
EXECUTIVE SUMMARY

ES.1.0 Background and General Site Description

During the early 1950s the Savannah River Site (SRS) began to produce materials used in nuclear weapons, primarily tritium and plutonium-239. Five reactors were built to produce these materials. Also built were supporting facilities including two chemical separations plants, a heavy water extraction plant, a nuclear fuel and target fabrication facility a tritium extraction facility and waste management facilities. After 40 years of producing nuclear materials for defense and non-defense uses, the SRS shifted its strategic direction and resources from nuclear weapons production to cleanup of the nuclear waste and environmental contamination created during production.

Today the SRS is a key Department of Energy (DOE) industrial complex dedicated to accelerated environmental cleanup, providing capability for supporting the enduring nuclear weapons stockpile, and processing and storing nuclear materials in support of the U.S. nuclear non-proliferation efforts. The Savannah River National Lab (SRNL), formerly the Savannah River Technology Center (SRTC), also develops and deploys technologies to support the accelerated cleanup, national security and energy security. SRS is designated as a National Environmental Research Park (NERP).

Environmental Management (EM) and National Nuclear Security Administration (NNSA) are the primary DOE programs and missions being carried out at SRS. SRS's FY05 budget is approximately \$1.8 billion with approximately 80% dedicated to the EM Cleanup Project, 17 % to NNSA and the remaining 3% to other DOE and federal programs.

The SRS complex covers 198,344 acres or 310 square miles, with industrial facilities (active and inactive) occupying less than 10% of the total area. It encompasses parts of Aiken, Barnwell and Allendale counties in South Carolina and borders the Savannah River.

The site is owned by DOE and operated by an integrated team led by Westinghouse Savannah River Company, LLC (WSRC) a subsidiary of Washington Group International's Energy and Environment Operations. The contract⁷, which went into effect October 1, 1996, is in effect through November 30, 2006. It was revised June 18, 2003, to provide significant modifications to accelerate the near-term schedule of the EM Cleanup Project beyond the goals of the EM Program Performance Management Plan (PMP) that was issued August 7, 2002, and revised in April 2004. (The 2005 PMP is currently being written.) The SRS EM Program PMP is considered to be the SRS EM Cleanup project baseline for purposes of this End State Vision. The WSRC contract scope is primarily responsible for DOE missions for EM, NNSA Defense Programs and support for NNSA Non-Nuclear Proliferation Programs. This also includes SRNL and the site's administrative and landlord functions that are under EM responsibility at SRS.

Other major DOE contractors at SRS include Wackenhut Services, Inc. (WSI) for security services and the University Of Georgia, which operates the Savannah River Ecology Laboratory (SREL). The DOE is also responsible for natural resources management under terms of an interagency agreement with the USDA United States Forest Service.

ES.2.0 End State Vision Summary

DOE "began with the end in mind" during the early stages (mid-1990s) of the SRS cleanup program. Collaboratively working with SRS

stakeholders and regulators, the SRS developed the *SRS Future Land Use Report* and confirmed this future use in the 1998 *DOE Future Use Report to Congress*. In this report, the DOE made significant declarations and confirmations of future land use end states that are the basis for cleanup to industrial (not residential) use.

Key ESV Themes

- The *SRS ESV* is a concise stakeholder's guide to current conditions at SRS and the conditions DOE plans to achieve through the site's EM Cleanup Project.
- The *ESV* describes current conditions and planned end states; however, it is not encyclopedic and data-intensive in its description. Many stakeholders will find this approach useful as an information source for future decisions about SRS areas and hazard end states.
- Periodic review of end states with stakeholders is not a static situation but is a continually evolving and improving process to support the EM Cleanup Project.
- Planned end states and schedules are not static. They have changed over time, as evidenced by the differences between the 2002 *PMP* and the 2004 *PMP* and will continue to change as DOE continues to seek and find new ways to reduce risk more cost-effectively. Stakeholders will always have the needed information to evaluate potential changes in planned end states.
- The *ESV* is not a decision document. Individual hazards and areas will be evaluated in greater detail, with ample stakeholder involvement, at the appropriate time to support decision-making.
- The evaluation method includes the elements of the Risk-Informed Decision-Making Approach described in *Risk and Decisions About Disposition of Transuranic and High-Level Radioactive Waste* (National Academy of Sciences, 2005).

