Savannah River Nuclear Solutions, LLC
Savannah River Site

Report from the Department of Energy
Voluntary Protection Program
Onsite Review
October 10-19, 2017

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

Foreword

The Department of Energy (DOE) 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 a *stretch for excellence* through systematic approaches, which emphasize creative solutions through cooperative efforts by managers and employees. Requirements for the DOE-VPP participation are based on comprehensive management systems with employees actively involved in assessing, preventing, and controlling potential health and safety hazards at their sites. All contractors in the DOE complex, including production facilities, laboratories, and various subcontractors and support organizations may participate in DOE-VPP.

However, 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 programs with names and functions similar to those in OSHA's VPP: Star, Merit, and Demonstration. The Star program is the core of DOE-VPP. This program is aimed at outstanding protectors of employee safety and health. The Merit program is a steppingstone for participants that have good safety and health programs, but need time and DOE guidance to achieve true Star status. The Demonstration program, expected to be used rarely, allows DOE to recognize achievements in unusual situations about which DOE needs to learn more before determining approval requirements for the Merit or Star program.

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 are certificates of approval and the right to use flags showing the program in which the site is participating. The participant may also choose to use the DOE-VPP logo on letterhead or on award items for employee incentive programs.

This report summarizes the results from the evaluation of Savannah River Nuclear Solutions, LLC (SRNS), conducted October 10-19, 2017, and provides the Associate Under Secretary for Environment, Health, Safety and Security with the necessary information to make the final decision regarding SRNS' continued participation as a DOE-VPP Star site.

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ABBREVIATIONS AND ACRONYMS

AHA	Assisted Hazard Analysis
AMP	Aspiring Mid-Career Professionals
AU	Office of Environment, Health, Safety and Security
AU-12	Office of Worker Safety and Health Assistance
BBS	Behavior-Based Safety
BLS	Bureau of Labor Statistics
CAIRS	Computerized Accident/Incident Reporting System
CAT	Consolidated Annual Training
CFR	Code of Federal Regulations
DART	Days Away, Restricted or Transferred
DOE	Department of Energy
DOE-SR	DOE Savannah River Operations Office
EM	Office of Environmental Management
ELDP	Engineers Leadership Development Program
FIT	Focused Improvement Transformation
FLM	First-Line Manager
FY	Fiscal Year
GET	General Employee Training
IDEAS	Individuals Developing Effective Alternative Solutions
IH	Industrial Hygiene
IHA	Individual Hazard Analysis
ISMS	Integrated Safety Management System
KT	Knowledge Transfer
LEAP	Leaders Emerging as Professionals
LOI	Line of Inquiry
LSIT	Local Safety Improvement Team
MFO	Management Field Observation
M&M	Motivation and Morale
NAICS	North American Industry Classification System
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
RIE	Rapid Improvement Event
RM	Responsible Manager
SME	Subject Matter Expert
SRNL	Savannah River National Laboratory
SRNS	Savannah River Nuclear Solutions, LLC
SR	Savannah River Operations Office
SRS	Savannah River Site
S&S	Safeguards and Security
STAR	Site Tracking, Analysis, and Reporting
Team	Office of Environment, Health, Safety and Security DOE-VPP Team
TMC	Training Manager's Committee
TRAIN	Training Record Automated Information Network
TRC	Total Recordable Case
TWD	Technical Work Document
VPP	Voluntary Protection Program

VSA	Value Stream Analysis
WBGT	Wet Bulb Globe Temperature

EXECUTIVE SUMMARY

The Department of Energy's (DOE) Voluntary Protection Program (VPP) Team (Team) from the Office of Environment, Health, Safety, and Security (AU) recommends that Savannah River Nuclear Solutions, LLC (SRNS) continue participating in DOE-VPP as a Star site. The Team conducted the triennial review of SRNS from October 10-19, 2017.

The Savannah River Site (SRS) covers approximately 310 square miles in South Carolina adjacent to the Savannah River. 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, including basic site management and operation responsibilities for the canyons, tritium facilities, and 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 2014. This assessment marks the second triennial reassessment for SRNS. This report provides the Team's recommendation to the Associate Under Secretary for Environment, Health, Safety and Security.

With approximately 1 year left on its contract, SRNS managers have continued their commitment to safety as a core value. They are determined to position the management and operations organization at the site for long-term success no matter which contractor DOE selects for the next contract. Their experience at SRS and other major projects worldwide provides them with the necessary insight to anticipate problems and implement timely solutions. SRNS demonstrated this commitment when it implemented an operational pause to improve its disciplined operations. SRNS managers continue to identify and implement improvements based on employee ideas and concerns.

SRNS provides many ways for employees to be involved in the SRNS safety and health program. Employees are involved in behavior-based safety (BBS) observations and Local Safety Improvement Teams (LSIT), including submitting suggestions through the Individuals Developing Effective Alternative Solutions (IDEAS) program. SRNS maintains a strong employee development program, including the Leaders Emerging as Professionals (LEAP), Aspiring Mid-Career Professionals (AMP), and the Engineers Leadership Development Program (ELDP).

SRNS has a mature hazard analysis process that is tailored to the risks associated with the work. SRNS revises the processes as necessary to incorporate new hazards, requirements, and hazard controls. Continuous improvement of the process is evident. Because workers perform much of the work using the individual hazard analysis (IHA) process that is dependent on the skill of the worker, SRNS should remain alert for errors in this process as experienced workers are replaced by newer workers.

SRNS effectively uses the proper hierarchy of controls in applying engineered, administrative, and personal protective equipment (PPE) controls to mitigate and control hazards that could injure workers. SRNS is identifying and incorporating new engineered controls throughout all aspects of the operations. SRNS increased use of polar monitors as a means to monitor for heat stress is particularly noteworthy.

SRNS has a well-established training and qualification program that trains employees to recognize hazards and to protect themselves and coworkers. SRNS training programs equip managers, supervisors, and employees with knowledge to understand the established safety and health policies, rules, and procedures. The ELDP, knowledge transfer, and mentoring programs demonstrate SRNS' proactive approach to address its changing training needs.

Over the past 3 years, SRNS has pursued excellence in worker safety and health by increasing managers' engagement with the workforce, stimulating worker involvement, and improving its Integrated Safety Management System (ISMS). SRNS managers and workers have a healthy relationship that encourages the identification and resolution of questions, concerns, and issues. SRNS is working to leave a legacy of safety excellence as it approaches the end of its contract and ensure the workforce is ready for the coming transition. With a limited amount of time remaining, SRNS will probably not make major programmatic changes, but there are opportunities for improvement identified in this report that the Team believes SRNS should consider, particularly as it seeks out the small segment of the worker population that may be hesitant to raise issues or concerns.

TABLE 1

OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
SRNS should encourage all personnel to seek out those employees who remain concerned and engage them in a positive way to identify the reasons for their distrust, and to help them raise any safety concerns they may be harboring.	**7**
SRNS should consider periodic, independent surveys to validate the results of the birthday surveys.	**7**
SRNS should integrate issues and recommendations from its Contractor Assurance Program and other self-assessments into its VPP assessment to identify specific goals for its VPP efforts.	**8**
SRNS should emphasize improvements that it has made over the past several years and encourage workers to take ownership of, and become champions for, those improvements.	**8**
SRNS should encourage workers to consider the change in contract not as a corrective action, but rather a change in command, to help workers quickly establish a healthy relationship with the new contractor and minimize the stress and distraction created by a contract change.	**8**
SRNS should evaluate why some LSIT organizations have demonstrated increased BBS observations while other LSITs have stagnated and, in some cases, experienced reduced numbers of BBS observations.	**10**
SRNS should consider the Knowledge Transfer and Knowledge Preservation approaches for broader use at the site and identify opportunities for sharing lessons learned and common resources to gain additional value.	**24**

I. INTRODUCTION

SRS covers approximately 310 square miles in South Carolina adjacent to the Savannah River. Initially constructed 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 25 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.

