Life-Cycle Baseline Customization for the Formerly Utilized Sites Remedial Action Program - 20304

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ABSTRACT

One of the responsibilities of the federal government is to estimate sound and defensible life-cycle baseline costs for use in federal budget estimates and to meet federal financial reporting requirements. To accomplish this, the US Department of Energy (DOE) Office of Legacy Management (LM) and the US Army Corps of Engineers (USACE) have partnered together to ensure that the liabilities documented in each Formerly Utilized Sites Remedial Action Program (FUSRAP) site's life-cycle baseline are specifically tailored. FUSRAP was created in the mid-1970s to clean up radiological contamination resulting from the early development of nuclear weapons. DOE was responsible for FUSRAP until October 1997, when Congress transferred the administration and execution of FUSRAP site cleanups to USACE. By 1997, DOE had completed the cleanup of 25 of the 46 sites that were active within the program and had begun cleanup at 13 additional sites. USACE was assigned responsibility for the cleanup of the 21 remaining FUSRAP sites, and at 8 additional sites that had since been referred for cleanup.

The LM mission for the FUSRAP sites is to perform long-term surveillance and maintenance (LTS&M). Currently, LM provides long-term stewardship for 34 completed FUSRAP sites. Another 20 sites are under active remediation by USACE. Within the last 5 years, USACE has completed the cleanup at five FUSRAP sites and the LTS&M responsibility has been transferred to LM. In the next 8 years, USACE will compete remediation at eight additional sites and LTS&M for those sites will transfer to LM. Because responsibilities for the FUSRAP sites transfer between USACE and LM upon completion of remedial actions, both agencies maintain life-cycle baselines for different stages of the project and both must have a strong understanding of the needs and requirements for each site. This understanding ensures that the life-cycle baselines form a complete and accurate picture of what is required for the site and for the FUSRAP program.

LM focuses on several things when customizing the life-cycle baseline estimates for the FUSRAP sites, including (1) Understanding the unique requirements for each site. By reviewing site-specific documents prepared by USACE, such as Feasibility Studies and Records of Decision, and partnering with USACE to gain additional insight about site conditions and requirements for stewardship, as well as potential risks, LM can better develop the life-cycle baselines. (2) Developing site-specific labor breakdowns. This ensures the required labor mix is baselined for specific activities by comparing the labor mix required to perform activities at (a) other LM-managed FUSRAP sites and (b) non-FUSRAP LM sites and (c) by USACE at active FUSRAP sites. (3) Taking a tiered approach to life-cycle baseline planning. Estimates for sites transferring to LM in the near term (5 years) are more definitive than for sites transferring in the out-year period. Remedial actions at the near-term sites are at or near completion, providing LM a strong understanding of the LTS&M requirements and remaining liabilities. This in turn allows for site-specific customization of the baseline. (4) Using a robust risk management approach to ensure that liabilities specific to each site are identified, evaluated by probability and severity, and documented in relation to the impact to cost or schedule.

To ensure the most accuracy within all the baselines, the FUSRAP life-cycle baselines are updated as needed to support program, project, and contract management needs.

INTRODUCTION

The Formerly Utilized Sites Remedial Action Program (FUSRAP) was initiated in 1974 by the former Atomic Energy Commission (AEC). FUSRAP's mission was to identify, evaluate, and clean up or control sites where residual radioactivity remains from Manhattan Engineer District/AEC contract activities. Initial FUSRAP efforts were spent on researching locations where private sector work had been contracted. AEC then conducted radiological surveys at some of the sites to determine if the levels of contamination were above current standards. AEC investigated over 600 locations, of which 46 sites in 14 states were designated for remediation through FUSRAP. Several of the sites had processed radioactive materials commercially, rather than for AEC, but nevertheless were designated for remediation by the US Department of Energy (DOE) at the request of Congress. AEC remained solely responsible for FUSRAP activities until it was abolished by Congress in 1975. Two years later, the Department of Energy Organization Act of 1977 placed all FUSRAP responsibilities under the control of DOE.

