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SOUTHERN COMPANY
Energy to Serve Your World℠

February 4, 2008

Docket No.: 50-321

NL-08-0035

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

Edwin I. Hatch Nuclear Plant
Request to Implement an Alternative Source Term
Response to Request for Additional Information Regarding the Unit 1
Main Steam Isolation Valve Alternate Leakage Treatment Seismic Evaluation

Ladies and Gentlemen:

On August 29, 2006 Southern Nuclear Operating Company (SNC) submitted a request to revise the Edwin I. Hatch Nuclear Plant (HNP) licensing/design basis with a full scope implementation of an alternative source term (AST). By letters dated November 6, 2006, November 27, 2006, January 30, 2007, June 22, 2007, July 16, 2007, August 13, 2007, October 18, 2007, December 11, 2007, and January 24, 2008 SNC has submitted further information to support the NRC review of the HNP AST submittal.

By letter dated October 3, 2007 the NRC requested additional information regarding the seismic evaluation of the Unit 1 main steam isolation valve alternate leakage treatment path, described in enclosure 8 of the referenced August 29, 2006 submittal, which is credited in the AST loss-of-coolant accident (LOCA) analysis. The enclosure to this letter contains the SNC response to the referenced NRC request for additional information (RAI).

The 10 CFR 50.92 evaluation and the justification for the categorical exclusion from performing an environmental assessment that were included in the August 29, 2006 submittal continue to remain valid.

(Affirmation and signature are provided on the following page.)

Mr. L. M. Stinson states he is a Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

This letter contains no NRC commitments. If you have any questions, please advise.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

L. M. Stinson
Vice President Fleet Operations Support

Sworn to and subscribed before me this 4th *day of* February, *2008.*

Notary Public

My commission expires: July 5, 2010

LMS/CLT/daj

Enclosure: 1. Response to Request for Additional Information Regarding the Unit 1 Main Steam Isolation Valve Alternate Leakage Treatment Seismic Evaluation

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. D. R. Madison, Vice President – Hatch
Mr. D. H. Jones, Vice President – Engineering
RType: CHA02.004

U. S. Nuclear Regulatory Commission
Mr. V. M. McCree, Acting Regional Administrator
Mr. R. E. Martin, NRR Project Manager – Hatch
Mr. J. A. Hickey, Senior Resident Inspector – Hatch

State of Georgia
Mr. N. Holcomb, Commissioner – Department of Natural Resources

Edwin I. Hatch Nuclear Plant
Request to Implement an Alternative Source Term

Enclosure 1

Response to Request for Additional Information Regarding the Unit 1 Main Steam Isolation Valve Alternate Leakage Treatment Seismic Evaluation

Edwin I. Hatch Nuclear Plant
Request to Implement an Alternative Source Term

Response to Request for Additional Information Regarding the Unit 1
Main Steam Isolation Valve Alternate Leakage Treatment Seismic Evaluation

NRC QUESTION 1

It is stated on Page 19 of Enclosure 8 of the Southern Nuclear Operating Company (SNC) August 29, 2006, application that for ½ SME (Seismic Margin Earthquake) and operating loads, all four sets of cast-in-place anchor bolts at the condenser piers have capacities, based on Generic Implementation Procedure, Revision 2 (GIP-2) and the GIP supporting document on seismic verification of equipment anchorage, that are greater than their demand for all load combinations. Furthermore, based on the SNC letter dated July 16, 2007, Question 4, part 2, the maximum shear force is 281,000 pounds for the southeast pier. The resulting shear stress per bolt due to this force is slightly larger than the GIP-2 shear stress allowable considered in table C.3-1 for cast-in-place bolts. The Nuclear Regulatory Commission (NRC) staff requests the licensee to justify the exceedance.

SNC RESPONSE

It is acceptable practice to revise the Seismic Qualification Utility Group (SQUG) Generic Implementation Procedure (GIP) anchorage capacities to be consistent with the known material strength of the anchorage if different than that assumed in the GIP, as long as the GIP methodology is maintained to derive the revised capacities. Based on this practice, the anchorage capacities used for the condenser anchorage are based on the GIP and are greater than their demand for all load combinations, as was stated in Enclosure 8 of the Alternative Source Term (AST) submittal dated August 29, 2006.

