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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Duke Energy Corporation
Oconee Nuclear Station - Unit 3
Docket No. 50-287
Inservice Inspection Summary Report for Class MC and CC Component Examinations Completed by End of Refueling Outage EOC18

Pursuant to 10CFR50.55a(b)(2)(viii) and 10CFR50.55a(b)(2)(ix), Duke Energy Corporation submits the attached ISI Summary Report for ASME Class MC and CC Inservice Inspections completed between January 1, 2000 and the end of refueling outage 3EOC18 on May 21, 2000.

Several conditions were observed which meet the criteria for inclusion in this Summary Report. This Summary Report includes descriptions of these conditions and of planned corrective actions to address these conditions. These planned corrective actions are described for your information only. This information is not intended to represent a commitment.

Questions regarding the attached report may be directed to M. J. Ferlisi at (704) 382-3923.

Very truly yours,

W. R. McCollum, Jr.
Site Vice President

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Attachment:
Oconee Nuclear Station Unit 3, Class MC and CC ISI Summary Report for Refueling Outage EOC18

xc w/att:

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Oconee Nuclear Station, Unit 3
Class MC and CC ISI Summary Report for Refueling Outage EOC18

By: _____ Date: 8/17/00
(Mark J. Ferlisi, P.E.)

Reviewed By: _____ Date: 8/18/00
(R. V. Hester, P.E. IWL Responsible Engineer)

Approved By: _____ Date: 8-18-00

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A. ASME Code and Regulatory Requirements for Class MC and CC ISI Summary Reports

10CFR50.55a(g)(4)(v)(B) requires that metallic shell and penetration liners which are pressure retaining components and their integral attachments in concrete containments must meet the inservice inspection, repair, and replacement requirements applicable to components which are classified as ASME Code Class MC. 10CFR50.55a(g)(4)(v)(C) requires that concrete containment pressure retaining components and their integral attachments, and the post-tensioning systems of concrete containments must meet the inservice inspection, repair, and replacement requirements applicable to components which are classified as ASME Code Class CC.

This inservice inspection summary report addresses requirements of 10CFR50.55a(b)(2)(viii) and 10CFR50.55a(b)(2)(ix) for inservice inspections conducted in accordance with the ASME Code, Section XI, Subsections IWE and IWL for the Oconee Unit 3 concrete containment.

Inservice inspections of Class MC and metallic shell and penetration liners of Class CC components are performed in accordance with the ASME Boiler and Pressure Vessel Code, Section XI, Subsections IWE and IWL, 1992 Edition with the 1992 Addenda. Article IWA-6000, Records And Reports, paragraph IWA-6210, requires the Owner to prepare inservice inspection summary reports for inservice inspections performed on Class 1 and 2 pressure retaining components and their supports.

IWA-6000 does not address inservice inspection summary reports for Class MC or CC pressure retaining components and their supports, and the Code does not require preparation and submittal of summary reports for Class MC or CC components. As such, this Class MC and CC ISI Summary Report does not contain all of the information specified in IWA-6220 or IWA-6230. Please note that this report is being submitted within 90 calendar days following the completion

of the refueling outage at Oconee Unit 3, in accordance with IWA-6240(b).

Duke Energy Corporation is maintaining a separate Inservice Inspection Program for Class MC and CC pressure retaining components and their integral attachments. Therefore, this ISI Summary Report contains only that inservice inspection information applicable to Class MC and CC components. ISI Summary Reports for other Code Class components are submitted separately.

This Summary Report includes all applicable information required by 10CFR50.55a (b)(2)(viii)(D), (b)(2)(viii)(E), and (b)(2)(ix)(A).

B. General Description of Examinations and Conditions Requiring Reporting

Conditions were observed during refueling outage EOC18 that require inclusion in this Class MC and CC ISI Summary Report, as required by 10CFR50.55a(b)(2)(viii) and 10CFR50.55a(b)(2)(ix). These conditions were identified during the performance of the following examinations:

1. ASME Code, Section XI, IWL Examinations in accordance with Table IWL-2500-1, Category L-A, Item L1.10.
2. ASME Code, Section XI, IWL Examinations in accordance with Table IWL-2500-1, Category L-B, Items L2.30, L2.40, and L2.50.
3. ASME Code, Section XI, IWE Examinations in accordance with Table IWE-2500-1, Category E-A, Item E1.11.

