



Exelon Generation®

Exelon Generation Company, LLC  
Braidwood Station  
35100 South Route 53, Suite 84  
Braceville, IL 60407-9619  
[www.exeloncorp.com](http://www.exeloncorp.com)

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U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Braidwood Station, Unit 1  
Facility Operating License No. NPF-72  
NRC Docket No. STN 50-456

Subject: Braidwood Station, Unit 1 Inservice Inspection Summary Report

Enclosed please find the post-outage summary report (i.e., 90 day report) for inservice inspection (ISI) examinations conducted during Braidwood Station, Unit 1 Refueling Outage 18 (A1R18). This report is submitted in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for the Inservice Inspection of Nuclear Power Plant Components," and ASME Code Case N-532-4, "Repair/Replacement Activity Documentation Requirements and Inservice Summary Report Preparation Submission - Section XI, Division 1."

Attachment 1 provides the Owner's Activity Report (OAR) for ISI activities conducted during A1R18 including a list of items with flaws or relevant conditions that required evaluation for continued service and an abstract of repair/replacements activities required for continued service. In addition, Attachment 2 provides the results of Containment ISI activities performed in accordance with ASME Section XI, Subsection IWE, "Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Power Plants," and Subsection IWL, "Requirements of Class CC Components of Light-Water Cooled Power Plants," with specified modifications and limitations in 10 CFR 50.55a, "Codes and standards."

Please direct any questions you may have regarding this submittal to Mr. Phillip J. Raush, Regulatory Assurance Manager, at (815) 417-2800.

Respectfully,

Mark E. Kanavos  
Site Vice President  
Braidwood Station

Attachments:

1. Owner's Activity Report (OAR) for A1R18
2. A1R18 Containment ISI (IWL/IWE) Results

**ATTACHMENT 1**

**FORM OAR-1 OWNER'S ACTIVITY REPORT**

**TABLE 1, ITEMS WITH FLAWS OR RELEVANT CONDITIONS THAT  
REQUIRED EVALUATION FOR CONTINUED SERVICE**

**TABLE 2, ABSTRACT OF REPAIR/REPLACEMENT ACTIVITIES  
REQUIRED FOR CONTINUED SERVICE**

# ATTACHMENT 1

## FORM OAR-1 OWNER'S ACTIVITY REPORT

Report Number A1R18

Plant Braidwood Generating Station, 35100 South Route 53, Suite 84, Braceville, Illinois 60407

Unit No. 1 Commercial Service Date July 29, 1988 Refueling Outage Number A1R18  
(If applicable)

Current Inspection Interval Third Inspection Interval (ISI), Second Inspection Interval (Containment ISI)  
(1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, other)

Current Inspection Period Second Inspection Period (ISI and Containment ISI)  
(1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>)

Edition and Addenda of Section XI applicable to the Inspection Plans ASME Section XI 2001 Edition through 2003 Addenda

Date / Revision of Inspection Plans January 26, 2015 / Revision 13

Edition and Addenda of Section XI applicable to repair/replacement activities, if different than the inspection plans Same as above

Code Cases used: N-460, N-508-3, N-513-3, N-532-4, N-566-2, N-586-1, N-597-2, N-613-1, N-639, N-649, N-652-1, N-661-1, N-661-2, N-700, N-706-1, N-722-1, N-729-1, N-731, N-751, N-753

### CERTIFICATE OF CONFORMANCE

I certify that (a) the statements made in this report are correct; (b) the examinations and tests, meet the Inspection Plan as required by the ASME Code, Section XI; and (c) the repair/replacement activities and evaluations supporting the completion of A1R18 conform to the requirements of Section XI (refueling outage number)

Signed Brendan J. Casey Brendan J. Casey, ISI Program Owner Date 7/13/2015  
(Owner or Owner's designee, Title)

### CERTIFICATE OF INSERVICE INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and the State or Province of Illinois and employed by HSB Global Standards of Hartford, Connecticut have inspected the items described in this Owner's Activity Report, and state that to the best of my knowledge and belief, the Owner has performed all activities represented by this report in accordance with the requirements of Section XI

