FUSRAP Strategy: A Plan fFor tThe Next 10 Years - 14145

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ABSTRACT

The US Department of Energy must be able to respond to an increase in scope for the Formerly Utilized Sites Remedial Action Program. Factors that will result in program growth include transition of additional remediated FUSRAP sites to US DOE for long-term surveillance and maintenance (LTS&M), requirements for more active LTS&M programs for the additional sites that may include environmental monitoring and institutional controls (ICs) management, the need to expand the depth of FUSRAP personnel expertise, the continuing need to ensure that comprehensive site information is preserved, and ongoing requests for stakeholder support for these mostly urban sites. US DOE conducted a comprehensive planning process to evaluate these and other factors. The findings and responses are incorporated in a strategic plan to guide program growth and development, and position US DOE to meet future growth and other FUSRAP challenges while protecting human, health, safety, and the environment and maintaining program excellence.

INTRODUCTION

US DOE is responsible for maintaining protectiveness at 30 sites where radioactive materials were used for Manhattan Engineer District (MED) or early US Atomic Energy Commission (AEC) activities and were remediated under the Formerly Utilized Sites Remedial Action Program (FUSRAP). Additional FUSRAP sites are being remediated by the US Army Corps of Engineers (US ACE) and, when completed, will be transitioned to the US DOE Office of Legacy Management (LM) for long-term surveillance and maintenance (LTS&M). Some of the additional sites will require more active LTS&M operations. Stakeholder interest in FUSRAP sites will likely remain high.

US DOE conducted a structured evaluation of program resources, obligations, and future requirements in order to define and initiate deliberate responses that will position the program to maintain site protectiveness and meet LM goals and objectives.

FUSRAP DESCRIPTION

FUSRAP Origins And Current Scope

United States government interest in the weapons potential of atomic fission began around 1939. In 1942, the research and development of atomic weapons was assigned to US ACE, which

established the MED to conduct the work. In 1946, control of atomic weapons production and nuclear materials was assigned to AEC, a civilian agency.

MED and AEC contracted with private companies and academic institutions to conduct research or provide storage, uranium-ore processing, refining, prototyping, and fuel element fabrication services. As government-owned facilities were established, AEC released the contracted sites. Release typically consisted of conducting a radiological survey of a contracted site and decontaminating it to comply with the radiological health standards in effect at the time. By the early 1970s, AEC had identified the need to review the status of the sites where work was performed for MED and AEC because cleanup standards had become more stringent and site conditions had changed. AEC initiated FUSRAP in 1974 to assess these sites and to ensure that site conditions were protective of human health and the environment.

The initial task under FUSRAP was to identify sites that might require cleanup. AEC reviewed MED and AEC operating, decontamination, and contracting records and identified more than 500 candidate sites involved with early federal nuclear energy and weapons programs. Of these, 46 sites were deemed eligible for cleanup under FUSRAP. A site being considered for inclusion into FUSRAP must meet four eligibility criteria:

- work was conducted in support of MED and/or AEC activities (typically during the 1940s to early 1960s timeframe);
- the activities resulted in residual radioactive contamination (primarily uranium, radium, and thorium and their daughter elements) that exceeds current cleanup criteria;
- the authority to conduct remedial action at the site is prescribed within the Atomic Energy Act of 1954 (AEA), as amended [1]; and
- the site is not subject to remedial action under any other program nor is residual radioactive contamination addressed under a US NRC or state license.

Site eligibility data were captured in an internal database and in site files. In response to questions about site conditions posed by stakeholders, US DOE made the Considered Sites Database available to the public in 2000 [2].

US DOE began cleanup of FUSRAP sites in 1979. By 1997, US DOE had completed remediation of 25 of the original 46 sites.[a] In 1997, Congress directed US ACE to conduct all site assessment, remediation, and closure activities for FUSRAP [3, 4]. The initial US ACE scope was to remediate the 21 remaining active sites. US DOE retained responsibility for determining if a site is eligible to be remediated under FUSRAP and for performing LTS&M of completed sites. Since 1997, eight more sites have been added to the program by establishing eligibility or by congressional order and are in various stages of assessment or remedial action by US ACE. US DOE and US ACE roles and responsibilities are defined in a 1999 Memorandum of Understanding (MOU) [5].