Initially constructed by E.I. Du Pont de Nemours, 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 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 2014. This assessment marks the third 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, the National Nuclear Security Administration's tritium facilities, and SRNL. SRNS also receives and stores spent fuel from university and research reactors, and downblends those fuels for commercial reactor use. SRNS also operates several waste treatment and disposal facilities that prepare waste for burial onsite or shipment to the Waste Isolation Pilot Plant. Finally, SRNS is performing risk reduction and cleanout activities for facilities that have been shut down.

Significant quantities of radiological and chemical hazardous materials are stored and used in various forms at SRS. Therefore, SRNS' activities involve various potential hazards that need to be controlled. 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 5,200 employees in 2014 to about 5,500 employees in 2017. SRNS has hired 1,910 new employees during that period to account for attrition and retirements. About 36 percent of employees now have 5 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.

Over the past 3 years, SRNS increased its site workscope to support converting surplus plutonium into plutonium oxide for use as mixed oxide fuel or for disposition by immobilization

at SRS. The H-Canyon and HB-Line Facility will provide the feedstock needed for the Mixed Oxide Fuel Fabrication Facility.

AU 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 (AU-12), within AU, and subject matter experts (SME) from the DOE complex conducted work observations and interviews from October 10-19, 2017.

II. INJURY INCIDENCE/LOST WORKDAYS CASE RATE

Injury Incidence/Lost Workdays Case Rate (SRNS)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Incidence Rate per 200,000 hours	DART* Cases	DART* Case Rate per 200,000 hours
2014	8,633,671	10	0.23	1	0.02
2015	8,834,438	14	0.32	7	0.16
2016	9,039,670	9	0.20	2	0.06
3-Year Total	2,6507,779	33	0.25	10	0.08
Bureau of Labor Statistics (BLS-2015) average for NAICS** 562 (Waste Management and Remediation Services)			4.5		3.0
Injury Incidence/Lost Workdays Case Rate (SRNS Subcontractors)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate per 200,000 hours	DART* Cases	DART* Case Rate per 200,000 hours
2014	593,365	2	0.67	0	0.00
2015	413,183	1	0.48	1	0.48
2016	435,948	2	0.92	2	0.92
3-Year Total	1,442,496	5	0.69	3	0.42
Bureau of Labor Statistics (BLS-2015) average for NAICS** 562 (Waste Management and Remediation Services)			4.5		3.0

* Days Away, Restricted or Transferred
** North American Industry Classification System

3-year TRC Incidence Rate, including subcontractors: 0.27
3-year DART Case Rate, including subcontractors: 0.09

Conclusion

The Team reviewed a sample of the injury and illness records and did not identify any issues. An audit performed by DOE Savannah River Operations Office (DOE-SR) in 2016 identified several first-aid cases that SRNS had incorrectly classified. After additional review and research, SRNS reclassified these cases as recordable and entered them into the DOE Computerized Accident/Incident Reporting System (CAIRS) database. Part-year performance

for 2017 shows a flat trend for injuries and illness. SRNS experienced 11 recordable cases to date in calendar year 2017. SRNS accident and injury rates, although relatively stable for the past 3 years, are 95 percent lower than the comparison industry recordable case rate, and 98 percent lower than the comparison industry DART rate. The Team did not identify any incentives that would discourage workers from reporting injuries. Interviews with workers indicate they have been encouraged to report all injuries, no matter how minor. Injuries experienced for the period were mainly hand injuries, slips, trips, and falls. The accident and injury statistics meet the expectations for participation in DOE-VPP.

III. MANAGEMENT LEADERSHIP

Management leadership is a key element of obtaining and sustaining an effective safety culture. The contractor must demonstrate senior-level management commitment to exceeding occupational safety and health requirements and meeting the expectations of DOE-VPP. Management systems for comprehensive planning must address health and safety requirements and initiatives. Elements of the management system include: (1) clearly communicated policies and goals; (2) clearly defined and assigned responsibilities and authority; (3) adequate resources; (4) accountability for both managers and workers; and (5) managers must be visible, accessible, and credible to employees. Authority and responsibility for employee health and safety must be integrated with the management system and must involve employees at all levels.

In 2014, the Team determined that SRNS had effectively managed numerous challenges and maintained its commitment to safety as a prerequisite to mission performance. It used available resources to provide workers with the necessary tools, training, and support to prevent accidents, promote excellence, and build trust. Several management changes had improved workers' perceptions of managers' commitment. Many managers were routinely visible to workers although some managers struggled to find time to visit worksites.

In the intervening 3 years, the management team has changed in several key positions. Changes include a new Senior Vice-President for Environment, Safety, Security and Health; a new Vice-President of Business Services; a new Executive Vice-President and Chief Operating Officer; a new Senior Vice-President for Environmental Management Operations; a new acting Chief Engineer and Nuclear Safety Officer; and a new President and Chief Executive Officer. The new president came to SRNS about a year before this assessment.

In September 2015, SRNS instituted a company-wide pause for work not essential to safety and security after finding procedural noncompliances in operations in HB-Line and identifying several other events that, although not directly related to one another, had common root causes. Those root causes included a lack of management engagement with the workforce, a lack of understanding of good conduct-of-operations behaviors (disciplined operations), and a failure by managers to identify and address some issues. These conditions reflected a deviation from the operational excellence that SRNS desired. As work gradually resumed, DOE's Office of Environmental Management (EM) and SRNS examined all operations, making changes in how procedures are developed and followed, training, and other areas. SRNS exited the pause in January 2016 after completing a number of actions. Those actions included an improved procedure revision process, additional training, increased staffing levels, individual coaching, training for first-line managers (FLM), revision of routine meeting schedules to permit additional manager field time, new assessment tools and processes, and small group sessions with workers and supervisors to discuss potential issues and improvements on a routine basis.

Since instituting the operational pause, SRNS has implemented a common standard of excellence model that encompasses Integrated Safety Management and VPP and helps employees identify the behaviors expected of them to achieve performance excellence. The model emphasizes the necessity of management engagement through field presence, reward and recognition programs, attendance at safety meetings, and sponsorship of LSITs to encourage workers to participate, raise safety issues, and pause or stop work when questions or issues arise. The effect of these

efforts was apparent to the Team as all the workers encountered by the Team complimented their managers' support for safety improvements, suggestions, and willingness to pause or stop work.

The new president identified several goals for the management team and used an All-Managers Meeting during this assessment to review and reinforce his goals and expectations. Those expectations included encouraging employee involvement beyond BBS observations and LSIT participation and getting managers to turn problems over to people who can identify creative solutions. He expects managers to encourage employees to be constantly looking for improvements using "green eyes" to gain a fresh perspective on how to accomplish the SRNS mission. He expects managers to perform focused observations and use those observations as an opportunity for them to become positive difference makers. One specific goal the president established for SRNS was to identify 15,000 errors. He believed that by establishing such a goal, he could encourage managers and workers to look for errors proactively. Experience at other DOE-VPP participant sites indicates that a more effective goal might center on tracking actions and events designed to identify errors. Tracking the number of management field observations, BBS observations, postjob reviews, self-assessments, and other reviews would provide a more effective leading indicator and help characterize those activities as opportunities to identify improvements.

