habitats.	Cross-Cut Guidance	Preservation Access

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
K. Cultural and Natural Resources (continued)	Requirements include protection of all cultural resources under the Department's jurisdiction, including resources of local historic and prehistoric significance and resources significant to Native American Culture.	36 CFR 800	Generation Preservation
L. Geophysical/political	This information is required for the final survey document.	DOE Order 5400.5	Generation
	Site practice is to routinely generate this information to facilitate performance of site objectives.		Generation
	Requirements for groundwater monitoring wells include concentrations for each well; results of ground-water surface elevations; quality assessment programs; and rate of migration of hazardous waste or hazardous waste constituents in the ground water during the reporting period. The results of the evaluations of groundwater quality surface elevations should be reported no later than March 1 following each calendar year.	40 CFR 265	Generation Preservation
	Information addressed in property transfer process includes: citation of order withdrawing or reserving the land for DOE use; legal description and acreage of land; description of improvement(s); description of easements or other rights and privileges (leases, encumbrances) burdened on the land; a certification DOE has exhausted GSA procedures for disposal of any abandoned improvements and that the improvements are without value; and status of civil and criminal jurisdiction over the land.	Cross-Cut Guidance	Preservation Access
	Records covered by these schedules include the following: (a) safety management; (b) medical and health research; (c) operational records for health units, fire units, and biological laboratories; (d) individual case files of employees exposed to hazardous or toxic substances, or radioactivity; and (e) records of DOE-controlled activities reflecting the protection provided to employees, the public, property, and the environment during the conduct of the activity. Some of these records must be preserved 10 to 80 years, depending upon the type of record. Others must be preserved permanently (files on occurrences that were of widespread public and Congressional interest).	DOE Records Retention Schedules	Preservation
All Data Types			
All Data Types	Enacted in 1966, the FOIA provides any person a statutory right, enforceable in court, of access to federal agency records. There are nine exemptions allowed to protect some records from disclosure and three special law enforcement record exclusions. Unless exempted from disclosure or excluded from the Act's coverage, virtually every record possessed by a federal agency must be made available to the public in one form or another.	FOIA	Access
	The Electronic Freedom of Information Act requires that records created as of November 1, 1996 must be made available online or in another electronic format. Federal agencies must create an index of material previously released under FOIA and must make that index available online by the end of 1999.	FOIA	Access
	Privacy Act imposes requirements on the Department regarding the collection and dissemination of information about individuals when the information is retrievable by name or other personal identifier, such as a social security, license, badge, or other number or identifier assigned to particular individuals.	DOE G 1324.5B	Preservation
	Information required for a system of records: system name; security classification; system location; categories of individuals covered by the system; categories of records in the system; authority for maintenance of the system; routine uses of records maintained in the system, including categories of users and the purposes of such uses, policies and practices for storing, retrieving, accessing, retaining, and disposing of records in the system; storage; retrievability; safeguards; retention and disposal; system manager(s) and address; notification procedure; record access procedures; contesting procedures; record source categories; systems exempted from certain provisions of the act.	DOE G 1324.5B	Access
	Official Personnel Folders and related payroll records shall be retired to the National Personnel Records Center (NPRC) at St. Louis, Missouri, as prescribed in the records disposition schedules. Official personnel folders of contractor employees are not sent to NPRC: they are subject to the records schedule requirements as provided in Attachment XI-1, DOE Records Retention Schedules.	DOE G 1324.5B	Preservation

Table A-1. List of Requirements (continued)

Data Type	Requirement	Source	Category
All Data Types (continued)	Specifies regulations and filing techniques for audiovisual records. The preservation of vital records, as well as legal and financial rights records, is also discussed.	DOE G 1324.5B	Preservation
	Establishes the basic requirements related to the creation, maintenance, use, and disposition of electronic records. Unless otherwise noted in the regulation, the requirements apply to all electronic records systems, whether on microcomputers, minicomputers, or main-frame computers; regardless of storage media, in network or in stand-alone configurations.	36, CFR Part 1234	Preservation
	Specifies standards for the Department's electronic records management program which cover electronic records creation, preservation, maintenance, use and disposition. This implementation guide also describes procedures for micrographic records and microfilm systems and optical disc records.	DOE G 1324.5B	Generation Preservation Access
	The chief historian is required to determine which records of historic value have been scheduled for permanent retention by reviewing for Headquarters only all Records Transfer Forms (HQ F 1324.8) and other forms used for the transfer of records from office space to low-cost storage. The chief historian also accepts custody of records of historical value no longer requiring retention by the originating office and services all requests for access to these records until they are offered to the National Archives.	DOE Order 200.1	Generation Preservation Access

List of References

10 CFR - Nuclear Regulatory Commission

36 CFR - Parks, Forests, and Public Property

40 CFR - Protection of Environment

Archeological Resources Protection Act (16 U.S.C. § 470aa et seq. as amended)

Atomic Energy Act (AEA) (42 U.S.C. § 2011 et seq. as amended)

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. § 96011 et seq. as amended)

Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers, Office of Environmental Safety and Health (EH-413), U.S. DOE, October 1997

Department of Energy Records Retention Schedules

DOE Order 4300.1C, *Real Property Management*¹

DOE Order 200.1, *Information Management Program*

DOE Order 5400.5, *Radiation Protection of the Public and Environment*

DOE G 1324.5B: Chapter V of DOE Implementation Guide for Use with 36 CFR Chapter XII - Sub-chapter B: Records Management, (January, 1995)²

Emergency Planning and Community Right-to-Know Act (EPCRA) (42 U.S.C. § 11001 et seq. as amended)

Freedom of Information Act (FOIA) (5 U.S.C. § 552 as amended)

National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq. as amended)

National Historic Preservation Act (16 U.S.C. § 470 et seq. as amended)

Resource Conservation and Recovery Act (RCRA) (42 U.S.C. § 6901 et seq. as amended)

Toxic Substances Control Act (TSCA) (15 U.S.C. § 26011 et seq. as amended)

¹ This Order has been canceled in DOE Order 430.1, *Life Cycle Asset Management*, approved 8/24/95. However, canceled Orders that are incorporated by reference in a contract shall remain in effect until the contract is modified to delete the reference to the requirement in the canceled Orders.

² This Order has been canceled in DOE Order 200.1, approved 9/30/96. However, canceled Orders that are incorporated by reference in a contract shall remain in effect until the contract is modified to delete the reference to the requirement in the canceled Orders.

APPENDIX B: SELECTED DOE RECORDS RETENTION SCHEDULES FOR INFORMATION PERTAINING TO STEWARDSHIP DATA

This appendix summarizes the DOE records retention schedules and highlights those most relevant to the stewardship data types. DOE developed the schedules to identify what information is retained and for how long it is retained. For each type of information covered by the schedules, there is a specific length of time for which DOE must retain the information, prior to destroying the information or sending it to the National Archives and Records Administration. Table B-1 lists each of the schedules and the types of records to which it pertains. This table also includes a listing of the stewardship data types that are addressed by each schedule (the stewardship data types are defined in Chapter 2). Most of the schedules do not address records that are likely to contain stewardship value. For those schedules that address records likely to contain stewardship value, a more detailed description regarding the preservation requirements is provided in Table B-2.

Table B-1. Summary of DOE Records Retention Schedules and Their Relationship to Stewardship Data Types¹

DOE Records Retention Schedule	Description	Relationship to Stewardship Data Types ^a
1. Medical, Health, and Safety Records	Records covered by this schedule include the following classes of records: (a) safety management; (b) medical and health research; (c) operational records for health units, fire units, and biological laboratories; (d) individual case files of employees exposed to hazardous or toxic substances, or radioactivity; and (e) records of DOE-controlled activities reflecting the protection provided to employees, the public, property, and the environment during the conduct of the activity.	A, B, C, D, E
2. Industrial Facility Records	This schedule covers records pertaining to the management and operation of DOE industrial facilities. Such facilities include, but are not restricted to, Naval, test, and production reactors; production facilities; laboratories; and separation plants. The records consist of a wide variety of facility management records such as progress, production, and status reports; quality control data files; equipment history and control records; special material accountability files; and product output summaries.	no apparent relationship
3. Nuclear Weapon Records	Nuclear weapons management records document the basis for DOE's nuclear weapons program management decisions, direction, policies, and responsibilities. The records include, but are not limited to, documents relating to interactions with the Department of Defense (DOD), and mission assignments and authorizations to the Design Agencies, Production Agencies, and Dismantlement Agencies.	no apparent relationship
4. Facility Records	This schedule applies to those records accumulated by contractor offices in the management, maintenance, and general upkeep of facilities such as buildings, structures, plants, laboratories, utilities, and houses, exclusive of design and construction drawings and related records covered by Schedule 14 and those Industrial Facility Records covered by Schedule 2. This schedule includes records documenting maintenance and repair of fixture-type equipment such as boilers, heating and ventilating systems, and equipment requiring the use of design and construction drawings to make repairs. (For other equipment see Schedule 6).	no apparent relationship
5. Special Materials Accountability Records	DOE special materials accountability records pertain to documentation involved in the allocation and transfer of nuclear material. Transfer of special nuclear material, DOE-owned source material and certain other DOE-owned material transferred within the United States or between the United States and foreign entities is controlled. Records included in this schedule cover material transfer, reporting, inspections, requests for material, allotments, and allocations.	no apparent relationship

^a The definition of the stewardship data types is provided in Chapter 2 of the main report.

¹ The information in this Appendix is excerpted from DOE records retention schedules information available on the Internet at: <http://www.fetc.doe.gov/rm/doers/doers.html>.

SELECTED DOE RECORDS RETENTION SCHEDULES

Table B-1. Summary of DOE Records Retention Schedules and Their Relationship to Stewardship Data Types (continued)

DOE Records Retention Schedule	Description	Relationship to Stewardship Data Types ^a
6. Equipment Control, Maintenance, and Operation Records	Records described in this schedule are those generally maintained by property and plant management personnel fulfilling their responsibility for the management, control, accountability, maintenance, and operation of mobile or stationary equipment and personal property. Fixture-type equipment requiring use of design and construction drawings for repair and maintenance is covered by Facility Records (Schedule 4). This schedule covers personal property, equipment, machinery, machine tools, vehicles, office equipment, accessory and auxiliary items, and spare parts, exclusive of motor vehicles (General Records Schedules 10) and Industrial Facility records (Schedule 2).	no apparent relationship
7. Legal Records	Legal records include the files created in the provision of legal services to the Department. Legal services protect the legal and financial rights of the government, DOE, and persons directly affected by DOE's activities. The records retention standards in this schedule include patent records, litigation files, and true copy certifications. This schedule does not apply to cases in which an action is in negotiation or is under prosecution.	no apparent relationship
8. Procurement, Supply, and Grant Records	This is an addendum to the General Records Schedule of the same subject, and includes approved disposition standards for procurement files documenting the initiation and development of transactions that deviate from established precedents with respect to general agency procurement programs; records on the use of DO, DX, and Authorized Controlled Material (ACM) rating authority; and requirements studies in connection with Headquarters offices mobilization planning and the Controlled Materials Plan.	no apparent relationship
9. Property Disposal Records	This is addendum to the General Records Schedule of the same subject, and includes approved disposition standards for case files on sales of surplus personal property documenting the initiation and development of transactions that deviate from established precedents with respect to general agency disposal or to major disposal programs; case files on disposal of surplus real and related personal property; excess real property reports; revenue-producing contracts with foreign and domestic customers for the sale of nuclear products (including source, by-product, special nuclear materials, and heavy water), toll enrichment services, and chemical processing of irradiated fuel; records documenting the "without charge" transfer of nuclear material in quantities suitable for research only; and agreements documenting the leasing of nuclear materials and heavy water to foreign and domestic customers.	no apparent relationship
10. Budget Preparation, Presentation, and Apportionment Records	This is an addendum to the General Records Schedule of the same subject, and includes approved disposition standards for budget policy files, copies of budget estimates and justifications, working papers and background materials, budget correspondence files, and budget background records.	no apparent relationship
11. Accountable Officers Accounts Records	This is an addendum to the General Records Schedule of the same subject, and includes approved disposition standards for audit files generated in the performance of DOE and cost type contractor operations; pension plan case files; and casualty insurance plan case files.	no apparent relationship
12. Travel and Transportation Records	This is an addendum to the General Records Schedule of the same subject, and includes approved disposition standards for hazardous material (radioactive and fissile material) shipping packaging records, including Certificates of Compliance; Safety Analysis Reports for Packaging (SARPs); evaluations of SARPs; amendments to licenses; and quality assurance records documenting packaging design, fabrication, maintenance, and use.	A, C, H
13. Communications Records	This is an addendum to the General Records Schedule of the same subject, and includes approved disposition standards for records relating to the accountability, transfer, inventory, receipt, and destruction of COMSEC materials.	no apparent relationship
14. Design and Construction Drawings and Related Records	This schedule provides guidelines for the disposition of design and construction drawings and related records that have been created or received by DOE or DOE management and operating contractors in connection with official activities. Drawings refer to the graphic or engineering records that depict conceptual as well as precise measured information essential for the planning, design, and construction of facilities such as buildings, structures, plants, utilities, and other public works projects. Drawings also include miscellaneous engineering and fabrication projects such as machinery and equipment. Related records include engineering studies, design calculations, project performance documentation, indexes and finding aids, specifications, and three-dimensional models.	E, F

^a The definition of the stewardship data types is provided in Chapter 2 of the main report.

Table B-2. Detailed Summary of Records Retention Schedules for Those Most Relevant to Stewardship Data

Records Retention Schedule and Description	Preservation Requirement
DOE Records Retention Schedule 1: Medical, Health and Safety Records	
<p>1. Safety Management Records</p> <ul style="list-style-type: none"> ● Report Files on Occurrences maintained by the Office of the Deputy Assistant Secretary for Safety and Quality Assurance <ul style="list-style-type: none"> - Files on occurrences which were of widespread public and Congressional interest - All other files ● Files on Occurrences maintained by field organizations, including a copy of the report, related correspondence, technical data, statements of witnesses and employees, and other relevant information and data 	<p>Permanent, offer to NARA 25 years after case is closed</p> <p>Destroy when 80 years old</p> <p>Destroy when 15 years old</p>
<p>2. Fire Unit Records</p> <ul style="list-style-type: none"> ● Alarm, investigation, and incident reports relating to various types of fire alarms and investigations of fires 	<p>Destroy when 10 years old</p>
<p>3. Medical or Health Research Project Case Files</p> <ul style="list-style-type: none"> ● Medical or health research project case files reflecting the history of the project from initiation to completion, including research, development, design, and test results 	<p>Permanent, offer to NARA 25 years after project is completed</p>
<p>4. Records concerning personnel exposure to hazardous concentrations of toxic chemicals and other materials, excluding radionuclides and individual employee files</p> <ul style="list-style-type: none"> ● Standards, operating guides, and procedures which establish or relate to establishing operating practices ● Records and investigations establishing the extent of employee exposure to toxic chemicals and materials ● Surveys indicating no industrial hazards ● Surveys indicating a potential industrial hazard 	<p>Permanent, offer to NARA in 25 years</p> <p>Destroy when 75 years old</p> <p>Destroy when 75 years old</p> <p>Until related facility is dismantled</p>
<p>5. Radiation-Contamination Control Program Records concerning or documenting accurate, quantitative description of the exposure of personnel to external radiation and internally deposited radionuclides, including development of appropriate regulations and procedures used as a basis for the radiation-contamination control program; excludes individual employee files</p> <ul style="list-style-type: none"> ● Personnel exposure dose record concerning or documenting radiation exposure dose as determined by personnel radiation monitors or by estimates based on other radiation dose instruments <ul style="list-style-type: none"> - Records of equipment calibration - Related automatic data processing system programs, codes, instruction tapes, and disks ● Technical standards; operating guides; laboratory, operating, and radiation-contamination control procedures describing the technical and administrative basis for the radiation-contamination protection program ● Logbooks (chronological history) which provide a concise summary of shift and daily activities, including unusual incidents, radiation and contamination problems, release of radionuclides to work areas or public zones, interpretation of unusual chart recordings, and similar items ● Routine radiation and contamination surveys and air sample logs, including resulting laboratory analyses and equipment calibrations, indicating no unusual health or safety problems ● Recorder chart records of radiation and contamination detected by air activity monitors (gaseous and particulate) and ionization chambers 	<p>Destroy after 75 years</p> <p>Destroy when 75 years old</p> <p>Permanent, offer to NARA when 25 years old</p> <p>Destroy when 75 years old</p> <p>Destroy when 75 years old</p> <p>Destroy when purpose is served or when 33 months old, whichever is earlier</p>
<p>6. Individual employee health hazard case file</p> <ul style="list-style-type: none"> ● Individual employee radiation exposure history file (both internal and external). Records include those of visitors. Each file provides a record of an individual's exposure. 	<p>Destroy when 75 years old</p>

Table B-2. Detailed Summary of Records Retention Schedules for Those Most Relevant to Stewardship Data (continued)

Records Retention Schedule and Description	Preservation Requirement
<p>7. Plant records</p> <ul style="list-style-type: none"> ● Radiation detection instrument calibration records relating to the calibration and inspection of instruments used in the detection and recording of radiation, against sources of known radioactive emission or dose rate - History of procedures indicating criteria for selection and methods used, and schedules giving frequency of calibration and maintenance of radiation detection instruments and equipment - Report instrument and equipment distribution, decontamination, performance, inventories, statistical data, physical status, operating condition, and any related data 	<p>Destroy when 75 years old</p> <p>Destroy when purpose is served or when one year old, whichever is earlier</p>
<p>8. Environmental contamination measurement records indicating the presence and amount of contaminating materials (including radioactive materials) in samples of air, water, earth, biological (animal and vegetation) and special materials from onsite and offsite locations</p> <ul style="list-style-type: none"> ● Procedures which detail the methods used and frequency of analysis of environmental samples. Includes records or correspondence which give the philosophy and scope of sampling, provide interpretations of results, and detail the plans for sampling and analysis of environmental samples. <ul style="list-style-type: none"> - General procedures - Specific procedures ● Analytical summaries of results of analyses, including results on standards or other calibrations used to establish the validity of analytical results ● Worksheets, recorder charts, laboratory analysis requests, radio-autograph film, dosimeter data, and other interim records or devices used in determining the basic data from which results in the previous item are obtained ● Notebooks of laboratory technicians and field inspectors concerned with earth sciences ● Data gathered to measure residual contamination of soil and ground water with long-lived radioactive or toxic substances at or near DOE sites ● Environmental monitoring reports and topical reports defining the extent and levels of radioactive contamination in soil or real estate 	<p>Permanent, offer to NARA in 25 years</p> <p>Destroy when analytical results are verified, accepted, and summarized, or when five years old, whichever is earlier</p> <p>Destroy when analytical results are verified, accepted, and summarized, or when five years old, whichever is earlier</p> <p>Destroy when analytical results are verified, accepted, and summarized, or when five years old, whichever is earlier</p> <p>Destroy when analytical results are verified, accepted, and summarized, or when five years old, whichever is earlier</p> <p>Permanent, offer to NARA when no longer needed by DOE</p> <p>Permanent, offer to NARA when no longer needed by DOE</p>
<p>9. Radioactive waste disposal or unplanned deposition records</p> <ul style="list-style-type: none"> ● Regulations governing radioactive waste shipments and burials, including DOE Orders, Federal regulations and guidelines, and other pertinent standards, guides, and procedures ● Records which indicate type of waste (solid, liquid, or gaseous); degree of radioactivity; and for solid waste: data of burial, volume buried, activity level, and storage location ● Unplanned deposition records (spills or leaks) or radioactivity ● Records of radioactive gaseous wastes discharged to atmosphere and radioactive liquid wastes discharged to surface or ground water ● Miscellaneous waste disposal records including transfers from operating building or between tanks, boiloff rates, and intank solidification information, provided pertinent data have been transcribed to records which are retained 	<p>Permanent, offer to National Archives when no longer needed</p> <p>Permanent, offer to National Archives when no longer needed</p> <p>Permanent, offer to National Archives when no longer needed</p> <p>Permanent, offer to National Archives when no longer needed</p> <p>Destroy when one year old</p>
<p>10. Biological laboratory records documenting programs under which data concerning the effect of radiation on animal and aquatic life are accumulated, evaluated, and reported</p> <ul style="list-style-type: none"> ● Researcher's Biology Notebooks containing all notes pertinent to laboratory experiments, including observations, calculations, and all other data pertinent to the experiment, including discussions by the researcher and conclusions <ul style="list-style-type: none"> - Research notebooks deemed by the DOE, contractor, and the National Archives to have exceptional value because of the highly significant nature of the research involved or uniqueness of the research - All other notebooks 	<p>Permanent, offer to NARA within 25 years</p> <p>Destroy when 15 years old</p>

