# Savannah River Nuclear Solutions, LLC
# Management and Operations Contract
# Savannah River Site

**Report from the Department of Energy**
**Voluntary Protection Program**
**Triennial Onsite Review**
**March 7-April 28, 2022**

U.S. Department of Energy
Office of Environment, Health, Safety and Security
Office of Health and Safety
Office of Worker Safety and Health Assistance
Washington, DC 20585

## PREFACE

The Department of Energy (DOE or Department) recognizes that excellence can be encouraged and guided but not standardized. On January 26, 1994, the Department initiated the DOE Voluntary Protection Program (VPP) to encourage and recognize excellence in occupational safety and health protection. This program closely parallels the Occupational Safety and Health Administration's (OSHA) VPP. Since its creation by OSHA in 1982, and implementation by DOE in 1994, VPP has demonstrated that cooperative action among Government, industry, and labor can achieve excellence in worker safety and health.

DOE-VPP outlines areas where DOE contractors and subcontractors can surpass compliance with DOE Orders and OSHA standards. The program encourages excellence through systematic approaches, emphasizing creative solutions through cooperative efforts by managers, employees, and DOE.

DOE bases requirements for DOE-VPP participation on comprehensive management systems, with employees actively involved in assessing, preventing, and controlling the potential safety and health hazards at their sites. DOE-VPP is open to all contractors in the DOE complex, including production facilities, laboratories, and various subcontractors and support organizations. DOE contractors are not required to apply for participation in DOE-VPP. In keeping with OSHA and DOE-VPP philosophy, *participation is strictly voluntary*. Additionally, any participant may withdraw from the program at any time.

DOE-VPP consists of three levels of participation with names and functions similar to those in OSHA's VPP: Star, Merit, and Demonstration. The Star level is the core of DOE-VPP. This level recognizes outstanding protectors of employee safety and health. The Merit level is a steppingstone for participants that have good safety and health programs that need time and DOE guidance to achieve Star status. The Demonstration level allows DOE to recognize achievements in unusual situations that DOE needs to learn more about before determining approval requirements for the Merit or Star level.

By approving an applicant for participation in DOE-VPP, DOE recognizes that the applicant exceeds the basic elements of ongoing, systematic protection of employees at the site. The symbols of this recognition provided by DOE are certificates of approval and the right to use flags showing the program level in which the site is participating. The participant may also choose to use the DOE-VPP logo on its letterhead or award items for employee incentive programs.

This report summarizes the results from the triennial onsite review of Savannah River Nuclear Solutions, LLC (SRNS) at the Savannah River Site (SRS) in Aiken, South Carolina, conducted from March 7 to April 28, 2022, and provides the Acting Director of the Office of Environment, Health, Safety and Security with the necessary information to make the final decision regarding SRNS' continued participation in DOE-VPP at the Star level.

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AHA | Assisted Hazard Analysis |
| BBS | Behavior-Based Safety |
| BLS | Bureau of Labor Statistics |
| CAIRS | Computerized Accident Injury Reporting System |
| CAT | Consolidated Annual Training |
| CFF | Containment Fabrication Facility |
| CHST | Construction Health and Safety Technician |
| CIH | Certified Industrial Hygienist |
| DART | Days Away, Restricted, or Transferred |
| DOE | Department of Energy |
| EFCOG | Energy Facility Contractors Group |
| EHSS | Office of Environment, Health, Safety and Security |
| ELDP | Engineering Leadership Development Program |
| ESH&Q | Environment, Safety, Health and Quality |
| GET | General Employee Training |
| GSP | Graduate Safety Professional |
| HPI | Human Performance Improvement |
| HRA | Hazard Risk Assessment |
| IH | Industrial Hygienist |
| IDEAS | Individuals Developing Effective Alternative Solutions |
| IDRT | Infectious Disease Response Team |
| ISM | Integrated Safety Management |
| iTrots | Integrated The Rest of the Story |
| KT | Knowledge Transfer |
| LANL | Los Alamos National Laboratory |
| LEAP | Leaders Emerging as Professionals |
| LMS | Learning Management System |
| LSIT | Local Safety Improvement Team |
| M&O | Management and Operations |
| MFO | Management Field Observation |
| MOX | Mixed Oxide |
| NAICS | North American Industry Classification System |
| NNSA | National Nuclear Security Administration |
| OSHA | Occupational Safety and Health Administration |
| PM | Preventive Maintenance |
| PPE | Personal Protective Equipment |
| PPEOC | PPE Oversight Committee |
| RIE | Rapid Improvement Event |
| S/RID | Standards/Requirements Identification Document |
| SME | Subject Matter Expert |
| SOST | Site Operations Standardized Tools |
| SRFO | Savannah River Field Office |
| SRNL | Savannah River National Laboratory |
| SRO | Savannah River Operations Office |
| SRNS | Savannah River Nuclear Solutions, LLC |
| SRS | Savannah River Site |
| SRSOC | Savannah River Site Operations Center |

| | |
|---|---|
| STAR | Site Tracking, Analysis, and Reporting |
| STR | Subcontractor Technical Representative |
| SYNC@SRS | Start Your New Career |
| Team | Office of Environment, Health, Safety and Security DOE-VPP Team |
| TEF | Tritium Extraction Facility |
| TMC | Training Managers Committee |
| TRAIN | Training Record Automated Information Network |
| TRC | Total Recordable Case |
| UAS | Unmanned Aircraft System |
| VPP | Voluntary Protection Program |
| WO | Work Order |
| WR | Work Request |

# EXECUTIVE SUMMARY

The Department of Energy's (DOE) Voluntary Protection Program (VPP) Assessment Team (Team) from the Office of Environment, Health, Safety and Security recommends that Savannah River Nuclear Solutions, LLC (SRNS) at the Savannah River Site (SRS) in South Carolina continue to participate in DOE-VPP at the Star level based on the triennial onsite review conducted March 7 to April 28, 2022.

The results of the review indicated that SRNS continues to:

- Encourage workers and managers to seek out ways to identify opportunities for continuous improvement. Managers have demonstrated their willingness to listen to workers' ideas and drive continuous improvement. Managers are appropriately responding to the variety of challenges posed by the changing mission, conditions, and growth of the workforce.
- Provide many ways for employees to be involved in the SRNS safety and health program. While the pandemic initially reduced employee participation, SRNS identified methods to improve employees' participation in behavior-based safety observations and Local Safety Improvement Teams (LSIT). Management sponsors strongly support the LSITs and the LSIT members feel empowered to make suggestions and improvements based on that support.
- Use proven methods, processes, and procedures to identify and analyze workplace hazards. The SRNS work planning and control system ensures a thorough understanding of hazards that might be encountered during work. The site conducts in-depth baseline assessments and a variety of surveys, exposure evaluations, assessments, and inspections to enable employees to work in a safe environment.
- Effectively eliminate or control hazards and exposures using the hierarchy of controls. SRNS plans, schedules, and completes maintenance safely employing certified professionals commensurate with the potential risks on the site. Personal protective equipment is available and worn to reduce hazard exposures or control their frequency and/or severity. SRNS provides a full range of medical services, emergency response and planning, and wellness program support to its workers.
- Train employees to recognize hazards and protect themselves and coworkers. The SRNS training program equips managers, supervisors, and employees with the knowledge to understand and implement established safety and health policies, rules, and procedures.
- Maintain accident and injury rates that are substantially lower than the comparison industry.

Since the last onsite DOE VPP review in 2017, SRNS has experienced significant changes that it could not have predicted that could have derailed its safety performance. SRNS has responded to these challenges by focusing on safe mission performance as a fundamental value. SRNS continues to foster employee engagement and involvement in every aspect of its mission. The LSITs remain a cornerstone of SRNS' continuous safety improvement efforts. SRNS has mature processes in place that implement an effective integrated safety management system and has a mature safety culture. SRNS does have opportunities to improve by preventing complacency related to its long history of safe performance, particularly among the 65 percent of the workforce that have less than 6 years of experience onsite. The Team did not identify any systemic noncompliance with requirements, nor did it identify any suppression of concerns or reporting. SRNS fully demonstrates continuous improvement and pursuit of excellence expected for continued participation in DOE-VPP. The Team recommends that SRNS continue participating in DOE-VPP at the Star level

**TABLE 1**
**OPPORTUNITIES FOR IMPROVEMENT**

| Opportunity for Improvement | Page |
|---|---|
| SRNS managers should ensure they balance their time in the workspaces between building relationships with the workforce and questioning those same workers about observed conditions to help prevent complacency, coach and mentor workers, and identify potential error traps. | **8** |
| SRNS should continue reaching out to those workers that may not be actively participating in safety programs to encourage their support and help them understand the value of their participation. | **8** |
| SRNS should consider adding a field to the *BBS 2.0* program tracking whether the observer to observed interaction took place, allowing that information to be easily included in performance indicators. | **10** |

# I. INTRODUCTION

This report provides the Department of Energy's (DOE) Acting Director, Office of Environment, Health, Safety and Security (EHSS), with the results of the triennial onsite review of Savannah River Nuclear Solutions, LLS (SRNS) at the Savannah River Site (SRS) in South Carolina conducted from March 7, to April 28, 2022. Based on the results of this review, the DOE Voluntary Protection Program (VPP) Assessment Team (Team) recommends that SRNS continue to participate in DOE-VPP at the Star level.