One of SRNS' contract goals is demonstrating cost savings. To support that goal, SRNS created the Focused Improvement Transformation (FIT) core team to manage and support the continuous improvement activities at SRNS. The FIT core team uses the "A3" approach to identify and execute Value Stream Analysis (VSA) and Rapid Improvement Events (RIE). The A3 approach, named after the size of the paper the problem and solution should fit, is a structured, problem-solving and continuous improvement approach first employed by Toyota and typically used by lean manufacturing practitioners. It provides a simple and strict approach to systematically solve problems. The FIT team works with senior managers to identify strategic improvements. The FIT team focuses on process improvements using a cross-functional team. In fiscal year (FY) 2017, the SRNS FIT program conducted 10 VSAs and 35 RIEs. SRNS calculated the program resulted in nearly $43 million in total savings.

Since 2014, SRNS has implemented several actions designed to monitor and improve the site culture. SRNS replaced the former Safety Culture Monitoring Panel with a new Culture Steering Committee. This committee, which includes key vice presidents and staff, is an advisory panel to the president that reviews assessment results, training, performance measures, and emergent trends. Based on these reviews, the committee makes recommendations to drive improvements and prevent organizational drift. Additional actions were added the SRNS Safety Culture Sustainment Plan in July 2017.

One challenge facing SRNS is the potential loss of knowledge and experience as personnel retire. In 2016 and 2017, SRNS hired roughly 1,900 new workers to replace expected losses and ensured knowledge transfer from exiting employees through several processes described in the Safety and Health Training tenet. It also implemented a number of initiatives to retain existing workers, such as a VSA to remove unnecessary actions, facility renovation and workspace improvements to improve workforce morale, and expanded conference or collaboration spaces. SRNS also improved many employee services, such as adding coffee shops, additional food services, expanded fitness and exercise facilities, and rapid charging stations in high traffic areas.

Since 2011, SRNS has been working to improve the supporting infrastructure for the site. It funds those improvements through a "tax" on all users at the site. There is a 5-year integrated infrastructure improvement plan that SRNS updates annually with DOE's agreement. That plan prioritizes infrastructure projects that address vulnerabilities and support the mission. Because of this process, SRNS has been able to complete several major infrastructure improvements that include the domestic water supply system, repairing or replacing aging roofs, and road repaving.

SRNS uses monthly birthday surveys to provide continuous feedback on safety and organizational culture. A key indicator from these surveys is that 85 percent of the responses indicate workers are comfortable raising safety issues or concerns. However, approximately a year ago, an employee prevailed in a whistleblower case against SRNS. DOE's Office of Hearings and Appeals determined that SRNS had wrongfully terminated the employee for raising safety issues and making protected disclosures about those issues. SRNS has responded to that case by reinstating the employee and making restitution, but the Team was concerned that this case could have affected other workers' willingness to raise safety issues or concerns. Interviews with managers and employees alike, however, did not reveal any hesitancy to report issues or concerns. The current site population of 5,500 people does make it possible that some people are concerned about their ability to raise issues. Extrapolating the birthday survey data could mean over 800 workers at SRNS might have some hesitation reporting a safety concern. SRNS senior managers, from the president down, are committed to creating a just culture that promotes and rewards workers that raise issues. Broad improvement initiatives and corrective actions taken so far have not swayed those workers' opinions. Convincing the general population of that commitment is a difficult task that will take time and managers and workers working together. To reach that remaining population, SRNS should encourage all personnel to seek out those employees who remain concerned and engage them in a positive way to identify the reasons for their distrust and to help them raise any safety concerns they may be harboring. SRNS should also consider periodic, independent surveys to validate the results of the birthday surveys.

Opportunity for Improvement: SRNS should encourage all personnel to seek out those employees who remain concerned and engage them in a positive way to identify the reasons for their distrust and to help them raise any safety concerns they may be harboring.

Opportunity for Improvement: SRNS should consider periodic, independent surveys to validate the results of the birthday surveys.

DOE expects VPP participants to provide a copy of the most recent self-assessment to DOE. SRNS has a strong Contractor Assurance Program and a robust self-assessment process, but it does not integrate the results of those assessments into the annual VPP self-assessment it provides to DOE Headquarters. The annual VPP assessment does an excellent job highlighting the improvements made during the year, but has very little information regarding issues identified from the assessments, their impacts on safety or culture, and the plans for the next year to address those issues. SRNS should integrate issues and recommendations from its Contractor Assurance Program and other self-assessments into its VPP assessment to identify specific goals for its VPP efforts.

Opportunity for Improvement: SRNS should integrate issues and recommendations from its Contractor Assurance Program and other self-assessments into its VPP assessment to identify specific goals for its VPP efforts.

SRNS' current contract ends in July 2018. Although SRNS expects an extension to that contract, the extension will probably be for only a matter of months until DOE names a new contractor, probably sometime in 2018. Recognizing that the transition is coming, SRNS managers are trying to minimize the stress that transition will cause for the workforce. Those efforts have consisted primarily of assuring words and encouraging people to focus on the work because the mission will not change. Many workers, mid-level managers, and supervisors have a strong allegiance to SRS rather than the contractor running the site. SRNS can use this allegiance to help prepare the workforce for the coming transition. SRNS should emphasize improvements that it has made over the past several years and encourage workers to take ownership of, and become champions for, those improvements such that workers will help the new contractor recognize when proposed changes may be detrimental to mission delivery. Further, SRNS should encourage workers to consider the change in contract not as a corrective action, but rather a change in command. Such an approach may help workers quickly establish a healthy relationship with the new contractor and minimize the stress and distraction created by a contract change.

Opportunity for Improvement: SRNS should emphasize improvements that it has made over the past several years, and encourage workers to take ownership of, and become champions for, those improvements.

Opportunity for Improvement: SRNS should encourage workers to consider the change in contract not as a corrective action, but rather a change in command to help workers quickly establish a healthy relationship with the new contractor and minimize the stress and distraction created by a contract change.

Conclusion

With approximately 1 year left on its contract, SRNS managers have continued their commitment to view safety as a core value. They are determined to position the management and operations organization at the site for long-term success, no matter which contractor DOE selects for the next contract. Their experience at SRS and other major projects worldwide provides them with the necessary insight to anticipate problems and implement timely solutions. SRNS demonstrated this commitment when it implemented an operational pause to improve its disciplined operations. SRNS managers continue to identify and implement improvements based on employee ideas and concerns. SRNS managers demonstrate the Management Leadership and commitment expected for continued participation in DOE-VPP.

IV. EMPLOYEE INVOLVEMENT

Employees at all levels must continue to be involved in structuring and operating the safety and health program and in decisionmaking that affects employee health and safety. Employee involvement is a major pillar of a strong safety culture. Employee participation is in addition to the right to notify managers of hazardous conditions and practices. Managers and employees must work together to establish an environment of trust where employees understand that their participation adds value, is crucial, and is welcome. Managers must be proactive in recognizing and rewarding workers for their participation and contributions. Employees and managers must communicate and collaborate in open forums to discuss continuing improvements, to recognize and resolve issues, and to learn from their experiences.

In 2014, the VPP Team determined that the employees at all levels at SRNS were involved in the structure and operation of the safety programs and in the decisions that concern employee safety and health. Managers empowered employees to participate in, and at times administer, the safety and health programs by collaborating with employees and implementing initiatives that maintain open lines of communication and promote safety and health responsibilities.

SRNS continues to provide a variety of ways for employees to be involved in the SRNS safety and health program. Employees can be involved by performing BBS observations, participating on LSITs, submitting suggestions through the IDEAS program, or participating in one of numerous established committees.

