



The International Association of Sheet Metal, Air, Rail and Transportation Workers (SMART) and the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) are partners in producing highly trained sheet metal workers employed in the construction, manufacturing, and nuclear industries. SMART and SMACNA jointly sponsor a national training fund, the International Training Institute for the Sheet Metal and Air Conditioning Industry (ITI), which works in conjunction with our 148 local joint apprenticeship and training committees (JATCs) in the United States to provide high-quality training to apprentices throughout the country.¹

Sheet Metal Work in the Nuclear Industry Requires Specialized Skills to Contain Hazardous Materials

Sheet metal work plays a crucial role in the construction, maintenance, and operation of active nuclear power plants, contributing to safety, efficiency, and infrastructure integrity in a highly regulated industry. The most safety-sensitive work performed by sheet metal workers at active nuclear sites takes place in containment buildings, which are air-tight buildings that house a nuclear reactor and its pressurizer, reactor coolant pumps, steam generator, and other equipment or piping that might otherwise release fission products to the atmosphere in the event of an accident.² In accordance with industry standards and Nuclear Regulatory Commission (NRC) regulations,³ our members are trained to perform highly specialized welding at active nuclear facilities, which is a critical process due to the severe consequences of weld failure on structural integrity and radiological safety. The integrity and safe operation of nuclear facilities rely heavily on properly designed, installed, and maintained HVAC systems. Filtration, ventilation, and air-handling equipment in nuclear plants are essential to containment integrity, radiation protection, and fire safety. A single failure in HVAC containment or smoke control can compromise operator safety or allow uncontrolled release of hazardous materials.

¹ The ITI serves many functions that assist local JATCs, including 50 years of curriculum development that anticipates the need for training and re-training as technology evolves.

² A containment building generally consists of high density, reinforced concrete as much as 5 feet (1.5 m) thick and is built to withstand not only a severe accident, but also earthquakes, tornadoes, terrorist attacks, and airplane impact by forming a barrier between fission products and the surrounding environment.

³ Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 requires the establishment of measures to ensure the control of materials and special processes such as welding, as well as proper welder qualification.

SMART Members are Employed at Active Nuclear Plants and DOE Decontamination Sites Throughout the County

SMART members are employed at the largest and most productive nuclear power plants and decontamination sites in the country. These active plants include Beaver Valley 1 and 2 (PA), Braidwood 1 and 2 (IL), Browns Ferry 1, 2, and 3 (AL), Crane Clean Energy Center (PA), Davis-Besse (OH), Donald C. Cook 1 and 2 (MI), Dresden 2 and 3 (IL), Fermi 2 (OH), Hatch 1 and 2 (GA), Limerick 1 and 2 (PA), Millstone 2 and 3 (CT), Peach Bottom 2 and 3 (PA), Perry 1 (OH), St. Lucie 1 and 2 (FL), Salem 1 and 2 (DE), Sequoyah 1 and 2 (TN), Susquehanna 1 and 2 (PA), Turkey Point 3 and 4 (FL), Watts Bar 1 and 2 (TN), and Vogtle 1, 2, 3, and 4 (GA), which is the largest plant in the U.S. with four reactors. Browns Ferry is the third-largest nuclear power producer in the U.S., with three boiling water reactors, produces about 20% of TVA's total generation capacity.

For more than three decades, SMART has supplied sheet metal workers to work in the cleanup mission at the Department of Energy's nuclear weapons and nuclear research sites. SMART members currently work at most of the 15 remaining cleanup sites,⁴ including Idaho National Laboratory, Nevada National Security Site, Oak Ridge, Hanford, Savannah River Site, Los Alamos, Sandia National Laboratories, Paducah, New Mexico Waste Isolation Pilot Plant, and Lawrence Livermore National Laboratory. These sites contain large amounts of radioactive wastes, spent nuclear fuel, excess plutonium and uranium, thousands of contaminated facilities, and contaminated soil and groundwater.

Nuclear, Hazardous Material and Power Plant Council

SMART operates a Nuclear, Hazardous Material and Power Plant Council with 30 Local Unions participating. The Nuclear Council's mission to meet the nuclear industry's need for skilled trades by: 1) developing specialized curriculum for trainees on nuclear facility construction, HVAC systems for containment buildings, radiation shielding, and safety protocols; 2) issuing certifications in nuclear-specific welding, rigging, and cleanroom fabrication; and 3) collaborating with nuclear utilities, reactor manufacturers, and DOE labs to ensure training meets real-world needs.