DOE began performing remedial actions at certain FUSRAP sites in 1979, using limited authority granted under the Atomic Energy Act of 1954 [1]. By the fall of 1997, DOE had completed cleanup at 25 of the 46 sites that were active within the program at the time [2]. These were generally privately owned metal casting, machining, or research facilities and were typically remediated to promulgated standards that allowed for unlimited use and unrestricted exposure (UUUE). UUUE is the level of cleanup at which there is an acceptable level of risk through all exposure pathways and under all land-use scenarios [3].

On October 13, 1997, management of cleanup of the FUSRAP sites was transferred to the US Army Corps of Engineers (USACE) under the Energy and Water Development Appropriations Act of 1998 [4,5], and USACE assumed responsibility for the cleanup of the remaining 21 FUSRAP sites. Since that time, eight additional sites that have been determined to be eligible for the program. Figure 1 shows the FUSRAP sites as of September 30, 2019.

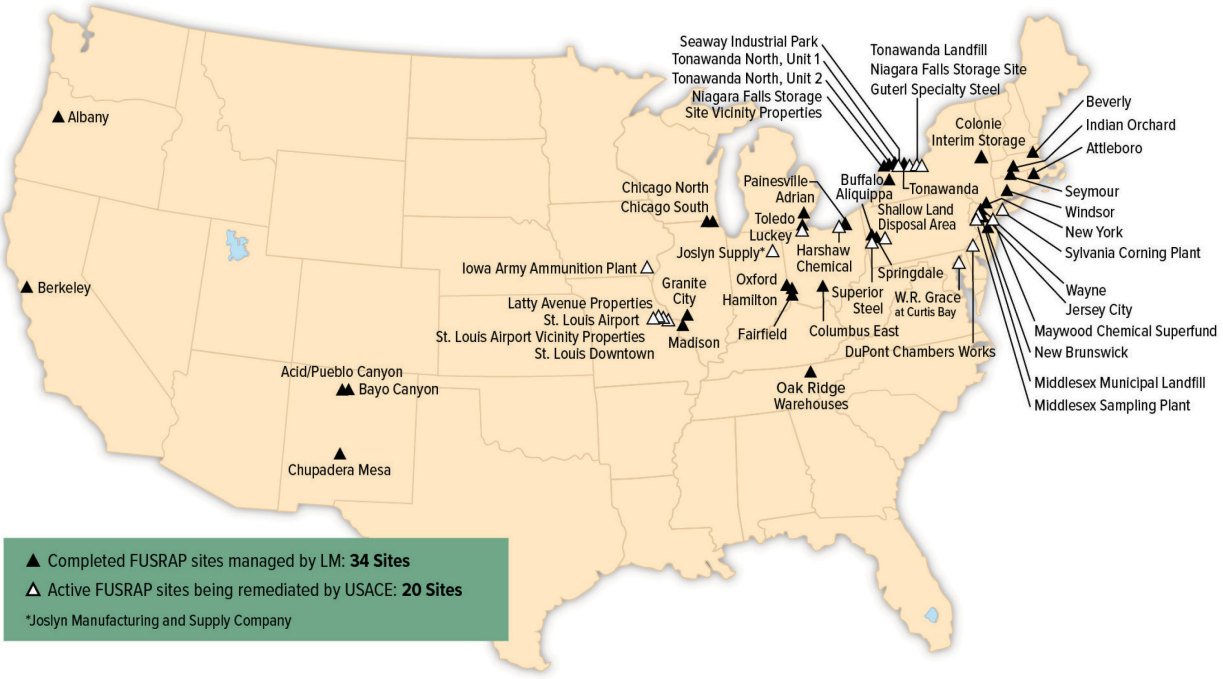

Figure 1. FUSRAP Sites

A 1999 Memorandum of Understanding between USACE and DOE defines the roles of each agency in administering and executing FUSRAP [6]. As shown in Figure 2, USACE performs assessment and cleanup of the FUSRAP sites. The MOU directs that USACE conduct these activities in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [7] and the National Oil and Hazardous Substances Pollution Contingency Plan [8]. DOE retains responsibility for determining if sites are eligible for FUSRAP remediation and for providing long-term surveillance and maintenance (LTS&M). LTS&M activities are designed to ensure that FUSRAP sites remain protective of human health and the environment and to preserve knowledge for each site. DOE maintains close coordination with USACE to ensure there is no loss of protectiveness when a FUSRAP site transfers to it for LTS&M.

