



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

June 14, 2010

Mr. Michael J. Pacilio  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 - RELIEF REQUEST I3R-02 FOR  
PRESSURE TESTING OF BURIED COMPONENTS (TAC NOS. ME2196 and  
ME2197)

Dear Mr. Pacilio:

By letter to the Nuclear Regulatory Commission (NRC), dated September 4, 2009 (Agencywide Documents Access and Management System Accession No. ML092510267), Exelon Generation Company, LLC (the licensee), submitted Relief Request (RR) I3R-02 for relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Subsection IWA, for the third 10-year inservice inspection (ISI) interval for Braidwood Station (Braidwood), Units 1 and 2. The third 10-year ISI interval for Braidwood is currently scheduled to end on July 28, 2018, for Unit 1, and on October 16, 2018, for Unit 2. In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), 50.55a(a)(3)(ii), the licensee requested relief from the ASME Code, Section XI, requirements in IAW-5244(b)(1) to perform certain visual examinations and system pressure tests for buried components of the essential service water piping.

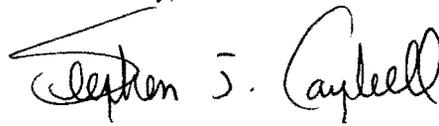
The NRC staff has reviewed the licensee's submittal and has determined that compliance with the specified code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, and that the alternative proposed in RR I3R-02 will provide reasonable assurance of structural integrity and leak tightness of the affected components. Therefore, the alternative proposed in RR I3-02 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii), for the third 10-year ISI interval for Braidwood, Units 1 and 2. All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved remain applicable, including third party review by the Authorized Nuclear Inservice Inspector. The NRC staff's safety evaluation is enclosed.

M. Pacilio

- 2 -

Please contact Mr. Marshall David at (301) 415-1547 if you have any questions on this action.

Sincerely,

A handwritten signature in black ink that reads "Stephen J. Campbell". The signature is written in a cursive style with a prominent horizontal stroke at the beginning.

Stephen J. Campbell, Chief  
Plant Licensing Branch III-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-456 and 50-457

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST NO. I3R-02

EXELON GENERATION COMPANY, LLC.

BRAIDWOOD STATION, UNITS 1 AND 2

DOCKET NOS. STN 50-456 AND 50-457

1.0 INTRODUCTION

By letter to the Nuclear Regulatory Commission (NRC), dated September 4, 2009 (Agencywide Documents Access and Management System Accession No. ML092510267), Exelon Generation Company, LLC (EGC, the licensee), submitted Relief Request (RR) I3R-02 related to the Inservice Inspection (ISI) Program pertaining to system leakage tests during the third 10-year ISI inspection interval for Braidwood Station (Braidwood), Units 1 and 2. In RR I3R-02, the licensee requested relief from performing the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) required pressure test of the buried portion of essential service water (SX) piping by measuring rate of pressure loss or change in flow between the ends of the buried components. Alternatively, the licensee proposed a test that will confirm that flow during operation is not impaired. The integrity of the buried piping will be verified during quarterly pump testing under inservice testing program for pumps and valves. As requested by RR I3R-02, the NRC staff reviewed the licensee's proposed alternative pursuant to Title 10 to the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii) since compliance with the ASME Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

The regulation at 10 CFR 50.55a(g) requires that ISI of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the Commission, if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components and system pressure tests conducted during the first 10-year ISI inspection

ENCLOSURE

interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month ISI inspection interval, subject to the limitations and modifications listed therein.

The ISI Code of Record for the third 10-year ISI inspection interval for Braidwood, Units 1 and 2, is the 2001 Edition through the 2003 Addenda of the ASME Code, Section XI.

### 3.0 TECHNICAL EVALUATION

#### 3.1 System/Component(s) for which Relief is Requested

RR I3R-02 requested relief for buried Class 3 components in the SX supply and return lines.

#### 3.2 ASME Code Requirements

As applicable to Braidwood, Units 1 and 2, the 2001 Edition through the 2003 Addenda of ASME Code, Section XI, Table IWD-2500-1, Examination Category D-B, Item No. D2.10 requires a system pressure test and a VT-2 visual examination. For buried components where a VT-2 visual examination cannot be performed, the examination requirement of Item No. D2.10 is satisfied by the following:

The system pressure test for buried components that are isolable by means of valves shall consist of a test that determines the rate of pressure loss. Alternatively, the test may determine the change in flow between the ends of the buried components. The acceptable rate of pressure loss or flow shall be established by the Owner.

#### 3.3 Licensee's Request for Relief

The licensee requested relief from performing the system pressure test or the system leakage test for buried portions that are isolable by means of valves by determining the rate of pressure loss or the change in flow between the ends of buried components.

#### 3.4 Licensee's Basis for Requesting Relief

The SX buried suction piping at Braidwood consists of six 30" diameter common supply headers that feed into two 48" diameter supply headers including the suction piping that runs between the Lake Screen House and the Turbine Building. The buried return piping consists of two 48" diameter return headers and the piping that runs between the Turbine Building and the SX Cooling Pond. There is no access to the buried sections of piping without excavation. Further, no annulus was provided during original construction that would allow for examination of these buried sections of piping.

The supply and return lines use butterfly valves for isolation. These valves are not suitable for performing a pressure isolation function since they were not designed to be leak-tight. Extensive maintenance or system modification would be required to conduct a rate of pressure loss test. The alternative test would be to determine the change in flow between the ends of buried

components. However, the buried SX supply and return headers were not designed with plant instrumentation and flow orifices on both sides of the buried sections of piping to determine the rates. Further, sufficient length of accessible straight pipe is not available to utilize an ultrasonic flow measuring device. Therefore, the configuration of the buried SX system will not allow for determining the change in flow between the ends of the buried components.

