

December 20, 2013
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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 17 (A1R17). 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 A1R17 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. Phil 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 A1R17
2. A1R17 Containment ISI (IWE/IWL) Results

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Braidwood Station
NRR Project Manager – Braidwood Station
Illinois Emergency Management Agency – Division of Nuclear Safety

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 A1R17

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 A1R17
(if applicable)

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

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

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

Date / Revision of Inspection Plans September 5, 2013 / Revision 10

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-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 A1R17 conform to the requirements of Section XI (refueling outage number)

Signed Brendan J. Casey Brendan J. Casey, ISI Program Owner Date 12/16/2013
(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 HSBCT 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

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

Date 12-16-2013

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

Examination Category	Examination Item Number	Item Description	Evaluation Description
C-H	C7.10	1RH8703B	Bolting evaluation completed under ATI 1407727-02 (updated again for IR 1536176)
D-B	D2.10	1BR7053	Body-to-bonnet bolting evaluation completed under ATI 1445789-02
C-H	C7.10	1CV8394	Body-to-bonnet bolting evaluation completed under ATI 1446900-02
C-H	C7.10	1SI8802B	Body-to-bonnet bolting evaluation completed under ATI 1449647-02
C-H	C7.10	1SI8811A	Body-to-bonnet bolting evaluation completed under ATI 1461230-02
C-H	C7.10	1CS01SA	Flange bolting evaluation completed under ATI 1520542-02
D-B	D2.10	1FC8762A	Body-to-bonnet bolting evaluation completed under ATI 1522773-02
C-H	C7.10	1CV8502C	Body-to-bonnet bolting evaluation completed under ATI 1522919-02
C-H	C7.10	1RH01CB	Flange bolting evaluation completed under ATI 1555373-02
B-P	B15.10	1RC8037A	IR 1555580, corrosion resistant body-to-bonnet material, bound by Evaluation 899596
B-P	B15.10	1RC8037B	IR 1555583, corrosion resistant body-to-bonnet material, bound by Evaluation 899596
B-P	B15.10	1RC8037C	IR 1555588, corrosion resistant body-to-bonnet material, bound by Evaluation 899596
B-P	B15.10	1RC01R	Legacy boron residue on RPV head CRDM tubes and mirror insulation (IRs 1555625, 1555636, 1560253 1557344, and 1560117) evaluation completed under EC 395417
C-H	C7.10	1CV8389B	Body-to-bonnet bolting evaluation completed under ATI 1555973-02
C-H	C7.10	1SI8811A	Body-to-bonnet bolting evaluation (and valve enclosure assembly, IR 1560140) evaluation completed under ATI 1556089-02
C-H	C7.10	1SI8810C	Body-to-bonnet (corrosion resistant material) evaluation completed under IR 1557841
C-H	C7.10	1SI05MC	Flange bolting evaluation completed under ATI 1558880-02
C-H	C7.10	1RH8716A	Body-to-bonnet bolting evaluation completed under ATI 1560158-02
C-H	C7.10	1SI8802B	Body-to-bonnet bolting evaluation completed under ATI 1560159-02

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

Examination Category	Examination Item Number	Item Description	Evaluation Description
C-H	C7.10	1SI8811B	Body-to-bonnet bolting evaluation (and valve enclosure assembly) evaluation completed under ATI 1562356-08
C-H	C7.10	1CV128	Body-to-bonnet bolting evaluation completed under ATI 687429-02 (IR 1354610) still bounding
C-H	C7.10	1CV8119 Targets	Target surfaces resulting from relief valve lifting were evaluated under ATI 1565067-02
B-P	B15.10	1RC8037A	IR 1565325, corrosion resistant body-to-bonnet material, bound by Evaluation 899596
B-P	B15.10	1RC8037B	IR 1565318, corrosion resistant body-to-bonnet material, bound by Evaluation 899596
B-P	B15.10	1RC8037C	IR 1565323, corrosion resistant body-to-bonnet material, bound by Evaluation 899596
C-H	C7.10	1CV03F	Filter flange bolting evaluation completed under ATI 1576244-02