ESV Chronology

On July 15, 2003, DOE issued DOE Policy 455.1, *Use of Risk -Based End States*, followed by guidance to support the implementation of this policy, by developing a site specific *End State Vision* document for every site where cleanup is being conducted. The *ESV* is the primary tool for communicating the individual site end states to the involved parties (i.e., DOE, regulators, public stakeholders, tribal nations, etc.). The guidance uses a standardized approach to portray a site's current state and planned and alternative end states by using narrative, maps, and conceptual site models.

SRS issued its first draft version, *Savannah River Site Risk-Based End State Vision*, in March 2004, following the DOE-HQ guidance. A Citizens Advisory Board (CAB) public meeting was held to discuss the draft, and the CAB made a recommendation (#190) on ways to improve the document. (See Appendix H, *Public Comment Matrix*.)

The next draft, *Savannah River Site End State Vision, Revision 2*, was issued in March 2005. Another CAB public meeting—a Stakeholders' End State Vision Workshop—was held on March 24, 2005, to discuss the draft and accept comments. (See Appendix H, *Public Comment Matrix*.) The CAB issued recommendation #216 on the *SRS End State Vision* in May 2005. SRS had planned to submit the final *End State Vision* document to DOE Headquarters in May, but postponed its submittal to accommodate and consider the CAB recommendation.

This final version of the *SRS ESV* describes current conditions and planned end states for contained and released hazards (all fourteen categories of hazards at SRS), where the earlier drafts focused only on released hazards for inactive soil and groundwater units and EM legacy facilities. Other features include:

- A "reader's guide" to facilitate use of the region, site, watershed and area hazard descriptions

- The public comments and response summaries from previous public involvement
- CAB Recommendations #190 (May 2004) and #216 (May 2005) with DOE responses
- Feedback from the National Governors' Association Next Steps Workshop (October 2004)
 - End States are not strictly "risk-based" but are logical, technically defensible, and protective of human health and the environment; therefore, the title has changed to *End State Vision*.
 - "Variances" have been renamed "Alternative End States" to remove the perception of deviation from laws and regulations.
- Expanded evaluation of Alternative End States
 - 1) Some previous Alternative End States (AES) (in-situ decommissioning and increased canister loading at the Defense Waste Processing Facility [DWPF]) are no longer AES but have been incorporated into the PMP baseline.
 - 2) Alternative End State #5, Area Completion, has been reinstated for consideration and potential application across the DOE complex. This alternative is currently being developed for implementation at SRS.
- Better defined future use of previous industrial areas within the existing SRS Future Land Use Plan
- Impacted areas identified
- Benefits and risk reduction better described
- The alternative regarding Area Risk Methodology, deleted from March 2005 draft, restored
- National Environmental Research Park description included
- Description of key factors to be considered in Facility End State Evaluation (for nuclear and radiological facilities) added, including opportunities for community involvement
- Quality of maps improved
- M Area now depicted as a future Industrial, rather than Maintenance (non-industrial), Area in Appendix B (Alternative End States)

ES 2.1. The End State Vision

The goal of the SRS EM Cleanup Project and resulting *SRS End State Vision* (ESV) is to dispose of all EM nuclear material and waste hazards permanently, decommission all EM facilities and remediate all SRS inactive waste units. The vast majority of EM nuclear material and waste hazards will be permanently removed from SRS and dispositioned offsite. Inactive waste units will be remediated by deploying an area-by-area closure and deletion strategy. Concurrently with area closure, all EM facilities will be decommissioned unless reused to support other long-range federal missions at SRS or designated for historical preservation or economic development. Inactive waste units will eventually be deleted from the National Priorities List (NPL) of Superfund sites.

With the removal and offsite disposition of EM nuclear material and waste hazards, the remaining hazards at SRS will be orders of magnitude less in quantity and risk than the current hazards. Any residual hazards to onsite and offsite receptors will be significantly reduced to an acceptable risk level that is protective of onsite and offsite potential

Key Changes to *End State Vision*

- CAB Recommendation #216 (May 24, 2005) and DOE response letter and stakeholder comments on the March 2005 draft, including those given at the Stakeholder ESV Workshop, with responses
- Enhanced description of Area Completion process, showing public involvement opportunities
- Status of cleanup on each hazard updated to reflect Gold Metrics as of June 30, 2005
- Alternative End States narratives (Appendix B, *Alternative End States*) improved

July 26, 2005

receptors and consistent with environmental laws and regulations.

