

Long-Term Stewardship at DOE's Hanford Site - 12575

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ABSTRACT

The U.S. Department of Energy's (DOE) Hanford Site is located in southeast Washington and consists of 1,518 square kilometers (586 square miles) of land. Established in 1943 as part of the Manhattan Project, Hanford workers produced plutonium for our nation's nuclear defense program until the mid 1980's. Since then, the site has been in cleanup mode that is being accomplished in phases.

As we achieve remedial objectives and complete active cleanup, DOE will manage Hanford land under the Long-Term Stewardship (LTS) Program until completion of cleanup and the site becomes ready for transfer to the post cleanup landlord—currently planned for DOE's Office of Legacy Management (LM).

We define Hanford's LTS Program in the "*Hanford Long-Term Stewardship Program Plan*," (DOE/RL-2010-35)[1], which describes the scope including the relationship between the cleanup projects and the LTS Program. DOE designed the LTS Program to manage and provide surveillance and maintenance (S&M) of institutional controls and associated monitoring of closed waste sites to ensure the protection of human health and the environment. DOE's Richland Operations Office (DOE-RL) and Hanford cleanup and operations contractors collaboratively developed this program over several years. The program's scope also includes 15 key activities that are identified in the DOE Program Plan (DOE/RL-2010-35).

The LTS Program will transition 14 land segments through 2016. The combined land mass is approximately 570 square kilometers (220 square miles), with over 1,300 active and inactive waste sites and 3,363 wells. Land segments vary from buffer zone property with no known contamination to cocooned reactor buildings, demolished support facilities, and remediated cribs and trenches. DOE-RL will transition land management responsibilities from cleanup contractors to the Mission Support Contract (MSC), who will then administer the LTS Program for DOE-RL. This process requires an environment of cooperation between the contractors and DOE-RL.

Information Management (IM) is a key part of the LTS program. The IM Program identifies, locates, stores, protects and makes accessible Hanford LTS records and data to support the transfer of property ultimately to LM. As such, DOE-RL manages the Hanford LTS Program in a manner consistent with LM's goals, policies, and procedures.

INTRODUCTION

The U.S. Department of Energy's (DOE) Hanford Site is located in southeast Washington and consists of 1,518 square kilometers (586 square miles) of land. Established in 1943 as part of the Manhattan Project, Hanford workers produced plutonium for our nation's nuclear defense program until the mid 1980's.

The Hanford LTS Program manages land and waste sites where cleanup has been completed in accordance with the post-cleanup requirements specified in the associated decision documents. These decision documents include, but are not limited to, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) Record of Decisions (RODs) [2] and Resource Conservation and Recovery Act of 1976 (RCRA) [3] post-closure plans. In addition to managing the post-cleanup completion obligations, the Hanford LTS Program manages site natural and cultural resources in accordance with federal laws, executive orders, Tribal Nations' treaties, DOE directives and Hanford Site documents and procedures.

Figure 1 below illustrates the location and major features of the Hanford Site. In 1989, representatives from the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), and DOE signed the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement [TPA]) (Ecology et al., 1989) [4]. The TPA was established to guide Hanford Site cleanup activities with enforceable schedules and to achieve compliance with the remedial action provisions of the CERCLA, and with treatment, storage, and disposal unit regulations and corrective action provisions of the RCRA.

Hanford Site History

The archaeological record of Native American occupation of the Hanford Site stretches back thousands of years. Typical archaeological sites include open campsites, hunting/kill sites, game drive complexes, quarries, and spirit quest sites (DOE-RL-97-1047 [5], PNNL, 2002, *History of the Plutonium Production Facilities at the Hanford Site*, Historic District - 1943 – 1990) [6]. Management of cultural resources is performed in accordance with DOE/RL-98-10, *Hanford Cultural Resource Management Plan* [7].

