

## **Utilizing the Shift Technical Engineer Pipeline to Develop the Next Generation of Engineers - 17354**

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### **Abstract**

As the liquid waste contractor for the U.S. Department of Energy's (DOE) Savannah River Site (SRS), Savannah River Remediation (SRR) is responsible for safely treating and dispositioning approximately 35 million gallons of liquid waste stored at SRS. To achieve this mission, SRR manages and operates several complex nuclear facilities. These nuclear facilities include the H and F Tank Farms, the Defense Waste Processing Facility (DWPF), and the Saltstone Processing and Disposal Facility. To support the operations of these complex nuclear facilities, a Shift Technical Engineer (STE) is stationed for every shift. The STE is the sole Engineering Organization representative on-shift and serves as a direct technical resource for operations, including safety basis interpretation, process monitoring and prompt troubleshooting support. The training and qualification for an STE is more intensive than for typical technical staff personnel at SRR, involving additional classes, under-instruction watches, demonstration of practical factors, and culminating in an intense oral board examination.

Like many other contractors in the DOE complex, SRR faces the challenge of preparing a significant number of new generation engineers to take the place of an aging workforce. Beyond the traditional training to establish minimum technical qualifications, SRR has established a number of initiatives aimed at accelerating the process of preparing early career engineers to replace experienced senior engineers. These initiatives include an internal rotational program, technical exchange activities with companies at other DOE sites, and an STE pipeline. The STE role provides a unique mechanism for select, early career engineers to gain in-depth knowledge and significant responsibility normally not achieved until much later in their careers. Once qualification is complete, the engineers perform the STE duties, providing technical support for nuclear facility operations. In addition, creating an STE pipeline, where promising young engineers are continually being qualified to replace the on-shift STEs, provides the company with a source of experienced engineers with in-depth technical knowledge as well as valuable experience interfacing with operations and other facility support groups. This paper will discuss the STE position, the qualification process, and how SRR is using the STE qualification pipeline to benefit both the company and the individual engineer.

## Introduction

SRR staffs nearly 2,000 employees to perform the complex operations of the Savannah River Site's liquid waste mission. Currently, over 40 percent of these employees are eligible to retire and that number will increase over the next several years [1].