The DOE-VPP encourages excellence in occupational safety and health protection by recognizing DOE contractors and subcontractors who maintain safety programs that surpass compliance with DOE; Occupational Safety and Health Administration (OSHA); and local, State, and Federal safety standards.

The Star level is the core of DOE-VPP. This level recognizes outstanding protectors of employee safety and health. A participant at the Star level should be a model for other members of its industry and other DOE contractors and subcontractors. Because this is a dynamic and continuous improvement program, participants cannot allow their efforts to stagnate. DOE does not limit approvals to set durations but uses triennial reevaluations to ensure that the participant still warrants Star level participation.

SRS covers approximately 310 square miles in South Carolina adjacent to the Savannah River. Initially constructed by E.I. Du Pont de Nemours between 1950 and 1955, it was one of the key production sites for the United States Atomic Energy program. Originally supporting several production reactors, two separation facilities, and a host of support facilities, SRS has slowly transformed over the past 30 years into a site focused on environmental cleanup and stewardship, waste management, disposition of nuclear materials, and ongoing support for the current stockpile stewardship efforts.

The site has undergone several transitions in the primary management and operating contractors. In September 2000, SRS, then managed by the Westinghouse Savannah River Company, entered DOE-VPP as a Star site. In 2008, DOE awarded the operating contract for the site functions to SRNS. SRNS is a partnership between Fluor-Daniels Corporation, Northrop Grumman Corporation, and Honeywell International, Inc. SRNS assumed an integrating role across SRS. Those responsibilities included basic site management and operation responsibilities, including operation of the canyons, tritium facilities, and the Savannah River National Laboratory (SRNL). Fluor requested to retain the DOE-VPP Star status earned by the previous contractors. DOE approved that request. Per DOE-VPP requirements, in 2010 SRNS completed the transition process and continued as a DOE-VPP Star participant. SRNS completed its last triennial assessment in 2017. This assessment marks the fourth triennial reassessment for SRNS.

The SRNS mission includes operation of nine nuclear facilities at SRS, including the Nation's plutonium repository, the only operating plutonium and uranium separation facility, and the National Nuclear Security Administration's (NNSA) tritium facilities. DOE recently split SRNL off as a separate operating contract to Battelle Savannah River Alliance, LLC, so SRNL is no longer under the SRNS program. SRNS also receives and stores spent fuel from university and research reactors. Since the last DOE-VPP review in 2017, SRNS has stopped downblending those fuels for commercial use and is now processing them directly for waste treatment and

disposal. SRNS also operates several waste treatment and disposal facilities that prepare waste for burial onsite or shipment to the Waste Isolation Pilot Plant. SRNS is performing risk reduction and cleanout activities for shutdown facilities. SRNS has added work to cancel construction of the Mixed Oxide (MOX) Fuel Fabrication Facility and shift to plutonium disposition and new plutonium pit production for the NNSA. Also, since 2017, the Tritium Extraction Facility (TEF) has ramped up production.

SRS stores significant quantities of radiological and chemical hazardous materials in various forms at SRS. Therefore, SRNS' activities must control various potential hazards. These hazards include exposure to external radiation, radiological contamination, nuclear criticality, hazardous chemicals, and various physical hazards associated with facility operations (e.g., machine operations, high-voltage electrical equipment, pressurized systems, and noise).

SRNS' worker population increased from approximately 5,500 employees in 2017 to about 5,775 employees in 2022. With retirements and new hires, about 65 percent of employees now have 6 years or less of experience. The Augusta, Georgia, Building and Construction Trades Council represents approximately 350 people, and fully supports SRNS' continued pursuit of safety excellence through DOE-VPP.

EHSS conducted this onsite review to verify that SRNS continues to meet DOE-VPP expectations for continued participation as a Star site. Personnel from the Office of Worker Safety and Health Assistance, within EHSS, conducted the review in two phases. The Team conducted an initial virtual review from March 7-18, to interview workers and managers, attend meetings, and review documents. The Team then performed onsite work observations, validations, and interviews from April 18-27.

This report contains a review and discussion of SRNS' injury and illness rates and an assessment of safety management system elements compared to the DOE-VPP tenets of Management Leadership, Employee Involvement, Worksite Analysis, Hazard Prevention and Control, and Safety and Health Training. The Team's final conclusion provides an overall assessment of SRNS' safety program and its continued participation in DOE-VPP.

## II. INJURY INCIDENCE CASE RATES

The contractor's average for both Days Away, Restricted, or Transferred (DART) case rates and Total Recordable Case (TRC) rates for the most recent 3-year period shall be at or below the most recent specific industry national average North American Industry Classification System (NAICS) code published by the Bureau of Labor Statistics (BLS). The following table presents the most recent 3-year period data validated by the Team using the site's OSHA 300 logs, the DOE Computerized Accident Incident Reporting System (CAIRS), the Team's calculation of the TRC and DART rates, and the specific industry national averages for the comparison industry.

| **Injury Incidence Case Rates - Contractor Employees (SRNS & SRNS Construction)** | | | | | |
|---|---|---|---|---|---|
| Calendar Year | Hours Worked | TRC | TRC Incidence Rate per 200,000 hours | DART Cases | DART Case Rate per 200,000 hours |
| 2019 | 10,049,890 | 15 | 0.30 | 3 | 0.06 |
| 2020 | 10,291,537 | 34 | 0.66 | 14 | 0.27 |
| 2021 | 11,828,718 | 23 | 0.39 | 8 | 0.14 |
| 3-Year Totals | 32,170,145 | 72 | **0.45** | 25 | **0.16** |
| Bureau of Labor Statistics (BLS-2020) average for NAICS** 562 Waste management & Remediation Services | | | 3.5 | | 2.5 |
| **Injury Incidence Case Rates - Subcontractors (SRNS Service Subcontractors and SRNS Construction Subcontractors)** | | | | | |
| Calendar Year | Hours Worked | TRC | TRC Incidence Rate per 200,000 hours | DART Cases | DART Case Rate per 200,000 hours |
| 2019 | 491,311 | 4 | 1.6 | 1 | 0.4 |
| 2020 | 613,749 | 3 | 1.0 | 0 | 0.0 |
| 2021 | 609,171 | 0 | 0.0 | 0 | 0.0 |
| 3-Year Totals | 1,714,231 | 7 | **0.8** | 1 | **0.1** |
| Bureau of Labor Statistics (BLS-2020) average for NAICS** 562 Waste management & Remediation Services | | | 3.5 | | 2.5 |

**TRC Incidence Rates, including subcontractors: 0.47**
**DART Case Rates, including subcontractors: 0.15**

**Discussion**

SRNS employs approximately 5,750 workers and approximately 290 service subcontractors. For the 3 years prior to this assessment, 2019 to 2021, SRNS experienced 72 recordable cases, resulting in a 3-year TRC rate of 0.45. During the same period, SRNS had 25 DART cases,

resulting in a DART case rate of 0.16. SRNS has had four TRC and one DART cases for the current year to date. The 2022 recordable cases include two lacerations, one loss of consciousness, and one rotator cuff tear. During the COVID-19 pandemic period, between March 2020 and December 2021, SRNS experienced 12 work-related COVID-19 cases and one work-related COVID-19 fatality. There are no reportable COVID-19 work related cases for the current calendar year. The Team did not identify any incentives that would discourage workers from reporting injuries. Interviews with workers indicate they do not fear reprisal for reporting and acknowledge managers encourage the reporting of an injury, incidence or first aid case.

The site maintains complete and accurate recordkeeping logs, including the OSHA 300 Log and 300A Summary. The 300A summary meets the requirements of the recordkeeping standard, is accessible to all personnel and available throughout the calendar year. The record-keeper documents all injuries in the CAIRS database. SRNS recordkeeping personnel are well versed in the recordkeeping standard, OSHA 300 Logs, and CAIRS requirements. SRNS' TRC/DART rates are 87.1/93.5 percent respectively, less than the BLS comparison industry average for its NAICS code and meets the expectations for continued VPP participation.

## III. MANAGEMENT LEADERSHIP

Management Leadership is a key element in obtaining and sustaining an effective safety culture and implementing the guiding principles of Integrated Safety Management (ISM). The contractor shall demonstrate senior level management commitment to ISM, occupational safety and health, and meeting the requirements of DOE-VPP. Management systems for comprehensive planning shall address safety and health requirements and initiatives. Elements of that management system shall include: (1) clearly communicated policies and goals; (2) clear definition and appropriate assignment of responsibility and authority; (3) adequate resources; (4) accountability for both managers and workers; and (5) managers shall be visible, accessible, and credible to employees. As with any other management system, the organization shall integrate authority and responsibility for employee safety and health with its management system and shall involve employees at all levels of the organization.

In 2017, with only 1 year left on its contract, SRNS managers continued their commitment to view safety as a core value. They were determined to position the management and operations organization at the site for long-term success, no matter which contractor DOE selected for the next contract. Their experience at SRS and other major projects worldwide provided them with the necessary insight to anticipate problems and implement timely solutions. SRNS managers continued to identify and implement improvements based on employee ideas and concerns.