By signing this certificate neither the Inspector nor his employer makes any warranty expressed or implied concerning the repair/replacement activities and evaluation described in this report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection

J. H. H. H. Commissions NB #8756, IL #1085 ANIC  
(Inspector's Signature) National Board, State, Province, and Endorsements

Date 7/13/2015

**TABLE 1**  
**ITEMS WITH FLAWS OR RELEVANT INDICATIONS THAT REQUIRED**  
**EVALUATION FOR CONTINUED SERVICE**

<b>Examination Category</b>	<b>Examination Item Number</b>	<b>Item Description</b>	<b>Evaluation Description</b>
C-H	C7.10	1CS05AB (1CS01SB)	Bolting evaluations completed under ATI 1639774-02 and 1697658-02
C-H	C7.10	1CV03F	Evaluation completed under ATI 1576244-02
D-B	D2.10	1FC01P	Evaluation completed under ATI 1599672-02
B-P	B15.10	1RC8037A body-to-bonnet	Bolting evaluation completed under ATI 2476265-02
B-P	B15.10	1RC8037C body-to-bonnet	Bolting evaluation bound by Evaluation 861305
B-P	B15.10	1RC8037B body-to-bonnet	Bolting evaluation bound by Evaluation 899596
C-H	C7.10	1CV05A Flange Bolted Connections	EC 401789
B-P	B15.10	1RC8037C body-to-bonnet	IR 2486744, EC 401889
B-P	B15.10	1RC8037A body-to-bonnet	IR 2486752, EC 401889
B-P	B15.10	1RC8037D body-to-bonnet	IR 2486772, EC 401889
F-A	F1.10C	1RY05001V	IR 2486784, EC 401898

**TABLE 2**  
**ABSTRACT OF REPAIR/REPLACEMENT ACTIVITIES**  
**REQUIRED FOR CONTINUED SERVICE**

Code Class	Item Description	Description Of Work	Date Completed	Repair/Replacement Plan Number
2	1CS011B	Replace one bolt at a time with new bolt per BACC evaluation recommendation. (IR 1598224)	1/29/2014	WO# 1700436-01 (Plan 1-14-002)
3	1DG01KA-Y1	Retorque existing heat exchanger flange bolting to eliminate leakage at joint. (IR 1605691)	2/12/2014	WO# 1704073-01 (No Plan)
3	1SX046B	Replace existing valve which was bound with new valve by welding. (IR 1442884)	3/25/2014	WO# 1596568-01 (Plan 1-14-001)
3	1DG01KA-X1	Replace existing stationary head with coated spare assembly due to epoxy coating damage. (IR 1646172)	4/14/2014	WO# 1501215-01 (Plan 1-14-004)
3	1SX25AA	Replace segment of pipe with through-wall leak. Leakage acceptability originally evaluated in accordance with Code Case N-513-3. (IR 1659136)	6/27/2014	WO# 1737992-07 (Plan 1-14-015)
3	1FC03009R	Repair cracked fillet weld on pipe support. (IR 1671816)	7/16/2014	WO# 1748167-01 (Plan 1-14-016)
3	Spare DG Stationary Head	Refurbish spare DG Jacket Water Cooler Stationary Head removed under WO 1501215-01	11/14/2014	WO# 1756460-01 (Plan 1-14-023)
3	1SX057B	Replace existing butterfly valve which leaks by seats. (IR 959497)	11/17/2014	WO# 1267929-01 (Plan 1-13-008)
3	1SX052B	Replace existing butterfly valve which leaks by seats. (IR 1599312)	11/17/2014	WO# 1700484-01 (Plan 1-14-046)
3	1DG01KB-X2	Replace jacket water floating end due to damaged Ceramallooy coating. (IR 2414320)	11/21/2014	WO# 1520645-01 (Plan 1-14-078)
3	1DG01KB-Y2	Retorque existing heat exchanger flange bolting to eliminate leakage at joint. (IR 2382478)	1/27/2015	WO# 1772837-01 (No Plan)
2	1CV8119	Replace existing relief valve which was installed without upgraded bellows (IR 1659609)	4/6/2015	WO# 1741519-01 (Plan 1-14-051)
2	1SI04017S	Replace existing mechanical snubber that passed functional testing with marginal results. (IR 2480143)	4/7/2015	WO 1698663-39 (Plan 1-15-032)
3	1SX27DA	Replace segment of pipe with through-wall leak. Leakage acceptability originally evaluated in accordance with Code Case N-513-3. (IR 2468066)	4/7/2015	WO# 1813976-01 (Plan 1-15-009)