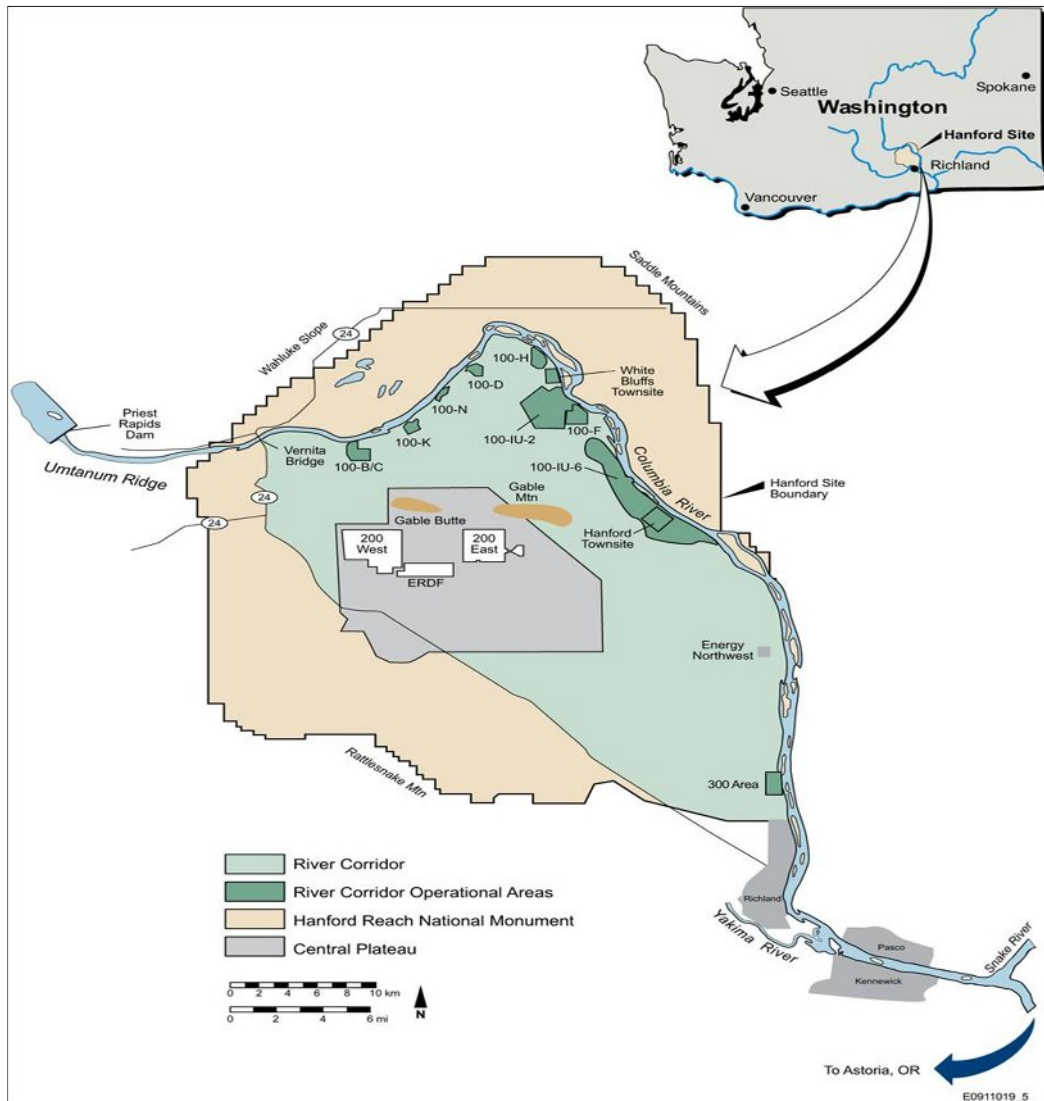
Historical activities occurring before 1943 (pre-Hanford) were limited to homestead and farming activities that included row crops and orchards. In 1943, the U.S. government obtained the Hanford Site to build plutonium production reactors as part of the Manhattan Project. The government built nine production reactors along the Hanford Reach of the Columbia River. Production continued through the mid 1980's when the government shut down the last reactor and removed its fuel.

Since then, DOE has actively engaged in demolition and decontamination, cleanup and environmental restoration at the site. As cleanup meets the conditions outlined in the interim RODs, the site will be transitioned to the Hanford LTS program until the final transfer to DOE LM or other governmental or non-governmental agencies.

Background of LTS at Hanford

Because of Hanford's size and geographic complexity, the Hanford Site cleanup is divided into three major geographic components including the Hanford Reach National Monument, the River Corridor and the Central Plateau (see Figure 1).

Fig. 1 Site location Map



1. **Hanford Reach National Monument**—The Hanford Reach National Monument cleanup component, completed in fiscal year 2011, included removal of debris piles, excess facilities and abandoned experiments. The land is owned by DOE and managed by the U.S. Fish and Wildlife Service.

