



Exelon Generation Company, LLC
Braidwood Station
35100 South Route 53, Suite 84
Braceville, IL 60407-9619

www.exeloncorp.com

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BW180078

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

Braidwood Station, Unit 1
Renewed 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 20 (A1R20). 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-532-5, "Repair/Replacement Activity Documentation Requirements and Inservice Inspection Summary Report Preparation and Submission - Section XI, Division 1."

Attachment 1 provides the Owner's Activity Report (OAR) for ISI activities conducted during A1R20 including a list of items with flaws or relevant conditions that required evaluation for continued service, and an abstract of repair/replacement 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 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. Francis Jordan, Regulatory Assurance Manager, at (815) 417-2800.

A handwritten signature in black ink, appearing to read "Marri Marchionda-Palmer".

Marri Marchionda-Palmer
Site Vice President
Braidwood Station

Attachments:

1. Owner's Activity Report (OAR) for A1R20
2. A1R20 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**

FORM OAR-1 OWNER'S ACTIVITY REPORT

Report Number A1R20

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 A1R20
(if applicable)

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

Current Inspection Period Third 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 and Revision of Inspection Plans September 29, 2017 / Rev. 18; January 26, 2018 / Rev. 19; June 29, 2018 / Rev. 20

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-508-4, N-513-4, N-532-5, N-566-2, N-586-1, N-639, N-652-1, N-700, N-706-1, N-729-4, N-731, N-739, N-753, N-798, N-800.

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 A1R20 conform to the requirements of Section XI (refueling outage number)

Signed Joseph Mergenthaler, Fleet ISI Program Owner  Date 7/23/2018
(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 employed by The Hartford Steam Boiler Inspection and Insurance Company 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.

 Commission 15538 I, N, R
(Inspector's Signature) (National Board Number and Endorsement)

Date 7/24/2018

TABLE 1

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

Examination Category	Examination Item Number	Item Description	Evaluation Description
B-A	B1.21	1RV-03-002 Reactor Head Dome-to-Ring Circumferential Weld	Volumetric examination identified indications in RPVH weld (IR 4129240). This was evaluated under EC 623996 and EC 623999.

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	1DG5030A	Existing relief valve replaced due to as found test failure (reference IRs 3990788 and 3990834).	3/31/2017	WO# 1736749-01 (Plan 1-17-006)
3	1SX057A	Replaced valve that leaks by (reference IR 1257703).	4/27/2018	WO# 1470349-01 (Plan 1-17-009)
3	0SX03CB-48"	Corrected seal weld leakage (reference IR 4117803).	3/23/2018	WO# 4595872-01 (Plan 1-17-012)
3	1SX052A	Replaced valve that leaks by (reference IR 1257701).	5/5/2018	WO# 1470331-01 (Plan 1-17-029)
1	1RY8010B	Replaced failed relief valve tested during PM surveillance (reference IR 4127323).	5/5/2018	WO# 1950855-01 (Plan 1-17-032)
3	1AF006A	Replaced valve internal part(s) to address leakage past seats (reference IR 2625736).	4/20/2018	WO# 1962980-01 (Plan 1-17-039)
3	1CC31029G	U-bolt destroyed during removal.	4/21/2018	WO# 1950807-48 (Plan 1-17-046)
3	1CC31027T	U-bolt destroyed during removal.	4/18/2018	WO# 4734812-22 (Plan 1-18-008)
2	1SD23093S	Replaced failed snubber (reference IR 4126776).	4/23/2018	WO# 4580219-60 (Plan 1-18-009)
3	1SX13017V	Adjusted component support that was identified to be out of tolerance during Section XI exam.	4/27/2018	WO# 4771901-01 (IR 4125654)
3	1SX16019V	Adjusted component support that was identified to be out of tolerance during Section XI exam.	4/27/2018	WO# 4774459-01 (IR 4127888)
2	1CV190	Packing leak and boric acid (reference IR 4119621).	4/19/2018	WR 1388978
2	1SI8934B	Boric acid at packing (reference IR 4124601).	4/20/2018	WR 1390153
1	1RC8036A	Body-to-Bonnet leak (reference IR 4131825).	4/28/2018	WO# 4778328-01

ATTACHMENT 2

A1R20 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 Plants) and Subsection IWL (Requirements for Class CC Concrete Components of Light-Water Cooled Plants) of ASME Section XI (2001 Edition through the 2003 Addenda), Division 1, along with specified modifications and limitations in 10 CFR 50.55a. The completed surveillance for IWE and IWL contain all the examination details along with indications recorded and their associated evaluations required by ASME Section XI.

