Operational Stewardship Program Development and Execution Lawrence Livermore National Laboratory – ABSTRACT #16353

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ABSTRACT

As LLNL carries out its national security missions, the Laboratory strives to ensure its facilities portfolio meets the latest technologies and enables infrastructure needs. Among the identified Science, Technology & Engineering (ST&E) areas that constitute strategic priorities, state-of-the-art facilities are needed to allow LLNL to draw collaborative partners required to advance capabilities and provide the requisite world-class forensics support in nuclear threat countermeasures.

Efficient utilization of existing facilities presents a unique challenge given the advanced age and unique mission design of many of LLNL's facilities. A strategy developed in 2007 sought to focus key reinvestments into enduring facilities while strategically migrating personnel and operations out of past mission facilities with the intent of closure and final Transition & Disposition (T&D).

At the time, LLNL lacked processes or procedures that met the continually changing facility mission and objectives needs. A comprehensive approach was needed to provide the framework to guide decisions along the entire life cycle of a project and/or facility. The development of an Operational Stewardship Program began in 2012 which outlines the process, and roles and responsibilities, in changing facility status to ensure good stewardship, accountability, and management and utilization of facilities. Further emphasizing LLNL forward actions, the 2015 NNSA sponsored Excess Contaminated Facilities Working Group charted the development of a common, Department-wide methodology for determining costs and risks. In December 2015, the complete Operational Stewardship Program was approved for implementation by LLNL senior management.

INTRODUCTION

Out of strategic direction, LLNL's legacy facility portfolio continues to grow. In 2013, LLNL reported to have 44 facilities classified as "legacy process contaminated" requiring $2M annual costs in surveillance and maintenance.[1] To curb the unguided utilization and transfer of facilities with risks and liabilities, and ongoing substantial stewardship costs, a number of actions have been taken. A primary objective for the establishment of the Institutionally Managed Facilities (IMF) Organization in 2006 was to close down and bring under one oversight organization facilities deemed to have passed beyond useful life due to past program contamination, escalating costs, those ill-configured for today's R&D

needs, and general obsolescence, amongst other evaluation means. The initial foundation was to develop parameters of how LLNL sought to cost effectively, risk aware, and strategically develop its operational oversight program, further refined as Operational Stewardship. Operational Stewardship thus employs a philosophy of concept-to-close-out life cycle lines of responsibility.

Strategic actions of the Operational Stewardship Program include:

- Ensure LLNL's compliance with all Federal, State and regional policies, procedures, laws and regulations.
- Ensure LLNL's timely response to NNSA and DOE Livermore Field Office (LFO) directives.
- Apprise Laboratory management of risks and consequences.

LLNL's now established Operational Stewardship Program defines life cycle stages along facility and/or mission lines, closely aligned with responsibilities and financial obligations as represented by Fig. 1.

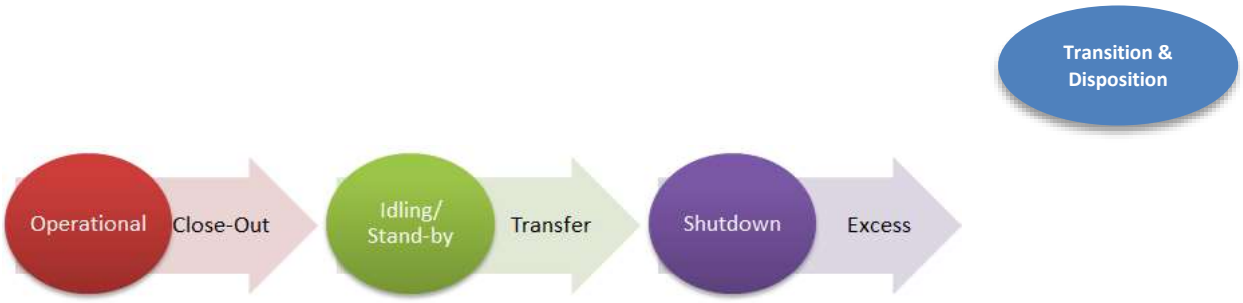

Fig. 1. Stable vs. Transitory States of a Facility

OBJECTIVES OF OPERATIONAL STEWARDSHIP PROGRAM

As LLNL's facility portfolio ages and missions change, LLNL is faced with ensuring current and emerging mission needs are met through the evolution of existing facilities and supporting new construction while managing costs, risks and priorities. Key to strategic and tactical planning is anticipating mission needs in context of bounding limitations such as developable sites and funding.