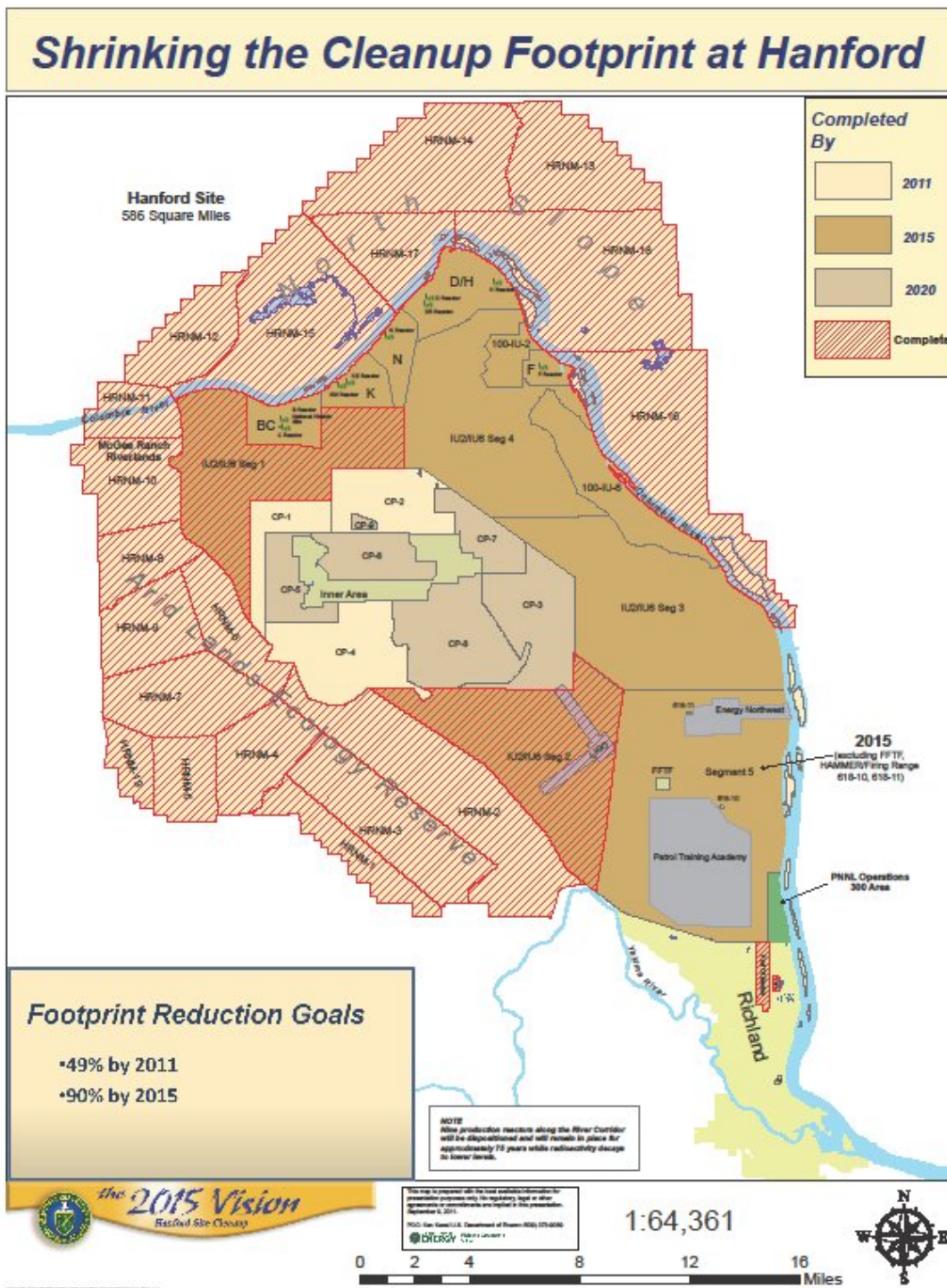
2. **River Corridor**—Completion of the River Corridor cleanup component is planned for calendar year 2015 as part of the vision 2015 for Hanford (see Figure 2). The River Corridor is being cleaned up to the criteria specified in the associated interim RODs. Currently, more than half of the River Corridor work scope is complete. Between 2012 and 2015, all segments of the River Corridor will be cleaned up consistent with the interim RODs. Groundwater remediation activities have been implemented and will continue after cleanup completion of the River Corridor component.

After completion of the River Corridor final RODs, the CERCLA process may still determine that additional cleanup is required beyond what was performed under the interim RODs. The River Corridor RODs are planned to be finalized in 2014.

3. **Central Plateau**—The Central Plateau area will be dedicated to long-term waste management and containment of residual contamination. The outer area waste sites are being cleaned to levels comparable with the River Corridor cleanup. The outer area will be cleaned up to the criteria specified in the Outer Area CERCLA ROD, with cleanup completion planned between 2015 and 2020. Completion of the inner area will follow.