Table B-2. Detailed Summary of Records Retention Schedules for Those Most Relevant to Stewardship Data (continued)

Records Retention Schedule and Description	Preservation Requirement
<p>10. (continued)</p> <ul style="list-style-type: none"> ● Machine-readable data taken from worksheets pertaining to radiological analysis or beta analysis of animal or aquatic life ● Necropsy protocols recording data collected during autopsies performed on animals, including pathological diagnosis of various organs and glands ● Animal case histories recording facts such as data from lambing records, treatment records, genealogical records, gestation periods, lambing dates, numbers, sex, and weight ● Thyroid count records ● Radio analysis sample data describing collected samples, counted samples, and listing the beta count, decay factor, analysis factor, and remarks ● Aquatic biology data analysis showing type of sample, location or source, counting information, laboratory correction factors, and related data ● Radiation counter control data used to maintain correct operating conditions for radiation detection instruments 	<p>Retain until entered in Biology Notebook</p> <p>Destroy when 15 years old</p> <p>Destroy when 20 years old</p> <p>Destroy when 15 years old</p> <p>Destroy when two years old</p> <p>Destroy when two years old</p> <p>Destroy when one year old</p>
<p>11. Personal Injury Files</p> <ul style="list-style-type: none"> ● Forms, reports, correspondence, and related medical and investigator records relating to on-the-job injuries, whether or not a claim for compensation was made; excluding copies filed in the Official Personnel Folder and copies submitted to the Department of Labor 	<p>Reserved (no schedule)</p>
<p>12. Synoptic Meteorology Records accumulated to evaluate, interpret, and determine meteorological and climatological conditions bearing on engineering and contamination problems</p> <ul style="list-style-type: none"> ● Records relating to wind speed and direction, soil and air temperature, dew point, relative humidity, barometric pressure, cloud cover, precipitation, frost, fog, and snow/ice cover 	<p>Destroy when 10 years old</p>
DOE Records Retention Schedule 12: Travel and Transportation Records	
<p>1. Hazardous Material</p> <ul style="list-style-type: none"> ● Hazardous material (radioactive and fissile material) shipping packaging records, including Certificates of Compliance, Safety Analysis Reports for Packaging (SARP), evaluations of SARPs, licenses and amendments, and quality assurance records documenting packaging design, fabrication, maintenance, and use in compliance with established safety and engineering standards 	<p>Destroy 5 years after Certificate of Compliance has terminated, unless information is received indicating that renewed use is definitely anticipated</p>
DOE Records Schedule 14: Design and Construction Drawings and Related Records	
<p>These records include graphic or engineering records that depict conceptual as well as precise measured information essential for the planning, design, and construction of facilities such as buildings, structures, plants, utilities, and other public works projects, as well as miscellaneous engineering and fabrication projects such as machinery and equipment</p> <ul style="list-style-type: none"> ● Initial Design Planning Records (including conceptual drawings and sketches; architectural renderings that show basic design features, including building perspectives, elevations, floor plans, and other general features; order-of-magnitude cost estimates and performance schedules; and three-dimensional models prepared for illustration or presentation purposes) ● Records selected for architectural, historical, and technological significance (selection criteria are included), including project description, location, engineering/design costs, and performance schedule; architectural renderings and final architectural and engineering drawings (selected to adequately depict the principal architectural and engineering features); special engineering/design reports, studies, and data; Construction Completion Reports; and models 	<p>Until project completion or upon project termination, whichever is earlier</p> <p>Permanent, offer to NARA when file is inactive</p>

Table B-2. Detailed Summary of Records Retention Schedules for Those Most Relevant to Stewardship Data (continued)

Records Retention Schedule and Description	Preservation Requirement
DOE Records Schedule 14: Design and Construction Drawings and Related Records (continued)	
<ul style="list-style-type: none"> ● Other Planning and Design Records (advanced planning, preliminary and final design, and engineering/design studies, calculations, analyses, and other engineering/design data documenting design decisions made) <ul style="list-style-type: none"> - Records of completed projects costing more than \$750,000 or which involve special equipment, systems, or processes - Records of completed projects costing \$750,000 or less which do not involve special equipment, systems, or processes - Records of terminated projects (projects not authorized for design, construction, or fabrication; or terminated prior to completion of any of these activities) costing more than \$750,000 or which involve special equipment, systems, or processes - Records of completed projects costing \$750,000 or less, which do not involve special equipment, systems, or processes ● Project construction files, including working drawings and construction specifications, "as-built" drawings, shop drawings, standard drawings, repair and alteration drawings, equipment specifications, operating and maintenance manuals, equipment warranty data, final inspection and acceptance reports, construction cost and schedule data, space assignment plans, and other essential information to document the construction process <ul style="list-style-type: none"> - For completed projects - For projects terminated prior to construction completion ● Construction Completion Reports (documented summary of the project, from design through construction completion) <ul style="list-style-type: none"> - For unique or special-interest projects - For other projects - Records selected for architectural, historical, and technological significance; including project description, location, construction costs and performance schedules; "as-built" architectural and engineering drawings (selected to adequately depict the principal architectural and engineering features); photographs of the completed project; Construction Completion Reports; and Finding Aids ● Finding Aids (indexes and other finding aids to design construction files) 	<p>Until dismantlement or disposal of facility, equipment, system, or process; or when superseded or obsolete; whichever is earlier</p> <p>10 years after completion of project</p> <p>10 years after project is terminated</p> <p>5 years after project is terminated</p> <p>Until dismantlement or disposal of the facility, equipment, system, or process; or when superseded or obsolete; whichever is earlier</p> <p>5 years after construction is terminated</p> <p>20 years, unless selected for architectural, historical, and technological significance</p> <p>Until dismantlement or disposal of the facility, equipment, system, or process; or when superseded or obsolete; whichever is earlier</p> <p>Permanent, offer to NARA when file is inactive</p> <p>Destroy in accordance with instruction covering the related design and construction records</p>

APPENDIX C: INFORMATION NEEDS ASSOCIATED WITH DOE PROPERTY TRANSFER: REQUIREMENTS AND PRACTICES

This appendix describes the requirements and practices regarding information associated with DOE property transfer, focusing on information that is most likely to have stewardship value. This appendix is not intended to be a complete reference for the property transfer process. Further information regarding DOE property transfer can be found in the Office of Field Management *DOE Real Estate Process: A Desk Guide for Real Estate Personnel*, as well as other DOE property transfer guidances.

C.1 Types of Transfer

DOE owns real and personal property; however, the need for stewardship data discussed in the main text is primarily related to data regarding real property. Therefore, this appendix focuses on the transfer of real property.

Types of Property

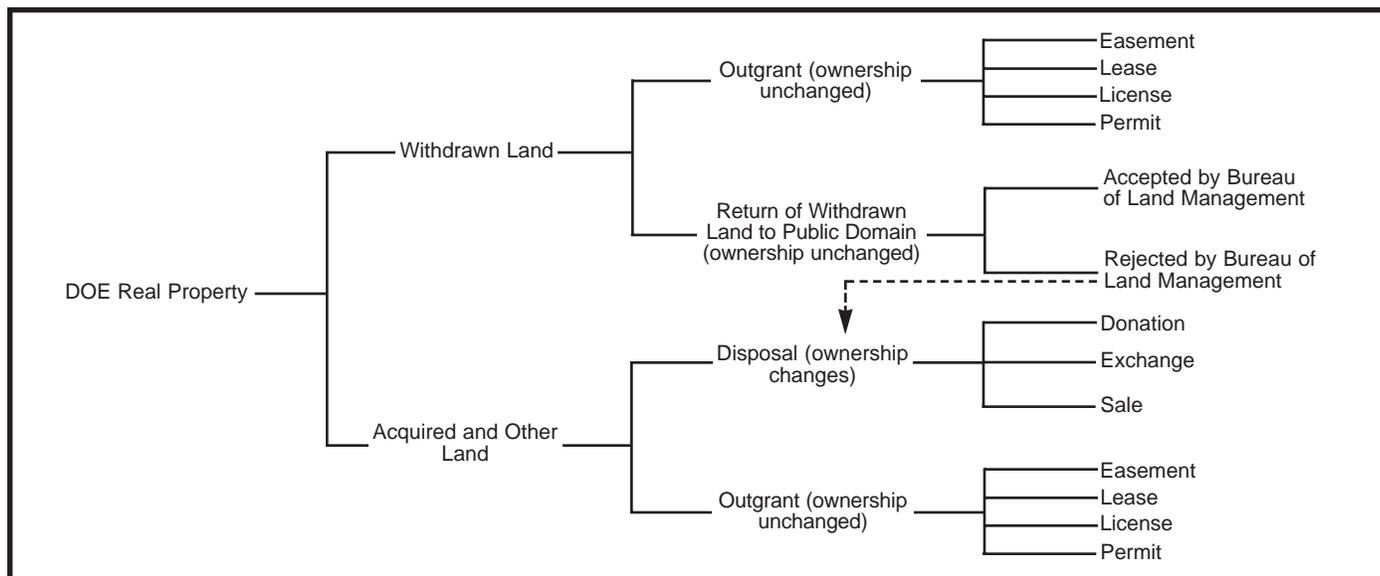
Real. Land and improvements on land (e.g., access roads, buildings, other structures).

Personal. Movable items (i.e., neither fixed nor installed) that do not form an integral part of real property.

There are several types of mechanisms for transferring property. DOE may transfer real property to another owner via donations, exchanges, and/or sales. DOE may transfer property to other users (not owners) via outgrants. Outgrants include easements, leases, licenses, or permits. Figure C-1 presents a graphical description of the various types of transfer mechanisms. As shown, the type of mechanism available to DOE depends on how DOE obtained the property. There are three primary mechanisms DOE may have used to obtain property:

1. Acquisition. Property obtained through purchase from original owner (approximately 27 percent of DOE land was obtained using this mechanism).
2. Withdrawal. Property withdrawn from public domain that has been reserved by the Department of Interior (DOI) for use by DOE (approximately 62 percent of land).
3. Other. Property provided to DOE via a grant or some other vehicle (approximately 11 percent).¹

Figure C-1. Types of Real Property Transfers



Source: *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, Office of Environmental Safety and Health (EH-413) U.S. DOE, October 1997.

¹ *Resourceful Reuse: A Guide to Planning Future Uses of DOE Sites*, May 1996, DOE/EM-0285.

C.2 Requirements

The transfer of DOE real property can be overseen by one of three agencies: (1) DOE; (2) Bureau of Land Management (BLM); and (3) General Services Administration (GSA). This section describes the requirements regarding information as property is transferred, focusing on stewardship data.

C.2.1 DOE

DOE can dispose of real property when the proposed action meets the provisions and requirements of certain statutory authorities. There are five primary sources of authority for DOE to sell or lease property directly:

1. **The Atomic Energy Act of 1954.** Section 161(g) as amended, 42 U.S.C. 2201(g), provides DOE with authority to sell, lease, and transfer real property, if the transfer advances the purposes and policies of the Act.
2. **The Atomic Energy Community Act of 1955.** This Act provides DOE with authority to transfer property that was originally owned and managed by the Atomic Energy Commission directly to private owners in the three "atomic energy communities" of Richland, Washington; Oak Ridge Tennessee; and Los Alamos, New Mexico. This Act establishes the procedures, terms, and conditions for the disposal of property in those communities.
3. **The National Defense Authorization Act of 1993: Section 3154 (Hall Amendment to the DOE Organization Act of 1977).** The Hall Amendment provides DOE with authority to lease property (for up to 10 years, with an option to renew) at DOE weapon production facilities (which represent only a portion of DOE sites) that are to be closed or reconfigured.
4. **The DOE Organization Act of 1977.** Section 649 authorizes DOE to lease its facilities that are temporarily not needed for up to five years, if the leasing is in the public interest.
5. **Energy Reorganization Act of 1974.** This Act provides DOE with authority to transfer facilities constructed from funds provided under the Act, subject to pre-approval by Congress.

In addition, there are several other statutory authorities for property transfer within specific sites and/or programs within DOE, including: Naval Petroleum Reserves, Strategic Petroleum Reserves, and Oil Shale Conversion Facilities.

Other legislation relevant to the transfer of property and future stewards includes Section 3158 of the National Defense Authorization Act of 1998. This section provides DOE with the authority to indemnify the future owners or lessees of DOE property at defense nuclear facilities against any claim for injury to person or property that results from the release or threatened release of a hazardous substance or pollutant or contaminant as a result of DOE activities at the facility on which the real property is located. The indemnification does not apply if the future owners or lessees contribute to such release or threatened release.

The various statutory authorities described above generally include the terms, conditions, and procedures for property transfer. They do not appear to contain requirements regarding the transfer of information to future stewards of the site. However, stewardship information is required of DOE to meet the terms, conditions, and procedures of the statutory authorities. For example, the Hall Amendment requires the Secretary of Energy to consult with the EPA Administrator (for property listed on the National Priority List (NPL)), or the appropriate State official (for property not listed on the

NPL) to "determine whether the environmental conditions of the property are such that leasing the property, and the terms and conditions of the lease agreement, are consistent with safety and the protection of the public health and the environment." To support implementation of the Hall Amendment, DOE must have information regarding the source, type, and extent of environmental contamination caused by DOE.

To conduct property management and transfer, DOE has developed various orders and guidances. The sections below describe key orders and guidances regarding property transfer.

C.2.1.1 DOE Order 430.1

This section highlights the stewardship information required for the key DOE Order regarding property transfer: DOE Order 430.1, *Life Cycle Asset Management*.

The DOE Order 430.1, *Life Cycle Asset Management*, specifies how DOE sites plan, acquire, operate, maintain, and dispose of physical assets as valuable national resources. This order replaces previous DOE orders regarding property management, including DOE Order 4300.1C, *Real Property Management*. However, DOE sites use the previous orders as guidance in conducting property management. This Order specifies requirements for the identification, inventory, and periodic assessments of the condition of physical assets in the property management program. For nuclear facilities, DOE Order 430.1 requires the development of decommissioning turnover and decontamination (if appropriate) plans, which may require stewardship information for their development.

Former DOE Order 4300.1C, *Real Property Management*, specifies DOE's policies and procedures for the acquisition, use, inventory, and disposal of real property or interests therein. Replaced by DOE Order 430.1 (described above), this order remains as guidance for DOE sites in conducting property management. For disposals that include both Government-owned land and improvements, this guidance requires the site real property representative is to prepare a memorandum for local field element or headquarters approval, whichever is required. This memorandum is to address several items, including several stewardship data items (Chapter II, (1)(g)):

- "General description, location, size, acquisition cost, nature of real estate interest proposed for disposal, brief history, effects upon severance, mineral and other rights, impact upon the natural resource conservation program of the installation, existence of facilities of cultural or historical significance as defined by 36 CFR 800, and any other relevant information, which explains the proposed disposal action.
- A brief discussion of the environmental and economic impact of the proposed disposal action, with a summary of the environmental requirements.
- A site and vicinity real estate map identifying the parcels; photographs, if available; number, type, use, size, age, and general condition of facilities and utilities proposed for disposal.
- Certification of compliance with 40 CFR 761 regarding use and storage of Polychlorinated Biphenyls (PCBs) will be required when there is any possibility PCBs have been utilized (transformers); a statement regarding presence or absence of friable asbestos; and, any underground storage tanks must be identified... as to location, size, and former use."

Former DOE Order 4300.1C, *Real Property Management*, also references the requirements in Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120(h). This section addresses the sale or other transfer of real property on which any hazardous substance was stored for one year or more, was known to have been released, or was disposed. The con-

tract for the transfer of the property must include notice of the type and quantity of such hazardous substance and notice of the time at which such storage, release, or disposal took place, to the "extent such information is available on the basis of a complete search of DOE files" (CERCLA Section 120(h)(1)-(2) and 40 CFR 373). Also, if hazardous substances were stored, disposed of, or released on land to be sold or transferred, CERCLA requires that the deed must identify these substances, their amounts, and when they were present. The deed must also include a covenant stating that remedial action necessary to protect human health has been completed and any subsequent remedial action, which may be required, will be conducted by the U.S. (CERCLA Section 120(h)(3)). A summary of the information required is shown in Table C-1.

Table C-1. Summary of CERCLA Requirements Regarding Hazardous Substances and Wastes

Requirement	CERCLA Section 120(h)(1)	CERCLA Section 120(h)(3)	CERCLA Section 120(h)(5)	CERCLA Section 120(h)(4)
Description	Include in the contract for sale or transfer, a notice of the types, quantities, and the time at which hazardous substances were managed	Include in the deed a description of the types, quantities, and the time at which hazardous substances were managed	Notify states of sites to be closed and that are encumbered by a lease beyond the closure date and are contaminated	Identify uncontaminated parcels of land
Contaminants covered	Hazardous substances as listed in 40 CFR 302.4 only		Hazardous substances or petroleum product or its derivatives	
Length of time managed on property	Hazardous substances stored for one year or more, released, or disposed on the property			Hazardous substances stored for less than a year, released, or disposed on the property
Types of real property transfers covered	All real property transfers regardless of whether ownership changes, including transfers between federal agencies	All real property transfers in which ownership changes, and transfers between federal agencies	Leases of real property after operations cease.	Not specified
Information sources	Departmental files only; however, it is a best management practice to follow the most stringent data gathering requirements (Section 120(h)(4))		Not specified; however, it is a best management practice to follow the most stringent data gathering requirements	Reasonably obtainable federal, state, and local government records and other sources (interviews, physical inspection, sampling, and aerial photographs)
Source: <i>Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers</i> , U.S. DOE, Office of Environmental Safety & Health (EH-413), October 1997				

C.2.1.2 DOE Guidance

Some DOE program offices have adopted their own guidances regarding property transfer. This section highlights the stewardship information required for two key property transfer guidances.

The stewardship information required for the Office of Environmental Management guidance² includes information required to determine the most "beneficial use" for excess property. Beneficial use refers to the use or range of uses that reflects a balance among a variety of goals, including "maximum return to the taxpayer, wise land stewardship, adherence to Tribal and community values, economic development, environmental protection, cultural and natural resource preservation, and aesthetic value." DOE

² *Resourceful Reuse: A Guide to Planning Future Uses of DOE Sites*, May 1996, DOE/EM-0285.

guidance regarding property reuse recommends several steps that involve the collection of stewardship information to determine the most beneficial use:

1. The site is to determine the extent and nature of any contamination (chemical, radiological, PCB, metal, or petroleum) of soils, ground and surface water, and structures. The guidance states the nature of the contamination must be known regardless of the reuse and mechanism of transferring the property. For example, contamination information is required when property is transferred to GSA or DOI. Also, potential private buyers or lessees will want to know the environmental status of available property.
2. The guidance recommends that information on completed or planned decontamination activities be gathered, such as cleanup levels, schedules, and costs.
3. Information needed to comply with NEPA and other legal requirements for releasing targeted property should also be collected: RI/FS, RODs, EAs, EIS, site comprehensive plans, RCRA corrective action plans, and decommissioning plans.
4. Sites are to identify the nature and magnitude of the risks of any contamination to human health and the environment, which may vary according to the future land use.
5. The guidance recommends that all natural resources that may affect the property's use and disposal be identified: wetlands, aquifers, flood plains, endangered or threatened species and habitats, flight paths of migratory birds, mineral deposits, ecologically rich pristine areas, and whether the property is part of a wild and scenic river designation.
6. Sites are to undertake a cultural resource assessment in collaboration with Tribal governments, and possibly others, prior to disposal of real property, including: buried sites, buried objects, cave paintings, human remains, archaeological sites, and structures of historical significance.
7. When a site conducts a marketability analysis to determine the reuse and transfer of the property, several types of stewardship data may be required, including: characteristics of the facility that will directly affect its marketability (facility's age and general condition, associated personal and intellectual property, compliance with applicable codes, and adaptability to new or expanded uses); condition and nature of site infrastructure; and the nature and degree of contamination.

Examples of DOE Program Office Requirements Regarding Property Transfer

Office of Environmental Management

- Policy on Decommissioning of DOE Facilities under the CERCLA
- Decommissioning Resource Manual
- Decommissioning Implementation Guide
- Charting the Course: the Future Use Report
- Resourceful Reuse: A Guide to Planning Future Uses of Department of Energy Sites

Office of Environmental Policy and Assistance

- Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers

Office of Field Management

- DOE Real Estate Process: A Desk Guide for Real Estate personnel

Office of Worker and Community Transition

- Guidance for Support of Economic Development Activities

Source: *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, Office of Environmental Safety & Health (EH-413), U.S. DOE, October 1997.