The LSIT safety and health committees are the primary mechanism for employee involvement. Twenty-four 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. The *SRNS Local Safety Improvement Team Charter* describes and provides guidelines for all SRNS LSITs. The charter defines the responsibilities and expectations for senior managers to support employee involvement.

SRNS held its *Safety Expo* at the Applied Research Center, a laboratory space constructed by Aiken County adjacent to SRS, during the Team's review onsite. This annual event provides a platform for all SRNS LSITs and several outside organizations to demonstrate and promote safety and health programs. LSITs and vendors had approximately 40 interactive booths and demonstrations focusing on safety and health. All 24 SRNS LSITs participated by preparing booths or providing logistical support. Many of the LSIT booths provided information pertaining to home safety or wellness input for employees to consider or share with their families. Outside vendors included the Aiken County Sheriff's office, the South Carolina State Police, and the American Heart Association. More than 3,000 employees attended the 2-day event. Interviews demonstrated that SRNS expected managers to support the event and provide workers at least 2 hours of work time to attend the event. SRNS personnel overwhelmingly supported the *Safety Expo.*

The Team was able to interview the majority of LSIT chairs, cochairs, and members at the *Safety Expo*. All the LSIT members interviewed expressed significant pride and ownership of the LSITs and their contribution to the improvements to safety and health within their areas. The

LSITs continue to promote teamwork and camaraderie with each LSIT creating and maintaining its own name and logo.

The LSITs are effective forums to communicate information between managers and workers. LSITs continue to be instrumental in implementing corrective actions that affect the entire site. 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 develop corrective actions and improvements with the support of their individual management sponsors.

SRNS encourages employee involvement through the BBS process. Interviews by the Team demonstrated that the use of BBS observations continues to provide a mechanism to improve the SRNS safety culture. Despite SRNS' encouragement for BBS observations, there has been a recent downward trend in the number of BBS observations since February 2017. SRNS attributed this downward trend to a spike in the number of observations that occurred before February 2017 that could not be sustained long term. For example, LSIT members noted increased instances of unsafe driving practices in parking lots, so those LSITs conducted an intensive parking lot safety campaign that helped address the issue, but also increased the number of BBS observations from November 2016 through January 2017. Several LSIT members believed their teams also had significant increases in BBS observations throughout the entire year. However, the total number of observations site-wide has declined since February 2017. This indicates that some LSITs have had declines in the number of observations that outweigh the increases by other LSITs. SRNS should evaluate why some LSIT organizations have demonstrated increased BBS observations while other LSITs have stagnated and, in some cases, experienced reduced numbers of BBS observations.

Opportunity for Improvement: SRNS should evaluate why some LSIT organizations have demonstrated increased BBS observations while other LSITs have stagnated and, in some cases, experienced reduced numbers of BBS observations.

Employees interviewed by the Team understood their rights under title 10, Code of Federal Regulations, part 851, *Worker Safety and Health Program,* (10 CFR 851). Moreover, most employees were comfortable exercising those rights without fear of reprisal, and had done so. Managers interviewed stressed that safety *timeouts* were encouraged when abnormal events occurred or if the work did not meet the expectations as described in the work package. In one example, the Team observed workers at the Tritium Facility exercising stop or pause work. In that case, workers were replacing a relief valve on the process chilled water system. While locking out the system and venting to zero pressure, the workers recognized that the pressure gauge for the system registered pressure during the venting process and would not zero out. Interviews with the workers and FLMs identified that the workers had experienced similar problems before because the gauges have a history of damage when exposed to subfreezing temperatures during the winter months. Even with that experience, the workers and FLMs did not *assume* the issue was with the suspected faulty gauge, and they initiated a *timeout* to allow the work control group to revise the work package to include work instructions isolating the pressure gauge in question and confirming that the pressure gauge was faulty. The actions of the workers and the FLM during this work evolution demonstrated the commitment of the SRNS

workers to the expectations of their work control program and reinforced their commitment to questioning abnormal work conditions.

Other workers interviewed by the Team expressed similar sentiments. All workers interviewed by the Team indicated their commitment to initiate a timeout if a work instruction was not correct or work was outside the scope of the work package. In addition, workers indicated that their working relationships with their FLMs and supervisors reinforced their belief that they could (and have) used the timeout approach in the past when necessary.

In 2016, SRNS expanded the VPP core team size to accommodate the increase in new hires over the past 2 years. The VPP core team manages and coordinates SRNS VPP activities, such as new hire training, annual self-assessments, tracking improvement activities, and developing safety promotional activities. SRNS recognized that the increase in retirements, and the resulting increase in new hires unfamiliar with the contractor's expectation for safety culture, necessitated increased attention from the VPP core team. SRNS added members to the VPP core team to help it connect with new personnel and communicate safety expectations across the site.

Employees are involved in the work planning and control process. They participate in walkdowns with the planning teams and are involved in reviewing and approving work documents. Hazard analysis is applicable to all work activities. The depth of hazard analysis is dependent upon the complexity of the task (see Worksite Analysis). Workers are responsible for continuously analyzing their work. The two most commonly used tools for analyzing hazards are the IHA and the assisted hazard analysis (AHA). The workers continuously analyze their work environment for changing conditions using the IHA whereas the AHA provides a complete set of controls to protect workers through a team effort.

SRNS maintains several recognition programs to reward employees for positive performance. The Champions Award and the President's Award are formal awards in addition to the Good Catch and Spot awards. Good Catch awards may consist of recognition for safe work or can be elevated to Spot awards. Spot awards are cash and recognition awards that can range from $250 to $1,500 for individual awards. Some facilities now post Good Catch and Spot awards on facility community bulletin boards to provide recognition for all workers' suggestions.

Individual organizations also have motivation and morale (M&M) funds for reward and recognition. For example, the Tritium Facility uses the M&M awards to provide lunches, ice cream socials, etc., to reward safety milestones or production goal recognition throughout the year. The managers at the facility take into account the shift workers and include any lunches or ice cream socials on the alternate shifts. The M&M is a predetermined annual budget item that managers can use as they see fit.

SRNS encourages employees to participate in the incentive-based employee suggestion program called IDEAS. The IDEAS program has been in effect since 1998 and has resulted in cost avoidances of over $234 million since its inception. IDEAS is the employee suggestion program that offers employees an opportunity to receive rewards ($20) for recommending unique safety and/or cost-saving contributions. The program captures innovative thinking and promotes continuous improvement. Suggestions may improve safety, business performance, quality, or productivity. The suggestions are screened for eligibility and are either declined or accepted. A

new campaign to encourage participation occurs every month. By challenging participants through campaigns, the program provides an innovative approach to seek out new ways to perform work safely and efficiently. In FY 2017, employees submitted 1,236 IDEAS suggestions, and SRNS approved 38 percent of those ideas. Overall, SRNS implemented 59 percent of those approved ideas. From the 1,236 IDEAs submitted, 415 (33 percent) affected safety. SRNS implemented 54 of those ideas. Based on FY 2017 IDEAS submissions, SRNS estimated a savings of $1.7 million.

SRNS maintains a strong employee development program. This program provides organizations and activities to enhance personal growth and career achievement. The LEAP and AMP are two examples of this approach, which the 2014 Team observed. LEAP applies to employees who have been at the facility for less than 5 years. LEAP is a unique tool in career development, offering professional networking, enhanced business awareness, and community involvement. SRNS' investment helps those young professionals have a positive impact on the future of the company. AMP is for employees with 5-20 years of experience. AMP provides an avenue for SRNS to invest in employees with hopes of increasing engagement and improving talent acquisition and retention. Finally, in 2012, SRNS created ELDP to improve hiring and retention of people with the necessary engineering skills. By continuing these programs, SRNS is proactively supporting its employees' career potential and increasing employee satisfaction with their careers at SRNS.