Since the 2017 review, SRNS managers have faced a new set of challenges. SRNS has managed changes to the site mission, changes in the experience profile of the workforce, changes in the SRNS contract schedule, and the COVID-19 pandemic. SRNS has successfully navigated these challenges and maintained very high levels of safety performance while effectively performing its mission.

Management leadership begins with clearly identified policies and procedures that integrate safety into all aspects of work and assign roles and responsibilities within the organization. SRNS includes safety in its extensive, if somewhat complex, set of policies and procedures. Since the original Dupont construction and management of SRS, there has been an extensive set of procedures contained within the *Integrated Procedures Management System*. Environment, safety, health, and risk management requirements flowdown from their source into the SRNS Standards/Requirements Identification Document (S/RID). The S/RID contains requirements that SRNS and DOE agree apply to the work and conditions at SRS. The S/RID defines the applicability of requirements on a facility basis according to the work and hazards conducted at each facility. From the S/RID, the applicable requirements flow down to policies and procedures established and maintained by the *Integrated Procedures Management System*. These policies and procedures include controls tailored to the work/activity and the type and level of hazards present and the roles and responsibilities of personnel. The DOE-approved SRNS *Integrated Safety Management System Description,* Rev.13 FY 2022, describes the entire flow of requirements and standards into procedures.

SRNS managers monitor performance continuously using an extensive set of statistical performance indicators. These indicators include both leading and lagging indicators designed to detect negative performance trends and developing issues. The indicators include mission performance against cost and schedule, and indicators of workforce behaviors that affect mission and safety performance. Performance indicators have statistical ranges, including control bands,

that SRNS uses to identify potential trends and actions. SRNS carefully reviews specific goals associated with those performance indicators to ensure they do not drive unsafe or at-risk behaviors. DOE's Savannah River Operations Office (SRO) includes some of these indicators in its Performance Evaluation and Monitoring Plan to determine SRNS' annual fee. Although not specifically identified, SRNS managers agree that mission success requires safe performance, and repeatedly emphasize safety as a value, not a priority or goal.

Ensuring resources are available to safely accomplish the mission is a key function of managers at SRNS. Managers ensure workers have the right resources to complete their tasks safely and do a very good job of ensuring workers feel comfortable raising safety issues or concerns. Managers universally demonstrated their willingness to listen to workers' concerns or issues and did not create any production pressures on workers. Managers frequently repeated the message that workers must do work correctly the first time and that if they could not do it right, they should not do it at all. SRNS is using its resources to ensure the new plutonium missions have the correct facility designs, efficient and effective training resources for new operators and missions, and safe and effective process designs and logistics, particularly in the new plutonium pit production facility in the repurposed MOX fuel production facility.

SRNS holds managers accountable for performance, primarily through its system of performance indicators. The Presidents Safety Council meets monthly to review in detail relevant performance indicators, open issues, corrective actions, events, and occurrences, and determine the overall effectiveness of corrective actions. Managers are accountable for performing Management Field Observations (MFO). SRNS intends for these observations to encourage managers' presence in the work areas. Most managers document a few observations per month. SRNS expects managers to observe workers, ask questions, and identify any issues. After completing observations, managers submit a brief written report, and SRNS tracks the overall number of observations.

SRNS performs many assessments throughout the year including those required by its DOE-approved Contractor Assurance System. One of those assessments is the annual DOE-VPP assessment. This report required for participation in DOE-VPP, is prepared by the SRNS VPP Core Team and approved through SRO. The report identifies accomplishments during the previous calendar year and recommendations and commitments for the coming calendar year.

SRNS' Management Leadership Team has extensive experience in the DOE/NNSA complex including operations, maintenance, environmental restoration, construction, decontamination, deactivation, decommissioning, and demolition. SRNS managers recognize the importance of managers' presence and visibility in reinforcing safety as a value in accomplishing the mission safely. During interviews, SRNS senior managers were very proud of the extensive employee involvement at SRNS and supported the local safety improvement teams (LSIT) under their purview.

SRNS has established an excellent reputation and relationship with DOE that has positioned it to continue as the site management and operations (M&O) contractor while DOE and NNSA finalize the future mission and management of SRNS. Since 2017, the long-term future of SRS has evolved. Rather than becoming a closure site, NNSA has expanded the mission at SRS. That mission expansion has added Plutonium Pit Production to the site's portfolio, requiring significant capital investment in new facilities and infrastructure. Additionally, the termination

of the MOX Fuel Facility mission has added plutonium downblending and disposal of the stored excess plutonium to the SRS mission. Rather than replacing the site M&O contractor, SRO has extended the SRNS contract several times pending a better definition of the future mission. Consequently, SRNS has expanded its workforce, creating an entirely different set of challenges than those anticipated in 2017 when the workforce was looking at a potential contract transition.

SRNS managers are now working with a significantly different workforce than they had in 2017. Sixty-five percent of workers onsite have been onsite for less than 6 years. Workers that were new to the site in 2017 are now supervisors and managers. SRNS trained these new supervisors and managers, but these new supervisors do not have the perspective previous supervisors and managers had developed over the years. The senior management team on average has many more years of experience at the site and faces the challenge of teaching the lessons of that experience to the new workforce. Senior managers could be making assumptions about workers' knowledge and practices that deviate from managers' expectations. For example, senior managers are getting out into the field to interact with the workforce, but not as much as they would like. The current team of senior managers has done an excellent job across the site of engaging employees, improving morale, and encouraging employees' participation in safe operations. However, they could better use those opportunities to emphasize the need for employees to comply with all procedures, and the Team saw a couple of examples where workers and supervisors may not be strictly following procedures.

For example, during a walkthrough of the TEF, the Team observed a "Danger Unsafe Condition Tag, OSR 7-200C", on a doorway into a glovebox room. The tag had a statement written on it not to enter without permission from the Shift Operating Manager. Workers placed the tag there earlier in the week as part of a response to a worker cutting a 120-volt power line to a temporary smoke detector. A worker cut the cable while removing temporary air monitoring lines without using the appropriate procedure and not at the point in the procedure where the maintenance work called for the removal of the lines. *Manual 8Q, Procedure 12, Section 5.2,* defines the use of Safety Tags. There are two types of tags: OSR 7-199, *Caution – Do Not Remove Without Authorization (Caution Tag),* applies in a situation where a component or system is functional, but some precaution or pertinent information is necessary before operation; and OSR 7-200C, *Danger Unsafe Condition Do Not Use (Danger tag),* prevents use, entry, or specifies other conditions for the protection of personnel against a hazard. In this case, personnel hung the *danger* tag when a *caution* tag would have been appropriate because workers could still operate the tagged door with permission from the Shift Operations Manager. When asked about the tags, the on-shift Shift Operations Manager was not familiar with the procedures governing their use. This case pointed out several instances of personnel not being alert to procedure requirements, taking actions outside the procedure, and probably acting as supervisors allowed (normalized deviations). Although personnel took all the actions with the intent of protecting other workers, they did not follow or reference the appropriate procedures. The tag on the door had been hanging for approximately four days, and none of the on-shift personnel had questioned its use, and no managers had raised the question. SRO had previously identified an issue at H-Canyon with improper use of Caution Tags rather than appropriate barricades, but those lessons had not transferred into the tritium facilities.

To help the new workers learn past lessons, avoid assumptions about operating procedure knowledge, and maintain their current high level of performance, SRNS managers should ensure they balance their time in the workspaces between building relationships with the workforce and

questioning those same workers about observed conditions. They should emphasize workers' understanding of correct practices and the appropriate procedures defining those practices. Where workers cannot do so, managers should take the time to coach and mentor those workers. This may help managers identify where procedural requirements or complexity may create error traps for workers.

**Opportunity for Improvement:** SRNS managers should ensure they balance their time in the workspaces between building relationships with the workforce and questioning those same workers about observed conditions to help prevent complacency, coach and mentor workers, and identify potential error traps.

The size of SRNS and the variety of facilities pose challenges for managers to get their messages down through multiple layers in the organization. With a workforce of nearly 5,800 people, it can be easy for individuals to choose not to participate in the safety programs. The workforce generally believes managers are looking out for them and providing the necessary resources, but many workers do not see value in managers' presence in the field because they do not see managers frequently. Actively disengaged workers are harder to identify. SRNS formed a Safety Culture Steering Committee a few years ago. That committee sends monthly surveys out randomly to 150 SRNS workers. Those surveys generally show a very positive safety culture, but there are a few people that are responding negatively. SRNS is trying to determine whether those negative results are indicative of a larger unidentified issue or just statistical variation. The Team did not encounter any workers with negative views of SRNS' culture but did encounter a few workers that were not engaging in safety programs and activities. They did not feel unsafe in their activities and confirmed they would never do anything unsafe, but they did not see any added value in their participation. SRNS should continue reaching out to those workers that may not be actively participating in safety programs.

**Opportunity for Improvement:** SRNS should continue reaching out to those workers that may not be actively participating in safety programs to encourage their support and help them understand the value of their participation.