Observed Conditions

Condition #1:

Grease leakage was detected during visual examination of the concrete surfaces. This requires reporting in accordance with 10CFR50.55a(b)(2)(viii)(D)(3). The locations of grease leakage are detailed later in this report.

Condition #2:

Bearing plate settlement noted and degraded concrete observed beneath bearing plate at top end of vertical tendon Mark 56V30. This condition was determined to require reporting in accordance with 10CFR50.55a(b)(2)(viii)(E).

Condition #3:

Free water was detected in vertical and dome tendon end caps. Specific tendons affected are detailed later in this report.

These conditions require reporting in accordance with 10CFR50.55a(b)(2)(viii)(D)(1).

Condition #4:

Water was observed at the embedment zone between the containment metallic liner and interior concrete basement floor at a location where existing moisture barrier was not intact. This condition allowed moisture to access portions of the embedded liner plate that are inaccessible for examination.

This condition was determined to require reporting in accordance with 10CFR50.55a(b)(2)(ix)(A).

C. Detailed Description of Reportable Conditions

Condition #1:

Grease leakage was detected at various locations on the exterior concrete surfaces of the Reactor Building during the performance of ASME Code, Section XI, IWL Examinations in accordance with Table IWL-2500-1, Category L-A, Item L1.10. These locations are summarized below, and are grouped by Component I.D. number assigned to each concrete surface area identified in the Oconee First Interval Containment Inservice Inspection Plan. Most horizontal tendon end caps exposed to weather show indications of past grease leakage of varying degrees through bolt holes, filler plug, or at the base of the cap. There are no active leaks of bulk grease.

<u>Component I.D. 3-CONC-001</u>

a) Grease staining/leakage observed at the joint between the Ring Girder and Buttress at the top of Buttress number 3.

b) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 3.

c) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 2.

d) Grease staining/leakage observed at a construction joint near El 955+0 on the face of Buttress number 3.

e) Intermittent grease staining/leakage observed along the interface between the Ring Girder and Cylinder Wall.

f) Grease staining/leakage observed on concrete surfaces adjacent to the Main Steam penetration near elevation 854+0, and azimuth 125°.

g) Grease staining/leakage observed at construction joint at elevation 834+0, near azimuth 110°-120°.

Component I.D. 3-CONC-002

a) Grease staining/leakage observed at the joint between the Ring Girder and Buttress at the top of Buttress number 2.

b) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 2.

c) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 1.

d) Intermittent grease staining/leakage observed along the interface between the Ring Girder and Cylinder Wall.

e) Grease staining/leakage observed at construction joint at elevation 884+0 at the centerline of Buttress number 1.

Component I.D. 3-CONC-003

a) Grease staining/leakage observed at the joint between the Ring Girder and Buttress at the top of Buttress number 1. Grease has stained face of Buttress.

b) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 1.

c) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 6.

d) Grease staining/leakage observed on the face of Buttress number 1.

e) Grease staining/leakage observed at construction joint at elevation 942+6, near azimuth 8°.

f) Faint grease staining/leakage observed at construction joint elevation 894+0, near azimuth 2°.

g) Grease staining/leakage observed at construction joint at elevation 884+0 at the center of Buttress number 1.

Component I.D. 3-CONC-004

a) Grease staining/leakage observed at construction joint elevation 961+6 between pockets for tendons 2D28 through 2D48.

b) Grease staining/leakage observed at construction joint elevation 961+6 between pockets for tendons 1D51 and 1D53.

c) Grease staining/leakage observed at the joint between the Ring Girder and Buttress at the top of Buttress number 6.

d) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 5.

e) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 6.

f) Intermittent grease staining/leakage observed along the interface between the Ring Girder and Cylinder Wall.

g) Grease staining/leakage observed at construction joint elevation 950+0 near azimuth 280°.

h) Grease staining/leakage observed at construction joint elevation 950+0 at the center of Buttress number 6.

i) Grease staining/leakage observed at construction joint elevation 942+6 on the right side of the face of Buttress number 6.

j) Grease staining/leakage observed at construction joint elevation 934+0 at the centerline of Buttress number 6.

k) Grease staining/leakage observed at construction joint elevation 924+0 on the right side of the face of Buttress number 6.

l) Grease staining/leakage observed at construction joint elevation 884+0 on the left side of the face of Buttress number 6.

m) Grease staining/leakage observed at construction joint elevation 874+0 on the left side of the face of Buttress number 6.