Considerations of facilities long-term viability:

- Facility Condition Index (FCI) – Replacement plant value in relation to required maintenance and capital investments
- Space Utilization Index (SUI) - Office + Office Support Net Square Feet (NSF)/Office Population Headcount
- Occupy-able footprint – Conditional statement regarding the viability of the facility to support mission operations, e.g. no heat due to decommissioned non-compliant boiler

- Mission Obsolescence – Facility is not easily or cost effectively reconfigured for a new mission due to unique design build
- Legacy contamination – Process contamination beyond reasonable cost to remediate
- Emerging mission strategic planning – Facility is located on a site slated for redevelopment

Absent of planning expectations, LLNL for the most part had been delivering on near and relatively close anticipated facility needs with a limited linear methodology of; request -> response -> action. The need for developing a comprehensive life cycle approach grew out of necessity to:

- Curtail or limit the risk and costs associated with existing missions loosing funding with contaminated facilities being returned to the Institution for stewardship
- Develop long range planning and funding strategies
- Establish clear expectations

Yet within the developmental framework, LLNL did establish additional working level expectation parameters:

- Current Programs to be accountable for past mission contamination
- Not to constrict inter-organization collaborations
- Able to evolve over time
- Be a negotiated, graded approach to life cycle management
- Provide guidance
- Capture going forward management expectations/documentation
- Develop site level stewardship responsibilities
- Strengthen continuing informed conversations with Headquarters (HQ)

Fig. 2 illustrates the various LLNL categorized Operational Stewardship states of a facility's life cycle. The attributes outline the general scope from inception of a mission need, through the useful life of the facility, to final remediation.

Fig. 2. Operational Stewardship Life Cycling

Facility Status Overview

For each Operational Stewardship attribute, LLNL has developed definitions and expectations to guide users through their roles and responsibilities.

Operational

The most common state for facilities is Operational. This phase includes project execution up to and including close-out of the space. Mission status can change due to change of scope, sponsor redirection, or other factors. During this phase, it is the responsibility of management authorizing the operations to ensure the operation is properly managed per ES&H, property management, and other applicable requirements. The Facility Manager remains responsible for ensuring the facility safety envelope is maintained.

Idling of an Operation

An operation or space is in idling status when its previous project has ended, the project-related materials and chemicals have been removed and contamination (if any) has been addressed. The space is ready for a new operation. When an operation transitions into idling status, the current authorizing organization, in conjunction with the Authorizing Individual/Responsible Individual (AI/RI) will take measures to ensure the safe stabilization of the operation, and will contact the ES&H Team to develop a monitoring plan, if needed.

Stand-By of a Facility

A facility is in stand-by status when it is no longer supporting active operations. The facility is temporarily not in use, but appropriate maintenance measures have been taken to maintain essential operating systems in a state of readiness. When a facility transitions into stand-by status, the current tenant, in conjunction with the Facility Manager, will take measures to ensure the safe stabilization of the facility. The ES&H Team will be contacted to develop a monitoring plan, if needed. Facilities in stand-by status are reviewed annually by management, for example using the Space Utilization verification process.

Re-Purposing

Re-purposing occurs when the current engineered design of the space (or facility) is significantly modified for a different use. Under these or similar situations, it is the responsibility of the authorizing organization of the operation, or the primary tenant of the space to ensure the transition is managed according to established ES&H and Roles & Responsibilities procedures.

Space Close-Out

When no future use for space(s) in a facility is expected, the space(s) can be considered for a facility stand-by status. This stage typically applies to concurrent blocks of spaces up to and including the entire facility. For process contaminated facilities or operations where the mission and/or funding have ended, the relevant aspects of Idling of an Operation or Stand-By of a Facility must first be met. In addition:

- The exiting organization authorizing the work prior to the funding or mission change remains financially responsible for maintaining compliance with ES&H requirements and the Authorization Basis. This will continue until/unless the remaining process-induced hazards and equipment are negotiated and formally transferred to another organization.
- The organization authorizing the work prior to the funding or mission change is responsible for appropriate disposition of all non-fixed equipment and material (e.g., waste, equipment transfer, excess materials, etc.) and reconciling accountable equipment and material within the respective tracking systems
- If the close-out process cannot be completed due to unresolved action(s) by the current owner, then the organization authorizing the work prior to the funding or mission change must document actions to be performed, with Line Management's concurrence, including a Proposed Action and due date. The current owner is the Action Owner responsible for closing out the actions.

Facility Transfers

A transfer may be a transition of space between two active Programs, or a transfer from a Program to the IMF Organization with the intention of shutdown. Transfer of facilities between managing organizations, or back to the Institution, is managed using LLNL's facilities management transfer tracking system and facilitated by the IMF organization.

Facility Shutdown

The Facility Manager or Facility Point of Contact (FPOC) (if delegated) takes the steps outlined in the, Shutdown, Surveillance, and Maintenance Plan (SSMP), as appropriate, to develop a facility SSMP for extended shutdown. The facility SSMP describes key surveillance actions that are associated with the space proposed to be shut down. Surveillance ensures the protection of workers and the public by demonstrating compliance with ES&H requirements, identifying problems requiring corrective actions, and determining the space's current environmental, radiological, and physical condition.

