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January 28, 1986
ST-HL-AE-1599
File No.: G9.17

Mr. Vincent S. Noonan, Project Director
PWR Project Directorate #5
U. S. Nuclear Regulatory Commission
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
DSER/FSAR Items; Electrical

Reference: Letter ST-HL-AE-1515 dated 11/8/85; M. R. Wisenburg to G. W. Knighton

Dear Mr. Noonan:

This letter is provided to address Draft Safety Evaluation Report (DSER) Item #'s 72A, 72B and 74 (see reference) regarding electric power. These items are as follows:

DSER Item	Response
#72A	Regarding the onsite distribution system analysis, conformance to BTP PSB-1 Positions 3 and 4 is provided in the response to Question 430.20N (see Attachment 1). The detailed analysis is available for review. The analysis verification will be available approximately 2 months after fuel load.
#72B	The undervoltage relay setpoint analysis is discussed in the response to Question 430.20N (see Attachment 1). The setpoints have been included in the draft Technical Specifications (pages 3/4 3-34, 3/4 3-40).
#74	The Standby Diesel Generator tests performed to demonstrate compliance with IEEE 387-1977 sections 6.3.1, 6.3.2 and 6.3.3 have been completed. This testing includes 300 start and load acceptance qualification tests, load capability qualification, and margin qualification. The 2-hour rating test was also performed by the manufacturer. Complete test results are available for review.

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Attachment 2 is provided to address informal questions from the Power Systems Branch (PSB).

If you should have any questions on this matter, please contact Mr. M. E. Powell at (713) 993-1328.

Very truly yours,

M. R. Wisenburg
Manager, Nuclear Licensing

JSP/RCM/yd

Attachment 1: Response to Question 430.20N (430.111, 430.121, 40.9)

Attachment 2: Response to PSB Informal Questions

cc:

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Revised 12/2/85

Question 430.20N

Your response to question 040.9 is not acceptable. We have recently revised this position to include an added feature to the second level undervoltage protection and further clarification. Our preference is compliance with the revised position. Your response to Part 4 concerning acceptable verification testing will be required regardless of which position you opt to meet, i.e., the original criteria presented in question 040.9 or the revised version. Supplement the description of your design in the FSAR to show conformance with the positions or provide detailed analysis to justify nonconformance.

1. In addition to the undervoltage scheme provided to detect loss of offsite power at the Class 1E buses, a second level of undervoltage protection with time delay should also be provided to protect the Class 1E equipment; this second level of undervoltage protection shall satisfy the following criteria:

   a. The selection of undervoltage and time delay setpoints shall be determined from an analysis of the voltage requirements of the Class 1E loads at all onsite system distribution levels;

   b. Two separate time delays shall be selected for the second level of undervoltage protection based on the following conditions:

      (1) The first time delay should be of a duration that establishes the existence of a sustained degraded voltage condition (i.e., something longer than a motor starting transient). Following this delay, an alarm in the control room should alert the operator to the degraded condition. The subsequent occurrence of a safety injection actuation signal (SIAS) should immediately separate the Class 1E distribution system from the offsite power system.

      (2) The second time delay should be of a limited duration such that the permanently connected Class 1E loads will not be damaged. Following this delay, if the operator has failed to restore adequate voltages, the Class 1E distribution system should be automatically separated from the offsite power system. Bases and justification must be provided in support of the actual delay chosen.

   c. The voltage sensors shall be designed to satisfy the following applicable requirements derived from IEEE Std. 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations":

      (1) Class 1E equipment shall be utilized and shall be physically located at and electrically connected to the Class 1E switchgear.

      (2) An independent scheme shall be provided for each division of the Class 1E power system.

Question 430.20N (Continued)

(3) The undervoltage protection shall include coincidence logic on a per bus basis to preclude spurious trips of the offsite power source;

(4) The voltage sensors shall automatically initiate the disconnection of offsite power sources whenever the voltage set point and time delay limits (cited in item 1.b.2 above) have been exceeded;

(5) Capability for test and calibration during power operation shall be provided.