ASME IWE REPORT OF CONTAINMENT DEGRADATION

The scope of IWE inspections during A1R20 included VT-3 examination of pressure retaining bolted connections (Category E-A, Item 1.11 of Table IWE-2500-1) for 3rd ISI (2nd CISI) Interval. Exelon Procedures ER-AA-330-007, "Visual Examination of Section XI Class MC Surfaces and Class CC Liners" and ER-AA-335-018 "Visual Examination of ASME IWE Class MC and Metallic Liners of IWL Class CC Components" were used to perform the examinations. The results of the examinations revealed no degradation of inaccessible areas in A1R20, therefore reporting under 10 CFR 50.55a(b)(2)(ix)(A)(2) is not required.

ASME IWL REPORT OF CONTAINMENT DEGRADATION

The 30th Year Inservice Inspection of Class CC Concrete Surfaces and Post Tensioning System for Braidwood Unit 1 and Unit 2 were conducted in accordance with the requirements of ASME Section XI, Table IWL-2500-1. As permitted by ASME Section XI IWL-2421, the examination requirements were modified. The Braidwood Units are identical in design, the post tensioning system operations were completed not more than 2 years apart, both containment structures are similarly exposed to and protected from the outside environment. Examinations required by IWL-2522, IWL-2523, IWL-2524, and IWL-2525 were performed for the Unit 01 Post Tensioning System. Examinations required by IWL-2524 and IWL-2525 were performed for the Unit 02 Post Tensioning System. In addition to the tendons selected in accordance with IWL-2521, a sample of 38 tendon grease caps were removed for free water inspection as an augmented scope. This sample included grease caps installed on 19 vertical tendons located below grade elevation (401'), 8 horizontal tendons located below grade elevation (401') and 11 dome tendons. The basis for selecting these tendons was a history of free water during past examinations.

Exelon Procedures ER-AA-330-005, "Visual Examination of Section XI Class CC Concrete Containment Structures", ER-AA-330-006 "Inservice Inspection and Testing of the Pre-Stressed Concrete Containment Post Tensioning Systems", and ER-AA-335-019 "Visual Examination of ASME IWL Class CC Containment Components", were used to perform the examinations.

As required by 10CFR 50.55a(b)(2)(viii)(E), for Class CC applications, the applicant or licensee must evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of or the result in degradation to such inaccessible areas. For each inaccessible area identified, the applicant or licensee must provide the following in the ISI Summary Report required by IWA-6000:

- (1) A description of the type and estimated extent of degradation, and the conditions that led to the degradation;
- (2) An evaluation of each area, and the result of the evaluation; and
- (3) A description of necessary corrective actions.

A description of the type and estimated extent of degradation, and the conditions that led to the degradation [10CFR 50.55a(b)(2)(viii)(E)(1)]:

The degraded conditions identified during the 30th Year Inservice Inspection of Class CC Concrete Surfaces and Post Tensioning Systems are listed in the table below.

Unit	Issue Report #	Description
1	02677576	Additional Degradation Of Unit 1 Containment Dome Coating
2	02684644	Additional Degradation Of Unit 2 Containment Dome Coating
1	02697479	Degraded Concrete Surface In U/1 Containment Buttress A/BA
1	03944697	Tendon D2-19 (Field End Concrete) Degradation
1	03954015	Ineffective Wire Id'd (Tendon V-112 Shop End)
1	03954009	Ineffective Wire Id'd (Tendon H-42-CB Shop End)
1	03969148	Ineffective Wire Id'd (Tendon H-21-BA Shop End)
2	04031417	4 Oz. Free Water Identified (Field End, Tendon V-241)
2	04031414	3.5 Oz. Free Water Collected (Field End, Tendon V-217)
1	04031409	2 Oz. Free Water Collected (Field End, Tendon V-112)
2	03957717	2 Oz. Free Water Collected (Shop End: Tendon H04-ED-D)
2	03957477	4 Oz. Free Water Collected (Field End: Tendon H04-ED-E)
2	03952156	4 Oz. Free Water Collected (Field End, Tendon H06-FE)
2	03952155	7 Oz. Free Water Collected (Field End, Tendon H05-FE)
2	02742695	32 Oz. Free Water Collected (Field End, Tendon D4-36)
2	02742688	12 Oz. Free Water Collected (Shop End, Tendon D6-13)
2	02742675	2 Oz. Free Water Collected (Shop End, Tendon D4-39)
2	02742632	8 Oz. Free Water Collected (Shop End, Tendon D4-27)
2	02742625	32 Oz. Free Water Collected (Field End, Tendon D4-38)
2	02742615	32 Oz. Free Water Collected (Field End, Tendon D4-08)
2	03992319	Tendon D5-12 Grease Moisture Content Acc. Criteria Exceeded
2	03992313	Tendon V-249 Free Water Grease Moisture Content Acc. Criteria