**Conclusion**

SRNS managers are happy but not satisfied with SRNS' safety performance. They are proud of SRNS employees' engagement and participation in safety improvements, the positive culture at the site and encourage workers and managers to seek out ways to identify continuous improvement. They have demonstrated their willingness to listen to workers' ideas and drive continuous improvement. They are appropriately responding to the variety of challenges posed by the changing mission, conditions, and growth of the workforce. SRNS managers fully demonstrate the Management Leadership necessary for continued participation in DOE-VPP.

## IV. EMPLOYEE INVOLVEMENT

Employees at all levels shall continue to be involved in the structure and operation of the safety and health program and in decisions that affect employee safety and health. Employee involvement is a major pillar of a strong safety culture. Employee participation is in addition to the individual right to notify appropriate managers of hazardous conditions and practices. Managers and employees shall work together to establish an environment of trust where employees understand that their participation adds value and is welcomed. Managers shall be proactive in recognizing, encouraging, facilitating, and rewarding workers for their participation and contributions. Both employees and managers shall communicate and collaborate in open forums to discuss continuing improvements, recognize and resolve issues, and learn from their experiences.

In 2017, the Team determined that SRNS provided many ways for employees to be involved in the SRNS safety and health program. Employees were involved in Behavior-Based Safety (BBS) observations, participating in LSITs, and submitting suggestions through the Individuals Developing Effective Alternative Solutions (IDEAS) program. SRNS maintained a strong employee development program, including the Leaders Emerging as Professionals, Aspiring Mid-Career Professionals, and Engineering Leadership Development Program (ELDP).

The LSIT committees are still one of the primary mechanisms for employee involvement. Twenty-three LSITs within SRNS represent each of the SRNS functional or technical organizations and areas. Each LSIT has a chairperson, a cochair, exempt and nonexempt employees, and a management sponsor. Each LSIT also chooses its team title and logo. The SRNS LSIT Charter describes and provides guidelines for all SRNS LSITs. The SRNS Safety and Health organization provides the LSITs with focus areas based on emerging issues to help guide LSIT meeting discussions and BBS observations. During the virtual portion of this review, the Team participated in 10 of the 23 LSIT meetings. While the content for all the LSITs was similar (i.e., heat stress was the safety focus based on spring approaching), each of the LSIT meetings had a unique aspect to it. For example, in four of the meetings observed, individuals described the warning signs for heat stress and included a discussion of their own heat stress experiences. The descriptions often included humorous moments, but the heat stress message became more meaningful given the personal nature of the experience. The fact that the presenters were employees everyone knew also made the message more effective.

The Team interviewed several of the chairs and cochairs after the LSIT meetings. In each of these interviews, the chair and cochair were always enthusiastic and positive and believed they had the support of their managers in any effort they chose to pursue to improve the quality of the LSIT.

Maintaining communication within the LSITs was challenging during the pandemic due to the reduced number of workers onsite. Initially, the LSITs had to wait approximately 2 months for approval to use the Microsoft Teams® software. Using the Teams® software, the LSITs were able to maintain communication and eventually improved employee participation. The SRNS LSITs have always experienced challenges getting full participation in their meetings due to the site's size and individual schedules. By using Teams®, the LSITs improved remote worker participation and saw improvements in onsite personnel attendance.

LSIT members working from home were concerned that they were unable to perform BBS observations because they could not observe site personnel as they had for so many years. The LSIT chairs unanimously agreed that remote workers could perform BBS observations of their home activities, including family and friends. Interviewed workers believed these observations in the home created an increased safety awareness of SRNS workers overall, and workers have brought an even stronger safety awareness back to the site.

All the LSIT members interviewed expressed significant pride and ownership of the LSITs and their contribution to the improvements to safety and health. The LSITs continue to promote teamwork and camaraderie. Based on Team interviews with the LSIT chairs, the LSITs continue to be effective forums to communicate information between managers and workers. LSITs use BBS observations, trending data, workplace walkdowns/inspections by managers and safety professionals, and employee concerns and questions to identify issues. LSITs use these inputs to recommend corrective actions and improvements with the support of their management sponsors.

SRNS continues to encourage employee involvement through the BBS process. Interviews with workers demonstrated that BBS observations continue to improve the SRNS safety culture. However, in the past few years, the SRNS managers and the BBS program managers wanted to improve the safety culture information the BBS process provided. Specifically, they wanted the details of the observations so they could identify focus areas and address safety culture issues. As a result, SRNS updated the BBS program and developed an online application to submit BBS observations. The new process, called *BBS 2.0,* provides specific dropdown menus and defined categories for users to enter their observations, which allows for improved classification of the issues observed. SRNS managers intend to use the categories to develop better metrics for safety performance and focus on emerging issues before they result in concerns or injuries. *BBS 2.0* does not automatically capture whether the observer discussed the observation with the observed individual. These details may be included in the comments section, but that information must be manually collected so it is not included in the automated metrics. The conversation between the observer and the observed is a critical element of a strong BBS program, and the number of observations with that interaction is an important measure of program performance. SRNS should consider adding a field to the *BBS 2.0* program tracking whether that interaction took place, allowing that information to be easily included in performance indicators.

**Opportunity for Improvement:** SRNS should consider adding a field to the *BBS 2.0* program tracking whether the observer to observed interaction took place, allowing that information to be easily included in performance indicators.

During the initial rollout of *BBS 2.0* in June 2021, SRNS experienced a reduction in BBS observations as workers learned the new online system. The managers of the system recognized an online system might deter workers who do not have routine computer access from submitting their observations. Areas that employ workers without routine computer access are taking steps to record workers' observations either by providing printed paper checklists for those workers to write their observations on or by collecting their observations and having administrative staff input them online for the workers. SRNS is also developing a phone application for SRNS workers to use in submitting their observations. As of this review, the number of BBS observations for each LSIT has returned to the levels observed before the inception of the new program.

SRNS held its annual Safety Expo at the Savannah River Site Applied Research Center during the Team's onsite review. This is the first time SRNS has held this event since the pandemic started. This event allowed SRNS LSITs and several outside organizations to demonstrate and promote safety and health. LSITs and vendors had approximately 40 interactive booths, static displays, equipment, and demonstrations focusing on safety and health. All 23 LSITs participated by preparing booths or providing logistical support. The Team attended the Safety Expo and observed significant attendance by SRNS personnel. Interviews demonstrated that managers supported the event and provided workers with at least 2 hours of work time to attend the event. SRNS invited several food truck vendors to encourage SRNS workers to visit the Safety Expo during their lunch break.

Employees participate in the work planning and control process during walkdowns with the planning teams and are involved in reviewing and approving work documents. SRNS encourages all employees to call a timeout or stop work if work performed deviates from the approved work plan. Interviews with workers demonstrated managers supported this expectation.

SRNS encourages employees' participation in the incentive-based employee suggestion IDEAS program. The IDEAS program has been in effect since 1998 and is the employee suggestion program that offers employees an opportunity to receive rewards ($20 minimum) for recommending unique safety and/or cost-saving contributions. Employees may get elevated awards depending on demonstrated savings from their suggestions. The program captures innovative thinking and promotes continuous improvement. Suggestions may improve safety, business performance, quality, or productivity. SRNS screens the suggestions for eligibility and either declines or accepts the suggestion. A new campaign to encourage program participation occurs every month.

**Conclusion**

SRNS continues to provide many ways for employees to be involved in the SRNS safety and health program. While the pandemic initially reduced employee participation, SRNS identified methods to improve employees' participation in BBS observations and LSITs. Management sponsors strongly support the LSITs and LSIT members feel empowered to make suggestions and improvements based on that support. SRNS meets the expectations for continued participation in DOE-VPP in the Employee Involvement tenet.

## V. WORKSITE ANALYSIS

Management of safety and health programs begins with a thorough understanding of all hazards that workers might encounter during work, and the ability to recognize and correct new hazards. The first two core functions of ISM, *Defining the Scope of Work* and *Identifying and Analyzing Hazards*, form the basis for a systematic approach to identifying and analyzing all hazards encountered during work. Work planners use the results of the analysis in subsequent work planning efforts. Effective safety programs also integrate feedback from workers regarding additional hazards that they encounter and include a system to address new or newly recognized hazards. Successful worksite analysis also involves implementing preventive and/or mitigating measures during work planning to anticipate and minimize the impact of hazards.

SRNS conducts in-depth baseline assessments to ascertain safety, health, and radiological concerns. SRNS maintains an adequate workforce of certified safety, health, and radiological professionals to analyze facilities, procedures, projects, identify hazards, and assess employee risk. When questions arise about conducting assessments or unknown exposures, new industrial hygienists (IH) and safety engineer professionals collaborate with local subject matter experts (SME) on SRNS-specific procedures and sampling protocols. Within a defined geographic area, safety professionals review program-specific information to assist in addressing controls and preventative actions based on past sampling results.

SRNS communicates employee procedures for reporting hazards through all of the following: The SRS Basic Hazard Control Handbook; Environment, Safety, Health and Quality (ESH&Q) Safety Plan; Consolidated Annual Training (CAT); General Employee Training (GET); Leadership 101 courses posters on bulletin boards throughout the site; and New Onboarding presentations. Workers report hazards to their supervisors, the ESH&Q office, or the Employee Concerns Program by word of mouth or email. Workers know they can report their safety concerns or hazards without fear of repercussion, or they can report anonymously. The Employee Concerns Tracking System documents and tracks hazards reported to senior managers. Once resolved the concerned employee can review the resolution. An anonymous complainant can create a unique PIN when submitting the concern that will allow them to contact the system and review any resolution while retaining their anonymity.