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	1SX2077A	Replace manual ball valve which had a bent stem (IR 989159)	7/31/2012	WO# 1299691-01 (Plan 1-12-031)
3	0SXK4D bolted connection	Replace bolting which was degraded from chemical injection (NSR) leak	1/24/2013	WO# 1567470-01 (Plan 1-13-005)
3	Spare Diesel Generator Cooler Water Heat Exchanger Parts	Weld repair pitted and/or worn areas on spare heat exchanger parts and return to Stores (IR 809032)	2/25/2013	WO# 1579999-01 (Plan 1-12-054) WO# 1579999-02 (Plan 1-13-002)
3	1DG5048A	Replace manual valve which was difficult to operate (IR 1256590)	2/27/2013	WO# 1466817-01 (Plan 1-11-012)
3	1SX2077B	Replace manual ball valve which was difficult to operate (IR 931427)	5/20/2013	WO# 1266644-01 (Plan 1-09-093)
3	1SX2080B	Replace manual ball valve which would not fully close	7/23/2013	WO# 720851-01 (Plan 1-13-032)
3	1AB03T	Remove temporary weld attachment remnants from construction left on tank internal surface (IR 1512174)	7/24/2013	WO# 1102353-16 (Plan 1-13-033)
3	1SX27DA	Perform overlay repair of through wall leak in accordance with Code Case N-661-1 (IR 1542372)	8/6/2013	WO# 1661641-13 (Plan 1-13-041)
2	1CS020A Hinge Pin	Clean/Tighten hinge pin to reduce leakage	9/4/2013	WR# 441805 (No Plan)
1	1CV28002S	Replace snubber which failed functional test (IR 1556771)	9/13/2013	WO# 1550210-05 (Plan 1-13-052)
1	1SI24012S	Replace snubber which failed functional test (IR 1559033)	9/16/2013	WO# 1550210-38 (Plan 1-13-077)
2	1SD24073S	Replace snubber which failed functional test (IR 1556055)	9/16/2013	WO# 1550210-29 (Plan 1-13-076)
2	1SD23093S	Replace snubber which failed functional test (IR 1557889)	9/16/2013	WO# 1550210-85 (Plan 1-13-053)
1	1RC01R Penetration 69	Remove/Reduce indications found during liquid penetrant examination of embedded flaw repair (IR 1558555, 1558897, 1559649)	9/17/2013 9/18/2013	WO# 1624374-08 (Plan 1-13-050) WO#1624374-13 (Plan 1-13-059)
3	1SX2186	Replace manual ball valve which is difficult to operate (IR 1357296)	9/19/2013	WO# 1535810-01 (Plan 1-13-026)
1	1RC01R Penetration 69	Weld repair indications found during liquid penetrant examination of embedded flaw repair	9/21/2013	WO# 1624374-060 (Plan 1-13-060)
2	1SI8802B	Clean body-to-bonnet connection leak (IR 1560159)	9/21/2013	WR 443203 (No Plan)

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

Code Class	Item Description	Description Of Work	Date Completed	Repair/Replacement Plan Number
MC	1PC01R	Repair pitted areas beneath moisture barrier through weld restoration	9/22/2013 9/23/2013	WO# 1300604-09 (Plan 1-13-034) WO# 1300604-11 (Plan 1-13-035) WO# 1300604-13 (Plan 1-13-036) WO# 1300604-15 (Plan 1-13-037)
2	1SI05MC	Removed one bolt at time to clean, VT-3 inspect, lubricate, reinstall and retorque to address observed flange leak (IR 1558880)	9/22/2013	WO# 1674846-01 (No Plan)
2	1RH8708A	Clean and tighten plug leaking on relief valve (IR 1560606)	9/23/2013	WO# 1675151-01 (No Plan)
3	1CC08MB	Clean dry chemical leakage on flange (IR 1555648)	9/23/2013	WR# 442296 (No Plan)
3	1VA08S	Correct cubicle cooler gasket leakage caused by improper reassembly (IR 1562177)	9/23/2013	WO# 1521073-11 (No Plan)
2	1RH8716A	Clean and retorque body-to-bonnet bolting leak (IR 1560158)	9/26/2013	WO# 1674804-01 (No Plan)
1	1RY06124S	Adjust piston setting on snubber	9/27/2013	WO# 1676641-01 (No Plan)
2	1CV8119	Replace relief valve which was overpressurized (IR 1564826)	9/28/2013	WO# 1676960-03 (Plan 1-13-064)
3	1SX93AB	Replace degraded pipe elbow (IR 1331203)	10/8/2013	WO# 1517605-01 (Plan 1-12-058)