### 3.5 Licensee's Proposed Alternative

In lieu of performing a system pressure test in accordance with the requirements of IWA-5244(b)(1) for Braidwood, Units 1 and 2, EGC proposed an alternative to use the provisions of IWA-5244(b)(2) of the 2001 Edition through the 2003 Addenda of the ASME Section XI Code, to confirm that flow during operation is not impaired in non-isolable buried piping. The unimpaired flow in the buried piping will be verified during quarterly SX pump testing. Braidwood will use the EGC-established minimum flow rate specified in the site inservice testing (IST) surveillance, currently specified at 23,520 gallons per minute, for all SX pumps as the acceptance criteria for IWA-5244 pressure testing of SX buried piping. If, during an IST surveillance, the minimum flow could not be achieved and the cause of the deviation is not attributed to the test instruments being used, the pump will be declared inoperable and an EGC Issue Report will be generated in accordance with the Exelon Corrective Action Program as required by the existing IST surveillance. Further corrective actions (e.g., maintenance on the pump and system walk downs) would be initiated as required to restore the pump and/or the system to an operable status. EGC will further trend pressure drop across each pump at the reference flow rate to assess any leakage through the buried piping assuming no degradation of the pump.

### 3.6 NRC Staff Evaluation

The Code of Record for Braidwood, Units 1 and 2, requires a system pressure test for the buried portion of SX piping that will determine either a rate of pressure loss or a change in flow at the ends of the buried piping. The buried SX piping at Braidwood uses butterfly valves at the ends, which were not designed for pressure isolation and, therefore, are unsuitable to determine meaningful rate of pressure loss. One end of buried piping is not instrumented for flow measurement, which does not permit measurement of change in flow. Therefore, the Code-required test cannot be performed. The Code, however, allows for nonisolable buried components to confirm that flow during operation is not impaired.

The NRC staff agrees with the licensee's approach that unimpaired flow in the buried piping can be qualitatively assessed during quarterly IST surveillance of SX pumps. Using the flow instrument downstream from the pump discharge, a reference flow rate could be established which would correspond to a target pump head. A decrease in pump head may indicate increase in flow due to any through-wall leakage in the buried piping. From trending of head loss (pressure drop) during a pump test at the reference flow, an assessment can be made on the integrity of buried piping. An issue related to this mode of testing is that pump head loss may be caused by the deterioration of the pump performance rather than the leakage in the buried pipe. As the performance of the pump deteriorates, the developed head decreases at the reference flow. The licensee has stated that if, during an IST surveillance, the minimum flow could not be achieved and the cause of the deviation not attributed to the test instruments being used, the pump would be declared inoperable and an Issue Report will be generated in

accordance with the Exelon Corrective Action Program as required by the existing IST surveillance. Further corrective actions (e.g., maintenance on the pump and system walk downs) would be initiated, as required, to restore the pump and/or the system to an operable status (i.e., no gross pipe rupture).

A mitigating factor in accepting the proposed alternative of trending quarterly IST surveillance, as opposed to the Code-required test to ensure structural integrity, is the fact that the primary degradation of buried SX piping material that can be attributed to corrosion has been addressed by protecting this piping internally through implementation of a water chemistry program and externally by use of coated, wrapped, and cathodically protected piping. Also, the SX buried piping operates at a low pressure of 30 psig.

The NRC staff has determined that the licensee's proposed alternative to test the buried portion of SX piping in conjunction with quarterly IST of SX pumps would detect significant through-wall leakage if present in the subject line and would provide reasonable assurance of structural integrity. Compliance with the Code requirement would require installation of additional flow measuring device at the inlet end of buried piping, which would result in hardship without a compensating increase in the level of quality and safety.

#### 4.0 CONCLUSION

The NRC staff concludes that, for the buried portion of SX piping, compliance with the ASME Code requirement to perform a test that determines the rate of pressure loss or the change in flow would result in hardship to the licensee without a compensating increase in the level of quality and safety. The NRC staff further concludes that the licensee's proposed alternative provides reasonable assurance of detecting any degradation in the buried portion of SX piping. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in RR I3R-02 is authorized for the third 10-year ISI inspection interval for Braidwood Station, Units 1 and 2. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Pat Patnaik, NRR

Date: June 14, 2010

M. Pacilio

- 2 -

Please contact Mr. Marshall David at (301) 415-1547 if you have any questions on this action.

Sincerely,

*/RA/*

Stephen J. Campbell, Chief  
Plant Licensing Branch III-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-455

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via Listserv

DISTRIBUTION:

PUBLIC	LPL3-2 R/F	RidsNrrDorlLpl3-2 Resource
RidsNrrPMBraidwood Resource	RidsNrrLATHarris Resource	RidsOgcRp Resource
RidsAcrsAcnw_MailCTR Resource	RidsNrrDciCsgb Resource	PPatnaik, NRR
RidsRgn3MailCenter Resource	RidsNrrDorlDpr Resource	RidsNrrPMPerry Resource

ADAMS ACCESSION NO.: ML101590696                      \*SE memo date                      NRR-028

OFFICE	LPL3-2/PM	LPL3-2/PM	LPL3-2/LA	DCI/CSGB/BC*	LPL3-2/BC
NAME	ABillochColón	MDavid	THarris	RTaylor	SCampbell
DATE	6/10/10	6/10/10	6/10/10	5/13 /10	6/14/10

OFFICIAL RECORD COPY