SRNS's Exposure Assessment Program establishes a systematic approach for analyzing and evaluating worker exposure to potentially hazardous physical, chemical, or biological substances. *Industrial Hygiene Manual 4Q,* describes SRNS site-specific exposure assessment criteria and procedures. The Exposure Assessment Program enables SRNS to control exposure limits specified by OSHA and the American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, whichever is more conservative. SRNS strives for alignment with American Industrial Hygiene Association's *A Strategy for Assessing and Managing Occupational Exposures*. IHs conduct risk analysis and negative exposure assessments at a 95 percent confidence level above or below the occupational exposure limits.

IHs conduct exposure evaluations, referred to as hazard risk assessments (HRA), and fundamental characterizations described in the Industrial Hygiene Manual 4Q, Procedure 104-*Exposure Assessment Program*, section 5.2.2. HRA, takes a description of labor, frequency, exposure duration, and all things known about the procedure to compute the risk rate. Open

Range (IH exposure database) assigns the method a rating. During the basic characterization outlined in the exposure assessment, the IH collects the current information and assembles the information on the workplace, workforce, and environmental agents. The data is entered into Open Range in an established assessment unit and linked to industrial hygiene sample data, assessment units, exposure profiles, and judgment of acceptability of the assessment unit exposure profile happen during the basic characterization. Open Range, Lotus Notes on SharePoint, and Electronic Document Workflow house the historical exposure data. Safety professionals spend time communicating hazards and sampling data to the SRNS workforce during safety and health meetings.

The Employee Safety Manual 8Q, Procedure 122-*Hazard Analysis Process,* defines the assisted hazard analysis (AHA) process for the SRS site. The AHA defines the hazard analysis process by linking the initiator, worker, and SMEs together to determine the risk. The AHA starts with defining work by breaking down the task into a sub-task, hazards associated with the work, method, tools, or equipment. Work planners use a hazard analysis determination guide to identify risks related to the scope of work and determine the level of hazard analysis required. The guide is a decision-tree that comprises numerous questions. The work planner calculates the hazard analysis level by responding to the questions. There are three distinct levels available: team, formal, and individual hazard analysis. The team and formal hazard analysis levels enable SMEs, line managers, and workers to analyze the activity and contribute to its development.

In addition to the Hazard Tree AHA process contained in the work planning and control database Asset Suite®, SRNS uses the results of worksite analysis to identify, analyze, eliminate, and control hazards. The SRNS ESH&Q Safety Plan, *Worker Safety and Health Program SRR-ESH-2018-00093*, *SRS M&O and Liquid Waste Basic Hazard Control Handbook, and Task Level Hazard Analysis, are* required by SRNS Manual 8Q, *Employee Safety Manual*, Procedure 122, *Hazard Analysis Process,* which describes the AHA process. The workers are knowledgeable of the hazards they face and are confident they can perform their work safely. The AHA system went from a desktop application to a web-based application in 2021.

SRNS' subcontractors have a different process for hazard analysis at SRS. SRNS trains subcontractors on hazard analysis requirements and the AHA process to ensure hazard awareness for all workers on the site. SRNS requires subcontractors to have task-specific plans for work onsite. Some subcontractors have access to the AHA web application depending on the job. SRNS also provides subcontractors ways to receive communications on hazards and safety emergencies.

SRNS has a robust accident and injury investigation procedure in place to track all events, occurrences, and near-misses. The investigation process uses a graded approach based on the severity of the incident and the possibility for lessons learned. Factfinding meetings, issue reviews, and no action are all choices for reviewing incidents, with closure actions noted in the Site Tracking, Analysis, and Reporting (STAR) database. SRNS continues to use the "Integrated -The Rest of the Story" (iTROTS) approach to record events that fall below reporting criteria for the CAIRS and Occurrence Reporting and Processing System. SRNS looks for patterns in these less serious incidents.

After an internal spot review of the SRNS issue investigation program in 2018, SRNS Site Services noticed that subcontractors did not have access to the onsite medical facility. To track

onsite accidents of subcontractors, SRNS began providing access to the medical facility to help identify actions for improvement and the integration of subcontractors onsite. While onsite, the Team observed Site Services investigate a subcontractor accident. A subcontractor working at "Russell's at the Hub" (the H-Area Cafeteria) cut her finger while cutting a sandwich in half. SRNS staff completed the investigation using the graded approach, factfinding meeting, and iTROTS to follow up on the incident. SRNS continuously works on improving communication with its subcontractors and ESH&Q staff collaborates with subcontractor technical representatives (STR) to address subcontractors' accidents onsite.

Onsite safety and health inspections play a significant role in identifying, analyzing, and controlling hazards at SRS. SRNS conducts a variety of surveys, assessments, and inspections to ensure employees work in a safe environment. ESH&Q personnel, managers, LSITs, and facility or organizational building managers complete routine/weekly workplace inspections per Manual 8Q Procedure 53-*Safety Inspections and Inspection Color Codes,* and Procedure 12, *General Site Safety Requirements.* Industrial hygiene and radiation control personnel conduct applicable surveys required by Manual 4Q, *SRS Industrial Hygiene*, and Manual 5Q, *Radiological Control Program,* respectively, as well as local program requirements, work packages, or controls. Facility SMEs and safety personnel conduct final acceptance inspections of new or altered facilities and components using Manual 8Q, Procedure 51, *Final Acceptance Inspections.* Results of surveys are documented in the STAR system either under Workplace (Tier 1) or Evolution of a Job (Tier 2 and 3). Deficiencies requiring more than routine action or services to correct are documented in Open Range, STAR database, Assets Suite, Environmental Evaluation Checklist, and AHA accordingly.

MFOs and focal point inspections operate as facility condition inspections. During the inspection, inspectors identify corrective actions or correct conditions on the spot. SRNS assigns codes to corrective actions based on risk level and imminent danger which help managers prioritize safety issues for correction. Inspections also document opportunities for improvement. SRNS uses ten human performance improvement (HPI) tools within inspections: Safety Analytics, Forecasting and Evaluation Reporting; Self-Check; Peer Check; three-way communication; place keeping; pre/post job brief; Phonetic alphabet; procedure use/adherence; Questioning Attitude; and Timeout.

Manual 8Q Procedure 53-*Inspections and Inspection Color Code,* outlines tools, equipment, safety equipment, and walking/working surfaces inspection requirements for SRNS. The three parties responsible for equipment inspections are the inspection group, the supervisor, and the end-user. The inspection group ensures inspections are according to schedule, meet procedure and inspection criteria, and informs the SRNS area of the results. Supervisors are responsible for ensuring equipment is in an operable condition and is properly inspected. SRNS employees conduct daily equipment inspections and report deficiencies.

Field observations, documents, and interviews confirmed that SRNS conducts frequent workplace inspections to identify and mitigate hazards. The Team observed a workplace safety walkdown by a group that included the local safety professional, a facility system engineer, a DOE facility representative, and a craft person. The effort is part of the ongoing periodic workplace safety and health inspection program that fulfills the VPP expectation for comprehensive workplace surveys.

Workers at SRNS conduct pre- and postjob briefings which serve as a vital element of the SRNS safety program. Prejob and postjob briefings are formal or informal, depending on the task frequency or size. Every SRNS job requires a prejob review identified in Manual 2S, Procedure 2.1. Before beginning work, workers undertake a task preview by reading processes, work packages, scope, task, precautions, limitations, worker protection controls, responsibilities, critical steps apart from the task, and confirming the working document. While onsite, the Team observed a steam outage prejob briefing at the 784 Biomass Facility. The prejob included a discussion on lockout/tagout, chemicals, and tools for the job. The prejob went over the critical steps of the job and discussed communication between the interested parties.

Postjob briefings are optional and informal. Postjob briefings follow the guidance provided in Manual 2S, Procedure 2.1, attachment 8.2. SRNS Utilities and Maintenance group tracks postjob briefs using the Site Operations Standardized Tools (SOST) database accessible through Insite. Actions that come from MFOs and postjob reviews are logged in STAR and reviewed at Management Review Boards. The Utilities Maintenance group uses the postjob briefings to help transfer knowledge from more senior mechanics to the new workers.

SRNS has made significant changes to the Chemical Management Manual 13B since the last onsite review. The chemical management center is responsible for integrating the chemical safety and lifecycle management program and providing technical guidance for chemicals at SRS. Since the last VPP assessment, SRNS has implemented the Chemical Safety Environmental Management Systems (CHMEMS), an intensive barcoding and approval system for tracking chemicals from procurement to waste. The chemical safety and lifecycle management program gives local area chemical coordinators responsibilities for maintaining chemical inventories on site.