By 2025, all inactive waste sites that pose an unacceptable risk to surface water or groundwater will be remediated, and any contaminated groundwater will be remediated or undergoing remediation. Units that leave waste in place will be under institutional controls that feature access restrictions and an inspection, maintenance, and monitoring program.

The vision for SRS includes the following:

- SRS land will be federally owned, controlled and maintained in perpetuity, as established by Congress.
- EM Cleanup Project and mission will be complete by 2025 and ongoing NNSA nuclear industrial missions will continue. SRS is a site with an enduring mission and is not a closure site.
- EM Cleanup will be complete consistent with *SRS EM Program Performance Management Plan (PMP)*:
 - EM nuclear materials will be removed from SRS and dispositioned offsite.
 - Waste (liquid radioactive, transuranic, mixed and hazardous) will be removed from SRS and dispositioned offsite except for the waste facilities closed and monitored in accordance with the Federal Facility Agreement (FFA) and the Resource Conservation and Recovery Act (RCRA) permit for wastes.
 - All SRS inactive waste units will be remediated and deleted (or proposed for deletion) from the National Priorities List (NPL) of Superfund sites, and institutional controls will be in place to ensure access to remediated waste units is limited.
 - All EM facilities will be permanently decommissioned by demolition or in situ disposal unless reused by another federal program or designated for

historical preservation or for economic development.

- Low level waste will be disposed on site in accordance with the Atomic Energy Act and DOE Order 435.1, *Radioactive Waste Management*.
- Facilities associated with NNSA missions, their supporting waste management and essential site infrastructure are anticipated to remain active and appropriately sized to support ongoing missions.
- Long-term Stewardship activities will continue, to ensure that EM cleanup project remedies and end states remain protective (see Appendix E, *Long Term Stewardship*). Environmental research consistent with the SRS NERP designation will continue to validate the protectiveness of end states and long term stewardship activities.

This *End State Vision* directly supports the environment and defense strategic goals in the *Department of Energy Strategic Plan*².

ES 2.2. The End State Vision Purpose

The purpose of the *ESV* is to ensure cleanup is focused and achieves clearly defined, mutually agreed-upon and technically defensible end states that are protective and sustainable and reflect the planned future use of the property. The Vision goal is to improve the effectiveness and accelerate the cleanup process by increasing stakeholder understanding of current conditions and planned end states.

ES 2.3. Key Features of the SRS *ESV*

- SRS has demonstrated positive results and success by employing “risk balancing” methods and will continue with the Alternative End State options evaluations.
 - Strong stakeholder support and collaborative regulator working relationships are cornerstones of DOE Savannah River
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Operations Office's (DOE-SR) past, current and future success. Regulators and the public already agree with DOE SR's EM end state as stated in the PMP and *SRS Future Land Use Report*. (Ref: 1995 CAB Future Land Use Recommendation #8, Regulator Letter Of Support and July 2003 MOA in Support of Accelerated Cleanup)

- SRNL, SREL, the Consortium of Risk Evaluation and Stakeholder Participation (CRESP) and National Academy of Sciences are partnering with DOE Science Program to improve methods for cleanup, as well as assisting other DOE facilities and federal agencies.
- SRS uses a graded approach to End State Vision data requirements.

ES 2.4. SRS Mission Summary: Current and Planned Missions

The SRS Cleanup Project mission and goal is to complete the cleanup by 2025 and transition SRS to a site focused on national security¹. SRS will accommodate the ongoing NNSA missions before and beyond 2025. SRS is not a DOE closure site.

ES 2.4.1. Environmental Management

The *EM Program Performance Management Plan*⁹ (PMP) is the SRS baseline for the EM accelerated cleanup mission. The SRS EM cleanup program involves completing the removal of waste from all liquid radioactive waste (LRW) tanks and closing all the tanks; completing nuclear materials stabilization and processing in the canyons and separations facilities; consolidating and dispositioning spent nuclear fuel; treating and disposing of solid wastes; remediating contaminated groundwater and soil; and deactivating and decommissioning EM facilities. This ESV provides a mission plan and area end state update that reflects any changes resulting from the June 2003 DOE-SR Contract Modification and *EM Life Cycle Baseline Required Program Guidance*¹⁰.