Conclusion

SRNS provides many ways for employees to be involved in the SRNS safety and health program. Employees are involved in BBS observations, LSIT participation, and submitting suggestions through the IDEAS program. SRNS maintains a strong employee development program, including the LEAP, AMP, and ELDP. SRNS meets the expectations for continued participation in DOE-VPP in the Employee Involvement tenet.

V. WORKSITE ANALYSIS

Management of health and safety programs must begin with a thorough understanding of hazards that might be encountered during the course of work and the ability to recognize and control any new hazards. Implementation of the first two core functions of an ISMS, 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 the course of work. The results of the analysis must be used in subsequent work planning efforts. Effective safety programs also integrate feedback from workers regarding additional hazards that are encountered and include a system to ensure that new or newly recognized hazards are properly addressed. Successful worksite analysis also involves implementing preventive and/or mitigative measures during work planning to anticipate and minimize the impact of hazards.

As discussed in the two previous VPP onsite evaluations, SRNS has baseline surveys that document safety, health, and radiological hazards. SRNS has a sufficient staff of certified safety, health, and radiological professionals to evaluate facilities, processes, projects, and experiments, and to identify hazards and determine employee risks. Using SRNS' 4Q Procedure 104, *Exposure Assessment Program*, industrial hygienists perform exposure assessments for design, construction, operation, maintenance, decontamination and decommissioning, and environmental restoration activities. The Exposure Assessment Program provides a comprehensive process for examining worker exposures to hazardous physical, chemical, or biological agents. It helps SRNS manage exposures to the most conservative and acceptable levels established by OSHA, the American Industrial Hygiene Association, and the National Institute for Occupational Safety and Health. The work planning and control process for AHA includes these exposure data.

Manual 8Q Procedure 122, *Hazard Analysis Process*, is the SRNS procedure that defines the hazard analysis process for activity level work using a Technical Work Document (TWD). AHA is the primary tool for performing activity-level work hazard identification and analysis. A work planner initially determines the level of hazard analysis by applying the Hazard Analysis Determination Guide incorporated in the AHA application. The Hazard Analysis Determination Guide is a decision tree consisting of a series of questions. By answering the questions, the work planner determines the hazard analysis level. Three different levels are available: Team, Formal, or IHA. The Team and Formal hazard analysis levels allow SMEs, line managers, and workers to evaluate an activity and assist in the development of the hazard analysis. This includes participation in worksite walkdowns to define the scope of work and analyze hazards.

Using the AHA, a menu-driven, computer-based program, planners answer a series of questions about the work. Selecting different tasks, the program identifies potential hazards and the controls recommended by SMEs. After review and approval, planners use Asset Suite® software to produce a TWD. The TWD includes the Work Release Form, which includes the Hazard Analysis Determination Guide, a Disposition Report (PreJob Brief Controls, TWD controls, and other user-defined controls), and a prejob briefing checklist that is produced by the AHA.

Work packages reviewed by the Team and field observations of work indicated that the work packages adhere to the requirements of the hazard analysis/work planning process. For activities observed, the work packages appropriately identified the hazards; workers implemented the controls; and with a few minor exceptions, performed work within prescribed controls.

When the planner, using the determination guide, screens work as low hazard, the worker will use an IHA. The IHA process is for routine work performed using *Skill of the Worker* that does not require a TWD and has well-understood hazards controlled through individual training and skill. Hazard controls include individual worker training in the recognition of hazards, the general employee Basic Hazard Controls (BHC) handbook, general area postings, and general site safety training. The 2014 VPP review identified an opportunity for improvement that involved the need to reevaluate the use of the IHA process should an injury or accident occur using the IHA process. The SRNS *Hazard Analysis Process* now incorporates a feedback requirement to review the type of hazard analysis that was used when controls, as implemented, failed to protect the worker resulting in injury, illness, overexposure, or other unplanned event.

In 2015, EM-42 and DOE-SR assessed the AHA process and identified seven findings mainly related to energy control. SRNS made improvements to the AHA process based on those findings, including:

- Completed formal briefings to inform and instruct FLMs on the proper use of the current AHA disposition reports;
- Revised Question 100 in the Hazard Tree for clarity and to recognize the hazard associated with hazardous energy;
- Reduced the complexity of the hazardous energy questions by adding three additional questions to the Hazard Tree;
- Integrated AHA and IHA to provide consistent controls for lockout/tagout and electrical safety;
- Redesigned the Hazard Analysis Determination Guide to apply a thought process by the AHA initiator with the guidance of the SMEs to determine the hierarchy of the AHA that will be performed;
- Redesigned the IHA thought process in the Hazard Analysis Determination Guide to credit IHA with parameters that align with controls in the Hazard Tree;
- Communicated through site-safety meetings on the proper use of IHA with AHA; and
- Continued the development of a new Information Technology platform to increase AHA software application functionality.

By implementing these changes, along with some changes to cover new hazards and emerging work, the SRNS hazard analysis process is exhibiting continuous improvement. An additional example of continuous improvement to the AHA process involved improvements needed to comply with changes in the OSHA Silica Standard. SRNS incorporated an additional module into the AHA to address the new requirements in the Standard.

Any organization can initiate a maintenance work request. There are four general categories for maintenance: corrective maintenance, preventative maintenance, modifications, and other support. SRNS has established a risk-ranking priority for scheduling work. Work involving safety or Technical Safety Requirements (safety significant systems) gets the highest priority, followed by production and general maintenance. The Team attended a work scheduling meeting that showed a disciplined approach to work prioritization and resource allocation.

Manual 2S Procedure 5.2, *Issues Investigations*, defines the SRNS event investigation process. This comprehensive procedure outlines the investigation process, including preserving the scene,

personnel that are to be included in the investigation, and details expected in the report or results produced by the investigation. The process incorporates a graded approach so that SRNS investigates events according to their severity and potential to produce lessons learned. Methods to review events include factfinding meetings; issue reviews; or no action, with closure actions tracked in the Site Tracking, Analysis, and Reporting (STAR) database. SRNS still uses the "Integrated -The Rest of the Story" (iTROTS) process to capture lower level events that are below CAIRS and Occurrence Reporting and Processing System (ORPS) reporting thresholds. SRNS analyzes these less serious events for trends.

SRNS determines the appropriate investigation process using a screening process for more serious events. The investigation process determines the level of rigor and investigation approach depending on the type and severity of the event. The procedure directs the responsible manager (RM) to other procedures for incidents of security concern, Occurrence Reports, or work stoppage resulting from a worker injury, unsafe condition, unsafe work practice, or exposure exceedance. For instance, in the case of Incidents of Security Concern, the procedure directs the RM to contact the facility safeguards and security (S&S) representative or S&S Security Incident Program Manager, per Manual 7Q, *Procedure 213*, and to follow the investigation process outlined there. The procedure also provides guidance to RMs on how to conduct investigations for other lower level events, such as an injury.

SRNS also uses the investigation process for near-misses or events that result in entry into an unplanned Limited Condition of Operation. Workers who had recently been involved with an investigation indicated that they were not reluctant to provide information and believed that the investigations were sincere efforts to find facts to preclude recurrence. ORPS reports reviewed were detailed and provided sufficient information to determine causes. SRNS tracks corrective actions from issue investigations in the STAR system. The SRNS Lessons Learned program disseminates lessons learned from investigations locally and complex-wide.

