Savannah River Remediation LLC
Liquid Waste Contract
Savannah River Site

Report from the Department of Energy
Voluntary Protection Program
Triennial Onsite Review
February 17-27, 2020

U.S. Department of Energy
Office of Environment, Health, Safety and Security
Office of Health and Safety
Office of Worker Safety and Health Assistance
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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 Remediation LLC (SRR) at the Savannah River Site in Aiken, South Carolina, conducted February 17-27, 2020, and provides the Associate Under Secretary for Environment, Health, Safety and Security with the necessary information to make the final decision regarding SRR's continued participation in DOE-VPP at the Star level.

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ABBREVIATIONS AND ACRONYMS

AHA	Assisted Hazard Analysis
AU	Office of Environment, Health, Safety and Security
BBS	Behavior-Based Safety
BCSP	Board of Certified Safety Professionals
BLS	Bureau of Labor Statistics
CAIRS	Computerized Accident Injury Reporting System
CSP	Certified Safety Professional
CIH	Certified Industrial Hygienist
CHP	Certified Health Physicist
DART	Days Away, Restricted, or Transferred
DWPF	Defense Waste Processing Facility
DOE	Department of Energy
EPD	Electronic Personal Dosimeter
ESQB	Executive Safety and Quality Board
ETP	Effluent Treatment Project
HA	Hazard Analysis
HTF	H-Area Tank Farm
IHA	Individual Hazard Analysis
ISM	Integrated Safety Management
LSIT	Local Safety Improvement Team
MEPI	Mobile Equipment Personnel Interface
NAICS	North American Industry Classification System
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PPEOC	PPE Oversight Committee
RAVE	Reinforcing Achievement of Values and Expectations
ROAR	Recognizing Our Accomplishments through Reward
Safe-T	Self-Awareness For Employees Team
SLT	Safety Leadership Team
SPARC	Suggestions Producing Active Results Creatively
SRO	Savannah River Operations Office
SRNS	Savannah River Nuclear Solutions, LLC
SRR	Savannah River Remediation LLC
SRS	Savannah River Site
STAR BBS	Safety Talks Achieve Results Behavior-Based Safety
STAR	Site Tracking, Analysis, and Reporting
STS	Safety-Trained Supervisor
SWPF	Salt Waste Processing Facility
TBO	Task-Based Observations
Team	Office of Environment, Health, Safety and Security DOE-VPP Team
TRC	Total Recordable Case
VPP	Voluntary Protection Program
VPPPA	Voluntary Protection Programs Participants' Association, Inc.

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 Remediation LLC (SRR) 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 February 17-27, 2020.

The results of the review indicated that SRR continues to:

- Demonstrate the leadership necessary to process the hazardous liquid wastes at SRS safely and compliantly. Managers are visible and credible to the workforce. SRR managers are committed to the principles of Integrated Safety Management and Nuclear Safety Culture, and recognize these principles as enablers for mission success. SRR has a comprehensive and cohesive set of policies and procedures that encourage safety and health excellence. A thorough set of statistical indicators, routine assessments, and regular observations provide managers with the data they need to make decisions, correct deficiencies before issues arise, and resolve issues when they occur. SRR managers have an effective working relationship with the workforce, and frequently encourage workers to stop or pause work when questions or issues arise.

- Provide opportunities for all workers to be involved in the structure and operation of the safety and health program, and employees continue to take advantage of those opportunities. Employee Involvement is a major contributor to SRR's strong safety culture. SRR's reorganization of the Local Safety Improvement Teams into the Safety Leadership Teams is using peer-to-peer observations and conversations to address the current key focus areas and further reduce accident and injury rates. SRR's reward and recognition programs provide rapid and meaningful awards to employees and encourage safe behaviors. Managers and employees trust each other and communicate openly with each other to accomplish the mission safely. SRR has opportunities to improve the visibility of DOE-VPP and ensure employees continue to report safety conditions.

- Use a systematic process for worksite analysis that addresses the full range of hazards workers encounter. Work planning and package development involves workers to leverage their understanding of hazards and experience to assist in the control of hazards and exposures. Managers and supervisors seek and respect workers' opinions and ideas before finalizing work packages or implementing controls. SRR's safety record and low rework frequency confirm that SRR is planning and performing work effectively. SRR demonstrates continuous improvement for worker safety by evaluating different and new technologies.

- Take the health and welfare of its staff and subcontractor workforce seriously. SRR effectively eliminates or controls hazards and exposures using the hierarchy of controls. Personal protective equipment is available and worn to prevent mishaps or control their frequency and/or severity. SRR employs certified professionals commensurate with the potential risks on the site. SRR provides a full range of medical services, emergency response and planning, and wellness program support. SRR conducts a variety of surveys and assessments to eliminate, reduce, and control workplace hazards.

- Maintain an established training and qualification program that trains employees to recognize hazards and protect themselves and coworkers. Through its assessment processes, SRR identified weaknesses in its training program caused by personnel reductions in 2013. SRR developed and implemented corrective actions to address the identified weaknesses and ensure continued compliance with DOE and SRR requirements.

SRR has fully integrated the DOE-VPP tenets and expectations into its Integrated Safety Management System and Nuclear Safety Culture. This integration of DOE-VPP into every aspect of SRR's mission has helped SRR achieve accident and injury rates that are 90 percent or more below its comparison industry. Managers establish appropriate expectations, provide resources, and create an environment that values and rewards accomplishing the mission safely without pressuring workers to take risks to meet a schedule. Workers understand the hazards they face, exercise caution in all work tasks, and pause or stop work when conditions deviate from expectations. SRR is refining its hazard analysis processes and implementing innovative controls that minimize workers' exposures to hazards. SRR's self-assessment processes help it identify trends before they become broader issues. With limited time remaining on its contract, SRR has an opportunity to prepare the workforce for the upcoming contract transition, raise employees' awareness of DOE-VPP, and help workers maintain their strong safety culture through the transition. The Team did not identify any programmatic noncompliance with DOE, OSHA, State, or local safety requirements that would preclude participation in DOE-VPP. SRR meets all the expectations for continued participation in DOE-VPP.

TABLE 1
OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
SRR should share the results of its safety culture survey compared to its Nuclear Safety Culture Dashboard with the rest of the DOE community through the Safety Culture Improvement Panel, as it may help other DOE sites implement effective, ongoing measurement of safety culture.	**6**
SRR should begin communicating to workers the potential for distractions related to contract transition, encourage workers to recognize when those distractions exist, reinforce the need to stop or pause work, and observe coworkers for potential errors.	**7**
SRR should consider identifying watch list items as goals or objectives in its annual DOE-VPP report.	**8**
SRR should closely watch the changed role of the SLTs to ensure employees do not stop reporting issues because they perceive the submission process is too complex.	**10**
SRR should reinstate the VPP committee charter, delineate the unique activities the committee should lead to improve employees' involvement in safety, and help integrate safety culture improvement and other safety functions. Activities to consider could include an annual program plan for safety promotions and committee members' participation in annual report preparation.	**11**
SRR should reemphasize its policy of using reverse briefing techniques for all prejob briefings.	**14**

I. INTRODUCTION

This report provides the Department of Energy's (DOE) Associate Under Secretary for Environment, Health, Safety and Security (AU) the results of the Triennial Onsite Review of Savannah River Remediation LLC (SRR) at the Savannah River Site (SRS) in South Carolina conducted on February 17 27, 2020. Based on the results of this review, the DOE Voluntary Protection Program (VPP) Assessment Team (Team) recommends that SRR 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. Approvals are not limited to set durations, but are subject to triennial reevaluation by DOE to ensure that the participant still warrants Star level participation.

