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SOUTHERN COMPANY
Energy to Serve Your World℠

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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 Power Sources for the Turbine Building Ventilation System

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, and August 13, 2007, SNC has submitted further information to support the NRC review of the HNP AST submittal.

By letter dated February 22, 2007, the NRC requested additional information concerning the power sources for the HNP turbine building ventilation exhaust system which is credited in the AST analysis with purging the area around the main control room beginning 9 hours following the initiation of three of the four HNP design basis accidents. The enclosures to this letter contain 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.

(Signature and affirmation 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.

The NRC commitments contained in this letter are provided as a table in enclosure 2. 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 18th day of October, 2007.

Notary Public

My commission expires: July 5, 2010

LMS/CLT/daj

Enclosures:
1. Response to Request for Additional Information Regarding the Power Sources for the Turbine Building Ventilation System
2. List of Regulatory Commitments

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
Dr. W. D. Travers, 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 Power Sources for the Turbine Building Ventilation System

Enclosure 1

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

Response to Request for Additional Information
Regarding the Power Sources for the Turbine Building Ventilation System

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NRC QUESTION

By letter to the Nuclear Regulatory Commission (NRC) dated August 29, 2006 (the submittal), Southern Nuclear Operating Company, Inc. (SNC), proposed to revise the Edwin I. Hatch Nuclear Plant, Units 1 and 2 (HNP), licensing and design basis with a full scope implementation of an alternative source term (AST). The AST analysis credited the Unit 1 and Unit 2 turbine building (TB) ventilation exhaust systems with purging the area around the main control room beginning 9 hours following design basis accidents (DBAs). Section 2.7.3 of Enclosure 1 to the submittal indicates that the TB ventilation system has not previously been designed or constructed as an engineered safety feature (ESF) system.

Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," (RG 1.183), states that credit may be taken for accident mitigation features that are classified as safety-related, are required to be operable by the TSs, are powered by emergency power sources, and are either automatically actuated or, in limited cases, have actuation requirements explicitly addressed in emergency operating procedures.

The TB exhaust ventilation system is not an ESF system, but the submittal proposes to assign it an accident mitigation role. In considering a loss-of-coolant accident (LOCA) concurrent with a loss of offsite power (LOOP), the submittal proposes, in lieu of an emergency power source for the TB exhaust ventilation system, to rely upon the ability to take manual actions to restore offsite power in 8 hours. Based on the information currently available, the NRC staff does not find that the ability to restore offsite power in this time frame has been adequately established, nor has it been demonstrated to be equivalent to being able to operate the system from the emergency power supply, and, therefore, does not provide reasonable assurance that when the TB exhaust ventilation system is required, power will be available to operate the system.

Please provide additional information to justify reliance on the ability to restore offsite power under all conditions and potential causes in the midst of a LOCA or other referenced DBA events or provide information as to how this system can be powered from an emergency power source.

SNC RESPONSE

Introduction

As described in AST submittal enclosure 1 section 2.7.3.3, electrical power is assumed to be available to the TB ventilation exhaust system within 9 hours after initiation of a LOCA, main steam line break (MSLB), or control rod drop accident (CRDA). The robustness of the electrical distribution system and the relatively long time period until the restoration of offsite power is needed are two factors that result in high assurance that the TB ventilation exhaust system will be able to receive power from its normal power supply, and therefore will be available to perform its dose mitigation function.

To further ensure that the dose mitigation function of the TB ventilation exhaust system will be available within the required 9 hours, in the highly unlikely event that offsite power cannot be restored within the required time period, SNC is committing to a proposed design modification for both HNP units to provide the capability of supplying electrical power to the TB exhaust fans from an emergency power source.

There are a total of four TB ventilation exhaust fans, two for each HNP unit. Only one of the four fans is needed for the execution of the dose mitigation function. Any one of the four fans is capable of achieving the necessary minimum exhaust rate of 15,000 cfm. The power requirement for each fan is 40 hp for Unit 1 and 75 hp for Unit 2. This small load can be accommodated by the emergency diesel generators (EDGs) within the required time period post-DBA. Therefore, even in the unlikely event that offsite power cannot be restored, the capability to supply power from a safety related emergency power source provides further assurance that the TB ventilation exhaust system will be able to perform its dose mitigation function in the event of a LOCA, MSLB, or CRDA.