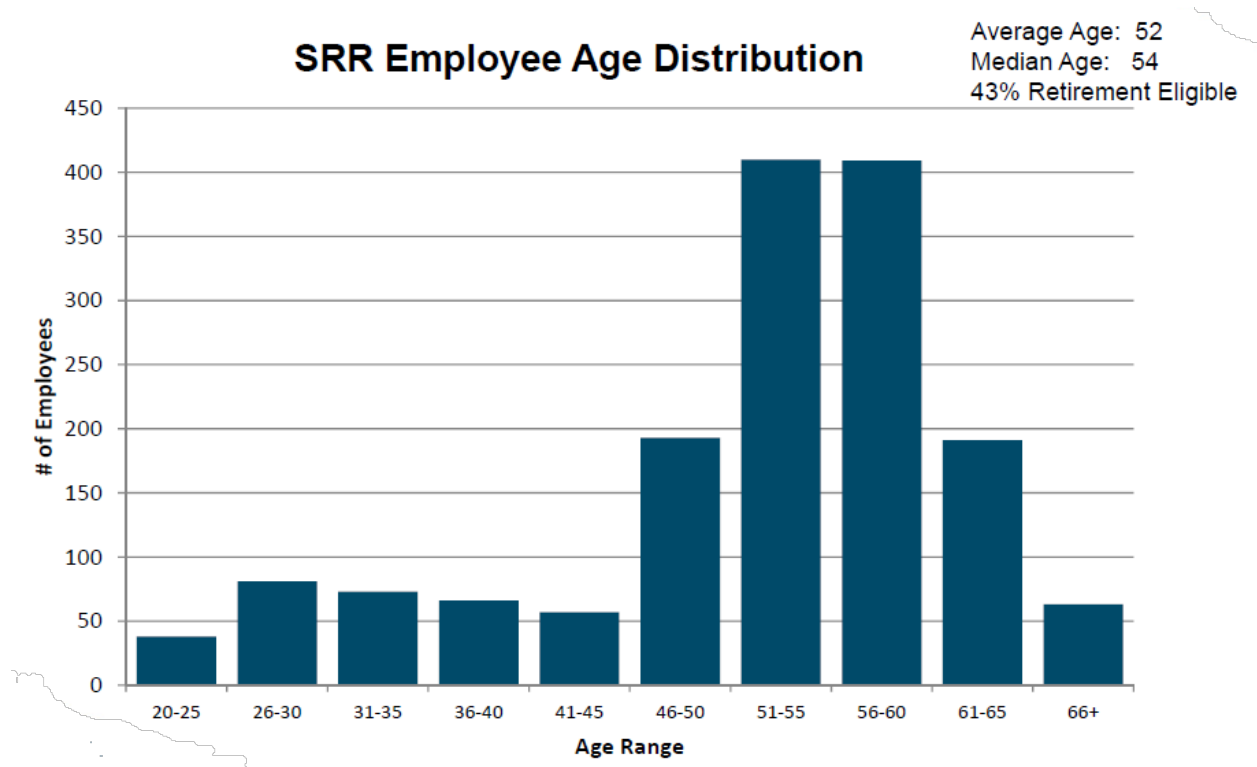


Fig. 1 SRR Age Distribution.

The Engineering organization has begun proactive recruiting in order to fill the critical needs that will be created by the aging workforce. Hiring in the engineering department has increased over the last few years; however, the difficult challenge still exists to develop early career engineers. There is a need to develop young engineers to a point that they are capable of assuming responsibility for some of the vital systems that are currently maintained by senior engineers. SRR has implemented several programs targeted at both reducing the attrition rate and also accelerating career development for early career engineers. The STE pipeline program was created as part of the initiative for the development of select early career engineers.

## **Shift Technical Engineer at SRR**

STEs are staffed for all of the facilities operated by SRR. This includes the F and H Tank Farms, DWPF and the Saltstone facilities. The STE in SRR facilities is modeled after the Shift Technical Advisor (STA), which is a required position in reactor operations. DOE Order 462.2 defines the STA as [2]:

*"...a person who has been assigned to provide on-shift advice and counsel to shift operating personnel during shift activities and to help determine cause and mitigation of facility accidents"*

The role of the STE is essentially the same and intended to be an immediate technical resource for facility operations. The main responsibilities for an STE include assistance with safety basis interpretation, troubleshooting equipment and monitoring process parameters. The STE also acts as an engineering point of contact for facility operations in order to communicate emergent issues to engineering management. An STE is stationed for every shift, meaning that more often than not, the STE is the only engineering resource available.

The STE position requires in-depth knowledge of the facility systems, processes, and the facility's safety basis. As such, a rigorous qualification is in place to ensure that the STE is prepared to perform the required duties. The STE qualification card varies between facilities but for all facilities the training requirements are significantly greater than that for a usual technical staff engineer. The training requirements typically include training in conduct of operations, facility/process specifics and emergency preparedness. In addition to classroom training, the qualification also includes several on-the-job training requirements, including a minimum number of under-instruction (UI) watches as well as several practical factors. The practical factors are performance of routine job tasks in front of a qualified observer to prove competency. The practical factors are either completed during the UI watches or in the control room simulator. The training qualification all culminates in an intensive oral board where the candidate is tested on all facets of the job and the applicable facility.

The pipeline selection begins by management identification of high-performing engineers as candidates for each facility. The training process begins once an engineer is selected and agrees to participate. Training classes are arranged by the engineering training lead and qualification progress is tracked for each candidate. Along with both self-paced and classroom training, much of the knowledge is gained by individual studying and preparation. It is through this process that the engineer develops much of the specific process and system knowledge required. The other considerable source of training comes from the UI watches and practical factors. Through on-the-job training, the engineer is able to apply the knowledge

gained from classroom training and self-studying as well as gain new knowledge by assisting with emergent issues on shift. The training culminates in an oral board. The candidate is tested on several different aspects of the facility and operations, including facility/process knowledge, safety envelope, emergency preparedness, environmental and radiological safety, conduct of engineering, and conduct of operations. After completion of the qualification process, the engineer will spend one or more years on shift as an STE. Meanwhile, the next pipeline class is identified, trained, and qualified to backfill the previous class.