SRR is the Liquid Waste Operations contractor at SRS and is a team of companies led by Amentum with partners Bechtel National, Jacobs, and BWXT. SRR took over operation of the Liquid Waste Facilities in F-Area Tank Farm, H-Area Tank Farm (HTF), Effluent Treatment Project (ETP), Saltstone Processing/Disposal Facility, and the Defense Waste Processing Facility (DWPF) on July 1, 2009. SRR's administrative operations are centrally located between these facilities in Building 766-H. The Liquid Waste Operations contract awarded to SRR focuses on emptying and closing the site's underground radioactive waste storage tanks. These tanks contain approximately 36 million gallons of radioactive liquid, salts, and sludge. The DOE Savannah River Operations Office (SRO) manages and oversees the SRR contract. The Liquid Waste Operations contract includes the following scopes of work:

- Storage of high-level nuclear waste in H- and F-Area Tank Farms;
- Receipt of high-level nuclear waste from H Canyon;
- Treatment of waste to remove radionuclides in the Actinide Removal Process and the Modular Caustic Side Solvent Extraction Unit;
- Disposition of nuclear waste in either the DWPF for high-level waste, or the Saltstone Production Facility for low-activity waste;
- Emptying, cleaning, and closure of waste tanks; and
- Support integration of the Salt Waste Processing Facility (SWPF) into the liquid waste treatment processes.

The high-level waste tanks at SRS constitute one of the largest, if not the largest, environmental risks in South Carolina. Movement of waste within the tank farms, evaporation of water to reduce volume, chemical treatment to inhibit corrosion, decomposition of organic materials, radiolysis of water to produce hydrogen, movement of sludge from the tank farms to DWPF, and transportation and storage of vitrified and solidified wastes all present risks to the workforce. In addition to radiological hazards, these facilities have industrial and chemical hazards. Explosion hazard potential also exists in facilities from chemical reactions, over-pressurization of

equipment, or equipment failure. Other types of hazards involve hazardous energy and material handling operations with forklifts, elevators, cranes, hoists, and earthmoving equipment. Hazards in the workplace are associated with operating pressurized process equipment and physical activities resulting in back/muscle injury and repetitive motion injuries.

The workforce at SRR consists of approximately 2,600 people, including operators, skilled crafts, building trades, engineers, support personnel, managers, and safety and health professionals. The Augusta Building and Construction Trades Council collectively represents construction personnel and has strongly endorsed SRR's participation in DOE-VPP.

SRR's predecessor was a DOE-VPP Star participant, and SRR successfully transitioned that status after taking over the liquid waste operations contract in 2009. AU last recertified SRR at the Star level in September 2014. Per DOE-VPP requirements, the Triennial Onsite Review was due in 2018, but the contract expired in March 2017. DOE's Office of Environmental Management delayed that contract award, and in 2019 extended the SRR contract through September 2020. The Team decided to conduct the review to help prepare the workforce for the eventual contract change and support a potential transition of the DOE-VPP Star if the new contractor decides to continue in DOE-VPP.

This report contains a review and discussion of SRR's 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. A final conclusion provides the Team's overall assessment of SRR's safety program and its continued participation in the 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 and the DOE Computerized Accident Incident Reporting System (CAIRS), the Teams calculation of the TRC and DART rates, and the specific industry national averages for the comparison industry.

Injury Incidence Case Rates – SRR Operations (nonconstruction)– CAIRS Org 8501042 SRR Operations (Other)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate per 200,000 hours	DART Cases	DART Case Rate per 200,000 hours
2017	3,660,145	5	0.3	3	0.2
2018	3,842,457	7	0.4	3	0.2
2019	4,109,574	3	0.1	1	0.0
3-Year Totals	11,612,176	15	0.3	7	0.1
Bureau of Labor Statistics (BLS-2018) average for NAICS 562 Waste Management and Remediation Services			4.2		2.9
Injury Incidence Case Rates – SRR Construction – CAIRS Org 8500505 SRR Construction (Other)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate per 200,000 hours	DART Cases	DART Case Rate per 200,000 hours
2017	897,205	1	0.2	1	0.2
2018	945,331	5	1.1	2	0.4
2019	1,156,424	7	1.2	3	0.5
3-Year Totals	2,998,960	13	0.9	6	0.4
(BLS-2018) average for NAICS 236210 Non-Residential Building Construction			2.5		1.4
Injury Incidence Case Rates - Subcontractors SRR– CAIRS Org 8501044 SRR Service Subcontractors (Other) and 8500516 Misc. SRR Construction Subcontractors (Other)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate per 200,000 hours	DART Cases	DART Case Rate per 200,000 hours
2017	258,449	1	0.8	0	0
2018	254,861	0	0.0	0	0
2019	419,485	0	0.0	0	0
3-Year Totals	932,795	1	0.2	0	0
(BLS-2018) average for NAICS 562 Waste Management and Remediation Services			4.2		2.9

TRC Incidence Rates, including subcontractors: 0.37
DART Case Rates, including subcontractors: 0.17

Discussion

SRR employs approximately 2,080 operations and 532 construction workers, and approximately 195 service subcontractors. From 2017 through 2019, SRR Operations had a 3-year TRC rate of 0.3 and a DART case rate of 0.1; SRR Construction had a TRC rate of 0.9 and a DART rate of 0.4. SRR service subcontractors have had no recordable TRC or DART cases in the same 3 years, and construction subcontractors had only one recordable case. At the time of this Triennial Onsite Review, SRR Operations has had one recordable TRC case and one DART case for calendar year 2020; SRR Construction has had one recordable TRC case and one DART case; and SRR subcontractors have had no TRC or DART cases. Employees demonstrated no fear of reprisal for reporting and acknowledged that managers encourage the reporting of injuries or incidents. The Team found no evidence of underreporting.

The recordkeeper has developed several documents and processes to manage, track, and trend injury/illness cases. SRR uses this information to adjust programs and policies. For instance, SRR Construction analyzed first-aid and injury cases and discovered employees onboard for less than a year account for 80 percent of all injuries. As a result, SRR is revamping employee onboarding and supervisor training to address this issue.

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 recordkeeper documents all injuries in the DOE CAIRS database. Recordkeeping personnel understand the OSHA recordkeeping standard, OSHA 300 logs, and CAIRS requirements.

SRR's TRC/DART rates for Operations are well below the BLS comparison industry averages for its NAICS codes and meet the expectations for continued DOE-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 and 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 2014, SRR managers demonstrated a high level of management commitment to safety and health excellence as a prerequisite for mission performance. Managers were visible, approachable, and credible to the workforce. Although resources to perform the mission were tightly constrained, managers were appropriately prioritizing the work, supporting efforts to increase efficiency and remove barriers, and empowering workers to pause or stop work.

Six years later, SRR still has a strong leadership team in place with a wealth of experience. Most of the managers have experience at multiple SRS facilities and other DOE facilities. This experience at other hazardous facilities gives the managers an excellent understanding of how to manage the complex processes involved in liquid waste operations, and the resources needed to meet the contract performance goals.

SRR uses a set of integrated policies and procedures to conduct work. Savannah River Nuclear Solutions, LLC (SRNS) is the SRS maintenance and operations contractor. By DOE direction, SRNS maintains many of the policies and procedures as site-wide practices applicable to all contractors at SRS, including SRR. This structure establishes common expectations throughout SRS and reduces the need for additional training of personnel that move between the different contractors at SRS. In some cases, SRR created desk references and guidance documents to supplement the site-wide requirements. SRR recently identified that it had many more desk references or supplements than it used or needed and has embarked on a program to delete unneeded desk references. This effort will help SRR reduce the effort required to keep the supplemental guidance aligned with site procedures.