The current focus of the Hanford LTS Program is to transition the River Corridor land from cleanup to the LTS Program that supports the Hanford 2015 Vision. This vision is the driving force behind Hanford's and DOE's push for accelerated footprint reduction.

Fig. 2 Hanford 2015 Vision showing Land Segments for LTS



METHOD

In order to accomplish the aggressive footprint reduction goals and accommodate the geographic diversity and cleanup schedules, DOE transitions lands to the LTS Program as they are cleaned, allowing cleanup contractors to focus on their objectives and the Mission Support Contractor to focus on Land Management, which includes LTS. Table I below identifies some of the cleanup statistics for the site. This is not an exhaustive list; however, it identifies the segments included in the River Corridor and groundwater remediation systems and wells.

Table I Information on Cleanup Activities by Segment

Segment	Total Acres	Waste Sites	Wells
Segment 1	18,161	16	124
Segment 2	20,080	5	161
Segment 3	24,483	5	262
100-F	1,149	112	144
100-K	2,218	148	230
Segment 5/400 Area	35,914	119	703
100-IU-2	1,980	1	38
Segment 4	20,181	29	183
100-B/C	2,851	116	137
100-N	2,197	171	447
100-IU-6	6,800	3	115
100-H	~3,500	~175	~444
100-D	~1,517	~70	~147
300 Area	1,030	406	228

~ Approximation due to boundary changes

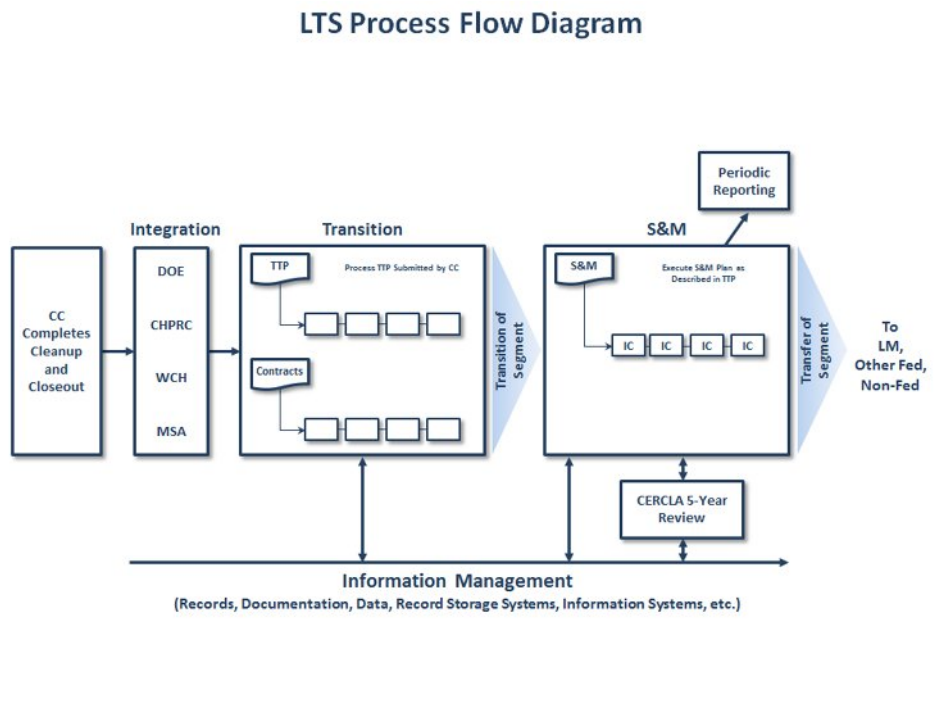
Transition to LTS

Once cleanup is complete, DOE transitions the site to the LTS program. A number of planning and guidance documents have been prepared to facilitate the transition process from cleanup to LTS. DOE-RL and MSC prepared documents that define what actions are required and how they are to be completed. The primary guiding documents include:

- DOE/RL- 2010-35 Hanford Long-Term Stewardship Program Plan
- DOE RIMS Transition of Real Property from Cleanup Project to the Long-Term Stewardship Program [8]
- MSC LTS System Description (MSC-MP 49744) [9]
- MSC LTS Transition Procedure (MSC-PRO 49715) [10]

From the planning and procedure documents, the process from cleanup through transfer to LM or other governmental or non-governmental agency is shown in the process flow map. (see Figure 3).