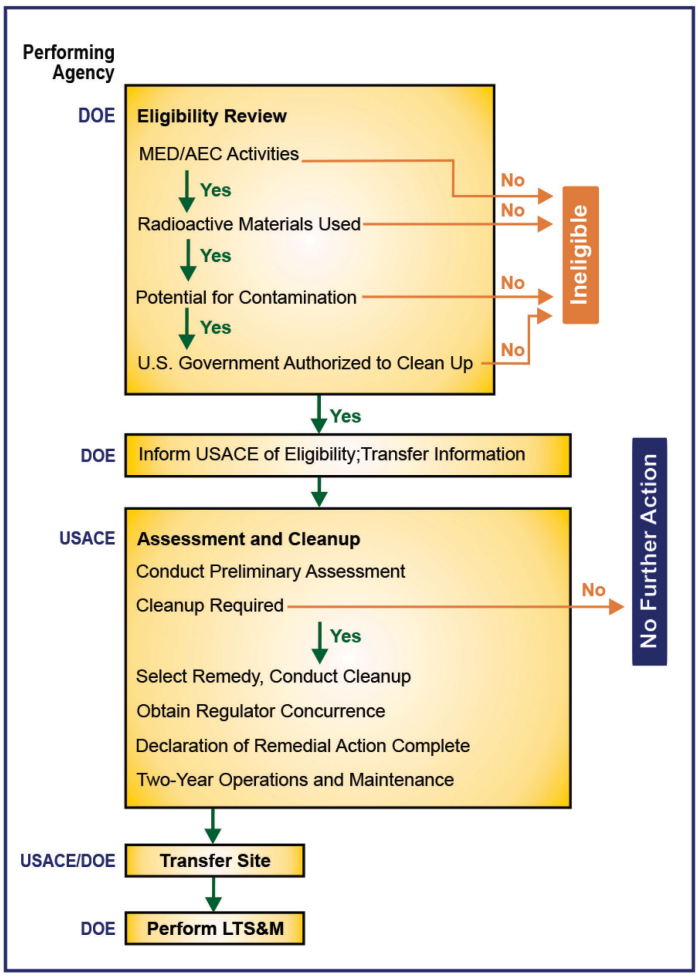

Figure 2. FUSRAP Roles and Responsibilities

DOE created the Office of Legacy Management (LM) in 2003 to ensure that its postclosure responsibilities would be met. Today, LM performs stewardship at 100 sites in the United States and the

territory of Puerto Rico—34 of these are completed FUSRAP sites. In fiscal year 2019, USACE completed cleanup at three FUSRAP sites and transferred them to LM for stewardship and is currently performing remediation at 20 additional sites. Long-term stewardship responsibilities vary by site, but may include environmental monitoring, inspections and institutional controls management, stakeholder support, preservation of records, and real property and beneficial reuse. LM-managed environmental liabilities are expected to grow as more sites are transferred from partner agencies such as DOE's Office of Environmental Management and USACE. By 2029, approximately 30 more sites are expected to transfer to LM, and 7 of those are FUSRAP sites.

DISCUSSION

One of the responsibilities of the federal government is to estimate sound and defensible life-cycle baseline costs for use in federal budget estimates and to meet federal financial reporting requirements. To accomplish this, LM and USACE have partnered together to ensure that the liabilities documented in each FUSRAP site life-cycle baseline are tailored for each site. The stage of the project is directly related to which agency develops the life-cycle baseline (see Figure 3). Because of the collaborative nature of FUSRAP, USACE maintains baselines for the sites while the site is undergoing remediation and for USACE activities during the 2-year transition period, whereas LM maintains a baseline for the site during the LTS&M period as well as for LM activities during the transition period.

