

January 20, 2023

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NL-23-0003  
10 CFR 50.90

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

Edwin I. Hatch Nuclear Plant – Units 1 and 2  
Response to Request for Additional Information Regarding License Amendment  
Request to Relax the Required Number of Fully Tensioned Reactor Pressure Vessel Head  
Closure Studs in Technical Specification Table 1.1-1, “MODES”

Ladies and Gentlemen:

On August 19, 2022, pursuant to the provisions of 10 CFR 50.90, “Application for amendment of license, construction permit or early site permit,” Southern Nuclear Operating Company (SNC) requested a license amendment to the Technical Specifications (TS) for Edwin I. Hatch Nuclear Plant (HNP) Units 1 and 2 Renewed Facility Operating Licenses DPR-57 and NPF-5, respectively [ML22231B055]. The proposed amendment would revise TS Table 1.1-1, “MODES,” to relax the required number of fully tensioned reactor pressure vessel (RPV) closure studs.

On December 21, 2022, as part of their review of SNC’s license amendment request, the NRC Staff sent requests for additional information (RAI) to SNC [ML22355A208].

The enclosure to this letter repeats the RAI and provides SNC’s response to each request.

SNC requests the same approval and implementation schedule as requested in its original application [ML22231B055]. The conclusions of the No Significant Hazards Consideration Determination and Environmental Consideration contained in the original application have been reviewed and are unaffected by this RAI response.

In accordance with 10 CFR 50.91, “Notice for public comment, State consultation,” paragraph (b), a copy of this application, with enclosure, is being provided to the designated Georgia Officials.

This letter contains no regulatory commitments. If you have any questions regarding this submittal, please contact Ryan Joyce at 205.992.6468.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on the 20<sup>th</sup> day of January 2023.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Cheryl A. Gayheart', with a stylized flourish at the end.

Cheryl A. Gayheart  
Regulatory Affairs Director  
Southern Nuclear Operating Company

CAG/agq/cg

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cc: NRC Regional Administrator, Region II  
NRC NRR Project Manager – Hatch  
NRC Senior Resident Inspector – Hatch  
Director, Environmental Protection Division – State of Georgia  
RType: CHA02.004

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**NL-23-0003**

**Enclosure**

**Responses to Requests for Additional Information**

### **Responses to NRC Request for Additional Information**

Nuclear Regulatory Commission (NRC) Staff sent requests for additional information (RAI) via email to Southern Nuclear Operating Company (SNC) dated December 21, 2022 [ML22355A208]. The RAIs were regarding SNC's license amendment request (LAR) to revise the required number of fully tensioned reactor pressure vessel (RPV) head closure studs in Technical Specification (TS) Table 1.1-1, "MODES" for Hatch Nuclear Plant (HNP) [ML22231B055]. The NRC Staff's requests are below, and SNC's responses follow each request.

#### **NRC RAI-01**

The NRC authorized relief requests, in 2017 and 2019 (ML17205A345 and ML19035A550 respectively), from inspection of RPV stud #33 based on impracticality. The 2017 authorization was a contingency in case the two planned stud removal techniques were not successful during refueling outage 2R24. Similarly, the 2019 relief was authorized, through the end of the current ISI interval (December 31, 2025), in case attempts to remove RPV stud #33 were not successful during the Hatch Unit No. 2 refueling outage 2R25.

- a) Please provide a summary of all attempts to inspect and/or remove stud #33 since the 2017 authorization, including techniques applied for removal of each attempt, results achieved, and acceptance criteria for terminating removal efforts.
- b) Also, please provide post-tensioning values for the as-left condition of stud #33 for each outage.