The Office of Environmental Policy and Assistance guidance³ contains several requirements for providing stewardship information to future users:

- **National Environmental Policy Act (NEPA) of 1969 documents.** NEPA requires Federal agencies to perform an evaluation of the impact of each proposed major Federal action on the quality of the environment before undertaking the action, which includes real property transfers (according to the *Secretarial Policy on NEPA* of June 1994). Unless the real property transfer is deemed to be categorically excluded from further NEPA review under Appendix A to Subpart D of 10 CFR Part 1021, an Environmental Assessment (EA) and/or and Environmental Impact Statement (EIS) is prepared.
- **Environmental Baseline Survey (EBS).** Information regarding the environmental condition of a property is summarized in an EBS. While no DOE guidance directly prescribes the preparation of an EBS, this guidance recommends the completion of an EBS, similar to that used by the Department of Defense, to fulfill CERCLA requirements applicable to real property transfer. The EBS is to provide a basis for determining if property is suitable for transfer, lease, or assignment; serve as a foundation study for installation closure; and satisfy legal requirements (e.g., CERCLA, state or local real property transfer requirements).
- **Occupational Safety and Health Baseline (OSHB).** Information regarding the condition of a property related to occupational safety and health is summarized in an OSHB.
- **Invitation for Bid/Offers.** Invitations to potential owners for the sale of DOE property may contain some information regarding the environmental condition of the property.
- **Other Agencies.** Information submitted to other agencies in the process of transferring the property includes some environmental information.
- **Conveyance of Property Transfer.** Information included in the conveyance of property transfer (e.g., deed, contract) to the new owner or user includes data regarding the environmental condition of the property.
- **Other Organizations.** Information provided to lessee or new owner and other entities include data regarding the environmental condition of the property.

The information need for each of the above requirements is summarized in Table C-2, by the type of environmental information that is required.

Table C-2. Summary of Environmental Information Required for DOE Real Property Transfer

Environmental Information Type	Type of Data	NEPA EA or EIS	EBS	OSHB	Invitation for Bid/Offers	Other Agencies	Conveyance of Property Transfer	Other
Floodplains and Wetlands	Information regarding floodplains and wetlands	◆	◆			If withdrawn land, data, any changes or disturbances, any terms and conditions deemed necessary to incorporate in any further disposition of the land to protect the public interest to BLM; otherwise, data to GSA	If outgrant, identification of floodplains/wetlands, appropriate restrictions, and responsibility for obtaining necessary permits	

³ *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfer*, Office of Environmental Safety & Health (EH-413), U.S. DOE, October 1997.

Table C-2. Summary of Environmental Information Required for DOE Real Property Transfer (continued)

Environmental Information Type	Type of Data	NEPA EA or EIS	EBS	OSHB	Invitation for Bid/Offers	Other Agencies	Conveyance of Property Transfer	Other
Natural Resources	Information about Federally-listed or proposed species, state-listed species, and the habitats of threatened and endangered species, environments of migratory birds, Wild and Scenic Rivers Act designated areas, and other environmentally sensitive natural resources	◆	◆			<ol style="list-style-type: none"> 1. Informal consultation with U.S. Fish and Wildlife Service regarding impacts on listed or proposed species, critical or proposed critical habitats, and migratory bird environments 2. If withdrawn land, appropriate information to BLM 		Inform lessee or new owner of potential need for biological assessment and formal consultation with the U.S. Fish and Wildlife Service if there are either (1) listed or proposed threatened or endangered species in the area or (2) listed or proposed critical habitats on the real property and the lessee or new owner is planning major construction activity
Cultural Resources	Information on historic properties, burial grounds, sacred sites, and access routes to sacred sites are identified	◆	◆			<ol style="list-style-type: none"> 1. Consult with ACHP if historic buildings are offered for lease, license, or permit 2. Appropriate information; any changes or disturbances to cultural resources; and any terms and conditions deemed necessary to be incorporated in further disposition of land to protect these cultural resources; otherwise, data to GSA 	Appropriate restrictions on historic properties, burial grounds, sacred sites, and access routes to sacred sites are identified	<ol style="list-style-type: none"> 1. Consult with potentially affected Indian tribes, Native Alaskan villages, and Native Hawaiian organizations if cultural resources identified 2. Attach confidentiality provisions to all data concerning cultural resources
Hazardous Substances, Hazardous Wastes, and Petroleum Products	Information on hazardous substances, hazardous wastes, or petroleum products (or their derivatives)	◆	◆		◆	<ol style="list-style-type: none"> 1. If leased, notify appropriate state officials 2. If withdrawn, data on extent of contamination and decontamination measures to BLM 	Appropriate information	
Underground Storage Tanks (UST)	Information regarding USTs	◆	◆	◆	◆	<ol style="list-style-type: none"> 1. If leasing, notify appropriate state officials 	Appropriate information	

INFORMATION NEEDS ASSOCIATED WITH DOE PROPERTY TRANSFER

Table C-2. Summary of Environmental Information Required for DOE Real Property Transfer (continued)

Environmental Information Type	Type of Data	NEPA EA or EIS	EBS	OSHB	Invitation for Bid/Offers	Other Agencies	Conveyance of Property Transfer	Other
Underground Storage Tanks (UST) (continued)						<ol style="list-style-type: none"> If withdrawn, extent of UST contamination and UST decontamination measures to BLM If USTs closed or changed in service and ownership changes, notify appropriate regulatory authority 		
Radioactive Substances and Contamination	Information regarding radioactive substances and contamination	◆	◆	◆	◆	<ol style="list-style-type: none"> If leasing, notify appropriate State officials If withdrawn, extent of radioactive contamination and decontamination measures to BLM If any changes in ownership affecting status of NRC license, notify appropriate NRC Regional Administrator 	Appropriate information	If leased, licensed, or permitted, inform tenants and occupants about presence and location of equipment with radioactive substances
Polychlorinated Biphenyls (PCBs)	Information regarding PCBs and any equipment with PCBs	◆	◆	◆	◆	<ol style="list-style-type: none"> If leasing, notify appropriate state officials If withdrawn, extent of PCB contamination and decontamination measures to BLM If any changes in ownership affecting status of PCBs, PCB activities, and unprotected, lower secondary voltage network PCB transformers in or near commercial buildings, notify appropriate EPA Regional Administrator 	Appropriate information	<ol style="list-style-type: none"> If leased, licensed, or permitted, inform tenants and occupants about presence and location of PCBs If any change in ownership concerning a PCB transformer, notify the organization(s) that would conduct initial response to fire

Table C-2. Summary of Environmental Information Required for DOE Real Property Transfer (continued)

Environmental Information Type	Type of Data	NEPA EA or EIS	EBS	OSHB	Invitation for Bid/Offers	Other Agencies	Conveyance of Property Transfer	Other
Asbestos	Information regarding friable asbestos	◆	◆		◆	1. If leasing, notify appropriate state officials 2. If withdrawn, extent of contamination and decontamination measures to BLM; otherwise, to GSA	Appropriate information	If leased, licensed, or permitted, inform tenants and occupants about presence and location of friable asbestos and equipment with friable asbestos
Environmental Permits	Information regarding CAA, NPDES, UIC, and RCRA permits					If permit transferred to new owner or operator, notification and written agreement (containing a specific date for transfer of the permit responsibility, coverage, and liability) between DOE and new permittee to permitting agency		

Source: *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, U.S. DOE, Office of Environmental Safety & Health (EH-413), October 1997. Only includes environmental requirements imposed by Federal statute or regulation.

Note: EA - Environmental Assessment, EBS - Environmental Baseline Survey, EIS - Environmental Impact Statement, NEPA - National Environmental Policy Act, OSHB - Occupational Safety and Health Baseline

C.2.2 BLM

The BLM oversees the transfer of land that has been withdrawn by the Department of Interior. The transfer is conducted according to the requirements of the Federal Land Policy and Management Act of 1976. DOE notifies the BLM via a Notice of Intention to Relinquish that DOE intends to declare the real property as excess. The notification must include information regarding 13 items (see Table C-3), including several items related to stewardship information. BLM then determines whether it will accept and manage the land. BLM may reject land that is not suitable for return to the public domain, including withdrawn land that contains improvements, or has substantially changed in character.

Table C-3. Information Required to Transfer Property to BLM

1. DOE field element responsible for the real property	9. A certification DOE has exhausted GSA procedures for disposal of any abandoned improvements and that the improvements are without value
2. Citation of order withdrawing or reserving the land for DOE use	10. Description of easements or other rights and privileges (leases, encumbrances) burdened on the land
3. Legal description and acreage of land	11. Any terms and conditions DOE may deem necessary to incorporate in any further disposition of the land to protect the public interest
4. Description of improvement(s)	12. Information relating to interest of other agencies or individuals in acquiring use of the land
5. Extent land has changed in character other than by improvement(s)	13. Any recommendations (e.g., disposition of the land by GSA)
6. Extent to which land is contaminated and nature of contamination	
7. Extent to which land is decontaminated or measures being taken to protect public from the contamination	
8. Extent to which land and resources have been disturbed and measures to recondition property	

Source: *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, Office of Environmental Safety & Health (EH-413), U.S. DOE, October 1997.

C.2.3 GSA

The GSA oversees the transfer of withdrawn land that is rejected by BLM, acquired land, and land obtained by other mechanisms. The transfer is conducted according to the requirements of the Federal Property and Administrative Services Act of 1949. To implement this Act, GSA promulgated the Federal Property Management Regulations (FPMR), which contain more specific requirements for the transfer of the land, including the submission of Standard Form (SF) 118, "Report of Excess Real Property" (41 CFR 101 Section 47.202-2). SF 118 requires information regarding 13 items (see Table C-4), including several items related to stewardship information. The FPMR also contains a provision to provide information to future stewards:

The disposal agency "shall render such assistance to [the buyer] as may enable them, insofar as feasible, to obtain adequate information regarding the property. The disposal agency shall establish procedures so that all persons showing due diligence are given full and complete opportunity to make an offer." (Section 47.304-3)

Table C-4. Information Required to Transfer Property via GSA

<ol style="list-style-type: none"> 1. Description of real property 2. Date title vested in U.S. 3. All exceptions, reservations, conditions, and restrictions relating to the title acquired 4. Information regarding any circumstances since acquisition that may have affected the right, title, and interest of the U.S. in the real property 5. Status of civil and criminal jurisdiction over the land 6. Information regarding flood hazards, floodplains, or wetlands and restricted uses 7. Description of fixtures and related personal property with historic or artistic value 8. Historic significance of real property (including any listing on the National Register of Historic Places) 9. Description of type, location and condition of asbestos in buildings or improvements on the land; any asbestos control measures taken; and any estimated costs and time to remove all or part of the asbestos 10. Information on the type and quantity of each hazardous substance known to have been stored (for one year or more), released, or disposed on the real property; whether all remedial actions necessary to protect human health and the environment with respect to hazardous substances on the real property has been taken; and if such remedial action has not been taken, when such action will be completed 11. Legible, reproducible copy of all instruments (agreements, licenses, etc.) affecting the right, title, or interest of the U.S. in the real property 12. Any appraisal reports of the fair market value or the fair annual rental of the real property 13. Certification that each item of equipment subject to 40 CFR Part 761 on the real property is in a state of compliance. <p>Source: <i>Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers</i>, Office of Environmental Safety & Health (EH-413), U.S. DOE, October 1997.</p>

C.3 Practice

In the transfer of property, the primary mechanism for community involvement with potential future property owners or lessees is through the local Community Reuse Organization (CRO) at each site. Created to alleviate the adverse impact of downsizing defense nuclear facilities on affected local communities, CROs exist at 12 sites.⁴ The membership of CROs includes a broad representation of the affected communities, including local economic and community development organizations, individual residents, community-based organizations, business, educational, and financial institutions, site workers and their labor organizations, local government officials, public interest groups, environmental groups, diversity groups, and federally-recognized American Indian Tribes.

The CRO works with DOE to develop a Community Transition Plan, which describes the overall strategy and actions proposed by the community to respond to a changing mission at a DOE facility, building upon other existing community and facility planning efforts in the region. The Plan may include proposals for the commercialization of DOE property (e.g., technologies, facilities, or equipment) by a third party or the M&O contractor for non-Department business activities; facility reuse by non-DOE entities (reuse of Department facility real estate and fixtures including buildings, land, and facilities that are not needed for the Department's traditional missions); and personal property transfer (transfer of Department-controlled equipment, supplies, and intellectual property to another entity).⁵

The role of the CRO in the actual transfer of property varies, depending upon the Plan. The CRO may facilitate the transfer of the property to a non-DOE entity. For example, the CRO at Hanford, TRIDEC, delegated authority for the transfer of property to the Port of Benton, a state authority. The CRO may also become the owner or lessee of the property. For example, the CRO at the former Pinellas Plant, the Pinellas Country Industry Council, is now its owner.

During the transfer process, the future property owner, lessee, and/or CRO identifies what stewardship information should be obtained from DOE and requests the appropriate records. DOE then provides the records requested. The type of stewardship data transferred thus far has varied from site to site, based on the current site conditions and the expected use of the site. Table C-5 lists each of the sites that have a CRO and summarizes some of the property that has been transferred at these sites.⁶ Table C-5 also presents any major issues identified after the transfer, primarily based on a survey of the CROs and DOE officials knowledgeable about the property transfers. As of the writing of this report, DOE is currently in the process or has already completed the transfer of property at several sites, including two nuclear sites (the Pinellas and the Mound Plants) and one research facility (Oxnard). DOE also leased and sold property at two sites with ongoing missions (Hanford and Oak Ridge).

The amount of property already transferred from DOE to other entities is limited. Many of the CROs are just now beginning to consider the kinds of information they will need from DOE. Based on the experience of the CROs, it appears that DOE sites provide data regarding environmental contamination (as required by CERCLA and other environmental regulations), site, and facility infrastructure, as well as any other data requested by the CRO or the future user of the property.

⁴ Fernald, Hanford, Idaho, Los Alamos, Mound, Nevada, Oak Ridge, Paducah, Pinellas, Portsmouth, Rocky Flats, and Savannah River. Prior to the transfer of property, there was also a CRO at Oxnard.

⁵ *Interim Guidance for Community Transition Activities*, Office of Worker and Community Transition, DOE.

⁶ Table C-5 is not meant to be a comprehensive list of all property transferred by DOE and may not include some property that has already been transferred.

Table C-5. Summary of Property and Data Transferred

Site/Community Reuse Organization(CRO)	Property Transferred	Stewardship Data Transferred	Issues Identified After Transfer
Fernald Fernald CRO	None	Not Applicable	Not Applicable
Hanford TRIDEC, which delegated property transfer authority to the Port of Benton County	3000 Area in September 1996; 71 acres and about 15 buildings	Environmental assessment documents; information regarding buildings (e.g., blueprints), land, infrastructure	<ul style="list-style-type: none"> • Need for transition period during which future owners can consult with current DOE employees regarding the property and its features • Need for additional information regarding utility location (While upgrading the water lines, contractors hit unmarked lines at a rate of about 3 or 4 a week, resulting in change orders at an approximate additional cost of 15 percent) • Need for more recent environmental assessment information (Environmental assessment documentation was more than two years old; the Port of Benton discovered an oil pit not previously mentioned in the documentation) • Need for information regarding the telecommunications system • Need for utility billing information to predict costs • The identification of stewardship information required by future owner is highly dependent on the experience of the future owner in property transfer
	Leased Building 313 to Kaiser Aluminum and Chemical Corporation (3 years), under the DOE Organization Act. Sold a 4,000-ton metal extrusion press located in the building to the City of Richland, under the Atomic Energy Community Act. The City of Richland then sold the press to Kaiser Aluminum.	Unknown	Unknown
Idaho East Idaho Economic Development Council	None	Not Applicable	Not Applicable
Los Alamos Los Alamos Regional Development	None	Not Applicable	Not Applicable
Mound Miamisburg Mound Community Involvement Corporation	Leasing of about 20 buildings over the last four years	Environmental-related information through the NEPA process and baseline surveys; utility information via conversations between the Corporation and site engineers	None yet identified. Currently working on developing a Finding of Suitability of Transfer (FOST) document that will summarize a variety of stewardship information (e.g., waste quantities stored, remedial actions, deed restrictions) and point to other documents containing more detailed information.

Table C-5. Summary of Property and Data Transferred (continued)

Site/Community Reuse Organization(CRO)	Property Transferred	Stewardship Data Transferred	Issues Identified After Transfer
Nevada NTS Development Corporation	None. On-going discussions regarding sub-permitting of property from CRO to private companies	None yet. Currently identifying type of information, which depends on the needs of the future user	Not Applicable
Oak Ridge CRO of East Tennessee	Leasing nearly 1,000 acres of land to East Tennessee Economic Council, that is in turn making land available to private sector for industrial development. DOE retaining right to continue on-going operations (e.g., environmental sampling and monitoring)	Land survey (including a map); environmental assessment; CERCLA Report; and Joint Inventory and Condition Report	Not Yet Determined. Lease had been executed but will not be effective until lessee obtains insurance policy.
Oxnard Oxnard CRO	Metal fabrications steel press plant to a private owner	Environmental information required by CERCLA; building and system information (e.g., blueprints, security, electrical and other utilities); and any other information requested by the private owner	Unknown
Paducah Paducah Area Community Reuse Organization	None	Not Applicable	Not Applicable
Pinellas Pinellas County Industry Council (PCIC)	Sold the Pinellas Plant on March 17, 1995, under the Atomic Energy Act, to the PCIC and transferred completely on September 14, 1997	Based on an agreement between the PCIC and DOE, DOE provided records pertaining to radiation contamination assessment and decontamination methods used; permitting information; asbestos survey data; facility information (e.g., historical data, building plans); vendor information for equipment; and various procedures (e.g., hazardous material management, spill prevention, utilities) that may be adopted and rewritten by the new landlord.	<ul style="list-style-type: none"> • Stewardship data transfer seen as successful by both CRO and DOE • Additional data provided are limited to information provided by several former Pinellas Plant employees who are on staff at the St. Petersburg Clearwater Economic Development Council
Portsmouth Southern Ohio Diversification Initiative	None	Not Applicable	Not Applicable
Rocky Flats Rocky Flats Local Impacts Initiative	No real property. Some personal property.	Not Applicable	Not Applicable. Prior to closure, State of Colorado is interested in obtaining geographical information to include in state Geographical Information System (GIS) to support environmental planning (e.g., watershed planning)
Savannah River Savannah River Regional Diversification Initiative	None. Only a limited amount of excess personal property has been transferred.	Not Applicable	Not Applicable
Note: The final column displays "Unknown" for those sites at which the CRO was unable to be contacted for this report, and if no other information was available.			

APPENDIX D: PILOT TEST TO IDENTIFY STEWARDSHIP DATA

This appendix presents the results of a pilot test to identify stewardship data available in a DOE site document index database. The pilot test was a preliminary feasibility exercise to see whether information of stewardship value can be identified from existing information indexes and to identify barriers that may prevent more diagnostic selections. The pilot test was conducted on a records management database from the Rocky Flats Environmental Technology Site (RFETS), hereafter referred to as the focus site. The methodology, results, and conclusions from the pilot test are presented below.

D.1 Methodology

The pilot test was conducted in three steps:

1. Develop criteria to identify stewardship data.
2. Develop queries to search for the stewardship data available in the site database.
3. Query the site database.

These steps are further described in the following sections.

D.1.1 DEVELOP CRITERIA TO IDENTIFY STEWARDSHIP DATA

To develop criteria to identify stewardship data, experts from a wide range of disciplines developed a variety of scenarios that were likely to be encountered during stewardship, identified the decisions needed to be made for each scenario and the data required to make the decisions, and criteria to identify the appropriate data (refer to Figure D-1). To focus the efforts and to simulate real situations in which a future steward may want to access stewardship data, the experts conducted the pilot test in the following functional areas:

- Barriers/buffers
- Compliance oversight
- Natural resource management
- Community planning
- Emergency response

An example of a stewardship functional area scenario with the corresponding decisions and information needs (for the barriers/buffers functional area) is shown in Table D-1.

Table D-1. Example of Scenarios, Decisions, and Information Criteria

Scenarios in Which Data Would be Used	Decisions that Would Need to be Made Under the Scenario	Information Needed to Support the Decision	Criteria to Identify Information
Monitoring indicates that the site is not performing as expected in original closure plan.	<ul style="list-style-type: none"> • Is nonperformance significant? • Should monitoring be altered? • Is a remedial action necessary? 	<ul style="list-style-type: none"> • Applicable standards (regulatory and performance) • Monitoring results • Closure plan and supporting documentation (data packages) 	Confine requested information to publicly available, published (referenceable) material.