SRR has a DOE approved worker safety and health plan and a DOE approved ISMS description that describes the entire integrated safety management approach. Safety policies and procedures referenced in those documents are available to all employees. Those documents contain the required elements per DOE regulations and the DOE-VPP expectations. SRR also posts its corporate values and expectation on its corporate web page: Safety, Integrity, Ownership, Teamwork, and Continuous Improvement. Under *Safety*, it establishes the following expectations:

A. Conduct all activities in a disciplined manner
B. Follow procedures or change them
C. Take your safety and the safety of your coworkers personally — 24/7
D. Use time out or stop work when things aren't right
E. Actively support safety programs and initiatives

SRR treats all subcontractors as SRR employees when it comes to safety. SRR subcontractors did not sustain a recordable injury in 2019, and the last subcontractor recordable injury occurred in April 2017. This exceptional performance results from a strong subcontractor management program and active involvement by Subcontract Technical Representatives in overseeing work. Safety is integrated into the entire subcontracting process. All subcontractors at SRS are provided the SRS subcontractor Safety Handbook that describes the expectations and requirements for personnel working on the SRS.

SRR and its parent company, Amentum, rotate managers to other facilities to give them more experience and opportunities for professional growth. These rotations may occur within SRR or to other Amentum projects. Several SRR managers rotated jobs in the past 18 months within SRR. Each of those managers reached out to the personnel in their new organization to build relationships and earn workers' trust, learn about workers' concerns, and understand the facilities and operations under their purview.

SRR has focused on Nuclear Safety Culture over the past several years, and the result of that focus was evident at each of the facilities SRR manages. Managers remain committed to safe, compliant operations and expect supervisors and workers to ask questions, stop or pause work if unsure, and not move forward until they are certain of the expected results. Managers used statements like "We're only in a hurry to do it right" and "We can move the schedule" to minimize workers' perceptions of production pressure. Leaders remain committed to maintaining a good safety culture and believe a good safety culture is essential to mission success. During this Triennial Onsite Review, managers demonstrated their willingness to stop or postpone work if workers could not meet the expected standards. For example, heavy rain and winds during the first week of this Triennial Onsite Review created unsafe conditions for outdoor work. Managers accepted the delay and ceased most outdoor work, particularly at the HTF, despite the potential effect on startup of the new SWPF, which is a high priority project for DOE. When unforeseen events or occurrences happen, managers have demonstrated a willingness to adjust expectations without pressing workers to take shortcuts to resume operation.

Managers are visible to the workforce while conducting regular management field observations, providing briefings to workers, walking around the facilities, and sharing their personal stories about safety. Managers also bring lessons learned from other DOE facilities. The facility manager at HTF blocks out time on his schedule each week to walk around his facility, which helps him manage other schedule demands and ensure he gets out in contact with the workforce. The company president makes monthly videos that include both safety and company accomplishments. These practices create a visible, accessible, and credible management presence within the SRR facilities. Workers' comfort with managers' presence was evident during worksite walkdowns, in meetings, and interviews.

SRR conducts monthly Executive Safety and Quality Board (ESQB) meetings. These meetings include all senior managers. The ESQB uses a structure of performance indicators and a "status window" color indicating SRR's self-evaluation of performance. The indicators are a combination of statistical measures and qualitative assessments. SRR has a collection of 23 Functional Area Health Evaluations that it includes in the indicators. Each area has both a "health" score and a "reliability" score. Areas that have poor performance in either or both of these scores may become "watch list" items. The responsible functional area manager then becomes responsible for reporting status and actions to correct the underlying problems.

SRR has also developed a Nuclear Safety Culture Dashboard that assigns a score indicating the strength of its safety culture. The score is a compilation of both lagging and leading indicators related to Management Leadership, Employee Engagement, and Organizational Learning. The monthly scores over the past 3 years correlate with watch list items from the functional area health evaluations. SRR is planning to have the Oak Ridge Associated Universities conduct a safety culture survey that will use a standard survey and measurement technique. Results from that survey should be available by the end of fiscal year 2020 and will provide feedback on the usefulness of the Nuclear Safety Culture performance indicator. SRR should share those results with the rest of the DOE community through the Safety Culture Improvement Panel, as it may help other DOE sites implement effective, ongoing measurement of safety culture.

Opportunity for Improvement: SRR should share the results of its safety culture survey compared to its Nuclear Safety Culture Dashboard with the rest of the DOE community through the Safety Culture Improvement Panel, as it may help other DOE sites implement effective, ongoing measurement of safety culture.

SRR is waiting for DOE to issue the final Request for Proposal for the Liquid Waste Operations contract. DOE has extended the current contract for the past 2 years and may have to extend it further. This contract change will coincide with other operational changes, including bringing the SWPF online. When SWPF begins processing waste, SRR will have increased production demands to provide feed to SWPF, and an increased operational tempo at the Saltstone facility to treat water from SWPF. These increased production demands may create safety cultural challenges within the workforce. Managers and workers alike expressed minimal concern that these changes would pressure workers to take shortcuts, but the changes may create distractions for workers, and lead to errors. SRR should begin communicating to workers the potential for these distractions, encourage workers to recognize when those distractions exist, reinforce the need to stop or pause work, and observe coworkers for potential errors.

Opportunity for Improvement: SRR should begin communicating to workers the potential for distractions related to contract transition, encourage workers to recognize when those distractions exist, reinforce the need to stop or pause work, and observe coworkers for potential errors.

SRR identified Conduct of Operations and Training as watch-list items. Approximately 3 years ago, SRR identified degrading conduct of operations as an issue. Those problems stemmed from training issues. The continuing training program relied on workers' experience at SRS, but when SRR lost many experienced personnel, it did not adapt the continuing training program for the less experienced workforce. SRR also had difficulty giving workers time to complete continuing training. SRR had been asking DOE for authorization to hire additional people so it could conduct continuing training without the need for workers to train on overtime.

Identifying and reporting the impact that training deficiencies were having on work practices helped SRR get approval to conduct training on overtime and hire additional personnel. SRR now has 4½ shifts, allowing workers to conduct training during normal work hours while maintaining full staffing within operating facilities. SRR has also hired additional training personnel and developed improved training courses. SRR removed Conduct of Operations from the watch list, but Training remains a watch list item while SRR ensures training issues do not recur.

SRR has obtained resources for improvements in facilities that enhance safety and reliability. Improvements include major capital upgrades to HTF infrastructure, improvements in DWPF laboratory's waste handling systems, a new mercury monitoring at ETP, and robotic tools for performing high-hazard work (see Hazard Prevention and Control).

SRR maintains excellent resources for radiological controls, industrial hygiene, and industrial safety. SRR has approximately 250 radiation control and industrial hygiene and safety technicians (approximately 10 percent of the workforce). Although 85-90 percent of those workers are radiological control technicians, many of them have been cross-trained and qualified to perform industrial hygiene technician tasks. This allows SRR to have nearly continuous coverage across both disciplines for hazardous work.

SRR managers meet frequently to discuss project status, issues, improvements, and safety. For example, the Team observed a Monthly Managers Safety Meeting (Construction) that demonstrated excellent management involvement in safety. The construction manager facilitated the meeting making it clear that he expected information from the meeting to flow down to all employees. Various managers talked about "Hot Topics," such as near-misses and injuries. The construction Safety Leadership Team's (SLT) Self-Awareness For Employees Team (Safe-T) chairperson provided a report on the status of the new Safety Talks Achieve Results (STAR) Behavior-Based Safety (BBS) observation program emphasizing the program is a "No Name, No Blame Program." Finally, the managers reviewed leadership engagement through field observations and reviewed injuries that had occurred since the last meeting.

SRR's annual DOE-VPP reports include many discussions of statistical measures (numbers of BBS observations, the number of issues tracked, the number of corrective actions completed), and describe a very positive image of SRR. SRR identified Training and Fire Protection as management watch list items 2 years ago. SRR included both these areas in the 2018 annual report, but there was little discussion in the report about actions in place to improve those areas. SRR (or its successor contractor) should consider identifying watch list items as goals or objectives in its annual DOE-VPP report.