**TABLE 2**  
**ABSTRACT OF REPAIR/REPLACEMENT ACTIVITIES**  
**REQUIRED FOR CONTINUED SERVICE**

<b>Code Class</b>	<b>Item Description</b>	<b>Description Of Work</b>	<b>Date Completed</b>	<b>Repair/Replacement Plan Number</b>
3	1CC9495A	Replace existing check valve cover due to galled threads observed during PM surveillance.	4/8/2015	WO# 1670802-01 (Plan 1-15-061)
2	1SD23093S	Replace existing mechanical snubber that failed to meet the visual examination acceptance criteria. (IR 2479809)	4/8/2015	WO# 1698663-30 (Plan 1-15-017)
2	1SD24073S	Replace existing mechanical snubber that failed to meet the functional test acceptance criteria	4/8/2015	WO# 1698663-31 (Plan 1-15-021)
2	1SI01035S	Replace existing mechanical snubber that passed functional test but upon disassembly was found to have internal corrosion from water intrusion. (IR 2480142)	4/8/2015	WO# 1698663-35 (Plan 1-15-018)
2	1SI24012S	Replace existing mechanical snubber that passed functional testing but upon disassembly was found to have a cracked screw shaft. (IR 2480085)	4/8/2015	WO# 1698663-41 (Plan 1-15-020)
3	1VP01AC	Existing bolting replaced, no documented discrepancy.	4/9/2015	WO# 1520768-02 (Plan 1-13-030)
2	1CV8346	Replace existing valve disc to correct seat leakage. (IR 1376583)	4/9/2015	WO# 1566349-01 (Plan 1-13-016)
2	1CV8117	Replace relief valve due to as found set point testing. (IR 2482746)	4/9/2015	WO# 1670751-01 (Plan 1-14-038)
1	1RC01BB-A	Replace control valve on hydraulic snubber due to failed functional test. (IR 2479629)	4/9/2015	WO# 1821370-01 (Plan 1-15-016)
1	1RC01R	Reduce liquid penetrant indication in embedded flaw repair of RPV Head Penetration 69. (IR 2479588)	4/10/2015	WO# 1689688-23 (Plan 1-15-019)
1	1RC8040C	Replace existing valve bonnet and yoke to repair valve bonnet leak. (IR 2481454)	4/11/2015	WO# 914344-01 (Plan 1-06-039)
2	1CV131	Replace valve trim kit as part of valve rebuild to address previous issues with valve sticking. (IR 1570063)	4/11/2015	WO# 1683271-01 (Plan 1-14-033)
2	1SI06031R	Modify existing support to correct design issues associated with NCIG-05 misapplication. (IR 1383554)	4/11/2015	WO# 1700484-01 (Plan 1-14-049)
3	1AF006A	Replace existing valve disc to correct seat leakage. (IR 1275290)	4/11/2015	WO# 1754474-01 (Plan 1-15-010)