SRNS has made significant improvements to the chemical management program and management team since the last VPP onsite assessment. In 2014, because of a high visibility whistleblower complaint that identified program vulnerabilities, SRNS conducted a formal, causal analysis to evaluate its chemical management program. The causal analysis concluded that SRNS had accepted chemicals into the excess chemical program, but had not dispositioned those chemicals for reuse or disposal in a timely manner. Employees had also intentionally vented compressed gas cylinders to the atmosphere rather than using the approved cylinders' handling process. Some chemicals may have originated from radiological facilities and the radiological condition and/or condition of the chemicals was unknown. The review resulted in over 30 program corrective actions that SRNS completed over a 2-year period. SRNS declared the corrective actions complete in 2016 and an SRNS organization, independent of the Chemical Management Program, conducted an effectiveness review of the corrective actions in October 2016 to verify closure.

Conclusion

SRNS has a mature hazard analysis process that is tailored to the risks associated with the work. SRNS revises the processes as necessary to incorporate new hazards, requirements, and hazard controls. Continuous improvement of the process is evident. Because workers perform much of

the work using the IHA process that is dependent on the skill of the worker, SRNS should remain vigilant to errors in this process as experienced workers are replaced by newer workers. SRNS continues to meet the expectations for participation in DOE-VPP for Worksite Analysis.

VI. HAZARD PREVENTION AND CONTROL

The third and fourth core functions of an ISMS, 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 controlled using engineered controls, administrative controls, or PPE. Equipment maintenance processes must ensure compliance with requirements and emergency preparedness. Safety rules and work procedures must be developed, communicated, and understood by supervisors and employees. These rules and procedures must also be followed by everyone in the workplace to prevent, reduce the frequency of, and reduce the severity of mishaps.

During the 2014 review, the Team determined that SRNS effectively used engineered, administrative, and PPE controls, which led to a substantially reduced number of injuries and illnesses. Additionally, SRNS recognized the need to use outside expertise to revamp and improve the heat stress program and the need to develop an approved PPE list to standardize PPE across the site. In addition, the emergency management program was working to improve issues raised because of previous exercise evaluations.

The Team observed that SRNS effectively uses engineered, administrative, and PPE controls. SRNS continues to use these controls to mitigate and reduce hazards that could cause injuries. In one example, K Area employees teamed with construction engineers and machinists to address drum-handling issues. In the past, workers used drum carts to position a drum on the edge of a pallet, and then manually positioned the 400-pound drum of nuclear material on the pallet. In a collaborative effort, material handlers, construction engineers, and machinists designed, fabricated, tested, and approved an attachment to an existing hydraulic lift frame. The new device replaced a ratcheting strap with a mechanical apparatus that clamped the drum, allowing workers to remain further from the drum to reduce exposure. The modified lift raises the drum approximately four to five inches to set the drum on a partitioned metal pallet rather than manually wrestling the drum into position, further reducing employee interaction and radiation exposure. Other more common examples of engineered controls observed include gloveboxes, machine guards, remote manipulators, laboratory hoods and long-reach tools to increase distance from hazards.

Field observations identified many safe behaviors. Examples include spotter use when backing, drivers honking while backing, full stops at stop signs, widespread use of PPE, and simple safe acts, such as handrail use on stairs. A review of recent BBS observations showed a greater-than-99 percent compliance rate for PPE use. However, the Team identified some exceptions that included handling heavy copper grounding wire without gloves, workers in areas requiring safety glasses without eye protection, and lack of hearing protection. Other field observations, include cell phone use while driving and failure to use seatbelts while driving. The Team observed enough at-risk behaviors that indicate SRNS can make additional improvements. SRNS is aware of these conditions and focuses its safety campaigns to address these behaviors.

The Team observed several examples of proper use of the hierarchy of controls. For example, at the Tritium Facility, SRNS established a glovebox mockup in a clean area to train workers on glovebox operations before performing activities in a contaminated environment. The glovebox mockup also allowed trained operators to rehearse work activities, evaluate the most efficient

work approaches, and determine the appropriate tools for the task within the glovebox environment.

The Team found examples where workers had identified ergonomic hazards and, working with their supervisors, mitigated the hazards by purchasing new tools. In one instance, workers in the firewater and utilities group identified ergonomic hazards that stem from the frequent manual opening and closing of hydrants and post indicator valves. To mitigate the hazard, workers located, and SRNS procured, battery-operated tools with revolution counters to more accurately position valves. Using the tools, workers can avoid the hazard from manually operating the valves and finish the valve test more quickly. In another example, one left-handed worker notified his supervisor that the angle grinder he had been issued was designed for a right-handed person. A different grinder was identified and procured that eliminated the ergonomic risk to the worker. Workers could reconfigure the new grinder for either right- or left-handed users.

The Team observed many examples of administrative controls, including barricades, ropes, and signs. SRNS procedure 8Q Procedure 9, *Barricades*, provides guidance for barricade use. The maintenance shop and machine shop signs identified PPE required for entry. Utility and mechanical rooms had signs defining required PPE, such as hearing protection and eye protection. SRNS has labeled electrical equipment with arc flash boundary information in accordance with National Fire Protection Association 70E, *Standard for Electrical Safety in the Workplace*. In one weld shop, a worker made metal placards that he places on recently welded pieces to warn of hot surfaces. These hazard identification signs provide timely hazard control information for workers.

PPE is available for all SRNS workers, and SRNS promotes frequent inspection of PPE before use. The Team observed workers performing a lockout of a 4,160-volt circuit using high voltage PPE. Workers tested their gloves and inspected their arc-rated protective clothing prior to beginning work. Using their training, the electrical workers properly checked their zero-energy test equipment against a known energy source, both before and after performing the zero-energy check. SRNS successfully uses the hierarchy of controls to mitigate hazards and prevent injuries.

Because of high temperatures and humidity at SRS, heat stress is a serious hazard. PPE use exacerbates potential heat stress hazards. Prior to the last assessment, SRNS had contracted with the University of Florida to help educate personnel about the heat stress index card and was encouraging the use of additional physiological monitoring, such as heart rate and body temperature, for higher risk, heat stress activities.

Manual 4Q Procedure 502, *Thermal Stress Management*, implements traditional heat stress management methods. The procedure directs managers to obtain Wet Bulb Globe Temperature (WBGT) information online from the SRNL Atmospheric Technologies Group. Managers at each work location, in consultation with the industrial hygiene (IH) staff, then determine if this appropriately represents conditions at a particular location. The IH staff and other qualified workers can collect measurements for a time/location-specific WBGT. The procedure also outlines other controls, such as fans, cooling vests, and work/rest regimes. While traditional approaches can be effective, some DOE sites have demonstrated better heat stress control using remote-reading heart monitors.

SRNS began using the Polar Heart ® monitor program in the summer of 2016 for site services infrastructure, H Canyon, and Area Completion Projects. The system uses heart rate monitoring devices that provide real time heart monitoring during work activities that include heat stress as a potential hazard. Real time monitoring allows IH personnel to monitor workers' heart rates and warn workers when they approach predetermined limits. Workers can then slow down or rest as necessary to prevent heat stress complications. These devices often help workers improve work efficiency over traditional work/rest regimes. SRNS is working to expand the program to additional work areas.

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 an ongoing periodic workplace safety and health inspection program that fulfills the VPP expectation for comprehensive workplace surveys.

Workers document issues in the STAR system, which tracks issues until corrected. One Team member attended a meeting for the review of workplace inspection metrics, STAR closure status of identified discrepancies, and BBS observations. Interviews with workers confirmed that the Management Field Observation (MFO) program is active; however, SRNS metrics show the MFO program as "red" on their contractor assurance system dashboard because it is below the 80 percent performance target on a monthly basis. Another group conducted a walkdown that identified and documented discrepant workplace conditions.

