Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Response to Request for Additional Information, Round 2,
Regarding the License Amendment Request to
Revise the South Texas Project Fire Protection Program
Related to the Alternative Shutdown Capability (TAC Nos. ME6346 and ME6347)

Reference:
1. STPNOC letter dated June 2, 2011 from G. T. Powell to the NRC Document Control Desk, "License Amendment Request for Approval of a Revision to the South Texas Project Fire Protection Program Related to the Alternative Shutdown Capability," dated June 2, 2011(NOC-AE-11002643) (ML11161A143)

2. STPNOC letter dated August 1, 2011 from Charles T. Bowman to the NRC Document Control Desk, "Supplement to the License Amendment Request for Approval of a Revision to the South Texas Project Fire Protection Program Related to the Alternative Shutdown Capability (TAC Nos. ME6346 and ME6347)" (NOC-AE-11002703) (ML11221A230)

3. NRC Document dated February 17, 2012, "South Texas Project, Units 1 and 2 – Request for Additional Information Email, Round 2, License Amendment Request to Approve Revision to Fire Protection Program in Fire Hazards Analysis Report Related to Alternate Shutdown Capability (TAC Nos. ME6346 and ME6347)" (ML120470160)

In reference 1, STP Nuclear Operating Company (STPNOC) submitted a licensee amendment request (LAR) for approval of a revision to the South Texas Project (STP) Fire Protection

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Program (FPP) related to the Alternative Shutdown Capability. Reference 2 provided supplementary information in support of the LAR. Per Reference 3, the Nuclear Regulatory Commission (NRC) requested additional information to support their review of the LAR. The STPNOC response to Reference 3 is provided in the Enclosure to this letter. Responses to all requests for additional information are provided in this letter with the exception of a response to RAI-01.1. STPNOC plans to provide a response to RAI-01.1 at a later date to be determined.

There are no regulatory commitments in this letter.

If there are any questions regarding this amendment request, please contact Ken Taplett at (361) 972-8416 or me at (361) 972-7566.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 3-22-2012
Date

G. T. Powell
Site Vice President

Enclosure: Response to Request for Additional Information

cc:

(paper copy)

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Response to Request for Additional Information

REQUEST FOR ADDITIONAL INFORMATION LICENSE AMENDMENT REQUEST FOR APPROVAL OF A REVISION TO THE SOUTH TEXAS PROJECT FIRE PROTECTION PROGRAM RELATED TO THE ALTERNATIVE SHUTDOWN CAPABILITY AT SOUTH TEXAS PROJECT, UNITS 1 AND 2 (TAC NOS. ME6346 AND ME6347)

By letter dated June 2, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11161A143), as supplemented by letter dated August 1, 2011 (ADAMS Accession No. ML11221A230), STP Nuclear Operating Company (the licensee) requested approval of a license amendment request to revise the South Texas Project (STP) fire protection program related to the alternative shutdown capability. The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided and requires the following additional information to complete its review.

RAI-01: Crediting of Actions

Section 2.2 of letter dated June 2, 2011 states that, "Performing the additional actions inside the control room ensures that the RCS [reactor coolant system] process variables remain within those values predicted for a loss of normal a-c [alternating current] power," and that, "The proposed change assumes one spurious actuation to occur before control of the plant is achieved through the alternative or dedicated shutdown system." However, the licensee did not state whether operators can achieve safe shutdown in the event that some or all of the requested actions are not completed before evacuating the control room and a spurious actuation occurs before operators reach the alternate control station.

Also, the request does not describe what the postulated fire scenarios are that might necessitate the requested actions. For instance, it is not clear whether the actions would be required or feasible given a rapid fire within the fire area or within a particular piece of equipment or why a postulated fire would not damage more than one circuit.

RAI-01.1

Please provide a technical justification that plant safe shutdown is achievable in the event that some or all of the requested actions are not completed before evacuating the control room and a spurious actuation occurs before operators reach the alternate control station.

STPNOC Response

STPNOC requires additional time to complete the analysis to support a technical justification that plant safe shutdown is achievable in the event that some or all of the requested actions are not completed before evacuating the control room and a spurious actuation occurs before operators reach the alternate control station.

STPNOC plans to provide a supplemental response to this letter by a date to be determined.

RAI-01.2

Please provide a discussion of what was assumed for the postulated fire scenarios as well as T=0 (time zero) for the fire, thermal-hydraulic analysis, and the requested actions. Additionally, provide a discussion of the relationship between the postulated fire scenarios and the operators or equipment necessary to perform the requested actions.

