August 16, 2007

Mr. Dennis R. Madison
Vice President - Hatch
Edwin I. Hatch Nuclear Plant
11028 Hatch Parkway North
Baxley, GA 31513

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2 (HNP) - REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING ALTERNATE SOURCE TERM APPLICATION (TAC NOS. MD2934 AND MD2935)

Dear Mr. Madison:

By letter to the Nuclear Regulatory Commission dated August 29, 2006, Southern Nuclear Operating Company, Inc., proposed to revise the HNP licensing and design basis with a full scope implementation of an alternative source term. We have reviewed your application and have identified a need for additional information on the turbine building ventilation exhaust system ducts and supports as set forth in the Enclosure.

We discussed this issue with your staff on August 13, 2007. Your staff indicated that it plans to submit a response to this issue within sixty (60) days of receipt of this letter.

Sincerely,

/RA/

Robert E. Martin, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-321 and 50-366

Enclosure:
RAI

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION (RAI) CONCERNING
IMPLEMENTATION OF AN ALTERNATIVE SOURCE TERM (AST) APPLICATION
FOR EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2 (HNP)

Heating, Ventilation and Air Conditioning (HVAC) duct and damper RAI

The HNP Turbine Building (TB) ventilation systems are credited in the AST analysis with purging the area around the main control room (MCR) for the removal of activity at an exhaust rate of 15,000 cubic feet per minute (cfm) following a loss-of-coolant accident (LOCA), a control rod drop accident (CRDA), and a main steamline break (MSLB) accident. Enclosures 11 and 12 of the licensee's August 29, 2006, submittal, include the seismic verification of the TB exhaust ductwork for Units 1 and 2, respectively, following the guidelines in Enclosure 13 of the Electric Power Research Institute's (EPRI) Report No. 1007896, "Seismic Evaluation Guidelines for HVAC [heating, ventilation, and air conditioning] Duct and Damper Systems," supplemented by the peer review comments in its Enclosure 14.

1 (a) Do the TB ventilation systems need to maintain pressure boundary integrity in order to perform their intended function? If so, provide justification.

(b) What are the maximum design and operating pressures for the TB ventilation systems?

2. Page 4-1 of Enclosure 11 of the AST application states that "Small tears of the duct skin or small openings at duct joints as a result of an earthquake will not impair the required function of the ductwork and therefore would be acceptable."

(a) Have any openings or tears been recorded in the earthquake experience database and what was the range of sizes (opening area/flow area)?

(b) Were there any openings identified during the Hatch seismic review team (SRT) walkdowns? Quantify your answer.

(c) If the answer to 2.a or 2.b is yes, then what is the maximum area ratio of an opening (or sum of all openings), to duct flow area that a duct could have and still maintain its intended function for the HNP AST analysis?

3. The evaluation of ductwork in the AST application follows the guidelines in Electric Power Research Institute's (EPRI'S) Technical Report 1007896. This EPRI report recommends an evaluation of the duct material for stresses due to uses of HVAC duct that require pressure boundary integrity. Enclosures 11 and 12 of the AST application acknowledge that the HVAC duct systems are required to maintain pressure boundary integrity. Sections 5 of Enclosures 11 and 12 state that the ductwork does not need to be reviewed for stresses due to pressure since small openings in joints and seams will not adversely affect the ability of the ductwork to perform its intended function. If the duct system experiences insignificant pressure losses due to small openings or tears, then the duct wall experiences pressure induced stresses. Provide a reasonable explanation of why the pressure effects have not been considered for duct wall evaluation.

4. For systems where full pressure boundary integrity is required, EPRI guidelines recommend that the worst case bounding sample should include the duct run itself as

well as the supports. Explain how this guideline has been followed.

5. For the duct support analytical reviews, the EPRI guidelines recommend selection of 10 to 20 different sample supports. Only 5 duct supports were selected in Enclosure 11, for Unit 1, and 4 in Enclosure 12, for Unit 2. Provide justification for this deviation.

6. According to Enclosures 11 and 12, the in-structure response spectrum (IRS) for HNP is ½ the Seismic Margin Earthquake (SME) IRS at 5 percent (%) damping and is shown in Fig 3-1 of Enclosures 11 and 12. In these enclosures, the peak spectral acceleration (PSA) of the HNP IRS at 5% damping has been used to qualify all of the analytical review duct supports except for two which utilized a more accurate method described in the EPRI guidelines, Enclosure 13. Attachments B of Enclosures 11 and 12 contain the support analytical review data sheets for selected bounding supports. Referring to these selected supports, what were the seismic inputs used and how were they derived? As an option, submit References 12 and 13 of Enclosures 11 and 12 that contain this information.