Opportunity for Improvement: SRR (or its successor contractor) should consider identifying watch list items as goals or objectives in its annual DOE-VPP report.

Conclusion

SRR managers continue to demonstrate the leadership necessary to process the hazardous liquid wastes at SRS safely and compliantly. They are visible and credible to the workforce. SRR managers are committed to the principles of ISM, Nuclear Safety Culture, and recognize these principles as enablers for mission success. SRR has a comprehensive and cohesive set of policies and procedures that encourage safety and health excellence. A thorough set of statistical indicators, routine assessments, and regular observations provide managers with the data they need to make decisions, correct deficiencies before issues arise, and resolve issues when they occur. SRR managers have an effective working relationship with the workforce and frequently encourage workers to stop or pause work when questions or issues arise. SRR meets the expectations for Management Leadership and 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 2014, the Team concluded that SRR continued to provide many opportunities for workers to be actively involved in the safety program. Team interviews indicated that SRR employee involvement and participation continued to be effective. SRR used worker input extensively to identify and correct safety issues, improve work processes and mission execution, select controls, conduct prejob and postjob briefings, and perform work safely. Depending on the work location, workers helped with control selection such that hazard controls did not impede work processes or introduce new hazards. The Team identified Employee Involvement as a strength of the SRR safety program. The Team confirmed that SRR provided employees with multiple opportunities to participate on safety committees and encouraged them to use the timeout process to ensure they performed work safely and effectively. The Team identified the next major challenge for SRR was encouraging workers to ask difficult questions regarding safety observations and use those workers' observations to identify potential systemic weaknesses or improvements.

SRR formerly used Local Safety Improvement Teams (LSIT) as a significant employee involvement mechanism. LSIT members represented a cross-section of the workforce who volunteered to become trained observers. LSITs maintained an action-tracking list that incorporated observed at-risk behaviors and hazardous conditions. Although LSIT meeting minutes demonstrated significant involvement in solving problems and issues, SRR evaluated the overall performance of the LSITs and determined that the LSITs were focusing too much on conditions, and not observing behaviors. This shift coincided with an observed increase in injuries and incidents related to behavioral errors. LSIT members also recognized a declining trend in the quality of safety discussions among peers and determined enhancements were necessary in positive reinforcement for safe behaviors, as well as expression of concern for at-risk behaviors.

In 2019, SRR revamped and renamed the LSITs to SLTs to refocus the teams on behavioral observations. SRR reorganized the teams from five to three teams. The three teams are Fritstone, HAWKS, and Safe-T. Fritstone represents workers at DWPF and Saltstone. HAWKS represents tank farm personnel. Safe-T represents construction personnel. SRR eliminated the Safety PAWS that represented administrative personnel and incorporated those personnel into the remaining three SLTs.

SLTs do not maintain actions lists related to conditions as the LSITs did. SRR does expect the SLTs to help workers submit work requests for observed conditions. Rather than raising concerns about conditions to the SLT, SRR wants employees to use the Site Tracking, Analysis,

and Reporting (STAR) issue tracking system to submit issues and determine the status of identified issues. SRR also has the Employee Feedback Kiosk system that employees can access from their computer or through one of 10 free standing kiosks located around the facilities. Employees can submit issues into the kiosk, anonymously if desired. ESH&Q personnel screen those issues, provide responses, and can raise the issue into the STAR issue tracking system if necessary. The issues are tracked and reported to the ESQB. SRR should closely watch the changed role of the SLTs to ensure employees do not stop reporting issues because they perceive the submission process is too complex.

Opportunity for Improvement: SRR should closely watch the changed role of the SLTs to ensure employees do not stop reporting issues because they perceive the submission process is too complex.

SRR also expects the SLTs to improve the peer-to-peer communication aspect of the BBS program to help strengthen the SRR safety culture. Since 2014, SRR has grown from 2,100 to 2,600 employees. This growth occurred simultaneously with an increase in retirements from SRR. SRR is concerned about the recent influx of new and younger employees who do not have the ingrained safety culture of the experienced employees at SRR. Additionally, SRR's trending analysis identified construction workers with less than 1 year of experience onsite were most likely to have recordable injuries.

SRR developed the STAR BBS initiative to address safety observations and trends. The STAR BBS program uses safety monitors, safety mentors, and safety coaches who follow the Announce, Watch, Ask, Reinforce, and Express concern model to strengthen and reinforce the peer-to-peer BBS approach. Safety mentors focus on "conversation versus observation." This approach reinforces safety mentors communicating with the workers they observe rather than only approaching workers for observed performance deficiencies. SRR expects the STAR BBS approach to enhance communication between safety mentors and employees by including positive feedback. The new approach emphasizes positive observations that make conversations easier when a safety mentor observes a performance deficiency. This approach reinforces to workers that conversations between workers about their daily activities facilitate and encourage workers to raise safety concerns when they occur.

SRR has established several tools to implement the STAR BBS program. SRR trained SLT members to help them understand the new expectations for peer-to-peer observations. SRR also developed Safety Mentor "Safety-Talk Kits." These kits consist of 3x5 cards with brief descriptions of the program expectations and sample questions for safety mentors to initiate safety talks with workers. SRR recognized that an individual's ability to perform peer-to-peer observations requires specific personality traits. SRR selected safety mentors for the STAR BBS program that demonstrated the desired personality traits, their ability to perform peer-to-peer communication, and their interpersonal skills.

The STAR BBS program uses four key focus areas as the emphasis for observations. The safety organization identifies those four key focus areas by analyzing issues, observations, near-misses, injuries, first-aid cases, incidents, and accidents. The four key focus areas may change as SRR collects more data, behaviors change, issues are resolved, or new issues arise. The current key focus areas are eyes on path; tool/equipment use; seatbelt use; and slips, trips, and falls. Safety mentors focus on these four key focus areas during their observations.

SRR monitors an employee engagement score as one of three components of Nuclear Safety Culture in its performance dashboard. The score is both an objective and subjective score compiled from the number of employee concerns submitted, new items in the STAR issues tracking system, safety meeting attendance, STAR BBS observations completed, safety assessments' return-on-investment, and return-on-investment from management field observations. SRR measures each of these scores by comparing monthly data to a statistical range and investigates indicators that exceed predetermined action levels. Although the actual numbers are not associated with specific performance targets, the trends around averages help SRR determine if engagement is improving, or if it needs to look for underlying issues affecting engagement before issues develop.

The SRR VPP committee includes representatives from the SLTs. The VPP committee coordinates and leads SRR's efforts to maintain its DOE-VPP status. The committee prepares the annual report, coordinates award applications to the Voluntary Protection Programs Participants' Association, Inc. (VPPPA), and coordinates SRR's participation in regional and national VPPPA conferences. Since the previous Triennial Onsite Review, SRR eliminated the charter for the VPP committee. The committee continues to function but does not have any dedicated budget. SRR has integrated DOE-VPP into other functions to the point where it has lost its identity. SRR should reinstate the VPP committee charter, delineate the unique activities the committee should lead to improve employees' involvement in safety, and help integrate safety culture improvement and other safety functions. Activities to consider could include an annual program plan for safety promotions and committee members' participation in annual report preparation.

Opportunity for Improvement: SRR should reinstate the VPP committee charter, delineate the unique activities the committee should lead to improve employees' involvement in safety, and help integrate safety culture improvement and other safety functions. Activities to consider could include an annual program plan for safety promotions and committee members' participation in annual report preparation.

Since the last Triennial Onsite Review, SRR initiated several new employee recognition programs: Suggestions Producing Active Results Creatively (SPARC), Reinforcing Achievement of Values and Expectations (RAVE), and Recognizing Our Accomplishments through Reward (ROAR).