(6) Annunciation must be provided in the control room for any bypasses incorporated in the design.

d. The Technical Specification shall include limiting conditions for operations, surveillance requirements, trip setpoints with minimum and maximum limits, and allowable values for the second-level voltage protection sensors and associated time delay devices.

2. The Class 1E bus load shedding scheme should automatically prevent shedding during sequencing of the emergency loads to the bus. The load shedding feature should, however, be reinstated upon completion of the load sequencing action. The Technical Specifications must include a test requirement to demonstrate.the operability of the automatic bypass and reinstatement features at least once per 18 months during shutdown.

In the event an adequate basis can be provided for retaining the load shed feature during the above transient conditions, the setpoint value in the Technical Specifications for the first level of undervoltage protection (loss of offsite power) must specify a value having maximum and minimum limits. The basis for the setpoints and limits selected must be documented.

3. The voltage levels at the safety-related buses should be optimized for the maximum and minimum load conditions that are expected throughout the anticipated range of voltage variations of the offsite power sources by appropriate adjustment of the voltage tap settings of the intervening transformers. The tap settings selected should be based on an analysis of the voltage at the terminals of the Class 1E loads. The analyses performed to determine minimum operating voltages should typically consider maximum unit steady state and transient loads for events such as a unit trip, loss of coolant accident, startup or shutdown; with the offsite power supply (grid) at minimum anticipated voltage and only the offsite source being considered available. Maximum voltages should be analyzed with the offsite power supply (gird) at maximum expected voltage concurrent with minimum unit loads (e.g. cold shutdown, refueling). A separate set of the above analyses should be performed for each available connection to the offsite power supply.

Question 430.20N (Continued)

4. The analytical techniques and assumptions used in the voltage analysis cited in item 3 above must be verified by actual measurement. The verification and test should be performed prior to initial full power reactor operation on all sources of offsite power by:

   a. loading the station distribution buses, including all Class 1E buses down to the 120/208 volt level, to at least 30%;

   b. recording the existing grid and Class 1E bus voltages and bus loading down to the 120/208 volt level at steady state conditions and during starting of both a large Class 1E and non-Class 1E motor (not concurrently);

      Note: To minimize the number of instrumented locations, (recorders) during the motor starting transient tests, the bus voltages and loading need only be recorded on that string of buses which previously showed the lowest analyzed voltages from item 3 above.

   c. using the analytical techniques and assumptions of the previous voltage analysis cited in item 3 above, and the measured existing grid voltage and bus loading conditions recorded during conduct of the test, calculate a new set of voltages for all Class 1E buses down to the 120/208 volt level;

   d. compare the analytically derived voltage values against the test results.

With good correlation between the analytical results and the test results, the test verification requirement will be met. That is, the validity of the mathematical model used in performance of the analyses of item 3 will have been established; therefore, the validity of the results of the analysis is also established. In general the test results should not be more than 3% lower than the analytical results; however, the differences between the two when subtracted from the voltage levels determined in the original analyses should never be less than the Class 1E equipment rated voltages.

Response INSERT A

~~STP design will comply with the requirement for the undervoltage protection for Class 1E buses, as described in the Question (430.20). Conformance with this requirement will be provided in an future amendment in late 1985.~~ 45

Insert A

1. Two undervoltage sensing schemes are employed for each Class 1E 4.16kV bus to provide two levels of undervoltage protection. The first scheme detects loss of voltage and the second scheme detects degraded voltage conditions on the bus. Voltage signals to each scheme are provided through four potential transformers connected to each bus. Four solid state type instantaneous undervoltage relays and four time delay relays are used for the first scheme (loss of voltage). The devices used for the second scheme (degraded voltage) include four solid state type instantaneous under voltage relays and two sets of four time delay relays. The first set provides for an alarm only, and the second set initiates a logic signal as shown on Figure 8.3-4 in the FSAR.

   a) The devices for the first (loss of voltage) scheme are set to operate after a time delay setpoint of 1.75 seconds at 74.7% of nominal voltage, which is below the minimum expected voltage during diesel generator sequencing. A 1.75 second time delay is provided to prevent spurious initiation of the logic signal due to a transient dip in voltage. The 74.7% voltage setpoint results in a relay operating range, including tolerance, of 71.6% to 77.6% of nominal voltage.