STPNOC Response

T=0 (time zero) is assumed in three different ways:

(1) The time when the fire is detected. This time zero is used for the Emergency Plan purpose,

(2) The time when the reactor trip is manually initiated. This is the same time zero that the thermal-hydraulic analysis assumes the spurious actuation occurs and is the same time zero that the requested actions in the control room are measured from to support the conclusions of the thermal-hydraulic analysis, and

(3) The time when the operators declare that the fire response procedure for a control room fire is being entered. In many cases, the time zero initiating the transient evaluated by the thermal-hydraulic analysis and the time zero for entering the fire response procedure may be the same.

The South Texas Project Fire Hazards Analysis and Safe Shutdown calculation postulates a fire can occur at any location within the control room. Administrative controls and control room design make it unlikely that the initiation of a fire in the main control room or relay room would progress to a condition that requires evacuation.

The control room fire area is divided into two main areas. The relay room has a 1301 Halon fire suppression system. The main control room consists of control panels and an overhead cable tray area with limited fill of cable trays. All cables used at STP are IEEE 383 cable to limit the flame spread.

Fire detection is available throughout the control room area, both above and below the suspended ceiling and in the safe-shutdown control cabinets, to provide early warning of a fire. The detectors alarm at the local fire panel and inside the control room itself. Detector spacing is such that the number of detectors employed is more than that required by NFPA 72E-1978.

Although the fire zone boundary between the relay room and the main control room are not provided with rated penetration seals or HVAC dampers, the fire zone boundary has significant obstructions to limit zone-to-zone fire propagation between the two rooms.

A fire within the control room will be detected in its incipient stages and alarm in the control room. A fire within the control room should not lead to a control room evacuation due to the separation between control panel circuits as detailed in the response to RAI-03.1. Fires within the main control room are expected to be short-lived because the fire loading is low, the STP transient combustibles program does not allow flammable liquids within the control room boundary, and the room is continuously manned.

A fire within the relay room is more likely to progress to a stage further than a fire in the control room because the relay room is not continuously occupied. This area has a large amount of concentrated cable trays and is served with an automatic 1301 Halon fire suppression system. Ventilation system dampers are provided that close on actuation of the suppression system to isolate the occupied main control room from the relay room. The isolation dampers prevent the suppression gas from leaving the relay room area to aid in suppressing a fire. The safety-related actuation cabinets containing plant protective actuation circuitry are of heavy metal construction and separated by a two-inch air gap to provide assurance that a single fire would not affect redundant safety trains.

In the unlikely event that the control room needs to be evacuated, two postulated scenarios generally apply:

(1) Multiple circuit failure occurs resulting in an overall loss of control room function, or

(2) Sufficient smoke is generated as a result of the fire so that the control room becomes uninhabitable.

In the unlikely event evacuation is required, the relationship between the operators and equipment necessary to perform the requested actions supports a timely evacuation. The operator actions to manipulate switches can be performed within a short time (i.e. less than two minutes) because (a) the actions are familiar to the

operators, (b) the actions are proceduralized and trained on, (c) the operators will be pre-alerted that actions will be required, and (d) the switches for performing the actions are located in close proximity to one another on adjacent panels within the main control room. The June 2, 2011 letter provides additional information regarding the feasibility and reliability of performing the required actions.

RAI-02: Evaluation of Operator Actions

Section 3.7 of letter dated June 2, 2011 refers to NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions [OMAs] in Response to Fire," but NUREG-1852 clearly defines OMAs as actions occurring outside the main control room. However, all of the requested actions occur inside the main control room. Additionally, no discussion is provided on what procedures or guidance operators will follow in order to successfully perform the requested actions or how operators and equipment will be impacted by a control room fire or possible fire brigade operations during a control room fire.

RAI-02.1

Please provide a justification for why NUREG-1852 is an appropriate standard to evaluate the requested actions and whether any other evaluations were performed. For example, Generic Letter (GL) 86-10 Question 3.8.4 includes considerations such as physical and electrical proximity of controls and the ability to predict which systems in the control room that would be affected.

STPNOC Response

While NUREG-1852 provides guidance for demonstrating the feasibility and reliability of performing operator manual actions in response to fire for actions occurring outside the main control room, the criteria from NUREG-1852 that are analyzed in the license amendment request (LAR) (ML11161A143) are useful for providing a basis in assessing the feasibility and reliability of performing the operator actions prior to evacuation in response to a fire in the main control room.