Proposed Modification

The TB ventilation exhaust fans are currently powered from non-essential motor control centers (MCCs). The proposed modification involves providing an alternate power supply to each of the four TB ventilation exhaust fans from an emergency source. The emergency power source will be an essential MCC (one essential MCC for each unit) that has the capability of receiving power from an EDG. Having an essential MCC available from each HNP unit ensures that a single electrical failure will not prevent at least one TB exhaust fan from being placed in service post-DBA.

While the details of the modifications differ slightly between HNP units, the modifications for both units involve the use of manual switches to make the electrical connection between the emergency power supply and the TB ventilation exhaust fans. As described in AST submittal enclosure 1 section 2.7.3, the TB ventilation systems exhaust through the reactor building vent plenums. Specifically, the two Unit 1 TB ventilation exhaust fans are located outside the Unit 1 reactor building on a lower portion of the reactor building roof at elevation (EL.) 185'. The two Unit 2 TB ventilation exhaust fans are located in the ventilation room on EL. 203' of the Unit 2 reactor building. The manual switches for connecting to the emergency power supply will be located in the respective Unit 1 and 2 reactor buildings at EL. 164' in the vicinity of the normal power supplies for the TB ventilation exhaust systems, areas that are easily accessible post-DBA. Additionally, it is noted that the other components associated with the proposed modifications, including any necessary cable routing, will be in the respective HNP unit's reactor building. Details of the conceptual designs for each unit are provided in the following discussions and shown in Figure 1.

Unit 1

The Unit 1 TB ventilation exhaust fans are currently powered from MCC 1R24-S016, cubicles 1C and 2C. The MCC supplies non-essential loads, and therefore, does not have the capability of being powered from an emergency source. The conceptual design provides an alternate starter located within the 1R24-S018A MCC that would be used to supply power to either one of the Unit 1 TB ventilation exhaust fans in the event that the normal (non-essential) power supply was unavailable. The 1R24-S018A MCC is powered from the essential 600-V bus 2C which is powered from an EDG when offsite power is not available. Four manual transfer switches, two per fan, would be required to 1) align power to either of the two Unit 1 TB ventilation exhaust fan motors from the cubicle located in 1R24-S018A and 2) align control power to the main control room to provide control and indication to the operators. The two switches for aligning power to the TB ventilation exhaust fan motors would be 600-V manual disconnect switches and the two switches for aligning control power to the control room would be 120-V rotary switches. All four switches would be located in the reactor building in the vicinity of the normal power supply (MCC 1R24-S016) to allow operations personnel the ability to operate the switches, if required, post-DBA.

The detailed engineering design work is scheduled to support the committed completion date. As with any design, field walkdowns during the design phase may dictate variations from the conceptual design described above. For example, the design may be more effectively implemented by utilizing local starters for the two Unit 1 TB ventilation exhaust fans These starters would control the TB fans normally and receive power from the current normal power supply at MCC 1R24-S016. Only two manual transfer switches (600V manual disconnect switches), one per fan, would then be required to align power to either local starter from the cubicle located in 1R24-S018A. Since the control power interface is located at the starter itself, realignment of the control power supply would not be required in order to start the TB ventilation exhaust fans. As described above, the manual transfer switches would be located in the vicinity of the normal power supply to allow operations personnel the ability to operate the switches post-accident. This approach, like the previous approach, maintains the capability for remote operation of the TB ventilation exhaust fans from the main control room. This second approach is the same design concept as described next for Unit 2, since the local starters are already present in the current Unit 2 configuration.

Unit 2

The Unit 2 TB ventilation exhaust fans are currently powered from MCC 2R24-S016, cubicles 3AL and 3AR. The MCC supplies non-essential loads, and therefore, does not have the capability of being powered from an emergency source. The proposed design modification for Unit 2 utilizes an alternate power supply to be used for either exhaust fan from the 2R24-S018A MCC. This would provide an emergency source of power to either one of the two TB ventilation exhaust fans in the event that the normal power supply was unavailable. The 2R24-S018A MCC is powered from the essential 600-V bus 1C which is powered from an EDG when offsite power is not available.