LM was formally established as a new US DOE element on December 15, 2003. LM is responsible for ensuring that US DOE's post-closure responsibilities are met at sites remediated

[a] Sites undergoing assessment and remediation are referred to as active sites. Remediated sites are referred to as completed sites.

under the US DOE Environmental Management program, and at sites remediated under other programs for which US DOE is authorized to accept responsibility for post-closure care (e.g., Uranium Mill Tailings Radiation Control Act [UMTRCA], FUSRAP, and the US DOE Decontamination and Decommissioning Program). LM programs include site management and LTS&M, records management, property management, land use planning, workforce restructuring and benefits, and community assistance to mitigate impacts of downsizing in the US DOE complex.

In 2004, LM assumed responsibility from the US DOE Office of Environmental Management for the 25 FUSRAP sites that had been remediated by US DOE, along with FUSRAP records and the Considered Sites Database. Remaining US DOE FUSRAP responsibilities were transferred to LM in 2005.

As of 2013, there are 54 sites included in FUSRAP (Fig. 1). US DOE is responsible for LTS&M of 30 sites, and US ACE is remediating 24 sites. US DOE has referred two additional sites to US ACE for assessment and, if needed, designation for remediation.

Current US DOE scope includes determining eligibility for candidate sites and referring eligible sites to US ACE, transitioning remediated sites from US ACE to US DOE, and conducting LTS&M. Program support functions include records management and stakeholder support. There is an ongoing potential for more sites to be added to FUSRAP—regulators have requested that determinations of site ineligibility be re-evaluated, and Congress can add sites to FUSRAP through legislation.

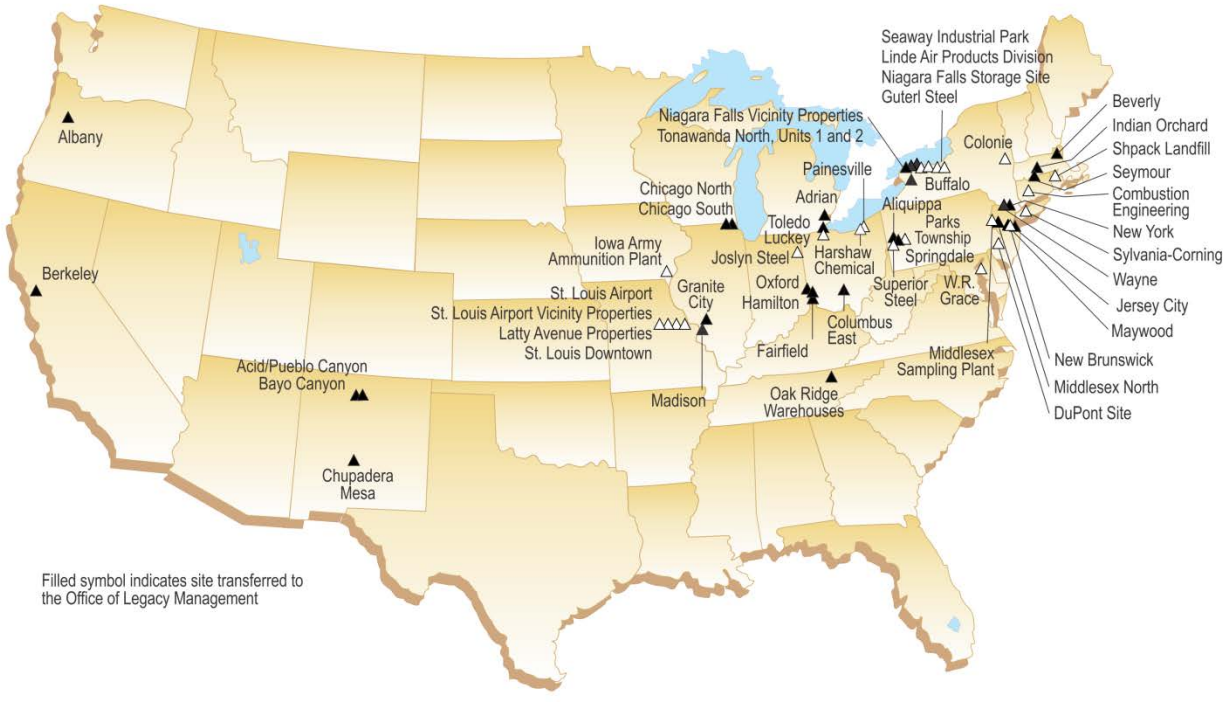

Fig. 1. This map shows the location of current FUSRAP sites.

