

**Building the Future Nuclear Workforce Through Regional Partnerships –  
17219**

Mindy Mets, Savannah River Site Community Reuse Organization

Pete Yerace, Department of Energy Environmental Management Consolidated  
Business Center

**ABSTRACT**

Industries across the United States of America are competing for highly skilled talent at a time when worker retirements are increasing and fewer students are pursuing science, technology, engineering and math (STEM) related fields of study. This specialized workforce is necessary for many industries, and it is essential for the processing and management of nuclear materials and operations of the nuclear security enterprise.

Competition for STEM talent impacts the region that includes the Savannah River Site (SRS), a Department of Energy complex that is responsible for environmental stewardship, environmental cleanup, waste management and disposition of nuclear materials. SRS employs nearly 11,000 people and anticipates significant workforce attrition due to retirements over the next several years. In the SRS region, nuclear industry workers are also needed for the growing nuclear power industry as construction of four new nuclear power plants is taking place within an 80-mile radius of SRS.

To address growing nuclear workforce needs in this region of Georgia and South Carolina, the SRS Community Reuse Organization (SRSCRO) established the Nuclear Workforce Initiative (NWI®) during 2009. Through NWI®, the SRSCRO has developed a network of partnerships with nuclear employers and regional educators to expand nuclear workforce development capabilities. Most notably, through NWI®, the SRSCRO established a partnership with five local colleges and universities and the Department of Energy Office of Environmental Management. Together, they have produced significant results. Recently, the National Nuclear Security Administration joined the partnership to help build the future nuclear workforce that includes scientists and engineers, but also skilled technicians, production operators, welders, nuclear quality specialists and other highly skilled professionals prepared to work in a secure and procedure-oriented environment.

This paper highlights results from a successful partnership between a non-profit organization, academic institutions and the United States Department of Energy designed to expand the nuclear industry talent pool.

**INTRODUCTION**

Recent reports have tracked a troubling decline in the number of United States citizens who are training to become scientists, technicians and engineers. Meanwhile, science, technology, engineering and math (STEM) job opportunities, which include

those in the nuclear industry, are growing at a rate of more than four times the rate of the United States labor force as a whole [1].

These highly educated and highly skilled workers are essential to the nation's nuclear security enterprise involved with nuclear materials management and environmental management. In addition to scientists and engineers, the nuclear industry employs skilled technicians, production operators, welders, nuclear quality specialists and other professionals prepared to work in a secure and procedure-oriented environment. Industries across the country are competing for workers with these skills at a time when workforce retirements are increasing and fewer students are pursuing STEM-related fields of study.

Strong competition for STEM talent is evident in the Georgia and South Carolina region that includes the Savannah River Site (SRS), a Department of Energy complex that is responsible for environmental stewardship, environmental cleanup, waste management and disposition of nuclear materials. SRS employs nearly 11,000 people and anticipates significant workforce attrition due to retirements over the next several years. In the SRS region, nuclear industry workers are also needed for the growing nuclear power industry as construction of four new nuclear power plants is taking place within an 80-mile radius of the SRS. The new nuclear power reactors are under construction and preparing for operations at Alvin W. Vogtle Electric Generating Plant near Waynesboro, Georgia and at Virgil C. Summer Nuclear Generating Station near Jenkinsville, South Carolina.

The Savannah River Site Community Reuse Organization (SRSCRO), a private, non-profit economic development entity, has been working to address nuclear workforce needs in the SRS region since 2009. The SRSCRO defined the long-term nuclear workforce needs for the five-county, two-state region by commissioning a study involving eight local nuclear employers. The 2009 SRSCRO Nuclear Workforce Survey [2] looked at 57 key job classifications organized into four general categories (professional, engineer, technician and craft). Study results showed the need for nearly 10,000 new nuclear workers by 2020 in the greater region of Georgia and South Carolina that surrounds SRS.

Given the significant workforce demands identified in the study, the SRSCRO established the Nuclear Workforce Initiative (NWI®) in 2010 to promote and expand nuclear workforce development capabilities for the region. The NWI® embraces a guiding philosophy – to assure that citizens in the region have the opportunity to develop skills needed for jobs in the region. Through NWI®, the SRSCRO has developed a network of partnerships with nuclear employers and regional educators that foster educational attainment, economic growth and job opportunities in the two-state community.

