
Long-term Stewardship Plan Guidance



Working Draft – April 17, 2001
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Note to Reviewers

This document is a first draft of a guidance designed to provide assistance to Department of Energy (DOE) field personnel and their contractors in developing site-specific long-term stewardship (LTS) plans. There are three parts to this guidance:

- Part I introduces an overview of long-term stewardship and key definitions;
- Part II identifies key questions and topics that should be addressed in LTS plans along with model tables of contents for site-specific plans.
- Part III, a website (in development), is designed to provide resources and examples for developing LTS plans.

This guidance incorporates materials such as information and components of a plan recommended by many of the recent DOE and stakeholder reports on long-term stewardship, including recommendations made by the Environmental Management Advisory Board, and inputs received from field offices through recent discussions and reviews.

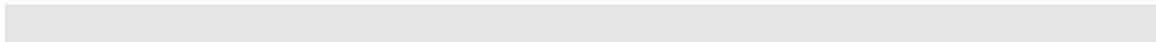
We hope that this document provides a basis for discussion and ideas. We fully expect that, based on those discussions and results of focus group reviews, and comments received, this document may undergo significant revisions. In addition, we anticipate that many of you will want to participate in development of portions of this guidance, or will have additional references and/or examples that you believe will be of benefit to others when developing LTS plans. Ultimately, we envision this guidance being a living document that continually changes with input from ongoing efforts and at any time reflects the best available resources and ideas to facilitate those still developing plans. If you have questions or comments on this document, please contact Rich Dailey (Office of Environment, Safety and Health) at (202) 586-7117 or Jonathan Kang (Office of Environmental Management) at (301) 903-7178. We welcome your comments, and look forward to working with you in the future.

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Part I – Overview of Long-Term Stewardship

1.0 Introduction

The U.S. Department of Energy’s (DOE) long-term stewardship program is in its early stages of development. Considerable work remains, both at Headquarters and in the Field, to develop a long-term stewardship program that will, with confidence, ensure protection of human health and the environment from the hazards that remain at DOE sites. With some sites nearing completion of cleanup activities and other sites with portions completed or nearing completion, it is clear that sites need to begin now to identify the specific roles and responsibilities, activities, costs and schedules for long-term stewardship.

The need for more detailed long-term stewardship (LTS) planning has been expressed both external to and internal to DOE. DOE’s regulators, the public, local and state governments, and tribes have expressed concerns that the levels of required protectiveness may not be maintained without a clearly defined strategy for managing the challenges ahead. DOE’s senior decision makers have issued memoranda requiring LTS planning at all DOE sites for a variety of purposes, including but not limited to, facilitating development of the LTS operational baselines.¹ These baselines will describe the scope of LTS program management, baseline technical activities, projected schedule, and expected costs. These baselines are expected to be updated periodically with information collected as part of ongoing LTS responsibilities.

For these reasons, the Office of Long-term Stewardship (within the Office of Environmental Management [EM]), working with the Office of Environment, Safety and Health (EH) and DOE Field Offices, has developed this guidance to Field offices for developing site-specific LTS plans. The primary objective of this guidance is to assist in developing well-thought-out LTS plans that include clearly defined scope, schedules, and costs to conduct long-term stewardship activities. In order to accomplish this, it is important to:

- Identify key decisions and questions that will need to be addressed during LTS plan development and, ultimately, during LTS implementation;
- Provide a flexible framework under which some of these decisions can be made;
- Identify and provide consistent definitions for key elements of an LTS implementation plan, recognizing that each plan will be unique to the site and take into account site-specific conditions, local stakeholder, government, and tribal concerns, and requirements resulting from the decisions made as to the ultimate site end state;
- Identify the “minimum expectations” that can be used to review and comment on site-specific LTS plans; and
- Serve as a resource with examples, references and considerations to assist authors in developing their plans (Part III).

¹ The December 15, 2000 Memorandum from Deputy Secretary T. J. Glauthier (S-2) directed DOE EM to develop guidance for preparing LTS plans, as well as guidance for the inclusion of discrete LTS elements in each PSO’s site planning and budget documents.

1.1 Use of This Guidance Document

This guidance consists of three parts. Part I provides an overview of LTS including key definitions. Part II of the guidance document provides a list of key questions that need to be addressed in an LTS plan (e.g., what locations will require LTS activities?), along with the key elements that should be included in the plan in order to answer these questions (e.g., location and description of areas at the site where residuals and/or wastes will remain). It is widely recognized that there is no “one size fits all” LTS plan and all plans will need to be tailored to the specific needs of the site, local community, and the regulatory community. The annotations in Part II provide definitions and/or criteria for each of the elements such that they can be applied consistently across sites. These annotations also discuss the purpose of each element of the plan so that authors are mindful of the intent and potential uses of information in the plan as they prepare it.

Following the annotated list of components are two sample tables of contents for an LTS plan. The first is organized around the “LTS activities” that will be ongoing at a site. For some sites (e.g., complex sites with multiple ongoing site-wide LTS activities), this approach may be effective in that it depends on only a single discussion of activities such as site-wide institutional controls, monitoring, etc., and is followed by identification of unique aspects of the unit-specific LTS activities to be addressed. The second format is organized around “geographic units,” such as regulatory units (e.g., Operable Units, Waste Area Groups), geographically contiguous areas (“portions”), or some other means of partitioning the site that best address how LTS activities will be managed. Site personnel may elect to use either of these approaches, or an alternative that is a hybrid approach, to organize the site’s LTS data; however, it is important to note that, regardless of how the data are organized, all relevant components, specified in Part II of the guidance, need to be addressed in an LTS plan.

It is envisioned that authors will select one of the model tables of contents and use it as a starting template to construct a site-specific implementation plan (electronic version will be available on the website). Upon reading Part II materials, authors will determine the sections and level of content required for their plan. If sections of the tables of content are not needed, they may be omitted providing a brief rationale for why that section is not required. The justification for omission can be just as illuminating to future stewards as information provided in sections that are retained.

The guidance is complemented by a website (Part III) that consists of resources and examples that can provide assistance during development of site-specific plans. The website includes (or will include) examples, references, other related websites, policy statements, and related matter from which authors can choose and after which they can pattern their own plans. *[Note to reviewers. Currently developing website to provide all resources on-line.]*

2.0 Posing the Relevant Questions: A Strategic View

During the past decade, DOE has made significant progress in addressing the environmental legacy of the Cold War. It has reduced the risks and costs associated with maintaining protective conditions across the DOE complex. However, in spite of that effort, the majority of DOE sites will not be cleaned up to the point where they can be released for unrestricted use. Factors such as technical infeasibility, excessive worker risk or environmental damage, programmatic priorities, and costs dictate the extent to which sites are undergoing remediation and the consequent end-states achieved. When cleanup is completed, most DOE sites will require some

level of long-term stewardship to ensure protection of human health and the environment from hazards that remain after the cleanup is complete.²

2.1 Why Is LTS Needed?

In light of technological and economic limitations, DOE decision makers, with approval from regulators and input from the public, have agreed upon cleanup end states³ that, in many cases, will result in leaving contamination and/or wastes in place. This does not abrogate the basic covenant with the public that we will protect human health and the environment. In order to ensure protectiveness, in light of uncertainties associated with future events and conditions that cannot be foreseen at the present, sites must be managed to prevent future exposure pathways – i.e., maintain and monitor physical and institutional controls over the time period necessary. Final or interim decisions include obligations to conduct certain activities that will provide assurance that the remedies are remaining protective. It is the role of long-term stewardship to ensure that the requisite management takes place and that future stakeholders have access to the information necessary for them to evaluate the consequences of events and proposed changes over time.

2.2 Why Develop LTS Plans?

It is important to note that, in concept, stewardship is nothing new. For decades, we have been capping landfills and making decisions leading to end states other than clean closure. All of these decisions result in the need for systems and activities to ensure protectiveness. While “long-term stewardship” is a relatively new term for these activities, the reasons for their conduct and the means by which they are achieved remain unchanged. Hence, the concepts embodied in LTS plans are, in fact, not new either. However, the guidance provided herein will structure those plans so that they best meet the diverse needs arising from programmatic changes. In that regard, this guidance is presented as a means of getting maximum utility out of the plans relative to the numerous programs that may be effected by those plans.

For example, the Grand Junction Office develops Long-term Surveillance and Monitoring (LTSM) plans as part of the requirement for sites governed by the Uranium Mill Tailings Radiation Control Act (UMTRCA).⁴ As early as 1998, the Environmental Management Advisory

² For the purposes of this guidance, “cleanup” refers to the process of addressing contaminated land, waters, facilities, and materials in accordance with applicable requirements. This refers not only to actions taken under CERCLA and RCRA, but also to the decontamination and decommissioning process and the low-level waste or other radioactive waste land disposal process. Cleanup does not imply that all hazards will be removed from the site. The term “remediation” is often used synonymously with cleanup. Cleanup/remediation is considered complete when deactivation or decommissioning of all facilities is complete, excluding long-term surveillance and monitoring; releases to the environment have been cleaned up in accordance with agreed-upon standards; groundwater contamination has been contained, or long-term treatment or monitoring is in place; nuclear materials and spent fuel have been stabilized and/or placed in safe long-term storage; and “legacy” wastes (i.e., produced by past nuclear weapons production activities, with the exception of high-level waste) have been disposed of in an approved manner. *From Cleanup to Stewardship*, a Companion Report to *Accelerating Cleanup: Paths to Closure* and Background Information to Support the Scoping Process Required for the 1990 PEIS Settlement Study, U.S. Department of Energy, Office of Environmental Management, October 1999, [DOE/EM-0466].

³ End state refers to the physical state of a site after cleanup activities are complete.

⁴ Examples of the LTSM plans can be viewed at www.doegjpo.com.