Protectiveness

Twenty-nine of the 30 completed FUSRAP sites were remediated to a condition that allows unrestricted use. At these sites, residual contamination concentrations do not exceed the cleanup standards and the sites can be used for any purpose. One site contains elevated arsenic in the soil on a portion of the site and US DOE manages an institutional control (IC) to prevent excavation and dispersal of the contaminated soil. The arsenic is naturally-occurring in native soils and is not a contaminant introduced by, or the result of, MED or AEC activities.

Supplemental limits[b] were applied to inaccessible residual radiological contamination at nine completed sites. Land use at four of these sites is controlled by another federal government entity and exposure is controlled. The other five sites are privately owned. In the current configuration of the five sites, there are no complete exposure pathways to the residual contamination and the sites are protective; as a result, there would be no unacceptable risks to construction workers involved in removing the supplemental limits material. However, in recognizing the long-lived nature of the hazards associated with the material in the supplemental limits occurrences, US DOE assumes that at some time in the future these sites will be redeveloped and the supplemental limits material may become accessible. US DOE is in the process of implementing ICs at these sites to ensure that supplemental limits material will be properly disposed of.

FUSRAP Environmental Factors

Following is a description of the current FUSRAP program and the external influences on program structure and operations. US DOE believes these baseline conditions must be understood in order to create a realistic plan to meet future program requirements. Some planning assumptions are included in the following analyses.

LM Organization—LM activities are designed to maintain protectiveness and regulatory compliance at the remediated sites in its custody, while preserving essential knowledge of the sites and responding to stakeholder interests. LM resources and expertise are sufficient to successfully conduct LTS&M operations for the 91 LM sites in diverse settings across the United States. LTS&M requirements for these sites include records and data management, environmental monitoring, inspections, maintenance, risk and remedy evaluation, and regulatory compliance.

LM has established four primary goals for conducting LTS&M:

1. Protect human health and the environment
2. Collect, preserve, and share records and information
3. Optimize the use of land and assets

[b] Supplemental limits can be applied to inaccessible radioactive material that exceeds numerical concentration limits but poses no unacceptable risk to site occupants or the public and the cost to remediate the material outweighs the benefits. Supplemental limits provisions are conveyed in DOE Order 5400.5, *Radiation Protection of the Public and the Environment,* and *U.S. Department of Energy Guidelines for Residual Radioactive Material at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites*, Revision 2, March 1987 [6, 7].

4. Manage the program for excellence

Regulatory Environment—US DOE is self-regulated under AEA authority for the 30 completed FUSRAP sites [1]. Of these, 29 sites were released for unrestricted use (Category 1 sites), and no active LTS&M is required.[c] At one site, a state-enforced IC is in place (a Category 2 site). As needed, US DOE works closely with state regulators to address issues and coordinate work with stakeholders. State regulators will likely play a prominent role in overseeing future Category 2 sites after they transition. In addition, several active sites are listed on the National Priorities List. For those sites, US EPA or the host state (if granted primacy) will have an oversight role.

Program Extent—Additional sites might be added to FUSRAP through congressional assignment and budget authorization. US DOE assumes that US ACE will remain responsible for remediation, cost recovery, and closure of new sites. The legislation assigning cleanup responsibility to US ACE does not establish the duration or ending date for the assignment [3, 4]. If the US ACE involvement in FUSRAP ends in the future, US DOE may have to assume those functions.

Stakeholder Interest And Engagement—US DOE responds to stakeholder interests and concerns with accurate information and transparency. Stakeholder awareness of FUSRAP has been raised by worker compensation programs and articles about former MED and AEC sites in the press [8]. US DOE responds to multiple Freedom of Information Act requests every year. On several recent occasions, attention was directed at a FUSRAP site because other nearby non-FUSRAP sites were in the news. US DOE has presented information about remediation of radiological contamination and risk to stakeholders, and met with stakeholders during transition to assure them that US DOE will maintain protectiveness of remediated sites and enlist local stakeholders as stewards.[d]

US DOE attempts to provide complete and accurate information to stakeholders via the LM website [9]. Contact information is provided and general information about the US DOE FUSRAP program is presented in the *FUSRAP Stakeholder Report* [10]. Periodic program information is presented in FUSRAP Updates, and information is presented on the sites.