Figure D-1. Approach to Developing Stewardship Data Selection Criteria

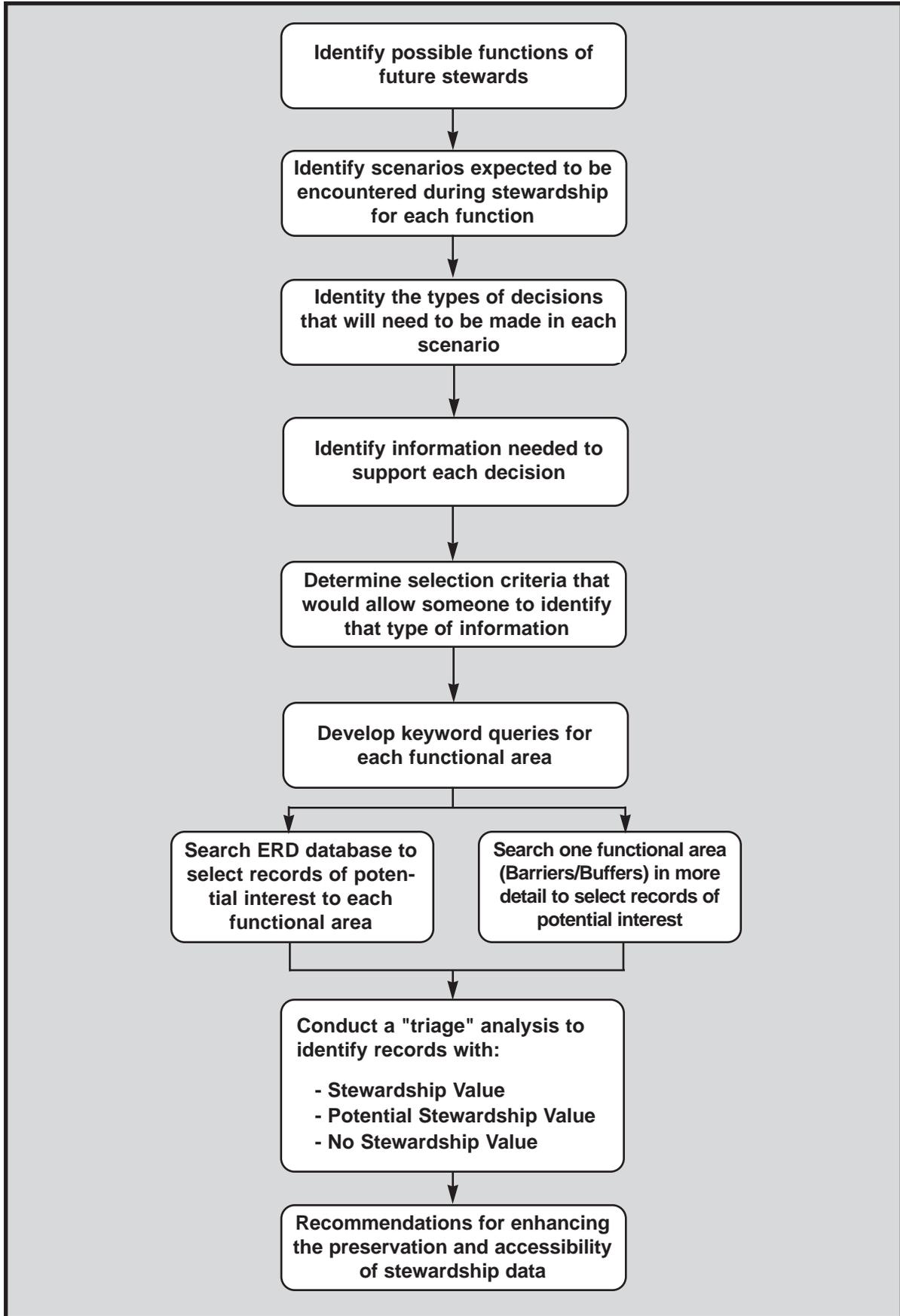


Table D-2. Specific Information to Support Stewardship (continued)

Data Type and Specific Information to Support Stewardship	Temporal Reference
Hazards and Controls (continued)	
<ul style="list-style-type: none"> • Personnel records, e.g., dates of employment. • Individual perspectives on the work - workers survey comments, worker interviews, management interviews, Congressional input. Information summarizes or otherwise relates staff, management, or stakeholder attitudes or concerns related to site operations. • Radiological Control Records. Record Copy, Approved by Management, Most Recent Version, Publicly Available. • Radiological Incident Reports. Record Copy, Approved by Management, Most Recent Version, Publicly Available. • Records of releases (both "planned" and accidental) to the environment from site activities prior to site closure. • Records related to all accidental releases of contaminants which affected occupational workers. • Reportable Events. Record Copy, Approved by Management, Most Recent Version, Publicly Available. • HEPA Filter Characterization Records. Record Copy, Approved by Management, Most Recent Version, Publicly Available. • Discharge point analysis dye tests. Record Copy, Approved by Management, Most Recent Version, Publicly Available. 	<p>Past/Future Past/Future Past/Future Past/Future Past/Future Past/Future Past/Future Past/Future</p>
<p>C. Disposition of historical hazards. This information pertains to site hazards that existed in the past but were removed or otherwise mitigated to a point that allows unrestricted future uses. It also includes legal or other supporting documentation to demonstrate that the hazards are no longer present onsite or the extent to which historical hazards were mitigated to baseline conditions at the start of long-term stewardship. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Facility/hazard name or geographic location(s). Is there a physical location associated with each hazard? I.e., can we construct an electronic map (GIS) that contains the locations of facilities or geographic areas where a hazard resides. • Characterization about the hazard itself. Would the hazard itself, without the intervention of an external accident (fire, flood, etc.) have a likelihood of causing a response? I.e., is the hazard itself explosive, flammable, undergo wind borne dispersion, etc.? • Previous inventories of hazardous materials above and below ground. • Copies of annual site environmental reports. • Shipments of materials to/from other DOE/DOD sites (e.g., irradiated fuel from one site shipped to another). • Environmental monitoring data for onsite and offsite environmental media (air, soil, groundwater, surface water, vegetation, animals (wild species) foodstuffs (crops, meat, milk, eggs, etc.). 	<p>Past/Future Past/Future Past/Future Past/Future Past/Future Past/Future</p>
<p>D. Information regarding existing barriers and other active or passive mechanisms for preventing exposures. This information includes the location, type, condition, and vulnerability (e.g., to fire, rain, earthquakes) of barriers and other protective mechanisms. This information includes knowledge of which specific barriers/protective mechanisms are required for each existing hazard. This information also includes schedules for maintenance or other related actions required to ensure adequate protections remain in place. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Consequences of the barrier failure relative to the status of the resources. Information would include exposure scenarios, exposure estimates and effects analyses. • Restrictions on land uses within the site, including buffer zones and easements. Information would include maps of buffer zones, restrictions on easements and access, and monitoring data relative to status of the buffer areas. • Assessment of the effectiveness of protective barriers and buffers. Approved post-closure monitoring plans Approved barrier/buffer maintenance plans. Record copy of post-closure compliance agreements. • Assessments of the effectiveness of monitoring systems and buffer/barrier performance. Record copy of reports evaluating the effectiveness of the site monitoring systems and the performance of engineered barriers/administrative buffers. 	<p>Past/Future Past/Future Future Future</p>

Table D-2. Specific Information to Support Stewardship (continued)

Data Type and Specific Information to Support Stewardship	Temporal Reference
<p>G. Post-closure/transfer operations and infrastructure (continued). Information pertaining to the operation of the site after closure including policies and procedures, post-closure monitoring data, compliance reports, land use during stewardship, remaining buildings/facilities, processes, pipelines, infrastructure, and effluent monitoring. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Monitoring capabilities (i.e., new instrumentation). 	Future
<ul style="list-style-type: none"> • Monitoring data required by reports. Access to record copy monitoring data or official monitoring databases. 	Future
<ul style="list-style-type: none"> • Monitoring record keeping, and reporting requirements under permits, agreements, regulations, etc. Required information will be identified in permits, agreements, and other compliance vehicles. Records including original data and associated QA/QC information. 	Future
<ul style="list-style-type: none"> • Past compliance monitoring. 	Future
<ul style="list-style-type: none"> • Policy statements and program documentation. Information describes stewardship practices and policies. 	Future
<ul style="list-style-type: none"> • Records of information disclosed by DOE to the stewardship entity and/or future site occupants. While the relevant records are principally needed for the period preceding execution of the stewardship agreement, any post-execution written communication between DOE and the stewardship entity is also of potential interest and value. 	Future
<ul style="list-style-type: none"> • Records related to DOE's compliance with site/facility closure agreements. 	Future
<ul style="list-style-type: none"> • Resources used in the monitoring network - which resources and where are the monitoring stations/areas located. Information would include monitoring program descriptions, maps of monitoring sites and media, monitoring schedules, and monitoring data trends. 	Future
<ul style="list-style-type: none"> • Stewardship agreement between site steward and DOE. Role of DOE vs. the site steward (if the steward is a different entity) in the litigation. 	Future
<ul style="list-style-type: none"> • Technical support information upon which the policies and procedures were based. Record copies of technical reports that are referenced in and provide the basis and rationale for the policies and procedures. 	Future
<ul style="list-style-type: none"> • Additional data not otherwise specified in applicable requirements (law, regulations, Order, etc.). 	Future
<ul style="list-style-type: none"> • Identified emergency response action levels. Need for emergency response. Necessary mitigating actions to assure protection and human health and the environment. 	Future
<ul style="list-style-type: none"> • Records related to the negotiation of the agreement between the stewardship entity and DOE. While the relevant records are principally needed for the period preceding execution of the stewardship agreement, any post-execution written communication between DOE and the stewardship entity is also of potential interest and value. 	Future
<ul style="list-style-type: none"> • Anonymous feedback from site workers concerning safety. Original copies of the anonymous feedback by workers concerning safety at the site. 	Future
<ul style="list-style-type: none"> • Access to monitored information for specific hazard. Link between monitoring, reporting and the specific hazard. 	Future
<ul style="list-style-type: none"> • Any additional data, including models, supporting compliance monitoring reduction. 	Future
<ul style="list-style-type: none"> • Active policies and procedures for site during stewardship. Record copy of past and present stewardship policies and procedures. 	Future
<ul style="list-style-type: none"> • Identification of an internal event. This would be the measurement of the hazard being the sole cause of an event, e.g., a contaminant reaching the groundwater table. 	Future
<ul style="list-style-type: none"> • Assessments of air, water, and soil monitoring programs. Record copy of reports evaluating the effectiveness of the site monitoring systems and the performance of engineered barriers/administrative buffers. 	Future
<ul style="list-style-type: none"> • Assessments of the effectiveness of policies and procedures. Record Copy of reports assessing effectiveness of policies and procedure. 	Future
<ul style="list-style-type: none"> • Correspondence file between DOE and the stewardship entity. While the relevant records are principally needed for the period preceding execution of the stewardship agreement, any post-execution written communication between DOE and the stewardship entity is also of potential interest and value. 	Future
<ul style="list-style-type: none"> • Effects of the proposed action on the site-monitoring network. Information will include the media being monitored and the locations of the monitoring stations. 	Future
<ul style="list-style-type: none"> • Emergency response plans to various types of hazards. Approved plans, publicly available.. 	Future

Table D-2. Specific Information to Support Stewardship (continued)

Data Type and Specific Information to Support Stewardship	Temporal Reference
Regulatory/Legal Framework	
<p>H. Regulatory framework (past and present). This information includes any compliance agreements, regulations, site closure agreements, permits, or other legal requirements associated with long-term stewardship activities at the site. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Copies of all relevant environmental permits, licenses, and authorizations (including Congressional and Presidential authorization). Record Copy, Approved by Management, Most Recent Version, Publicly Available. 	Past/Future
<ul style="list-style-type: none"> • Records related to past enforcement actions taken against DOE and documents related to response actions taken by DOE. 	Past/Future
<ul style="list-style-type: none"> • Changes to the applicable regulations. Confine requested information to publicly available, published (referenceable) material. 	Past/Future
<ul style="list-style-type: none"> • Facility Radiological Release (termination of license) documentation. Record Copy, Approved by Management, Most Recent Version, Publicly Available. 	Past/Future
<ul style="list-style-type: none"> • Public comments on site activities - comment summaries from EISs, CERCLA interactions, etc.. 	Past/Future
<p>I. Requirements specific to transfer/closure and post transfer/closure. This information includes any specific monitoring, maintenance, or reporting requirements established as a part of site closure agreements. This information also includes specific reporting schedules established for monitoring or other data. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Copy of site closure agreements and any individual agreements related to closure of individual facilities. 	Future
<ul style="list-style-type: none"> • Clear definition of the frequency, format and content of required reports. Record copy of Post-Closure Compliance Agreements. Record copies of all required compliance reports already submitted. 	Future
<ul style="list-style-type: none"> • Record of Decision (ROD). Confine requested information to publicly available, published (referenceable) material. 	Future
<ul style="list-style-type: none"> • Distribution lists (including organizational entities and addresses) for all reports. 	Future
<ul style="list-style-type: none"> • Description of any side agreements that were made in order to gain site closure acceptance (These may include things like public outreach programs, local economic development activities, and medical surveillance of local populations). 	Future
<ul style="list-style-type: none"> • Data modeling requirements. Confine requested information to publicly available, published (referenceable) material. 	Future
<ul style="list-style-type: none"> • Barriers/buffer performance criteria. Record copy of post-closure compliance agreements. 	Future
<ul style="list-style-type: none"> • Applicable standards (regulatory and performance). Confine requested information to publicly available, published (referenceable) material. 	Future
<ul style="list-style-type: none"> • Applicable monitoring requirements (law, regulation, Order, permit, etc). 	Future
<ul style="list-style-type: none"> • Copies of all relevant environmental permits, licenses, and authorizations (including Congressional and Presidential authorization). 	Future
<ul style="list-style-type: none"> • Closure plan and supporting documentation (data packages). Confine requested information to publicly available, published (referenceable) material. 	Future
<p>J. Real Estate records. Real property records related to acquisition of the site, easements and other access rights onsite and offsite through public/private property, mineral rights, and water rights. This information includes legal agreements and associated documentation to allow appropriate access to offsite monitoring stations, pumps, or other active or passive control systems. This information also includes specific schedules for data collection, maintenance, and related tasks. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Real property records relating to encumbrances added during DOE's occupation of the site. The local DOE real property office should have the necessary records. Real property records are also maintained by the local county auditor. 	Past/Future
<ul style="list-style-type: none"> • Real property records relating to encumbrances dating from the steward's takeover of the site. The local DOE real property office should have the necessary records. Real property records are also maintained by the local county auditor. 	Future
<ul style="list-style-type: none"> • Real property records relating to pre-existing encumbrances. The local DOE real property office should have the necessary records. Real property records are also maintained by the local county auditor. 	Past

Table D-2. Specific Information to Support Stewardship (continued)

Data Type and Specific Information to Support Stewardship	Temporal Reference
<p>J. Real Estate records (continued). Real property records related to acquisition of the site, easements and other access rights onsite and offsite through public/private property, mineral rights, and water rights. This information includes legal agreements and associated documentation to allow appropriate access to offsite monitoring stations, pumps, or other active or passive control systems. This information also includes specific schedules for data collection, maintenance, and related tasks. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Survey records. The local DOE real property office should have the necessary records. Real property records are also maintained by the local county auditor. 	Past
<ul style="list-style-type: none"> • Real property records related to acquisition of a site. The local DOE real property office should have the necessary records. Real property records are also maintained by the local county auditor 	Past
<p>Site Characteristics/Settings</p>	
<p>K. Information about cultural and natural resources. This information includes the location, type, and condition of onsite natural resources (including minerals, land and water resources, and habitats/species of concern), including resources of particular importance to Native American Tribes. It also includes the vulnerability of these resources to a variety of hazards, including residual radioactive and chemical hazards, other manmade hazards, and natural hazards. This information also includes relevant laws, regulations, and agreements regarding protection and/or permitted uses of these resources. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Locations of resources that have the potential to be developed. Maps of present distributions of groundwater quality and flow, surface water quality and flow, economically valuable resources, ecological habitats, protected species, cultural or archaeological sites. 	Past/Future
<ul style="list-style-type: none"> • Consequences of proposed actions relative to the status of the resource. Information would include exposure scenarios, exposure estimates and effects analyses, or risk analysis codes. 	Past/Future
<ul style="list-style-type: none"> • Input from Natural Resource Trustees as well as stakeholders. Most likely this information would not be developed onsite. 	Past/Future
<ul style="list-style-type: none"> • Trends in the resource (condition and contaminant burdens). Information on resource would include quality, contaminant concentrations, population processes for as many years in the past as are available. 	Past/Future
<ul style="list-style-type: none"> • Locations of protected and utilized resources within the site and its buffers. Maps of present distributions of groundwater quality and flow, surface water quality and flow, economically valuable resources, ecological habitats, protected species, cultural or archaeological sites. 	Past/Future
<ul style="list-style-type: none"> • Specifics of what damages have been identified and information related to activities that might have had the potential to damage those resources. Information summarizes environmental contamination from site activities or how contamination was mitigated; information summarizes site state at closure. 	Past
<ul style="list-style-type: none"> • Maps of existing resources. maps of present distributions of groundwater quality and flow, surface water quality and flow, economically valuable resources, ecological habitats, protected species, cultural or archaeological sites. 	Past
<ul style="list-style-type: none"> • Information regarding species, distribution, trends in historical status, and status at closure of threatened and endangered species. Information describes species, distribution, trends in historical status, or status at closure of threatened and endangered species. 	Past
<ul style="list-style-type: none"> • Indicators of resource health or status. Information on resource would include quality, contaminant concentrations, population processes. 	Past
<ul style="list-style-type: none"> • Existing and past resource usage. Mining records, water withdrawals, fisheries, hunting areas. 	Past
<ul style="list-style-type: none"> • Descriptions of the existing cultural and natural resources. Information would describe and summarize surface and groundwater flows, rates, quality, and uses; geology and mineral resources; soils; land use; ecological resources. 	Past
<p>L. Geophysical and political information. This information includes site topography, site hydrogeology, geotechnical hazards, physical hazards, site boundaries, political boundaries, agricultural distribution patterns, and public exposure data. A few examples are listed below.</p>	
<ul style="list-style-type: none"> • Results of tracer and dispersion studies. 	Past
<ul style="list-style-type: none"> • Special diet data for sensitive population in surrounding areas (elderly, children, Native American, ethnic groups, etc.). 	Past
<ul style="list-style-type: none"> • Public exposure data (consumption data or wild animals, domesticated animals, locally grown foodstuffs, regionally produced foodstuffs). 	
<ul style="list-style-type: none"> • Population demographics. Census data. 	

Table D-2. Specific Information to Support Stewardship (continued)

Data Type and Specific Information to Support Stewardship	Temporal Reference
L. Geophysical and political information (continued). This information includes site topography, site hydrogeology, geotechnical hazards, physical hazards, site boundaries, political boundaries, agricultural distribution patterns, and public exposure data. A few examples are listed below.	
<ul style="list-style-type: none"> • Offsite public use patterns (public access locations, activity patterns, residency records). 	Past/Future
<ul style="list-style-type: none"> • Agricultural production for surrounding areas by location (crop types, harvest times, production quantities, storage practices). 	Past/Future
<ul style="list-style-type: none"> • Agricultural distribution patterns. 	Past/Future
<ul style="list-style-type: none"> • Surface water conditions (flow rates, stage data, etc.). 	Past/Future
<ul style="list-style-type: none"> • Meteorological/climatological data summaries. Summary documents and meteorological monitoring data for site and facilities. 	Past/Future
<ul style="list-style-type: none"> • Meteorological data from onsite monitoring stations (wind speed, direction, stability, etc.). 	Past/Future
<ul style="list-style-type: none"> • Meteorological data from onsite monitoring stations (wind speed, direction, stability, etc.). 	Past/Future
<ul style="list-style-type: none"> • Meteorological data from offsite monitoring stations (wind speed, direction, stability, etc.). 	Past/Future
<ul style="list-style-type: none"> • Groundwater transport models. Contaminant transport models used for the site. 	Past/Future
<ul style="list-style-type: none"> • Groundwater transport data (flow, direction, water levels data, etc). 	Past/Future
<ul style="list-style-type: none"> • The effect of new development on the hydrology, the buffers, and the monitoring network. Confine requested information to publicly available, published (referenceable) material. 	Past/Future

D.1.2 DEVELOP QUERIES TO SEARCH FOR STEWARDSHIP DATA

After developing the criteria to identify stewardship data, the functional area experts developed queries to search a document index data base for stewardship data. The site database used was the Environmental Records Database (ERD) from the focus site. The ERD, active through 1995, is a compilation of over 30 record indexing databases from across the site and has over 408,000 records. A list of the databases included in ERD is shown in Table D-3. The databases were included in the ERD because of their environmental data value.