Board formalized recommendations for site-specific LTS plans as a means to better manage LTS at sites.⁵ LTS plans are now required for all DOE sites, or portions of sites, where DOE anticipates LTS obligations.⁶ As such, all EM landlord Operations Offices or Field Offices will be required to develop LTS plans and incorporate the elements of these plans into geographic site Project Baseline Summaries (PBSs) by FY 2004.^{7,8} For an EM landlord Operations Office or Field Office for which site LTS responsibility will be transferred to another Program Secretarial Office (PSO), a long-term stewardship baseline will be required prior to transfer.⁹

In addition to the requirements and recommendations discussed above, LTS plans are valuable for a number of reasons:

- (1) to improve management both before and after cleanup is complete;
- (2) to facilitate development of a baseline scope, schedule and cost for LTS;
- (3) to facilitate transfer of sites and LTS responsibilities between PSOs; and
- (4) to provide a mechanism for demonstrating DOE accountability to the public by clearly communicating the defined end state, maintenance requirements, performance metrics, monitoring programs, and contingencies in place to address the impact of changes to the end state (e.g., decisions made to change land use or failures arising from reliance on assumed values for uncertain factors that prove to have been in error).

In addition, LTS plans:

- (5) encourage strategic planning and identification of cost savings and optimization;
- (6) provide a mechanism to identify technology needs by which future technological advances will be reviewed and implemented, as appropriate;
- (7) serve as a single, consolidated reference point for knowledge management for future stewards;
- (8) for UMTRCA sites, are required to comply with general licensing requirements of the Nuclear Regulatory Commission (NRC) ; and
- (9) present an opportunity to integrate and coordinate under one “umbrella” all required post-cleanup elements, such as five-year reviews, site-specific post-closure permit requirements,

⁵ Environmental Management Advisory Board Long-term Stewardship Committee Report and Recommendations, October 8, 1998; and Long-term Stewardship Committee, Environmental Management Advisory Board Resolution on The Environmental Management Long-term Stewardship Program, September 23, 1999.

⁶ DOE will need to determine the level of documentation necessary for those sites for which record-keeping is the only requirement (i.e., site has been cleaned up to unrestricted use and possibly transferred); however, those sites are not the focus of this document.

⁷ Long-term Stewardship Responsibilities memorandum, Carolyn Huntoon, January 19, 2001.

⁸ Geographic site level refers to one level at which data are collected in IPABS-IS. For additional information, see “Detailed Guidance for the Integrated Planning, Accountability, and Budgeting System Information System” (IPABS-IS), Volume2, p 4-2, February 17, 2000.

⁹ Long-term Stewardship Transition to Site Landlord memorandum, T.J. Glauthier, December 15, 2000.

state-specific closure requirements, long-term monitoring plans, exit strategies,¹⁰ land use controls, air monitoring systems, NRC license requirements, agreed-upon local requirements, and requirements detailed in other relevant DOE Orders and/or other agreements.

Development and implementation of LTS plans will also facilitate discussion between the prospective site landlord/PSO, local regulators, tribes, community officials, and other interested stakeholders in determining key components of the LTS plans and determining how LTS will be managed at the sites.

2.3 How Does this Guidance Apply to My Site?

The guidance applies to all DOE sites,¹¹ regardless of regulatory framework or PSO. It is designed to be flexible so that it can be used to develop LTS plans for the wide range of sites and complexity that exist within the DOE complex:

- Sites already conducting only long-term stewardship activities;
- Sites scheduled for closure (near term) with no ongoing mission;
- Sites where EM is the landlord (long-term cleanup activities);
- Sites with planned ongoing missions; and
- “Third-party” sites where DOE is or has completed cleanup but an entity other than DOE will be responsible for LTS at the site.

The LTSM Program at the Grand Junction Office currently manages sites where LTS is the only ongoing activity. This office develops LTSM plans for sites under its purview to meet requirements established by NRC for closing UMTRCA disposal cells.¹² However, the office also manages other sites and develops LTSM plans for this wider range of sites. DOE anticipates that this new LTS guidance can be used to identify those elements that are not currently included in the existing GJO LTSM plans and to determine the most effective way to organize the additional information.¹³ In addition, several non-NRC sites are expected to transition into the GJO program in the coming years and will be expected to transition into the program with an LTS plan in place (or with all information necessary to develop an LTS plan).

For sites or portions of sites that will be closing in the near term, this LTS guidance will serve as a means for organizing existing data to formulate a baseline that can be used not only to communicate necessary information to future stewards, but also provide the basis of planning budgeting. It is anticipated that most information requested in this guidance will already exist in documents and data sources generated for other purposes. Therefore, the primary effort will be to identify and consolidate existing planning documents (e.g., land use plans, site baselines, etc.) that provide the relevant information to the extent that it already exists. The goal is to ensure that all LTS elements are addressed to the degree possible and the information is made readily

¹⁰ For information on exit strategies, see [Developing Exit Strategies for Environmental Restoration Projects](#). [DOE/EH-413-0013]

¹¹ For the purpose of this guidance, “site” refers to a contiguous geographically distinct area (as opposed to a release site or a sub-area of a site). For example, the Idaho National Engineering and Environmental Laboratory, Fernald, and the Tuba City UMTRCA Cell are all considered sites, even though they differ significantly in size and extent of anticipated long-term stewardship activities.

¹² 10 CFR 40.27 and 10 CFR 40.28.

¹³ Note that HQ recognizes the need for flexibility because regulatory authorities have already signed the LTSM plans for GJO sites. It may be possible to develop supplemental plans/appendices that will not change the body of the signed documents.

available to stakeholders and future stewards. For example, health and safety requirements are included as part of LTS; however, we do not anticipate that the health and safety documents will be included in the LTS plan. Rather the plan will highlight key H&S activities, and reference the full H&S plans.

For sites with long-term cleanup missions where EM is the landlord (e.g., Hanford), much of the specific long-term stewardship information may not yet exist because decisions regarding site cleanup have not yet been made. However, an overall site-wide LTS strategy or framework exists that is described in the site-specific NDAA report, land use plans, or other site-wide planning initiatives. Therefore, for these sites, it may be desirable to take an approach similar to the EPA Region 4 Land Use Control Assurance Plan (LUCAP).¹⁴ The LUCAP policy directs a site to develop an overarching “umbrella document” that provides as much information as is available at the time and applicable to the whole site (e.g., site missions, current and anticipated future steward, current and anticipated land use, maps, etc.). As units, portions, areas, etc., are closed, the site develops a unit/area-specific land use control implementation plan (LUCIP). As a site gradually closes and these unit/areas and others transition into a site-wide LTS program, the opportunity will exist to re-evaluate the LTS management strategy to identify opportunities for cost savings and optimization. For these sites, this guidance will provide a framework for identifying those data deemed important for LTS purposes, and will also provide tools for organizing these data.

At sites with an ongoing mission, e.g., Los Alamos National Laboratory, current DOE policy is that the environmental stewardship function will transfer to the site landlord.¹⁵ With this transfer must come a clear understanding of the remediation end state, the required LTS activities, and the estimated costs of those activities. This is so that budget can be transferred to the landlord, along with a formal transfer of responsibility that is clearly documented in a memorandum of agreement (MOA) developed by both the transferring and receiving programs.

Finally, there are so-called “third party” sites where, upon completion of cleanup activities, DOE does not currently anticipate being responsible for conducting LTS activities. At these sites, DOE is responsible for site cleanup activities but is not the site owner; therefore, the responsibility for conducting LTS activities will likely be designated to the site owner/operator. However, if deed restrictions or other institutional controls are part of the final end state, DOE will need to maintain the ability to verify that these controls are being enforced.

Note that this guidance does not currently address sites for which record-keeping is the only long-term requirement, i.e., clean closed sites, sites deemed acceptable for unrestricted use after cleanup. While there will be a need to maintain records documenting activities, site history, and cleanup levels, LTS plans are not required for these sites.

¹⁴ Assuring Land Use Controls at Federal Facilities, April 13, 1998 Memorandum from Jon D. Johnston, Chief Federal Facilities Branch EPA Region 4. Many EPA Regions have developed similar policies; however, they differ in both intent and how they will be applied at DOE sites. DOE staff need to work closely with their regulators to ensure that the LTS plans meet the specific requirements and expectations.

¹⁵ Long-Term Stewardship Transition to Site Landlord memorandum for all major departmental elements from T.J. Glauthier, December 15, 2000.

2.4 When Should LTS Planning Be Initiated?

Ideally, as with pollution prevention planning, LTS considerations should be integrated into the start of all new construction projects, as well as during planning and implementation of all cleanup projects.¹⁶ However, due to the current focus on DOE's cleanup mission, early planning for LTS has traditionally not been a top priority. Therefore, the goal now is to ensure that LTS planning is initiated and incorporated into all projects as soon as possible, regardless of project status or schedule. This includes new non-environmental missions and projects (e.g., those developed in support of defense and science programs), as well as remediation and corrective action activities, surplus facility deactivation and decommissioning, and radioactive waste disposal missions that are conducted solely under the authority of the Atomic Energy Act (AEA). At a minimum, LTS activities should be evaluated as part of the life-cycle cost analysis for new and existing DOE missions and projects.

Regardless of what DOE entity will ultimately be responsible for LTS, there is a clear need to document decisions, assumptions, the final end state of the site, and the activities necessary to maintain that end state. These items need to be agreed upon and documented by the key decision makers prior to site (or portion of site) closure so that future stewards have the information necessary to make decisions as changes in site conditions take place.

3.0 Key Definitions – (*this section still under development and will be modified later*)

Note to reviewers: In order to ensure a consistent planning basis in developing LTS plans, it is important to have consistent definitions among sites. Establishing consistent definitions will ensure all site LTS plans are based on a common understanding of the scope of long-term stewardship, and the activities included within that scope.

The definition of LTS provided in this document is a compilation of definitions used in various DOE and other documents. The goal is to have consistent definitions that will be used in all subsequent Department reports, guidance, etc.

3.1 What is Long-Term Stewardship?

Proposed Definition for LTS: Long-term stewardship is defined as the set of activities necessary to protect human health and the environment from physical hazards and hazards posed by residual contamination and/or wastes remaining at sites (or portions of sites) once cleanup is complete. A site is considered to be conducting long-term stewardship activities once required remediation (or “cleanup”), disposal, or stabilization activities are completed or, in the case of long-term remedial actions (e.g., groundwater, surface waters, sediments, and entombed facilities), the remedy is shown to be functioning properly and operating as designed. A site can transition into LTS all at once, as may be the case for site with a single disposal cell, or transition in phases according to cleanup schedules. Long-term stewardship activities are designed to ensure that the implemented remedies remain effective for an extended, or possibly indefinite, period of time -- until such time that the residual hazard is reduced such that the site may be released for unrestricted use and unlimited access.