US ACE FUSRAP Program—The US ACE FUSRAP program is managed by a headquarters element and implemented at the division and district levels by matrixed staff. Remediation scope in a given fiscal year is determined by congressional funding and priorities and, as such, site completion schedules can change.

US ACE Coordination—US DOE relies on close coordination with US ACE for the successful operation of FUSRAP. US DOE informs US ACE of potential new sites that could increase

[c] Category 1 sites were remediated to a condition that allows unrestricted use and unlimited exposure, and LTS&M requirements consist of managing site records and responding to stakeholder inquiries. Category 2 sites contain residual contamination and use must be restricted, so LTS&M requirements may include inspections, environmental monitoring, or managing ICs.

[d] At many LM Category 2 sites, local maintenance subcontractors are available to monitor and report on site conditions, either on a routine basis or as needed (e.g., in case of a report of severe weather, trespass, or other concern). Regulators and nearby landowners have assisted in this function as well.

US ACE scope and resource demands. US ACE provides US DOE information about anticipated final site conditions at sites that will be transitioned to US DOE for LTS&M. During transition, US DOE works with US ACE to obtain complete site records and data sufficient to describe final conditions and residual risk, as well as other records that are needed for making informed stewardship decisions. US DOE discusses internal guidance with US ACE to ensure that the needed results for referral and transition activities are achieved.

Availability Of Information—LM records holdings include eligibility determination records for considered sites, remediation records for eligible sites, LTS&M records for completed sites, and programmatic records. However, other information of importance to FUSRAP, such as historical operations records needed to establish eligibility or liability, is stored at or maintained by other agencies (e.g., the National Archives and Records Administration, US ACE, and other US DOE sites and programs). Some historical records are classified. LM does not control access to or retention of the records in the custody of other US DOE elements or other agencies.

Program Resources

Staffing—Four US DOE staff members are assigned to the project, including a FUSRAP Program Manager/Coordinator. The FUSRAP Program Manager/Coordinator reports to a team lead. LM site responsibilities are assigned by the geographic areas of the US ACE districts, which allows US DOE staff to develop relationships with US ACE counterparts, regulators, and stakeholders at the assigned sites, as well as interact with known US ACE staff for referral and transition activities. This also facilitates coordination for responding to stakeholder concerns.

US DOE staff members are not dedicated to FUSRAP—they all have other assignments as well. This arrangement allows multiple people to gain knowledge of FUSRAP, ensures availability of knowledgeable program staff with knowledge of FUSRAP and other LM programs, and maintains program continuity in the event of turnover. Future staffing needs will be determined by project scope. Additional FUSRAP sites will be transitioned, and some of the sites will have groundwater remedies with associated periodic reviews and, perhaps, more complex LTS&M requirements and more stakeholder involvement. Post-closure care requirements will be no more demanding or risky than requirements for sites under other programs that are already assigned to LM. Therefore, corporate expertise is currently available and will remain so.

FUSRAP contractor support is organized as a stand-alone project within a larger task order. Three contractor project technical staff members are currently assigned to FUSRAP, one serving as project manager. One staff member, a mid-level scientist, recently joined the staff to integrate into program processes, provide additional technical resources, and ensure continuity of program support. Contractor staff members provide requested support and have nominal site assignments also based on US ACE districts, but are also able to assist in any aspect of the program. The contractor has a multidisciplinary FUSRAP team of designated support staff with expertise in risk assessment, groundwater hydrology, geology, environmental compliance, records management, property management, and public affairs. Other specialists are available as required.

Information—Shortly after LM assumed responsibility for FUSRAP, and while former workers with institutional knowledge of FUSRAP were available, US DOE initiated an effort to identify the locations of records describing MED and AEC activities and site conditions. In 2004, LM took possession of records used to determine eligibility for the more than 500 candidate (i.e., considered) sites, and remediation records for the 25 sites completed by 1997; these collections reside in the US DOE LM Business Center in Morgantown, West Virginia. In 1997, active sites' remediation records were transferred to US ACE and will remain in their custody, along with remediation and closure records generated by US ACE. Additional records pertinent to FUSRAP are located in MED/AEC accessions at federal records centers and in the National Archives. Some of these records are classified. Collections that may contain records relevant to FUSRAP comprise many thousands of cubic feet of documents.