Historically, LLNL has experienced degrading roofs due to lack of funding for repairs or replacement. The Facility Manager is responsible for monitoring roof leaks. This has prompted the need for "Rainy Day" walks. Which involves walking the facility at each rainfall, on and off regular business hours. The consequence of not monitoring rain activities and/or a roof repair is the potential of electrical fire, potential spread of contamination within and to the exterior of the facility requiring enhanced ES&H oversight, water accumulation in pits requiring Radioactive & Hazardous Waste Management (RHWM) support. These additional oversight activities place an undue burden on our limited budget.

The Asset Management Program (AMP) funds prioritized repair and replacement of major building systems that are common across the NNSA enterprise (e.g. roofs, heating, ventilating, air-conditioning [HVAC]). Due to the severe degradation of roofs, the AMP program is funding a Life Extension on our most highly contaminated facilities.[2]

Space Transitioning and Dispositioning

The primary objective of a facility SSMP is to bring each space to its lowest cost while ensuring required safety controls are maintained. In addition, various Real Property and Asset Management (RPAM) and National Fire Protection Association (NFPA) requirements must be met until T&D has been completed for the facility. Subset within are what have been deemed Legacy Encumbered facilities; those requiring significant facility and ES&H oversight to ensure containment, monitoring and limited remediation of legacy contamination.

Long-term stewardship (LTS) activities are required to protect human health and the environment from hazards remaining after cleanup is complete. When process contamination is left in place, risk is managed by preventing exposure pathways from being complete. LTS encompasses those activities necessary to maintain discontinuity in the exposure pathways. Activities include access control, operation, maintenance, and monitoring of physical and institutional controls, information management, and related functions applied to engineered units containing wastes, residually contaminated ground water, surface water bodies and sediments, soils, and stabilized contaminated facilities.

In general, the LTS program objectives are to:

- Protect workers, the public and the environment from existing hazards and those which may develop over time or under various consequence scenarios.
- Ensure hazards are quantified and managed appropriately.
- Provide an informed platform from which to develop disposition and stewardship actions.
- Provide a foundation to develop near and long-term disposition strategies.
- Provide founded risk-/cost-base information to management in support of strategic decisions:
    - cost vs risk gradient
    - ongoing cost vs T&D cost gradient

LTS priorities include:

- Quantification of Action Priority – derived primarily from historical data, known issues, current cost models and extrapolation of consequence scenarios.
- Qualification of Action Priorities – developed risk/cost matrix.
    - Health consequence – Exposure potential if legacy hazard containment is not maintained or fails.
    - Political consequence – Could result in inflammatory/negative press if surveillance, containment or stabilization processes fails.
    - Cost acceleration – Remediation, waste disposal, and/or demolition costs are anticipated to accelerate. Inter-relation of cost to maintain surveillance, RPAM and NFPA requirements.
- The target LLNL facility footprint is that of a right-sized enduring portfolio that supports current and planned near-term mission objectives.
- Utilization of each facility has been optimized within constraints of security classifications and mission segmentation.
- Costs have been stabilized to maintain enduring facilities at standards expected of a world-class research institution.
- LLNL's site redevelopment master plan is supported ensuring ongoing mission success and the evolution of new facilities to support emerging missions.

Strategic actions for T&D include:

- energy and maintenance cost reduction actions,
- access control,
- T&D preparatory characterization,
- building systems isolation, and
- risk reduction actions.

In those instances, when the managing organizations demonstrates there are no viable Sponsor/Program funding for currently assigned space, that portion of the building becomes the responsibility of the Institution. At that time the managing organizations may seek Institutional financial support after consultation with the Chief Financial Officer (CFO) for a funding determination, or transfer the space to Institutional stewardship after performing project conclusion and close-out in accordance with Idling/Stand-By and Close-Out of Space expectations.

It is possible to transfer the space to the Institution without close-out via arbitration. Arbitration requests are to be made by LLNL's governance structure in conjunction with the IMF organization.

Deactivation, transitioning, and dispositioning operations (including activities and experiments), where required, will be accomplished in accordance with T&D preparation expectations.

Excess and Legacy Management

It is assumed that a facility in excess status will not be reactivated. Maintenance on these facilities should be kept to a minimum. Only essential ES&H equipment should be maintained to protect workers, the public, and the environment. LLNL, as an NNSA M&O Partner, has the responsibility to ensure the safe and complaint stewardship of these facilities while awaiting direction and funding from NNSA and/or EM.