¹⁶ See EH fact sheet on incorporating LTS throughout the remediation process – *draft document*.

Long-term stewardship activities include, but are not limited to: (1) site monitoring and maintenance of engineered controls (e.g., surveillance activities, inspections, ongoing pump and treat activities, cap repair, maintenance of entombed buildings or facilities, and maintenance of other engineered controls such as containment structures); (2) the application and enforcement of legal or other mechanisms (referred to as institutional controls in this document) to restrict land and water use or access; (3) information management (e.g., record-keeping activities); (4) environmental monitoring (e.g., groundwater monitoring); (5) contingency planning for emergency response and funding in the event that remedies or controls fail; and (6) landlord functions when the site has no more mission.

3.2 When Does LTS Start?

Because long-term stewardship is the final phase of any residuals management process (e.g., environmental restoration under CERCLA, wastes disposed and corrective action taken under RCRA, low level waste management under AEA, and facilities decontamination and decommissioning), one of the most problematic aspects of defining LTS is determining when the activities transition from a cleanup activity to a long-term stewardship activity. Even though most sites are already conducting LTS activities as part of program activities, the challenge of defining the start date is difficult. The activities will be ongoing regardless of whether they are called LTS or included as part of overall site functions; however, in order to be able to frame the scope of the LTS program, we need to define the point(s) at which the administrative distinction is made. Given this, there are essentially two approaches to defining LTS start dates -- the first is by regulatory definition; the second by remedial action objective (performance-based). A discussion of each approach is presented below.

3.2.1 Regulatory-Based LTS Start Date¹⁷

Note that the purpose of this section is to assist in determining the starting point for LTS. This is not to imply that LTS is a regulatory phase or defined action. LTS is not, itself, regulatory in nature; rather, it is a concept that applies regardless of the regulatory framework under which the site was/is managed, activities taken, or decisions made regarding the agreed upon facility end state.

- For CERCLA remedial actions, the LTS start date coincides with the date the Regional EPA official approves in writing the *Interim* or *Final Remedial Action Report*.¹⁸ For delisting and partial delisting, LTS would begin when the delisting or partial delisting petition is finalized and approved by EPA.
- For RCRA closure of hazardous waste management units, the LTS start date coincides with the date that closure is “certified”.¹⁹ This is generally referred to as the “post-closure period” and generally involves issuance of a RCRA post-closure permit.
- For RCRA closure under Corrective Action, the LTS start date is triggered when EPA determines that the lead agency has necessary and sufficient information about a facility

¹⁷ This is not necessarily an exhaustive list of regulatory-based LTS start dates, but rather a starting point for further discussion.

¹⁸ *Close Out Procedures for National Priorities List Sites*

¹⁹ *40 CFR 264/265.115 Certification of Closure*

and remedy to:

- Document the facility, portion of facility, or unit for which the decision is made;
 - Document that the remedy was selected and implemented properly;
 - Document any land use assumptions or restrictions used in the remedy selection;
 - Document any associated long-term care requirements for the facility, portion, or unit;
 - Ensure that the remedy is consistent with anticipated future land use; and
 - Document that cleanup standards or other remedial goals are achieved.²⁰
- For Title I and Title II UMTRCA sites, the LTS start date is triggered when compliance with performance or engineered barrier criteria is demonstrated to NRC and the site is transferred to DOE.²¹
 - For low-level/mixed low-level radioactive waste units, the LTS start date is triggered when all of the activities outlined in the closure plan (which includes the performance assessment and composite analysis) for the disposal facility closure have been accomplished.²² For DOE “greater than Class C” low-level radioactive waste (LLRW), LLRW disposal facilities are required to be NRC licensed in accordance with the LLW Policy Act, and NRC would make the determination through the NRC licensing process. For LLRW disposed of on DOE’s own sites, DOE will make the determination of when the facility is “closed” (i.e., will no longer accept waste). Mixed LLRW is also regulated by EPA as a hazardous waste and is subject to permit requirements. This is one area where regulatory programs overlap, and where there may be a “gray area” with regard to when LTS starts.
 - For contaminated facilities, LTS begins once the facility stabilization has been demonstrated and includes the long-term surveillance and maintenance period that is often planned before final decontamination and decommissioning takes place. For these facilities, LTS takes place in two “phases” – the first during the period between stabilization and D&D, and the second once the final remedy is in place.

3.2.2 Performance-Based LTS Start Date

Both soil and groundwater remedies are generally designed to meet one of three objectives: 1) source removal, 2) containment, or 3) restoration. The threshold for when LTS starts differs among these objectives; therefore, the technologies that are applied to achieve the objectives are described in the following text and table.

Source Removal Source removal is generally attempted through physical removal (e.g., excavation) or in-situ destruction (e.g., in-situ chemical oxidation). To the extent that the objective is achieved and there are no residual hazards left in place for which access or use restrictions are required to maintain protectiveness, there are no LTS activities required other than maintenance of records. In these cases, LTS would begin with transfer of the records to the appropriate repository.

²⁰ RCRA Corrective Action Workshop on Results-Based Project Management

²¹ Federal Institutional Control Requirements for Radioactive Waste and Restricted Release of Property Containing Radioactive Material

²² Implementation Guide for use with DOE Manual 435.1-1

However, if the achievement of the objective is uncertain, there is likely to be a monitoring phase for verification. In this case, a one-time or one-seasonal round of monitoring would be considered part of the contract acceptance procedure (i.e., criterion that must be demonstrated for procurement to authorize payment to the contractor) and, hence, part of construction of the remedy, rather than LTS. If, however, multiple rounds or multiple years of sampling are required to determine that, for example, the in-situ technology was successful, then this monitoring activity would be considered long-term stewardship.

Example technologies to which this definition would apply include:

- Soil -
 - Excavation
 - In-Situ Chemical Destruction
 - Six-Phase Heating
 - Dynamic Underground Stripping
 - In-Situ Vitrification for Organics

- Groundwater -
 - In-Situ Chemical Destruction
 - Six-Phase Heating
 - Dynamic Underground Stripping

Containment. Containment may be achieved through emplacement of engineered controls, such as physical (e.g., caps), hydraulic (pump and treat), pneumatic (soil vapor extraction), chemical (permeable treatment walls), or institutional controls (e.g., use restrictions) designed to stop contaminant migration and/or prevent human or other forms of intrusion. For remedies with a containment objective, LTS begins when construction/installation is complete and acceptance testing demonstrates that containment is expected. Demonstration that containment is probable will differ with the type of barrier installed.

- Physical barriers, such as caps and permeable treatment walls, will often have design standards rather than performance standards for their acceptance criteria. Hence, acceptance will be based on proof that dimensions and materials of construction meet specifications.
- Hydraulic and pneumatic barriers are more typically accepted on the basis of performance standards. Typical performance standards would be demonstration of the radius or zone of influence (i.e., the target area is within the hydraulic or pressure gradient established by the extraction wells).
- Chemical barriers are generally accepted on the basis of meeting both design and performance standards related to the dimensions and content of the barrier as well as concentration changes over time.

In general, institutional controls are long-term stewardship functions by definition. However, they are often implemented in conjunction with other remedies and, therefore, become an LTS activity upon transition of those other associated activities to the long-term stewardship mode.

Therefore, with physical controls, LTS begins when construction is complete and controls are demonstrated to meet design specifications. Demonstration of attainment of performance specifications requires long-term monitoring and, therefore, is a part of the LTS program. With hydraulic and pneumatic barriers, LTS begins when initial testing of pressure gradients demonstrates that the design capture zone has been established. With chemical barriers, LTS begins when the initial monitoring indicates that desired concentration reductions are occurring.

Institutional controls then transition to LTS, along with their companion remedial activities. If there are no companion activities, institutional controls are a part of LTS from the point of the decision document.

Examples of technologies applied to achieve containment include:

Soil - Caps (*physical*)
Liners (*physical*)
Rip Rap or Armoring (*physical*)
Soil Vapor Extraction (*pneumatic*)
In-Situ Vitrification for Inorganics (*chemical*)
Institutional/Access Controls (*physical*)

Groundwater - Pump and Treat (*hydraulic*)
Permeable Treatment Walls (*chemical*)
Slurry Walls (*physical*)
Grout Curtains (*physical*)
Sheet Piling (*physical*)
Cryogenic Barriers (*physical*)
Sparge Curtains (*hydraulic*)
In-Situ Redox Manipulation (*chemical*)
Institutional/Access Controls (*physical*)

Facilities - Entombment (*physical*)
Institutional/Access Controls (*physical*)

Restoration. Radioactive decay and some forms of bioremediation can be relied upon to restore soils and building surfaces. With respect to surface water and ground water, restoration may be achieved with pump and treat systems, bioremediation, or monitored natural attenuation. With pump and treat systems, stewardship would begin after acceptance testing demonstrates that containment is expected, as indicated under the above discussion on containment. With bioremediation and monitored natural attenuation, stewardship would begin once the monitoring wells were constructed. Examples of technologies applied for restoration include:

Soil - Bioremediation (e.g., bioventing)
Radioactive decay

Ground Water - Pump and Treat
Bioremediation
Monitored Natural Attenuation
Phytoremediation

Given these considerations, the threshold for defining when stewardship begins can be summarized by technology, as indicated in Table 1, below.