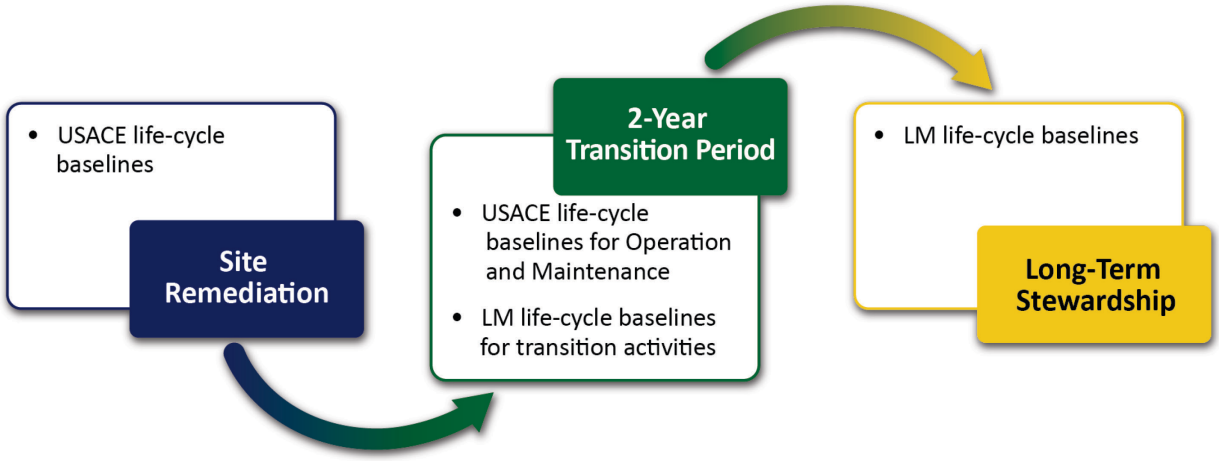

Figure 3. Life-Cycle Baseline Development per Stage of the Project

ENVIRONMENTAL LIABILITIES

Per the US Government Accountability Office (GAO), the federal government's environmental liability has been growing for the past 20 years and will likely keep increasing as agencies continue to better understand the complexities of their clean-up mission. The government's estimated environmental liability was $465 billion in fiscal year 2017, with DOE and the Department of Defense responsible for most of the liability [9].

According to GAO, because of a lack of complete information about long-term cleanup responsibilities and their associated costs, as well as an inconsistent approach to making cleanup decisions, federal agencies also do not always address their environmental liabilities in a cost-effective manner. This makes

it difficult for decision makers, including Congress, to understand the full scope of the federal government's cleanup obligations. Because of this and the risk of the contaminated sites to the public and the environment, the issue of federal environmental liabilities was placed on the GAO High Risk List in 2017 [9].
A liability is a present obligation of the federal government to provide assets or services to another entity at a determinable date, when a specified event occurs, or on demand [10]. A liability must be probable and measurable as follows:

- Probable–more likely than not
- Measurable–reasonably estimable

Coordination between USACE and LM is required to ensure that all environmental liabilities are accurately identified in both agencies' annual life-cycle baselines as the sites transfer from USACE to LM.

USACE Approach to Life-Cycle Baseline Customization

Administrative and financial management of FUSRAP activities is the responsibility of USACE headquarters in Washington, D.C. Its headquarters then delegates work to the USACE divisions, which in turn directs their geographic districts to conduct the project management. Each FUSRAP site is managed by a project manager, and their team is made up of experts from across the different districts. The project manager provides annual input to headquarters to ensure accurate environmental liability and life-cycle baseline planning. There are many factors that impact environmental liability and life-cycle baseline estimates for FUSRAP sites, such as expanded scope, changes to the regulatory approach, costs efficiencies, and the timing and complexity of the site transfer. When customizing the life-cycle baseline estimates for the active FUSRAP sites, USACE focuses on the following.

Understanding the Unique Requirements for Each Site. USACE must be prepared to handle a range of environmental contamination issues at FUSRAP sites, including those of surface and subsurface soils, buildings, and groundwater. A wide range of contaminants can be found at the sites, including uranium, radium, and thorium, as well as chemical contaminants such as arsenic, lead, thallium, and chlorinated solvents. The initial investigations, assessments, and studies performed by USACE provide it with the information needed to develop the unique baselines for each FUSRAP site.

Prioritization. In general, the cleanup work for the FUSRAP sites is prioritized by using a risk management approach, where the sites and the properties/areas within the sites posing the most risk to human health, safety, and the environment are addressed first. USACE focuses first on actions that reduce risks and then addresses longer-term risk management actions. This prioritization allows USACE to develop the most accurate life-cycle baseline estimates. USACE updates site transfer dates for each site based on any changes to the prioritization.