Sheet Metal JATCs Provide Site-Specific Training in the Highly-Regulated Nuclear Industry

In 2023 alone, JATCs co-sponsored by SMACNA contractors and SMART, invested more than \$73 million at the national and local level combined dollars in sheet metal training programs. Our JATCs have a proven track record of success in preparing sheet metal workers to specialize in nuclear welding and fabrication, which involves fabricating specialized components and parts within the plant, including those for reactor internals, fuel cladding, and pressurized structures. Training of workers dispatched to nuclear sites emphasizes site-specific safety protocols, work rules, administrative procedures, quality control processes, understanding of nuclear codes and regulations, and proficiency in specific welding processes needed for

⁴ Since 1989, DOE has completed its cleanup mission at 92 of the 107 major nuclear weapons and nuclear research sites.

specialized work in steel-reinforced concrete containment buildings, which have designed to prevent the release radioactive materials.

As discussed below, the process of qualifying workers varies from site to site based an NRC licensee's application of NRC regulations, "Training and Qualification of Nuclear Power Plant Personnel."⁵ JATCs are equipped to modify training to enable sheet metal workers to pass the "gate tests" for employment required by construction management at nuclear plants.

The demand for sheet metal workers at a site varies depending upon active projects at the site. At Savannah River Site, for example, there was a higher demand for nuclear welders throughout the Savannah River Plutonium Processing Facility (SRPPF), which was installed by repurposing the unfinished the Mixed Oxide (MOX) project.⁶ Following completion of work on the MOX project, 90% of welders trained for MOX were dispatched to Vogtle.

Sheet metal JATCs modify training, as needed, to satisfy the protocols of the construction contractor at a nuclear site. On the MOX project, for example, the Local JATC in South Carolina modified its advanced welding program to meet Superior Air Handling's "gate test," which resulted in a 98% pass rate on welders trained in the Local 399 JATC.

Additional examples of site-specific training at other nuclear sites, such as Hanford and Millstone, are available upon request.

American Welding Society (AWS) Certification of Nuclear Welders at SMART-SMACNA JATCs

AWS certification as a certified welder is a baseline qualification for nuclear welders, which is supplemented by site-specific training. It is a prerequisite to eligibility for taking a "gate test" at a nuclear plant. SMART-SMACNA JATCs perform a valuable role in training nuclear welders in hands-on work functions, learning AWS code, facilitating AWS certification, and providing site-specific training to enable these welders to pass a gate test.

A. AWS Recognizes the ITI's Expertise in Welding Qualification and Certification

The Executive Director of the ITI, Michael Harris, is currently an Executive Member of AWS's Qualification & Certification Committee, and Adam Smith, Welding Specialist at the ITI is Chair of the Subcommittee on Welding Test Facilities and Welders (QCTW), which is responsible for creating and revising the qualification standard and specification for certification of welders and accreditation of test facilities.

⁵ 10 CFR 50.120

⁶ This project involved the dismantlement and removal of equipment such as HVAC ducts, piping, electrical conduits, pumps, tanks, and gloveboxes from the structure without damaging the configuration of items that might be reused.

B. More than 100 JATC Sites are AWS-Accredited Test Facilities

SMART JATCs have more than 100 AWS accredited test facilities (ATF) to test (and qualify welders who are apprentices and journeypersons for AWS certification. The AWS ATF program establishes minimum requirement that a facility, and its personnel, training materials, and equipment must meet for accreditation to test and qualify welders for AWS certification.⁷ The *Specification for AWS Certification of Welders and Accreditation of Test Facilities* states that an ATF management is responsible for, among other things, for ensuring that personnel with adequate education, training, technical knowledge, and experience are assigned to perform their assigned functions. At sheet metal JATCs, welding certification testing is administered by AWS-certified welding inspectors (CWI).

SMART-SMACNA's ATFs are located in close proximity to DOE decontamination sites and nuclear power plants. In Alabama, for example, where Browns Ferry is located, there are two SMART-SMACNA ATFs: Birmingham and Rogersville.