Most notably, through NWI®, the SRSCRO established two partnership programs with five local colleges and universities and the Department of Energy Office of Environmental Management (DOE-EM) to train and develop the area's workforce. The first program, called Advancing Nuclear Skills Regionally (ANSR), was funded by DOE-EM between 2011 and 2016. ANSR produced seven new nuclear education and training programs to address specific skill gaps in the local industry. More than 600

students enrolled in ANSR's two-year and four-year programs, and 195 graduated with 86% working in their field of study, many at SRS.

Funding for the ANSR program ended in May 2016, but the newly established training courses continued as part of a second program called Workforce Opportunities in Regional Careers (WORC). The WORC program partners include the SRSCRO, DOE-EM, the National Nuclear Security Administration (NNSA) and the same five post-secondary partners that were involved with ANSR. Academic scholarships and workforce experiences related to the nuclear industry are the focus of the WORC program which is scheduled to run from May 2016 – May 2021.

A recent workforce study of the region surrounding SRS shows that the local nuclear industry is currently competing with other regional industries seeking STEM-qualified employees for local jobs. Industry sectors such as advanced manufacturing, cyber security and healthcare are looking for many of the same workers needed by the nuclear industry. In fact, nearly 37,000 workers are needed by 2019 to support these local industries according to the 2015 Regional Workforce Study [3] commissioned by the SRSCRO. Hence, the ANSR and WORC programs play a significant role in the region as pathways toward high demand careers that support the nuclear industry.

## **DISCUSSION**

### **Advancing Nuclear Skills Regionally (ANSR)**

In March 2010, the Savannah River Site Community Reuse Organization (SRSCRO) and its five post-secondary education partners began development of a new education and training concept. The concept, named Advancing Nuclear Skills Regionally (ANSR), was designed to support long-term nuclear workforce needs in the Georgia and South Carolina region surrounding SRS. Each member of the consortium determined program plans for ANSR based on their areas of expertise and local nuclear workforce needs as defined by the 2009 SRSCRO Nuclear Workforce Survey Report. Collaboratively, the educational institutions worked with the SRSCRO to assure that new training programs were coordinated to complement broader local workforce needs and to avoid duplication in the region. The programs were also intended to complement the local Nuclear Uniform Curriculum Programs (NUCP) [4].

The ANSR concept was proposed by the consortium and accepted by the Department of Energy Office of Environmental Management (DOE-EM) to support Savannah River Site (SRS) long-term workforce development. Beginning in March 2011 and ending in May 2016, the consortium was awarded a total of \$4.8 million by DOE-EM to develop and begin implementation of the ANSR programs. College and university partners invested \$4.6 million in the programs over the five year period in the form of facility development, salaries and in-kind contributions to the program. The SRSCRO served as the fiscal agent for the ANSR grant and provided program management and regional promotion. ANSR programs and each partner institution are listed in Table I. ANSR Program Overview.

**Table I. ANSR Program Overview**

| ANSR Consortium                                            | ANSR Training and Education Programs                                                                                                                                                              |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aiken Technical College<br>Aiken, SC                       | <ul style="list-style-type: none"> <li>• Associate of Applied Science in Nuclear Quality Systems Degree</li> <li>• Nuclear Welding Certificate</li> </ul>                                         |
| Augusta Technical College<br>Augusta, GA                   | <ul style="list-style-type: none"> <li>• Chemical Technology Associate of Applied Science Degree</li> <li>• Nuclear Career Advisement Program for Nuclear Engineering Technology (NET)</li> </ul> |
| Augusta University<br>Augusta, GA                          | <ul style="list-style-type: none"> <li>• Nuclear Science Track in Chemistry and Physics Bachelor of Science Degree Programs</li> </ul>                                                            |
| University of South Carolina Aiken<br>Aiken, SC            | <ul style="list-style-type: none"> <li>• Environmental Remediation and Restoration Program (ERRP) specialized Bachelor of Science Biology Degree</li> </ul>                                       |
| University of South Carolina Salkehatchie<br>Allendale, SC | <ul style="list-style-type: none"> <li>• Workforce Pipeline Expansion of STEM Coursework in the Salkehatchie Region</li> </ul>                                                                    |
| SRSCRO                                                     | <ul style="list-style-type: none"> <li>• ANSR Program Management, Fiscal Agent, Promotion of ANSR Programs</li> </ul>                                                                             |

ANSR degree and certificate programs have produced significant results. At least 600 individual students have enrolled in ANSR programs, and 195 have graduated with 168 graduates working in their field of study, many at SRS. In addition, over 4000 elementary, middle and high school students benefited from ANSR programs designed to educate rural populations about nuclear technology through engaging science and technology programs.