Two 600-V manual disconnect switches, one per fan, would be required to align power to either local starter from the cubicle located in 2R24-S018A. Since the control power interface is located at the starter itself, a separate switch would not be required to realign the control power supply in order to start the TB ventilation exhaust fans. The manual transfer switches would be located in the reactor building in the vicinity of the normal power supply to allow operations personnel the ability to operate the switches post-accident. Again this design maintains the capability for remote operation of the TB ventilation exhaust fans from the main control room.

As noted above, design details will be finalized as part of the preparation of the design change packages for HNP Units 1 and 2.

The switching components to be used in the modification include 600-V manual disconnect switches and 120-V rotary switches. The switching components to be used will be qualified safety related switches.

As is typical for systems powered from emergency power buses, the design will require that the TB ventilation exhaust fans be connected to the emergency power source such that any TB ventilation exhaust system electrical fault will not impact the essential 600-V bus and/or other equipment being supplied by the bus. The proposed design modification would entail supplying the non-safety related TB ventilation exhaust fans with safety related power. HNP currently has other non-safety related equipment that is fed from safety related power supplies as follows, the electric fire pump is supplied from essential 4160-V bus 1E and the Unit 2 service air compressors 2A and 2B are supplied from essential 600-V buses 2C and 2D respectively.

The primary isolation devices for all of these loads are the component supply breakers located in the associated switchgear cubicles. The circuit breakers not only provide a means of primary isolation, but also provide circuit protection as well as switching functions in some applications. The protective device settings are chosen to open the circuit breakers during a fault closest to the affected loads and to significantly reduce or eliminate the adverse effects of the fault to the rest of the distribution system. Consistent with the current configuration, the proposed modification will be designed such that a single failure would not prevent or impair the operation of essential safety functions.

The proposed modifications will be designed in accordance with the HNP electrical power system design bases, specifically referencing HNP Unit 1 FSAR sections 8.3.2, 8.4.2, and 8.8.2 and HNP Unit 2 FSAR sections 8.1.4, 8.3.1.2.1, 8.3.1.3, 8.3.1.4, and 8.3.1.5. In addition, current licensing basis (CLB) HNP unit specific compliance with the General Design Criteria (10 CFR 50, Appendix A), NRC Regulatory Guides, and Industry Standards will be maintained.

Emergency Diesel Generator Capacity

The size of each of the Unit 1 TB ventilation exhaust fans is 40 hp (30 kW). The size of each of the Unit 2 TB ventilation exhaust fans is 75 hp (56 kW). The continuous rating of each of the five Unit 1 and 2 EDGs is 2850 kW. A single Unit 1 TB ventilation exhaust fan represents only 1% of the continuous rating of one EDG. A single Unit 2 TB ventilation exhaust fan represents only 2% of the continuous rating of one EDG.

As discussed in the HNP safety analysis applicable to both units, reference Unit 2 FSAR chapter 15, the DBAs pose the most limiting challenge to plant design, including the offsite and onsite electrical power systems. Unit 2 FSAR section 15.3 documents the CLB event sequences for the three DBAs which will credit the TB ventilation exhaust system in AST. The DBA LOCA is the only accident with significant long-term power demands. For the MSLB or CRDA, the long-term core and containment cooling demands are much less significant. Therefore, electrical demand is substantially less for these accidents.

The HNP CLB electrical load analysis, reference Unit 1 FSAR chapter 8 and Unit 2 FSAR chapter 8, addresses the limiting event sequence, the LOCA, for the offsite and onsite electrical power systems. A complete loss of offsite (normal) power supply is assumed to occur simultaneously with the LOCA. The limiting DBA LOCA power demands occur during the short-term response to the event, the first 10 minutes, during which time the emergency core cooling system (ECCS) is called upon to reflood the core. Per the CLB SAFER/GESTR LOCA ECCS evaluation, reference Unit 2 FSAR section 6.3.3 applicable to both HNP units, the core reflood occurs by approximately 130 seconds after initiation of the LOCA. The CLB LOCA analysis credits no operator action prior to 10 minutes following initiation of the DBA. At 10 minutes the operator can terminate excess ECCS pumping capacity and transition to the long-term LOCA response. By approximately one hour post-LOCA, reference HNP Unit 1 FSAR section 8.4.3

and Unit 2 FSAR section 8.3.1.1.3, the required long-term core cooling can be achieved with one core spray pump and the required long-term containment heat removal with one residual heat removal pump and two residual heat removal service water pumps (see the referenced FSAR sections for other loads).