Table 1. Defining Stewardship Trigger by Technology – Examples

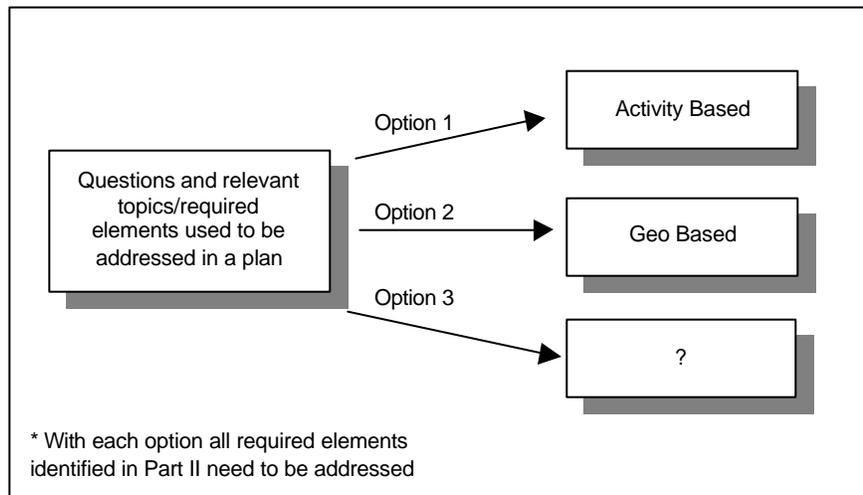
Technology	Objective	Trigger
Armoring	Containment	Acceptance to Design Standard
Bioremediation	Restoration	Wells Installed
Bioventing	Restoration	Wells Installed, Flow Rates Verified
Caps and Covers	Containment	Acceptance to Design Standard
Cryogenic Barriers	Containment	Acceptance to Design Standard
Dynamic Underground Stripping	Source Removal	LTS Only If Long-Term Monitoring Required
Excavation	Source Removal	N/A
Grout Curtains	Containment	Acceptance to Design Standard
In-Situ Air Sparging	Containment, Restoration	Acceptance to Performance Specifications After Shakedown
In-Situ Chemical Oxidation	Source Removal	LTS Only If Long-Term Monitoring Required
In-Situ Redox Manipulation	Containment	Acceptance to Performance Specifications After Shakedown
In-Situ Vitrification	Containment	LTS Only If Long-Term Monitoring Required
Institutional Controls	Containment (In Context of Preventing Receptor Access)	Decision Document or Transition of Companion Activities - Later of Two
Liners	Containment	Acceptance to Design Standard
Monitored Natural Attenuation	Restoration	Wells Installed
Permeable Treatment Walls	Containment	Acceptance to Design and Performance Standard
Pump and Treat	Containment, Restoration	Demonstration of Hydraulic Control
Phytoremediation	Restoration	Completion of Planting
Recirculating Wells	Containment, Restoration	Demonstration of Hydraulic Control and Acceptance to Performance Std.
Sheet Piling	Containment	Acceptance to Design Standard
Six-Phase Heating	Source Removal	LTS Only If Long-Term Monitoring Required
Slurry Walls	Containment	Acceptance to Design Standard
Soil Vapor Extraction	Containment	Demonstration of Pneumatic Control
Sparge Curtains	Containment	Acceptance to Design and Performance Standard

Part II – Questions and Relevant Topics to be Addressed in an LTS Plan

Introduction

Part II of the guidance presents key questions and relevant topics (“requirements”) that need to be addressed in an LTS implementation plan, including a description of what needs to be included for each section that should be included in the LTS plans. It describes the purpose of each section and considerations that should be taken in preparing a site-specific plan.

The next section (beginning on page 36) presents two generic tables of contents for the LTS plan, shown first in an activity-based framework, and shown second around a geographically-based framework. As shown in the box below, sites may use either template or a hybrid thereof for the organization of their plans depending on their judgment as to which will best facilitate implementation and reporting. These model templates are intended as tools to assist in organizing site data and to use as a checklist to ensure that all elements are being included in the LTS plans. However, regardless of which template is used as a basis for the plan, all elements identified in Part II need to be addressed. It may be necessary to reorganize information within major headings so that it better fits the needs of the site.



The key questions and topics to be addressed in an LTS implementation plan are as follows:

Questions and Relevant Topics

1.0 What is the Purpose and Scope of the Site-Specific Plan?

This section includes a brief statement of why LTS is required at the site and discusses how the plan will be used to implement LTS activities. In addition to addressing the general reasons for LTS at the site (i.e., residual hazards will remain at the site, there are potential receptors to the residual hazards, and, therefore long-term stewardship is necessary at the site to manage the residual hazards), this section should state the purpose and scope of the LTS plan itself. The

intent of this section is to clearly define the boundaries to which the plan applies, the breadth of activities it encompasses, the performance objectives for the activities it specifies, roles and responsibilities, and the process for changing either the plan itself or the activities within the plan. The latter is needed so that future stewards can continually compare performance with objectives and stakeholders can see how their concerns have been addressed.

Specific topics to be addressed in describing the purpose and scope of the plan are provided below.

1.1 Objectives

The LTS plan will state the purpose or objectives of the LTS plan, and of long-term stewardship activities that will be performed at the site. Stewardship may have several objectives, and these should be clearly stated. Objectives for performing long-term stewardship at the site may include, for example:

- To ensure protectiveness of human health and the environment from residual hazards that remain on site;
- Maintain site records and information so that future custodians can continue to provide effective stewardship;
- To assure regulators and stakeholders that DOE's institutional controls have been identified and are accompanied by redundancy and a commitment to provide stewardship for the site for as long as required;
- To respond to regulatory and other stewardship requirements in a fully compliant manner;
- Provide accountability for the sites;
- Provide a plan for emergency response;
- Provide a plan for funding LTS for the site;
- Provide a method to transfer the site to LTS;
- Identify the analysis methods of site oversight to perform trend analysis and identify thresholds at which future actions must be taken; and
- Provide a forum for Stakeholder and Regulator involvement for ensuring enduring protection of the site.

The overarching objectives of LTS are common to most sites and can be drawn from LTS reports and example plans. Content should be consistent with programmatic definitions of LTS and Departmental policies. Other objectives may apply at specific sites. It is assumed that some of these objectives will be "generic," to LTS e.g., to ensure protection of human health and the environment, and others will be more specific to site specific LTS plans and situations, e.g., to provide mechanism to ensure smooth transition to landlord PSO.

1.2 Scope

This section of the LTSP provides general information about the scope of long-term stewardship at the site. The scope includes the physical attributes of the site that will require long-term stewardship (e.g., parcels or portions) and the long-term stewardship activities required to ensure institutional control of the site. Examples of long-term stewardship activities include the following: inspect, maintain, and repair engineered containment systems; monitor wells and other as-built features; conduct emergency response; maintain security; monitor environmental indicators; provide reports; and perform information management tasks. Each key component of the LTS activities and each portion of the site addressed in the plan should be identified in the scope section so that the reader has a capsule look at the entirety of the plan scope. Details should be provided in subsequent sections of the plan.

Note that while business closure activities, such as worker transition, employee health monitoring, and retirement benefits, may be considered part of stewardship obligations at some sites they are not addressed in this document. There is a clear need to coordinate these and other closure activities at the sites to ensure that the best management strategy is developed for the site, and may be included in the LTS plan, depending on the needs of the site managers and stewards.

Ideally, the scope of the LTS plan will be organized parallel to the organization of the LTS plan itself. It is anticipated that most plans will be organized on an activity basis (like functions are grouped across multiple release sites) or a geographic basis (all activities are grouped for each portion of a site).

1.3 Organization of the LTS Plan

The site-specific plans can be organized in a number of different ways, depending on site type, size, LTS activities, or schedule. This section supplements the scope section by describing the framework around which the LTS plan is developed. For example, is it designed to follow one of the two model tables of content provided (e.g., activity- or geographically-based framework) or a different model that better maps to how LTS will be (or is currently) managed at the site? Regardless of framework, information identified in this annotated outline needs to be provided at the site-wide level and detailed for activities occurring at a sub-element level (e.g., activities that may be unique to a certain area/disposal unit/facility).

2.0 Where will Long-term Stewardship be Required?

If you are developing a geographically-based LTS plan, this section (Section 2), which describes the geographic locations requiring LTS, will be the framework of the rest of the plan (i.e., all activities will be organized around the geographic locations described in this section). For activity-based LTS plans, the information contained in Section 4 will be the framework for the plan.

2.1 Describe the physical boundaries to which plan applies

The purpose of this section is to provide a clear record of what space and media fall under the LTS plan such that future stewards understand the full extent of the property for which activities are to be conducted. Hence, clarity and specificity are paramount.

This section should contain a description of the physical boundaries that constitute the site or portions of the site to which the LTS plan applies. If the LTS plan applies to an entire site, it would include the entire site boundary. This may also include activities outside the site boundary if, for example, a groundwater plume has moved offsite and groundwater use restrictions are deemed necessary. If the LTS plan applies only to specific portions of a site, i.e., other areas of the site will have ongoing missions and are not expected to be in an LTS phase, then this section should include the boundaries of the applicable portions and the relationship of the portion(s) to the larger site boundary. The description in this section should be supplemented with maps, GIS coordinates (described in later in this document), survey benchmark reference points, photographs, or other means of describing the physical boundaries of the site/portion. This section should also identify the location of areas such as buffer zones, location of specific waste management areas, boundaries of groundwater plumes, and location of residual hazards to the extent that they can be physically mapped out. Finally, this section should also include discussion of onsite or offsite areas that could be affected should a release (failure) occur.

2.2 Location of Residual Contaminants and Wastes in Place

This section should identify the location and nature of residual contaminants and physical hazards. It is the presence of these residual hazards that necessitates development and implementation of the plan. Preferably, this is not accomplished with an exhaustive treatment of all data, but provides a synopsis from which the reader can understand the nature and extent of potential risk as a result of remaining hazards. Readers seeking more detailed data can be directed to the appropriate information repository. The means of identification must be selected with a clear recognition that many surface, geologic, and anthropogenic features may change over the time periods required for stewardship. As a consequence, reference points should be those expected to survive the longest as identifiable features to future stewards. The information in this section can be presented in graphical form (i.e., annotated maps) or other forms such that the location of the contaminants or residual hazards can be identified.

2.3 Location and Description of Identifiable Portions

For location-specific documents in which the site can be divided into discrete portions for managing LTS, this section will identify those portions. For example, sites may start with the portion descriptions identified in the NDAA report, may identify discrete areas based on geographically-based units, or may divide the site by waste area groups, operable units, or other “regulatory”-based portions. This section should describe and present graphically information on where significant features and portions of the site are located.

2.4 Legal Description

This section should contain a legal description of the site, site portion, or offsite real property that is consistent with deeds and other documents to which institutional controls may be attached. This section also needs to include any third-party liens granted on the property, such as utility access rights, mineral rights, or other liens that may affect decisions on future management of the site. The intent of this section is to provide a traceable link to other documents that may be employed to convey institutional controls to future users.

2.5 Offsite Locations

This section should address characteristics of any offsite location affected by the LTS plan, including current uses, potential future uses, and liens and other property rights. This includes any offsite location where residual hazards are or are anticipated to be located (e.g., offsite soil contamination or groundwater plumes) for which DOE is responsible for conducting LTS activities, if applicable, as well as potential effects that the offsite activities may have on the site (e.g., industrial, agricultural, or residential uses).