Table D-3. Descriptions of Databases Included in ERD

Name	Description	Summary
Environmental Record Database (ERD)	The ERD is a compilation of over 30 record indexing databases from across the site and has over 408,000 records. Databases included in the ERB were chosen due to their environmental data value. The system has migrated overtime and is currently maintained in FileMaker Pro.	<p>Summary: Databases included in the ERD are: Procedure Tracking and Document Tracking System, RF Correspondence Control System, Env. Master File, Rocky Flats Dbase, Marcus Church Dbase, Records Mgmt. Dbase, Master Records Inventory, CERCLA Administrative Records, ERM Project File Center Dbase, Rockwell (Grand Jury Investigation) Dbase, EPA Dbase, ChemRisk, Woodward Clyde System, Doty Database, RAC Dbase, CDPH&E Dbase, Solar Ponds Files, RCRA Permitting and Compliance Library, Summary of Root Cause Analysis, Lessons Learned, Hazspills, and RCRA Regulatory Programs Permitting Files.</p> <p>Data Status: In most cases, data is current through 7/1/95. Current system is inactive.</p> <p>Document Availability: Most documents are available from Records Management at the site or from other site document custodians.</p>

Table D-3. Descriptions of Databases Included in ERD

Name	Description	Summary
Rockwell (Criminal Grand Jury Investigation)	Contains records seized by the FBI and EPA agents and records produced in response to Grand Jury Investigations. The database contains approximately 150,000 documents that focus mainly on the activities that occurred at the site from 1984 to 1989. The database is owned and operated by Rockwell International.	<p>Summary: The database is primarily used for litigation defense by Rockwell International. Many of the documents within the system have been optically scanned.</p> <p>Data Status: The database focus mainly on the activities that occurred at the Site from 1984 to 1989. Current system is inactive.</p> <p>Document Availability: Documents are available through an attorney's office in Denver.</p>
Marcus Church	Contains documents associated with monitoring data, reports and scientific studies dealing within offsite environmental issues. Approximately 35,000 documents are in the system.	<p>Summary: The database was developed in support of the Church-McKay litigation against the DOE, DOW Chemical and Rockwell International.</p> <p>Data Status: The database focuses mainly on the years 1952 - 1981. Current system is inactive.</p> <p>Document Availability: Documents were optically scanned and full text retrieval is available. Hard copies are available from the Federal Records Center.</p>
Cook	Contains documents collected in support of a class action lawsuit (class members are people who reside or work within a certain radius of the site) against Dow Chemical and Rockwell International in 1990.	<p>Summary: The database was developed in support of the class action lawsuit against DOW Chemical and Rockwell International. Along with information that is associated with potential impact to health or decreases in property value, the system contains records of building history for several buildings constructed from the early 1950s through the early 1970s.</p> <p>Data Status: The database focus mainly on the years of 1952 - 1990. Current system is inactive.</p> <p>Document Availability: Documents were optically scanned and full text retrieval is available. However, not all documents are available due to poor quality originals.</p>
Rocky Flats	Contains documents for future possible litigation purposes. The majority of these documents deal with organizational information. The system also contains security, safety and health information for the period of collection.	<p>Summary: The database was developed for future litigation support and on a variety of subjects.</p> <p>Data Status: The database contains pre-1990 documents. Current system is inactive.</p> <p>Document Availability: Documents were optically scanned and full text retrieval is available. Hard copies are available from the Federal Records Center.</p>
Environmental Master File (EMF)	The EMF contains records associated with the environmental history of the site and the surrounding lands. The data-base contains approximately 28,000 documents and has been used to support environmental projects and litigation activities.	<p>Summary: The database was developed to retain a historical log of environmental activities at and around the site.</p> <p>Data Status: The database focus mainly on the years of 1952 to the late 1980s. Current system is inactive.</p> <p>Document Availability: Documents were optically scanned and full text retrieval is available for some documents. Hard copies are available from the both the site contractor and from the Federal Records Center.</p>
Woodward Clyde	This system contains environmental documents collected in characterizing the environmental baseline conditions of the operable units identified at the site.	<p>Summary: The database was developed for site characterization and delineation of operable units. Information contained in the database include the site history, nature of contamination at the site, and environmental conditions of the site in 1992.</p> <p>Data Status: Data has not been updated since origination. Current system is inactive.</p>

Table D-3. Descriptions of Databases Included in ERD

Name	Description	Summary
(continued)	(continued)	Document Availability: Documents were optically scanned and full text retrieval is available. Hard copies are available from the Federal Records Center.
ChemRisk	This system contains documents collected during 1991 and 1992 for the dose reconstruction/ toxicological review performed by the Colorado Department of Health. The system contains approximately 2,000 documents.	<p>Summary: The dose reconstruction project included the collection of onsite and offsite monitoring data, routine and accidental releases of radionuclides and non-radioactive chemicals, environmental management procedures, and waste stream characterizations.</p> <p>Data Status: The database focus mainly on the years of 1951 to 1989. Current system is inactive.</p> <p>Document Availability: Documents were optically scanned and full text retrieval is available. Hard copies are available from the Site contractor.</p>
Doty	This system contains documents collected for the generation of the Historical Release Report in June, 1992. The system contains approximately 5,700 documents.	<p>Summary: The Historical Release Report (HRR) contains information regarding spills, releases and/or accidents involving hazardous substances; potential cumulative effects of inside-building releases on the environment beneath buildings; and known/potential environmental impacts outside the site.</p> <p>Data Status: The database contains documents collected during 1991 and 1992. Current system is inactive.</p> <p>Document Availability: Documents were optically scanned and full text retrieval is available. Hard copies are available from the site contractor.</p>
RAC	The system contains documents collected in support of the Phase II Dose Reconstruction study started by ChemRisk. Documents contained within this system came from the same collection of documents, which were available to the Doty and ChemRisk efforts. Approximately 1,100 documents are in the database.	<p>Summary: Contains historical public exposures (estimate of offsite exposures, doses and potential health risks).</p> <p>Data Status: Not known, but it is expected that the information in the database has not been updated nor maintained since generation of the RAC report in the early 1990s. Current system is inactive.</p> <p>Document Availability: Not known.</p>
EPA	The system contains documents collected in response to EPA CERCLA 104(e) Requests for Information.	<p>Summary: Information contained in the system include information regarding plutonium in the air ducts, and shipments of contaminated wastes.</p> <p>Data Status: The database contains information regarding shipments to the Lowry Landfill covering the years 1952 through the early 1980s. Current system is inactive.</p> <p>Document Availability: Documents were optically scanned and full text retrieval is available. Hard copies are available from the Site contractor.</p>
CDPH&E	The system contains miscellaneous documents requested by the CDPH&E and used in a cancer incidents study. Approximately 180 documents are in the database.	<p>Summary: Collection of miscellaneous documents requested by the CDPH&E for a cancer incidents study. Information includes original land selection documentation, Church-McKay land litigation, and Industrial Hygiene records.</p> <p>Data Status: Current system is inactive.</p> <p>Document Availability: Hard copies are available from the Site Contractor.</p>

Table D-3. Descriptions of Databases Included in ERD

Name	Description	Summary
Records Management Database (RMDB)	<p>The RMDB is the site's primary system for locating and retrieving inactive, unclassified site records. Approximately 60 million pages of inactive unclassified records are tracked by the system. The system resides on a mainframe using Oracle software.</p>	<p>Summary: The RMDB is used to index and retrieve inactive records that have been sent to Records Management for low-cost storage. The RMDB has been active since October 1993 and contains records from a variety of dates. Nearly 6,000 cubic feet of records and 3,000 reels of microfilm were indexed in FY 96.</p> <p>Data Status: Current system is active.</p> <p>Document Availability: Database is an indexing system only. Documents can be retrieved via formal search requests of the Site contractor.</p>
Master Records Inventory (MRI)	<p>The MRI contains data from a sitewide records inventory that was conducted from June 1993 through August 1995.</p>	<p>Summary: The MRI contains a variety of active record information assessed from June 1993 through August 1995. Contents of the MRI provide history, use and function of the record series at the Site. The system has been used heavily by Site efforts including the epidemiology study, transition environmental database report, operating records audit, and the dose reconstruction study.</p> <p>Data Status: It is stated that the inventory ended in August of 1995. It is not known whether the system has been maintained. Current system is inactive.</p> <p>Document Availability: Documents indexed in the MRI are retained by the record originator as the system was designed to track active records.</p>
Master Records Turnover Instruction (RTI) Database	<p>The RTI is used by Records Management to retain all records turnover instructions that have been written for site records collections.</p>	<p>Summary: The RTI is essentially a controlled procedure that identifies the pertinent information fields that need to be captured for cost effective and efficient record retrieval. The RTI acts as a guide for data entry personnel to enter individual records into the Records Management Database.</p> <p>Data Status: Current system is active.</p> <p>Document Availability: n/a</p>
Plantwide Procedures and Manuals Tracking Database (PADT)	<p>The PADT is used to track distribution of all documents controlled by the centralized Document Control organization. The PADT resides on a mainframe running on Oracle software.</p>	<p>Summary: The PADT consist of an index that tracks the distribution of all site policies, plans, manuals, and procedures formally controlled by the Site. The system is linked to the RMDB in order to link data on inactive records for electronic transfer.</p> <p>Data Status: Current system is active.</p> <p>Document Availability: Controlled documents can be obtained through the Site contractor.</p>
Rocky Flats Correspondence Control System (RFCC)	<p>The RFCC has been used at the site since 1993 to track incoming and outgoing external correspondences. The RFCC resides on a mainframe running on Oracle software.</p>	<p>Summary: The RFCC is an index of all external correspondences controlled by the Site contractor. It is primarily used to identify commitments to actions, dates or resources for the Site contractors identified in correspondences to and from the Department of Energy.</p> <p>Data Status: Current system is active.</p> <p>Document Availability: Hard copy files are available from the Site contractor.</p>
Building 706 Technical Library, Technical Reports Database	<p>The Technical Library database provides an index of approximately 64,000 classified documents. The system is run on a FileMaker Pro database.</p>	<p>Summary: The Technical Library provides an index of classified technical reports that were used for production support at the site.</p> <p>Data Status: Current system is inactive.</p> <p>Document Availability: Hard copies are available through the Site contractor.</p>

The queries developed to search for stewardship data are based on the fields available in the ERD. The fields available in the ERD are shown in Table D-4.

Table D-4. Fields Available in the ERD

1. Record ID	Unique number for each record	13.6. External Letters
2. Data Source		13.7. Manual
2.1. AR	Administrative Record	13.8. Administrative
2.2. RMDB	Records Management	13.9. Health and Safety Preventive Manuals
2.3. MRI		13.10. Informational Procedure not held by Doc Control
2.4. RFCC	Rocky Flats Correspondence Control	13.11. Other
2.5. RRR	Release Reports	13.12. Old Manual Type
2.6. OCCU		13.13. Preventative Maintenance Order
2.7. SPF	Solar Ponds	13.14. Environmental Management Procedure
2.8. CCFM		13.15. Program Plan
2.9. ERDC		13.16. WSRIC Book
2.10. FFCA		13.17. Requirements
2.11. LL	Lessons Learned	13.18. Waste Processing Report
2.12. RCA		13.19. Miscellaneous
2.13. RPF		13.20. Doe memorandum
2.14. CHEM		13.21. Survey
2.15. PADT		13.22. Internal Letters
2.16. PFC		13.23. Analytical Requisition
2.17. ROCK		13.24. Presentation
2.18. HAND		13.25. Graph
2.19. CD		13.26. Table
2.20. EMF		13.27. Investigative Report
2.21. RFD		13.28. Miscellaneous Handwritten Docs
2.22. MCD		13.29. Telecommunications Message
3. Title		13.30. Memoranda
4. Keywords		13.31. Logbooks
5. Authors		13.32. List
6. Addressees		13.33. Misc Traffic Documents
7. Distribution		13.34. Procedure
8. Comments		13.35. Unplanned Event Info CTR Report
9. Reference Numbers		13.36. Routing Slip
10. Publication Date 1		13.37. Policy
11. Publication Date 2		13.38. Diskette
12. Estimated		13.39. Shipping Papers
13. Type		13.40. Building Book
13.1. Outgoing Correspondence		13.41. Approval Forms
13.2. Correspondence		13.42. Performance Indicator Reports
13.3. Notes		14. Size
13.4. Technical		15. Location
13.5. Reports		

The queries used to search the database are lists of keywords, developed by each functional area expert based on their information requirements (as discussed in the above section). Such searches most likely represent the method by which stewards would try to identify information in a database. Through iterative searching, functional area experts developed lists of keywords expected to encompass the majority of documents of interest to their functional area. The final keyword queries developed for the functional areas are presented in Table D-5.

One functional area, buffers/barriers, was further investigated. The keyword queries developed for buffers/barriers were grouped into sub-topics. These sub-topics and their corresponding keyword queries are shown in Table D-6. Each subtopic was then individually queried through the ERD database.

Table D-5. Final Keyword Queries ¹

Functional Area	Final Keyword Query	Number of Records Selected
Barriers/ Buffers	<p>Checking for the word anywhere within Keywords, Comments and Title and not accepting data source "RMDB"</p> <p>Like <i>"*electronic database*"</i> Or Like <i>"* soil *"</i> Or Like <i>"* soils *"</i> Or Like <i>"*surface water*"</i> Or Like <i>"*hydrology*"</i> Or Like <i>"*geology*"</i> Or Like <i>"*landfill*"</i> Or Like <i>"* pond *"</i> Or Like <i>"* ponds *"</i> Or Like <i>"*ditch*"</i> Or Like <i>"* NEPA *"</i> Or Like <i>"*environment*"</i> Or Like <i>"*monitoring*"</i> Or Like <i>"*groundwater*"</i> Or Like <i>"*ecology*"</i> Or Like <i>"*ecological*"</i> Or Like <i>"*EcMP*"</i> Or Like <i>"* SED *"</i> Or Like <i>"*RFEDS*"</i> Or Like <i>"*RI/FS*"</i> Or Like <i>"* RI *"</i> Or Like <i>"* FS *"</i> Or Like <i>"* ROD *"</i> Or Like <i>"* (ROD) *"</i> Or Like <i>"*RCRA*"</i> Or Like <i>"*CERCLA*"</i> Or Like <i>"*closure plan*"</i> Or Like <i>"* EIS *"</i> Or Like <i>"* (EIS) *"</i> Or Like <i>"* map *"</i> Or Like <i>"*meteorology*"</i> Or Like <i>"*weather*"</i> Or Like <i>"*sampling wells*"</i> Or Like <i>"*remedial investigation*"</i></p>	85,659
Natural Resources	<p>Checking for the word anywhere within Title and no screening of document types</p> <p>Like <i>"*ecolog*"</i> or like <i>"*cultur*"</i> or like <i>"*groundwater*"</i> or like <i>"*geolog*"</i> or (like <i>"*transport*"</i> and like <i>"*model*"</i>) or like <i>"*archaeolog*"</i> or like <i>"*endangered*"</i> or like <i>"*mineral*"</i> or like <i>"*mining*"</i> or like <i>"*monitor*"</i> or like <i>"*meteorol*"</i> or like <i>"*weather*"</i> or like <i>"*radiol*"</i></p>	14,388
Community Planning	<p>Only searching Title</p> <p>Like <i>"*land use*"</i> or like <i>"*site development*"</i> or like <i>"*sitewide eis*"</i> or like <i>"*site wide eis*"</i> or like <i>"*sitewide environmental impact statement*"</i> or like <i>"*site wide environmental impact statement*"</i></p>	514
Emergency Response	<p>Checking for the word anywhere within Title and no screening of document types</p> <p>Like <i>"*earthquake*"</i> Or Like <i>"* fire *"</i> Or Like <i>"*firefight*"</i> Or Like <i>"* flood *"</i> Or Like <i>"*floodplain*"</i> Or Like <i>"*emergency response*"</i> Or Like <i>"*disaster*"</i></p>	3,924
Compliance	<p>There was no "final query set by subject expert" for the Compliance subject area. It is believed that the expert's query attempts may have been too restrictive and failed to find more than a minimal set of possible database entries. A set of records provided by the expert as a sample of query results had chromium in most of the records. A representative query for chromium was put together and results comparable to other subject areas, at least in number, were obtained.</p> <p>Checking for the word anywhere within Title and no screening of document types</p> <p>Like <i>"*chromium*"</i></p>	470

¹ The keyword searches were conducted using queries in an MS Access 97 database. Like *"something"* is the format of a basic query in Access, where *something* is the keyword (criteria) being searched. Access is sensitive to format. For example;

- like *"radiation"* must match the entire field
- like *"radiation*"* matches a field starting with radiation
- like *"*radiation"* matches a field ending in radiation;
- like *"*radiation*"* finds radiation anywhere in the field.

Note that *"*radiation*"* would also also match both Irradiation whereas *"* radiation *"* (radiation with a blank on each side) would match radiation only.

Table D-6. Buffer/Barrier Sub-Topic Queries

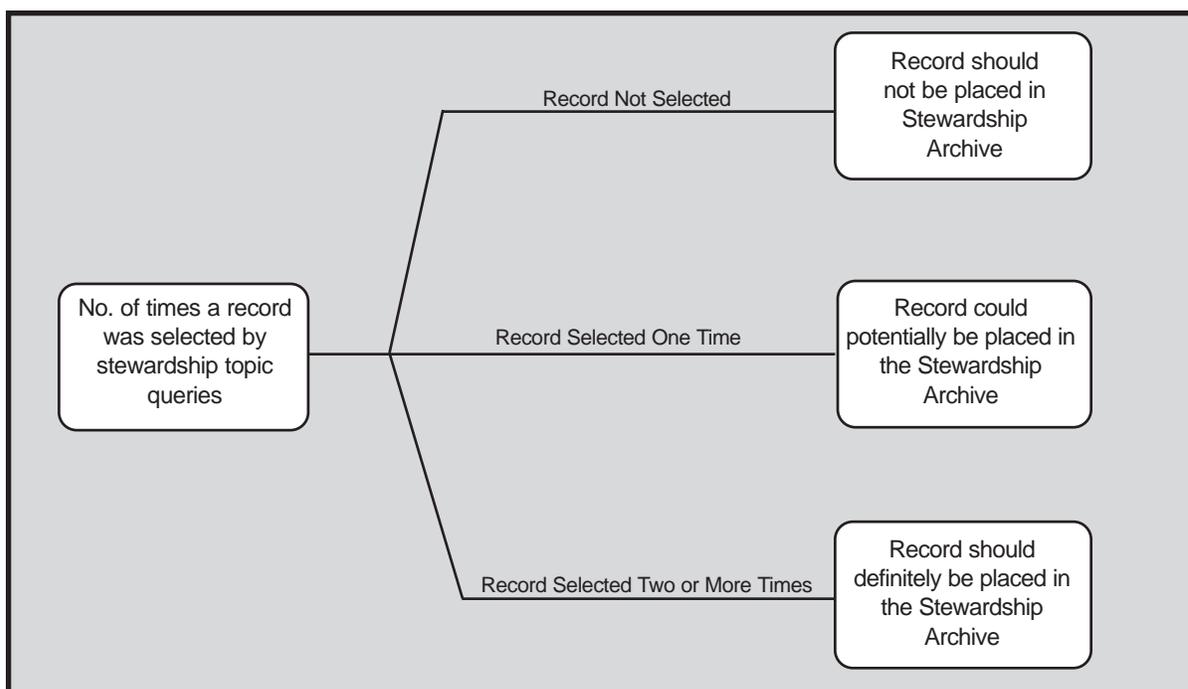
Buffer	Barrier Sub-topic Queries
ElecDB	Like "*electronic database*" Or Like "* SED *" Or Like "*RFEDS*"
Soil	Like "* soil *" Or Like "* soils *"
SurfWater	Like "*surface water*" Or Like "* pond *" Or Like "* ponds *" Or Like "*ditch*"
Hydro	Like "*hydrology*" Or Like "*groundwater*"
Geology	Like "*geology*"
Landfill	Like "*landfill*"
Acts	Like "* NEPA *" Or Like "*RCRA*" Or Like "*CERCLA*"
Enviro	Like "*environment*"
Ecolog	Like "*ecology*" Or Like "*ecological*"
Monitor	Like "*monitoring*" Or Like "*EcMP*" Or Like "*sampling wells*"
Investigate	Like "*RI/FS*" Or Like "* RI *" Or Like "* FS *" Or Like "*remedial investigation*"
Plans	Like "* ROD *" Or Like "* (ROD) *" Or Like "*closure plan*" Or Like "* EIS *" Or Like "* (EIS) *"
Map	Like "* map *"
Weather	Like "*meteorology*" Or Like "*weather*"

Note: SED = Surface Environmental Database, RFEDS = Rocky Flats Environmental Database System, and EcMP = Ecological Monitoring Program.