**TABLE 2**  
**ABSTRACT OF REPAIR/REPLACEMENT ACTIVITIES**  
**REQUIRED FOR CONTINUED SERVICE**

Code Class	Item Description	Description Of Work	Date Completed	Repair/Replacement Plan Number
3	1SX27DB	Perform flaw disposition per Code Case N-513-3 and local weld build up repair at degraded area of pipe in accordance with Code Case N-661-1/N-661-2. (IR 2482749)	4/11/2015	WO# 1822647-01 (Plan 1-15-023)
3	1AF02A	Existing flange bolting replaced, no documented discrepancy.	4/11/2015	WO# 1670764-01 (Plan 1-14-040)
2	1CV121	Replace valve trim kit as part of upgrade per EC 385832.	4/12/2015	WO# 1520505-01 (Plan 1-13-022)
2	1SD054B	Replace existing valve bonnet as part of valve restoration for leak seal injection clamp removal. (IR 1498331)	4/13/2015	WO# 1631254-01 (Plan 1-14-013)
2	1SI007	Repair Weld FW-1 that failed radiography. (IR 2469339)	4/14/2015	WO# 1692235-29 (Plan 1-14-066)
2	1AF03ED	Repair Weld FW-3 to orientate flange. (IR 2472917)	4/13/2015	WO# 1722810-01 (Plan 1-14-055)
3	0SX63A	Replace existing carbon steel valve with stainless steel valve (EC 357816) to address packing leak that was impacting sump inputs. (IR 2468744)	5/15/2015	WO# 859747-01 (Plan 1-13-067)
3	1DG01KB-Y1	Retorque existing heat exchanger flange bolting. (IR 2415889)	5/19/2015	WO# 1792640-01 (No Plan)
3	1SX03A	Replace weld neck flange due to through-wall leak. (IR 2501820)	5/20/2015	WO# 1831958-05 (Plan 1-15-030)
2	1CS020A	Replace flange bolting per BACC Program evaluation recommendation. (IR 2488870)	6/8/2015	WO# 1747286-01 (Plan 1-15-029)

**ATTACHMENT 2**

**A1R18 CONTAINMENT ISI (IWE/IWL) RESULTS**



## ATTACHMENT 2

### A1R18 CONTAINMENT ISI (IWE/IWL) RESULTS

#### REPORT OF CONTAINMENT DEGRADATION

Containment inspections were performed in accordance with Subsection IWE (Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Power Plants) and IWL (Requirements for Class CC Components of Light-Water Cooled Power Plants) of ASME Section XI, Division 1, (2001 Edition through the 2003 Addenda) along with specified modifications and limitations in 10CFR 50.55a. The scope of the examinations during A1R18 included locations below the moisture barrier (MB) where previous examinations revealed loss in excess of 1/64" but not exceeding 4/64".

#### (ASME IWE) REPORT OF CONTAINMENT DEGRADATION

Augmented Section XI IWE examinations of the Class CC liner examinations during A1R18 (Second Period of the Third Interval Containment ISI) were performed in accordance with the requirements of ASME Section XI, Table IWE-2500-1, "Category E-C, Containment Surfaces Requiring Augmented Examination". The scope of the examinations included locations below the moisture barrier where previous examinations revealed loss in excess of 1/64" but did not exceed 4/64".

Exelon Procedures ER-AA-330-007, "Visual Examination of ASME Section XI Class MC Surfaces and Class CC Liners", ER-AA-335-018 "Visual Examination of ASME IWE Class MC and Metallic Liners of CC Components", and ER-AA-335-004 "Ultrasonic Measurement of Material Thickness and Interfering Conditions" were used to perform the examinations.

#### **A description of the type and estimated extent of the conditions that led to the degradation [10CFR 50.55a(b)(2)(ix)(A)(2)(i)]:**

During the performance of A1R18 augmented exams, no additional degradation was found at the locations below the moisture barrier. None of the liner metal losses exceeded 4/64", therefore no weld repairs were required. With regard to the existing degradation examined during A1R18, the most notable type of degradation was liner metal loss due to corroded metal just below the MB, found as a result of UT of augmented areas resulting in metal loss of varying depths. The maximum pit depth identified was 0.021" (approximately 1/64"). It should be noted this metal loss took place prior to application of Keeler and Long 9600 Series coating in A1R14. All UT areas were found coated and dry.

#### **Extent of Condition:**

The maximum metal loss of 0.021" (approximately 1/64") occurred at one location based on UT examinations of the areas inspected. These examinations also indicated that the liner plate had contained numerous pits in the areas below the MB. It should be noted that areas examined in A1R18 were previously identified in A1R14 or A1R15 and not repaired in A1R17.

The depths of the pits did not change from exams performed in previous period (A1R14 or A1R15); therefore these areas no longer require augmented examinations in accordance with IWE-2420(c).