The University of South Carolina Salkehatchie program was not designed as a degree or certificate program. Instead, in order to better prepare the future workforce in rural regions of Allendale and Barnwell, South Carolina, new STEM programs were implemented. The STEM programs focused on students in grades K-12 and included robotics programs, STEM camps, teacher workshops and career forums for students, many times in connection with SRS. The STEM programs reached minority and rural populations of the community to promote the skills needed for the future nuclear workforce.

Course development for ANSR degree programs involved advisory panels from the nuclear industry to guide curriculum material based on industry needs. Each college and university involved with developing new degree programs met approval requirements through state review boards as applicable. The degree programs began phased implementation as early as Year 2 of the ANSR grant (2013), with programs becoming fully developed and implemented by Year 4 of the program (2015). Scholarships were offered for the ANSR degree programs to aid in attracting and retaining students, with particular focus on non-traditional students.

Sustainability of the ANSR degree programs was an early consideration. To help assure that new education and training programs remained available for the long-term, programs were developed to address skill needs that cross over multiple industries in the region. For example, the Chemical Technology program at Augusta Technical College helps students develop laboratory skills suitable for the nuclear industry, but also for manufacturing and medical industries. Also, each college and university agreed to continue their respective ANSR programs by funding instructor salaries once the ANSR grant funding ended.

Throughout the ANSR program, the SRSCRO served as the fiscal agent, project manager and primary point of contact for the Department of Energy. The SRSCRO was involved with regional outreach and public communication to promote the new college programs at teacher workshops and public forums. The SRSCRO also developed a video, available on YouTube [5] to convey ANSR programs to high school students in the community. Local ANSR students and instructors are featured in the video.

There were three main challenges during implementation of the ANSR program:

1. Qualified Developers and Instructors – Finding qualified developers and instructors for the nuclear-related programs was problematic. This is not a new issue for college and university programs, nor is it unique to the ANSR programs. But, it took many of the academic institutions longer than expected to hire the people needed for development and instruction. The reason is due in part to the nature of the subject matter. People that are qualified to instruct students on nuclear-related topics are also qualified to work in the nuclear industry, which tends to pay more than academia. Ultimately, this challenge did cause delays in the course development and implementation plans. However, in time, the right people were hired.
2. Funding Uncertainties at Savannah River Site – During 2013, SRS was faced with potential budget cuts that were well-publicized in the region. Talk of layoffs and furloughs at the Site was prevalent in the community. This climate impacted local interest in workforce development related to SRS. The perception was that preparation for nuclear-related careers would lead to an unstable job. The result was that populating the new courses with students became challenging. Along with the SRSCRO, colleges and universities worked to ensure that the courses developed under ANSR would be sustainable during these situations by aligning the coursework to support multiple industry sectors. For example, the Chemical Technology program at Augusta Technical College was designed to support not only the laboratory needs of SRS, but the skills developed would be transferrable to the local pharmaceutical manufacturing industry and healthcare. The Nuclear Quality Systems program was structured so that the quality control and quality systems lessons could serve the local tire manufacturing sector as well.

3. **Grant Award Funding Uncertainties** – The system for funding the ANSR program involved an annual request to the Department of Energy. Funds were not necessarily available to continue the program each year due to budget constraints. This uncertainty created challenges for the colleges and universities to develop and implement programs without the assurance of funds to support the effort, especially in the early stages. Some instructors and curriculum developers moved on to other projects because of the funding uncertainty. Also, the uncertainty of scholarship funds for students impacted the early enrollment efforts.

The ANSR partners, including DOE-EM, worked to offset the uncertainties year by year and established back-up program plans throughout. Ultimately, the programs were fully realized and enrollment numbers were successful. Partners believe that as more students enter the workforce with the skills needed by industry, the training programs will be more stable in the long-term.