#### **SNC Response to RAI-01**

- a) During the Spring 2017 refueling outage (2R24) at HNP Unit 2 inservice inspections (ISI) were performed on all RPV head studs. The code-required volumetric examinations discovered an indication on stud #33 below the vessel flange at the threads. SNC's contractor mobilized during disassembly to attempt to remove the stud for further evaluation using site supplied tooling. The contractor was unable to remove the stud due to the inability to adequately clean the threads of the top stud hole to allow attachment of the tooling without impacting critical path. In lieu of utilizing the site tooling the contractor did attempt to remove the stud utilizing a stud runner adapter and a breaker bar which was also unsuccessful. The contractor then mobilized the Stud Removal Tooling (STAR) to HNP Unit 2 and assembled a plan to remove the stud during reassembly. The planned stud removal during reassembly was scheduled for 5 hours in parallel with RPV nut, washer, and stud installation but actually took 8 hours due to dose and heat stress challenges. The efforts using the STAR tooling were also unsuccessful and removal efforts were halted and reassembly resumed.

During the HNP Unit 2 Spring 2019 refueling outage (2R25) SNC in conjunction with its contractor planned to attempt to remove stud #33. The plan consisted of utilizing the STAR tooling but increasing the air supply line size to create more pressure as well as increasing the size of the air impact to produce 50k ft-lb of torque. The plan also consisted of a system that would introduce penetrating oil (Kroil) at 2,000 psi to aid the removal. A roller – vibrator was also used to help loose the stud from the flange. The

STAR tooling was installed on the stud and the penetrating oil was introduced through the elongation rod hole in the stud and pressurized to 2,000 psi. The penetrating oil was given a 5-hour soak time prior to beginning efforts to remove the stud. The 50k ft-lb air impact was installed on the STAR tooling and efforts began to remove the stud. The stud did not rotate immediately so the team began using the roller vibrator in conjunction with the air impact for about 15 minutes. However, this was not successful, and removal efforts were halted once again.

As stated in the LAR, no attempts were made to remove stud #33 during the 2021 HNP Unit 2 refueling outage (2R26). Due to the SARS-CoV-2 (COVID-19) pandemic, SNC took precautions to prevent the spread of COVID-19 on site. One aspect of this involved minimizing the number of contractors on site, thus limiting the scope of the outage. The attempt to remove HNP Unit 2 stud #33 was among the activities removed from the 2021 refueling outage scope.

- b) The following post-tensioning elongation measurement values were recorded for stud #33 during the 2017, 2019, and 2021 refueling outages: 0.045" in 2017, 0.042" in 2019, and 0.044" in 2021. The measured elongations are within the required elongation tolerance band, and the difference among the measurements is typical for outage-to-outage variation due to measurement uncertainty and tensioning performance.

## **NRC RAI-02**

In its LAR dated August 19, 2022, the licensee states that Table 1.1-1 is proposed to be revised to address the increased possibility that a RPV head closure stud cannot be fully tensioned and avert the possible need for an exigent or emergency license amendment during the Spring 2023 refueling outage.

- a) Please describe the technical basis supporting the assertion that stud #33 or any other stud cannot be fully tensioned.
- b) Please provide any estimated calculations or inspection results that would indicate that the known flaw on stud #33 would propagate to a point such that sufficient tensioning is not achievable.

## **SNC Response to RAI-02**

- a) SNC cannot fully characterize the indication and is unable to predict the operational impact of stud #33 (e.g., its continued ability to be fully tensioned). Furthermore, this is a condition for which there is not any directly applicable operating experience. Given these uncertainties, SNC is requesting approval of the LAR as a contingency in the event that the stud may not be able to be fully tensioned during the refueling outage and future attempts to remove and replace the stud may result in not being able to fully tension the stud. SNC fully intends to employ sound engineering principles to maintain all RPV studs in service. While there is no apparent degradation of any other RPV studs on HNP Unit 1 or Unit 2, circumstances may arise that result in the need to safely operate HNP Units 1 and 2 with a head closure stud(s) not fully tensioned. SNC considered it prudent and reasonable to request the change as a contingency given the engineering calculation included with the LAR supports plant operation with one Unit 1 stud and two Unit 2 studs less than fully tensioned.

- b) SNC is unable to fully characterize the indication in stud #33 to predict the behavior of the indication. Therefore, there are no calculations or inspection results that indicate a potential for the indication to propagate to a point that the tensioning is not achievable. SNC is requesting the LAR as a contingency in the event the stud #33 were to not achieve sufficient tensioning.