Component I.D. 3-CONC-005

a) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 4.

b) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 5.

c) Widely spaced intermittent grease staining/leakage observed along the interface between the Ring Girder and Cylinder Wall.

d) Grease staining/leakage observed at the joint between the Ring Girder and Buttress at the top of Buttress number 5.

e) Grease staining/leakage observed at construction joint elevation 942+6 near the center of Buttress number 5.

Component I.D. 3-CONC-006

a) Grease staining/leakage observed at the joint between the Ring Girder and Buttress at the top of Buttress number 4.

b) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 3.

c) Grease staining/leakage observed at the underside of the Ring Girder at the face of the Cylinder Wall at Buttress number 4.

d) Grease staining/leakage observed along the interface between the Ring Girder and Cylinder Wall near azimuth 160°.

e) Minor grease staining/leakage observed at construction joint elevation 914+0 near azimuth 180°.

f) Minor grease staining/leakage observed at construction joint elevation 904+0 on the left side of the face of Buttress number 4.

g) Minor grease staining/leakage observed at construction joint elevation 894+0 on the left side of the face of Buttress number 4.

Component I.D. 3-CONC-007

Minor oil leaks were noted from two end caps at Buttress number 1 as well as grease stains from the ceiling.

Component I.D. 3-CONC-008

No oil/grease leaks were noted in this area.

Component I.D. 3-CONC-009

a) Minor oil leaks were noted from nine end caps at Buttress number 5.

b) Minor oil leaks were noted from fourteen caps at Buttress number 6.

Component I.D. 3-CONC-010

a) Minor oil leaks/staining were noted from the ceiling at Buttress number 1.

b) Minor oil leaks were noted from sixteen end caps at Buttress number 1.

Component I.D. 3-CONC-011

Minor oil leaks/staining were noted from the ceiling at Buttress number 6.

Component I.D. 3-CONC-012

No grease leaks were noted in this area.

Component I.D. 3-CONC-013

Minor oil leaks were noted on two end caps in this area at Buttress number 6.

Component I.D. 3-CONC-014

Minor oil leaks/staining were noted at the top of Buttress number 6.

Component I.D. 3-CONC-015

Minor oil leaks/staining were noted from three end caps at Buttress number 5.

Component I.D. 3-CONC-016

A minor oil leak was noted beneath the Personnel Air Lock Penetration in the area.

Component I.D. 3-CONC-017

No grease/oil leaks were noted in this area.

Component I.D. 3-CONC-018

No grease/oil leaks were noted in this area.

Component I.D. 3-CONC-019

No grease/oil leaks were noted in this area.

Component I.D. 3-CONC-020

No grease/oil leaks were noted in this area.

Component I.D. 3-CONC-021

No grease/oil leaks were noted in this area.

Component I.D. 3-CONC-022

No grease/oil leaks were noted in this area.

Component I.D. 3-CONC-023

No grease/oil leaks were noted in this area.

Component I.D. 3-CONC-024 (Tendon Gallery)

Minor oil leaks were noted on seventy-three end caps in this area.

Discussion of Identified Grease/Oil Leakage and Staining

Grease/oil leakage from tendon end caps was observed at gaskets, installation screw holes in caps, and/or threaded vent/fill fittings attached to the caps. Because leakages observed at hoop tendon caps has stained other hoop tendon caps and bearing plates on each Buttress, the precise number and location of

hoop tendons that are actually leaking grease cannot be accurately determined without additional examinations or maintenance.

Because grease leakage was also identified during inspections on Unit 2 in 1999, Oconee has already begun to plan the following corrective actions to address the problem of leaking tendon caps. These corrective actions are being planned for all three Oconee units.

1. Reinspection of leaking/stained hoop tendon caps to identify which caps are the likely source of the majority of grease leakage, if this determination cannot be readily made from existing inspection records.

2. Cleaning of tendon bearing plates, tendon caps, and concrete surfaces in the vicinity of leaking hoop tendons.

3. Periodic reinspection of hoop tendon end caps and bearing plates to identify any additional leaking end caps requiring corrective action.

4. Removal of caps from tendon ends with significant leakage to perform an inspection of anchorage hardware. It should be noted that Oconee's experience has been that tendon cap grease leakage of the type indicated in this report has not resulted in an unacceptable level of grease coverage on tendon anchorage components and wires (The oil in the original grease tends to separate from the grease, but the residual viscous grease continues to provide a sufficient coating on the tendon wires and anchorage components).

5. Replacing existing tendon caps removed for anchorage inspections with an improved design to prevent additional grease leakage.