US DOE began an evaluation of the available records in 2004 and determined that a focused effort was needed to identify records and preserve access to the information. US DOE has compiled information about FUSRAP-related records collections in *FUSRAP Historical Records: Collections, Contents, Access, Custody, and Finding Aids*, which is referred to as the FUSRAP Finding Aid [11]. This effort established a records program for FUSRAP, creating tools to help identify and retrieve records, and has included records and information transfer as an integral part of the site transition process.

Other Resources—The following lists of resources were created during the FUSRAP strategic planning activity in 2013:

Program Agreements And Regulatory Basis

- *Memorandum of Understanding between the U.S. Department of Energy and the U.S. Army Corps of Engineers Regarding Program Administration and Execution of the Formerly Utilized Sites Remedial Action Program (FUSRAP)*, March 1999 (MOU) [5]
- Energy and Water Development Appropriations Acts of 1998 (PL 105-62) and 1999 (PL 105-245) [3, 4]
- AEA of 1954, as amended [1]
- DOE Order 5400.5, "Radiation Protection of the Public and the Environment" [6]
- *U.S. Department of Energy Guidelines for Residual Radioactive Material at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites* (Revision 2, March 1987) [7]
- Site-specific laws and regulations reflecting applicable or relevant and appropriate requirements identified for the remediation and remedy implementation, including CERCLA[e] [12]
- Laws and regulations for program compliance, such as NEPA and property disposition regulations
- US DOE orders addressing program implementation

[e] Several active FUSRAP sites are listed on the National Priorities List, and Congress directed US ACE to follow the CERCLA process for assessment and remediation of all FUSRAP sites.

Procedures

- *Long-Term Surveillance and Maintenance Requirements for Remediated FUSRAP Sites* (contains risk assessment results, which drive LTS&M requirements) [13]
- *Formerly Utilized Sites Remedial Action Program, Program Plan* (supersedes 1986 FUSRAP Protocols) [14]
- Program management procedures and guidance for pre-1997 program operations (preserved in the program records collection)

Tools And Resources

- Considered Sites Library (eligibility case files)
- Considered Sites Database (online site document server)
- LM FUSRAP records collection in Grand Junction, Colorado, and the LM Business Center in Morgantown, West Virginia
- Other records collections in the National Archives, other US DOE facilities (including records at federal records centers), and in US ACE custody (post-1997 remediation records)
- LM records management database
- FUSRAP website at lm.doe.gov [9]
- *FUSRAP Historical Records: Collections, Contents, Access, Custody, and Finding Aids* (i.e., the FUSRAP Finding Aid) [11]
- US ACE site completion schedule
- Active Sites Status Chart (in development)
- Task Order Management Actions List (i.e., the FUSRAP "to-do" list maintained by the contractor)
- FUSRAP collaborative work site (internal access only)
- LM geographic information system and environmental monitoring database

Communication

- *Formerly Utilized Sites Remedial Action Program Stakeholder Report* [10]
- US DOE FUSRAP stakeholder updates (newsletters)
- FUSRAP Working Group quarterly reports and conference calls with US DOE and US ACE FUSRAP staff
- FUSRAP federal and contractor team weekly conference calls
- Papers and presentations (e.g., Waste Management presentations—see papers posted on the LM website; topics were selected to facilitate stakeholder and interagency communication and understanding)
- US ACE communications – district and headquarters newsletters

FUSRAP EVOLUTION

US DOE anticipates the FUSRAP program will grow and evolve to address increases in scope and other changes to the program and the environment in which it operates.

US ACE continues remediation at 24 active FUSRAP sites. The US DOE FUSRAP program must be positioned to provide LTS&M to these additional sites. The selected remedy and final conditions for some of these new sites will likely result in requirements for more active LTS&M

oversight. Consequently, US DOE costs will increase, as will staffing needs and other resource requirements.

Additional FUSRAP Sites Will Be Assigned To LM

Remediation has been completed at 30 FUSRAP sites. US DOE bases out-year planning for transition on the US ACE site completion schedule, which is updated annually. Site transition dates are assumed to be 2 years after the site construction completion, which reflects a 2-year operations and maintenance period that is consistent with CERCLA. As of 2011, US ACE projects site completions through 2027 (Fig. 2). US DOE expects the site transition schedule to be revised every year due to the addition of sites, US ACE budget constraints, and changing US ACE priorities. While active sites remain, US DOE will seek to maintain close coordination with US ACE to fulfill the terms of the 1999 US DOE/US ACE MOU [5]. Interagency cooperation is needed to manage referral of sites to US ACE for remediation and transition of completed sites from US ACE to US DOE for LTS&M. More information is presented in *Implementation of the Formerly Utilized Sites Remedial Action Program: Coordination Between the U.S. Department of Energy and the U.S. Army Corps of Engineers* [15].