## **ATTACHMENT 2**

### **A1R18 CONTAINMENT ISI (IWE/IWL) RESULTS**

#### **Description of the Conditions That Led to the Degradation:**

Based on the recorded observations it is evident that the significant portions of the liner plate degradation below the moisture barrier (MB) are attributed to corrosion. The liner plate surface below the MB was coated with Carbo Zinc CZ11 in year 2000. Carbo Zinc CZ11 does not tolerate improper surface preparation and is not recommended for use unless white metal condition with a contoured surface profile is achieved. Since this strip of liner plate below the MB is not easily accessible, it is unlikely that the proper surface preparation was attained during the initial application. Furthermore, the liner plate surface may not have been completely dried (some moisture left in the wall from the wet Cerafibre resting against it) when the MB was replaced in 2000. In the year 2000, the Cerafibre was found wet and adhering to the metal liner. The liner most likely experienced a slow chronic corrosion rate prior to 2000. The bulk of the liner corrosion likely occurred soon after the year 2000 when the liner below the moisture barrier was coated with Carbo Zinc CZ11. Keeler and Long 9600 Series coating has been applied as the new Service Level I coating in A1R14 through A1R18. Keeler and Long 9600 Series was chosen for the coating in containment because it does not require white metal surface conditions prior to coating.

#### **Evaluation of each area, and the result of the evaluation [10CFR 50.55a(b)(2)(ix)(A)(2)(ii)]:**

Engineering evaluation EC #402443 was performed to address all the indications. The evaluation determined that the liner plate with the highest degraded condition 0.021" loss (approximately 1/64") will remain operational and meet its intended design function throughout the upcoming cycle. Additional augmented examinations are scheduled during the next refuel outage (A1R19). As previously discussed, weld repairs were not required at any of the locations since the liner material losses did not exceed 4/64".

#### **Description of Necessary Corrective Actions Completed [10CFR 50.55a(b)(2)(ix)(A)(2)(iii)]:**

- 1) Approximately 66' of liner plate directly below the MB that was examined previously in either A1R14 or A1R15 were re-examined by VT-1 visual examination after the MB was removed.
- 2) Select areas previously classified as augmented inspection locations (> 1/64" metal loss) in A1R14 or A1R15 and not repaired in A1R17 were examined using the Ultrasonic examination method to document actual liner plate thicknesses in the vicinity of these pitted areas.
- 3) Engineering evaluation EC #402443 was completed to provide justification for the acceptability of the liner plate at its thinnest location and continued operation of Unit 1 without additional repair or replacement activities on the containment liner plate until the next time it is required to be reexamined during the Third CISI Period.
- 4) The liner surfaces at all the exposed locations where the moisture barrier had been removed were coated with for Keeler and Long 9600 series coating (used for Level I coating in containment) during A1R18 along with new Cerafibre and new MB.
- 5) A new MB was installed at all areas where the existing MB was removed during A1R18. A post installation GV exam of the entire replacement MB was performed. No cracks or voids which would allow water intrusion were observed.

## **ATTACHMENT 2**

### **A1R18 CONTAINMENT ISI (IWE/IWL) RESULTS**

- 6) Portions of Class CC liner below the MB have been categorized as Category E-C (Containment Surfaces Requiring Augmented Examination) in the Unit 1 ISI schedule.

#### **Proposed Corrective Actions for the Third CISI Period (A1R19 or A1R20):**

Schedule VT-1 and UT examinations of all containment liner plate directly below the MB that exhibited metal thickness losses greater than 1/64" in A1R16 that were not repaired in A1R17 (ATI #1363165-04), and any new augmented areas found as a result of UTs during A1R17 or were repaired and still remain augmented (ATI #1570741-01).

#### **Conclusions/Findings:**

The liner plate is acceptable and capable of performing its intended design function until A1R19 where additional augmented examinations are scheduled. (ATI #1363165-04)

### **(ASME IWL) REPORT OF CONTAINMENT DEGRADATION**

No evidence of degradation was identified for ASME Class CC Components during this cycle.