7. This RAI is in reference to duct support analytical review outlier AR-1, discussed in Enclosure 11. This support was an outlier of the Vertical Capacity Check at 5 times the dead load. Per the EPRI guidelines, the Lateral and Longitudinal Load Check may be used to evaluate outliers that do not meet the Vertical Capacity Check. This is most applicable to supports characterized as non-ductile. From review of the support drawing shown on page B-4 of Enclosure 11, this support appears to be non-ductile. The bottom and particularly the top welds appear to be weaker than the support vertical members and a plastic hinge may not be formed in the vertical member(s) preventing possible weld failure by allowing ductile response. As stated in the EPRI report, a brittle failure (weld failure) is not acceptable seismic performance. Page E-2 of Enclosure 11 states that this support was evaluated for both lateral and longitudinal seismic loading and was found adequate. From the support drawing shown on page B-4 of Enclosure 11, the vertical support members are skewed to the top and bottom welds. The all around 1/8-inch fillet weld designation on the bottom weld is considered a weak weld. In addition, due to its skewed orientation, the effective weld throat is less than 0.707 x 0.125 on the longitudinal direction side of the angle iron which compounds its ineffectiveness. The top weld is a flash (fill) weld and by common engineering practice is not considered to provide resistance to structural loads, seismic horizontal plus dead load in this case.

   (a) For the "Lateral Load Check" EPRI recommends using a horizontal static equivalent seismic input of 1.0 times the PSA of the IRS at 5% damping. Figure 3-1, Enclosures 11 and 12, indicates this value to be approximately 0.32. If a different value was used provide technical justification.

   (b) Provide technical justification regarding the structural adequacy of these welds to support the design loading. Also, provide the size of the vertical members (size is not shown on support drawing).

8. In Enclosure 11, duct supports AR-2 and AR-3 failed the vertical Capacity Check. These supports were further evaluated using the Lateral and Longitudinal Load Check

and found acceptable. The bolt pattern in these supports does not appear to be capable of supporting applied dead weight plus seismic longitudinal loads. Provide detailed justification regarding the structural adequacy of these supports.

9. The screening and evaluation work sheets (SEWS) of Enclosure 11, sheet A-27, identifies a masonry wall between columns TC and TB south of row T10. It is stated that this "wall was evaluated per the IE [Inspection and Enforcement] Bulletin 80-11 program and is therefore not a seismic interaction concern." Was this wall included in the re-evaluation of the design adequacy of the masonry walls for IE Bulletin 80-11 and was it determined to be adequate to withstand seismic loads?

10. Walkdown Outlier No. 4 in table 4-1 of Enclosure 11, identifies a duct penetrating a masonry wall at column TB between rows T7 and T8, at TB floor elevation 112, and references Unit 1 drawing H-16048. Failure of this wall could cause the duct to fail. It is also stated that the licensee will modify the masonry block wall to prevent potential seismic interaction with the ductwork.

    (a) Confirm that this duct to masonry wall penetration is shown on drawing H-16047 and not on H-16048.

    (b) Has a design modification been prepared with the SRT's concurrence?

    (c) Provide a brief description of the proposed repair.

    (d) Provide the schedule for completion of the modification.

11. Walkdown Outlier No. 2 in Enclosure 11, identifies an unbolted duct strap hanger which needs to be restored to its original configuration. If restoration has not been completed, provide the schedule for completion.

12. Unit 2 walkdown outlier Nos. 2 and 5 in Enclosure 12, identifies masonry walls as possible seismic interactions that could cause duct failure. Walkdown outlier No. 3 identifies a seismic interaction hazard with the moisture separator reheater (MSR) vessel, a large vessel suspended on long rods and positioned against a bend of a 12"x18" duct. Walkdown outlier No. 4 identifies supports missing hardware. Walkdown outlier No. 6 involves a cantilever duct section that is inaccessible for inspection. To resolve these outliers, the SRT performed qualitative failure modes and effects analyses (FMEA). Provide these FMEAs which conclude that duct failure would not compromise the ability of the duct system involved to perform its required function.

13. Unit 2 walkdown outlier No. 1 identifies that the east filter train housing has a nut missing from one of its anchor bolts. Confirm that this nut has been reinstalled.