ANSR partners were able to successfully develop and implement the planned programs for a variety of reasons. These five areas were identified as significant best practices from the program because each contributed to the positive results:

1. **Clearly Defined Goal** – Partnerships between the SRSCRO, five colleges/universities across two states and DOE-EM were formed to achieve the ANSR programs because of a clearly defined goal – to help build the nuclear workforce for the future of the SRS region. This goal was established because of the regional nuclear workforce study that defined the need for new workers in the region over a long term. Having a clear goal for the regional partners provided a foundation that all partners understood and supported.
2. **Regional Approach** – Instead of one academic institution attempting to solve nuclear workforce challenges independently, partners from across the region were able to address workforce in their areas of expertise. The combined approach minimized risk for each partner and resulted in multiple training options for local citizens – all focused on nuclear workforce development. Since the SRSCRO is an established, regional entity with an understanding of the Department of Energy mission, its role as the primary point of contact served to link all of the partners to a regional perspective.
3. **Scholarships** – Each of the academic partners included scholarship opportunities for local students. The scholarships served to attract students to the new ANSR programs. They also served to assist students, especially non-traditional students, in completing their education. Many of the students involved in the ANSR programs were either first generation college students or students working to obtain skills for higher levels of employment. This student population generally must continue to remain employed while attending college. Often, the financial stress causes these students to quit the college training before realizing their goal. ANSR scholarships allowed students to remain in college and complete the programs.

4. **Work Experiences** – Some ANSR program instructors were able to make connections with local employers to arrange internships and other work experiences for their students. This was particularly true with the Augusta University program and the University of South Carolina Aiken program. At each university, students had the opportunity to work at SRS on research projects. For a few students, these experiences led to job offers. All ANSR partners believe that more work experiences need to be part of their programs in the future.
5. **Employer Involvement** – ANSR programs made use of advisory groups in the development of their programs. These advisors came from the nuclear industry. Also, employers participated in classroom lessons for some of the programs. The result is that students were more interested in companies that participated in their education and training. All ANSR partners would like to expand employer relationships more fully.

Success of the ANSR program partnership demonstrates the value of regional workforce development. By involving multiple institutions, the new training programs were spread across a region allowing citizens in a five county, two-state area the opportunity to advance their skills related to the nuclear industry and to enter the workforce. Involvement of the SRSCRO reduced the amount of grant administration work required by each academic institution, and DOE-EM participation provided not only funding, but also guidance on specific skill needs. The regional partnership provided a solid foundation for a long-term strategy to help sustain the nuclear workforce pipeline for the Department of Energy, particularly in the Savannah River Site region.

### **Workforce Opportunities in Regional Careers (WORC)**

The desire to ensure a strategic nuclear workforce pipeline in the SRS region did not end with the ANSR program. ANSR provided some new training pathways for local citizens, but the future workforce demands extend far beyond what ANSR programs might provide. Looking beyond 2016, both DOE-EM and the National Nuclear Security Administration (NNSA) face challenges in the competition for human talent required to accomplish missions at SRS and across the nation.

To support DOE-EM and NNSA long-term needs, the SRSCRO proposed a new five-year workforce pipeline program called Workforce Opportunities in Regional Careers (WORC). Both DOE-EM and NNSA accepted the plan and during May 2016 the agencies entered into a partnership with the SRSCRO and the five academic institutions as the grantors of funds for the WORC program.

In addition to DOE-EM, NNSA and the SRSCRO, the WORC program involves Aiken Technical College, Augusta Technical College, Augusta University, University of South Carolina Aiken, and University of South Carolina Salkehatchie degree programs that are directly related to the nuclear industry. The objective of the program is to better

enable students to develop critical skills needed for careers that support DOE-EM and NNSA's nuclear missions. WORC is a 5-year initiative, estimated at \$5 million.

The new program includes funding for key areas to attract and train students. Funds support as many as 140 student scholarships annually in relevant programs across the five post-secondary institutions. Scholarship opportunities are aligned with DOE-EM and NNSA workforce needs in the region. The program involves student retention strategies, development of workplace credentials and has a goal to develop work experiences for students such as internships or apprenticeships at SRS.

Early results from the WORC program will be available during the summer of 2017, once the first year of the program has been completed.

