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

Edwin I. Hatch Nuclear Plant – Unit 1
Inservice Inspection Program
Owner's Activity Report for Outage 1R27

Ladies and Gentlemen:

Enclosed is the ASME Section XI Code Case N-532-4 OAR-1 Owner's Activity Report for the 1R27 Refueling Outage. Table 1, "Items with Flaws or Relevant Conditions that Required Evaluation for Continued Service," lists evaluations performed for continued service. Repair/Replacement activities are addressed in Table 2, "Abstract of Repairs, Replacement or Corrective Measures Required for Continued Service." The SNC evaluation of shroud crack-like indications is included in Enclosure 4.

This report is for the third period of the 4th Interval ISI activities (Interval 4, Period 3, Outage 2).

This letter contains no NRC commitments. If you have any questions, please contact Ken McElroy at (205) 992-7369.

Respectfully submitted,

C. R. Pierce
Regulatory Affairs Director

CRP/OCV

- Enclosures:
1. 1R27 Form OAR-1 Owner's Activity Report
 2. 1R27 Form OAR-1 Owner's Activity Report, Table 1, Items with Flaws or Relevant Conditions that Required Evaluation for Continued Service
 3. 1R27 Form OAR-1 Owner's Activity Report, Table 2, Abstract of Repairs, Replacement or Corrective Measures Required for Continued Service
 4. SNC Evaluations

cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Mr. D. R. Vineyard, Vice President – Hatch
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**Edwin I. Hatch Nuclear Plant – Unit 1
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Owner's Activity Report for Outage 1R27**

Enclosure 1

1R27 Form OAR-1 Owner's Activity Report

FORM OAR-1 OWNER'S ACTIVITY REPORT

Report Number 1-4-3-2 (Unit 1, 4TH Interval, 3RD Period, 2nd Report)

Owner Southern Nuclear Operating Co, (as agent for Georgia Power Company), 40 Inverness Center Parkway, Birmingham, AL 35242

Plant Edwin I. Hatch Nuclear Plant, P. O. Box 2010, Baxley, Georgia 31513

Unit No. 1 Commercial service date 12/31/75 Refueling outage no. 1R27
(if applicable)

Current inspection interval 4TH
(1ST, 2ND, 3RD, 4TH, other)

Current inspection period 3RD
(1ST, 2ND, 3RD)

Edition and Addenda of Section XI applicable to the inspection plans 2001 Edition with 2003 Addenda

Date and revision of inspection plans Volume 1: 4/08/2011 Ver. 3.0; Volume 2: 01/20/ 2016 Ver. 5.0; Volume 3: 4/12/2011 Ver. 3.0; Volume 4: 01/21/2016 Ver. 7.0; Volume 5: 06/08/13 Ver. 6.0; Volume 6: 1/31/2013 Ver. 6.0; 1R27 Outage Plan: 3/7/16 Ver. 1.2

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

Code Cases used: N-532-4 ; N-460 ; N-663 ; N-2476; N-513-3; N-586-1
(if applicable)

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 1R27 conform to the requirements of Section XI.
(refueling outage number)

Signed Brian Hulett / Brian Hulett
Owner or Owner's Designee, Title

Date 5/26/2016

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 Georgia and employed by Hartford Steam Boiler Inspections Insurance Company of Connecticut of Hartford, CT 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.

Steven Fitzwater
Inspector's Signature

Commissions

NB 15193 A, N, I
National Board, State, Province, and Endorsements

Date 5/26/16

**Edwin I. Hatch Nuclear Plant – Unit 1
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Owner's Activity Report for Outage 1R27**

Enclosure 2

**1R27 Form OAR-1 Owner's Activity Report, Table 1, Items with Flaws or
Relevant Conditions that Required Evaluation for Continued Service**

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

UNIT 1 Cycle 27 TABLE 1

Examination Category and Item Number	Item Description	Evaluation Description
B-N-2 (B13.40)	During IVVI (VT-3 and EVT-1), crack like indications were reported at various locations on the Core Shroud.	Current Shroud evaluation bounds all conditions seen during 1R27.
F-A(F1.10)	Pipe Clamp 1B21-109-H004 (3" steam drain) was found with minor rotation of the clamp and a missing cotter pin.	The minor rotation of the clamp and missing pin would not impact the supports function.