The SPARC program is a creative outlet for employees to submit ideas or suggestions on how SRR as a company can perform work more cost effectively, efficiently, and productively. The program rewards employees' suggestions that improve work efficiency through innovative methods and problem solving. SRR has established criteria that define eligible suggestions. The SPARC Review Team logs, tracks, and reviews suggestions, typically during the first full week of each month. The winning suggestion earns a $100 award. The best SPARC suggestion each quarter earns an additional $300 award. The SPARC Review Team may select some suggestions for recognition without a monetary award. Since program inception in April 2019, SPARC has generated over 450 suggestions.

SRR initiated RAVE in June 2019 to help SRR employees provide immediate positive reinforcement to other employees when they observe behaviors consistent with SRR's values and expectations, including safety. Since its inception, SRR has awarded 333 $25 gift cards and recognition certificates. The Engineering organization initially piloted the program. The

Environment, Safety, Health, and Quality Assurance; Tank Farm Operations; and Tank Closure organizations have since adopted the program. Any SRR employee may nominate another SRR employee using the SRR application on a smartphone or computer. The system forwards the recommendation to the employee's supervisor and level-2 manager. SRR typically awards the gift card within an hour of the recommendation. Employees may submit any number of recommendations but may only receive four awards per year.

ROAR is a new program that has four levels of recognition: Applause ($100-$499), Bravo ($500-$3,000), Ovation ($3,001-$6,000), and Encore ($6,001-$10,000). This program evaluates the recognition level using 14 specific criteria. The criteria include the contribution to safety, quality, health, environment, innovation, cost savings, and process improvement. The ROAR Evaluation Team evaluates submitted suggestions using the criteria specified in the program and bases the awards levels on those reviews.

In addition to the recognition programs, supervisors and managers informally recognize workers for their safe work behaviors at plan-of-the-day meetings, prejob briefings, or as the situation warrants. The Public Affairs department's "Liquid Scoop" newsletter reports on formal recognition programs. Systems remain in place in Manuals S16, Procedure 1.4, *General Human Resource Program,* and S16, Procedure 1.12, *Disciplinary Process,* to hold workers accountable for failure to comply with safety and health rules, regulations, and roles and responsibilities.

During the SRR Construction Manager's Monthly Safety Meeting, SRR demonstrated effective public recognition for individual workers' safety awareness during the past month. The manager called the recognized individuals to the front of the group and summarized their action. The manager then asked the worker to describe the situation they observed and the actions they took to address the issue. This approach recognized the employee, reinforced their actions, and gave other workers confidence about raising safety concerns.

In combination with these positive reinforcement processes, SRR has a progressive discipline process that attempts to correct problems through coaching, or discipline, before termination. Manual S16, Procedure 1.12, *Disciplinary Process*, provides for graduated levels of discipline, from warnings, probation, time off without pay, to termination. The process includes personnel from human resources and legal if necessary. Time off without pay up to termination requires a formal Disciplinary Panel, consisting of both the responsible line management chain and human resources. Termination must be approved by the SRR President/Executive Vice President. The Team did not find any evidence that discipline created any fear of reprisal among workers for raising issues, reporting incidents, or stopping work.

Conclusion:

SRR continues to provide opportunities for all workers to be involved in the structure and operation of the safety and health program, and employees continue to take advantage of those opportunities. Employee Involvement is a major contributor to SRR's strong safety culture. SRR's reorganization of the LSITs into the SLTs is using peer-to-peer observations and conversations to address the current key focus areas and further reduce accident and injury rates. SRR's reward and recognition programs provide rapid and meaningful awards to employees and encourage safe behaviors. Managers and employees trust each other and communicate openly with each other to accomplish the mission safely. SRR has opportunities to renew the visibility of DOE-VPP and ensure employees continue to report safety conditions. SRR meets the Employee Involvement expectations for continued participation in DOE-VPP.

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 shall 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.

In 2014, SRR shared programmatic processes for Worksite Analysis with SRNS. SRR augmented these processes with facility-specific direction to address unique facility hazards. SRR used safety analyses to drive continuous improvement. SRR had opportunities to improve its hazard analysis by validating that its strategies controlled exposures and by using leading indicators to monitor safety campaigns' effectiveness.

At the activity task level, the Manual 8Q, Procedure 122, *Hazard Analysis Process,* describes the Hazard Analysis (HA) process. The HA process is a method for the identification of hazards, such as industrial safety, industrial hygiene, environmental, and radiological hazards associated with specific tasks. HA can include an Individual Hazard Analysis (IHA). SRR uses an IHA to evaluate a variety of routine and repetitive tasks individuals can perform safely using their knowledge and training. The Assisted Hazard Analysis (AHA) is a systematic process based on the complexity of the tasks, facility hazards, and the extent of the task hazards. When hazards are beyond the IHA controls, an AHA ensures that the scope of the job is defined, the hazards are analyzed, and the controls are specified before performing work. The AHA process uses team planning that includes subject matter experts and workers in the identification of hazards. Manual 8Q, Procedure 122, *Hazard Analysis Process,* integrates with Manual 1Y, *Work Control,* for maintenance/construction activities, and Manual 2S, *Conduct of Operations,* for operational activities. When the AHA is complete and approved, the work may begin with the Shift Manager or designee's authorization. SRR requires a prejob briefing before work begins to ensure workers understand the scope of work, and that the controls are in place to protect the worker. Upon completion of the activity, postjob feedback is solicited (verbal and/or written) from workers to identify potential improvements that may be applied the next time the job is performed.

The AHA process received a major revision in 2016. Subject matter experts updated and increased analysis questions throughout the AHA process based on lessons learned and feedback from the work planners and field personnel. Along with more screening questions came additional administrative controls for the planners to use to mitigate hazards. Planners believe the 2016 revision made work packages more consistent among planners and even across construction and maintenance activities. SRR is planning another revision by the end of fiscal year 2020.

In addition to the AHA process, SRR uses the results of worksite analysis per Worker Safety and Health Program SRR-ESH-2018-00093 Rev 2, *SRS M&O and Liquid Waste Basic Hazard Control Handbook, and Task Level Hazard Analysis,* required by SRNS Manual 8Q, *Employee Safety Manual*, Procedure 122, *Hazard Analysis Process,* to eliminate or control hazards.

The workers are knowledgeable of the hazards they face and are confident they can perform their work safely. Workers indicated they are involved in work planning and package development. This approach leverages workers' understanding of hazards and their experience controlling those hazards and exposures. Managers and supervisors seek workers' opinions and ideas before finalizing work packages or implementing controls.

Supervisors and foremen monitor and evaluate their workers' fitness-for-duty. One supervisor said he knew his crew well enough that he could see when someone is not feeling well. In those cases, he has assigned people to lower risk tasks. He encourages them to self-report any physical, mental, or emotional issues that might distract them and put them or their coworkers at a higher risk for injury. He also encourages workers with colds or the flu to stay at home to reduce the spread of illnesses. He watches for people taking shortcuts, explaining those shortcuts put workers at higher risk for an injury. The supervisors and foremen's concern for workers' condition demonstrates the continuous hazard analysis necessary to achieve excellent safety and health performance.

SRR Construction uses Task-Based Observations (TBO), a web-based inspection and issue tracking database to track regular weekly construction site inspections and reevaluate worksite hazards. TBOs are formal, ongoing self-assessments, conducted using checklists with preidentified lines of inquiry. SRR Construction performs 300-400 TBOs each month. In addition to TBOs, SRR conducts focused observations that are risk-based OSHA compliance and behavioral observations. TBOs and focused observations require personnel to look at behavioral and compliance issues frequently, and help identify and mitigate deteriorating conditions or work practices quickly, before accidents and injuries occur. SRR analyzes the data collected to determine if additional assessments or performance initiatives are necessary. SRR also bins data using ISM principles to identify both positive and negative performance trends in its safety program.