- Transfer of process contaminated facilities from NNSA to EM was discontinued in 2001. [1]
- In 2015, NNSA directed the sites to take on the responsibility for non-process contaminated facilities less than $10M, placing an additional burden on the site funding resources. [2]
- In support of the Secretary's direction that Deferred Maintenance (DM) not increase in 2016, the sites are to identify any equipment no longer needed and not to be maintained. Only safety systems needed to keep the facility safe and to support eventual disposition are to be reported as DM. [2]

The managing organization is responsible for ongoing use of a facility (e.g., authorization of work, access control, space utilization). As Directorate needs change, the managing organization may choose to close out, transfer, or shutdown a facility. All accountable, fixed programmatic property is reviewed and retired as appropriate as "real-related." Throughout the life cycle, all idle, non-essential, and

excess contaminated items, equipment, and non-fixed generated waste items are to be properly disposed of in accordance with ES&H requirements.

Characterization

In-depth characterization is conducted in process contaminated legacy closed facilities. "The process of characterization begins with the use of existing knowledge of the facility and its radiological and/or hazardous chemical material inventory. Reliance on 'existing' information is treated with caution, especially for facilities that have not been in operation for a long period of time." [3]

Data gathering actions:

- Review existing facility knowledge by collecting and reviewing available facility information (Authorization Basis Documents, ES&H documents, Facility Safety Plans, Integrated Safety Worksheets). [3]
- Conduct interviews of past employees, ES&H, RHWM, to supplement knowledge of past operations, including Lessons Learned and incidents. [3]
- Identification and documentation of hazards (chemical, radioactive, and others). Attention to be paid to hazards that can affect resulting conditions such as the effect of a contaminated exhaust system, fume hoods, or other suspect contaminated systems becoming static. [3]

Based on the results of these actions, the need for intrusive characterization (sampling and analysis) may arise when knowledge of hazards is insufficient to identify hazardous material types, quantities, forms, potential exposures, locations and methods for hazard reduction or removal. [3]

Data will inform future T&D planning, refine T&D estimates, ongoing risk consequences, and present opportunities for DM reduction. Further characterization will not eliminate the risk, but will influence management strategies regarding risk/consequence scenarios.

An additional objective is to clarify areas of risk and response mitigation efforts while under stewardship watch. Program performed process close-out sampling and characterization data is sufficient for general stewardship but is not sufficient as a complete T&D sampling profile or response to catastrophic failure/release.

Increased characterization data knowledge is valuable for response scenario planning and actions as these facilities continue to degrade, experiencing significant roof and safety system failures.

Site Remediation

Cleanup work at DOE's sites is governed by one or more regulatory agreements or orders that establish the scope of work to be performed at a given site and the dates by which specific cleanup milestones must be achieved. [1] LLNL has been declared a Superfund cleanup site regulated under CERCLA. As such LLNL primarily

follows the CERCLA requirements and as applicable, portions of RCRA. A number of facilities at LLNL have been taken down to grade but still require significant surface to sub-surface remediation. While awaiting funding, LLNL provides monitoring, surveillance and access control to these areas and in some limited cases, site ground water treatment.

CONCLUSION

The implementation of life cycle planning and LLNL's Operational Stewardship Program has begun to shift responsive actions to strategic and tactical planning. Through procedural expectations and guidelines, LLNL's process forward is aligning with mission and NNSA directives. Having clearly documented guideposts has facilitated strong conversations with the Programs and Institution as to where resources should be allocated and the challenges for evolving and new missions. Yet, lacking substantive funding to manage legacy facility issues, facility life cycle end state issues continue to be financial and risk challenges. Newly established programs through NNSA have great promise is addressing many of these concerns.

REFERENCES

1. DOE GAO-15-272, "DOE Facilities: Better Prioritization and Life Cycle Cost Analysis Would Improve Disposition Planning," pp. 2, 9, 18, Report to the Committee on Armed Services, U.S. Senate (March 2015).
2. NNSA Office of Safety, Infrastructure, and Operations, "Program Management Plan," pp. 13, 25, 33, 55, (September 2015).
3. A. SZILAGYI and G. BRIN, "Operations to Disposition: The Final Steps of a Facility's Operational Phase," Waste Management 2000 Conference, Tucson, Arizona, February 27-March 2, 2000.

ADDITIONAL BIBLIOGRAPHY

- DOE G 430.1–2, "Implementation Guide for Surveillance and Maintenance during Facility Transition and Disposition," (September 1999).
- DOE G 430.1–3, "Deactivation Implementation Guide," (September 1999).
- DOE O 430.1B Chg 2, "Real Property Asset Management," (April 2011).
- LLNL Description Document DES-5001, "Shutdown or Transfer of Facilities, Operations or Associated Equipment," (December 2014).
- LLNL ES&H Manual Document 12.8, "Decontamination and Disposition of Process-Contaminated Facilities and Associated Equipment," (October 2014).