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Enclosure 3

**1R27 Form OAR-1 Owner's Activity Report, Table 2, Abstract of Repairs,
Replacement or Corrective Measures Required for Continued Service**

ABSTRACT OF REPAIRS, REPLACEMENT OR CORRECTIVE MEASURES REQUIRED FOR CONTINUED SERVICE

UNIT 1 Cycle 27 TABLE 2

Code Class	Item Description	Description of Work	Date Completed	Repair/Replacement Plan Number
1	"12" Recirculation Inlet Risers	Applied Full Structural Weld Overlays on both the N2C and N2E nozzle to safe-end welds per approved Alternative HNP-ISI-ALT-15-01	3/3/2016	WO SNC685754 / SNC685755
1	3" Piping Welds	After ISI indication was reported, flapped weld 1B21-1MS-3-7 on the Main Steam system to remove possible material porosity. After flapping, welds passed re-exam criteria.	3/2/2016	WO SNC762620
1	24" RHR Weld Overlay	Full Structural Weld Overlay installed on RHR welds 1E11-1RHR-24B-R-12 and 1E11-1RHR-24B-R-13. The two subject piping welds are now replaced by one large continuous FSWOL per HNP-ISI-ALT-15-01.	3/3/2016	WO SNC657129
3	4" PSW Piping 1P41-F1378	Replaced section of 4" PSW line that contained a 4 dpm leak. This is plant service water piping in the torus room.	2/23/2016	WO SNC566971
3	4" PSW line	Replaced 6 feet of 4" PSW piping which repaired a 5 dpm leak near the 1P41-F050 (PSW containment outlet isolation). This is plant service water piping in the torus room.	2/23/2016	WO SNC570745

ABSTRACT OF REPAIRS, REPLACEMENT OR CORRECTIVE MEASURES REQUIRED FOR CONTINUED SERVICE


UNIT 1 Cycle 27 TABLE 2

3	4" PSW line	Replaced 5 feet of 4" PSW piping near valve 1P41-F049 (PSW containment inlet isolation). This repaired a 60 dpm leak in the torus area.	2/24/2016	WO SNC575187
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**Edwin I. Hatch Nuclear Plant – Unit 1
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Enclosure 4

SNC Evaluations

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BWRVIP EVALUATION

TE # 951268, 951048, 951137

Component Shroud

Applicable NMG NMP-ES-010-GL02

BWRVIP Guideline # BWRVIP-76, Rev. 1-A


INF/INR # I16H1006, I16H1007, I16H1009 / INRs H1R27 IVVI 16-02, 16-05, 16-10

Condition:

- 1) During 1R27, ASME Code VT-3 exams were performed of the score shroud ID surfaces at cells 02-23, 34-03, 34-51, 42-07, 46-11, 50-23, 50-27, 50-31, 50-35, and 50-19 from the top guide to the core plate. ASME code reinspections of flaws noted at 50-35 and 50-19 during 1R26 were conducted as a result. The 2.9" flaw at 50-35 appears to have grown approximately 0.16", and the 3" flaw at 50-19 appears to have grown approximately 0.31". Additionally, a second flaw adjacent to the 50-19 flaw was noted that is approximately 1.88" long. This flaw was present in 2014 but not recorded. No other flaws were noted as a result of the VT-3 inspections listed above.
- 2) BWRVIP extent of condition EVT-1 inspections were performed on shroud welds V5 and V6 from the OD. Previously noted OD-Initiated flaws dating from 1987 were reinspected as a result. These flaws are typical IGSCC flaws running parallel to V5 and V6 and within the HAZ. Two linear flaws were noted on the left side of the V6 weld in the HAZ starting at 1" below H4. The length of the first flaw was approximated at 6", with about 5.5" of unflawed ligament separating it from the next flaw. The second flaw begins at approximately 12.5" below H4, and is approximately 20.5" in length. One linear flaw was noted which started about 19" below the H4 weld and continues in right side HAZ of the V5 weld for a total length of 13.5". In addition, a 1.4" indication running perpendicular to the weld from the right side the V6 weld toe was noted at about 26.5" from the H4 weld toe. UT is normally performed as opposed to enhanced visual exams on the OD of V6. The last EVT-1 exam that was performed at V6 was during 1999. It is unclear whether this is a newer indication or if it was not identified during the 1999 EVT-1 exam. It was likely not seen during the 1R26 VT-3 because cleaning was not required for VT-3 examination.
- 3) BWRVIP extent of condition EVT-1 exams were also performed on the shroud ID and OD along the H4 weld in locations of vacated fuel cells 50-35, 50-31, 50-27, 50-23 and 50-19 (65° to 115° and beyond) in order to identify additional off-axis or through-shroud cracking similar to that noted at the shroud H4-V4 intersection during 1R26. One or more flaws were noted in each cell except for cell 50-35. From the shroud ID, 14 off-axis or "transverse" flaws ranging from 0.31" to 1.67" in length were reported, several of which extended above the weld toe, a few of which extended below the weld toe, and one of which was contained in the weld. From the OD, two short indications at approximately 106 degrees (0.27" above the weld toe and 0.15" below the weld toe), aligned with two indications at 106 degrees from the ID (1.47" above weld toe, 0.31" below weld toe). These two flaws are presumed to have grown through-wall.

Disposition:

- 1) ASME Code VT-3 base metal flaws - These flaws are bounded by existing flaw evaluations and calculation SIA 1200283.303 Rev. 1, and therefore are acceptable for continued service. Because growth was noted in 1R27, these flaws must be reexamined during the next 3 periods in accordance with ASME Section XI requirements.
- 2) BWRVIP EVT-1 V5 and V6 OD flaws – The linear flaws are bounded by existing flaw evaluations and calculation SIA 1200283.302 Rev. 1, and the transverse flaw is not a concern due to existing tie rod repairs for horizontally oriented flaws.
- 3) BWRVIP EVT-1 H4 off-axis flaws - These flaws are bounded by existing flaw evaluations and calculation SIA 1200283.303 Rev. 1, and therefore are acceptable for continued service. The flaws presumed through wall at this location are also bounded by the existing leakage evaluation, which assumes multiple >4" through wall flaws occur at each 30" span along the circumference of H4. The only confirmed through wall flaws at this location

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were 1.47" and 0.31" long, and if assumed connected across the H4 weld, would only total 2.78" in length. Another set of suspect indications that line up at 116 degrees and include a weld flaw would total 4.03" if assumed connected. These two flaws can be presumed through wall, but would still be well within the bounds of the existing shroud leakage assumptions in the 1R26 off-axis flaw evaluation. Therefore, the flaws at this location are acceptable for continued service. Because this qualitative evaluation is based on the assumptions of the 1R26 shroud off-axis flaw evaluation, the same inspection interval should apply, and these flaws should be reinspected during the same outage as the H4/V4 flaws.