Between now and 2024 (which is the planning horizon for the US DOE strategic plan), FUSRAP will remain a significant part of the LM LTS&M program, with 21 additional FUSRAP sites projected to transition to LM. Also during that time, LM will assume responsibility for 18 additional UMTRCA Title II sites and sites from other programs as well. Figure 3 shows the total numbers of all sites projected to be assigned to LM for LTS&M through 2030 [16].

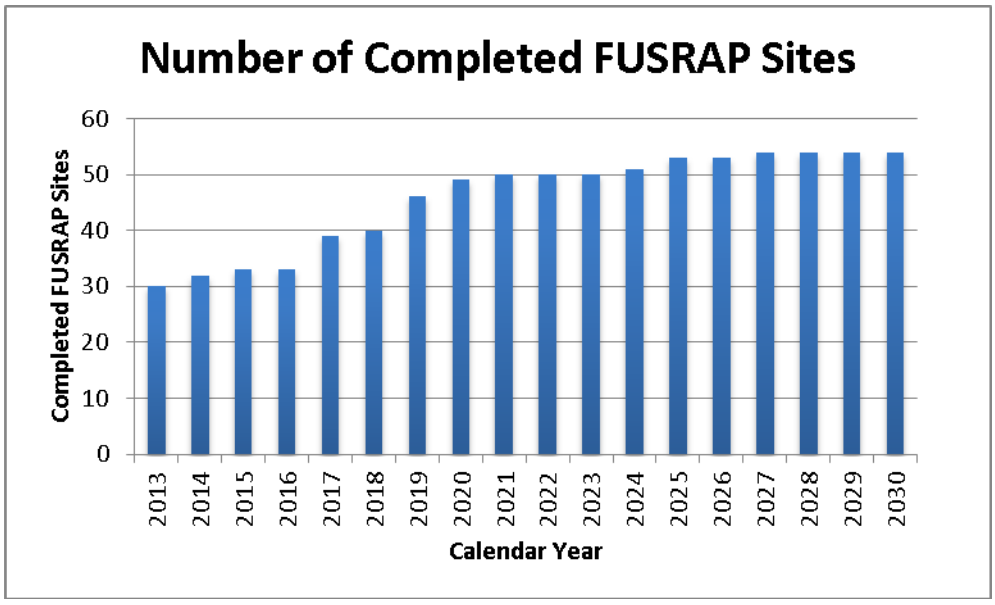

Fig. 2. Additional FUSRAP sites will transition to US DOE through 2027.