The SRNS process to review, record, and track injuries and illnesses is mature. The SRNS case manager uses information provided by the occupational medicine provider to classify injuries, evaluates work restrictions using information from an injured worker's supervisor to determine recordability, and maintains case files that include information about recordability decisions. The case files include the criteria defined in OSHA regulations and standards. This best practice documents the case recordability decisions for future reference. The Team reviewed a sample of first-aid cases. All the case files included the reasoning behind the non-recordability decisions.

The 2014 assessment report referenced a March 2013, DOE-SR review of the occupational injury and illness recordkeeping and reporting program. That particular DOE-SR review recommended: (1) ensuring all occupational injury/illness work restriction forms contained routine duties since several forms did not have that information; (2) ensuring signatures were on the forms; and (3) ensuring SRNS included any assessments of the injury/illness program in STAR. The current injury and illness records include evaluations of work restrictions against routine duties. SRNS also provided assessment reports demonstrating conduct of the DOE Order-mandated quarterly record quality reviews with the results tracked in STAR. The Team reviewed several cases that SRNS had properly classified according to OSHA requirements. The case manager properly entered cases determined to be recordable into CAIRS. During an annual injury and illness recordkeeping assessment, DOE-SR identified a few cases that SRNS classified as first aid, but which DOE-SR believed met the criteria for recordability. Although the SRNS case manager did not agree with the DOE interpretations, SRNS did reclassify the cases and entered them into the CAIRS database per DOE-SR direction. Neither the Team nor DOE-SR believed these cases indicated a pattern of underreporting.

The site medical clinic is located in N-Area near the central shops. A satellite facility is also located in the Portable Equipment Commodity–Management Center area. Medical support includes two full-time medical doctors, a nurse practitioner (with an open requisition to hire a second), and five registered nurses. Local hospitals also provide services for Savannah River Remediation LLC, SRNS, Centerra, and DOE Federal employees. The fire department responds to medical emergencies from one of its three station houses and has three ambulances available for transport. A fourth ambulance is available when another is in for maintenance. Paramedics consult with the site occupational medicine director for medical advice, care, and hospital selection when an injury occurs on back shift or the injured workers are transported offsite. The medical clinic operates 12 hours per day, Monday through Thursday, and 10 hours on Friday. This onsite medical clinic affords employees timely access to licensed physicians and medical services.

The medical staff conducts periodic worksite walkdowns to survey work areas for hazards and participates in accident investigations. The medical program provides health care, annual human reliability program physicals and psychological evaluations, a wellness program, injury disposition, and chemical-specific medical surveillances. The wellness program includes breastfeeding stations, Healthy Heart (an American Heart Association program), smoking cessation, weight loss, stress management, and carotid artery scans to detect blockages. Medical personnel review workers' employee job task analyses during medical appointments. The medical program provides required monitoring of workers enrolled in the lead, chromium, beryllium, asbestos, and hearing conservation programs. It also provides Department of Transportation surveillances for workers holding Commercial Driver Licenses. A contracted mobile x-ray truck provides x-ray services during two scheduled visits each week. Overall, the medical program and support staff provide the necessary care and services to protect the health of the SRNS workforce.

SRS Emergency Management is responsible for the overall preparedness of all aspects of site emergencies, including planning, response, and recovery. The emergency management organization ensures the protection of the health and safety of both on and offsite populations, site property, and the environment. To provide adequate protection, Emergency Management has procedures in place to address offsite response interfaces, emergency categorization and classification, communications, consequence assessment, protective actions, medical support, and emergency facilities and equipment. Emergency Management includes support from an approximately 700-member security force (Centerra) and an 80-member fire department. The fire department has three fire stations with full emergency medical service, hazardous material response, and rescue capabilities. The Emergency Response Organization (ERO) also has a 30-member contractor emergency management staff. SRNS has approximately 30 qualified wildland firefighters from the U.S. Forest Service who are on call 24 hours a day, 7 days a week.

In preparation for potential emergencies, SRNS plans and conducts SRS site-level emergency preparedness drills and exercises per Manual 6Q Procedure 007, *Standards for Site Emergency Management Drill and Exercise Coordination and Conduct*. It conducts approximately 300 drills each year and conducts annual exercises in each facility. Designated facility Emergency Preparedness Coordinators serve as the interface between the Site Emergency Preparedness Drill and Exercise Program and facility staff for scheduling and coordinating site drills and exercise activities at the facility level, assisting in the preparation of the exercise evaluation report, and developing and implementing corrective and improvement actions. SRNS

conducted two Active Shooter Tabletop Drills during FY 2017. SRNS Emergency Management maintains emergency planning and hazards analysis plans for facilities under SRNS control. Employee interviews indicated that employees were aware of what to do and where to go in various cases of an emergency and were not hesitant to provide feedback about drills and exercises.

The SRNS Emergency Management program continues to demonstrate its commitment to continuous improvement. In 2016, SRNS Emergency Management developed a standard set of performance-based criteria and 336 subordinate Lines of Inquiry (LOI). Using the developed criteria and LOIs, Emergency Management assessed six SRNS facilities over a 6-month period, ultimately applying 948 criteria and 2,016 LOIs. Nationally recognized, certified 911 training began this year, that certified two communication trainers and one training coordinator.

The previous VPP onsite report identified the need to improve notifications to workers during off-normal events. Specifically, the opportunity for improvement indicated that SRNS should ensure public address broadcasts are audible in all occupied areas, particularly in temporary buildings. In 2016, SRNS upgraded its notification system to broadcast messages to all government-issued cell phones and, with permission from their owners, to personal cell phones. SRNS also made upgrades to the Desktop Alert notification system, which provides immediate notification to all SRS employees on their desktop computers. In addition, the Savannah River Site Operations Center (SRSOC) recently acquired new radios and communication systems for increased capacity and better efficiency that are able to integrate with offsite counterparts and components.

Each facility maintains its own Emergency Operating Procedures. Recent emergency preparedness accomplishments include: a gap analysis of current drill scenarios that identified 146 scenarios that require development, several successful small-scale tests of the new SRS notification system in preparation for site-wide testing, and the development of an alternative scoring method for evaluation of facility- and site-wide annual exercises. Overall, the joint SRS emergency preparedness program demonstrates continuous improvement and meets the VPP emergency preparedness criteria.

Conclusion

SRNS effectively uses the proper hierarchy of controls in applying engineered, administrative, and PPE controls to mitigate and control hazards that could injure workers. SRNS is identifying and incorporating new engineered controls throughout all aspects of the operations. SRNS is increasing its efforts to implement the use of polar monitors as a means to monitor heat stress. SRNS meets the expectations for continued participation in DOE-VPP in the Hazard Prevention and Control tenet.

VII. SAFETY AND HEALTH TRAINING

Managers, supervisors, and employees must know and understand the policies, rules, and procedures that prevent or reduce exposure to hazards. Training for health and safety must ensure that responsibilities are understood, personnel recognize hazards they may encounter, and employees are capable of acting in accordance with managers' expectations and approved procedures

In 2014, the Team concluded that SRNS had a well-established training and qualification program that trained employees to recognize hazards and to protect themselves and coworkers. SRNS training programs equipped managers, supervisors, and employees with knowledge to understand the established safety and health policies, rules, and procedures in order to promote safe work practices and minimize exposure to hazards.

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.

SRNS maintains training records in the Training Record Automated Information Network (TRAIN) and all employees, their managers, and training coordinators have access to TRAIN. Using TRAIN, training coordinators query the system for employees whose training will expire within 30 days, 60 days, and 90 days. The training coordinators then notify employees and their managers of expiring training.