ES 2.4.2. National Nuclear Security Administration

In support of the DOE's NNSA Defense Program missions, SRS has been designated to continue as DOE's center for the tritium supply to the enduring nuclear weapons stockpile. The primary new source of tritium will be an existing commercial reactor in the Tennessee Valley Authority system. Tritium extraction from targets and loading into containers for shipment to the Department of Defense will continue to be a SRS long-term mission beyond 2025.

In support of the DOE's NNSA Nuclear Non-Proliferation missions, SRS has been selected to "blend down" weapons usable highly enriched uranium fuel (irradiated and unirradiated) to low-enriched uranium that can be converted to reactor fuel suitable for commercial nuclear power reactors.

Additionally, in January 2000, the Secretary of Energy announced that SRS will be the location for the DOE's facilities to disposition 34 metric tons of surplus weapons grade plutonium as mixed oxide (MOX) fuel to be irradiated in commercial nuclear reactors. The MOX conversion process is expected to cost \$3.8 billion over 20 years. The current schedule would build, operate and complete its current mission before 2025.

ES 2.5. Regional Land Use – Current and End State

The current regional land uses surrounding SRS are primarily forestry and agricultural with secondary use by industry and government operations, light residential and recreation. The forestry and agricultural surrounding land use is not expected to change appreciably by 2025.

ES 2.6. Savannah River Site Land Use – Current and End State

The current *SRS Future Land Use Plan* (see References 3, 4, 5 and 6) assumes that the entire site will be owned and controlled by the federal government in perpetuity and used for industrial purposes for future DOE and non-DOE missions. Site boundaries will remain unchanged. Residential use will not be allowed onsite. Offsite repositories will be available for liquid radioactive, transuranic, hazardous, and mixed waste.

The current *SRS Future Land Use Plan* concentrates future industrial land use operations toward the center of the site to form a central industrial core for continuing missions. The central industrial core is surrounded by concentric site industrial support and general support land use areas.

The ESV assumes the same SRS future land use plan and proposes a revised future land use scenario for limited portions industrial areas where no future industrial missions are planned. Reference Alternative End State #1 (Appendix B, *Alternative End States and Recommendations*) which proposes a non-industrial (Maintenance/Long-term Stewardship) use scenario.

ES 2.7. SRS Hazards

All SRS hazards are summarized in five major classes and 14 sub-categories:

- **Nuclear Materials:** plutonium, uranium, spent nuclear fuel (SNF), and tritium.
- **Radiological Waste:** liquid radioactive waste (LRW), transuranic (TRU) waste, low level waste (LLW) and low level mixed waste (LLMW).
- **Non-Radiological Waste** Hazardous and sanitary
- **Inactive Waste Units:** Soil and groundwater

- **EM Facilities:** Nuclear, radiological, other industrial facilities, and LRW tanks

ES 2.8. Alternative End State Summary - Enablers and Recommended Congressional Action

SRS has identified five alternative end states. For the purposes of this document, a alternative end state is defined as a significantly different cleanup approach or different end state relative to the original SRS EM PMP.

It is important to note that the proposed alternative end states and recommendations are considered to be “enablers” to accomplish the EM Cleanup project by 2025 within the desired out year funding targets. Currently the SRS EM life cycle baseline (technical scope, cost and schedule) is in the process of validation. After baseline validation, the alternative end states will be reassessed for changes to the EM Cleanup project baseline.

The following alternative end states are submitted for consideration. Alternative end states with associated implementation recommendations are included in *Appendix B, Alternative End States and Recommendations*.

- Future Land Use and Exposure Scenario Modification
- Alternate Disposal for Plutonium-238 Transuranic Contaminated Waste
- In Situ Decommissioning in lieu of Demolition
- Increased High-Level Waste DWPF Canister Loading
- Area Completion

ES 2.9. Recommended Congressional Action To Accelerate Cleanup

SRS recommends formal Congressional Authorization to provide perpetual federal ownership and responsibility for SRS’s fixed boundaries.