Fig. 3 LTS Process Flow Diagram



DOE-RL notifies the LTS Program when a segment of land is nearing “cleanup completion,” initiating the transition process. Through coordination meetings with cleanup contractors and DOE-RL, the LTS Program initiates the documentation necessary for transition to LTS. This documentation takes form as a Transition and Turnover Package (TTP). A TTP is prepared for each segment of land transitioned. While the TTP is being prepared, contract modification packages are initiated to facilitate the seamless transition of segment responsibility from the cleanup contract to the LTS contractor. When the TTP and the contract modifications are completed, the land is contractually transitioned to the LTS Program for execution that includes, but is not limited to, S&M activities of remedial actions and institutional controls defined in the respective regulatory decision documents.

IM activities are ongoing during the process to ensure that documents referenced in the TTP are identified, located, stored, protected and made accessible. These documents demonstrate the completed cleanup actions and show what, if any, residual contamination may remain.

Contractual Structure

There are five main contracts involved with the cleanup and operations of the Hanford Site. The contracts are listed below:

1. Mission Support Contract (MSC)
2. River Corridor Cleanup Contract (RCCC)
3. Central Plateau Cleanup Contract (CPCC)
4. Tank Operations Contract (TOC)
5. Waste Treatment Plant (WTP)

Most of the coordination is between the first three contractors; however, as the cleanup activity nears completion in the River Corridor and storage, cleanup, and treatment activities continue in the Central Plateau, continued coordination between all contractors is imperative to meet DOE's continued push for footprint reduction.

RESULTS

DOE transitioned the first segment of land to the LTS program in 2011. Two segments will be transitioned in 2012 and three segments including three cocooned reactor buildings in 2013. Planning for these transitions has already begun.

There are 15 key activities outlined in the DOE-RL Hanford Long-Term Stewardship Program Plan (DOE/RL-2010-35, Rev 1). They are listed in Table II below. The activities were identified based on a review of LTS activities at other sites through the DOE benchmarking efforts. MSC is responsible for executing the program in accordance with these activities. The key activities are discussed briefly in the following sections.

Table II LTS 15 Key Activities

1. Conduct administrative activities.	9. Conduct monitoring and maintenance of completed natural injury restoration projects.
2. Conduct surveillance and maintenance of physical remedies and institutional controls.	10. Ensure the safety and health of LTS workers.
3. Conduct CERCLA 5-year reviews.	11. Provide quality assurance.
4. Conduct environmental monitoring of the remedies.	12. Manage and budget necessary funding.
5. Protect and manage Site resources.	13. Interface with other Hanford Site programs.
6. Manage LTS information.	14. Interface with external entities.
7. Provide emergency services and response.	15. Continuous process improvement.
8. Manage post-cleanup completion infrastructure.	

Conduct Administrative Activities

Administrative activities include, but are not limited to, managing the program, overseeing the program to ensure execution of all the LTS elements (as defined in subsequent sections), identifying, scheduling, and coordinating resources, budgeting and cost estimating, developing

the baseline and managing baseline changes, as well as measuring performance. The MSC LTS Program works closely with other components of the MSC's land management organization to ensure the LTS activities are aligned with land management activities.

Surveillance and Maintenance of Physical Remedies and Institutional controls

The Hanford LTS Program conducts S&M of the physical remedies and institutional controls to ensure continued protection of human health and the environment. S&M of the physical remedies and institutional controls enables DOE-RL to verify that the remedies remain effective and that the institutional controls remain in place. The MSC LTS Program develops an S&M plan for each segment as a part of the TTP. The S&M plans include information regarding the post-cleanup requirements and how they will be performed. The S&M plans for segments cleaned up to interim action ROD requirements include the interim S&M activities—S&M plans for segments cleaned up to final action ROD requirements include the final S&M activities.

The MSC LTS Program also manages DOE/RL-2001-41, *Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions* (IC Plan) [11], which describes the institutional controls for the current CERCLA response actions, including how the institutional controls are implemented and maintained. DOE/RL-2001-41 also serves as a reference for selecting institutional controls in the future. The MSC LTS Program typically updates the IC Plan within 180 days after new CERCLA or RCRA decision documents requiring institutional controls are issued.

Conduct CERCLA Five-Year Reviews

The MSC LTS Program works with the MSC Energy and Environmental Services organization to support DOE in the CERCLA five-year review process. The reviews are conducted in accordance with DOE guidance, Title 40, *Code of Federal Regulations* (CFR), Part 300.920, "National Oil and Hazardous Substances Pollution Contingency Plan," [12] requirements, and U.S. Environmental Protection Agency (EPA) guidance.