C. AWS Certification for CWIs Requires a Passing Grade on Three Separate Exams

The AWS certification for CWI is comprehensive and provides third-party validation of competence through three separate exams:

- *Fundamentals*: 150 questions on destructive testing, fabrication math, safety, metallurgy, nondestructive testing, welding symbols, welding procedure specification/procedure qualification record (WPS/PQR), and welding fundamentals
- *Practical Exam*: hands-on activities using equipment provided by AWS, and 46 questions related to those activities. Activities include: application of WPSs and PQRs, use of inspection tools and methods, and execution of required welds
- *Code Book Exam*: 50 to 65 questions that test a welder's ability to locate and understand information in the code book. The AWS establishes over 240 standards for welding. AWS codes are written in accordance with American National Standards Institute (ANSI) rules.

⁷ AWS QC47, Specification for AWS Certification of Welders and Accreditation of Test Facilities: *****aws-p-001-delivery.sitecorecontenthub.cloud/api/public/content/qc47-2016-amd2?v=893aa3e4

D. Firewall Between Training and Testing at JATCs to Avoid Conflicts of Interest

To maintain the integrity of the training and testing process, instructors do not administer practical tests. In the field of personnel certification, use of firewalls is necessary to avoid a conflict of interest.

E. JATCs Provide the Necessary Training to Support Continuity of Certification

JATCs undertake the time-consuming task of ensuring that AWS certifications remain current on an indefinite basis. The AWS code book, *Specification for Welding Procedure and Performance Qualification*, states, “When he or she has not welded with a process during a period exceeding 6 months, his or her qualifications for the process shall expire.” If a SMART member’s current work assignments do not involve one or more AWS certifications used in the nuclear industry, the JATC provides the worker opportunities to practice those skills at the training site.

SMART Members are Certified in Additional Key Functions Necessary for the Safe Operation of Nuclear Power Plants

SMART members dispatched to perform safety-sensitive functions at nuclear plants obtain third-party certification the International Certification Board, which is accredited by ANSI National Accreditation Board (ANAB). The ICB certifications include fire and smoke damper technicians (FSD) who test and inspect,⁸ smoke control systems technician (SCS), and testing, adjusting, and balancing (TAB) technicians.⁹ The TAB certification demonstrates that a sheet metal worker is qualified to perform testing and maintenance on containment and nuclear air cleaning systems in accordance with ASME N509/N510. The certifications of FSD and SCS technicians demonstrate their competence in control room and life-safety systems which enables compliance with the NRC requirement that HVAC systems protect operators from fire, smoke, toxic gases, and radioactive hazards. The value of these ICB certifications is that: 1) they ensure consistency and reliability in meeting performance requirements, including those required by the NRC, ASME, ASHRAE, and/or National Fire Protection Association (NFPA), as applicable; 2) provide end user protection by guaranteeing only trained, skilled, and certified technicians perform nuclear HVAC work; and 3) provide direct support for contractors by reducing cost and risk by deploying pre-qualified HVAC personnel.

⁸ Since nuclear facilities must demonstrate compliance with NFPA 805 performance requirements, which rely on damper integrity to preserve fire barriers and prevent smoke migration, certification of nuclear HVAC technicians in accordance with NFPA 80 (fire doors/dampers), NFPA 105 (smoke doors/dampers), and NFPA 92 (smoke control systems) greatly facilitates adherence to this requirement.

⁹ Technicians certified by TABB are trained to verify airflows, pressures, and balancing in accordance with SMACNA standards. In nuclear facilities, TAB certifications can ensure that containment HVAC systems maintain the pressure differentials and air change rates required by NRC and ASME standards -- ASME N509 (Nuclear Power Plant Air-Cleaning Units and Components) & N510 (Testing of Nuclear Air Treatment Systems).

SMART Signatory Contractors Hold a Nuclear Quality Assurance (NQA-1) Certification by the American Society of Mechanical Engineers (ASME)

SMART signatory contractors with an ASMC NQA-1 certification fabricate and install HVAC materials for new construction in nuclear power plants. ASME's NQA-1 Certification Program provides centralized, independent, third-party certification for quality assurance programs in conformance with the ASME NQA-1 standard, "Quality Assurance Requirements for Nuclear Facility Applications." This standard reflects industry experience and current understanding of the quality assurance requirements necessary to achieve safe, reliable, and efficient utilization of nuclear energy, and management and processing of radioactive materials. To obtain an NQA-1 certification, candidates undergo an audit by ASME auditors with an extensive background in quality assurance.