July 26, 2005

ES 2.10. End State Issues for National Consideration

Significant challenges to SRS mission planning and accelerating cleanup are:

- *Need for a DOE-wide integrated disposition plan and process for DOE nuclear materials and waste.* Consolidation strategy and disposition paths are critical to EM cleanup completion and baseline risk management.
- *Liquid radioactive waste federal repository startup and optimization of LRW and transuranic repository loading.*
- *Federal government ownership of SRS in perpetuity.* This would enhance the reliability and credibility of the federal government's institutional controls and land use on its property, with resultant control over human exposure to residual hazards.
- *Groundwater cleanup standards and points of compliance.* Given the federal government's ownership of SRS and aquifer and land use control in perpetuity, and the technical difficulty and expense of restoring groundwater to Maximum Contaminant Levels, objectives for groundwater remediation (which currently assume human consumption) could be developed that are not drinking-water based.

ES 2.11. SRS Next Steps in the End States Process

The *SRS End State Vision (ESV)*:

- defines the end state for materials, wastes, and facilities as described in the SRS EM PMP, similar to project requirements for a construction project. The EM PMP references its dependency on the ESV.
- is a subset of the comprehensive long-range planning for DOE mission, infrastructure and land use.
- bridges the gap to post-EM long term stewardship and continuing missions at SRS.
- ensures stakeholder involvement in the ESV process, leading to involvement with cleanup decisions and SRS missions.

- is an additional planning vehicle to support the FFA Appendix E (out year scope).

The "next steps" at SRS are to:

- Annually review the end states with key stakeholders to include SRS mission requirements and land use. (Note: this is a continuing comprehensive planning process with stakeholders that was initiated in 1995.)
- Network with other DOE sites to develop and implement an integrated disposition plan for nuclear materials and waste. EM Cleanup baselines at multiple sites are at risk until a single DOE-wide integrated disposition plan for all nuclear materials and waste is established.
- Periodically assess the EM PMP to ensure program planning and execution are aligned with the *End State Vision*.
- Periodically assess other planned and potential SRS missions to facilitate and optimize SRS facilities and infrastructure mission decisions.
- Continue to identify Alternative End State (AES) cleanup options for evaluation.
- Amend the Core Team process with the regulators to establish an End State Core Team to ensure proactive regulatory involvement for measuring end state progress, evaluation of AES opportunities, long-term stewardship transition and monitoring area closure.

ES 2.12. References:

1. *Definition of Environmental Management Completion, Jessie Roberson to EM Field Office Managers, February 12, 2003.*
 2. *DOE Strategic Plan, Protecting National, Energy, and Economic Security with Advanced Science and Technology and Ensuring Environmental Cleanup* September 30, 2003
 3. *SRS Long Range Comprehensive Plan, December 2000,*
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4. *SRS Citizen's Advisory Board Recommendation No. 8, Future Land Use*, September 26, 1995.
 5. *Report, SRS Future Use Project Report*, Jan., 1996, Memo, Mario P Fiori to Thomas P. Grumbly (EM-1)
 6. *DOE Report to Congress: Planning For The Future, An Overview Of Future Use Plans At Department Of Energy Sites*, October 7, 1998
 7. *DOE-SR and SRSO Performance Evaluation and Measurement Plan for WSRC LLC Contract No. DE-AC09-96SR185000, Modification No. M100*, June 18, 2003.
 8. *Savannah River Site, Risk-Based End State Vision*, Draft: March 30, 2004.
 9. *SRS Environmental Management Program Performance Management Plan (EM-PMP)*, Predecisional Draft, April, 2004.
 10. *Environmental Management Life Cycle Baseline – Required Program Guidance*, J. M. Allison to R. A. Pedde, September 16, 2003
 11. *Savannah River Site's Cold War Built Environmental Cultural Resources Management Plan*, January 26, 2005.
 12. *Programmatic Agreement Among the U. S. Department of Energy (DOE), the State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation (ACHP) for the Management of Cold War Historic Properties on the Savannah River Site (SRS), Aiken, Barnwell, and Allendale counties, South Carolina*, May 2004
 13. *Risk and Decisions About Disposition of Transuranic and High-Level Radioactive Waste* (National Academy of Sciences, 2005)
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