D.1.3 QUERY THE SITE DATABASE

After developing the criteria to identify stewardship data and the queries to search for the data, the functional experts queried the database to identify stewardship data. First, the functional area experts analyzed the completeness of the data available in the database. For each of the fields in the ERD database, the functional area experts identified the number of records that contained data. The functional area experts also identified how many records were contained in each of the 30 databases. Second, the functional area experts identified stewardship data by determining how many times a record was selected by the keyword queries, i.e., conducting a "triage" on the records selected by the keyword queries (Figure D-2).

Figure D-2. Preliminary Triage Decision Logic



D.2 Results of Stewardship Pilot Study

The results of the stewardship pilot study include an analysis of the completeness of the data available in the site database and a summary of the records identified as stewardship data. These results are presented in the following sections.

D.2.1 COMPLETENESS OF INFORMATION AVAILABLE IN SITE DATABASE

As discussed above, the ERD contains 15 fields and 406,060 records. For each of the fields (except for the Record ID field, which is the unique number for each record and was populated for every record), the number of records with data for the field was counted and summarized (see Table D-7). As shown, the Data Source and Title/Description fields are completed for each record, although a small percentage of the records have a value of "N/A." Six other fields are completed for more than half of the records (Keywords, Authors, Addressees, Reference Numbers, Publication Date 1, and Location).

Of the populated fields, the only really useful field was Title. This field was really a combination title/abbreviated abstract for each record. The quality of this field varied widely. Some records contained detailed abstracts outlining specific contents. On the other hand, many of the entries in the title field were of little or undeterminable value.

Table D-7. Summary of ERD Database Field Population

Data Name	Number of Records with data	Number of Records with only "N/A"
Data Source	408,060	7,680
Title/Description	408,060	41,447
Keywords	277,281	7,689
Authors	377,051	7,687
Addressees	367,013	92
Distribution	134,435	7,700
Comments	99,772	0
Reference Numbers	405,444	0
Publication Date 1	384,962	0
Publication Date 2	59,187	0
Estimated Date	Cannot Check	0
Type	Cannot Check	0
Size	Cannot Check	0
Location	406,858	12

Of some value were the fields Keywords and Comments because these often contained useful information in which to search. They also provided information regarding the record pedigree (review information, etc.). The remaining fields were of little value. Table D-8 presents a summary of the number of records that were contributed by each of the databases consolidated into the ERD. The largest single source of records was the Rockwell Criminal Grand Jury Investigation (ROCK). This database contributed over a quarter (148,323 records) of the total records. The PFC database contributed another 50,516 records. There were seven other databases that contained between 10,000 and 40,000 records. The remaining 21 databases were relatively small and contained less than 10,000 records.

Table D-8. Number of Records from each Data Source

Data Source	No. of Records	Data Source	No. of Records
None identified	35	OCCU	1
ACCE	2	PADT	7,673
AR	5,828	PFC	50,516
CCFM	37,689	RCA	47
CD	22,821	RECO	53
CHEM	16,342	RF#:	823
ELEC	2	RFCC	24,248
EMF	30,981	RFD	4,823
EPA	1,746	RMDB	25,793
ERDC	1,503	ROCK	148,323
FFCA	187	RPCL	451
HAND	78	RPF	189
LL	140	RRR	743
MCD	18,316	SPF	996
MRI	7,680	UNIQ	31
		Total:	408,060

D.2.2 STEWARDSHIP DATA IDENTIFIED

As discussed above, stewardship data was identified based on the keyword queries. The number of records selected for each of the functional areas, based on the keyword queries, is shown in Table D-9.

Table D-9. Summary of Number of Records Selected by Functional Areas

Data Source	Total No. of Records	Hit by Any Query	No. of Records Selected by Barriers	No. of Records Selected by Compliance	No. of Records Selected by Natural Resources	No. of Records Selected by Community Planning	No. of Records Selected by Emergency Response
Total:	408,060	100,317	85,659	470	14,388	514	3,924
Percent:	100%	25%	21%	0.12%	3.5%	0.13%	1.0%

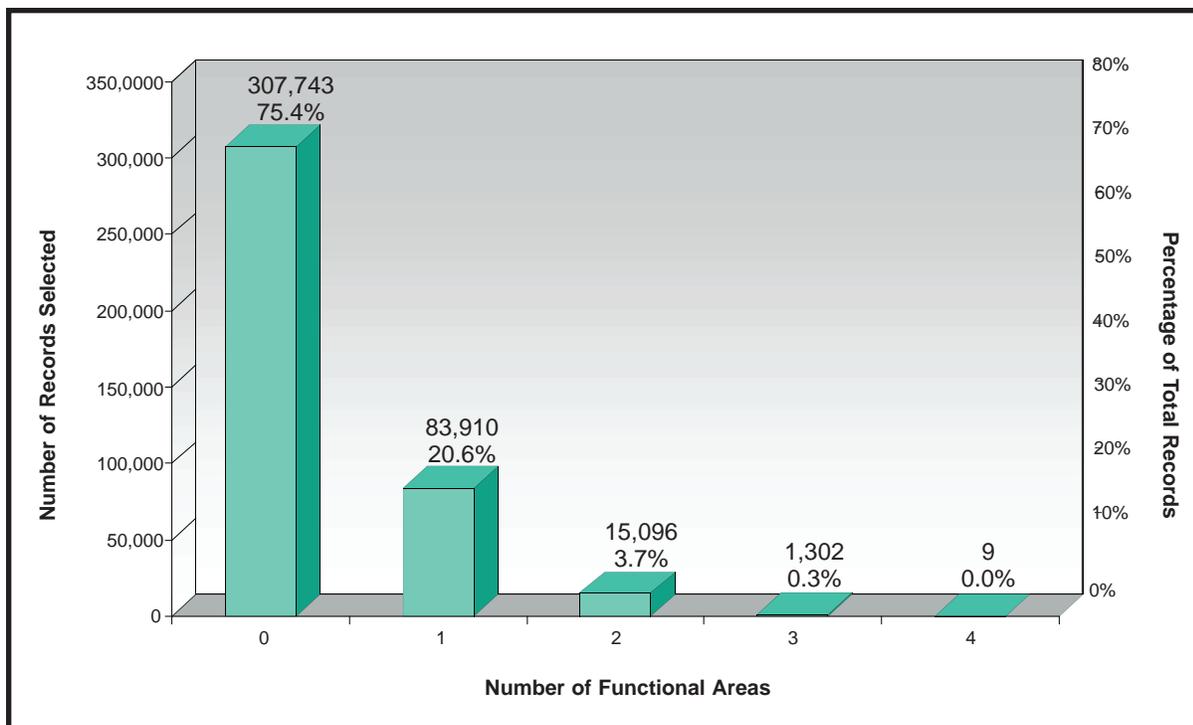
As can be seen in the table, about 25 percent (100,317) of the records were selected by the queries. The Barriers/Buffers functional area selected the vast majority of the records identified as having potential stewardship value. It is interesting to note that over 75 percent of the records selected by the queries came from just three (EMF, PFC) of the 30 databases consolidated in the ERD database.

To determine the likelihood the records selected in Table D-9 contain stewardship data, the functional area experts conducted the triage logic (discussed in Section D.1.3). Figure D-3 shows the number of selections for each record in the database. As can be seen, most records were not selected. Of those selected, most were selected by only one functional area. This would seem to indicate that the functional area queries were very focused on the unique and individual needs of the subject matter. It may also indicate the potential to effectively reduce the amount of data archived for sites by applying specific criteria.

If the triage decision logic presented above was applied to the data in Table D-9, then:

- 75% of the records would be categorized as not useful for stewardship.
- 21% would be categorized as potentially useful.
- 4% would definitely be included in the archive.

Figure D-3. Number of Records Selected by Multiple Functional Areas



The results of the 14 individual Barrier/Buffers sub-topic queries are presented in Table D-10. The number of times individual records were selected by the multiple Barrier/Buffer sub-topic queries are shown in Figure D-4.

Table D-10. Results of Barrier/Buffers Sub-Topic Queries

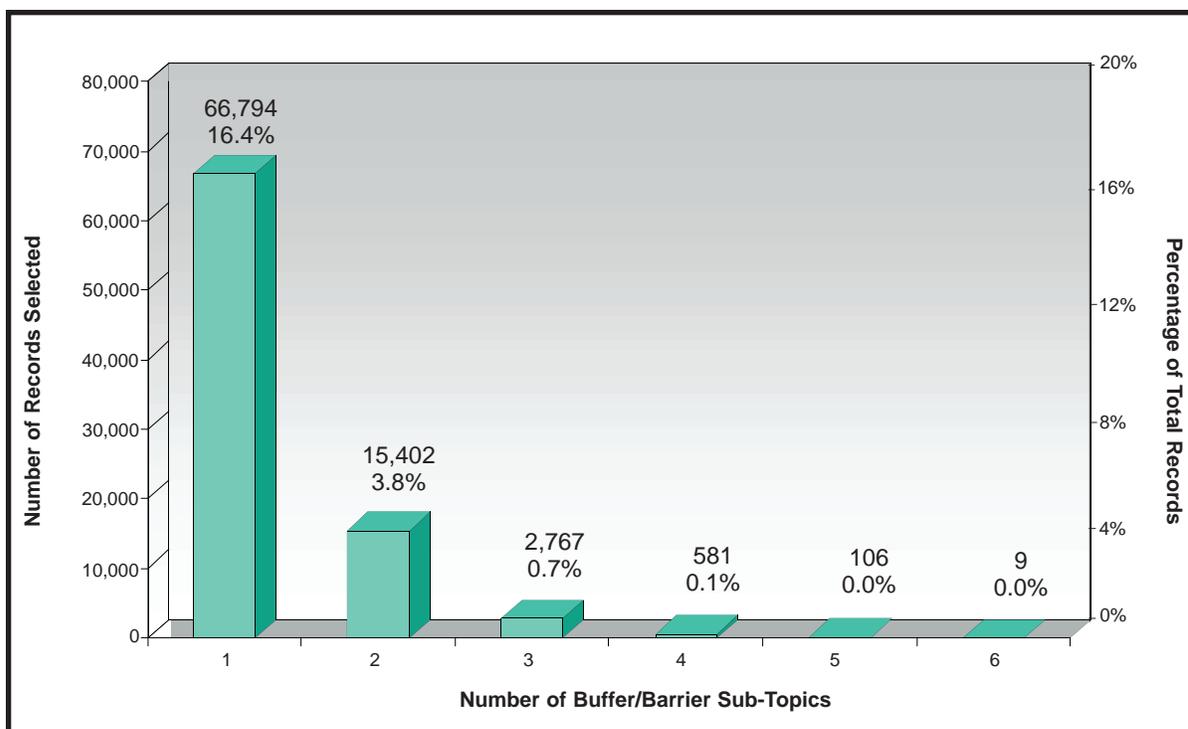
Barrier Sub-Topic	Total:	Percentage	Barrier Sub-Topic	Total:	Percentage
Electronic DB	1,238	0.30%	Environment	30,529	7.48%
Soil	10,560	2.59%	Ecology	724	0.18%
Surface Water	19,138	4.69%	Monitor	14,540	3.56%
Hydrology	6,598	1.62%	Investigation	4,377	1.07%
Geology	147	0.04%	Plans	997	0.24%
Landfill	4,141	1.01%	Map	485	0.12%
Regulatory Acts	15,094	3.70%	Weather	239	0.06%
Total No. of Records in ERD Database	408,060		Total No. of Records Selected by Barriers/Buffers Functional Area	85,659	21%

If the triage decision logic presented above is applied to Figure D-4, then:

- 79 percent of the records would be categorized as not useful for stewardship.
- 16 percent would be categorized as potentially useful.
- 5 percent would definitely be included in the archive.

In both analyses, the triage decision logic demonstrates the potential to substantially reduce the volume of data to be placed in a stewardship archive.

Figure D-4. Number of Buffer/Barrier Records Selected by Multiple Sub-Topic Queries



D.3 Pilot Study Conclusions

As a result of this pilot study, the following conclusions can be drawn:

- **The pilot study indicates the potential to greatly reduce the volume of information required for a stewardship archive.**

This pilot study indicated that a 75%-79% reduction in the volume of records required by a stewardship archive can be reasonably achieved by screening existing information archives. The reduction potential is expected to be increased with the refinement of selection criteria, the introduction of document pedigree criteria, and the enhancement of archival metadata standards.

- **The current information describing the content of the data is insufficient.**

This pilot study activity focused almost exclusively on document content criteria, under the hypothesis that content would allow for effective screening of information of value for stewardship. While this method was useful for developing meaningful database searches, it was not sufficient to screen between duplicative or similar information. For example, advising sites to archive all groundwater maps (content criteria) might still result in an unwieldy and less than useful set of information for a particular stewardship function. Far more useful in diagnostic screening would be the so-called pedigree criteria used in conjunction with the content criteria, including:

- Vintage (did it cover the period of interest?)
- Currency (was it the most recent edition of the work?)
- Stature in decision making process (had it been used for site decision making, such as a federal facility agreement?)
- Administrative pedigree (had it received the necessary reviews for release of information?).

- **The document index used in the pilot study was not sufficiently consistent nor rich enough in metadata.**

The diagnosticity of triage screening is directly correlated with the quality and consistency of the information contained in the database. Of the thirteen fields in the ERD (defined in Table D-4), many were poorly populated. Of the populated fields, the only field that proved useful in the pilot study was Title. This field was really a combination title/abbreviated abstract for each record. The quality of this field varied widely. Some records contained detailed abstracts outlining specific contents. On the other hand, many of the entries in the title field were of little or undeterminable value.

Of some value were the fields Keywords and Comments, because these often contained useful information in which to search. They also provided information regarding the record pedigree (review information, etc.). The remaining fields were of little value.

The ERD index did not include any of the pedigree information (metadata) that could potentially sharpen the resolution of stewardship triage.

- **Most records selected in the pilot study come from a small subset of the databases.**

Over 75 percent of the records selected by the functional area queries came from just three (EMF, PFC, and ROCK) of the 30 databases consolidated in the ERD database. It is possible to reduce the effort of stewardship triage by focusing on the subset of databases containing the most valuable information.

APPENDIX E: ANALYSIS OF COSTS AND BENEFITS OF STEWARDSHIP ASPECTS

The purpose of this appendix is to summarize the costs and benefits of various aspects of a stewardship data system and support many of the observations and findings presented in Chapter 4 of this report. Because there is currently no system at DOE to address stewardship data, this appendix describes the various costs of other information management systems that contain components that would be similar to the components of a DOE stewardship data system. This appendix also describes some of the benefits of a stewardship system.

E.1 Introduction

To identify the costs and benefits, the project team developed a general model of the records management process, building off of the model presented in Chapter 3. A graphical description of this model is presented in Figure E-1. A series of general steps are taken as data are generated and preserved. Similarly, a series of general steps are taken as data are accessed.

The potential problems with records management include several key issues: 1) the failure to identify information correctly for retention; 2) the loss or abandonment of a record; 3) incomplete supporting information for archiving of the record; and 4) an inability to or difficulty in accessing the record. The model we used to represent these problems is presented in Figure E-2. As shown, problems with the records management can occur at any stage (e.g., as data are generated, indexed, etc.). Also shown are the steps in data analysis. The creation, use, and management of data are dynamic processes. As data are created, they may be included in a document (e.g., an Environmental Assessment). As future analyses are conducted, that use the data contained in the document, the data may be retrieved either directly from the original source of the data or from the document in which it was published. There may be difficulties if the data must be retrieved from the document, rather than from the original source, depending on the complexity and magnitude of the data and the use to which the data is to be put.

Figure E-1. General Model of Records Management Process

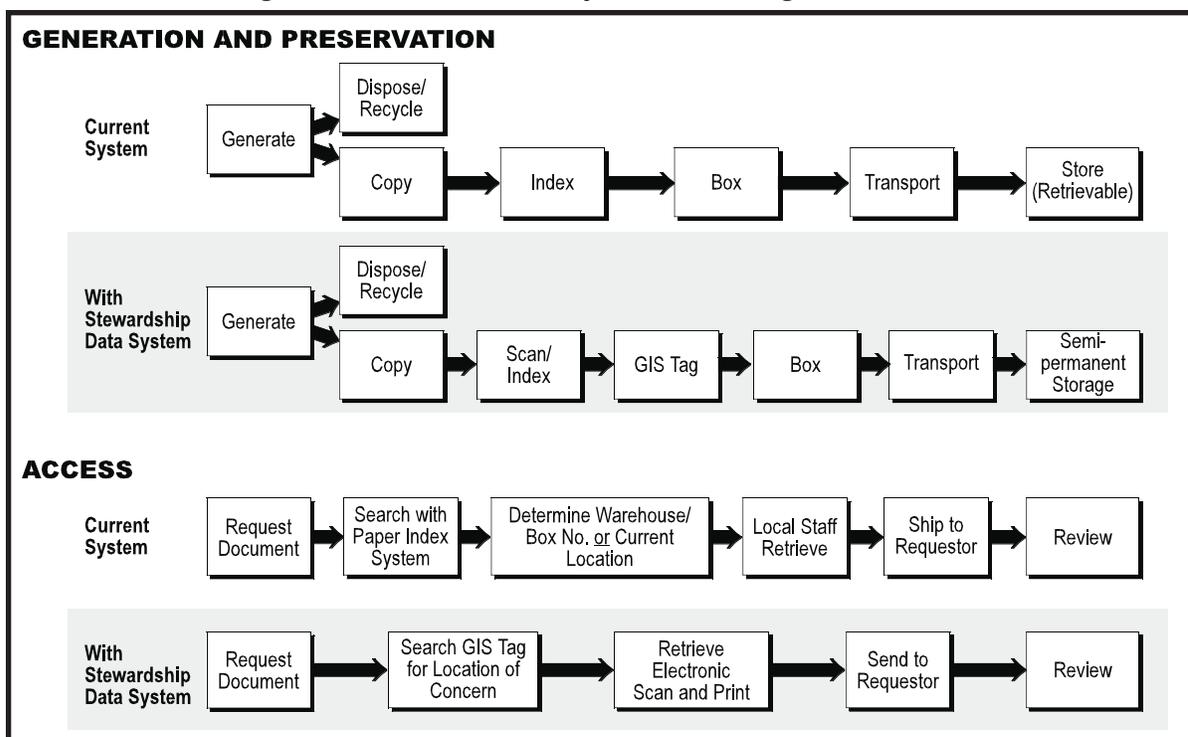
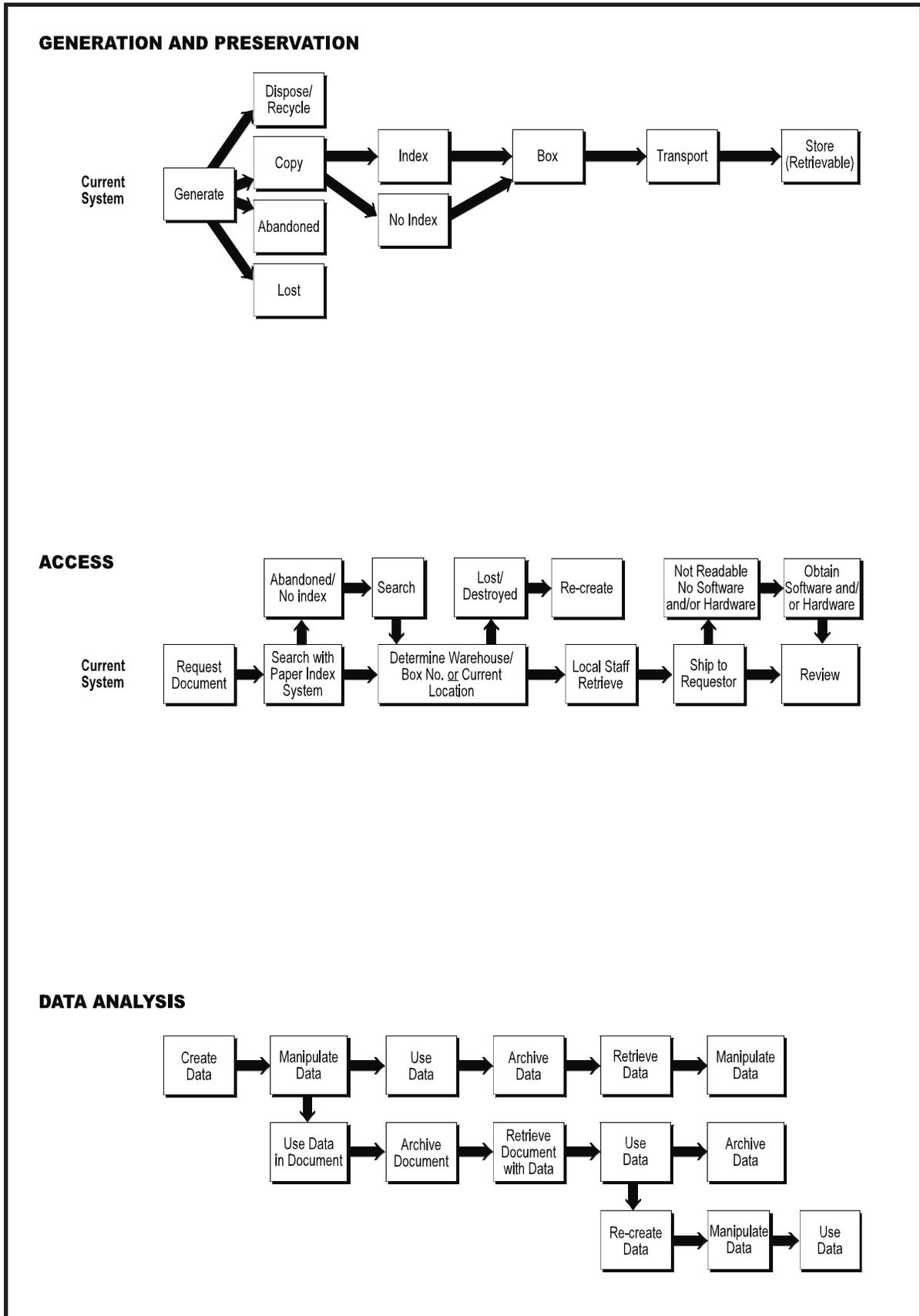


Figure E-2. General Model of Problems Associated with Records Management



E.2 Department of Energy Benchmark Costs

This section presents benchmark costs from a variety of DOE sources, including complex-wide records management systems, as well as site-specific systems. It also provides examples of costs placed upon organizations due to the lack of preservation of data.