Verification of the Qualifications of Sheet Metal Workers in a Cost Efficient Manner Through Nuclear Mechanic Apprenticeship Process (NMAP)

A. Development of Personnel Qualification Process at Nuclear Plants in Response to NRC Mandates

In response to NRC mandates for specific personnel qualification requirements at active nuclear power sites, a tripartite committee consisting of major utilities, six construction unions,¹⁰ and contractor management was formed in 1990 to develop and implement a formal process for verification of the qualifications of skilled trades employed at nuclear power plants, with a focus on those workers trained in JATCs,¹¹ including those in the sheet metal industry.¹² The purpose of this process, known as the "Nuclear Mechanic Apprenticeship Process," is to verify personnel qualifications in a cost efficient manner.

B. NMAP is a Formal Method of Verifying Qualification of Personnel in Accordance with NRC Requirements

The NMAP Committee developed a structured approach to review craft journeyworker qualifications for performing independent work activities at commercial nuclear facilities in the United States. The NMAP is a formal method of providing evidence that knowledge and skills training requirements have been met by contracted craft labor union personnel on an individual basis. This cost-effective process takes advantage of the well-structured and effective craft

¹⁰ The six unions representing sheet metal workers, electricians, millwrights, iron workers, pipefitters, and boilermakers are involved with the NMAP program.

¹¹ At the same time, the American Nuclear Society (ANS) 3.1 Committee was actively revising the ANSI/ANS-3.1-1987 Standard, entitled *Selection, Qualification, and Training of Personnel for Nuclear Power Plants*, to address the proposed training regulations.

¹² See *The Nuclear Mechanic Apprenticeship Process Handbook* (Sept. 1999): *****nabtu.org/wp-content/uploads/2017/03/NMAP-Implementation-Handbook-September-1999.pdf

JATCs. NMAP is recognized at nearly all nuclear power plants¹³ by power companies that are NRC licensees, such as Duke Energy Power Co., Exelon Generation, Dominion Generation, Florida Power & Light Co., Arizona Public Service Co., Northern States Power Company – Minnesota, Entergy Nuclear Operations, Inc., Tennessee Valley Authority, Entergy Nuclear Operations, Southern Nuclear Operating Co., and many others.

C. NMAP's Endorsement of JATCs for Six Crafts, Including Sheet Metal Worker

After completion of a study, the NMAC Committee determined that the scope of the craft union apprenticeship programs provide the appropriate fundamental skills for the basic types of maintenance and modification work normally assigned to contract crafts at nuclear plants. Fundamental knowledge and skills are the entry level knowledge and skills which allow an employee to perform fundamental tasks within a trade without detailed training. These skills also provide a reasonable expectation that an individual can successfully complete further detailed, site-specific training.

Conclusion

SMART and SMACNA invite DOE officials to visit our JATCs to learn more about the training provided to apprentices and journeymen. The AWS and ICB certification processes are best understood by observation.

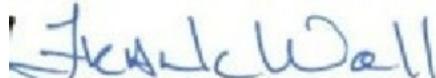
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Respectfully submitted,



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Respectfully submitted,



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¹³ Arkansas Nuclear 1 and 2, Beaver Valley 1 and 2, Braidwood 1 and 2, Browns Ferry 1, 2, and 3, Brunswick 1 and 2, Byron 1 and 2, Callaway, Calvert Cliffs 1 and 2, Catawba 1 and 2, Clinton, Columbia Generating Station, Comanche Peak 1 and 2, Cooper, D.C. Cook 1 and 2, Davis-Besse, Diablo Canyon 1 and 2, Dresden 2 and 3, Duane Arnold, Farley 1 and 2, Fermi 2, Fitzpatrick, Fort Calhoun, Ginna, Grand Gulf 1, Hatch 1 and 2, Hope Creek 1, Indian Point 2 and 3, La Salle 1 and 2, Limerick 1 and 2, McGuire 1 and 2, Millstone 2 and 3, Monticello, Nine Point Mile 1 and 2, North Anna 1 and 2, Oconee 1, 2, and 3, Oyster Creek, Palisades, Palo Verde 1, 2, and 3, Peach Bottom 2 and 3, Perry 1, Pilgrim 1, Point Beach 1 and 2, Prairie Island 1 and 2, Quad Cities 1 and 2, River Bend 1, Robinson 2, Saint Lucie 1 and 2, Salem 1 and 2, Seabrook 1, Sequoyah 1 and 2, Shearon Harris 1, South Texas 1 and 2, Summer, Surry 1 and 2, Susquehanna 1 and 2, Three Mile Island 1, Turkey Point 3 and 4, Vermont Yankee, Vogtle 1 and 2, Waterford 3, Watts Bar 1, Wolf Creek 1.