Specifically, the cast-in-place capacities provided in Table C.3-1 are based on the bolt material being ASTM A-307, as stated in footnote 1 of GIP Revision 2 Table C.3-1. However, the bolt material used for the Edwin I. Hatch Nuclear Plant (HNP) condenser cast-in-place anchor bolts is ASTM A-36. Therefore, the capacities were revised to properly represent the ASTM A-36 bolt material. The same GIP Revision 2 allowable stress equation was used, specifically 1.7 x American Institute of Steel Construction (AISC) Part 1 nominal allowable stress for tension and shear.

Using AISC 7th edition, which is the edition used for HNP, the revised GIP Revision 2 shear capacity is 1.7 x (0.30 Fy) = 1.7 x (0.30 x 36 ksi) = 18.4 ksi. There are four 2¼" diameter bolts per condenser support pier. This resulted in a total anchor bolt shear capacity of 292 kips per pier which is greater than the maximum shear force of 281 kips for the condenser southeast pier, provided in the referenced SNC letter dated July 16, 2007 in response to NRC question 4.

NRC QUESTION 2

It is stated on Page 13 of Enclosure 8 of the August 29, 2006, application, that the condenser sole plate has 1.5-inch thick by 50-inch long shear plates. The plan dimensions of the condenser piers are given as 58 inches x 38 inches in SNC's letter dated July 16, 2007, Question 4, part 3. There is an apparent inconsistency in this information with respect to whether there can be a 50-inch long shear lug on the narrow side. The NRC staff requests SNC to provide the configuration and dimensions of the shear lugs in the short direction and to revise Enclosure 8 appropriately.

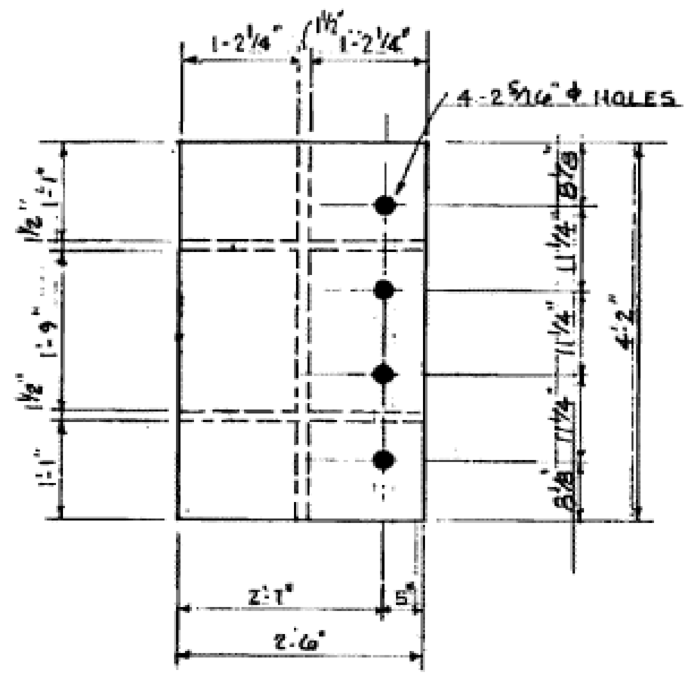
SNC RESPONSE

The referenced information provided on page 13 of AST submittal Enclosure 8 refers to the total minimum length of the shear plates available to transfer shear in either the north-south (N-S) or east-west (E-W) direction for each condenser pier, specifically stating: "The sole plate has 1½" thick by 50" long shear plates that extend 4 inches down into a 4 foot high reinforced concrete pier." The referenced information provided in the SNC letter dated July 16, 2007 in response to NRC question 4 described the overall dimensions of each condenser pier which contains the shear plates, specifically stating: "Each pier is approximately 4' high, and has plan dimensions of 4'-10" by 3'-2"." The pier plan dimension of 4'-10" is in the E-W direction and the pier plan dimension of 3'-2" is in the N-S direction. The following provides the detail description of the layout of the shear plates on the bottom of the sole plate which demonstrates that at least the minimum length of 50" of shear plates is provided in both the E-W direction and the N-S direction.

The sole plate plan dimensions are 2'-6" in the N-S direction and 4'-2" in the E-W direction. There is a single shear plate, 50" long, running in the E-W direction and located along the center line of the sole plate. There are four shear plates, each 14.25" long, running in the N-S direction and located on either side of the single E-W shear plate. The centerline of these N-S shear plates are 1'-1 ¾" from either the east or west ends of the sole plate. The total sum of the lengths of the N-S shear plates is 57". Therefore, the minimum length of the shear plates available to transfer shear of 50" is met or exceeded in both directions.

In summary, the following information supplements the previously provided information on shear plates. The sole plate has 1 ½" thick shear plates that extend 4 inches down into a 4 foot high reinforced concrete pier. The length of the shear plate in the E-W direction is 50" and the sum total length of the shear plates in the N-S direction is 57".