SRNS' trend analysis program takes a comprehensive approach to identify, analyze, and eventually prevent and mitigate hazards, injuries, and illnesses. SRNS has made advancements in its Contractor Assurance System analysis and trending program. The ESH&Q organization developed a portfolio of slides to analyze when injuries and illnesses are occurring including time and day of the week, locations, job positions, body parts, types of injuries and accidents, causes, and nature of injuries. Managers review the trend analysis and put programs, processes, or procedures in place to prevent reoccurrence. Statistical process analysis tools identify issues management trends to get the big picture and demonstrate SRNS' commitment to continuous improvement.

**Conclusion**

SRNS demonstrated it actively uses proven methods, processes, and procedures to identify and analyze workplace hazards. The SRNS work planning and control system continues to ensure a thorough understanding of hazards that might be encountered during work. Managers and supervisors seek and respect workers' opinions and ideas before finalizing work packages or implementing controls. The site maintains an adequate workforce of certified safety, health, and radiological professionals to analyze facilities, procedures, projects, identify hazards, and assess employee risk. Workers at SRNS conduct pre and postjob briefings which serve as a vital element of the SRNS safety program. The site conducts detailed baseline assessments and a variety of surveys, exposure evaluations, assessments, and inspections to ensure employees work in a safe environment. Field observations, documents, and interviews confirmed that SRNS

conducts frequent workplace inspections to identify and mitigate hazards. SRNS continues to meet the expectation in Worksite Analysis for continued participation as a DOE-VPP participant.

## VI. HAZARD PREVENTION AND CONTROL

The third and fourth core functions of ISM, *Identify and Implement Controls,* and *Perform Work in Accordance with Controls*, ensure that once hazards have been identified and analyzed, they are eliminated (by substitution or changing work methods) or addressed by implementing effective controls (engineered controls, administrative controls, or personal protective equipment (PPE)). The equipment maintenance processes and emergency preparedness plans shall ensure compliance with requirements. The organization shall develop and communicate safety rules and work procedures that all employees understand and follow to prevent, control the frequency of, and reduce the severity of mishaps.

In 2017, hazards at SRNS were well controlled. SRNS followed the hierarchy of controls to minimize its workers' exposure to hazards. Workers demonstrated an ability to conduct work safely, had an effective awareness of hazards, and continually sought ways to make work safer.

Since 2017, SRNS stepped up hazard prevention and control by aggressively working on continuous process improvements and rapid improvements events (RIE). SRNS complies with SRS Industrial Hygiene Manual (4Q), Procedure 105-*Hazard Prevention and Control,* and managers and workers constantly look for ways to eliminate hazards or substitute less hazardous processes; implement engineered or administrative controls and provide PPE to minimize workers' exposure to hazards.

Safety and Security encircle the core elements of SRNS' Standards of Excellence ensuring completion of work in a safe manner and protecting the security of SRS' mission and facilities. All workers know it is the individual right of every employee, including subcontractors, to call a "time out" if they observe a compromise to safety. Every employee has the responsibility to correct any unsafe act or condition and/or notify their supervisor as soon as possible. All employees accept responsibility for their personal safety, and the safety of others. SRNS continues to fully implement its *Integrated Safety Management System Description* FY2022 SRNS-RP-2008-00087, as well as Procedures 1-*Safety Principles and Program Responsibilities*, and 12-*General Site Safety Requirements,* of the Employee Safety Manual 8Q, which provides employees a safe work environment.

The safety program encompasses the environment, safety, and health of visitors and subcontractor/supplier, and subtier subcontractor/supplier employees required by DOE Regulation 10 CFR 851, *Worker Safety and Health Program*, and Employee Safety Manual 8Q Procedure 15- *Subcontractor and Visitor safety and Health*. Health and safety specialists review subcontractors' Worker Protection Plans. Depending on the hazards or complexity of work performed by the subcontractor, site STRs either visit the location of work performed and carry out daily inspections, or the STR remains at the location for the period the subcontractor is conducting work. Visitors receive safety briefing handouts and orientations by their site point-of-contact or escort.

A sufficiently staffed ESH&Q organization controls and corrects hazards ensuring a safe work environment exists in all areas for workers, visitors, and subcontractors. Certified professionals are available based on potential risks on the site. SRNS has 13 Certified Safety Professionals, and six Certified Industrial Hygienists. In addition to certified staff, the organization includes two Safety Trained Supervisors, two Construction Health & Safety Technicians, two Safety

Management Specialists, seven Graduate Safety Professionals, one Associate Safety Professional, one Occupational Hygiene and Safety Technician, 28 Safety Engineers, and 26 IHs. Numerous health physicists and radiation control technicians located throughout the site's facilities support the ESH&Q staff. Managers provide funding, procurement of equipment, training, and other professional services including a certified ergonomist from Los Alamos National Laboratory (LANL) and a subcontracted electrical safety specialist, as required.

SRNS took many actions in response to the COVID-19 Pandemic. At the outset, SRNS implemented a COVID-19 Site Integrated Response that established the Infectious Disease Response Team (IDRT) War Room. The IDRT identified and coordinated response efforts that included manufacturing face coverings onsite, developing an SRS Heat Map/Contact Tracing tool, creating various protocol sheets, posters, signs, and improving communications site-wide. SRNS medical staff screened over 21,000 COVID-19 related issues and increased the site's internet bandwidth to 10 gigabits per second within weeks of the COVID-19 outbreak to accommodate the increased numbers of new workers working remotely. Additionally, the site established two testing facilities onsite that conducted over 6K PCR/Rapid tests, partnered with Augusta University Health System which conducted over 17.5K tests, subcontracted to acquire five additional nurses for COVID-19 related testing and vaccinations, and provided 4,374 doses of the Pfizer® vaccine at SRS allowing the site to return to work quickly and in some cases continue to work under modified conditions. While employees' COVID-19 cases reached 4,675 total cases with a few deaths, actions implemented by the IDRT limited work-related COVID-19 cases to 12 with one fatality.

The Team reviewed a sample of hazard control programs from the Radiation Control Program 5Q Manual, and Employee Safety Manual 8Q, and observed hazard controls during various processes and procedures. The Team observed no deviations or improper acts during the onsite assessment with Procedures 32-*Lock Out/Tag Out Energy Control*, 63-*Fall Protection*, 33-*Confined Space,* and Procedure 52-*Safety Showers and Eye Wash Facilities*. Program managers are well informed, and workers were very familiar with and comply with the requirements of the programs.

SRNS effectively uses the hierarchy of controls to mitigate and reduce hazards. Examples include:

- Containment Fabrication Facility (CFF): After a worker suffered a left bicep injury while pulling plastic sheeting from the rolled stock on a dispensing rack onto a layout table at the CFF, a timeout occurred and the LSIT conducted an iTROTS evaluation of the event and work process. SRNS determined the injury occurred because workers pulled the sheeting from variable heights using variable hand and arm positions. Workers familiar with the process developed a push bar device that coils onto the end of the sheeting allowing two employees, one on each side of the layout table, to push the plastic sheeting across the layout table keeping the push bar at the same height and level instead of pulling it onto the table. (Elimination and substitution)

- Lead Melter Facility 711-4N (Project Management & Construction Services): During operation of the open-air lead Melter and cold lead machining area, several workers recorded high lead level readings on their personal breathing zone samplers. No exposure to workers occurred because they wore appropriate PPE using the approved full-face respirator with

P-100 cartridges. As a result of the high lead level readings on the breathing zone samplers, managers called a timeout to develop procedures and implement controls to reduce breathing zone lead levels. Adding High Efficiency Particulate Air filters in both areas and installing a smaller melting pot reduced the breathing zone area levels. (Administrative, substitution, and engineer)

- Centerra Dog Kennels: Observers monitoring personnel using handheld grinders to remove paint from the dog kennel floors in the onsite Centerra Dog Kennels identified improvements to the process which would eliminate potential ergonomic issues, as well as exposure to silica dust. Initially, workers used handheld angle grinders. The site obtained a commercial floor grinder better suited for this task that allowed the worker to perform the work in a vertical position (instead of on hands and knees). This improved the ergonomic position of the workers and moved their breathing zone away from the potential silica hazard caused by the grinding. Workers also identified an extension for the handheld grinders which would allow the worker to work in a more vertical position and away from the hazard. (Substitution)

- Unmanned Aircraft System (UAS) Drones: Through support from SRNL and UAS team, SRNS has implemented the use of drones to complete infrastructure inspections, aerial photography and videography, and emergency response support exercises. This new engineering control has eliminated the need for personnel to climb ladders to access rooftops of certain facilities to conduct various inspections, apply herbicides to tops of buildings, monitor training exercises, and obtain aerial photographs. This minimized the need for access ladders or using onsite helicopter support from Centerra reducing the higher risk activities using unmanned drones (Engineered)

- Remote Workers: Because of the vast area of SRS, SRNS remote workers, defined as any worker within the SRS boundaries who will be beyond the range of an installed safety alarm system, establish a line of communication with the Savannah River Site Operations Center (SRSOC) via SRS two-way radio or remote worker pager and cell phone. Remote workers call the SRSOC before heading to their remote work location. They identify who they are, where they are working and duration (start/stop times) of their work. (Administrative)

The SRNS Occupational Medical Organization includes the Occupational Health Director, two additional physicians, two certified nurse practitioners, two psychologists, one optician, seven registered nurses, five COVID-19 subcontractor registered nurses, eight health information systems administrative assistants, two Drug Program Managers and three support staff, nine subcontractor laboratory phlebotomists, and two contract physical therapists who were released because of the COVID-19 pandemic. The occupational health clinic provides fitness-for-duty reviews, employee job task analysis, audiograms, minor injury and first-aid care, coordination of peripheral offsite referrals for specialty care, referral to occupational medical services, and referrals to employee assistance programs if required. The SRNS medical provider engages employees to seek out ways to improve their health. SRNS' occupational medicine providers also counsel employees about health or job-related concerns. Medical organization personnel initiate the injury/illness first report using the Electronic Medical Business Operations System which links the medical organization directly with site managers to form a closed-loop system.