3.0 Why is Long-term Stewardship Required?

3.1 The History of Operations

The history of a site is always of interest, but it may be critically important in the following circumstances: if contamination is ever detected; if new information indicates site-related chemicals are problematic at lower concentrations than previously thought; if contamination is discovered outside the site boundary in a way that implicates the site; or if the regulatory environment should change. This section of the LTSP summarizes the history of the site in terms of previous occupation and use. Information on previous occupants and their operations can be important to future site personnel. Hence, this section of the LTSP should be written to preserve important aspects of corporate memory that may prove helpful in understanding the types of contaminants that may be present and how they got there.

This section should include the following:

- Former occupants and operators as a means of helping future stewards better understand the range of possible values for unknown parameters and other uncertainties.
- When operations were conducted such that questions about contaminants or other factors that might affect future uses can be put in context relative to historical use of specific chemicals and/or practices that would have impacted releases.
- The processes and products that were employed at the site as a means of assisting future stewards in better understanding uncertainties.
- The waste materials and contaminants that were employed at the site as a means of assisting future stewards in better understanding uncertainties.
- Historical photographs of the site, if available.
- Acquisition history; current and historical property ownership.
- References to NEPA documents and other historical documents that describe historical site conditions.

3.2 The Regulatory and Institutional Framework for Long-term Stewardship

The purpose of this section is to compile in one location all of the regulatory compliance requirements at the site (or portion of the site) that will impact LTS. This section should include the following information:

- A description of the legal authorities under which cleanup, facility stabilization and D&D, and waste management are or were mandated and LTS is needed. These authorities lead to the types of LTS activities that will be conducted at the site. In addition, there is a clear linkage between this section and the relevant portions of the roles and responsibilities section. This should include identification of what agencies have enforcement authority.
- Identification of all LTS activities that are specifically required by regulation, statutes, Federal Facility Agreements, Records of Decision, permits, compliance orders, licenses or other third-party enforceable agreements.
- Identification of all LTS activities that will be conducted pursuant to DOE Orders, policies, guidance.
- Identification of any other requirements addressed in the LTS plan, such as agreements with third parties (e.g., land use or access agreements).
- Identification of portion-specific regulatory requirements. Many sites operate under multiple regulatory frameworks, most often a combination of RCRA and CERCLA. To the extent applicable, identify specific requirements (e.g., post-closure permit requirements, NRC license requirements) that are unique to a portion.

3.3 Site Characteristics and Setting

Most of the characteristics listed in this section will describe the site in its entirety. However, to the extent that portion-specific characteristics are important for LTS management, these characteristics and settings need to be clearly identified in the description of the unique portions. For example, a portion of the site may border a wetland, making LTS responsibilities different for that particular portion. There may be multiple watersheds onsite, which would also require the descriptions to allow for characterization of the unique aspects of the watersheds.

- Physical Site Conditions. Describe the physical site conditions that may impact risk posed by residual hazards. Subsequent sections may address aspects specific to portions of the site for which the LTS plan may be specifically written.
- Regional Setting. Describe the physical features of the region surrounding the site that will affect how contaminants may be released and transported to receptors. This may include the type of vegetative cover if that cover may impede ability to conduct LTS activities.
- Elevation/Topography. Describe elevation and topographic features (e.g., ravines) that would impact contaminant fate and transport and/or the feasibility of conducting LTS

activities.

- Climate and Weather. Describe climate and weather characteristics that might impact contaminant fate and transport and/or the feasibility of conducting LTS activities.
- Geologic Setting. Describe geologic characteristics that might impact contaminant fate and transport and/or the feasibility of conducting LTS activities.
- Demography. Describe the nature and density of potential receptors, and address such issues as encroachment on the buffer zones. The discussion should reflect trends in changing populations and identify distance to nearest receptors, city, etc.
- Liens and Other Property Rights. Identify any and all encumbrances that impact site use or pose restrictions on LTS activities.
- Assumptions used in developing end state or future mission (if applicable). Explicitly identify that which is not known or understood so that monitoring data can be properly evaluated and contingency plans maintained where appropriate. Assumptions will be modified or removed as monitoring data are collected and a better understanding of the site is developed.
- Cleanup Actions. Describe all actions taken relative to site contaminants (not just those resulting in LTS requirements), thus indicating how risk has been managed and what implications may be put to future monitoring results. Hence, removals, interim actions and complementary remedial actions would all be addressed. This section should document the as-builts for all remedial actions taken in the portion being addressed by the LTS plan.
- Facilities. Describe all actions taken relative to closing, stabilizing, and decontaminating and decommissioning onsite facilities (not just those that resulted in LTS requirements), indicating how the risk has been managed onsite and what implications may be put to future monitoring results. This section should document (or reference) the as-builts for all remaining structures included in the LTS plan.
- Waste Management Structures. Describe all actions taken relative to closing waste management disposal cells onsite (not just those that resulted in LTS requirements), indicating how the risk has been managed onsite and what implications may be put to future monitoring results. This section should document (or reference) the as-builts for all waste management cells included in the LTS plan, and identify those cells not yet included but anticipated to be included in the LTS plan once they stop receiving waste.
- Condition of Offsite Areas of Contamination. Describe the condition of offsite areas of contamination to the extent they are unique to those areas versus the site-wide conditions.
- Development of Conceptual Site Model (*including identification of current and potential receptors*). Provide a synopsis of the original exposure pathways and describe how all pathways have been terminated. The discussion should include the level of redundancy in those actions such that future stewards can understand the implications of perceived failures and/or proposed changes in site use. The discussion should also clearly reflect uncertainties and assumptions, as outlined in the previous section, thus alerting future

stewards to those elements of the model and remedy that may be based on erroneous or missing data.

- Characterization of Residual Risk. Provide a synopsis of the risk associated with residual hazards and why they prohibit unrestricted use of the site in their current state.

4.0 What Activities are Required to Maintain and Demonstrate Protectiveness of Human Health and the Environment?

This part of the LTS plan should describe the engineered and institutional controls used to manage residual hazards. Engineered controls include physical, chemical, and biological controls designed to stop contaminant transport or to prevent receptor contact with residues. Institutional controls are designed to prevent access and uses that would lead to contact by human and/or ecological receptors.

Note: If you are developing an activity-based LTS plan, Section 4 will form the framework around which most of your information is organized.

4.1 Institutional Controls

This section should describe each institutional control that is being implemented, and how it is being implemented and maintained, as part of the LTS program. This should include a description of other use/access restrictions required to maintain redundant protectiveness and describe the location of where these controls are in effect at the site. This section should describe the overall layering strategy for institutional controls that demonstrates redundancy in protectiveness should a control fail.

- Site-wide - Identify the institutional controls that are applicable to the entire site, e.g., site-wide fences and security to the extent they are considered part of the LTS program. Note that some activities at sites (e.g., fencing, site-wide security) are similar to institutional controls but may not be directly correlated to the need to protect human health and the environment from residual hazards that remain onsite. These activities are not considered part of the LTS program until such time that the original site mission changes, and these activities are then subsumed into the LTS program.
- Portion-specific – Identify the institutional controls that are unique and directly attributable to a specific locations or portions of the site requiring LTS.

There is a key linkage between this section and roles and responsibilities, as well as sections describing the inspection and surveillance activities by which effectiveness will be monitored.

4.2 Land Use Planning/Implementation – to be developed by John Stewart

This section should address land use planning aspects not specifically addressed as institutional controls.

- Site/Portion Land Use Maps. Provide maps depicting land use and land use restrictions for the site and specific portions addressed by the LTS plan. Identify potential LTS implications if the land use changes.
- Land Use Definitions. Define the scope of activities intended within each land use category, so that stewards have a clear understanding of how the definitions were used when describing land use.
- Land Use Policies. Present all policies impacting land use at the site and/or portion of the site addressed by the LTS plan.

This section should include graphical representation of current and anticipated future land use accompanied by definitions those uses.

4.3 Operating LTS Systems

This section should describe the activities necessary to safely operate LTS systems, such as groundwater pump and treat units, facility air and radiation monitoring systems, or disposal cell leachate collection systems. Many of the specifics will be contained in detail in other documents. Therefore, this section should summarize key activities needed for each system in place and provide reference to how the more detailed information can be accessed. Note that there should be a clear link between these operating requirements and the roles and responsibilities identified in the LTS plan.

This section should include a description of the following elements for all operating components:

- Methods. Describe how each operation would be performed.
- Reporting Requirements. Describe the reporting requirements for all operating systems.
- Health and Safety. Describe health and safety requirements associated with operating systems. It may reference a function or site-specific health and safety plan.

4.4 Maintaining Engineered Controls

This section should describe the activities necessary to maintain physical engineered controls, such as caps and permeable treatment walls. Many of the details will be contained in detail in other documents. This section should summarize key activities for each system in place and provide reference to the more detailed information. Note that there should be a clear link between these operating requirements and the roles and responsibilities identified in the LTS plan.

This section should include a description of the following elements for all components of the engineered controls:

- Methods. Describe how routine maintenance will be performed on LTS engineered controls.
- Frequency. Identify the frequency for routine preventative maintenance activities and the trigger levels for determining when corrective measures are required.
- Reporting Requirements. Identify reporting requirements for routine maintenance activities and determine the trigger levels for reporting events or maintenance needs (e.g., repairs).

4.5 Surveillance Activities

This section includes those methods selected to monitor institutional controls and physical engineered land use controls including a description of each of the following for each surveillance activity:

- Types of Inspection. Describe the inspection activities required to monitor institutional controls and some physical barriers such as caps.
- Objectives of Inspection Activities. Clearly identify the objective(s) for each inspection activity.
- Frequency. Identify the frequency at which each type of inspection is required.
- Qualification of Inspectors. Identify the qualifications for personnel performing inspection services.
- Procedures. Describe the procedures for conduct of type of inspection.
- Health and Safety Requirements. Describe the health and safety requirements to be observed by inspectors. Requirements should be consistent with those implemented across the site and among all affected parties.
- Reporting Requirements. Describe all routine reporting requirements for the results of inspection activities. Content must be consistent with reporting and archiving requirements specified in previous sections. Also address reporting requirements when inspections find that some sort of corrective measure or emergency response is warranted.
- Emergency Response and Corrective Action. Identify the linkage between inspection observations and emergency response and/or corrective actions arising from adverse findings with reference to materials provided in previous sections.
- Quality Assurance. Describe the quality assurance program under which routine inspections will be conducted.

