

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
OFFICE OF NEW REACTORS
WASHINGTON, DC 20555-0001

April 9, 2010

NRC INFORMATION NOTICE 2010-08: WELDING AND NONDESTRUCTIVE
EXAMINATION ISSUES

ADDRESSEES

All holders of an operating license or construction permit for a nuclear power reactor issued under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

All holders of or applicants for an early site permit, standard design certification, standard design approval, manufacturing license, or combined license issued under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

All holders of or applicants for a license for a fuel cycle facility issued pursuant to 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to alert addressees of recent operating experience involving welding and nondestructive examination. The NRC expects recipients to review the information for applicability to their planned activities and to consider actions to avoid similar problems. However, the suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

DESCRIPTION OF CIRCUMSTANCES

Prairie Island Inservice Inspection

On October 1, 2008, at Prairie Island Nuclear Generating Plan (Prairie Island), NRC inspectors reviewed the weld control records of the licensee contractor that performed machine gas tungsten arc welding of the structural weld overlay on a pressurizer surge nozzle dissimilar metal weld. The NRC inspectors noted that the documented weld speed on several weld control records had not changed as would be expected and as required by procedure. To control the weld heat input (an essential welding variable), it is necessary to control the weld head travel speed. The operating instruction specified that welders would use the values for piping/nozzle radius and the desired travel speed to determine the appropriate travel speed setting for the welding machine. In this case, contrary to welding procedure specifications, the

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welders did not determine and enter a new speed into the welding machine as the piping/nozzle radius increased as weld layers were added. Notwithstanding, a subsequent engineering evaluation determined that based on the travel speeds recorded in the weld control record, the resulting heat inputs were within the acceptable range.

While evaluating this weld speed issue, the welding contractor discovered that incorrect welding parameters had been used to apply the first layer of the temper bead weld over a section of the ferritic nozzle adjacent to a stainless steel butter interface. Specifically, the welders had failed to change temper bead welding parameters when transitioning from the butter to the nozzle, a requirement which was not delineated in the operating instruction. The resulting heat input on the ferritic nozzle exceeded that allowed by the welding procedure specifications. As a result, the weld had to be removed (ground out) and rewelded. An extent of condition review showed that other structural weld overlays performed were applied correctly.

Additional information is available in Prairie Island Nuclear Generating Plant, Units 1 and 2, NRC Integrated Inspection Report (IR) 05000282/2008005; 05000306/2008005, dated February 10, 2009, and can be found on the NRC's public website in the Agencywide Documents Access and Management System (ADAMS) under Accession No. [ML090420033](#).

Welding Issues at Louisiana Energy Services, National Enrichment Facility

In May 2009, the NRC inspectors identified welding issues involving the construction of the Louisiana Energy Services, National Enrichment Facility (LES NEF). The following are three examples of failure to implement American Society of Mechanical Engineers (ASME) B31.3 "Process Piping" requirements for welding and nondestructive examination.

- (1) Progressive radiography sampling was not proceduralized to comply with the requirements of ASME B31.3. The NRC inspectors reviewed weld records and identified examples where a designated lot of random radiography samples was not expanded when results revealed a weld defect for work performed by a welder/welding operator in Category M Fluid Service. Corrective actions included performing additional radiography of production welds.
- (2) Welders were not qualified in accordance with ASME Section IX for manual tack welding of pipes, as required by ASME B31.3. Corrective actions included additional radiography of field welds with fused tacks that were not previously selected for random radiography and requalification of all welders to perform manual tack welding.
- (3) Weld reinforcement height exceeding the maximum allowed by ASME B31.3 for circumferential butt welds on pipe. LES NEF corrective actions included re-inspecting all welds to ensure compliance with the ASME B31.3 maximum height of weld reinforcement and correction of any welds that exceeded the maximum criteria.

Additionally, NRC inspectors identified examples where LES NEF did not meet requirements regarding commercial grade dedication of cascade component welds. Additional information regarding the above examples is available in NRC IR 70-3103/2009-002, dated June 26, 2009, at ADAMS Accession No. [ML091770643](#) and NRC IR 70-3103/2009-007, dated January 27, 2010, at ADAMS Accession No. [ML100271177](#).

Subcontractor Welding Issues at Flamanville-3 in France

On October 22, 2008, inspectors for the French regulatory authority, Autorité de Sûreté Nucléaire, inspected the welding records of Società delle Fucine (SdF), a subcontractor under AREVA who in turn is the primary contractor for the construction of Flamanville-3. The inspectors reviewed documentation and quality assurance measures applied to the weld test samples to support the manufacturing of an intermediate collar ring for a pressurizer. The inspectors found that the subcontractor used welding rods that were not qualified and did not conform to the American Society for Testing and Materials (ASTM) E208, the International Organization for Standardization (ISO) 9001, and subcontractor's own procedures. The welding rods were considered unqualified because they were not tested before performing drop-weight testing.

The inspectors found that the subcontractor SdF was aware that unqualified weld rods were used for the test samples and decided to not generate a nonconformance report, which is contrary to ASTM E208, ISO 9001, and the subcontractor's own procedures. The subcontractor only generated a nonconformance report following unsuccessful tests of the samples taken from the intermediate collar ring of the pressurizer.

The French regulators determined that without the necessary documentation to demonstrate conformance with the French nuclear construction code, it did not have the assurance that the subcontractor manufactured the pressurizer components in accordance with specified requirements. Also noted was that the primary contractor AREVA had not prevented the nonconformances by its subcontractor. The French regulators required AREVA to perform the following three actions:

- (1) Propose a way to demonstrate that the three pressurizer intermediate collar rings already manufactured conformed completely to the required specifications. This approach will not rely on subcontractor's quality assurance (QA) program.
- (2) Implement a more effective surveillance of AREVA's supplier, such that these QA issues do not repeat themselves.
- (3) Describe measures that AREVA will implement before any additional orders are placed with the subcontractor SdF for the manufacture of pressure-boundary components, destined for French nuclear power plants.

BACKGROUND

NUREG-1425, "Welding and Nondestructive Examination Issues at Seabrook Nuclear Station: An Independent Review Team Report," dated July 28, 1990, describes lessons learned regarding licensee radiographic and welding programs. (Agencywide Documents Access and Management Systems (ADAMS) Accession No. [ML090300351](#)).

DISCUSSION

This IN provides examples of welding issues that illustrate the importance of licensee oversight of contractors or subcontractors, including direct observation of welding activities while in progress when possible, to ensure welders adhere to welding procedure specifications and QA requirements. Specifically, 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants": (1) Criterion VII requires that measures be established to adequately control contractor materials and services, (2) Criterion IX requires a licensee to establish adequate measures to ensure the control of special processes, "including welding, heat treating, and nondestructive testing." and (3) Criterion XVI requires that measures be established to "assure that conditions adverse to quality" be "promptly identified and corrected."

CONTACT

This IN requires no specific action or written response. Please direct any questions about this matter to the technical contacts listed below.

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