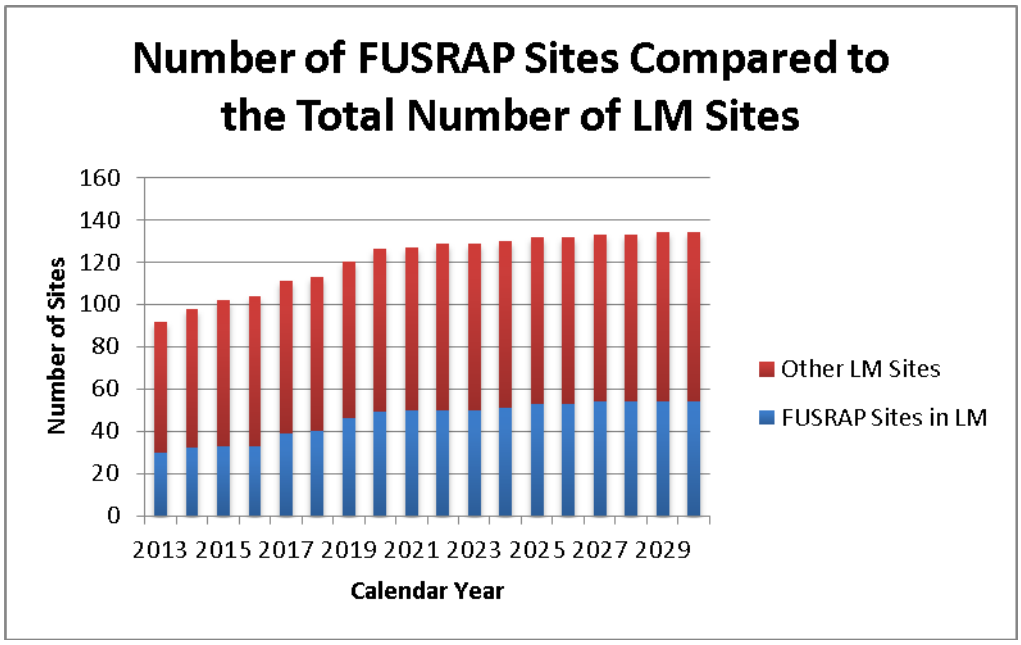

Fig. 3. FUSRAP sites will remain a significant portion of the US DOE LM program.

LTS&M Requirements Will Become More Complex

Whereas most of the 30 sites that US DOE currently manages have been released for unrestricted use and unlimited exposure, many of the new sites will require active stewardship to maintain protectiveness. LTS&M programs for these sites might include surveillance, ICs management, environmental monitoring, and periodic evaluations of protectiveness. US DOE will apply guidance and expertise from within LM to implement a consistent and proven approach to managing FUSRAP sites. As shown in Figure 4, the proportion of Category 2 FUSRAP sites (i.e., sites with requirements for active LTS&M) will increase, resulting in scope increases [16].

Some of the FUSRAP sites that will transition to LM between now and 2024 will require use restrictions to maintain protectiveness because contaminated media will remain after transition. Most FUSRAP sites are privately owned. While US DOE relies on federal ownership to control land use at many of the LM sites, at the FUSRAP sites US DOE will require enforceable ICs to prevent exposure to the residual contamination.

Resource Requirements Will Increase

Staffing—As project scope increases, staffing requirements will increase. US DOE must ensure that sufficient staff is trained and available to meet LTS&M and other FUSRAP requirements. Other considerations are ensuring that the depth of program knowledge is sufficient to survive staff turnover and that new stewards are brought on to FUSRAP in time to be mentored by older staff. These actions will help preserve knowledge, sustain expertise, and maintain continuity of operations and relationships with stakeholders, regulators, and US ACE. Future contractor