In this process, MSC and the other site contractors evaluate the performance of the selected remedies to determine if they are protective of human health and the environment. Additionally, they verify that immediate threats have been addressed and that the selected remedy will be protective when complete. The review may result in the conclusion that the remedy is protective and no further action is necessary. Alternatively, the review may result in the conclusion that further evaluation is needed. The latest five-year review was completed in 2011.

Conduct Environmental Monitoring of the Remedies

The MSC LTS Program works with the MSC Energy and Environmental Services organization to conduct environmental monitoring of the remedies as appropriate. Such activities include monitoring ecological receptors (e.g., wildlife, vegetation), as prescribed by the remedies in the cleanup decision documents or if required by federal and state requirements and regulations for releases and the potential transport of radioactive material and hazardous contaminants. Environmental monitoring requirements for each segment are identified in the corresponding

S&M Plan. Groundwater monitoring activities are included under the MSC's LTS work scope; however, those activities are currently performed by the Central Plateau Cleanup Contract.

Protect and Manage Site Resources

Site resources are managed and protected at the Hanford Site through the use of resource management plans and area management plans within the framework of the Comprehensive Land-Use Plan. These resource management plans have been developed to protect and provide the policies, goals, and objectives for the management of the Site's biological, natural, and cultural resources. These plans address the ongoing surveillance, protection, and controlled use of the site's resources. The Hanford LTS Program is an active component to work with the resource and environmental monitoring programs to ensure the ongoing protection of the Site resources.

Manage LTS Information

The objectives of information management for the MSC LTS Program are to identify, locate, store, protect and make accessible Hanford LTS records and data. Records and data transitioned to the MSC from the cleanup projects are provided with each TTP.

The MSC prepared the *Long-Term Stewardship Information Management Program* (HNF-50340) [13] to establish procedures to meet the program objectives. This plan adheres to national regulations including the National Archives and Records Administration and DOE Orders. It is the goal of the LTS Program that LTS records be retained in electronic format, when possible, and stored in a single location for easy access. To that end, the program has set up a records storage area to capture electronic versions of all information sources referenced in the TTPs.

Provide Emergency Services and Response

The MSC LTS Program works with other MSC organizations that provide emergency services and response, including the following activities:

1. Emergency management
2. Notification to DOE and regulatory agencies
3. Safeguards and security
4. Fire and emergency response
5. Responding to previously undiscovered contamination.

With the exception of Number 5, each service provider follows established procedures for handling emergencies. Examples of situations potentially applicable to LTS include the deterioration of a physical control beyond predicted levels, extreme weather conditions, and natural disasters. Safeguards and security provides Site perimeter protection and is the first line of defense in protectiveness of human health by restricting access.

If previously undiscovered contamination is identified (Number 5 above), the MSC LTS Program works with the MSC Emergency Services to address immediate safety needs. The MSC LTS

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Program notifies DOE of the discovery and works with DOE to notify the appropriate entities, including the regulatory agencies (e.g., EPA and Ecology). If a new waste site is discovered during LTS, MSC adds the new site to a punch list in the associated TTP. Punch list items are formally tracked to disposition by the LTS team.

Manage Post-Cleanup Completion Infrastructure

Post-cleanup completion infrastructure is necessary to ensure sufficient access and support remains for S&M activities. This infrastructure includes site roads, facilities, and utilities. It also includes services required to ensure protection of government property (e.g., emergency response, waste management, power, water). The Hanford LTS Program coordinates with the Site Infrastructure and Logistics organization to ensure that the minimum infrastructure requirements are available to support LTS and that they will be maintained.

Conduct Monitoring and Maintenance of Completed Natural Resource Injury Restoration Projects

The Natural Resource Injury Assessment process is separate from the Hanford LTS Program; however, the Hanford LTS Program's activities include the monitoring and maintenance of completed natural resource injury restoration projects.

Ensure the Safety and Health of LTS Workers

LTS activities fall under the auspices of the MSC safety program and are executed to keep workers safe. DOE's Integrated Safety Management System (ISMS) extends to all LTS activities. The MSC contractor is certified as a Voluntary Protection Program (VPP) Star status engaging workers to work safely towards a goal of zero accidents.

Provide Quality Assurance

The MSC LTS Program engages the MSC Quality Assurance organization to support quality assurance in accordance with MSC-MP-599, Quality Assurance Program Description (QAPD) [14]. The QAPD is applied on a graded basis to LTS activities to ensure such activities meet or exceed the applicable requirements.