4.6 Emergency Response, Corrective Action, and Contingency Plans.

This section should describe the procedure for implementing emergency response, when required, and the procedure for implementing corrective actions, when required. It should also describe the contingency plans and actions identified as a part of the existing uncertainty management strategy. Emphasis should be placed on those actions that have been identified and the nature and extent of preparation already accomplished to expedite mobilization. (There is a linkage between this section and relevant portions of roles and responsibilities.)

- Emergency Response. Describe the procedures for implementing emergency response, as required, as well as criteria for determining when something is considered an “emergency” (i.e., imminent threat to human health and the environment). This should include descriptions of site-wide emergency response activities, as well as portion-specific requirements, as applicable. This section should provide contact information for emergency responses.
- Corrective Actions. Describe the procedures for implementing corrective actions and for determining when those actions are necessary. This should include mechanisms for reporting that the corrective actions were implemented, the reason why the corrective action was necessary, and the action taken. This should include information for site-wide, as well as portion-specific, corrective actions, as applicable. Include contact(s) to

inform that emergency response or corrective measure has been taken or is currently underway.

- Contingency Plans. Describe the contingencies in place to manage residual uncertainty. For each action taken, including implementing institutional or other administrative controls, there should be a contingency identified in case the action fails. The level of detail required for the contingencies will depend on several factors, including the significance of the uncertainty (i.e., what is the impact if it happens?), and the time available to respond should, for example, a cap fail. Discussion of contingencies may include unit- and/or activity-specific contingencies or may be include “generic” contingencies that would apply to multiple units/activities (e.g., contingency developed for all facilities with like LTS activities).²³

This section should include the emergency response, corrective action, and contingency plan specified for each failure mode identified in the uncertainty management plan.

4.7 Health and Safety

- LTS Workers. This section should summarize the health and safety requirements for all on-site workers implementing the LTS plan. This will include workers responsible for maintenance and other activities, in addition to those operating remedial action systems and conducting monitoring and surveillance. Elements of this text are linked to related discussions under monitoring, maintenance, surveillance and operations. As a consequence, it may be most efficient to use this section to summarize site safety procedures and reference other segments for activity-specific requirements.
- Other Onsite Workers (including federal and non-federal tenants). This section should describe any health and safety requirements for all other site workers not associated with LTS activities, such as tenants. This section would include information such as personnel protection equipment requirements for onsite construction workers.

This section should include identification of all relevant health and safety requirements, including OSHA and state-specific requirements

4.8 Resource Management and Personnel Training

This section should describe how resources will be managed and how personnel will be trained and include a description of the following:

- Human Resource Requirements. Identify the human resource requirements for implementation of the LTS activities.
- Personnel Needs. Describe the personnel needs associated with the human resource requirements.

²³ Insert reference Uncertainty Management fact sheet.

- Skill Requirements. Identify the skills required to complete LTS activities identified in the LTS plan.
- Training Requirements. Identify training requirements relative to performance of LTS activities. [Coordinate with worker transition to ensure proper training available to existing workers, if appropriate.]
- Equipment and Materials Estimation. Identify equipment and material requirements arising from implementation of the LTS plan. [Coordinate with personal property managers to make sure that, especially during site closeout, necessary equipment remains available for use during LTS.]
- Equipment and Materials Management Policies/Procedures. Describe any policies or procedures required to manage equipment and materials.

5.0 What Data are Available and What Data are Needed to Demonstrate Protectiveness?

This section should summarize procedures for the two key types of site-related information: 1) records that document past operations and activities; and 2) monitoring data generated as a part of the LTS program.

5.1 Identifying and Preserving Long-term Stewardship Records.

This section should identify the records that will be archived in the permanent repository and include a description of the following:

Identification of LTS-Critical Information. Identify types of records and data critical to implementing LTS at the site, and describe how these records and data will be identified as LTS-critical.

Information Preservation. Identify the methods and means by which information will be preserved. Includes all types of data deemed necessary (e.g., maps, photos, documents, electronic files and databases, etc.).

Storage and Archiving LTS Records. Describe how and where records will be stored, the length of time they will be stored, and for what purpose the records are being maintained.

Records Retrieval. Describe how record access will be enabled and the measures necessary to ensure compatibility with information hardware and software at future dates in light of continual technological advances in information management. Discussion should include location of records index or taxonomy so stewards can easily identify and locate archived records or data.

Public Access Systems. Identify the means by which the public will be afforded access to records. Identify which of the LTS records the site anticipates will be requested by the public and which records may be made accessible.

5.2 Monitoring Program

This section describes the monitoring activities during LTS.

- Groundwater. Identify the aquifer and spatial extent of ground water to be monitored.
- Surface Water. Identify the water body and spatial extent of surface water to be monitored.
- Air. Identify the height and spatial extent to which air is to be monitored.
- Biota. Identify the nature of species and tissues to be monitored.
- Soils. Identify the depth and spatial extent of soil to be monitored.
- Engineered Structures. Identify the structures and surfaces to be monitored on waste management disposal cells and vaults, facilities, and other engineered structures (e.g., caps).

This section should include a description of the following:

- Objectives for Monitoring Program. State the objectives for each monitoring activity. Distinction should be made among detection, performance assessment and ambient monitoring.
- Detection Monitoring. Describe monitoring activities that have the objective of determining that contaminants have escaped containment at a level requiring implementation of contingency actions.
- Performance Assessment. Describe monitoring activities that have the objective of providing an indication that the remedy is not performing as anticipated, thus suggesting the need to modify performance assessment models, monitoring or operations to achieve better predictability in the future.
- Ambient Conditions. Describe monitoring activities with the objective of determining up-gradient baseline conditions for calibration of detection and performance assessment results.
- Monitoring Parameters. Identify the parameters to be monitored in each media.
- Standards that Apply. Identify the standards that will dictate the acceptability of data from each monitoring activity.
- Methods of Monitoring. Identify the methods to be employed for each monitoring activity.
- Locations. Identify the locations at which monitoring devices are to be located or where samples are to be taken.
- Frequency. Identify the frequency at which monitoring is to be conducted.

- Duration and Development of Ramp Down and/or Exit Strategy. Articulate the exit or ramp-down strategy for the monitoring activity. Exit strategies describe the conditions or results necessary to terminate monitoring. Ramp-down strategies describe the results or conditions necessary to drop analytes, omit locations, or reduce the frequency of monitoring.
- Expectations (Results of Performance Assessment). Provide a metric for interpretation of monitoring results relative to anticipated performance of the remedy. For instance, if a site is capped, how soon are results expected to reflect the break in the pathway and at what point might one assume the cap has failed because monitoring results do not show sufficient response?
- Quality Assurance/Quality Control. Describe the quality assurance and quality control program for the monitoring activity. This program may be outlined in the decision document or may be an extension of ongoing monitoring activity at the site.
- Data Interpretation. Identify the statistical algorithms that will be applied to monitoring results (e.g., mean, 95 % upper confidence level, etc).
- Reporting and Archiving. Describe how monitoring results will be reported and archived. As such, it has a significant linkage with sections on roles and responsibilities, as well as information management and data availability.

6.0 How Have We Planned for Technical, Regulatory and Environmental, Health and Safety Uncertainties?

6.1 Assumptions and Uncertainty Management

This section should be closely linked to the conceptual site model and assumptions provided in the site description. The purpose of this section is to explicitly identify that which is not known or understood (the uncertainties) so that monitoring data can be properly evaluated and contingency plans developed and maintained to help manage potential future risk. Uncertainties should be identified and communicated to stakeholders and regulators. These uncertainties should be identified in several areas, including, but not limited to: regulatory changes, land use changes (both onsite and offsite), technology effectiveness (in terms of performance), changes in ambient subsurface conditions, changes in facility use, etc. This section also needs to clearly articulate assumptions that were made during end-state selection, and selection of LTS activities, etc., such that future stewards can test those assumptions to determine if they are still valid. Discussion may include development of an uncertainty management matrix.²⁴

6.2 Threshold Criteria, Contingency Plans

This section should identify the trigger criteria that would require implementation of contingencies. This includes a description of how the data will be interpreted and what the threshold criteria are for determining when contingent actions are warranted. This section needs

²⁴ See fact sheet on managing uncertainty.

to link with the monitoring program description. Each trigger should be linked explicitly with the appropriate contingency action as described in previous sections and should be referenced in the monitoring discussion.

6.3 Science and Technology Review and Implementation

This section should describe the policy and procedures for identifying technology needs, communicating those needs to the science and technology community, and selecting and implementing technologies that fill those needs. It should include what will trigger technology re-evaluations that are not driven by failure of existing technologies. Much of this will likely be accomplished through the technology aspects of the five-year review process. However, additional measures may be needed to communicate needs. Low-level waste sites have the mechanism for communication through DOE Order 435.1 and the Research and Development interface implemented in response to concerns raised by the Defense Nuclear Facilities Safety Board. Additional linkages will emerge from the roadmapping and needs assessment work ongoing at INEEL. This section should identify how technology needs will be identified and communicated to the science and technology community. This could be linked to performance assessment models and results from sensitivity analyses performed with those models. This section should describe how new technologies will be integrated into the program when appropriate.

7.0 What are the Costs Associated with LTS at the Site?

7.1 Cost Estimating

This section should present the estimate for LTS cost. It should include assumptions used to develop the cost estimate, as well as assumptions for determining when sites or portions of a site will start and stop LTS activities. This requires a clear link between cost and the discussion of schedule described in Section 8.0. Content needs to link with the schedule for LTS activities, as well as the anticipated LTS scope. Discussion should include a description of the cost model used and identify those activities that are provided on a site-wide basis (e.g., site-wide fence maintenance), those activities that can be provided on a unit-cost basis (e.g., cost to monitor a single well); and those costs generated for activities at a specific portion of a site (e.g., costs associated with a specific groundwater plume, disposal cell, etc.). Costs need to be provided at a minimum of two levels: (1) a site-wide rollup of all anticipated LTS costs (annual costs), and (2) costs at the portion or activity level, depending on how the site LTS plan is organized. Note, however, that Headquarters may request information at a unit-specific level of detail in order to conduct cost analyses (e.g., costs of monitoring).