Section 3.8.4 of NRC Generic Letter (GL) 86-10, "Implementation of Fire Protection Requirements," provides guidance for control room fire considerations. GL 86-10 recognizes that the damage in the control room for a fire that causes evacuation cannot be predicted. Because a fire-induced circuit failure can cause a spurious actuation of any single control circuit, sufficient actions are taken to address plausible failures that impact the plant prior to evacuating the control room. These actions are backed up from pre-defined control stations outside the control room to mitigate possible damage to systems required for safe shutdown.

As stated in section 3.7.9 of the LAR, control room fires leading to evacuation are addressed by procedure. The actions are in plant procedure 0POP04-ZO-0001and familiar to the operators. The plant operations staff is trained on the use of this plant procedure through the licensed operator requalification program which includes drill training in the simulator. The operator manual actions are straightforward and familiar to the operators. Once the fire condition is diagnosed and control room evacuation is needed, the actions are performed in sequence without further diagnosis. The operator required to perform the actions is not a member of the fire brigade.

It is reasonable to conclude that control room operators will be pre-alerted to a condition where a fire has progressed to a point where evacuation is required. Therefore, the control room operators will be anticipating the need to perform the actions. The actions are performed by a single operator in the control room who does not have fire brigade responsibilities. The required actions are performed by the manipulation of switches within close proximity of one another. (See Figure 1 of the LAR)

RAI-03: Turbine Trip Assumptions

Section 3.5 (letter dated June 2, 2011) concerning the automatic turbine trip when the reactor is tripped states "It is unlikely that a fire-induced circuit failure would impact both independent channels" of the solid state protection system logic trains. However, no justification is provided for the unlikelihood of such a failure occurring or how such a failure has been addressed in the analysis to support taking credit for an automatic turbine trip in response to the reactor trip.

Section III.L of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix R requires that a loss of offsite power be assumed while GL 86-10, Question 3.8.4 and Regulatory Guide 1.189, Revision 2 states that the analysis should also assume the loss of automatic starting of the onsite AC [alternating current] generators and the automatic function of valves and pumps with control circuits that could be affected by a control room fire.

RAI-03.1

Please provide additional detail on the basis for concluding that a single fire will not affect a turbine or common trip signal for a control room fire. Include, if applicable, a brief description of separation distances and intervening combustible materials.

STPNOC Response

Regarding the control panels within the main control room where the reactor trip and the turbine trip control circuitry is located, physical and electrical separation is provided between the Class 1E Control Circuits, Class 1E Instrumentation Circuits (Post-Accident Monitoring), Balance of Plant (BOP), and the non-Class 1E Circuits to preserve

redundancy and to ensure that the effects of a single postulated event (such as a fire or short circuit) will not influence the operation of the redundant circuits.

The separation requirements for these circuits are in accordance with Section 5.6 of the IEEE 384 Standard and NRC Regulatory Guide 1.75. The method(s) for achieving the separation requirements consist of any of the following methods or a combination thereof:

- Mounting the Class 1E devices on physically separate control benchboards.
- Providing a fire retardant barrier or air space for redundant Class 1E devices in close proximity. This separation consists of:
    1. Six-inch physical separation between devices.
    2. One-inch air space between device and barrier.
    3. Thermal insulating material as a barrier only when one-inch air space is unachievable.
- Enclosed metal wireways.
- Metallic Conduit.

The Class 1E logic and control circuits, Reactor Trip and ESF actuation barrier switches, Class 1E instrumentation circuits, and the non-Class 1E circuits meet the separation criteria described above.

The separation between redundant Class 1E devices and between Class 1E and non-Class 1E devices mounted in close proximity is achieved by a flame retardant barrier.

Redundant Class 1E circuits that are located in close proximity to one another are routed in either an all-metal wireway system that has removable covers or metallic conduit between the first wire connection point (within a few feet of the board-mounted device) and the control board termination area.

For any exposed wiring up to a termination point, a minimum distance of six inches is maintained between separation groups. If the separation criteria cannot be met, a physical barrier is utilized. Where this physical barrier is utilized, a minimum one-inch air space is provided between the Class 1E circuits (or devices) and the barrier. If the one-inch air space cannot be provided, thermal insulating material is used.

The wiring for the Class 1E and non-Class 1E circuitry is flame retardant as required by IEEE 383, Section 2.5 and IEEE 420, Section 4.3.