## CONCLUSIONS

The SRSCRO, its five post-secondary partners and DOE-EM established a regional approach to train and develop the area's workforce. The first program was a \$4.8 million DOE-EM funded program called Advancing Nuclear Skills Regionally (ANSR). In just five years, the ANSR partnership produced seven new nuclear education and training programs to address specific skill gaps identified locally. College and University partners also leveraged more than \$4.6 million on their own to support ANSR programs with notable results. More than 600 students have enrolled in ANSR's two-year and four-year programs, and 195 have graduated with 86% working in their field of study, many at SRS. This success rate exceeds that described in a recent Washington Post article which states that more than four out of five college students graduate without a job [5].

The ANSR program was focused on establishing education and training programs related to nuclear industry needs. Each ANSR degree program is described online and can be accessed as shown in Table II. ANSR Program Website Locations.

**Table II. ANSR Program Website Locations**

| Institution               | ANSR Program                                 | URL                                                                                                                                                                         |
|---------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aiken Technical College   | Advanced Welding                             | <a href="http://www.atc.edu/Study/Programs-of-Study/Technical-Education/Welding">http://www.atc.edu/Study/Programs-of-Study/Technical-Education/Welding</a>                 |
| Aiken Technical College   | Nuclear Quality Systems                      | <a href="http://www.atc.edu/Study/Programs-of-Study/Technical-Education/Nuclear-Quality">http://www.atc.edu/Study/Programs-of-Study/Technical-Education/Nuclear-Quality</a> |
| Augusta Technical College | CHEM 1100 for Nuclear Engineering Technology | <a href="http://www.augustatech.edu/nuclear_engineering_technology.html">http://www.augustatech.edu/nuclear_engineering_technology.html</a>                                 |

|                                  |                                         |                                                                                                                                                                             |
|----------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Augusta Technical College        | Chemical Technology                     | <a href="http://www.augustatech.edu/chemical_technology.html">http://www.augustatech.edu/chemical_technology.html</a>                                                       |
| Augusta University               | Nuclear Science Concentration           | <a href="http://www.augusta.edu/scimath/chemistryandphysics/nuclearscience.php">http://www.augusta.edu/scimath/chemistryandphysics/nuclearscience.php</a>                   |
| University of SC Aiken           | Environmental Remediation & Restoration | <a href="http://www.usca.edu/biology/academics/bs-in-biology-with-err-concentration.dot">http://www.usca.edu/biology/academics/bs-in-biology-with-err-concentration.dot</a> |
| SRS Community Reuse Organization | Fiscal Agent, Project Management        | <a href="http://www.srscro.org">www.srscro.org</a>                                                                                                                          |

The SRSCRO and its partners are using this solid foundation to support long-term nuclear workforce needs through a new program, Workforce Opportunities in Regional Careers (WORC). The WORC program began in May 2016 and is funded by DOE-EM and the National Nuclear Security Administration (NNSA) for five years at an estimated \$5 million. Through ANSR and WORC, regional partners are defining new pathways to nuclear industry employment for local citizens in the region that surrounds SRS. The successful approach provides a road map to address workforce needs across the nation for the nuclear enterprise.

## REFERENCES

1. What does the S&E job market look like for U.S. graduates? (n.d.). Retrieved November 16, 2016, from <https://www.nsf.gov/nsb/sei/edTool/data/workforce-03.html>2009
2. Nuclear Workforce Survey Report for Savannah River Site Community Reuse Organization by Booz, Allen, Hamilton; June 8, 2009; <http://www.srscro.org/wp-content/uploads/2010/09/Expanded-Summary-Booz-Allen-Report.pdf>
3. Regional Workforce Study Prepared for the SRS Community Reuse Organization by TIP Strategies; April 2015; <http://www.srscro.org/community-issues/regional-workforce-study/>
4. Nuclear Uniform Curriculum Program. (n.d.). Retrieved November 16, 2016, from <http://www.nei.org/Careers-Education/Education-Resources/Nuclear-Energy-Training-Education-Programs/Nuclear-Uniform-Curriculum-Program>
5. ANSR Video. Retrieved November 16, 2016, from <https://www.youtube.com/watch?v=EZzFn9uSsKU>
6. More than 4 out of 5 students graduate without a job. How could colleges change that? (n.d.). Retrieved November 16, 2016, from <https://www.washingtonpost.com/news/grade-point/wp/2015/01/30/more-than-4-out-of-5-students-graduate-without-a-job-how-could-colleges-change-that/>

## **ACKNOWLEDGEMENTS**

This material is based upon work supported by the Department of Energy/National Nuclear Security Administration under Award Number DEEM0004214.

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States.