Manage and Budget Necessary Funding

DOE is responsible for requesting funds necessary for conducting LTS activities through the annual budget process. The MSC LTS Program supports DOE in developing cost estimates used for planning and budgeting.

As requirements are identified, the MSC LTS Program incorporates the cost estimates for these requirements and any consequential issues into the existing program. During the transition of segments from the cleanup projects to the LTS Program, the respective cleanup contractors are responsible for costs of their transition activities.

Interface With Other Hanford Site Programs

Interfacing with other Hanford Site programs including the RCCC, CPCC, TOC and WTP is done to ensure a smooth transition from cleanup to LTS. Additionally, consulting with Tribal Nations and interfacing with EPA, Ecology, state and local governments, and stakeholders support LTS objectives and the 2015 vision.

The Hanford LTS Program works closely with the cleanup projects to develop the schedule for transition of areas of the Hanford Site, including interim S&M activities. This integration also is critical during the CERCLA five-year review to evaluate effectiveness of remedial actions.

Interface with External Entities

External entities that operate at the Hanford Site include:

- *USEPA and Washington State Department of Ecology* are primary regulatory agencies for which the LTS program interacts.
- *The U.S. Fish and Wildlife Service (USFWS)* that is responsible for the management of a significant portion of the Hanford Reach National Monument.
- *US Ecology Inc.*, operates a commercial, low-level waste disposal facility on site.
- *Energy Northwest* operates the Columbia Generating Station, a commercial nuclear power plant.
- *Bonneville Power Administration* is responsible for the operation of the electric power substations and transmission lines that cross the Hanford Site.
- *The Laser Interferometer Gravitational Wave Observatory (LIGO)* is an onsite facility designed to observe gravitational waves of cosmic origin. LIGO is operated by the California Institute of Technology and the Massachusetts Institute of Technology for the National Science Foundation.

Access agreements, easements, institutional controls, and land-use restrictions are a vital component of the post-cleanup requirements, as well any existing LTS-type requirements included in permits, agreements, or leases. The Hanford LTS Program ensures that LTS requirements are included in real estate instruments (e.g., lease, license, and permit).

Continuous Process Improvement

As a new, dynamic, and flexible program, the Hanford LTS Program addresses issues, using ISMS principals, as they arise and incorporates lessons as they are learned. The process includes continual evaluation of performance and seeks ways to improve. To date, improvements have been made through a formal Lessons Learned workshop that took place during the transition period for Segment 1.

The workshop involved team members from the MSC, DOE-RL and the cleanup projects. We directly applied ideas generated at this workshop to the first revision of program documents and it led to the elimination of one document—a 20 percent reduction. As the LTS Program

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matures, we will garner ideas from LM sites, other federal government sites (e.g., Department of Defense sites), and the Hanford LTS team.

DISCUSSION

While conceived several years ago, we defined the Hanford LTS Program in 2011. As a new program, the challenges are many. The complexity of the program is enhanced by the sheer size of the Hanford Site and the multiple contracts and contractors operating there. The challenges are easily defined into two categories—operational and financial.