In conclusion, both the reactor trip and the turbine trip circuitry are independent of one another and meet the separation criteria described in the paragraphs preceding. A single fire will not affect a turbine or any other redundant trip signal (i.e., reactor trip) for a control room fire. A turbine trip is initiated as the result of a reactor trip and the redundant trip circuits within the control room would not be impacted by a single fire-induced circuit failure in a manner that would prevent accomplishment of the turbine trip function.

Additionally, the function of reactor trip from within the Control Room is a redundant function. In the Control Room, there are two separate control panels where a reactor trip toggle switch is located. Each of the control panels where these reactor trip switches are located meet the separation criteria described in the paragraphs above and the panels are separated from one another by a distance of approximately ten feet. Because the control room is continuously occupied, it is not postulated that a fire would go undetected to the point where both control panels are affected before the required action to trip the reactor is performed. Hence, a single fire-induced circuit failure will not affect the ability to trip the reactor. Therefore, the turbine trip is assured.

RAI-04: Lack of Automatic Suppression in Control Room

Attachment 3, Section 2.4.4 of letter dated June 2, 2011 states that no fixed suppression is provided in the control room but does not provide an explanation for whether the arguments used to justify this deviation remain valid or the deviation has any impact on the requested actions.

RAI-04.1

Please state what impact, if any, the lack of fixed suppression in the control room has on the postulated fire scenarios and requested actions. Additionally, confirm that the assumptions used in the original deviation for a lack of fixed suppression remain valid.

STPNOC Response

During initial licensing, South Texas Project received a deviation for no fixed suppression in the control room during the initial licensing of the facility. The relay room, which is part of the control room complex, has 1301 Halon automatic fire suppression system activated by crossed-zone detector system and is isolated from the control room by fire dampers.

All original assumptions for the deviation remain valid.

Automatic fire suppression has not been provided in the control room as the use of manual suppression by trained personnel provides a high reliability against accidental introduction of fire protection agents into the occupied control room area. Considering

the high density early warning detection provided, the wide spacing of the trays, the type of cables and size of trays, the full accessibility of manual hose streams and carbon dioxide fire extinguishers, and the continuous manning of the control room, the use of automatic systems in this room is neither justified nor necessary.

The control room is located at the 35-foot elevation in the Electrical Auxiliary Building between column lines B-F and 20- 22. The control room is surrounded by a three-hour rated fire barrier. The operating area of the control room is enclosed by a seismically designed suspended ceiling and architectural barriers, all of which are constructed of materials with a flame spread rating of 50 or less. Fire detection is provided throughout the control room, both above and below the suspended ceiling and in the safe-shutdown control cabinets to provide early warning of a fire for manual fire fighting. These detectors alarm at the local fire panel and inside the room itself. The number of fire detectors employed is more than that required by NFPA 72E-1978. Fire protection is effected through portable water and carbon dioxide fire extinguishers. Hose streams from standpipes are strategically located immediately outside the entrances to the control room and in a corridor adjacent to the normal entrance to the control room. The majority of cables can be effectively reached by these hose streams from the floor level. A seismic catwalk above the ceiling ensures access for manual suppression in the event of a fire in the cabling in the area above the ceiling. The heating, ventilation and air conditioning (HVAC) system return ducts contain smoke detectors which, upon activation, close dampers and divert airflow into a purge and cleanup mode. The system also has manual override capability. The space above the suspended ceiling is not used as an HVAC plenum and contains limited combustibles. In-situ combustibles loading is IEEE 383 cable and ordinary Class A combustibles. There are only 38 cable trays (of which approximately 20% are covered) above the suspended ceiling. The configuration of the cable trays is not considered to be concentrated as defined in Figures 1- 1 and 1-2 of the STP Fire Hazards Analysis Report. In addition, these trays are only 40 percent filled.

As stated in the response to RAI-02.1, the actions required prior to evacuating the control room are performed by a dedicated operator that is not a member of the fire brigade. Therefore, this operator is not required to provide manual fire suppression.

The assumptions used in the original deviation for a lack of fixed suppression are based on a control room design that makes it highly unlikely that a fire in the control room could rapidly spread before the fire could be extinguished using manual fire fighting methods. The lack of fixed suppression prevents accidental introduction of fire protection agents into the occupied control room area and a need to evacuate for this reason. Therefore, the assumptions used in the original deviation for a lack of fixed suppression remain valid.