E.2.1 OFFICE OF SCIENCE AND TECHNOLOGY INFORMATION

DOE's OSTI manages several programs to disseminate scientific and technical information:

- **Energy Files.** Provides researchers with access to energy-related scientific and technical information. This information includes electronic journals and preprints, applied and engineering standards, database and document delivery services, and regulatory, funding, and reference materials.
- **DOE Information Bridge.** Will provide DOE employees and contractors with free access to bibliographic citations and DOE reports of energy-related scientific and technical information obtained from a variety of domestic and international sources beginning in early 1998.
- **R&D Project Summaries Web Database.** Allows access to over 75 percent of DOE's Managing and Operations (M&O) research and development (R&D) holdings regarding projects in many of DOE's programs: Energy Research, Fossil Energy, Environmental Management, and Energy Efficiency and Renewable Energy.
- **Scientific and Technical Information Program.** To create, collect, and share scientific and technical information using state-of-the-art technologies. The program will coordinate the efforts of the program managers, research community, and scientific and technical information professionals across the Department.
- **Electronic Exchange Initiative.** Is a DOE-wide effort to implement standards for the electronic exchange of scientific and technical information.

The estimated costs for the various steps in retrieving, scanning, and disseminating OSTI's information are presented in Table E-1.

Table E-1. OSTI Estimated Costs

Step	Paper Copy			Electronic Documents	
	Handling	Scanning	Other	Handling	Other Costs
Description	Retrieve, File, Assign Bar Codes	300 dpi, No OCR Cleanup Maintenance	Programming Indices & Other	Coordinate and Troubleshoot Maintenance	Programming Indices & Other
Cost/Page	\$ 0.05	\$ 0.14	\$ 0.003	\$ 0.021	\$ 0.003
Cost/Document	\$ 6.54	\$ 17.64	\$ 0.38	\$ 2.69	\$ 0.38

Source: Conversation with Kelly Dunlap, U.S. DOE, OSTI, November, 1997. Assumes 126 pages per document. Estimates taken from experience in managing approximately 2,600 documents.

E.2.2. OFFICE OF HUMAN RADIATION EXPERIMENTS

The DOE Office of Human Radiation Experiments was established in March 1994 to catalog Cold War radiation experiments on human subjects. Relevant historical documents were identified from DOE's estimated 3.2 million cubic feet of records. Presenting the results of this research on the Internet was deemed key to DOE being more open and responsive to the American public.

Over 200 staff in Washington, D.C., and around the country spent most of their time in 1994 in an effort to find, declassify if necessary, evaluate, and make publicly accessible and usable DOE's records related to human experimentation with radiation. These records included records in the custody of DOE and important private institutions that explain why human-subject research was performed. The approximately 3.2 million cubic feet of DOE records survive in dozens of locations from coast to coast, many of which are cataloged poorly, if at all. The stated goal of the radiation experiment program is to leave a roadmap to the information that is available.

Three categories of information are presented on the program's web site:

- Narrative summaries of the major DOE facilities associated with human radiation experiments, presenting facts, establishing context, and discussing the most useful sources of pertinent information.
- Record series descriptions that summarize the content of records collections that contain important experiment-related documentation.
- Record series for each site follow the corresponding narrative. These contain descriptions of individual human radiation experiments.

The series descriptions were used to target more detailed searches for individual documents. These documents were copied and sent to the Coordination and Information Center (CIC) in Las Vegas, Nevada. The CIC scanned and indexed the document into Internet-ready files. As of 1994, approximately 13,000 documents, comprising more than 150,000 pages were scanned in this manner. Additional documents have been added to the collection. The documents are available at <http://www.eh.doe.gov/home.html>. The information is fully searchable by personal names, places, technical, and many other keywords. Because of the large number of organizations involved in this effort, there is no estimate available for the total cost of identifying, collecting, and preserving this information.

E.2.3. FREEDOM OF INFORMATION ACT

Enacted in 1966, the FOIA provides any person a statutory right, enforceable in court, of access to federal agency records. There are nine exemptions allowed to protect some records from disclosure and three special law enforcement record exclusions. Unless exempted from disclosure or excluded from the Act's coverage, virtually every record possessed by a federal agency must be made available to the public in one form or another.¹

The Department of Energy Headquarters and Field Offices receive thousands of FOIA requests each year. The number of requests submitted for 1994 through 1996 are presented in Table E-2. The number of requests for 1994 and beyond do not include the number of requests for documents received at the 14 DOE Reading Rooms, which are located at various DOE sites and contain anywhere from 500 documents (PETC) to 313,701 documents (Nevada Test Site). Prior to 1994, the number of FOIA requests also included the number of requests for documents at DOE Reading Rooms. The number of requests submitted in 1992 and 1993 were 8,247 and 11,391, respectively.²

¹ "Freedom of Information Act Guide & Privacy Act Overview," U.S. Department of Justice, Office of Information and Privacy, September 1996 edition.

² DOE FOIA Annual Report for 1994.

Table E-2. Total Number and Cost of DOE FOIA Requests

	1994	1995	1996
Number of FOIA Requests Received	2,949	3,136	2,837
Total Cost of Administering FOIA	\$4,909,553	\$5,124,366	\$5,515,453
Approximate Unit Cost ^a	\$1,665	\$1,634	\$1,944

^a Calculated by dividing the Number of FOIA Requests Received by the Total Cost of Administering FOIA.
Source: DOE Annual FOIA Reports for 1994, 1995, and 1996.

The total costs of administering the FOIA program are also shown in Table E-2. The costs include: Departmental personnel (salary and fringe benefits), litigation proceedings, overhead costs (training, traveling, subscriptions, printing, duplicating, and mailing), and other associated expenses for all program areas and field operation activities to administer the Freedom of Information Act. The approximate unit cost shown in is calculated by dividing the total annual cost by the total number of requests. The number of FOIA requests received and the approximate unit cost are shown in Figure E-3.

Table E-3. Average Time to Respond to FOIA Requests

	Average Age of Requests (days)
1991	1,265
1992	1,196
1993	699
1994	603
1995	472

Source: *Freedom of Information Act: Progress and Accomplishments in the DOE*, February, 1996.

DOE is required to respond to each FOIA request within 10 days; however, the request may not be completed for a much longer time period. The average age of requests submitted to DOE for 1991 through 1995 is shown in Table E-3. The average age of requests roughly correlates to the time required to respond to FOIA requests. As shown, the average age was reduced from 1,265 days in 1991 to 472 days (approximately one and one-third years) in 1995.

Not all FOIA requests are directed to the Environmental Management (EM) Program Office; requests may be made to any of the DOE Program Offices. DOE's FOIA Office does not track the number of requests for each program within DOE; however, of the 261 pending FOIA requests from January 1 through November 19, 1997, 24 of the requests (approximately 10 percent) were directed to EM.

E.2.4. LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROJECT

The LANL Environmental Restoration Project maintains the Facility for Information Management Analysis and Display (FIMAD) database containing the results of several million environmental sample analyses conducted to support cleanup at LANL. FIMAD users include the LANL Environmental Restoration Project, other programs at LANL, and state and national regulators.

FIMAD contains about 26,000 records of field data. Each record contains information regarding the samples collected, including the beginning and ending depths, the sample location, the sample identification number, sample results, and quality control data. Each record may contain data regarding multiple samples; FIMAD includes sample results for three to four million analytical points (which is approximately an average of 135 analytical points per record).³ FIMAD also contains the Screening Action Levels (SALs) for analyses of concern to the Environmental Restoration Project.

FIMAD allows users to merge the analytical data with geographical information to produce maps. As an example of a map that can be produced by FIMAD, FIMAD can plot the locations at which the concentration of chromium exceeded the SALs at a particular depth onto a map of LANL. FIMAD contains geographical information for each analytical point, as well as digital photographs of LANL, airborne images, hydrogeological data, watershed management information, and information regarding LANL infrastructure (e.g., locations of buildings and telephone lines). Users may access FIMAD on the Internet to generate maps directly or may submit a request to LANL to produce a particular map(s).

About 10 to 12 people are required to enter and edit data, maintain FIMAD, and generate the maps. About half of the personnel enter and edit data, and the other half maintain FIMAD and generate the maps. The hardware required includes 30 servers, based on a UNIX platform. The data are preserved in an Oracle database. Data for about 500,000 analytical points are entered into the system every year. Using the approximation of 135 analytical points per record, the 500,000 analytical points roughly translates into 3,700 records. Data are submitted electronically and in hard copy reports, which must be reconciled if there are discrepancies. About 3,000 maps are generated by FIMAD every year. When FIMAD was first installed, the annual cost was approximately \$2 to 4 million. Currently, the annual cost of maintaining FIMAD is approximately \$1.8 to 2.1 million.⁴

To calculate the approximate cost of entering and editing data, the project team divided the annual cost of maintaining FIMAD (about \$2 million) by two (as discussed above, roughly one-half of the staff supports the entering and editing of data). Therefore, it appears to cost about \$1 million per year to enter and edit approximately 3,700 records of data and about \$1 million per year to maintain the GIS data and produce 3,000 maps displaying a variety of technical data.

E.2.5 OAK RIDGE ENVIRONMENTAL RESTORATION PROGRAM

Pursuant to the DOE “Roadmap to the Year 2000” plan, the Environmental Restoration (ER) program at Oak Ridge has consolidated documents from 10 records centers at the K-25 plant into two records repositories. These records are searchable in an electronic index. The ten separate centers were created on an *ad hoc* basis throughout decades of plant operation (e.g., engineering would store its plans and drawings in one area, the budgetary staff would store financial records in another, etc.). DOE’s goal is to turn over K-25 to private entities by the year 2010. This program reflects the fact that future stewards of the K-25 plant do not want to be burdened by record management activities. The cost for records management has been difficult to identify because there is not a specific line-item for records management; funding for records management is included in the administrative budget. DOE staff are currently working on identifying those records that should be turned over the future stewards of the site, and who should have access to the records.

Because records have a limited retention time, and NARA has not set standards for electronic file archiving, Oak Ridge has not engaged in scanning legacy documents. Much of the legacy information is stored on microfilm. Both legacy records, and records created on a going-forward basis are managed pursuant to DOE’s records schedules.

³ Conversation with Martha Menzel, FIMAD Tabular Data Manager, LANL, November, 1995.

⁴ Conversation with Steve Bolivar, FIMAD Project Leader, LANL, November, 1997.

Table E-4 illustrates the scope of ER's document management activities at Oak Ridge. Active record volume has grown three-fold over the past five years. This is in part due to the recently lifted moratorium on records disposal during that time, initiated by DOE in response to inquiries regarding human radiation experiments. Legacy records are stored in boxes. These boxes are bar coded, and entered into a database, searchable on a limited basis by key word. The procedures used by staff to index these records involved randomly checking three places in each box to ascertain what types of records were available. This procedure did not fully characterize the legacy documents; however, it was deemed adequate by site staff given the limited requests for legacy ER data.

Table E-4. Environmental Restoration Records Management at Oak Ridge

Record Type	Volume of Records (cubic feet)
Active Records (1993)	4,000
Active Records (1997)	12,000
Legacy Records (1997)	14,000
Source: Conversation with Debbie Matteo, Oak Ridge, December 1997.	

A company known as Delphi Systems (Boston, MA) prepared a study of several document management systems for Oak Ridge ER. Based on this study, ER decided on a proprietary document management system known as Documentum. A preliminary analysis of benefits associated with electronic records management was initiated prior to system implementation, which identified the following benefits:

- **Enhanced record compliance.** Automatic enforcement of records retention guidelines can be achieved through record deletion or media migration throughout the record's life-cycle. The system allows compliance quality to be proactively monitored and documented.
- **Increased document control.** Audit trails and sophisticated system security features allow the Records Custodians to monitor the usage and contents of documents. There is no disputing whether a version of a document is the most current.
- **Enhanced access to information.** The structured indexing and query abilities of the system allow for superior information retrieval. The system will allow users to find documents more quickly than if they had to consult an information specialist.
- **Decreased cost.** The new system is expected to decrease overall records management costs.
- **Increased reliability.** Once a document is filed or indexed electronically, it is much less likely to become misfiled or lost.
- **Reuse of information.** Many users at Oak Ridge have indicated that they retrieve documents most often to reuse information. If key documents are available on-line, this effort could be avoided.

Active records and data have been managed on an ongoing basis for three years through the Documentum system at Oak Ridge ER. The Documentation software package is a completely integrated document management and workflow system, centered around a distributed document database server. Documentum is an object-oriented system, meaning that almost any type of document/data can be stored and retrieved in its native format. Document viewing may occur via third party viewers (e.g., over the Internet). Editing capabilities are provided on a Documentum workstation by launching the native application.

Documentum has the capability to store full documents, or to store only a filing profile. The filing profiles are fully-customizable. CMC Consulting (Atlanta, GA) assisted the Savannah River Site in making Documentum compatible with NARA records management regulations. The customized Documentum system used by Savannah River was adopted by Oak Ridge ER.

Table E-5. Cost Estimate of Environmental Restoration Document Management System at Oak Ridge

Task	Approximately Annual Cost
Scoping	\$300,000
Initial Project Installation	\$3,000,000
Yearly Records Management Cost	\$1,500,000
Source: Conversation with Debbie Matteo, Oak Ridge, December, 1997.	

The Documentum system, and associated improvements in the record management systems at Oak Ridge ER have allowed staff to manage the increased volume of active records with fewer staff: while active records have increased five-fold (see above), full time records management staff have has been reduced from 40 to 25.

E.2.6 FOCUS SITE

This section includes several cost benchmarks from the focus site, including the estimated direct and indirect costs for records management and document control in 1997. This section also includes several examples of the costs associated with re-creating data.

E.2.6.1 Direct and Indirect Records Management Costs

At the focus site, costs for records management are both direct and indirect. Direct costs mean any cost taken on by the project using the support, while indirect costs mean any cost taken on as overhead. Projects contain tasks (line items) that represent the types of things being done on each project. Using the Rocky Flats Closure Project Life-Cycle Baseline, tasks were identified as records management tasks if the work was, by definition, records management. Records management at the focus site includes: records storage/retrieval, litigation support, library services, imaging services, record oversight, document control, and correspondence control. In all, 179 tasks were related to records management. Records management at the focus site comprise one percent of the total budget. Direct costs account for one-fifth of the total records management cost. Table E-6 details the costs of records management at the focus site.

Table E-6. Document Management Costs at the Focus Site

	Total Cost (Thousands)	Average Yearly % of Total Cost
<i>Direct Document Management</i>	\$ 11,974	0.20%
<i>Indirect Document Management</i>	\$ 45,565	0.84%
Total Document Management	\$ 57,539	1.03%
Total Other	\$ 6,384,845	98.99%
Costs for document management include: (1) records management costs; (2) discovery and other legal costs; and (3) document control costs.		
Source: Rocky Flats Closure Project Life-Cycle Baseline, Rev1		

E.2.6.2 Dose Reconstruction

Phase II of a dose reconstruction for the focus site is currently taking place. During Phase I, ChemRisk performed calculations based on unclassified records at the site. This involved searching through records onsite, and offsite at the Denver NARA records repository. The initial study was prepared over the course of two to three years. The Phase I team encountered such a large volume of non-indexed records that they were forced to spot-check every box for useful information. Almost the entire cost of performing the Phase I study was spent on searching for records.

Phase II of the reconstruction involved going through classified records in the 881 Vault. This process took two professionals approximately one month to complete. These two staff searched through approximately 2,000 boxes of material (~ 2,400 cubic feet). The staff used “records receipts,” which were not always complete to aid in their search of each box. Data gaps existed that forced the study team to extrapolate their results through months of missing records. They were aided somewhat by the Environmental Master File, which pointed them to certain useful boxes, and contained a limited number of scanned records.

A comprehensive automated records management system may have saved up to 75 percent of the labor hours spent on Phase II of the reconstruction study, reducing labor costs and allowing more time to be available for the study.⁵

E.2.6.3 Search for Reactive Materials and Hazards

As a result of the discovery of reactive materials in several buildings at the focus site that were not previously known to be there, such as actuators and hydrides, the focus site is conducting a search to identify the use and management of reactive materials and materials of other hazardous potential at the focus site. Several methods are being used to conduct the search: taking a chemical and nuclear materials inventory, recording process knowledge, searching cargo containers and storage lockers, and surveying all site personnel and retirees.⁶ The total cost of re-generating records to identify the reactive materials and hazards, by conducting the search described above, is currently unknown, but is likely very high.

E.2.6.4 Trench 1 Cleanup

The focus site is planning to cleanup “Trench 1;” however, the records for the waste buried in Trench 1 (beginning as early as the 1950s) are minimal. The only records available are sample data records, indicating that 90 to 125 barrels of “special” or miscellaneous” wastes are buried in Trench 1. As a result, the search for information has been focused on interviews with past site employees. As of November 20, 1997, the costs for searching the records and conducting the interviews was approximately \$56,000 (two persons working full-time for three months). No additional information to assist the planning of the cleanup has been gathered. As a result, the cleanup will be conducted assuming the highest risk scenario, which will result in higher remediation costs. Personnel will use the highest level of personal protective equipment and additional sampling will be conducted significantly more than typically required.⁷

⁵ Conversation with Dr. Kathleen Meyer, December, 1997.

⁶ “Search for Reactive Materials and Hazards - RGC-223-97,” Memorandum from Robert Card and Jerry Harden to all Rocky Flats personnel and retirees, November 12, 1997.

⁷ Fax from Laura Tyler, Rocky Mountain Remediation Services, November, 1997.

E.2.6.5 Facility Characterization

At the focus site, a facility characterization and inventory was performed during 1993, 1994, and 1995 that identified the nature and extent of contamination within the major facilities at the site. With a change over of the site contractor and several rounds of personnel reductions, personnel knowledgeable of the data and control of the data itself were lost. During initial characterization efforts of a major plutonium facility at the site, the characterization data were recovered from a stack of computers that were pending dispositioning. Recovery of the data resulted in a cost avoidance of nearly \$1.5 million over the next two to three years for re-creation of the characterization data.

E.2.6.6 Document Production to Support Litigation

On June 6, 1989, the Federal Bureau of Investigations (FBI) began an investigation of the focus site. Unannounced, FBI investigators targeted specific focus site offices, where they knew particular documents to be located, and began taking documents off site. On the first day of the investigation there was no record of which documents the FBI had seized and removed from the site. By the second day, the focus site records management office developed a process for cataloging and copying the documents prior to removal by the FBI. When requested, the FBI returned the documents seized on the first day for cataloging and photocopying by the focus site records management office. However, it is unknown whether all of the documents seized were returned; it is possible that some documents, potentially including vital records and/or original records (i.e., focus site does not have a copy), may not have been returned.