SRR expects all work teams to use reverse briefings. Reverse briefings ensure workers understand the scope of the work and are aware of safety-related changes to either the work package or working conditions. The Team observed this process during a maintenance briefing, and it was an excellent way to keep workers engaged. To ensure workers understood the hazards for the work, the supervisor asked every worker their role and each replied stating their tasks. In addition, it was notable to see the group paying attention to the speaker rather than being on their phones or otherwise distracted. The construction group has a no-phone policy on jobsites because they feel the distraction increases the chances of injury.

Although expected, SRR supervisors do not always use the reverse briefing technique in prejob briefings. In one case, SRR had stopped an ongoing activity where conditions in the field changed. Radiation exposure readings were higher than expected in the original work package. After updating the work package, planners and supervisors walked down the job. The supervisor asked if anyone had questions or issues after the prejob briefing but did not use the formal reverse briefing technique to determine if workers understood the changes to the work package or had any additional concerns. SRR should reemphasize its policy of using reverse briefing techniques for all prejob briefings.

Opportunity for Improvement: SRR should reemphasize its policy of using reverse briefing techniques for all prejob briefings.

The SRR industrial hygiene group has implemented *Open Range*, a commercial industrial hygiene and safety software solution, for the collection and analysis of industrial hygiene exposure assessment data. SRR and SRNS worked together and decided to adopt *Open Range* as a site-wide database. SRR began using *Open Range* in 2016 for chemical hygiene data, and they believe it is a major improvement over the previous system. The new system makes it easier for industrial hygienists to retrieve and evaluate baseline exposure assessment data when performing hazard analysis and record new sampling results for future reference. SRR populated the new system with exposure data dating back to 2010 but has not yet included asbestos exposure or sampling data. SRR is evaluating *Open Range* for the asbestos exposure and sampling data.

SRR has extensive analysis associated with potential mercury exposures. The reactor fuel separations process uses mercury to stabilize and catalyze the dissolution of fuel in H and F Canyon facilities. Mercury, carried over from the fuel separations process into the waste tanks, presents a hazard to workers as it may be present in tank vapor emissions, evaporators, process piping, and process water returns to the tanks. SRR has used stack analysis to ensure exit velocities from tank exhaust stacks sufficiently dilute emissions to meet Environmental Protection Agency standards. SRR has identified mercury hazards at the ETP, which treats low-level contaminated water before releasing it from the site. SRR identified mercury vapors that settle in the ETP area during certain weather conditions, such as thermal inversions. Although below occupational exposure limits, these levels were high enough to trigger mercury alarms at ETP. SRR has evaluated the ETP systems and identified system drains to tanks as mercury vapor release points and modified those drains to reduce or prevent mercury emissions. SRR is also piloting a Tekran® mercury analyzer that can sample multiple points in ETP providing workers with timely information to avoid potential mercury exposures. These analysis efforts have helped SRR improve mercury controls and reduce employee mercury exposures.

Early in the construction of the new Saltstone Disposal Units, SRR recognized the need to manage the interfaces between mobile equipment and personnel. Near-miss events or incidents from the comingling of personally owned vehicles with large construction site vehicles, pedestrian safety, housekeeping issues with laydown areas, and the location of trailers used as offices and shops added urgency to this need. The construction manager applied a tool from one of the parent companies to help him identify, analyze, and control these hazards, called Mobile Equipment Personnel Interface (MEPI). MEPI examines common construction site hazards and produces a construction worksite master plan. The MEPI analysis identified the need to widen access roads to better accommodate construction vehicles, designated contractor areas for their trailers, laydown, work areas, as well as locations for personal vehicle parking and heavy equipment parking. The construction manager and his team regularly update and enforce the worksite master plan.

Last year, a craft worker experienced a shoulder injury while moving 90-pound lead blankets used for radiation shielding around tank farm piping. Although SRR required two people to lift the 90-pound blankets, the various body positions and inability to equally share the load (45 pounds per person) at all times necessitated further risk mitigation. The first option was a smaller 45-pound blanket that one person could lift. The analysis of the issue resulted in replacing an administrative control with an engineered control. SRR also evaluated other methods to deliver the blankets to the exact worksite locations, but because of the tight workspaces on tank tops, workers could not use forklifts or other vehicles for all movements. SRR began to use cranes to deliver the lead blankets to locations near their point of use. The

blankets still require some manual handling, but the evaluations led to controls that reduced the material handling risk to workers.

SRR continues to use the existing supply of 90-pound blankets throughout the facilities until the supply has been disposed through normal means. To reduce the injury risk to employees who will have to move these heavier blankets, SRR is evaluating exoskeleton suits that assist workers with ergonomic hazards of manual work. SRR also inquired about other tools with one of its parent companies. In response, the parent company sent an exoskeleton for testing. Exoskeletons are passive units with no battery or external power. The Suit X exoskeleton has three units that a worker can use individually (shoulder, back, or leg unit) or combined. The shoulder unit supports the arms for prolonged overhead work. The construction safety manager has conducted initial tests on this suit, but is waiting to hear back from two other manufacturers and get devices he can test. He then plans to have a group of craft personnel test the suits simultaneously to see if any of them would be suitable for tank farm work, and if so which one they felt was the best exoskeleton. Even if the system proves itself, SRR will continue enforcing a 50-pound maximum lift per person.

SRR is evaluating the effectiveness of different methods of equipment decontamination. DWPF is investigating the use of "ice-pigging," a cleaning technique using a water/ice slurry to decontaminate the internal components of pumps or other equipment. This technique captures contamination in a liquid form and recycles it into the DWPF process streams. It may reduce doses to workers and may allow for repair of equipment identified for replacement due to lower radiation levels. DWPF is also exploring the use of a laser decontamination system, which they anticipate will be more effective for removing rust and cesium embedded in the surface of the high-level waste canisters during the glass pouring process.

Conclusion

SRR uses a systematic process for worksite analysis that addresses the full range of hazards workers encounter. Work planning and package development involves workers to leverage their understanding of hazards and experience to assist in the control of hazards and exposures. Managers and supervisors seek and respect workers' opinions and ideas before finalizing work packages or implementing controls. SRR's safety record and low rework frequency confirm that SRR is planning and performing work effectively. SRR demonstrates continuous improvement for worker safety by evaluating different and new technologies. SRR continues to meet the expectation in Worksite Analysis for participation as a DOE-VPP Star 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 2014, hazards at SRR were well controlled. SRR followed the hierarchy of controls using engineered and administrative controls, and PPE 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.

SRR continues to fully implement and support SRR-RP-2014-00926, *Savannah River Remediation, LLC Integrated Safety Management System*, which provides employees a safe work environment. The site has effectively integrated environment, safety and health controls into all levels of work through implementing procedures from Manuals 1Y, Procedure 8.20, *Work Control Procedure*; S4 MNT.07, *Tank Farms/ETP Work Control Package Development Guidelines*; SCD-15, *Work Planning Guide*; SW4-V1, *DWPF and Saltstone Maintenance Planner's Guide*; and S4 OPS.14, *Liquid Waste Facilities Work Control Procedure*.

Since 2014, SRR has stepped up hazard prevention and control by aggressively working on continuous process improvements. SRR complies with SRS Industrial Hygiene Manual (4Q), Procedure 105, *Hazard Prevention and Control,* and managers and workers are continuously looking for ways to eliminate hazards or substitute less hazardous processes; implement engineered or administrative controls, and provide PPE to minimize workers' exposure to hazards.

The site has many examples of improved controls. For example, during a camera inspection of the Strip Effluent Coalescer pump skid in the Modular Caustic Side Solvent Extraction Unit, workers identified a loose discharge flange caused by vibration from the pump skid. In the past, workers had to enter a confined space in a high radiation area to tighten this flange with hand tools, potentially resulting in high radiation exposure to the worker. Work Control, Engineering, and Maintenance personnel developed an extended air ratchet to access this flange from the cell top without entering the confined space in a high radiation area. After several successful mockup runs, workers successfully repaired the flange with significantly less radiation exposure.