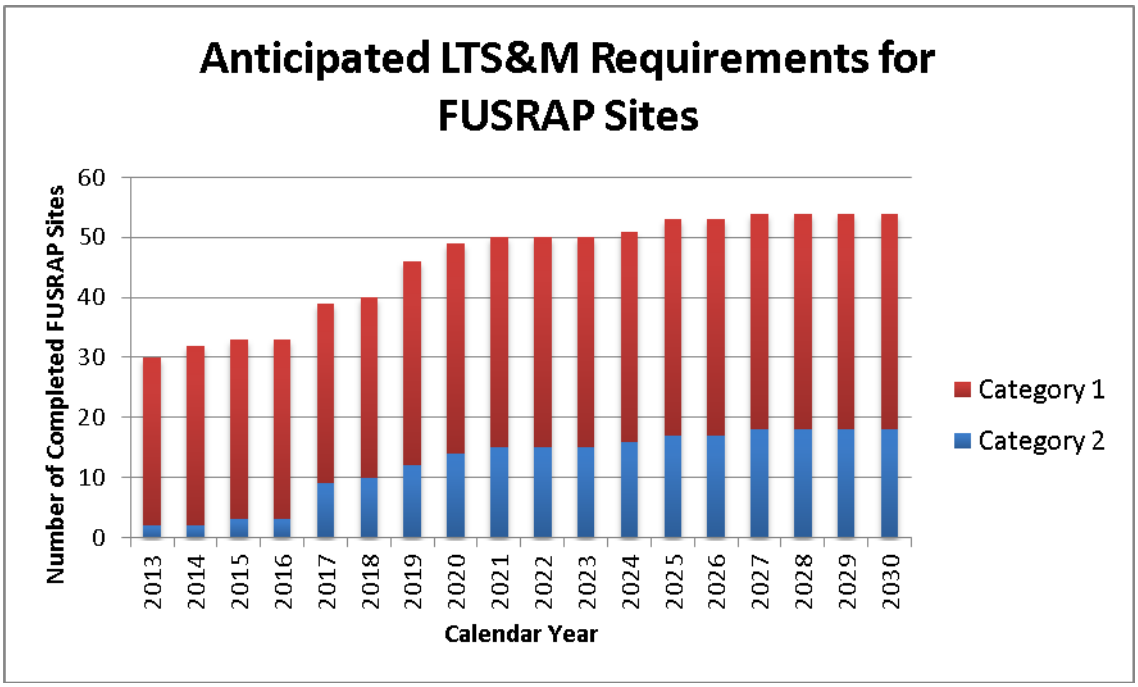

Fig. 4. Anticipated LTS&M requirements for remediated FUSRAP sites.

staffing needs will be driven by program scope, and contractor expertise will be provided as needed.

Cost—The cost to fulfill US DOE FUSRAP responsibilities will also increase. Transition activities occur as a remediated site enters the LTS&M phase of its life cycle. These transition activities include a review of the remedy implementation and site protectiveness, and are designed to capture and preserve site knowledge. Program costs should approach a steady amount once all FUSRAP sites have transitioned and routine LTS&M operations commence.

FUSRAP cost estimates are presented in a life-cycle baseline that captures anticipated environmental liability costs for the program for the following 75 years. Estimates for future program costs are revised annually.

One objective of the FUSRAP strategic planning process was to identify opportunities for reducing the cost of maintaining LM FUSRAP sites. Opportunities included optimizing resources, deploying technology improvements, ensuring that LTS&M scope is appropriate with regard to site conditions and risk, and discussing optimization opportunities with regulators. By decreasing the costs of maintaining the current FUSRAP sites, more FUSRAP sites could be accepted into the LM program with only minimal increases in overall program costs.

Fig. 5. US ACE performing remediation at the Maywood, New Jersey, Site, in September 2013. This site is listed on the National Priorities List. Upon completion, the anticipated LTS&M requirements include groundwater monitoring, management of ICs (which may include an inspection requirement), and 5-year reviews.

Knowledge Acquisition And Retention Initiatives Will Continue

US DOE will continue efforts to document the location of records and other information needed to respond to inquiries about FUSRAP site protectiveness and US DOE's authority to conduct remedial action at candidate sites. Records collections are dynamic, and FUSRAP workers must ensure ongoing access to collections held in National Archives and Records Administration facilities, multiple US DOE facilities, and private collections.

Recent inquiries from media, stakeholder groups, and other government entities reinforce the need to have access to comprehensive historical MED/AEC records for considered FUSRAP sites, as well as for sites that have and have not been evaluated for eligibility in the past (i.e., potential orphan sites). Key records should also be available to the public.

Information gathering is a critical aspect of site transition activities. Site knowledge must be captured while remediation workers are available to provide it. In addition to reports and other records, US DOE must acquire environmental and geospatial data to address management responsibilities and liabilities and to trend residual contaminant behavior.

STRATEGY FOR THE NEXT 10 YEARS AND BEYOND

FUSRAP will continue to grow in scope and complexity and present new challenges. To help guide the program and provide a baseline for program growth and development, US DOE captured the response to changes in FUSRAP scope and responsibilities in a strategic plan. The FUSRAP strategic plan establishes the objectives and strategies for maintaining effective and efficient FUSRAP operations.

In developing the plan, US DOE evaluated the following program attributes [17].

- LM Mission and Goals
- Objectives and Strategies
- Environmental Factors
- Schedule
- Scope and Resource Requirements
- Information Needs
- Stakeholder Support
- US ACE Coordination

Periodic Program Evaluation And Strategic Plan Revision And Recertification—US DOE will periodically evaluate the FUSRAP program for conformance to LM mission and goals. The quality of LM operations will be evaluated. Resource requirements will be assessed and modified to reflect effectiveness and anticipated requirements. Strategy implementation success will be assessed using established performance measures. The written strategic plan will be revised to incorporate the evaluation results, reaffirm program objectives and strategies, and establish new performance measures.

CONCLUSION

The US DOE FUSRAP program will expand to fulfill increasing responsibilities for additional sites and changing technical support requirements. US DOE reviewed all aspects of the FUSRAP program to identify and mitigate risk, capitalize on successes, optimize program operations, and implement measures to improve program performance. The resulting strategies will guide the necessary evolution of the LM FUSRAP program to meet expanding program requirements.

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