The litigation support office at the focus site is currently facing the challenging task of producing documents seized by the FBI during the investigation to support on-going litigation (e.g., *Cook* and *Stone* cases described below). When particular requests are submitted for documents involved in the FBI investigation, the focus site must determine: (1) whether the document existed and (2) where the original and/or copy of the document is located. When the focus site is unable to find a document, it is often difficult to know whether the document ever existed or whether it was among those seized on the first day of the investigation and was not returned to the focus site for cataloging and copying.

The litigation support office must produce many other documents to support on-going litigation, in addition to those related to the FBI investigation. During the litigation process, the production of documents can consume up to 100 percent of the time of the personnel in the litigation support office, particularly during the trial. At other times, the production of documents may require as little as five percent of their time. The percent of time required depends upon at what stage of the litigation process the case is in, the number of documents being requested, and the ease of identifying, searching for, and obtaining the documents.

Most litigation involves activities and decisions made in the past; many of the documents required are historical and may not currently be in use (e.g., they may have been generated by the focus site contractor that is no longer at the site). Thus, the largest problem facing the litigation support office is producing abandoned records.

The ability of the litigation support office to produce a document is partially dependent on the thoroughness of the generator of the document. If the generator of the document placed the document into the focus site records management control process, the litigation support office may be able to identify whether the document still exists. Depending upon the length of time between the generation of the document and current litigation activities, many of the documents may already have been destroyed according to the DOE records retention schedules. If the document has not been

destroyed, the litigation support office may then be able to identify where it is located. If the generator of the document did not place the document into the focus site records management control process, the effort to identify whether the document exists and where it is located becomes more difficult. For instance, the person who generated the document may no longer hold the same position s/he held when generating the document. There are several scenarios for what s/he did with the document, including the following:

1. Kept the document in his/her possession.
2. Gave the document to the person who was to fill the position next.
3. Gave the document to another person who did not hold the position next but who may be in a similar position.
4. Lost and/or destroyed the document.

The consequence of failing to produce a document is that the focus site office is not able to fully support the litigant in the case.

The focus site litigation support office is currently supporting two cases that are requiring a considerable amount of time and effort to conduct the search for documents: *Cook* case and *Stone* case. The *Cook* case (*Marilyn Cook, et al. v. Rockwell International and Dow Chemical Company*) is a class action suit in which the plaintiffs are concerned about their families health and safety and their property values due to possible contamination from offsite releases from the focus site. The *Stone* case (*United States of America, ex rel. James S. Stone v. Rockwell International*) is a false claims act in which the plaintiff seeks to recover damages and civil penalties for the wrongful conduct and acts of Rockwell. The total cost for document production for these cases is difficult to assess. Since their filings in 1989, the litigation support staff has spent several years' worth of time in document production, sometime requiring the full attention of all staff (up to six people), as well as personnel from across the site. The total number of documents produced to date have included over one million pages for each case.⁸

E.2.7 WASTE ISOLATION PILOT PLANT

The cost for managing records at the Waste Isolation Pilot Plant (WIPP) is approximately two percent of the total budget (about \$4 of \$182 million). This cost includes equipment (e.g., scanning technologies), supplies, labor, and litigation support. Records are maintained in an active records system, an inactive records system, and in multiple inventories in the field. WIPP maintains an electronic index of all records, including a description of the records and their location. Some records are also maintained and can be retrieved electronically.⁹

E.2.8 YUCCA MOUNTAIN SITE

The Yucca Mountain site is close to completing the development of a records management system that achieves traceability and transparency of archived records. The system developed and maintained by TRW was put in place to fulfill the requirements set forth in 10 CFR Subpart J, which states the needs for the system in order to obtain a license to dispose of high-level waste (HLW) at Yucca Mountain. This proposed geologic repository is still in the early stages of development and much like the Waste Isolation Pilot Plant (WIPP), it will face close scrutiny by agencies such as EPA before any waste is approved for disposal there. The records system was designed to allow storage and retrieval of data needed to support the viability assessment application. For fiscal year 1998, two percent (\$6 million) of the operational budget for Yucca Mountain is allocated towards its records management system. Nearly 720,000 documents that were previously stored on microfilm must be converted to an image file. Yucca Mountain estimates that 50 percent of the legacy data will be imaged by the end of fiscal year 1998. Currently two-thirds (\$4 million) of the records management budget

⁸ Conversation with Andrea Wilson (Source One Management, Inc.) of the focus site litigation support office.

⁹ Conversation with Barbara Compton of Day and Zimmerman, February 25, 1998.

is allocated to the reprocessing of legacy data currently on microfilm while one-third (\$2 million) of the budget covers processing of records as they are generated.¹⁰

Requirements of the Yucca Mountain records management system are based on licensing requirements. Although the types of records kept will be similar to stewardship data, a requirements analysis was not performed assessing stewardship needs.

The records management system implemented at Yucca Mountain has created new understandings of the vital steps involved in developing an efficient records archive: detailed analysis of current systems of records management to facilitate conversion to electronic data management system (version control, routing, access control); early determinations on necessary retrieval types; design of indexes which allow for this type of retrieval; establishment of controlled vocabulary for indexing purposes; and functionality to allow the generator (subject matter expert) of documents to add categories for indexing purposes.

E.3 Other Federal Agencies Benchmark Costs

This section presents benchmark costs from other federal agencies, including the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA) and the Nuclear Regulatory Commission (NRC).

E.3.1 ENVIRONMENTAL PROTECTION AGENCY

EPA's Office of Information Resources Management (OIRM), along with the EPA Geographic Information Systems (GIS) Work Group, developed the EPA Spatial Data Library System (ESDLS). A repository for the Agency's new and legacy geospatial data holdings, users of ESDLS can access these data holdings through various GIS applications.

Maps on Demand (MOD)(<http://www.epa.gov/enviro/html/mod/index.html>) is part of the ESDLS (http://www.epa.gov/enviro/html/esdls/esdls_over.html). This service generates maps that display environmental information for the entire United States. MOD accesses data available through the EPA Envirofacts Warehouse. Maps are requested online and an email is sent when it is ready. The email includes information on where the maps are posted for viewing or downloading.

The SiteInfo application of ESDLS creates maps and reports, such as EPA-regulated facility, demographic, and safe drinking water information for areas surrounding any given location in the United States (lower 48 states). The query allows the user to access maps of facility locations and view the surrounding demographics, Geographic Retrieval and Analysis System (GIRAS) land use and land-cover, as well as physical and cultural features.

The Zip Info application of ESDLS maps and reports provide information about EPA-regulated facilities, demographics, and safe drinking water information for areas within any given ZIP Code in the lower 48 United States. Similar map searches can be done by county and watershed.

The Facility Density Mapper application allows users to map and assess the concentration of EPA-regulated facilities in a given area. Facilities are identified by a valid Facility Indexing System (FINDS) identification number assigned by EPA. These maps can include demographic data, such as population density, ethnic population distribution, and socioeconomic information. Additional, information about infrastructure such as roads, bridges, and buildings can be included. A variety of facilities that are regulated by EPA can also be mapped using data bases that have been designed to hold information about those facilities. Examples of EPA regulations and the data bases that are associated with them include the NPDES Water Discharge requirements (the PCS data bases),

¹⁰ Communication with David Warriner, DOE Records Manager, Yucca Mountain Site Characterization Office.

Superfund (CERCLIS), RCRA (RCRIS), Toxic Release Inventory (TRI), Air Monitoring requirements (AIR/AFS), and the Safe Drinking Water Act (SDWIS).

The cost of producing the ESDLS was several million dollars (the exact amount was not obtainable). The costs included converting maps to electronic files, purchasing hardware and software, maintaining up-to-date data, and labor hours. EPA is currently developing an interactive GIS database to allow access to these data.

E.3.2 NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION

The NOAA Environmental Information Services provides information on data sets available from NOAA data centers and other NOAA data providers. The data sets include data regarding the oceans, atmosphere, nautical charting, weather, coastal zones, and other related subjects. The NOAA data centers include the NOAA National Climatic Data Center, National Geophysical Data Center, National Oceanographic Data Center, and the National Snow and Ice Data Center. Other NOAA data providers include the NOAA National Marine Fisheries Service and the NOAA Libraries.

NOAA's Environmental Services Data Directory on the Internet (<http://www.esdim.noaa.gov>) allows Internet users to search the databases available from the NOAA data centers and other NOAA data providers described above. The Data Directory allows the user to identify all data sets, including publications and reports, related to the subject(s) of interest and identify where the data are available (either on-line or its physical location). The Data Directory also provides other relevant information regarding the data sets in a metadata format. The metadata format is based upon the standards set by the Federal Geographic Data Committee (FGDC). The information available in a metadata format include the following elements:

- **Temporal and Spatial Information.** Includes time period of content, keywords identifying the geographic location of data, and the latitude and longitude of the data.
- **Supplemental Information.** Includes equipment used to collect data (e.g., aircraft), the type of sensor used to collect the data, the originating NOAA data center, the storage medium of the data, and references.
- **Other Keywords.** Includes a listing of all keywords related to the data set.
- **Point of Contact.** Includes name, address, and other contact information for the organization collecting the data.
- **Distribution Information.** Includes name, address, and other contact information for the organization distributing the data.
- **Ordering Information.** Includes information on how to order the data, either online or offline.
- **Metadata Information.** Includes reference information regarding the organization providing the metadata, the date the information was submitted, and the name of the metadata standard.

The Data Directory was started around 1990 and contains descriptions of about 3,000 data sets and 7,000 publications and reports. The cost of maintaining the Data Directory is about \$200,000 to \$400,000 per year. This cost includes three to four personnel to maintain the Internet site and enter, edit, and maintain the metadata descriptions. The time required to enter the metadata regarding a particular data set varies, depending upon the experience of the staff and the amount of data readily available to complete the description. NOAA estimates that the time required can be as little as one hour, if the staff is familiar with the metadata standard and information regarding the data set is readily accessible, and as great as two days (sixteen hours), if the staff is unfamiliar with the metadata standard and information regarding the data set is not readily accessible (e.g., the data set is archived and is not currently active).¹¹

Based on the information provided by NOAA, the estimated cost of developing a metadata description for a particular data set is presented in Table E-7. The estimated cost of maintaining the metadata database for NOAA is presented in Table E-8.

Table E-7. Cost Estimate to Develop Metadata Description

	Lower End of Range	Higher End of Range
Number of Hours Per Description ^a	1	16
Hourly Rate ^b	\$16	\$16
Cost Per Description	\$16	\$256
^a Conversation with Gerald Barton, NOAA, Environmental Information Services, November, 1997. ^b Estimated hourly rate.		

Table E-8. Cost Estimate to Maintain Metadata Database

	Lower End of Range	Higher End of Range
Annual Cost	\$200,000	\$400,000
Number of Data Sets	10,000	10,000
Annual Cost Per Data Set ^a	\$20	\$40
^a The Annual Cost Per Data Set is calculated by dividing the Annual Cost by the Number of Data Sets. Source: Conversation with Gerald Barton, NOAA, Environmental Information Services, November, 1997.		

E.3.3 NUCLEAR REGULATORY COMMISSION

The NRC deals with large volumes of records during everyday activities. These documents support the Agency’s policies, decisions and bases for regulatory actions. NRC has recently implemented the Agency Document Access and Management System (ADAMS). Prior to implementing this system, the Agency used 75 local and one central indexing system. The centralized system, NUDOCS, was originally developed in 1978. NUDOCS was similar to an electronic library filing system. It allowed author and title searches of NRC documents. If document retrieval was necessary, staff would have to either search in a very limited hard copy archive, or request that a microfiche version be copied in the Agency’s File Center.

¹¹ Conversation with Gerald Barton, NOAA, Environmental Information Services, November, 1997.

The following problems were reported by NRC staff due to this system:

- Staff did not always submit copies of documents to the File Center. NRC is therefore not certain that all official records were maintained in the archive.
- Professional staff wasted time. A senior license reviewer estimated spending 25-40 percent of her time using the old document retrieval system.
- The local systems unnecessarily used NRC resources. The same function could have been served using the NUDOCS system.
- Critical documents are sometimes not available in any form.

The following document control options were considered by the NRC: status quo, re-platforming NUDOCS, installing a document management system such as ADAMS, which was not compatible with NARA requirements, or installing a NARA-sanctioned electronic system. A cost-benefit study performed by the Agency determined that a NARA-approved electronic management system would be the most effective solution to the NRC's document control needs.

The NUDOCS system is no longer supported by the original vendor, and was not prepared to deal with the year 2000 problem. Attempting to fix the legacy system could potentially cost more than the installation of a new system. Annual costs prior to the ADAMS implementation were approximately \$7 million, and included automated purchase and maintenance of systems, contractor support, supplies (e.g., for duplicating paper), and rented space (and the imputed value of government building space) associated with document usage, distribution, and storage. This cost did not include NRC staff time, which was estimated at 350 Full Time Equivalents (FTEs) each year.

Document collaboration capability was also desired by NRC. In the past, staff prepared documents and emailed them or distributed hard copies to others for review or additions. Document progress was monitored by email or phone. The ability to keep one centralized current version of a document is an important feature of the ADAMS system. It is designed to be a cradle-to-grave management system for NRC documents. Paper duplication efforts are substantially reduced by the ADAMS system. Document "reuse" or "mining" is now available through cutting and pasting of online text. The ADAMS system has been designed to comply with NARA requirements as the NRC's official electronic record keeping system.

The following benefits of using ADAMS are expected by NRC:

- The Offices of Nuclear Material Safety and Safeguards (NMSS), and Nuclear Reactor Regulation (NRR) have efforts underway to streamline their primary regulatory activities (materials licensing, and reactor licensing and inspection, respectively). Without ADAMS, the NMSS and NRR proposed solutions, (i.e., new processes and automated systems), will require that these offices develop their own independent versions of an ADAMS-like system.
- NARA's acceptance of the system will help NRC comply with the Paperwork Reduction Act and the Electronic Freedom of Information Act. ADAMS will make NRC documents more readily available to the public, and will help staff respond to public, licensee, and Congressional requests.
- NRC estimates that ADAMS could free up approximately 540 Full Time Equivalents for more productive activities in its first five years of operation.
- ADAMS provides the infrastructure to realize significant improvements in staff productivity during document preparation. ADAMS provides the infrastructure to meet new requirements, and the flexibility to cope with future changes in mission-required activities. Most importantly, ADAMS will provide agency management with the assurance that in the future, NRC's document and record collections will be more complete and accurate.

E.4 Commercial Vendors Benchmark Costs

This section presents benchmark costs from commercial vendors in the records management industry. This section also contains examples of savings realized due to the application of particular records management practices.

E.4.1 OFFSITE STORAGE

Industry incurs costs to archive, store, and retrieve documents from long-term storage. Larger volumes of material may be stored at a substantial discount (i.e., a large company storing 50,000 boxes and adding 500 per year pays a much lower per box rate than a small firm sending 20 boxes per year offsite). Pierce Leahy is a large national storage company. The costs for document storage at a Pierce Leahy are presented in Table E-9.

Table E-9. Industry Offsite Storage Costs

Item	Fee
Process fee for initial storage (\$/box)	\$ 0.95
Storage fee, (\$/box/year)	\$ 1.80
Retrieval search fee (\$/box/occurrence)	\$ 1.50
Retrieval loading fee (\$/box/occurrence)	\$ 1.50
Transportation charge	\$ 9.75
Source: Conversation with Pierce Leahy, Sales Department, November, 1997.	

Costs are customized for each large client. In this case, the client has approximately 92,000 cubic feet of records under management. The per year fee for each box is based on a rate of \$0.12/cubic foot/month. For very large clients, this rate may be as low as \$0.10/cubic foot/month.

E.4.2 MANAGEMENT OF ELECTRONIC DOCUMENTS

FileNET Corporation provides client/server software to organize, manage, store, and access electronic documents. The electronic documents include text, scanned images, faxes, spreadsheets, graphics, CAD drawings, and video. FileNET offers a variety of software packages, depending upon the number of documents and the functionality desired by the customer. The product brands they sell include FileNet, Watermark, Filenet EDM, Greenbar Computer Output to Laser Disk (COLD).¹²

The FileNET Internet site provides a demonstration software package to estimate the savings of using the FileNET software. Though it appears to be software designed for active management of files, the projected savings indicate the benefits of electronic management of files. The projected savings of applying an integrated solution to a company's electronic documents include the following:

1. **Management Savings.** System management costs are reduced by 20 percent; support supervision costs are reduced by 50 percent, and support staff costs are reduced by 25 percent.
2. **Operational Savings.** Filing costs are reduced by 90 percent, retrieval costs are reduced by 75 percent, and duplication costs reduced by 50 percent.

¹² Based on FileNET Internet Site. (<http://www.filenet.com/prods/index.html>).

E.4.3 ENVIRONMENTAL SITE ASSESSMENTS

E Data Resources, Inc. (EDR) develops the EDR Radius Map Report for sites to meet the government records search requirements of the ASTM Standard Practice for Environmental Site Assessments.

Included in the EDR Radius Map Report is the site name, Site EPA ID number, surficial aquifer flow direction, locations of oil and gas pipelines/electrical lines and measured depth to water. For a given radius around the site, EDR conducts a search of available government environmental information, along with site maps and geologic information. Available “reasonably ascertainable” government records are used as a source for maps and detailed drawings of a requested site. A list and description of the databases the EDR searches is provided below. The cost of an EDR-Radius Map with Geocheck is \$195. This cost data is based on information presented in the EDR Web page (<http://www.edrnet.com/>). For larger sites, such as the focus site (approximately 6,100 acres), the EDR Radius map is approximately \$535. Special contracts can be set up for EDR’s services, so prices may vary. The following is a list of databases that EDR searches:

- **AST.** Lists Registered Aboveground Storage Tanks.
- **LAST.** Provides Leaking Aboveground Storage Tank Incident Reports.
- **AFS.** AIRS Facility Subsystem. Contains data for nearly 150,000 air pollution point sources monitored by the U.S. EPA and/or state and local air regulatory agencies.
- **CERCLIS.** CERCLIS contains data on potentially hazardous waste sites that have been reported to the U.S. EPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites that are either proposed to be or are the National Priorities List (NPL) and sites, which are in the screening and assessment phase for possible inclusion on the NPL.
- **CORRACTS.** CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.
- **ERNS.** Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.
- **FINDS.** Facility Index System. FINDS contains both facility information and ‘pointers’ to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).
- **FTTS.** Tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years.
- **HMIRS.** Hazardous Materials Incident Report System contains hazardous material spill incidents reported to DOT.

- **SHWS.** State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.
- **LUST.** Leaking Underground Storage Tank Incident Reports records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.
- **MLTS.** Maintained by the NRC and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements.
- **NPL.** National Priorities List (Superfund) is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries.
- **NPL LIENS.** Contains information on Federal Superfund liens. Under the authority granted the US EPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the US EPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability.
- **PADS.** PCB Activity Database identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify the EPA of such activities.
- **RAATS.** RCRA Administration Action Tracking System contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by US EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.
- **RCRIS.** Resource Conservation and Recovery Act Information System includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).
- **SSTS.** Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1 each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.
- **SWF/LF.** Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.
- **TRIS.** Toxic Release Inventory System identifies facilities that release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

- **TSCA.** Toxic Substances Control Act (TSCA) identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance inventory list. It includes data on the production volume of these substances by plant site. US EPA has no current plans to update and/or re-issue this database.
- **UST.** Contains information on registered Underground Storage Tanks. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

In addition to EDR Radius Map Reports, EDR also provides other services to support environmental site assessments. For example, EDR can provide a copy of an aerial photograph of a site for each decade (if available). For sites within Virginia, the cost is \$95. For sites outside of Virginia, there is an initial search file (\$49) to identify those photographs that are available.

E.5 Other Benchmark Costs

The OSU Archives and Records Management Program published annual estimates of maintaining a five-drawer filing cabinet in an office. The estimates are summarized in Table E-10. The total annual cost of maintaining an active five-drawer filing cabinet is approximately \$2,100. Assuming there are 10,000 pages in a filing cabinet, the cost of maintaining each page is approximately \$0.21.

Table E-10. Cost Estimate of Maintaining Five-Drawer Filing Cabinet

Item	Approximately Annual Cost
Salary & Benefits	\$1,912.50
Floor Space	\$104.00
Supplies (Active File Maintenance)	\$55.00
5-Drawer Filing Cabinet	\$27.50
Total	\$2,099.00
Source: OSU Archives and Records Management Program Internet Site (http://www.orst.edu/Dept/archives/ARMH/rma42cc.html)	