This section should include unit costs for activities, period of performance, and rolled up life-cycle cost based on individual portions and the entire site.

7.2 Funding

This section should describe the budget category and source that will fund LTS activities. If responsibility is transitioning from EM, the receiving PSO should be identified.

7.3 Financial Management

This section should describe the work breakdown structure (WBS) to be applied for budgeting and tracking costs. A standard WBS has been developed and is/will be available on the LTS website [as part of the Part III appendices].

8.0 When are LTS Activities Anticipated?

This section should present the schedule for LTS activities, including:

- Anticipated start date for whole site (if appropriate); or
- Anticipated start date, by portion, media.

Sites will need to provide justification for start dates for activities, portions, and media, as described in Part I, Section 3.0, *When Does LTS Start?* It may be more appropriate to include individual schedules throughout the LTS plan, depending on how the plan is organized. For example, each geographic area may be on its own schedule, and important decision points and key LTS activities (e.g., start and end dates) may be addressed in those sections and rolled up at the facility-wide level in this section.

This may be best illustrated through a master schedule that shows not only LTS start and stop dates, but also key decision points on decisions yet to be made that are relevant to LTS. For example, this could include dates for decision documents, dates for when facility decommissioning is anticipated, dates for transfer to/from EM program, decision points for ramping down monitoring programs, when 5-year reviews will be required, etc.

9.0 What are the Roles and Responsibilities for the LTS activities?

This section should identify key individuals or groups responsible for carrying out long-term stewardship activities for the site and its individual portions and should describe their roles and responsibilities. The intent is to clearly demonstrate that all activities have been assigned and that there is an entity responsible for each activity. This will assist stakeholders in identifying whom to contact when they have concerns and will reiterate responsibilities when stewards or other parties change in the future. The plan should include clear identification of the steward and how that position relates to regulators (who often comprise the other positions on the core team), landlords and stakeholders. In addition, when other parties will carry responsibility for performance of specific LTS activities, those parties and the scope of their responsibilities must be clearly identified (i.e., when the landlord will maintain use restrictions or regulators will monitor resource use). In addition to identifying the assignment of responsibilities, this section should also identify the communication requirements, especially the knowledge management activities associated with archiving information for future generations. Important roles and responsibilities are provided below.

10.1 Site Steward

This section should identify the site steward, including a point of contact for the site LTS activities.

10.2 LTS Management Team

This section should identify the team of decision makers for LTS activities at the site (i.e., decision makers with the authority to approve/disapprove future actions), including the role of the steward versus activities that need to be conducted by the team, including regulators, stakeholders, tribes, etc. This should include a description of activities that the team needs to be responsible for (e.g., conducting 5-year reviews), when the team needs to be notified of activities onsite, and a delegation of authority for activities. There will be a link between team responsibilities and the roles and responsibilities section.

10.3 Regulatory Lead and Oversight

This section should clearly identify points of contact at the regulatory agencies responsible for enforcing and overseeing LTS activities at the site.

10.4 Delegated Parties

For activities where DOE is delegating responsibility to someone other than the DOE, this section will include a description of who is responsible for conducting each of the following activities, including points of contact:

- Emergency Notification
- Reporting/Five-Year Reviews
- Operation and Maintenance
- Monitoring and Surveillance
- Records
- Final Site Disposition
- Documentation Requirements
- Information Management
 - Internal Policies and Procedures
 - External Policies and Procedures
- Public Participation
 - Roles and Responsibilities
 - Public Information Plan
- Records Disposition
- Science and technology review/reporting

11.0 What are the Expectations for Community Involvement?

This section should describe the plan for community involvement, including roles and responsibilities during LTS plan development, modification, and implementation. It should also include the key points at which public meetings will be held, specific activities requiring

community involvement, the extent to which DOE will rely on communities to provide assistance in maintaining controls, etc. This section should also identify specific activities, such as maintaining land use planning documents and records (e.g., historical records of community activities/populations changes, industry activities), to the extent they impact LTS planning and implementation, enforcing use and access restrictions, providing maintenance and/or surveillance support (e.g., conducting visual surveys of fences, cap integrity), and communicating to stewards any changes in land use that may impact the LTS activities (e.g., rezoning for industrial, residential use).

12.0 How Can LTS Activities be Integrated with Other Site-Wide Programs and Planning Initiatives?

This section should indicate how the LTS activities will be integrated with activities required for other obligations including:

- Land Use Management Plan
- Natural and Cultural Resources Management Plans
- Land conservation initiatives
- Land transfer/closure activities
- Interagency coordination/communication
- Ongoing operations
- NEPA activities and documentation

The purpose of this section is to recognize that there are multiple planning efforts ongoing at most DOE sites. There may be opportunities to build from existing data originally collected for other purposes, rather than have to generate the LTS plan from scratch. This does not imply that these activities/planning efforts are required as part of the LTS plan. However, depending on the site, they may be included.

Model Tables of Contents

The following two tables of contents include all elements described in this annotated outline. They are developed around two potential ways to organize the site LTS activities: (1) by geographic area, and (2) by activity. The outlines themselves are very detailed. It is not anticipated that all sites will retain the outline format to this level of detail. The level of detail provided herein is used to illustrate how the various components are linked together and the types of information that are included within each section.

Exhibit II-1: Model Template for Activity-Based LTSP Table of Contents

Introduction

- Overview of site, cleanup, LTS activities (anticipated 2-3 paragraphs)

1.0 Purpose and Scope

1.1 Objectives

1.2 Scope

1.2.1 Physical Boundaries To Which Plan Applies

1.2.2 Institutional Controls

1.2.3 Physical Barriers

1.2.4 Monitoring and Surveillance Activities

2.0 Site Description and Uncertainties

2.1 Site History

2.1.1 Former occupants or operators

2.1.2 Years of operation

2.1.3 Processes and products

2.1.4 Waste materials and contaminants produced

2.1.5 How the site was designated for remedial action

2.2 Site Location and Legal Description

2.2.1 Location of Identifiable Site Portions

2.2.2 Legal Description

2.2.3 Site Access

2.3 Regulatory Framework

2.3.1 Legal Authorities

2.3.2 Regulatory Requirements

2.3.3 Other Stewardship Requirements

2.4 Physical and Baseline Conditions

- 2.4.1 Physical Site Conditions
 - 2.4.1.1 Regional setting
 - 2.4.1.2 Demography
 - 2.4.1.3 Land use
 - 2.4.1.4 Elevation
 - 2.4.1.5 Climate and weather
 - 2.4.1.6 Geologic setting.
 - 2.1.4.7 Current Uses
 - 2.1.4.8 Potential Uses
 - 2.1.4.9 Liens and Other Property Rights
- 2.4.2 Conditions of Specific Site Portions
 - 2.4.2.1 Location
 - 2.4.2.2 Current Uses
 - 2.4.2.3 Potential Uses
 - 2.4.2.4 Liens and Other Property Rights
- 2.5 Off-site Locations and Characteristics
 - 2.5.1 Location
 - 2.5.2 Current Uses
 - 2.5.3 Potential Future Uses
 - 2.5.4 Liens and Other Property Rights
- 2.6 End State Objective
 - 2.6.1 Site Portion End States, as applicable
 - 2.6.2 Site Mission
- 2.7 Remedial Actions
 - 2.7.1 Site Portion Remedial Actions
 - 2.7.2 As-Builts
- 2.8 Records Disposition
- 2.9 Assumptions and Uncertainty Management
- 2.10 Site Conceptual Model
- 2.11 Relationship to Other Site Documents
- 3.0 Operation and Maintenance Activities
 - 3.1 Institutional Controls
 - 3.1.1 Site-wide
 - 3.1.2 Portion-specific
 - 3.2 Institutional Controls Implementation
 - 3.2.1 Site-wide

- 3.2.2 Portion-specific
- 3.3 Operations of Remediation Systems
 - 3.3.1 Methods
 - 3.3.2 Reporting Requirements
 - 3.3.3 Health and Safety
- 3.4 Maintenance of Barriers
 - 3.4.1 Methods
 - 3.4.2 Frequency
 - 3.4.3 Reporting Requirements
- 3.5 Emergency Response, Corrective Action, and Contingency Plans
 - 3.5.1 Emergency Response
 - 3.5.2 Corrective Action
 - 3.5.3 Contingency Plans
- 3.6 Health and Safety
 - 3.6.1 LTS Workers
 - 3.6.2 Other On-site Workers (including federal and non-federal tenants)
- 3.7 Land Use Planning/Implementation
 - 3.7.1 Site/Portion Land Use Maps
 - 3.7.2 Land Use Definitions
 - 3.7.3 Land Use Policies
 - 3.7.4 Land Use Management Plan
 - 3.7.5 Natural and Cultural Resources Management Plans
- 3.8 Resource Management and Personnel Training
 - 3.8.1 Human Resource Requirements
 - 3.8.2 Personnel Needs
 - 3.8.3 Skill Requirements
 - 3.8.4 Training Requirements
 - 3.8.5 Equipment and Materials Estimation
 - 3.8.6 Equipment and Materials Management Policies/Procedures
- 3.9 Costs for Operation and Maintenance Activities
- 4.0 Monitoring and Surveillance Activities
 - 4.1 Monitoring Activities
 - 4.1.1 Specific Monitoring Requirements
 - 4.1.2 Media that will require monitoring

- 4.1.2.1 Ground water
- 4.1.2.2 Surface Water
- 4.1.2.3 Air
- 4.1.2.4 Biota
- 4.1.2.5 Soils
- 4.1.2.6 Engineered Units

4.1.3 Objectives for Monitoring Program

- 4.1.3.1 Detection
- 4.1.3.2 Performance Assessment
- 4.1.3.3 Ambient Conditions

- 4.1.4 Parameters
- 4.1.5 Standards that Apply
- 4.1.6 Methods of Monitoring
- 4.1.7 Locations
- 4.1.8 Frequency
- 4.1.9 Duration and Development of Ramp Down and/or Exit Strategy
- 4.1.10 Expectations (Results of Performance Assessment)
- 4.1.11 Quality Assurance/Quality Control
- 4.1.12 Contingency Plans/Commitment to Intervene if Parameters are Exceeded
- 4.1.13 Health and Safety
- 4.1.14 Data Interpretation
- 4.1.15 Reporting and Archiving
- 4.1.16 Threshold Criteria, Contingency Plans