The following sketch (plan view from drawing H-12007) provides the steel details of the sole plate (MK-AF) with the shear plates.



PLAN @ MK. AE (sc. 3/4"=1'-0")

NRC QUESTION 3

Enclosure 8 does not include information relative to the evaluation and acceptability of the condenser sole plate shear lugs. The NRC staff requests SNC to demonstrate shear lug adequacy (e.g., weld stress, bending and shear stress in the shear lugs) and transfer of load from shear lug to the concrete pier (adequate bearing and shear strength of concrete).

SNC RESPONSE

The following evaluation summary demonstrates the acceptability of the structural elements in the load path from the condenser sole plate shear lugs to the reinforced concrete pier. This evaluation used the maximum shear load of 325 kips for a pier as provided in the SNC letter dated July 16, 2007 in response to NRC question 4 part 2. The evaluation accounted for the angle of the slotted hole in the condenser base plate to determine the resultant maximum shear forces being applied to the N-S and E-W shear lugs.

The capacity of each element of the load path was based on either AISC 7th edition Part 2 allowables following the GIP Revision 2 methodology or American Concrete Institute (ACI) 318-77 ultimate strength capacities. The evaluation considered the shear lug (i.e., maximum lug bending and shear and the lug weld) and the transfer of the load from the shear lug to the concrete pier (i.e., bearing and shear strength of the reinforced concrete). The results of the evaluation show that the capacities of each element of the load path exceeded their maximum demand. Therefore, the adequacy of the shear lug and the transfer of the load from the shear lug to the concrete pier are acceptable.

NRC QUESTION 4

With the presence of shear lugs on the underside of the condenser sole plate and considering the slotted hole details shown in Figure 6b of Enclosure 8, it appears that the anchor bolts may not be loaded in shear until yielding of the shear lugs occurs. The NRC staff requests the licensee to provide further information (assumed condenser base shear load path, etc.) relative to the rationale used to calculate the resulting shear force/stress in the anchor bolts as noted in Enclosure 8 and in the SNC letter dated July 16, 2007, Question 4, part 1.

SNC RESPONSE

The following provides a description of the load path for the condenser lateral loads (shear loads). The lateral load path is by direct bearing between different anchorage components as described below. The load transfer does not require yielding of any of the anchorage components. The described load path is consistent with the rationale used to calculate the resulting shear force/stress in the anchor bolts as noted in AST submittal Enclosure 8 and in the SNC letter dated July 16, 2007.

There are four condenser base plates; one at each of the four corners of the condenser. The condenser base plate is an integral part of the condenser. It is welded to the condenser shell plus there are stiffeners welded to the base plate and the condenser shell. The base plate has four slotted holes. The direction of the slot for a given slotted hole is parallel to a line that starts at the “anchor point” shown in Figure 6a of AST submittal Enclosure 8 and then crosses or intersects the center of the 2¼ inch diameter cast-in-place anchor bolt located in the center of the slotted hole. The angle or orientation of each slotted hole therefore varies as shown in Figure 6b of AST submittal Enclosure 8. As stated on page 13 of AST submittal Enclosure 8, this arrangement of the slotted holes allows for thermal growth of the condenser from the fixed point, i.e., stationary point, so that no forces are transmitted to the piers due to thermal growth.

Within each slotted hole is a 3¼ inch square steel block with the 2¼ inch diameter anchor bolt extending through a hole in the center of the square steel block. The thickness of the steel block is 1/16 of an inch less than the 2” thick condenser base plate. The purpose of the steel block is to transfer shear forces perpendicular to the slotted hole from the condenser base plate to the 2¼ inch diameter anchor bolt. This provides a direct load path by bearing from the base plate to the anchor bolt.

Similarly the anchor bolt then transfers this shear force to the sole plate by bolt bearing on the 2 inch thick sole plate. Note that the sole plate is directly beneath the condenser base plate. The shear load is then transferred from the sole plate to the reinforced concrete pier through bearing on the concrete embedded shear plates or lugs that are welded to the bottom of the sole plate.

NRC QUESTION 5

There appears to be an inconsistency in the table provided in SNC's letter dated July 16, 2007, in response to Question 4, part 2. The axial force for the northeast pier, -172,000 pounds for the D + L – (1.25 x ½ SME) load combination is not consistent with -84,000 pounds for the D + L – ½ SME load combination. The NRC staff requests SNC to review the values in the referenced table and to revise the table accordingly.