### **Individual Benefits**

An individual who participates in the STE pipeline has much to gain from the experience. The following skills and valuable information are learned through the experience:

- Intimate facility design and process knowledge is obtained through both the qualification process and the technical research and investigation required of the STE in order to provide support and advice for all systems in the facility.
- The STE, as the authority of the facility safety basis while on shift, obtains working knowledge of the facility's safety basis through supporting operations with implementation of Technical Safety Requirements.
- The STE is placed in situations where urgent decisions must be made and with those decisions comes accountability. The STE pipeline provides young engineers with an avenue to obtain much higher responsibility than what is typical for an engineer with two to five years of professional experience.
- The engineer will be required to communicate technical issues with shift personnel as well as facility and engineering management. Through execution of this function, the STE will develop crucial communications skills.
- While on shift, the STE works very closely with operations. Conduct of Operations is a required skill set for the STE position and tested on the oral board. The STE also gains conduct of operations skills through close interface with the shift personnel and through participation in emergency preparedness drills or actual abnormal operations. This familiarity with operations becomes extremely valuable in facility engineering, especially when developing operations procedures or planning changes to the configuration of the facility.

### **Company Benefits**

A young engineer can become a significant asset to the company after successful completion of the STE pipeline. There are several ways that an STE pipeline participant gains value:

- The program serves to accelerate development of the early career professional. After completion of the STE pipeline, the engineer would have demonstrated the ability to handle high responsibility, obtain high levels of detail in a facility and make technical decisions without senior support. This positions the STE to take on an engineering role of higher responsibility than other early career peers. This better positions the company to place early career engineers to backfill senior engineers who will soon retire.
- The STE pipeline helps ensure an adequate supply of qualified personnel for a required position. Prior to the start of the STE pipeline, over 50 percent of on-shift STEs were eligible for retirement in the following 5 years. The STE pipeline creates a constant flow of young talent into the STE position, which ensures there is not a personnel deficiency when the current STEs retire. There will be young STEs constantly being training to backfill the senior STEs. The STEs that complete the pipeline program will be able to maintain qualification and can be available as relief STEs, if needed.
- Lastly, the STE pipeline benefits the company by providing a path for engineers to enter into Operations. The Operations organization is also impacted by an aging workforce. Most of the management staff in operations comes from a technical background. An engineering degree is either preferred or required for openings in operations management positions. The STE pipeline gives engineers relevant experience and preparation for these management positions. The STE immerses the engineers into the operations organization, which also can motivate engineers to pursue an operations career.

### **Lessons Learned/Improvements**

The STE pipeline is a young program at SRR. Although only a handful of engineers have completed the pipeline into STE qualification, assessments of the required training and oral board examinations have led to revisions to the qualification requirements. Updates have been made to the practical factors training document. Several practical factors were included to add performance of several procedures to be performed by the STE trainee in the control room simulator. Performance of these specific procedures gives the engineer working knowledge of specific facility operations, conduct of operations training as well as additional facility knowledge. Another improvement to the qualification requirements is the addition of other supplementary qualification requirements that support the STE in routine duties. One example is the addition of Lockout/Tagout Reviewer qualification. Design Authority reviews are required for electrical Lockout/Tagouts per the site hazardous energy control program. Including the Lockout/Tagout reviewer qualification into the STE qualification ensures that the STE has the appropriate prerequisites to assist in common shift activities.

## **Conclusion**

SRR, like most other contractors in the DOE complex, has been faced with the challenges associated with planning for the retirement of the industry's aging workforce. The STE pipeline was created in conjunction with several other company programs to retain and develop young engineers. The STE pipeline was implemented at SRR two years ago. Since then, one class has completed the STE rotation, one class has received qualification and the next class has been identified for training. Though early in the program, it is clear that it equips an early career engineer with valuable skills and knowledge not typically obtained in such a short time. This program is and will continue to be a valuable tool in readying engineers to fill positions that will soon need backfill due to the aging workforce. The program's benefit will be seen not only in the engineering organization but the company as a whole.

## **References**

1. SRR-CES-2016-00025. Engineering Recruiting / Hiring / Attrition Update 2009-2016, August 2016.
2. DOE O 426.2. Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities, April 2010.