6. Complete regreasing or addition of grease to those tendons that have been fitted with new caps.

Condition #2:

Description of the Type and Estimated Extent of Degradation and Conditions that Led to the Degradation

The top bearing plate of tendon 56V30 was noted as having settled approximately 7/16" to 1/2" and the concrete surrounding the bearing plate was degraded. Damaged, loose concrete was carefully removed and a void was discovered beneath the bearing plate affecting a significant percentage of the bearing surface in the vicinity of the degraded concrete. This condition creates a path for rainwater to access inaccessible surfaces of the sheath and tendon, and observations indicated that moisture access has likely occurred in the past. Problem Investigation Process Report (PIP) #O-00-01930 was generated to document these conditions and address this degradation.

It should be noted that the Unit 3 Prestressing Report, dated October, 1973 identified the bearing plate settlement and documented the acceptability of this condition. The lack of complete concrete placement beneath the bearing plate is attributed to poor initial construction practices.

Although cracking was observed on concrete surrounding other vertical tendon anchorage locations on top of the Reactor Building, settlement and degradation of this significance was not observed at any other location. As a result, this condition is considered to be isolated to the affected tendon anchorage.

Evaluation of the Degradation and Evaluation Results

PIP #O-00-01930 documents the acceptability of the containment. The potential loss of this single vertical tendon does not affect the structural integrity of the containment. Although corrective actions are necessary, no immediate corrective actions are required to ensure continued structural integrity of the containment.

Description of Necessary Corrective Actions

1. Work Order #98276325 was generated to temporarily seal the edges of the bearing plate to preclude continued water intrusion.

2. Corrective actions are being planned for refueling outage 3EOC19 to permanently correct the condition of this bearing plate, including possible detensioning of the tendon to permit a more permanent repair to be made to the affected bearing surfaces beneath the bearing plate.

Condition #3:

Free water was detected in vertical and dome tendon end caps.

As a result of maintenance activities concurrent with but separate from Class CC ISI activities, free water was discovered in the end caps of tendons listed below:

a) The lower end cap of 45V16

b) The lower end cap of 45V28

c) Both end caps of 1D28

d) The end cap of 3D28 near Buttress number 4

pH tests of these samples indicated the water found was neutral or slightly basic. No water was observed in the tendon sheaths. Tendons 45V16 and 45V18 were drained and regreased. Tendons 1D28 and 3D28 had defective gaskets and had new end caps and gaskets installed.

Condition #4:

Description of the Type and Estimated Extent of Degradation and Conditions that Led to the Degradation

Moisture barrier degradation had been detected during the previous refueling outage and was addressed previously in Problem Investigation Process Report (PIP) #3-O98-4856.

This condition was also addressed previously in the Oconee Unit 3 Class MC ISI Summary Report for Refueling Outage 3EOC17, dated March 16, 1999 and submitted to the NRC via letter dated March 18, 1999. During refueling outage 3EOC18, all of the corrective actions required for the affected moisture barriers had been completed, except for a single location approximately 10" in length at azimuth 210°. During the performance of IWE Category E-A, Item E1.11 general visual examinations during 3EOC18, water was observed standing in the expansion joint at this embedment zone location. This condition was determined to require reporting in accordance with 10CFR50.55a(b)(2)(ix)(A).

As reported in the previous Class MC ISI Summary Report, it is believed that nearly all of the periphery of the liner plate beneath the embedment zone has been exposed to moisture and is submerged in standing water that cannot drain because of the geometry of the liner plate and the Reactor Building basement floor.

The standing water was caused by leaking components in the vicinity of the embedment zone. Because suitable environmental conditions (lack of humidity/moisture) could not be obtained during 3EOC18, completion of repairs to the affected moisture barrier was not possible.

Evaluation of the Degradation and Evaluation Results

These conditions were adequately addressed as discussed above during refueling outage 3EOC17. No other adverse conditions such as corrosion were observed in the vicinity of the standing water and missing moisture barrier.

Description of Necessary Corrective Actions

1. Leaking component(s) were corrected to eliminate source of water during 3EOC18.
2. Remaining missing moisture barrier material is to be corrected during refueling outage 3EOC19.
3. Permanent inspection ports are to be installed during refueling outage 3EOC19 to enable continued monitoring of the embedded containment liner plate at selected locations around the containment liner plate

embedment zone. These inspection ports were described previously in Problem Investigation Process Report #0-O96-2414, as documented in the previous Class MC ISI Summary Report for Unit 3.