Basis for Disposition:


- 1) ASME Code VT-3 base metal flaws - No new base metal flaws were identified as a result of ASME code shroud surface VT-3 exams. Two flaws previously reported in 1R26 were reported to have grown 0.16" to 3.06" total length, and 0.31", 3.31" total length, over the past cycle of operation, and another flaw was present but not reported in 1R26, and was measured at 1.88" in length during 1R27. The small amount of growth noted is well below the crack growth rate used in the current Hatch-1 Shroud flaw evaluation, and the flaw lengths are bounded by the longest H4/V4 off-axis flaw noted in 1R26. For example, a 3" flaw reported in 1R26 is assumed to have grown to 4.8" by 1R27 in the current evaluation, and the longest flaw of 8" is assumed to have grown to 9.8" long. The 1R26 SIA evaluation for the base metal and off-axis shroud flaws (1200283.303 Rev. 1) concluded that a flaw up to 45" is structurally acceptable for a 10-year inspection interval. Grinding was noted near each of these indications, which is known to increase susceptibility to IGSCC. The flaw growth noted from 1R26 to 1R27 far lower than the assumed growth rate in existing evaluation. The actual growth rate was 1.78E-5 in/hr in comparison to the projected growth rate of 5.0E-5 in/hr in the evaluation. This growth is not unexpected, and within the bounds of industry guidance.
- 2) BWRVIP EVT-1 V5 and V6 OD flaws – The one 13.5" linear flaw noted along V5 lines up with the 1R26 UT flaw noted in CNF-SHD-004 and the 1R26 Shroud UT Report. In 1R26, a flaw 13.9" was reported. This flaw has grown little if any during once cycle of operation. The two linear flaws reported at V6 also match very closely to UT results from 2014/1R26, with a few exceptions. Below is a table summarizing the OD initiated flaws reported in 1R26 and 1R27 for comparison:

V6 OD flaws

Flaw ID	1	2	3	4
Flaw start, distance below H4, 1R26/1R27	1.9"/ 1.0"	11.7" / 12.5"	50.6" / not reported	NA-transverse/ 26.5"
Flaw length, 1R26/1R27	6.2" / 6.0"	20.3" / 20.5"	3.5" / not reported	NA-transverse/ 1.4"

The 3rd OD flaw at V6 was not identified via EVT-1 in 1R27. The other linear flaws have shown essentially no change since 2014. The transverse flaw was not detectable using the UT equipment used for V6 during 1R26. Off-axis UT was only performed along H4 at the weld intersections and was not performed at V5 or V6. The transverse flaw on the OD initiates at the right side V6 weld toe and extends 1.4", which is outside the HAZ. Because the shroud tie rod repairs are installed and are designed to repair all horizontally oriented flaws, this flaw is not a structural concern. The equivalent location on the ID was not inspected due to inaccessibility, however, 1R26 ID VT-3 video was reviewed to determine if similar flaws on the ID were in the vicinity of the OD flaw, approximately 26.5" below H4. Although several transverse flaws are documented via INR H1R26 IVVI-14-10 at the equivalent cell 06-15 location on the ID, none of them were identified near the same OD shroud elevation. As a result this flaw was determined not to be through wall and no leakage calculation update is required. Based on a review of the 1R26 shroud evaluations, and no discernable change from previous inspection findings, all flaws reported at these locations during 1R26 are currently bounded by 1R26 flaw evaluations.

- 3) BWRVIP EVT-1 H4 off-axis flaws - The longest flaw reported in the 50 degrees of inspected area (75" of H4 weld), was reported at 116 degrees (cell 50-19) at 1.65" in length. Two other flaws that aligned with this flaw are located within the weld (0.38") and below the weld toe (1.38"). If it was assumed that these flaws connected, the total flaw length would be 4.03" long. A similar set of indications is located at 106 degrees, with