SRR uses robotics for liquid waste tank sampling, inspection, cleaning, contaminated cell cleanup, and remote repairs to prevent radiation exposure to workers during highly hazardous work in the waste tank closure process. For example, SRR samples tank wastes using a crawler named G.I. Joe®. Robots surveil primary tank walls and outer annuluses of aging tanks with a remotely manipulated camera using high-resolution photography and ultrasonics. During the installation of Melter 3 at DWPF, modified robots helped clean, package, and remove radioactive debris for disposal. SRR built a hybrid robot using a Kuka Robotics® arm attached to a Brokk® base to make a weld repair on an evaporator pot that also reduced personnel radiation exposure.

SRR made several improvements to reduce worker exposure during evaporator maintenance. For example, SRR installed a camera through a port plug opening on top of the evaporator to perform required inspections. Workers fabricated an extended tool to remove the port plug and maximize the distance between the worker and the port plug. The workers also fabricated a special tool extension that allowed the camera installation. Other improvements included extensions on oil fill, grease lubrication points, and drain ports, eliminating the need to access equipment in odd locations, and removing the requirement to shut down or lock out the equipment. These changes reduced radiological exposure to the workers by limiting the need to access high radiation areas for maintenance.

SRR developed a mockup to demonstrate and practice the final tie-ins to interconnect SWPF with DWPF, Saltstone, and the tank farms. These tie-ins required work in radiation and contamination areas, opening waste transfer lines, and other hazardous work. After completing the exploratory excavation in December 2017, workers discovered the Strip Effluent line (transfer line requiring modification) had higher radiation rates (3 to 6 Rad/hour) than expected when performing the final tie-ins. SRR created the mockup to allow workers to develop work methods, resolve any potential execution issues, and reduce the potential exposure to liquid waste and radiation hazards. The mockup helped determine the tools and techniques required to perform the tie-ins while reducing exposure to the workers by practicing in a clean, nonradiation environment. Workers performed the mockup several times before installing the tie-ins, so the actual people performing the work could refine their techniques.

SRR uses the Teletrak® system to monitor dose rates on high-potential radiological jobs. Workers wear electronic personal dosimeters (EPD) that transmit a signal to a repeater and base station. This, in turn, connects to a computer system or laptop located in a command trailer displaying and tracking Deep Dose, Deep Dose rates, Skin Dose, and Skin Dose rates. The Teletrak® repeater transmits dose data from the EPD transmitter to the base station when the line of sight is blocked or when the transmitter is out of range. This system allows a monitor to identify personnel approaching dose limits for the job so an affected worker can exit the area before exceeding their allowable radiation dose.

SRR developed its heat stress prevention plan *Beat the HEAT* in order to implement requirements in Manual 4Q, *Industrial Hygiene,* Procedure 502, *Thermal Stress Management.* The SRR plan identifies high heat activities and controls, such as air-conditioned containment huts, heat oases, scheduling work for cooler parts of the day, and water at step-off pads. In 2017, SRR incorporated the Polar OH1® physiological heart rate monitoring devices and hand-held Extech HT30 Wet-Bulb Globe Thermometer into the heat-stress program. Since implementing these improvements, SRR has had no recordable or reportable heat stress cases reported in CAIRS. In 2019, SRR conducted physiological monitoring using Polar heart rate monitoring for heat stress one thousand nine hundred and fourteen (1914) times and intervened 130 times when monitored workers exhibited sustained elevated heart rates. On those occasions workers paused their activities or moved to a cooler location to allow their bodies to recover before a heat illness occurred.

SRR subcontracts dedicated heat stress technicians for 6-month periods (April to September) to perform the daily monitoring with support of the field industrial hygienists. Workers wear personal physiological monitoring devices on their chest or arm that tracks individual heart rate during work activities. When a worker's heart rate rises above a predetermined threshold, the worker must stop working, come out and cool off. They can resume working when their heart

rate has returned to normal levels. Monitoring remotely from up to 100 feet, the device records heart rate in real-time. The equipment allows a single industrial hygiene technician to monitor up to 10 workers. Workers can wear monitors under multiple layers of clothing, so the system works with multiple layers of PPE. SRR has found that using this system allows workers to be more efficient in work-rest routines than they would be using standardized work-rest cycle charts.

SRR is also incorporating the Bullard DC 70 Series Cooling Vests® with Bullard HC2400 Hot/Cold Climate Control Tubes® in nonradiation work environments to minimize the potential for heat-stress injuries. The system requires a breathing air compressor or another clean air source, belt-mounted climate-control tube, and a lightweight vest. The heart of the system is the climate-control tube that can heat or cool incoming air up to 30 degrees Fahrenheit.

SRR used its engineering expertise to redesign the DWPF laboratory waste-handling practices to eliminate radiation exposure to workers' hands, and keep other exposures well below regulatory limits. Since it began operating, the rate of sampling has allowed personnel to make cell entries to bag up laboratory waste for removal and disposal. SRR evaluated the potential extremity dose to workers if it continued this practice, as sampling requirements will increase once SWPF begins sending waste to DWPF, and it determined that exposures would be unacceptable. SRR has redesigned the laboratory waste-cell to use remote handling equipment to bag the waste and will be using a shielded transfer cart to move the waste out of the cell.

SRR redesigned the laboratory sample cell to make it easier for workers to draw the required quality and compliance samples before vitrifying waste in DWPF. The redesign required installing new equipment in the sample cell, with the potential of high radiation exposure to workers. To reduce the amount of workers time in the cell, SRR used a 3-dimesional laser modeling system to make detailed virtual drawings of the sample cell. It then designed the new equipment so workers could assemble it outside the cell, with a very short entry into the cell for the final installation, thus minimizing workers' exposures.

SRR has a comprehensive, continuously improving PPE program. The site stocks and provides a wide range of standard PPE to employees. SRR also provides stipends for purchase of safety shoes and prescription safety glasses. Personnel receive initial General Employee Training to familiarize them with standard PPE use and care. Safety professionals review AHAs and work packages to identify the proper PPE for each activity. SRR participates in the SRNS PPE Oversight Committee (PPEOC), an open forum to discuss potential changes to PPE based on routine, nonroutine, and new processes to include the use of nonstandard PPE. Supervisors and employees are constantly identifying or recommending more efficient and effective methods to protect their employees to the PPEOC when other forms of hazard controls are not effective or practical. For example, in the 18 months preceding this Triennial Onsite Review, bump caps, various versions of powered air purifying welding helmets, Uvex S8510 Bionic Ratchet Face Shield System and various types of new gloves were submitted to the PPEOC and approved for use.

Certified professionals are available based on potential risks on the site. SRR has 6 Certified Safety Professionals (CSP), 3 Certified Industrial Hygienists (CIH), 14 Safety Trained Supervisors (STS), 3 Masters of Public Health, 1 Master of Science in Public Health, 2 Graduate Safety Professionals, and 2 Certified Health Physicists (CHP). SRR has approximately 250 radiological control personnel (managers and inspectors), several industrial hygienists, safety

engineers, industrial hygiene technicians, and safety and health technicians providing specific facility support to the workers.

All direct-hire personnel are covered by the SRNS Occupational Medical Department, comprised of the Site Occupational Medical Director, 2 staff doctors, 1 nurse practitioner, 6 registered nurses, 2 medical assistants, and 10 medical staff records assistants who provide a full range of site-specific occupational health services. SRR Construction has a Certified Occupational Health Nurse providing fitness-for-duty reviews, employee job task analysis, minor injury and first-aid care, coordination of peripheral offsite referrals for specialty orthopedic care, referral to SRNS occupational medical services, and referrals to employee assistance programs if required. The wellness program, the Certified Occupational Health Nurse in Construction, and the SRNS medical provider engage employees to seek out ways to improve their health. SRNS' occupational medicine providers also counsel employees about health or job-related concerns.