4.2 Portion-specific Monitoring Activities

4.3 Surveillance Activities

- 4.3.1 Types of Inspection
- 4.3.2 Objectives of Inspection Activities
- 4.3.3 Frequency
- 4.3.4 Qualification of Inspectors
- 4.3.5 Procedures
- 4.3.6 Health and Safety Requirements
- 4.3.7 Reporting Requirements
- 4.3.8 Emergency Response and Corrective Action
- 4.3.9 Quality Assurance

4.4 Portion-specific Surveillance Activities

4.5 Costs for Surveillance activities

5.0 Technology Review

- 5.1 Strategy Evaluation Policy and Procedure
- 5.2 Research and Development Needs and Activities
- 5.3 Technology Integration/Deployment

6.0 Cost and Schedule

6.1 Schedule for Long-term Stewardship Activities
6.2 Cost Estimating, Funding, and Financial Management

- 6.2.1 Funding sources
- 6.2.3 Financial Management
- 6.2.3 Cost Estimation

6.3 Schedule and Cost for LTS Activities

7.0 Roles and Responsibilities

7.1 Roles

- 7.1.1 Steward
- 7.1.2 Core Team
- 7.1.3 Regulatory Lead and Oversight
- 7.1.4 Delegated Parties

7.2 Responsibilities

- 7.2.1 Emergency Notification
- 7.2.2 Reporting/Five-Year Reviews
- 7.2.3 Operation and Maintenance
- 7.2.4 Monitoring and Surveillance
- 7.2.5 Records
- 7.2.6 Final Site Disposition
- 7.2.7 Documentation Requirements
- 7.2.8 Information Management
 - 7.2.8.1 Site characteristics and setting
 - 7.2.8.2 The location and nature of residual hazards
 - 7.2.8.3 Engineered and institutional controls used to manage residual hazards
 - 7.2.8.4 Past and present operations and activities that generated hazards and left residual hazards
 - 7.2.8.5 The regulatory and institutional framework for long-term stewardship.
 - 7.2.8.6 Identifying Long-term Stewardship Information
 - 7.2.8.7 Information Preservation
 - 7.2.8.8 Storage and Archiving LTS Records
 - 7.2.8.9 Records Retrieval
 - 7.2.8.10 Public Access Systems

7.2.9 Oversight Responsibilities

- 7.2.9.1 Internal Policies and Procedures
- 7.2.9.2 External Policies and Procedures

7.2.10 Public Participation

- 7.2.10.1 Roles and Responsibilities
- 7.2.10.2 Public Information Plan

Exhibit II-2: Model Template for Location-Based LTSP Table of Contents

Introduction

- Overview of site, cleanup, LTS activities (anticipated 2-3 paragraphs)

1.0 Purpose and Scope

1.1 Objectives (Facility-Wide)

1.2 Scope

1.2.1 Physical Boundaries To Which Plan Applies

1.2.2 Description of Individual Parcels

2.0 Overall Facility History

3.0 Physical Site Characteristics

3.1 Regional Setting

3.2 Land Use and Demographics

3.3 Climate and Weather

3.4 Geologic Setting and Regional Hydrology

3.5 Liens and Other Property Rights

3.6 Regional End State Plan

4.0 Parcels Requiring LTS

4.1 Drainage Area A

4.1.1 Portion Description and Uncertainties

4.1.1.1 History

4.1.1.2 Location and Legal Description

4.1.1.3 Regulatory Framework

4.1.1.4 Site Conditions

4.1.1.4.1 End State Objectives

4.1.1.4.2 Remedial Actions Summary

4.1.1.4.3 Chemical Characteristics

4.1.1.5 Conceptual Site Model

4.1.1.6 Assumptions and Uncertainties

4.1.2 Institutional Controls/Use Restrictions

4.1.2.1 Operation and Maintenance Requirements

4.1.2.2 Surveillance

4.1.2.2.1 Types of Inspections

4.1.2.2.2 Objectives

4.1.2.2.3 Frequency

4.1.2.2.4 Qualifications

4.1.2.2.5 Procedures

4.1.2.2.6 Health and Safety

4.1.2.2.7 Reporting

4.1.2.2.8 QA/QC

4.1.3 System Operations

4.1.3.1 Groundwater Monitoring Wells – Operation and Maintenance Requirements

4.1.3.1.1 Pumping Rates

4.1.3.1.2 Treatment Procedures

- 4.1.3.1.3 Discharge Procedures
 - 4.1.3.1.4 Routine Maintenance
 - 4.1.3.2 Groundwater Monitoring Wells – Monitoring Objectives
 - 4.1.3.2.1 Detection Monitoring
 - 4.1.3.2.2 Performance Assessment Expectations
 - 4.1.3.2.3 Ambient Conditions
 - 4.1.3.3 Groundwater Monitoring Wells – Monitoring Requirements
 - 4.1.3.4 Health and Safety for All System Operations
 - 4.1.3.4.1 Worker Training
 - 4.1.3.4.2 Work Procedures
 - 4.1.4 Cost and Schedule for Drainage Area A
- 4.2 Disposal Pit and Disposal Pit Groundwater
 - 4.2.1 Portion Description and Uncertainties
 - 4.2.1.1 History
 - 4.2.1.2 Location and Legal Description
 - 4.2.1.3 Regulatory Framework
 - 4.2.1.4 Site Conditions
 - 4.2.1.4.1 End State Objectives
 - 4.2.1.4.2 Remedial Actions Summary
 - 4.2.1.4.3 Chemical Characteristics
 - 4.2.1.5 Conceptual Site Model
 - 4.2.1.6 Assumptions and Uncertainties
 - 4.2.2 Institutional Controls/Use Restrictions
 - 4.2.2.1 Operation and Maintenance
 - 4.2.2.2 Surveillance
 - 4.2.2.2.1 Types of Inspections
 - 4.2.2.2.2 Objectives
 - 4.2.2.2.3 Frequency
 - 4.2.2.2.4 Qualifications
 - 4.2.2.2.5 Procedures
 - 4.2.2.2.6 Health and Safety
 - 4.2.2.2.7 Reporting
 - 4.2.2.2.8 QA/QC
 - 4.2.3 System Operations
 - 4.2.3.1 Groundwater Monitoring Wells – Operation and Maintenance Requirements
 - 4.2.3.1.1 Pumping Rates
 - 4.2.3.1.2 Treatment Procedures
 - 4.2.3.1.3 Discharge Procedures
 - 4.2.3.1.4 Routine Maintenance
 - 4.2.3.2 Groundwater Monitoring Wells – Monitoring Objectives
 - 4.2.3.2.1 Detection Monitoring
 - 4.2.3.2.2 Performance Assessment Expectations
 - 4.2.3.2.3 Ambient Conditions
 - 4.2.3.3 Groundwater Monitoring Wells – Monitoring Requirements
 - 4.2.3.4 Health and Safety for All System Operations
 - 4.2.3.4.1 Worker Training
 - 4.2.3.4.2 Work Procedures
 - 4.2.4 Cost and Schedule for the Disposal Pit and Disposal Pit Groundwater

4.3 Manufacturing Plant Area – Including Disposal Cell, Leachate Sump System and Groundwater

- 4.3.1 Portion Description and Uncertainties
 - 4.3.1.1 History
 - 4.3.1.2 Location and Legal Description
 - 4.3.1.3 Regulatory Framework
 - 4.3.1.4 Site Conditions
 - 4.3.1.4.1 End State Objectives
 - 4.3.1.4.2 Remedial Actions Summary
 - 4.3.1.4.3 Chemical Characteristics
 - 4.3.1.5 Conceptual Site Model
 - 4.3.1.6 Assumptions and Uncertainties
- 4.3.2 Institutional Controls/Access Restrictions
 - 4.3.2.1 Operation and Maintenance
 - 4.3.2.2 Surveillance
 - 4.3.2.2.1 Types of Inspections
 - 4.3.2.2.2 Objectives
 - 4.3.2.2.3 Frequency
 - 4.3.2.2.4 Qualifications
 - 4.3.2.2.5 Procedures
 - 4.3.2.2.6 Health and Safety
 - 4.3.2.2.7 Reporting
 - 4.3.2.2.8 QA/QC
- 4.3.3 System Operations – Disposal Cell, Leachate Sump System, Groundwater Monitoring Wells
 - 4.3.3.1 Disposal Cell – Operation and Maintenance
 - 4.3.3.2 Disposal Cell – Monitoring Objectives
 - 4.3.3.2.1 Detection Monitoring
 - 4.3.3.2.2 Performance Assessment Expectations
 - 4.3.3.2.3 Ambient Conditions
 - 4.3.3.3 Disposal Cell – Monitoring Requirements
 - 4.3.3.4 Leachate Sump – Operation and Maintenance
 - 4.3.3.5 Leachate Sump – Monitoring Objectives
 - 4.3.3.5.1 Detection Monitoring
 - 4.3.3.5.2 Performance Assessment Expectations
 - 4.3.3.5.3 Ambient Conditions
 - 4.3.3.6 Leachate Sump – Monitoring Requirements
 - 4.3.3.7 Groundwater Monitoring Wells – Operation and Maintenance
 - 4.3.3.8 Groundwater Monitoring Wells – Monitoring Objectives
 - 4.3.3.8.1 Detection Monitoring
 - 4.3.3.8.2 Performance Assessment Expectations
 - 4.3.3.8.3 Ambient Conditions
 - 4.3.3.9 Groundwater Monitoring Wells – Monitoring Requirements
 - 5.3.3.10 Health and Safety for All System Operations
 - 5.3.3.10.1 Worker Training
 - 5.3.3.10.2 Work Procedures
- 4.3.4 Contingency Plans/Corrective Action
- 4.3.5 Cost and Schedule for the Manufacturing Plant Area

5.0 Facility-Wide Roll Up

5.1 Cost

5.2 Schedule

6.0 Facility-Wide Roles and Responsibilities

6.1 Steward

6.2 Core Team

6.3 Regulatory Lead and Oversight

6.4 Delegated Parties

6.5 Point of Contact

Definitions for this Guidance will be included here.

TBD