The types of degradation found during concrete surface examination were evidence of dome coating deterioration, moisture / efflorescence in the concrete surface and degraded patches. The specific inaccessible area of concern is the containment wall surfaces located below grade level (< 401' Elevation). The estimated extent of degradation in the inaccessible area is negligible if any exists. All other areas / surfaces where these conditions were identified (containment dome surfaces, containment buttresses and tendon tunnels) are fully accessible for examination. The conditions that led to the degradation included normal wear, water intrusion through minor cracks and voids in the concrete and aging of previously placed patches.

The types of degradation found during post tensioning system examination were ineffective tendon wires, evidence of free water and grease samples moisture content exceeding 10% by weight. The anchorage components for all tendons are accessible for inspection when the grease caps are removed. The three indications of ineffective wires are considered as isolated cases and are not considered a generic condition for the Unit 01 or Unit 02 post tensioning systems. For those fourteen locations where the presence of free water was detected, no evidence of degradation or active corrosion was identified on either the anchorage components or the surrounding concrete. All the components were found to be completely covered in the corrosion protection medium. The presence of free water in tendon anchorage is limited to specific anchorage locations / areas of the containments and is not considered a generic condition for the Unit 01 or Unit 02 post tensioning systems. The presence of free water at specific locations is managed through additional examinations in conjunction with the post tensioning surveillance activities required by ASME Section XI on a 5 year frequency. The condition that led to the presence of free water in the tendons is water infiltration through minor cracks and voids in the outer surface of the structure.

An evaluation of each area, and the result of the evaluation [10CFR 50.55a(b)(2)(viii)(E)(2)]:

Engineering evaluations (Ref. EC 620893 and 620894) were performed to address all the examination results that did not meet the acceptance standards of IWL-3100 or IWL-3200. With regard to concrete surface examinations, the degraded conditions did not warrant repair as they had negligible impact on the containment structure. With regard to post tensioning system examinations, the degraded conditions did not result in tendon anchorage components becoming uncovered or susceptible to corrosion.

A description of necessary corrective actions [10CFR 50.55a(b)(2)(viii)(E)(3)]:

Detailed visual examinations were performed on degraded conditions found during concrete surface examination. Based on the review of detailed examination results, no impact on the containment structure and no further actions, investigation or inspection of the inaccessible surfaces were needed. Recoating of the localized areas was performed on Unit1 and Unit2 Containment Dome Surfaces in 2016.

Braidwood will continue including additional anchorage locations beyond that required by ASME Section XI for the purpose of inspection for the presence of free water during the 35th year surveillance and beyond (ATI 02534983-11). The scope of the tendons selected will include the anchorage locations with greater than eight ounces of free water collected during the 30th year surveillance. Additionally, other anchorage locations located below grade level and dome tendons will be selected for grease cap removal and inspection for evidence of free water.

CONCLUSION

The results of the examinations revealed no degradation that adversely affects the structural integrity of the containment structures. During grease cap examinations, there was no evidence of deformation observed which was indicative of deterioration of anchorage hardware. With regard to pre-stress forces and elongation measurements, all acceptance standards were met. Additionally, the Regression Analysis (Ref. EC 620855) as specified in NRC Information Notice 99-10 was completed. The result of the regression analysis concludes the containment post-tensioning systems will continue to maintain the minimum design force through the extended 60-year life of the plant.