SRR conducts a variety of surveys and assessments to provide employees with a safe work environment. Facility subject matter experts and safety personnel conduct final acceptance inspections of new or altered facilities and components using Manual 8Q, Procedure 53, *Final Acceptance Inspections.* Routine/weekly workplace inspections are completed using Manual S4 Procedure OPS.13, *Liquid Waste (LW) Safety and Housekeeping Inspection Program.* Industrial hygiene and radiation control personnel conduct applicable surveys based on Manual 4Q, *SRS Industrial Hygiene*, as well as local program requirements, work packages or controls. SRR's parent company assists SRR through biannual integrated independent assessments of 23 programmatic functional areas. The assessments focus on the operating facilities and include work packages, prejob briefing observations, and job performance evaluation for completeness and compliance with relative procedures.

Facility conditions observed by the team did not call into question any preventive/predictive maintenance issues. The extent of modification work to utilities around the tank farm demonstrated managers concern for improving the facility condition. SRR managed its preventive maintenance program by completing an average of five hundred (500) PM tasks monthly in 2019, averaging less than one percent preventive maintenance deferrals, and having only two delinquent preventive maintenance actions for 2019. The dashboard for the ESQB held during the assessment identified Maintenance Program Reliability as "Yellow" beginning in the second quarter for FY19, based on five issues resulting from errors that occurred prior to that. Ongoing corrective actions for those errors include conduct of maintenance/conduct of operations training, coaching, and the five issues remain active in the STAR Issues Tracking system.

SRR 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 emergency (fire and security) medical and paramedic services capable of responding to SRR locations in less than 5 minutes. SRNS conducts a coordinated annual site exercise that may include SRR, Parsons Corporation, and Centerra-SRS. SRR conducts annual exercises to evaluate responses and quarterly drills for training. The scenario writers develop exercises and drills. SRR 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.

Conclusion

SRR takes the health and welfare of its staff and subcontractor workforce seriously. It effectively eliminates or controls hazards and exposures using the hierarchy of controls. PPE is available and worn to prevent mishaps or control their frequency and/or severity. SRR employs certified professionals commensurate with the potential risks on the site. SRR provides a full range of medical services, emergency response and planning, and wellness program support. SRR conducts a variety of surveys and assessments to eliminate, reduce, and control workplace hazards. The Team did not identify any programmatic noncompliances with DOE, OSHA, State, or local safety requirements. SRR's injury and illness rates are well below the comparative industry average and reflect effective hazard prevention and control methods. SRR 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 are capable of acting in accordance with management expectations and approved procedures.

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

SRR continues to have effective training and qualifications programs that ensure employees can recognize the hazards of the work environment and protect themselves and their coworkers. Manual 4B, *Training and Qualification Program,* establishes a systematic approach to training that helps SRR work effectively and safely. The training and qualification program provides the knowledge, skills, and abilities workers need to perform tasks competently and safely.

SRR uses a computer-based Training Record and Information Network system to track, record, and maintain the training records for all employees. The SRR safety and health training consists of a mixture of self-paced (e.g., self-study and computer-based training), classroom, seminars or briefings, mockups, on-the-job training, and under-instruction hands-on training. The Team walked down three mockups used by SRR to qualify operators. The mockups ranged in complexity based on the system being simulated for the worker being qualified. The mockups provide effective situational evaluation of employee's responses to off normal conditions in a controlled training environment.

A 2016 SRR Conduct of Operations compliance assessment identified weaknesses in the training program that occurred, in part, because of unplanned staffing reductions in 2013 due to budget reductions. The unplanned reductions in staffing contributed to the loss of key elements of continuing training. For example, the assessment identified that SRR had high quality training, but had not captured the job or task analyses it used to produce that training. The continuing training program depended heavily on the long-term experience of the workforce. When SRR experienced significant workforce turnover (see Employee Involvement), the weaknesses in continuing training became evident.

To address the training issues, SRR performed two comprehensive Manual 4B compliance assessments, one in 2018 and one in 2019, to identify any additional concerns in the training program. Both assessments identified several examples of incomplete training plans and curricula for continuing training for workers. One barrier to completing continuing training was related to staffing levels. SRR was only authorized staff levels for four shifts, which did not provide workers the ability to complete continuing training during normal working hours. Federal Acquisition Regulations in the SRR contract prohibited training on overtime. To address the short-term need for continuing training, SRR requested and received permission from SRO to allow workers to complete training on overtime. For the longer-term solution, SRO authorized SRR to increase staffing levels to 4½ shifts. This increase eliminated the need to perform continuing training on overtime. The overtime training exemption ended in December 2019 and all workers are current on their training. The 2019 Manual 4B assessment identified that the SRR training organization and training program complied with Manual 4B with four discrete

exceptions. Those exceptions were related to operator and supervisor training programs. SRR developed corrective actions to address those issues.

At the time of this Triennial Onsite Review, SRR had 17 remaining open actions to address in the training program. None of the 17 corrective actions recommended in the 2019 Manual 4B compliance assessment represented noncompliance with DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*. SRR expects to complete the identified corrective actions by the end of the fiscal year 2020.

As part of its professional development and training, SRR encourages personnel to seek certification in safety disciplines, including the Board of Certified Safety Professionals (BCSP) STS program. This certification is for executives, directors, managers, supervisors, superintendents, and employees, who may not have safety as a primary duty, but their knowledge of safety practices ensures safer and healthier worksites, and their competency strengthens the foundation of safety in the organization. To encourage the pursuit of the STS certification, SRR requested application fee waivers from BCSP. BCSP granted the application fee waiver. BCSP still requires a testing fee, so SRR recognizes employees that pass the test with a monetary award equal to the testing fee. For 2020, SRR set an aggressive goal of qualifying 75 individuals as STS. The goal includes conducting three 12-hour STS preparation classes with 25 candidates each. SRR uses a similar approach to cover CIH, CHP, and CSP application and testing fees. SRR is considering an additional monetary award for those completing STS, CSP, CHP, and CIH certifications.

Conclusion

SRR has an established training and qualification program that trains employees to recognize hazards and to protect themselves and coworkers. Through its assessment process, SRR identified weaknesses in its training program caused by unplanned personnel reductions in 2013. SRR developed and implemented corrective actions to address the identified weaknesses and ensure continued compliance with DOE and SRR requirements. SRR meets the Safety and Health Training expectations for continued participation in DOE-VPP.

VIII. CONCLUSIONS

SRR has fully integrated the DOE-VPP tenets and expectations into its Integrated Safety Management System and Nuclear Safety Culture. This integration of DOE-VPP into every aspect of SRR's mission has helped SRR achieve accident and injury rates that are 90 percent or more below its comparison industry. Managers establish appropriate expectations, provide resources, and create an environment that values and rewards accomplishing the mission safely, without pressuring workers to take risks to meet a schedule. Workers understand the hazards they face, exercise caution in all work tasks, and pause or stop work when conditions deviate from expectations. SRR is refining its hazard analysis processes and implementing innovative controls that minimize worker exposures to all hazards. SRR's self-assessment processes help it identify trends before they become broader issues. With limited time remaining on its contract, SRR has an opportunity to prepare the workforce for the upcoming contract transition, raise employees' awareness of DOE-VPP, and help workers maintain their strong safety culture through the transition. The Team did not identify any programmatic noncompliances with DOE, OSHA, State, or local safety requirements that would preclude participation in DOE-VPP. SRR continues to meet all the expectations for DOE-VPP, and the Team recommends that SRR continue to participate in DOE-VPP at the Star level.

Appendix A: Onsite VPP Assessment Team Roster

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