14. Unit 2 walkdown outlier No. 7 involves 3 duct strap hangers on a duct run that is not connected to overhead structural members. At least two of these appear to be adjacent to each other. Confirm whether this is correct. If missing supports are not adjacent to each other, ignore the remainder of this RAI. The affected duct run (19x12) appears to have changes in direction (at least two) between supports adjacent to these unconnected straps. It was judged that the duct runs containing these three hangers

were acceptable as adequately supported without these strap hangers.

(a) Provide a line sketch with approximate support span dimensions that shows the duct run containing these 3 strap hangers and 2 functional adjacent hangers on each side of the run containing a missing hanger (existing walkdown information and drawings could be utilized).

(b) Related to item 14.a above, provide the allowable duct spans and any span associated data, such as span stresses and loads, to confirm that existing spans without the three nonfunctional supports still meet allowable span criteria. Discuss whether you included reduction factors for changes in direction. Also provide your technical justification if reduction factors were not included in your evaluation.

(c) Provide the load rating for this type of strap hanger and compare it to the approximate loading of the straps adjacent to the nonfunctional supports.

Piping RAI (does not include pipe supports)

15. Walkdown data sheets signed by qualified SRT personnel, used for screening and evaluation of walkdown structures, systems and components (SSCs) similar to the ones contained in Enclosure 10, are not included with Enclosures 8 and 9 to the August 29, 2006, application. Justify the omission of the walkdown data sheets from Enclosures 8 and 9.

16. The main steam isolation valve (MSIV) alternate leakage treatment (ALT) path is credited in AST for HNP Unit 1 and the seismic evaluation is contained in Enclosure 8. Some of the lines included in the ALT path were seismically analyzed prior to this submittal. According to Enclosure 8, the ALT path lines that were designed by rule or by empirical/approximate methods have been seismically qualified in accordance with the generic method in General Electric (GE) topical report NEDC-31858P, Revision 2, "BWROG Report for Increasing MSIV Leakage Limits and Elimination of Leakage Control Systems." To address the seismic adequacy of the ALT piping, the Boiling-Water Reactor Owners Group (BWROG) report utilizes an earthquake experience data base for the performance of main steam piping in past earthquakes. The methodology is conceptually similar to that utilized by the Seismic Qualification Utility Group (SQUG) in the Generic Implementation Procedure (GIP) for the seismic adequacy verification of nuclear plant equipment. Section 3.2 of Enclosure No. 8, "Main Steam Drain to Condenser," identifies the following pipe sizes:

NPS 3, schedule 160, D/t = 8, and NPS 1, schedule 160, D/t = 5

(a) Were these lines included in their entirety in the analysis model of Section 3.2.2.5, "Bounding Seismic Analysis of the Main Drain Piping?"

(b) What was the calculated combined maximum displacement from the bounding analysis model and the clearance used during the walkdowns to evaluate seismic interactions?

(c) The following lines shown in table 1 of Enclosure 8, are not included in the BWROG report seismic experience database piping data.

NPS 6, schedule 80, D/t = 15; NPS 8, schedule 80, D/t = 17
NPS 4, schedule 120, D/t = 10; ½" tubing, wall=0.065, D/t = 8

Provide technical justification for the provision that the non-seismically analyzed ALT lines are well represented in the earthquake experience database.

(d) Section 3.1, "Main Steam and Turbine Bypass," contains a list of pipe sizes. Were any of these lines qualified using the BWROG report generic method?

(e) Identify all systems and pipe sizes that were seismically qualified using the BWROG report generic method that are not included in table 1 of Enclosure 8.

17. The path description and scope of work for the unit 1 MSIV ALT piping are shown in Enclosure 8. The staff cannot identify in Enclosure 8 that the lines from the main steam turbine bypass valve manifold to the condenser have been included in the ALT path. This is not in accordance with the BWROG report which credits these lines for ALT (see BWROG report, Volume II, Section 6.7). Explain this apparent discrepancy.

18. Table 2 of Enclosure 8 contains a list of outliers that were resolved either by analysis or by modification design change packages (DCPs). Provide a schedule for completion of modifications that have not been completed.

19. With the exception of items requested in RAI 18, provide a list of modifications and additions required for SSCs credited in the AST that have not been completed along with a schedule of completion.

20. Are there any air handling units (AHUs), motor control centers (MCCs), Fans and I&C cabinets associated with the AST that need to be seismically qualified? If yes, when will their evaluation be completed?

21. Were there any inaccessible areas for seismic ruggedness walkdowns of piping and or ductwork credited for the AST? If yes, discuss the schedule of completion.

Edwin I. Hatch Nuclear Plant, Units 1 & 2

cc:

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