ATTACHMENT 2

A1R17 CONTAINMENT ISI (IWE/IWL) RESULTS

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A1R17 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 A1R17 included locations below the moisture barrier (MB) where previous examinations revealed loss in excess of 1/64" but not exceeding 4/64". Local repairs by welding were completed at all locations where losses exceeded 4/64" (refer to Work Order 1300604 for documentation of repairs).

(ASME IWE) REPORT OF CONTAINMENT DEGRADATION

Augmented Section XI IWE examinations of the Class CC liner examinations during A1R17 (Second Period of the Second 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". Additionally, repair by welding was completed at locations where losses exceeded 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)(1)]:

As previously discussed, all locations below the moisture barrier which had losses exceeding 4/64" were repaired by welding. These repairs were completed prior to conducting the Containment Integrated Leak Rate Test (ILRT). With regard to other degradation identified during A1R17, 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 0.049" (approximately 3/64"). 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 0.049" (approximately 3/64") occurred at two locations 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 A1R17 were areas with the largest degradation documented in A1R14, A1R15 or A1R16. When augmented UT exams are performed in future outages, it is likely that the UT values will show metal losses less than this since the remainder augmented areas yet to be examined in future outages showed smaller degradation in initial exams performed in A1R14, A1R15 and A1R16.

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A1R17 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. The new coating applied in A1R14 through A1R17 was Keeler and Long 9600 Series used for Service Level I coating in containment which 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)(3)]:

An Engineering evaluation (EC 395445) was performed to address all the indications. The evaluation determined that the liner plate with the highest degraded condition 0.049" loss (approximately 3/64") will remain operational and meet its intended design function throughout the upcoming cycle. Additional augmented examinations are scheduled during the next refuel outage (A1R18). As previously discussed, repair by welding was completed at locations where liner material losses exceeded 4/64".

Description of Necessary Corrective Actions Completed [10CFR 50.55a(b)(2)(ix)(A)(3)]:

- 1) Approximately 175' of liner plate directly below the MB that was examined previously in A1R14, A1R15 or A1R16 was re-examined using the VT-1 method after the MB was removed.
- 2) Select areas determined as augmented (> 1/64" metal loss) in A1R14 or A1R15 and not repaired in A1R17 had been further examined using the Ultrasonic examination method to document actual liner plate thicknesses in the vicinity of these pitted areas.
- 3) Repairs were completed in A1R17 for areas previously examined in A1R14, A1R15 and A1R16 and determined to have a metal loss greater than 4/64".
- 4) An Engineering evaluation (EC 395445) was completed to provide justification for the acceptability of the liner plate at its thinnest location and operation of Unit 1 until A1R18 without additional repair or replacement activities on the containment liner plate.
- 5) 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 A1R17 along with new Cerafibre and new MB.

ATTACHMENT 2

A1R17 CONTAINMENT ISI (IWE/IWL) RESULTS

- 6) A new MB was installed at all areas where the existing MB was removed during A1R17. A post installation VT-3 exam of the entire replacement MB was performed with no cracks or voids which would allow water intrusion observed.
- 7) 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 A1R18:

Examine and UT all augmented areas discovered in A1R14 and A1R15 and not VT-1 examined and UT in A1R16 or A1R17 or repaired in A1R17.

Conclusions/Findings:

The liner plate is acceptable and capable of performing its intended design function until A1R18 where additional augmented examinations are scheduled. (ATI 1570741-03)

(ASME IWL) REPORT OF CONTAINMENT DEGRADATION

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