SRNS has a comprehensive training process for all employees. New employees are required to attend General Employee Training (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) based on the type of access required and the length of work duty. The final step of GET is a test, which requires a minimum score of 80 percent. Employees receive site identification badges once they have provided proof of completion of GET to the Badge Office. All employees must also take the Consolidated Annual Training (CAT) to retain their badges. CAT is computer-based training and serves as a yearly GET refresher given in January of each year. The manuals for GET and CAT are comprehensive and include discussions of VPP, ISMS, BBS, and Human Performance Improvement programs.

All employees must attend mandatory monthly safety meetings that include topics on integrated safety management, health, and productivity management. The LSITs and the SRNS Video Services group produce a monthly video entitled "SRNS NOW" that becomes part of the monthly safety meeting package. Each month, the 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.

SRNS leads the Training Managers' Committee (TMC) that includes all SRS prime contractors and maintains the SRS training manual. 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 approves all revisions to Procedure Manual 4B in accordance with company-level procedures. Team interviews demonstrated that TMC is active and remains an effective process for addressing and maintaining the SRS contractors' training programs. The TMC is in the process of evaluating and procuring a new learning management system using experience gathered from the DOE Energy Facilities Contractor Group Training Working Group and from other DOE sites. Based on the efforts of the TMC and the SRNS Training Group, SRNS was certified and accredited as a DOE Training Institute training site, which enables it to achieve reciprocity for its training programs across the DOE complex.

In an effort to ensure that local training institutions are providing curricula of critical importance to the SRS site, SRNS has established partnerships with five area technical colleges to promote educational specialties related to the site's needs. SRNS provides technical direction and SMEs to develop curricula to support these efforts. For example, SRNS sponsors the Nuclear Fundamentals Certificate program, which provides $10,000 in scholarships to Aiken Technical College. For this program, the SRNS training group worked with Aiken Technical College to perform a gap analysis between the school and the site's Nuclear Operator Fundamentals Training materials. As a result, Aiken Technical College now teaches directly to the DOE training requirements. This partnership results in significant cost savings to SRNS when it hires students into the SRNS engineering program.

In 2012, SRNS created ELDP to address the critical need to hire and retain engineers in response to the increase in engineering retirements. The ELDP was designed to encompass multiple aspects of the hiring process, including advertising, interviews, hiring, and training and indoctrinating newly-hired engineers to ensure their success and retention within the SRNS programs. The ELDP developed program criteria and provides two senior engineering mentors. These two dedicated senior engineers provide day-to-day mentoring to the new hires to ensure that they understand the engineering processes at SRNS facilities. The ELDP includes a 4 to 6-month internship during which new hires get help in completing their site training and qualification requirements and security clearance, including participation in up to three, three-week "deep dives" at multiple SRNS nuclear facilities. The "deep dives" are temporary assignments to SRNS nuclear facilities in which the ELDP participants provide onsite engineering support under the direct mentoring of site engineers. The "deep dives" provide the newly-hired engineers the opportunity to obtain working experience at various SRNS nuclear facilities. Since the program's inception, SRNS has hired 212 engineers with a 93 percent retention rate.

SRNS is concerned about the increase in retirements of experienced craft workers and nuclear operators in the past 2 years. To address this concern SRNS has adopted a proactive approach through mentoring. For example, the Site Services organization has implemented a policy and approach that pairs new craft employees with experienced crafts until the new craft employees are familiar with their areas of responsibility. The mentor recommends when the mentee is prepared to work independently.

SRNS assigns mentors to new nuclear operators when the new operators arrive at their assigned facilities. Initially, the mentor is a day-shift senior operations employee who is required to work with the new operators during their facility classroom phase to learn systems, safety basis

material, etc. Once the new employees are "on shift," a mentor, usually an FLM or Shift Operations Manager, works with them until they complete their qualifications. As with the Site Services mentor program, the mentors provide recommendations to management when they determine the mentee is qualified and prepared to work independently. Team interviews indicated this approach provides a greater level of confidence in newly-hired crafts' and operators' experience and qualifications.

The SRNS Site Services organization has developed a Knowledge Transfer (KT) process in an effort to capture and retain historical knowledge for maintenance activities in response to the increase in senior craft personnel retirements. The process creates a video record of maintenance activities to retain knowledge of older systems for newer employees to reference after senior and experienced crafts have 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 will capture the maintenance activities of those systems on iPhone® video over the next few years so that newer crafts may observe those maintenance tasks in the future. The KT process will also capture routine tasks on video to provide enhanced prejob evaluations compared to simply reviewing documents in preparation for those work tasks. The process also addresses the fact that younger generations are more inclined to learning from visual input rather than paper instruction. There have been eight KT videos created to date. Additionally, SRNS is exploring the use of GoPro® cameras for employees who routinely perform rounds and lineman workers. Workers at the Tritium Facility initiated a similar approach called Knowledge Preservation. The knowledge preservation program includes videotaping of activities exclusively related to maintenance activities for tritium operations. These two approaches are similar but independent. SRNS should consider these approaches for broader use at the site and identify opportunities for sharing lessons learned and common resources to gain additional value.

Opportunity for Improvement: SRNS should consider the Knowledge Transfer and Knowledge Preservation approaches for broader use at the site and identify opportunities for sharing lessons learned and common resources to gain additional value.

SRNS has developed several leadership courses to enhance manager knowledge and leadership skills. For example, the *Transition to Leadership (T2L) Workshop* is a 4-day workshop designed to guide new managers through the transition from "Bud to Boss." Topics covered include, but are not limited to: Transition to Management, Communication and Listening Skills, Effective Meetings, and Time Management/Delegation. Other training initiatives include *Leadership Development 101*, designed to enhance leadership skills for all levels of management. SRNS offers *Effective Meeting Skills* to all interested SRNS workgroups to provide them with tools that help them plan and conduct effective meetings. The *Five Dysfunctions of a Team* course revolves around the dynamics of a team and uses team-building exercises to help develop cohesion and synergy in a workgroup. The *Mentoring Circles* are group-mentoring sessions, conducted monthly, that enhance participants' leadership skills and site/company knowledge and provide an opportunity to expand their professional network. These training courses are examples of SRNS' efforts to improve its employees' knowledge, communication, and leadership skills.

Conclusion

SRNS has a well-established training and qualification program that trains employees to recognize hazards and to protect themselves and coworkers. SRNS training programs equip managers, supervisors, and employees with knowledge to understand the established safety and health policies, rules, and procedures. The ELDP, knowledge transfer, and mentoring programs demonstrate SRNS' proactive approach to address its changing training needs. SRNS meets the expectations for continued participation in DOE-VPP in the Safety and Health Training tenet.

VIII. CONCLUSIONS

Over the past 3 years, SRNS has continued to pursue excellence in worker safety and health by increasing managers' engagement with the workforce, stimulating worker involvement, and improving its ISMS. SRNS managers and workers have a healthy relationship that encourages the identification and resolution of questions, concerns, and issues. SRNS is working to leave a legacy of safety excellence as it approaches the end of its contract and to ensure the workforce is ready for the coming transition. With a limited amount of time remaining, SRNS will probably not make major programmatic changes, but there are a few opportunities for improvement identified in this report that the Team believes SRNS should consider, particularly as it seeks out the small segment of the worker population that may be hesitant to raise issues or concerns. SRNS demonstrates the continuous improvement expected for continued participation in DOE-VPP, and the Team recommends it continue to participate in DOE-VPP at the Star level.

Appendix A: Onsite VPP Assessment Team Roster

Management

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