### **NRC RAI-03**

In its LAR dated August 19, 2022, the licensee requests approval of operation of Hatch, Unit 2, with two RPV studs less than fully tensioned and Hatch, Unit 1, with one stud less than fully tensioned. Based on the 2017 and 2019 relief requests, the NRC understands the impracticality assessment regarding stud #33. Based on review of Section 2.3 of the SNC submittal, the NRC has concerns regarding the basis for the need regarding the request to allow a second stud to be less than fully tensioned in Hatch Unit 2 and the basis for any RPV studs to be less than fully tensioned in Hatch Unit 1.

Please provide the safety basis to have additional studs less than fully tensioned in Unit 1 and 2 when there is no apparent degradation or inspection results supporting such action.

### **SNC Response to RAI-03**

SNC intends to employ sound engineering principles to maintain all RPV closure studs in service. Justification for two studs in HNP Unit 2 and one stud in HNP Unit 1 being less than fully tensioned is provided in the DEI calculations included with the LAR. While there is no apparent degradation of any other RPV closure stud in HNP Unit 1 or Unit 2, SNC considered it prudent and reasonable to request the change as a contingency given the engineering calculation included with the LAR supports plant operation with one Unit 1 stud and two Unit 2 studs less than fully tensioned.

### **NRC RAI-04**

In its 2019 relief request, the licensee told the NRC that it planned to remove stud #33 and requested relief as a contingency. In its LAR, the licensee states that, "There were no attempts to remove the stud during the 2021 refueling outage (2R26)," but asserts that these amendments are needed to "avert the possible need for an exigent or emergency license amendment during the Spring 2023 refueling outage." Because this condition has existed for more than six years and the licensee has had opportunities to remove/repair stud #33, the NRC has concerns that the entry conditions for an exigent or emergency amendment may be challenging to address. During the audit on December 14, 2022, SNC stated that there are no repair plans for stud #33 for the Spring 2023 refueling outage and that no inspection is planned because of the prior relief authorization through 2025.

- a) Please confirm outage-specific repair plans for stud #33 that are expected to be completed during the spring 2023 refueling outage for Hatch, Unit 2.
- b) Please provide justification for SNC's request for NRC approval and LAR issuance by February 25, 2023, prior to completion of the Spring 2023 outage.

### **SNC Response to RAI-04**

- a) There are no repair plans for stud #33 for the Spring 2023 refueling outage for HNP Unit 2. A different non-destructive method was being considered since other methods of removal have not been successful. The method under consideration has not been used in the nuclear industry, so additional vetting is required to ensure no adverse collateral impacts to other areas such as the vessel flange. There was not sufficient time to complete these vetting activities prior to the upcoming Unit 2 refueling outage.
- b) SNC is requesting NRC approval of the LAR prior to the completion of the Spring 2023 refueling outage as a contingency.

### **NRC RAI-05**

During the audit on December 14, 2022, the NRC asked about industry operating experience at boiling water reactors concerning stuck reactor vessel studs and removal success. The licensee discussed some known pressurized water reactor (PWR) examples and mentioned the precedents in its LAR submittal.

- a) Please provide available industry operating experience for stuck RPV studs at other boiling water reactor (BWRs) and methods used to repair/replace such studs.
- b) If applicable, please confirm that this is the first request for a BWR to change its design and licensing basis to allow operation with one or more reactor vessel studs less than fully tensioned.

### **SNC Response to RAI-05**

- a) SNC is not aware of any such operating experience for stuck studs in any domestic BWRs.
- b) A review of domestic BWR plant-specific Technical Specifications (TS) was performed during the preparation of the license amendment request. Specifically, the TSs that define the operating modes were reviewed for changes that would allow plant operation with a specified number of reactor vessel head closure bolts (studs) less than fully tensioned. This review confirmed that HNP Unit 1 and Unit 2 is the first request for a BWR to propose the allowance to operate with one or more reactor vessel studs less than fully tensioned.