Based on the above limiting event sequence for a LOCA, the HNP CLB electrical load analysis extends to one hour post-LOCA. The electrical load analysis considers the limiting single failure of any one diesel or diesel battery and its associated buses. Because the limiting DBA electrical loads occur within the first hour of the response to the LOCA, it is not necessary to extend the time frame of this analysis. In addition, beyond the short-term LOCA response, the long-term response could have many variations. The long-term response will be dictated by the specific symptoms of the event and will be in accordance with the HNP emergency operating procedures (EOPs) and abnormal operating procedures. The electrical loading associated with core cooling and containment heat removal after completion of the short-term response will be reduced, freeing up capacity on the EDGs and allowing for the discretionary addition and removal of loads consistent with applicable EDG ratings in accordance with applicable HNP procedures. The small load of one TB ventilation exhaust fan (56 kW or less) will be able to be powered by an EDG well within the required 9 hours.

Based on the above, a longer electrical load analysis, such as covering 9 hours post-LOCA, would be of little or no value. With the limiting DBA electrical loads defined by the LOCA response in the first hour, SNC has determined that there will be sufficient capacity on the EDGs by approximately 2 hours after the initiating event to power one TB ventilation exhaust fan requiring, at the maximum, 56 kW. As stated earlier, in the event of a MSLB or CRDA, the electrical demand is substantially less. This would result in there being sufficient capacity on the EDGs to power one TB ventilation exhaust fan, even a short time after the onset of a MSLB or CRDA. Since the TB ventilation exhaust fans are not required until 9 hours after initiation of the three DBAs for which they are credited in the AST analyses, there will be adequate capacity on the EDGs to provide the small amount of power required for one TB ventilation exhaust fan to perform its dose mitigation function.

Vital Area Operator Actions

The proposed TB ventilation exhaust system design modification described above requires a new operator mission to be performed within 9 hours post-accident in vital areas. The mission is to position manual switches in order to align the TB ventilation exhaust fans to an emergency power source. An evaluation has been performed to demonstrate that the radiological dose consequences to an operator performing this mission are within regulatory dose limits per 10CFR50, Appendix A, General Design Criterion 19 and NUREG-0737 (Clarification of TMI Action Plan Requirements, November 1980) Item II.B.2.

The operator dose evaluation assumes conservative values for walking speed from the main control room to the required locations in the reactor building and for the time required to identify and operate the necessary switches at the designated switch locations for each unit. The switch location is assumed to be in the respective reactor building in the vicinity of the normal power supply (MCCs 1R24-S016 or 2R24-S016). The TB ventilation exhaust fans will be aligned to emergency power, if required, such that a single failure will not prevent the use of at least one TB ventilation exhaust fan to perform the required dose mitigation function.

The ingress/egress time to the switch locations in the Units 1 and 2 reactor buildings and the time spent locally for component identification and operation is conservatively estimated to be 10 minutes. Dose sources considered for the mission include:

- Dose from the turbine buildings and reactor buildings during ingress/egress
- Dose from the reactor building vent plenums
- Shine from Unit 1 and Unit 2 reactor buildings
- Radiation streaming through doorway openings to reactor building switch locations
- Dose from contaminated pipes
- Dose from standby gas treatment system filters

As noted in the previous section on the proposed modification, the capability for remote operation of the TB ventilation exhaust fans will be maintained in the main control room and TB ventilation exhaust fan operation will continue to be monitored from the main control room once aligned to the emergency power source. Specifically, Unit 1 TB ventilation exhaust fan operation is verified by confirming damper position and TB ventilation exhaust fan low flow is also annunciated in the MCR. For Unit 2 TB ventilation exhaust fan operation, a flow recorder in the MCR records TB ventilation system exhaust flow and TB exhaust fan low flow is annunciated. During the alignment of the TB ventilation exhaust fans to an emergency power source, the operator will verify that at least one TB ventilation exhaust fan is operating via communication with the main control room.