SRNS' wellness programs help workers remain healthy even during the challenging circumstances related to COVID-19. SRNS wellness programs include occupational medical

programs focusing on health promotion and physical therapy, cardiac health, Wellness Fairs, Weight-Loss Challenges, 19 Wellness Rooms throughout the site providing private spaces for nursing mothers, diabetics, and blood pressure and weight self-screenings. The wellness program coordinated onsite teams to participate in offsite events, challenges, and local events. Finally, the wellness program provides educational outreach for topics such as, cardio-pulmonary resuscitation/first aid/Automated External Defibrillator, Seven Healthy Steps to Eating, opioid programs, lunch and learns, and stress and time management.

SRNS has a comprehensive, continuously improving PPE program complying with the Employee Safety Manual 8Q Procedure 61-*PPE*. PPE is widely available to all personnel when necessary to protect them from associated hazards. Workers wear the PPE and are knowledgeable of the care, maintenance, and storage of their PPE. SRNS also provides stipends to purchase safety shoes and prescription safety glasses. In addition, the site provides uniforms, running shoes, and athletic clothes for firefighters. Routine and general PPE are available at material access centers located in various areas around the site. Personnel receive initial GET to familiarize them with standard PPE use and care. Safety professionals review AHAs and work packages to identify the proper PPE for each activity. Field hazard assessments check for use and validate the correct PPE worn for the task performed.

SRNS chairs the SRS PPE Oversight Committee (PPEOC), an open forum to discuss and approve potential changes to PPE based on routine, nonroutine, and new processes to include the use of nonstandard PPE by other contractors on SRS. Supervisors and employees are constantly identifying or recommending more efficient and effective methods to protect employees to the PPEOC when other forms of hazard controls are not effective or practical.

SRNS complies with DOE Order 151.1D, *Comprehensive Emergency Management System,* and Manual 6Q, *SRS Emergency Plan/Emergency Management Program Procedures Manual*. SRNS coordinates and communicates with all contractors and provides fire and emergency medical and paramedic services capable of responding to SRS locations in less than 5 minutes meeting National Fire Protection Association's 1710 turnout requirements. SRNS conducts a coordinated annual site exercise that may include Savannah River Mission Completion, LLC, SRNL, Ameresco, and Centerra-SRS. SRNS conducts annual facility exercises to evaluate responses and quarterly drills for training. The scenario writers develop exercises and drills. SRNS emergency preparedness coordinators assign controllers to conduct the exercise and provide input to exercise players. Evaluators monitor the exercise to determine if actions meet the exercise performance criteria. The Emergency Preparedness Program Manager enters the results and action items in the STAR issues management database.

All emergency personnel refresh their qualifications annually. During the COVID-19 pandemic, firehouses remained manned but no close-in, hands-on, training occurred. The Emergency Preparedness Program Director implemented a virtual response tabletop environment to ensure emergency personnel could maintain and demonstrate proficiency. SRNS maintains mutual aid agreements with Aiken, Barnwell, Allendale, Jackson, and Burke counties.

SRNS implemented several readiness assurance improvements identified by DOE's Office of Enterprise Assessment's March 2022, Independent Focused Assessment of Emergency Management Corrective Actions reports at NNSA and the Office of Environmental Management sites. SRNS implemented a comprehensive, multi-faceted approach to ensure corrective action

closure as a best practice. The approach included: the creation of a new Readiness Assurance Manager position, increased involvement of the site facility review board, development of a self-assessment criteria review and approach document, training of emergency management personnel on readiness assurance activities, and implementation of a policy for timely issuance of lessons learned.

Facility conditions observed by the Team did not call into question any preventive/predictive maintenance issues. A certified maintenance professional manages the Maintenance Center and established separate predictive and preventive liability engineering maintenance teams. The preventive maintenance (PM) team ensures structures, systems, and components remain in good working order to protect site employees and surrounding areas and meet requirements of the nuclear facility safety bases so SRNS can perform work safely and reliably per design.

The engineering group determines which PMs need to occur and provides the criteria. The PM program is responsible for equipment and sets up PMs based on manufacturers' recommendations and frequency optimum window. Engineers develop model work orders (WO) for PM in Asset Suite®, which generates the work order at the appropriate time. The Predictive Maintenance group uses noninvasive methods like vibration analysis, infrared tomography, and ultrasound to predict failures before they happen. The Predictive Maintenance group issues "Warnings" (keeps an eye on because something may be happening) and "Alerts" (needs a WO generated). The operations, maintenance, and work control groups meet regularly to ensure all site work is on a schedule and to keep all workgroups aware of impending WOs that have the potential to interrupt operations.

SRNS has developed and implemented a site-specific Worker Protection Plan which integrates environment, health, and safety into Work Planning and Execution in accordance with its contract. The Work Planning and Control process encompasses all SRNS by integrating SRNS' eight work management centers with mechanics and engineers to safely prepare to conduct work. SRNS' work planning process complies with its governing documents, Conduct of Maintenance Manual 1Y, Procedure 8.20-*Work Control Procedure*, Employee Safety Manual 8Q, Procedure 122-*Hazard Analysis Process*, Source Compliance Document 15, *Work Panner Guide*, and Activity Hazard Analysis (AHA), *Hazard Tree Report 4.00*. The Site Utilities Division generates corrective maintenance within Asset Suite®. Work Management center managers screen and process work requests (WR) for appropriate information and priority. WRs change to WOs after validation. SMEs walk down WOs to ensure correct workscope development and inclusion of technical documents and AHAs. All individuals involved with the WO receive an electronic copy to ensure hazard and control identification and then return the WO to the planner for approval.

A scoping meeting occurs after the WOs return to the planners. The planner sets the WO to ready status in Asset Suite®, enabling pre-job briefing and task review. A post-maintenance test after WO completion enables the planner to collect feedback and all documents. The work planner electronically approves work completion in Asset Suite® and enters the completed WO into the Electronic Document Workflow System. The same process follows for all types of work: expedited and repetitive, unplanned, corrective and preventative based on variations as applicable, and functional class.

The site has established and complies with a disciplinary and positive reinforcement safety program described in Human Resources Manual 5B, Procedure 1-4, *General Human Resources Program,* and Procedure 2-14, *Disciplinary Program*. The disciplinary program can be either progressive (i.e., verbal warning, written warning, time off, up to dismissal), or immediate, based on the type and severity of the offense. The program applies to union and nonunion employees, leaders, and managers. All interviewees felt the program applies to everyone equitably. SRNS has numerous monetary and administrative positive reinforcement and recognition programs available and regularly awarded throughout the site.

In addition to MFOs conducted at least weekly, the Team observed many safe behaviors. Examples include: spotter use when backing large or visibility obscured vehicles; drivers honking while backing; full stops at stop signs; widespread use of PPE; wearing of seat belts operating forklifts; and simple safe acts, such as handrail use on stairs, vehicle walkarounds before driving government vehicles, and ensuring all passengers are wearing a seat belt before moving a government vehicle.

**Conclusion**

SRNS effectively eliminates or controls hazards and exposures using the hierarchy of controls. It takes the health and welfare of its staff, workers, and subcontractor workforce seriously. SRNS plans, schedules, and completes maintenance safely employing certified professionals commensurate with the potential risks on the site. PPE is available and worn to prevent mishaps or control their frequency and/or severity. SRNS conducts a variety of surveys, inspections, and assessments to eliminate, reduce, and control workplace hazards. It provides a full range of medical services, emergency response and planning, and wellness program support to its workers. The Team did not identify any programmatic noncompliance with DOE, OSHA, State, or local safety requirements. SRNS' injury and illness rates are well below the comparative industry average and reflect effective hazard prevention and control methods. SRNS meets the Hazard Prevention and Control expectations for continued participation in DOE-VPP.

## VII. SAFETY AND HEALTH TRAINING

Managers, supervisors, and employees shall know and understand the policies, rules, and procedures established to prevent exposure to hazards. Training for safety and health shall ensure that personnel understand their responsibilities, recognize hazards they may encounter, and can act in accordance with management expectations and approved procedures.

In 2017, the Team concluded that SRNS had a well-established training and qualification program that trained employees to recognize hazards and protect themselves and coworkers. SRNS training programs equipped managers, supervisors, and employees with the knowledge to understand the established safety and health policies, rules, and procedures. The ELDP, knowledge transfer, and mentoring programs demonstrated SRNS' proactive approach to addressing its changing training needs.