### **NRC RAI-06**

Table 3 of DEI Calculation C-037-2201-00-02 for Hatch Unit 2, the "Stud Condition" column indicates Cases B1, C1, B2, and C2 are for one untensioned/failed stud, but the description of the cases in Section 5.2.3 of DEI Calculation C-037-2201-00-02 states the cases are for two untensioned studs separated by nine tensioned studs (Cases B1 and B2) and two studs that fail in service separated by nine tensioned studs (Cases C1 and C2).

Please clarify that the stud conditions that were analyzed in Table 3 of DEI Calculation C-037-2201-00-02 for Hatch Unit 2 were for two untensioned studs separated by nine tensioned studs

for Cases B1 and B2 and two studs (separated by nine tensioned studs) that fail in service for Cases C1 and C2.

### **SNC Response to RAI-06**

The reference to one stud untensioned/failed in the “Stud Condition” column of Table 3 of DEI Calculation C-037-2201-00-02 for HNP Unit 2 is a typo. Table 3 summarizes the analysis results of having *two* studs untensioned, separated by nine tensioned studs, which is consistent with the discussion of these results in Sections 2, 5.2.3, and 5.2.4.1 through 5.2.4.4 of DEI Calculation C-037-2201-00-02.

### **NRC RAI-07**

The NRC staff noted that the application did not discuss the impact of the proposed change to the Hatch TS Table 1.1-1 to have less than a full set of tensioned studs on the RPV threads-in-flange. Because these are the threads into which the studs are installed in the RPV flange, there could be a potential impact of the licensee’s proposed change on the RPV threads-in-flange. The NRC staff noted that American Society of Mechanical Engineers Section XI Code Case (CC) N-864 may be used by licensees to forgo the inservice inspection (ISI) examination of the RPV threads-in-flange for a certain number of ISI intervals without the need for an alternative request, because the Code Case is conditionally approved in Regulatory Guide (RG) 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1,” Revision 20, which is incorporated by reference in 10 CFR 50.55a. The technical basis for CC N-864 is in EPRI Technical Report 3002007626, “Nondestructive Evaluation: Reactor Pressure Vessel Threads in Flange Examination Requirements,” March 2016 (ML16221A068). The analysis of the RPV threads-in-flange in the EPRI report assumes a full set of tensioned studs, and is, therefore, inconsistent with the proposed change to the Hatch TS Table 1.1-1 to have less than a full set of tensioned studs. Therefore, if the licensee is using CC N-864 or will use CC N-864 in its ISI program for the Hatch RPV threads-in-flange. Please discuss this apparent inconsistency.

- a) Please state whether CC N-864 is used now or will be used in the future in the ISI program for the Hatch RPV threads-in-flange.
- b) If CC N-864 is used now or will be used in the future in the ISI program, please show that the impact of the proposed change during preload conditions is bounded by the maximum applied stress intensity factor for the “Preload” case in Table 6-1 of the EPRI report.

### **SNC Response to RAI-07**

- a) Plant Hatch does not currently use CC N-864 but does not wish to preclude usage of CC N-864 with one stud out of service (Unit 1) or two studs out of service (Unit 2).
- b) The stud load applied for the “Preload” case in the EPRI report is defined in Section 6.1.2 of the report, where a pressure load of 42,338 psi is applied as a traction to a 6-inch diameter cross section (28.274 in<sup>2</sup>). The equivalent force under these conditions is equal to 1.20 x 10<sup>6</sup> lbs. At HNP Unit 1, the maximum preload stress under one stud out of service conditions is 43,770 psi on a stud cross section equal to



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27.489 in<sup>2</sup>. The equivalent force under these conditions is equal to  $1.20 \times 10^6$  lbs. At HNP Unit 2, the maximum preload stress under two studs out of service conditions is 40,130 psi on a stud cross section equal to 27.489 in<sup>2</sup>. The equivalent force under these conditions is equal to  $1.10 \times 10^6$  lbs. Given these results, the impact of the proposed change during preload conditions for HNP Unit 1 or HNP Unit 2 is either equal to or bounded by the "Preload" case in the EPRI report.