The Light company

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July 9, 1996
ST-HL-AE-5414
File No.: G20.02.01
10CFR50.90, 50.92

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498; STN 50-499
Additional Information Regarding Proposed Single Engineered Safety Features
Train Mitigation Capabilities
(TAC No. M92169/M92170)

Subsequent to the transmittal of information to support the previously submitted Special Test Exception of the Standby Diesel Generator, the Nuclear Regulatory Commission staff requested additional information relating to single train event mitigation. The requested information and response is provided in Attachment 1 to this letter.

Should you have any questions, please contact Mr. A. W. Harrison at (512) 972-7298 or me at (512) 972-7795.

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Attachment 1

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A. Describe the operator actions and time frame to accomplish the following activities. Clarify where the operator has to go to perform the action if outside the Control Room.

1. Action to depressurize the Reactor Coolant System to a pressure for using the Low Head Safety Injection pump to mitigate the Small Break Loss of Coolant Accident:

Response:

In the event of degraded or inadequate core cooling, the Emergency Operating Procedures at the South Texas Project provide direction for manual post-accident depressurization and cooldown. These actions are based on core exit thermocouple temperatures and are found in procedures 0POP05-EO-FRC1, Response to Inadequate Core Cooling", and 0POP05-EO-FRC2, "Response to Degraded Core Cooling". If Auxiliary Feedwater flow and Steam Generator level are adequate, the operator is instructed to lower Reactor Coolant System pressure via a secondary side cooldown using the Steam Generators. If this is not possible, the operator is instructed to manually open a Pressurizer PORV to depressurize the Reactor Coolant System to a pressure that will allow injection via the Low Head Safety Injection pump. Either of these actions can be taken from the Control Room quickly (<15 minutes to perform actions) if necessary to mitigate a Small Break Loss-of-Coolant Accident.

2. Action to isolate non essential flow to Component Cooling Water system:

Response:

As stated on page 3 of 12 in letter ST-HL-AE-5208 dated November 22, 1995, an analysis of the Component Cooling Water system following a Safety Injection signal indicates the remaining Component Cooling Water train will operate satisfactorily following a loss of power to any two Component Cooling Water trains. The Component Cooling Water has five flow paths that are isolated by a safety injection signal. Total Component Cooling Water flow for these five flow paths is approximately 12, 400 gpm. Approximately 95% of the flow or 11,800 gpm is carried by two of the flow paths, the spent fuel pool coolers and the non-safety header. The isolation design for these two flow paths has redundant valves powered from all three Standby Diesel Generator trains. The configuration of these redundant valves ensures that if there is only one operable Standby Diesel Generator, only one of these flow paths will remain unisolated. This condition is only applicable for Trains A or B, since Train C powers an isolation valve in both of these flow paths. In the case where a flow path is unisolated and it is desired to isolate the remaining flow path, an operator can be dispatched to manually close the remaining open isolation valve. This action would be performed by a Plant Operator in the Component Cooling Water header room of the Mechanical Auxiliary Building, which is located within 5 minutes of the Control Room. The open isolation valve could be manually closed within approximately 5 minutes by the operator.

3. Action to load the Positive Displacement Pump on the Technical Support Center Diesel Generator and align to the Reactor Coolant Pump seals:

Response:

The Technical Support Center Diesel Generator will start automatically on the Loss of Offsite Power event and power its associated bus. If required, the Control Room Operator will then start the Positive Displacement Pump from the Control Room and supply Reactor Coolant Pump seal injection via the normal path. These actions which are described in 0POP04-AE-0001, "Loss of any 13.8 kV or 4.16 kV bus", could be complete in approximately 15 minutes. However, as discussed in the response to question D, single train operation will still provide the necessary Component Cooling Water flow to the Reactor Coolant Pump thermal barrier to prevent seal damage.

4. Action to align Auxiliary Feedwater to an intact Steam Generator:

Response:

STP has four Auxiliary Feedwater (AFW) trains feeding four steam generators. Auxiliary Feedwater trains A , B, and C are powered from Safety Trains A, B and C respectively. Auxiliary Feedwater Train D is a Turbine Driven pump which feeds D steam generator. If only one Standby Diesel Generator is available, then the minimum of one motor driven Auxiliary Feedwater pump and the steam driven Auxiliary Feedwater will be available to feed the steam generators. If either of these Auxiliary Feedwater pumps feeds an intact steam generator, the acceptance limit for this accident, which is the pressurizer does not go water solid within 30 minutes with no operator action, will be met.

If it becomes necessary for another steam generator to be supplied by either of the running Auxiliary Feedwater pumps, a Plant Operator can be dispatched from the control room to the Auxiliary Feedwater valve cubicle in the Isolation Valve Cubicle in approximately 5 minutes. The performance of the necessary valve manipulations will take approximately 10 minutes.

5. Action to isolate the containment isolation valves to the piping for the containment radiation monitors:

Response:

Emergency Operating Procedure 0POP05-EO-0000, "Reactor Trip or Safety Injection" will be revised to provide direction to manually isolate these lines if unable to do so from the control room. A Plant Operator dispatched from the control room will be able to reach the Mechanical Auxiliary Building 41' Piping Penetration in approximately 5 minutes and locally isolate the containment radiation monitors in approximately 10 minutes.