The SRNS Manual 4B, *Training and Qualification Program,* establishes a systematic approach to training. The training and qualification program, as defined and implemented, continues to provide the knowledge, skills, and abilities to perform tasks competently and safely. Training consists of a combination of self-study, computer-based training, classroom instruction, seminars or briefings, simulator training, on-the-job training, and practical demonstration.

For the past 25 years, SRNS maintained its training records in the Training Record Automated Information Network (TRAIN). SRNS developed many customized features in the TRAIN system to address its programmatic needs. The TRAIN systems depended on the Internet Explorer® platform, which Microsoft® no longer supports, so SRNS switched to a new learning management system (LMS) for its training and tracking needs. SRNS issued a request for proposal for the new system and worked with the Energy Facility Contractors Group (EFCOG) Training Working Group to seek input from other sites' lessons learned before selecting a replacement LMS.

SRNS ultimately chose the Site-U LMS to replace the TRAIN system because Site-U agreed to develop a custom program to address SRNS' "watch bill" requirement. The new LMS can confirm operators' qualifications before scheduling them for work. The Site-U LMS automatically verifies operator qualifications when they are added to the watch bill list for nuclear facilities. The SRNS training department has shared its experience of choosing and implementing the new system with the DOE EFCOG Training Working Group, along with lessons learned from the process to assist other DOE contractors seeking to replace their LMS.

SRNS continues to have a comprehensive training program for all employees. New employees attend GET, which provides basic safety and health training. Trainees complete one of four levels of GET (i.e., Category 1, Category 2, Category 3/Full GET, and Category 3/Full GET Challenge Test Out), depending on the type of access required. GET requires passing a knowledge check test with a minimum score of 80 percent. Employees receive their site identification badges from the Badge Office upon validation of completion of GET. Full-time employees must also take the CAT to retain their badges. CAT, a computer-based training, serves as a yearly GET refresher given yearly in January. The manuals for GET and CAT are comprehensive and include discussions of VPP, Integrated Safety Management System, BBS, and HPI programs.

SRNS requires all employees to attend monthly safety meetings that include topics on ISM, health, and productivity management. Each month a video provides an overview of activities at a spotlighted facility. The monthly safety topics and safety meetings also contain crosscutting information that covers relevant information for seasonal hazards. The video may also contain information related to recent accident and injury trends.

Manual 4B contains the requirements for training activities at SRS. These procedures, along with facility/support training program descriptions, serve as the overall Training Program Plan for SRS' Hazard Category 2 and 3 Nuclear Facilities per DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*. Manual 4B Procedures require DOE-SRO approval. NNSA's Savannah River Field Office (SRFO) is the cognizant approval authority for Technical Training and Qualification Programs within all NNSA-SRFO facilities at SRS. SRNS leads the site Training Managers' Committee (TMC), which includes all SRS prime contractors and coordinates any changes to SRS Manual 4B. The TMC provides a forum for consistent programmatic integration of activities, problem identification and resolution, and policy development. The committee meets monthly and reviews and recommends revisions to Manual 4B. Team interviews demonstrated that the TMC is active and remains an effective process for addressing and maintaining the SRS contractors' training programs.

SRNS continues using its ELDP to address the critical need to hire and retain engineers in response to the increase in engineering retirements. SRNS designed the ELDP to encompass multiple aspects of the hiring process for new engineers, including advertising, interviewing, hiring, and training newly hired engineers to help them succeed, and improve retention within the SRNS programs. The ELDP developed program criteria and provided a senior engineering mentor. The dedicated senior engineer provides day-to-day mentoring to the new hires to ensure that they understand the engineering processes at SRNS facilities.

SRNS modified the ELDP program since the last VPP review. The program continues to require a 4-to-6-month internship during which mentors assist new hires with site training, qualification, and security clearance. SRNS eliminated its previous practice requiring participation in up to three, 3-week "deep dives" at multiple SRNS nuclear facilities. SRNS now assigns newly trained engineers directly to the specific facility they were hired to support where they complete their training. The newly hired engineers are assigned a mentor at their assigned facility and complete any required training for that facility under that mentor. This practice facilitates the engineers' immediate support for the facility they were hired to support.

SRNS began the Start Your New Career @SRS (SYNC) in April 2019, to reach out to the population of new hires dating back to January 2018. The SYNC is a new employee orientation workshop designed to inform and align employees with SRNS' core values. The SYNC workshop is typically held in person and continued virtually during the pandemic. New employees are invited to attend and interact with various SMEs and colleagues to garner those individuals' experiences.

The SYNC program bolsters SRNS' safety expectations historically provided during the GET training and onboarding requirements by sharing general knowledge from SMEs and senior employees' experience with new employees. The SYNC process introduces new employees to the SRS historical and foundational knowledge, SRNS-specific functions, SRNS standard of

excellence, and helps them appreciate why SRNS' culture is important and why it operates in its particular fashion. SRNS plans to invite all new hires to participate in SYNC within 90 days of employment.

Recently, SRNS identified several improvements to the SYNC process that would increase peer interaction with the new employees and labeled it Re-SYNC. However, Re-SYNC has been put on hold due to the results of an onboarding and development RIE performed in March 2022.

SRNS uses the RIE process to develop solutions to emerging issues by assembling a team of experts to drill down and resolve those issues. In this case, the RIE team consisted of 18 members, including the ESH&Q VP, Site Training Director, and many others familiar with the onboarding process. The RIE's focus was to develop an efficient and comprehensive process that consistently onboards and provides continuous development, including leadership to all SRNS employees throughout their careers at SRS. The RIE issued its report on March 3, 2022, and SRNS plans to complete implementing the RIE recommendations by April 2023, when it will roll out Re-SYNC.

SRNS remains concerned that the increase in retirements of experienced craft workers and nuclear operators in past years could affect safe operations by losing historical worker knowledge. To address this concern, SRNS created the Knowledge Transfer (KT) process. The KT process captured and retained historical knowledge for maintenance activities within nuclear or old facilities. The KT process identified maintenance activities that would benefit from a video record to retain the knowledge of older systems for newer employees to reference after senior and experienced crafts had retired. SRNS maintains equipment no longer available in the private sector, so newer employees are unlikely to have experience with those systems. The KT process captured the maintenance activities of those older systems on iPhone® video or Go Pros® so that newer crafts may observe those maintenance tasks in the future. The KT process also captured routine tasks on video to provide enhanced pre-job evaluations compared to simply reviewing documents in preparation for those work tasks. The KT process appealed to younger workers that are more inclined to learn from visual input rather than paper instruction. Workers at the Tritium Facility used a similar approach called Knowledge Preservation. The knowledge preservation program included videotaping activities exclusively related to maintenance activities for tritium operations. These two approaches were similar but operated independently.

Over the past few years, SRNS has expanded and combined these approaches. The SRNS KT process intends to capture and curate institutional knowledge while delivering impactful content that enhances SRNS' safety culture and drives mission success. Previously, SRNS applied this process to the Tritium Facility, preserving and documenting knowledge, procedures, and tasks exclusive to that facility.

In 2021, SRNS applied this process to the NNSA Capital Project work using the KT, preservation, and sharing approach at the Plutonium Pit Manufacturing Project at SRNS. The KT element intends to expand the skillset of the SRNS workforce to help develop a deeper knowledge and understanding of roles and functions through a 2-year rotational assignment of SRNS personnel at LANL alongside LANL PF-4 workers to support the Plutonium Pit Manufacturing Project. The Knowledge Preservation element included documenting and capturing existing organizational knowledge on process systems and support evolutions, the development of facility systems training (study guides), and the refinement of operations

philosophy/procedure development for Pit Manufacturing at SRNS. The knowledge share element of the process intends to transfer the knowledge gained from the transfer/preservation elements throughout the SRNS Pit manufacturing workforce at SRNS.

**Conclusion:**

SRNS has an established training and qualification program that effectively trains employees to recognize hazards and protect themselves and coworkers. The SRNS training program equips managers, supervisors, and employees with the knowledge to understand and implement established safety and health policies, rules, and procedures. The ELDP and KT program demonstrates SRNS' continued proactive approach to addressing its changing training needs. SRNS meets the expectations for continued participation in DOE-VPP in the Safety and Health Training tenet.

## VIII. CONCLUSIONS

Since the last onsite DOE VPP review in 2017, SRNS experienced significant changes that it could not have predicted. Extension of the contract, a world-wide pandemic, and a major change in site mission have presented many challenges that could have derailed its safety performance. SRNS responded to these challenges by focusing on safe mission performance as a fundamental value. SRNS continues to foster employee engagement and involvement in every aspect of its mission. The LSITs remain a cornerstone of SRNS' continuous safety improvement efforts. SRNS' safety culture and mature processes implement an effective ISM system. SRNS can improve by preventing complacency related to its long history of safe performance, particularly among the 65 percent of the workforce that have less than 6 years of experience onsite. The Team did not identify any systemic noncompliance with requirements nor did it identify any suppression of concerns or reporting. SRNS fully demonstrates continuous improvement and pursuit of excellence expected for continued participation in DOE-VPP. The Team recommends that SRNS continue participating in DOE-VPP at the Star level.

## Appendix A: Onsite VPP Assessment Team Roster

### Management

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