SNC RESPONSE

SNC has reviewed the axial and shear loads provided in the referenced table included as part of the response to NRC question 4 part 2 in SNC letter dated July 16, 2007. The axial load for the north-east pier for the load combination of DW + Live - 1.25 (1/2 SME) was inadvertently listed as -172 kips due to a typographical error. The correct value is -113 kips. No other necessary changes to the table were identified. The revised table is provided below:

	DW + Live + ½ SME	DW + Live – ½ SME	DW + Live + 1.25 (½ SME)	DW + Live – 1.25 (½ SME)
South-east pier				
Axial (Kips) *	7	-145	26	-164
Shear (Kips)	281	76	325	120
North-east pier				
Axial (Kips) *	143	-84	172	-113
Shear (Kips)	204	114	243	153
South-west pier				
Axial (Kips) *	-21	-166	-3	-184
Shear (Kips)	280	76	324	120
North-west pier				
Axial (Kips) *	166	-53	193	-81
Shear (Kips)	202	113	242	153

* Minus sign indicates tension.

"DW" is dead weight. "Live" is the live load which includes vacuum pressure plus nozzle loads. "½ SME" is the seismic loading based on one-half of the Hatch Unit 1 SME ground motion response spectra. The ½ SME exceeds the required Hatch Unit 1 Design Basis Earthquake (DBE).

NRC QUESTION 6

Section 5.7 of the NRC safety evaluation report (dated March 3, 1999) for GE Topical Report NEDC-31858P, Revision 2, states "The staff has determined that the generic methodology presented, coupled with the plant-specific analytical evaluations for the condenser structural members and their associated anchorages, would provide an acceptable method to verify the seismic adequacy of the condenser design." The NRC staff requests SNC to clarify the evaluation performed for the condenser shell/structural members and to provide justification for their adequacy.

SNC RESPONSE

SNC has concluded that the condenser structural members and their associated anchorages are adequate for the HNP ½ SME seismic demand, based on information previously provided by SNC in the AST submittal and in SNC responses to NRC requests for additional information (RAIs) and based on an additional analytical evaluation performed in response to this NRC question.

The focus of the evaluation of condenser adequacy in AST submittal Enclosure 8 was to address the applicable limitations provided in section 6.0 of the referenced NRC safety evaluation report (SER), dated March 3, 1999 for GE Topical Report NEDC-31858P, Revision 2. Specifically SER limitations 3, 4, and 5 refer to the condenser. Section 5.0 of AST Enclosure 8 summarizes how SNC addressed the referenced limitations. As stated in Section 5.0, the evaluations and associated walkdown covered in AST Enclosure 8 demonstrated the seismic adequacy of the HNP Unit 1 condenser and satisfied the applicable limitations.

Specifically, SER limitation 3 states: "Individual licensees should demonstrate that the plant condenser design falls within the bounds of the design characteristics found in the earthquake experience database. This should include review of the as-built design documents and/or a walkdown to verify that the condenser has adequate anchorage." Section 2.0 of AST submittal Enclosure 8 provides this demonstration. SER limitation 4 states: "Individual licensees should perform a plant-specific seismic evaluation for representative supports and anchorages associated with…the condenser." Section 2.2 of AST submittal Enclosure 8 describes the plant-specific analytical evaluation of the condenser anchorage. Additional information has been provided on the analytical evaluation of the condenser anchorage in the SNC responses to NRC questions 1 through 4 in this letter and in the SNC response to NRC question 4 in the SNC letter dated July 16, 2007. Finally, limitation 5 states: "Individual licensees should confirm that the condenser will not fail due to seismic II/I type of interaction (e.g., structural failure of the turbine building and its internals)." Section 1.0 of AST submittal Enclosure 8 provides the basis that the turbine building will not be a II/I concern; and the walkdown of the condensers did not identify any II/I concerns.

Additionally, in response to this RAI, SNC has performed an analytical evaluation of the condenser shell and condenser structural elements at the four corner supports for the loadings described in section 2.2 of AST submittal Enclosure 8. The capacities of the condenser shell and structural elements were based on the AISC 7th edition methods, with the allowable stresses modified to be consistent with SQUG GIP Revision 2 values. The results of this evaluation showed that the condenser shell seismic stresses are low for the 1.25 (1/2 SME) loading, less than 1 ksi. The structural elements at the condenser corner supports, e.g., stiffeners, condenser base plate, welds, all have capacities significant greater than the demand. For specifics on demand see the previous response to NRC question 5. Therefore, this additional analytical evaluation confirms the original assessment of the structural adequacy of the condenser which was based on demonstrating that the HNP condenser was well within the bounds of the earthquake experience data as presented in section 2 of AST submittal Enclosure 8.