The evaluation has demonstrated that required activities in support of the mission to align the TB ventilation exhaust fans to an emergency power source can be completed with operator exposures of 5 rem total effective dose equivalent (TEDE) or less. The evaluated doses meet 10CFR50, Appendix A, General Design Criterion 19 and NUREG-0737 (Clarification of TMI Action Plan Requirements, November 1980) Item II.B.2.

Procedure Control

It is acceptable to credit operator action for initiation of TB purging via at least one exhaust fan and alignment to an emergency power source, in the highly unlikely event that offsite power cannot be restored within the required time period, since the dose mitigation function of the TB ventilation exhaust system is not required until 9 hours after the initiation of a LOCA, MSLB, or CRDA. As long as power is available to the TB ventilation exhaust system, TB purge can be initiated and monitored from the main control room as detailed in the previous section. The only operator action outside the main control room requiring post-accident vital area access is alignment to an emergency power source, if required.

Applicable procedures for the initiation of TB purge post-LOCA, MSLB, and CRDA and alignment of TB ventilation exhaust fans to an emergency power source, if required, will be revised and implemented in sufficient time to support HNP AST implementation following approval by the NRC. The impacted procedures include the severe accident guidelines (SAGs), abnormal operating procedures, system operating procedures, and annunciator response procedures. These procedures are considered safety related procedures in the context that they cover activities involving safety related structures, systems, and components. Plant programs are in place, such as procedures implementing 10 CFR 50.59 and the guidance of RG 1.33 revision 2, "Quality Assurance Program Requirements (Operation)," which assure safety related procedures remain consistent with the CLB, including HNP design bases and applicable regulatory requirements.