B. Discuss the mitigating actions for Train C of Fuel Handling Building HVAC:

Response:

The Fuel Handling Building HVAC is designed to mitigate the consequences of a fuel handling accident as well as LOCA (leakage from ECCS components located in the Fuel Handling Building) by limiting plant site boundary dose to within the guidelines of 10 CFR 100. This is accomplished by routing exhaust air from the spent fuel pool and the remainder of the Fuel Handling Building through ESF filter units containing HEPA filters and iodine removal carbon filter units if high levels of airborne radioactivity are detected in the exhaust air or Safety Injection is actuated.

The Fuel Handling Building exhaust air filters consist of a two train arrangement powered from A and B ESF diesels. In the event that only C ESF diesel is available, action would be taken to cross-connect ESF 4.16 kV buses to provide power to either A or B Fuel Handling Building exhaust air filter trains.

The following describes the steps required to connect one South Texas Project Engineered Safety Features train to another Engineered Safety Features train, via Emergency Bus 1L, any two Auxiliary Engineered Safety Features Transformers, and the associated motor operated switches. This cross-connect scheme would be utilized to provide Standby Diesel Generator-backed power to the Fuel Handling Building HVAC heaters (114 kW per train) should no other preferred offsite power source or SDG-backed source be available. This description summarizes required actions following the postulated loss of AC power to Engineered Safety Features Buses A and B. The initial conditions for this scenario include: (1) SDG A and B are out of service; (2) SDG C is in the standby mode; and (3) Class 1E buses are supplied from offsite power. A loss of offsite power then occurs, followed by a fuel handling accident or LOCA, the successful start of SDG C, and the successful loading of SDG C.

The specific steps required to cross-connect two Engineered Safety Features buses are detailed in Addendum 12 of STP procedure 0POP04-AE-0001, "Loss of Any 13.8 kV or 4.16 kV Bus". This description summarizes the steps for cross-connecting Engineered Safety Features Bus C to Engineered Safety Features Bus B. The cross-connect sequence includes opening the Engineered Safety Features Transformer E1B and E1C Motor Operated Switches (MOS) [#1] from the preferred offsite power source; closing the E1B and E1C MOS units [#1] to the Emergency Bus 1L source; closing the Emergency Bus 1L feeder breakers [#2] to Engineered Safety Features Buses B and C; and closing the Engineered Safety Features Bus B and C normal supply breaker [#3] to each 4.16 kV Engineered Safety Features Bus. Engineered Safety Features Bus B is then energized from the output of SDG C. The FHB HVAC loads may then be manually actuated and energized by SDG C.

This cross-connect scheme was utilized in the docketed South Texas Project position for Technical Specification Amendments 71 and 60, requested in letter ST-HL-AE-4924 dated November 7, 1994 and approved by the NRC in letter ST-AE-HL-94117, dated February 14, 1995.

C. Clarify Control Room HVAC single train capability:

Response:

While the South Texas Project design bases for Control Room Envelope HVAC is two of three trains, the capabilities of a single train of the Control Room Envelope HVAC system supported by a single train of Essential Chilled Water powered by the same ESF diesel generator are the following. A single train of Control Room Envelope HVAC will maintain designed temperature and relative humidity conditions. However, a single train of the Control Room Envelope HVAC system is not sufficient to maintain the control room envelope at 1/8" positive pressure relative to the surrounding areas. While single train operation testing has demonstrated most configurations will provide a positive pressure in the control room envelope, it was determined approximately 30 cfm inleakage could occur under certain single train configurations. This unfiltered inleakage, plus the normally assumed 10 cfm from the use of other doors in the pressurized areas, would yield a total Control Room inleakage of approximately 40 cfm.

The results of a sensitivity study of the Control Room thyroid dose to variations of the in-leakage between 10 cfm and 40 cfm are shown below. The doses represent the TID-14844 source term results for one train of Control Room Envelope HVAC and consequently include a substantial amount of conservatism.

THYROID DOSE RESULTS

IN-LEAKAGE (CFM)	DOSE (REM)
10	36
17	49
25	63
40	90

[The results noted above assumed a "once-filtered" inleakage of 250cfm. Results from the tests indicated that this inleakage value could be as high as 300cfm for certain conditions. Use of the 300cfm value would slightly increase the above doses]

When considering the extremely low probability (< E-9)of this beyond design basis configuration, Control Room dosage is considered acceptable given the conservatism in the calculation and that the doses are within the 10 CFR 50, Appendix A General Design Criteria limits when using the more realistic Westinghouse gap activity source term.

Based on the above, South Texas Project considers that the Control Room Envelope HVAC system has sufficient capability in the single train configuration to justify the short allowed outage time requested in the proposed Technical Specification.

D. Clarify Reactor Coolant Pump seal cooling capability if B Train ESF diesel is the only operating diesel generator:

Response:

If the B Train ESF diesel is the only operating diesel generator following a LOOP, no centrifugal charging pump is available to provide seal injection to the Reactor Coolant Pumps. In the event of a loss of offsite power, the B train component cooling water system will provide adequate cooling flow to the Reactor Coolant Pump thermal barrier heat exchanger to maintain the integrity of the Reactor Coolant Pump seals without Operator action. For additional defense in depth, the Positive Displacement Pump may be powered by the Technical Support Center Diesel Generator to provide seal injection to the Reactor Coolant Pumps in the event of a loss offsite power with only B SDG available.