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a 1.47" flaw above the weld toe and a 0.31" flaw below the weld toe. These indications have matching flaws on the shroud OD and must be assumed through wall. If this flaw was assumed connected through the weld, it would be 2.78" in total length. Another set of suspect indications that line up at 116 degrees and include a weld flaw would total 4.03" if assumed connected. These two flaws can be presumed through wall, but would still be well within the bounds of the existing shroud leakage assumptions in the 1R26 off-axis flaw evaluation. The reason for this is that the 1R26 shroud leakage evaluation considered four separate through wall off-axis flaws along H4 with a total through wall length of 25" and assumed the same amount of leakage detected in the 30" of H4 inspected 1R26 repeated for every 30" of H4 weld length around the shroud (19 times). In comparison, the length of H4 that was inspected 1R27 was 50", with a total leakage flaw length of 7", which is far less than the 1R26 distribution of flaws. Therefore, the existing leakage calculation assumptions bound the leakage flaws discovered during 1R27. The remainder of the flaws are <0.7" in length and are considered minor. Each of the 16 total off-axis flaws that were reported in at this location during 1R27 is bounded by the 1R26 off-axis flaw evaluation. The longest off-axis flaw reported was 8" long, which is twice the length of the 4" flaw assumed connected at 116 degrees.

Scope Expansion (ref. NMI step 4.6.9)


No unexpected inspection results were encountered as a result of shroud inspections during 1R27. No scope expansion was determined necessary, and BWRVIP-76 Rev. 1-A scope expansion requirements were not applicable to these inspections. No ASME Section XI scope expansion is required.

Follow-on or Supplemental Examinations (ref. NMI step 4.6.10)

- 1) ASME Section XI requires follow-on exams during the next 3 periods due to growth. Therefore, shroud surface VT-3 inspections should be planned at cells 50-19 and 50-35 during the 5th interval period 1 (1R29 or 1R30), period 2 (1R31 or 1R32), and period 3 (1R33 or 1R34).
- 2) No follow on EVT-1 inspection is required of V5 and V6 due to pre-existing plans to UT these welds during 2020 (1R29). However, follow up 2-sided inspection of the flaw ~29.5" below H4 at weld V6 should be planned to confirm or rule out leakage.
- 3) Reinspection of the H4 weld at cells 50-31, 50-27, 50-23, and 50-19 should coincide with reinspection of H4/V4 flaws, which are currently scheduled for 1R29. This reinspection may be carried out via off-axis UT or 2-sided EVT-1 exams.

References (ref. NMI step 4.7.1)

- 1) I16H1006 and INR H1R27 IVVI-16-02, HNP-1 1R27 Shroud VT-3 ID indications (INF and INR)
- 2) I16H1007 and INR H1R27 IVVI-16-05, HNP-1 1R27 Shroud H4 ID EVT-1 indications (INF and INR)
- 3) I16H1009 and INR H1R27 IVVI-16-10, HNP-1 1R27 Shroud V5/V6 ID and OD EVT-1 indications (INF and INR)
- 4) SIA 1200283.303 Rev. 1, HNP-1 Core Shroud Axially Oriented Flaw Evaluation and Leakage Rate Calculation – H4 Weld, Base Material Flaws between H3 and H4 Weld, V7 Flaws, V8 Flaws, 2/27/2014
- 5) SIA 1200283.302 Rev. 1, HNP-1 Core Shroud Vertical Welds V5/V6 Crack Growth and Fracture Mechanics Evaluation, 2/27/2014
- 6) GEH Report #HAT1-14-TS2-184479, HNP-1 Ultrasonic Examination of Core Shroud Vertical Welds, February 2014
- 7) SNC555460, HNP-1 1R26 Core Shroud Leakage Margin RER
- 8) I14H1007, HNP-1 1R26 Shroud Base Metal Indications INF
- 9) I14H1011, HNP-1 1R26 Shroud OD Indications INF
- 10) I14H1012, HNP-1 1R26 Shroud H4-V4 ID and OD Indications INF
- 11) I14H1014, HNP-1 1R26 Shroud VT-3 ID Indications INF
- 12) I14H1016, HNP-1 1R26 Shroud UT results INF

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Review and Approval (ref. NMI Step 4.7)

Responsible Engineer: DeJas S. Bourgeois Date: 2/28/16

Independent Review: ANDREW GORDON Date: 2/28/16

Supervisor Approval: Dale W. Wynd / Dale Wynd Date: 2/28/16