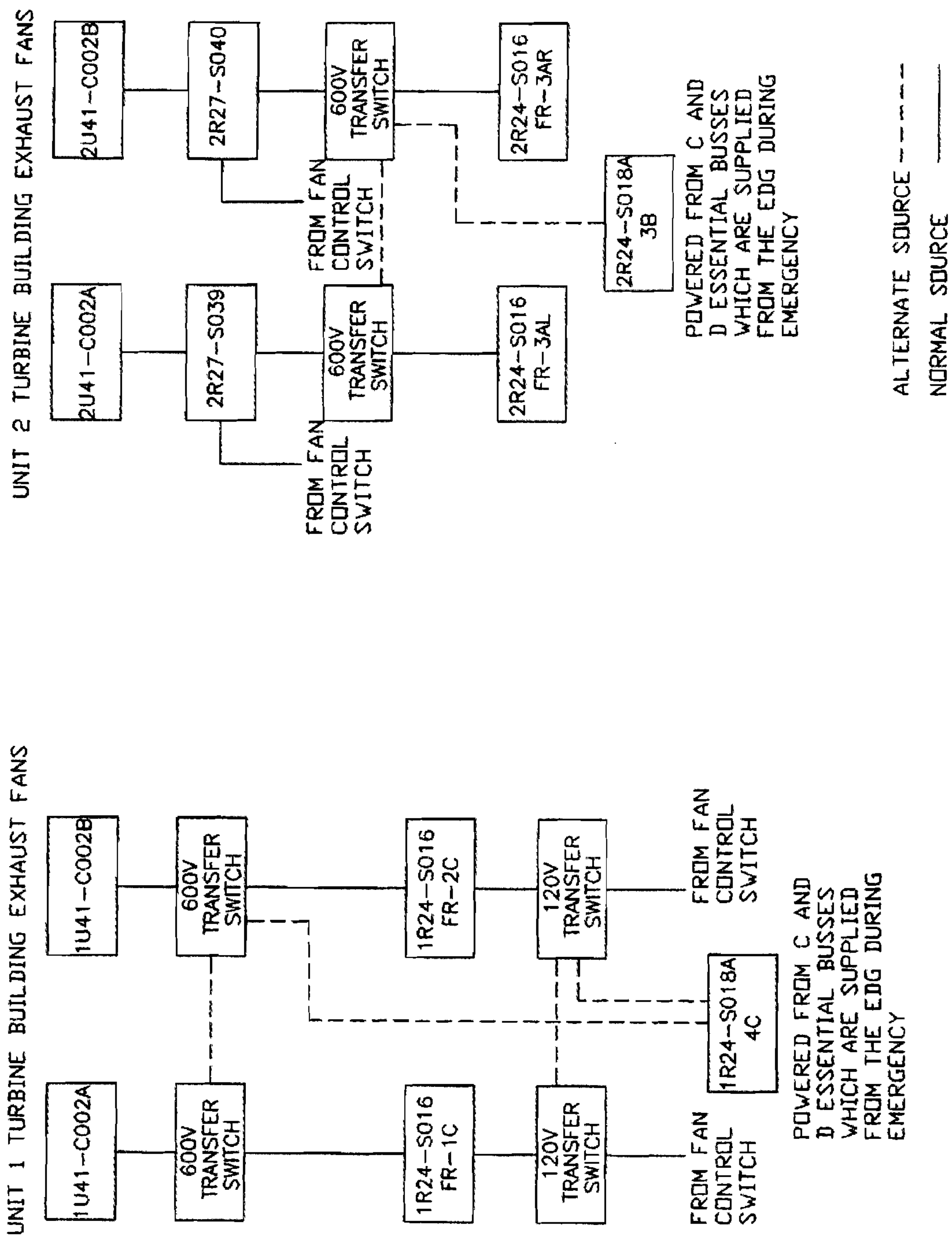
The LOCA CLB event sequence will result in plant symptoms that require entry into the emergency operating procedures and ultimately the SAGs. The appropriate location for the procedural step to require initiation of TB purge within 9 hours post-LOCA is in the SAGs, specifically upon detection of high drywell radiation associated with the postulated activity release. As noted in section 2.7.2 of enclosure 1 to the AST submittal, the SAGs will also be modified to prompt manual initiation of the standby liquid control system for post-LOCA suppression pool pH control upon detection of high drywell radiation. If the TB ventilation exhaust fans are not already running, the procedure steps detailing the precise actions to be taken to initiate at least one of four TB ventilation exhaust fans and align the TB ventilation exhaust fans to an emergency power source, if required, will be provided in the abnormal operating procedures, system operating procedures, and/or annunciator response procedures, as appropriate.

For the MSLB and CRDA, the precise actions to be taken to initiate at least one of four TB ventilation exhaust fans and align the TB ventilation exhaust fans to an emergency power source, if required, will be provided in the abnormal operating procedures, system operating procedures, and/or annunciator response procedures, as appropriate. The MSLB and CRDA CLB event sequences will result in plant symptoms requiring entry into abnormal operating procedures but will most likely not require entry into emergency operating procedures and/or the SAGs.

Conclusion

For the LOCA, MSLB, and CRDA, the radiological dose analysis in the AST submittal requires a dose mitigation function by the TB ventilation exhaust system to ensure that the dose to main control room operators remains below regulatory limits. While it is likely that offsite power would be available to power the TB ventilation exhaust fans, the design modification to the TB ventilation exhaust system described in this response provides a high degree of assurance that when the TB ventilation exhaust system is required to provide its dose mitigation function, power will be available to operate the system.

Figure 1: Conceptual Design for TB Fan Power Supply Modification



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

Enclosure 2

List of Regulatory Commitments

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

Response to Request for Additional Information
Regarding the Power Sources for the Turbine Building Ventilation System

List of Regulatory Commitments

The following table identifies those actions committed by Southern Nuclear Operating Company (SNC) in this document for the Edwin I. Hatch Nuclear Plant. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE		SCHEDULED COMPLETION DATE (If Required)
	One-Time Action	Continuing Compliance	
Provide alternate safety related power supply to HNP Units 1 and 2 TB ventilation exhaust systems with a manual switchover	X		April 30, 2010