NRC QUESTION 7

The NRC staff requests SNC to identify the edition of the design codes (the American Concrete Institute (ACI), American Institute of Steel Construction (AISC), etc.) used in the evaluation of Unit 1 turbine building and condenser for the main steam isolation valve alternate leakage treatment path (e.g., on page 19 of Enclosure 8, there is no edition of the ACI 318 code noted for condenser pier evaluation).

SNC RESPONSE

The design codes used in the design of the Unit 1 turbine building are provided in section 1.1.3 of AST submittal Enclosure 8. Subsequent evaluations discussed in AST submittal Enclosure 8 for the turbine building and condenser are based on AISC 1970 edition (7^{th} ed.) and ACI 318-77.

NRC QUESTION 8

Normally, the turbine pedestal is a separate structure independent of the turbine building. Enclosure 8 does not specifically address the turbine pedestal adequacy. The NRC staff requests SNC to address the turbine pedestal potential Seismic Category II/I concern.

SNC RESPONSE

The turbine generator foundation (TGF), or pedestal, is not connected to the turbine building (TB) above the basemat. The TGF and the components attached to the TGF were evaluated by the HNP Seismic Review Team (SRT) and found to not represent a potential seismic interaction concern with the condenser nor the main steam isolation valve alternate leakage treatment path piping.

The following provides a basis for this conclusion:

- The TGF does not have a separate basemat but instead is supported on the large TB basemat. Therefore the seismic motion of the basemat is the same for both the TGF and the TB.
- Above the basemat there is a 1 inch gap between the TGF and adjacent TB floors. The ½ SME seismic analysis results of the TB, which included the TGF, provides relative seismic displacements of the different mass points or floors. The absolute sum of the relative seismic displacements between adjacent portions of the TGF and the TB are all significantly less than 1 inch. Therefore, the gap is sufficient so that there is no potential for seismic impact between the TGF and the TB.
- The condenser is supported on reinforced concrete piers on the TB basemat. The turbine generator (TG) is supported on the TGF. There is a bellows connection between the condenser and the turbine. The bellows can easily accommodate the small seismic differential displacements.
- The TGF is a large stiff reinforced concrete foundation that was designed to criteria to minimize foundation displacements due to TG operating and accident loads. Also, the HNP SRT found that components connected to the TGF were well anchored. Therefore, the SRT concluded there was no falling or structural failure interaction concerns with the TGF.

NRC QUESTION 9

Enclosure 9 references GIP Revision 3A while Enclosure 8 references GIP Revision 2. The NRC staff requests SNC to review the respective references for consistency and to revise the pertinent sections accordingly.

SNC RESPONSE

HNP current licensing basis for Units 1 and 2 allows the use of the GIP. The HNP Unit 1 Final Safety Analysis Report (FSAR) Appendix A section A.3.1.4 and HNP Unit 2 FSAR Supplement 3.7.A both state: "…the methodology based on earthquake experience data developed by the Seismic Qualification Utility Group and documented in the Generic Implementation Procedure (GIP), Revision 2, plus any addition to the GIP reviewed and accepted by the Nuclear Regulatory Commission (NRC), for use in resolving Unresolved Safety Issue A-46, as required by NRC Generic Letter 87-02, may be used to verify the seismic adequacy of currently installed equipment …"

The referenced two AST submittal enclosures 8 and 9 have been reviewed. AST submittal Enclosure 8 is titled "Unit 1 Main Steam Isolation Valve Alternate Leakage Treatment Path Description and Seismic Evaluation." Though the report was issued July 28, 2006 a large portion of the work was prepared during the 1990s when the latest revision of the GIP was Revision 2 dated February 2, 1992. AST submittal Enclosure 9 is titled "Unit 1 Seismic Verification of Potential Secondary Containment Bypass Leakage Paths Terminating at the Main Condenser," and dated July 28, 2006. That work was performed in 2006 when the latest revision of the GIP was Revision 3A dated December 2001. GIP 3A is GIP Revision 3 but with the NRC SER comments for GIP 2 and GIP 3 incorporated and footnoted.

The use of either revision of the GIP would not affect any of the information or conclusions provided in these reports. For clarity, since none of the information or conclusions in the referenced enclosures are affected by which revision of the GIP was used, effectively, GIP Revision 2 was used in preparation of the enclosures.