Using a Robust Risk Management Approach. USACE performs risk screening to ensure that the environmental liabilities specific to each activity performed at each site are identified. Once a liability is identified, it is evaluated by the probability of occurrence and the severity of consequence, and it is documented in relation to the impact to cost or schedule. A risk assessment matrix is used to determine the site's risk level, which is based on the previous described outcomes and applied as a percentage of direct total cost. USACE mitigates many of the risks before the sites transfer to LM; examples include minimizing the amount of inaccessible soil remaining on the site and ensuring all site records are provided to LM prior to site transfer. This ensures that these risks will also be minimized for LM during the stewardship portion of the life cycle.

LM Approach to Life-Cycle Baseline Customization

To meet DOE environmental liability estimating requirements, LM must maintain a 75-year life-cycle baseline reporting period for the FUSRAP sites. In fiscal year 2015, LM began implementing a customized approach for updating the FUSRAP life-cycle baselines. Prior to this time, all 55 active and completed FUSRAP sites were captured in one summary technical, scope, schedule, and risk package. This approach encouraged blanket assumptions and constraints that were no longer relevant or applicable to many of the sites. The FUSRAP team transformed this outdated structure into a multilevel format and developed site-specific baselines for each active and completed FUSRAP site. Because of these efforts, the high-level priorities documented in the LM Strategic Plan, Goal 5: Sustain Management Excellence are now being better supported by FUSRAP. This allows the program to operate more efficiently and more effectively. Customization efforts continue each year as LM continues to refine the individual site baselines. LM focuses on the following items when customizing life-cycle baseline estimates for the FUSRAP sites.

Understanding the Unique Requirements for Each Site. By reviewing site-specific documents prepared by USACE, such as Feasibility Studies and Records of Decision, and through partnering efforts, LM gains insight about site conditions and unique requirements for stewardship, as well as potential site risks. This information allows LM to develop more accurate life-cycle baselines and document the environmental liabilities with more confidence.

Developing Site-Specific Labor Breakdowns. By comparing the labor mix required to perform activities at (a) other LM-managed FUSRAP sites and (b) non-FUSRAP LM sites and (c) by USACE at active FUSRAP sites, LM can develop specific labor breakdowns for the required activities. This ensures the required labor mix is baselined for specific activities.

Taking a Tiered Approach to Life-Cycle Baseline Planning. LM can develop the strongest life-cycle estimates by focusing first on sites transitioning to LM in the near term (within the next 5 years). This is because remedial actions at the near-term sites are at or near completion, providing LM a strong understanding of the LTS&M requirements and remaining liabilities. LM then focuses on sites that are scheduled to transfer in the out-years (sites with defined transfer dates beyond the 5-year window); these sites generally have USACE Proposed Plans and/or Records of Decision (RODs). Through discussion with USACE, LM is also able to develop a good understanding of the planned remedial actions and residual contamination that will remain to determine the LTS&M requirements to be included in the life-cycle baselines for these sites. Finally, LM looks at sites where the transfer year has not been set by USACE (the to be determined sites). In some cases, the sites do not have a Proposed Plan or ROD and there may not be a good understanding of what residual contamination will remain or what the LTS&M requirements will be. In these cases, LM will make the best assumptions possible based on the information that is available.

Using a Robust Risk Management Approach. DOE guidance directs that a minimum contingency be applied to all sites undergoing stewardship because of the uncertainties associated with long-term management. This contingency includes a probability of a major event at the site and the uncertainty associated with the assumptions and costs of maintaining the site over the extended time frame. LM performs risk screening to ensure that the risks to each FUSRAP site or activity are identified. Once a liability is identified, it is evaluated by the probability of occurrence and the severity of consequence and it is documented in relation to the impact to cost or schedule. A risk assessment matrix is used to determine the site's risk level, which is based on the previous described outcomes and applied as a percentage of direct total cost [11].

CONCLUSION

USACE and LM have both implemented methods to ensure that the FUSRAP life-cycle baselines accurately predict costs and environmental liabilities throughout the project life cycle. Because of the collaborative nature of FUSRAP as directed by Congress, the two organizations must find ways to work proactively together to share critical information that affect each agencies baseline. The customized approaches that LM and USACE have independently developed and are implementing as a team ensure cost-effective predictions of life-cycle costs and environmental liabilities for the FUSRAP sites and reduced risks to the public and the environment and allow the program to operate more effectively.

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