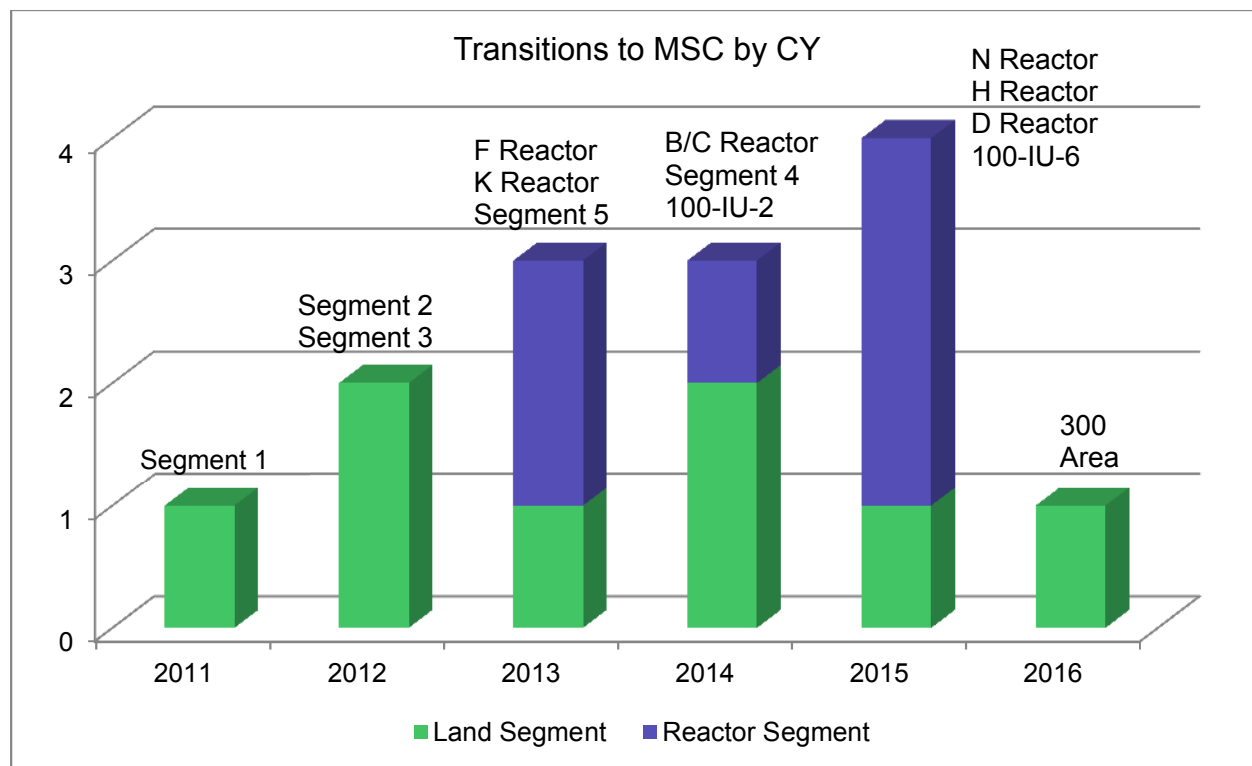
Operational challenges include starting a new program with the required planning documents. It also included educating personnel from other Hanford Site Programs on those requirements, aligning internal (MSC) organizations and external entities on roles and responsibilities, and then working through the associated contractual issues that arise. An extra challenge was maintaining the schedule between three primary contracts on document production and revision.

Mitigation actions used to meet these challenges include using Integrated Project Teams (IPT) of Subject Matter Experts (SME) at the contractor and DOE-RL level to build the program documents and develop roles and responsibilities. By involving the IPT and SMEs early, the program benefited from getting it close to right the first time. We minimized learning curves and we furthered the educational process by having people engaged. Holding the Lessons Learned workshop during Segment 1 allowed immediate improvement in the Segment 2 TTP and provided valuable ideas for the revision of program documents. The IPT that meets weekly also reviews the integrated schedule for segment transition and TTP preparation (see Figure 4). Reviewing the schedule progress weekly provides team focus and early detection and resolution of operational and financial issues.

Financial challenges include estimating tasks that have not been completed to date at Hanford and starting a new program in today's shrinking budget reality.

Mitigations to meet the financial challenges include engaging the other Hanford Programs and the IPT to effectively scope upcoming activities necessary for executing LTS. Looking forward and involving team members allows a more complete scope of work and schedule of activities. We will prepare a life cycle baseline in 2012 to establish the baseline for the remaining contract period and for the LTS lifecycle through 2060, when the land is expected to transfer to LM.

Fig. 4 Schedule of Segment Transition



REFERENCES

1. DOE/RL-2010-35, Hanford Long-Term Stewardship (LTS) Program Plan
2. Comprehensive Environmental Response, Comprehensive and Liability Act of 1980 Record of Decisions
3. Resource Conservation and Recovery Act of 1976
4. *Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)* Ecology et al., 1989
5. DOE/RL-97-1047, *History of the Plutonium Production Facilities at the Hanford Site Historic District*
6. PNNL, (2002), *History of the Plutonium Production Facilities at the Hanford Site, Historic District – 1943-1990*
7. DOE/RL-98-10, Hanford Cultural Resource Management Plan

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8. DOE RIMS Transition of Real Property from Cleanup Project to the Long-Term Stewardship Program
9. MSC-MP 49744, MSA System Description
10. MSC-PRO 49715, MSA Transition Procedure
11. DOE/RL-2001-41, *Sitewide Institutional controls Plan for Hanford CERCLA Response Actions*
12. Title 40, *Code of Federal Regulations*, Part 300.930, “National Oil and Hazardous Substances Pollution Contingency Plan”
13. HNF-50340, *Long-Term Stewardship Information Management Program*
14. MSC-MP-599, Quality Assurance Program Description