      The degraded voltage relays are set to operate at 94.2% of 4.16kV, which corresponds to 90% of 480 volts at the bus of the worst case motor control center (MCC). The worst case MCC is determined based on the maximum voltage drop from the 4.16kV switchgear bus to the MCC bus with the lowest offsite system voltage and maximum in plant load conditions.

   b.(1) The first set of time delay relays used in the degraded voltage scheme are set to operate after 30 seconds and provide an alarm in the control room to alert the operator. The setpoint is longer than the worst case motor accelerating time of approximately 23 seconds at 80% rated voltage for the Reactor Coolant Pump drive motor. The logic is set up to trip the offsite source feeder breaker in the event of a subsequent occurrence of safety injection (SI) actuation signal in order to separate the Class 1E distribution system from the degraded offsite source.

   (2) The second set of time delay relays used in the degraded voltage are set to operate at 50 seconds to initiate separation of the system from the degraded source.

      Analysis of motor thermal damage curves indicates that the loads are capable of withstanding 70% of nominal voltage for a duration of more than 50 seconds without damage.

c. The undervoltage sensors are designed to satisfy the following applicable requirements derived from IEEE Std. 279-1981 "Criteria for Protection Systems for Nuclear Power Generating Stations".

(1) Class 1E equipment is utilized, physically located in and electrically connected to the Class 1E switchgear.

(2) An independent scheme is provided for each division of the Class 1E power system.

(3) The undervoltage protection uses coincident logic on a per bus basis to preclude spurious trips of the offsite power source. This is shown in FSAR Figure 8.3-4 sheets 2 and 5.

(4) The undervoltage relays automatically initiate disconnection of the offsite power source in the event the voltage setpoint and time delay limits (discussed in item 1.b.2 above) are exceeded.

(5) The undervoltage relays can be tested and calibrated during power operation.

(6) Annunciation is provided in the control room in the event any of the undervoltage relays operate. The relay test procedures require that some alarms be activated during testing of an undervoltage relay by applying a shorting link to the test switch used to isolate the relay. The shorting link energizes the timer that is used to provide the alarm.

d. The Technical Specifications will include setpoints, with minimum or maximum limits, as applicable, for the loss of voltage and degraded voltage relays, and associated time delay relays.

2. The design of the bus loading scheme does not permit sequencing and shedding of emergency loads at the same time. See Logic Diagram Figure 8.3-4 and FSAR paragraph 8.3.1.1.4.4 for a description of the load shedding scheme. In the event that a mode I or mode II recognition signal is received while load sequencing is in progress, the logic is such that further sequencing of loads stops immediately. The emergency loads already connected to the bus by the sequencer are shed and the sequencer is restarted from step 1. Westinghouse indicates that, based on sensitivity studies (WCAP-8471), the time delay due to stopping and restarting of the sequencer under the worst condition is within the acceptable limit of LOCA analysis.

Upon completion of sequencing, load shedding reinstatement is accomplished by manually resetting the reset button in the Main Control Room or at the sequencer panel. Note that manual resetting prevents inadvertent excessive starting of motors. The Technical Specifications include testing of the automatically bypassed load shed and manual operation of load shed reinstatement.

Since simultaneous occurrence of sequencing and shedding of emergency loads is precluded per logic design, it is not necessary to include the first level undervoltage relay setpoint limits in the Technical Specifications.

3. A voltage analysis was performed in accordance with BTP PSB-1, Position 3. Optimum transformer tap settings have been selected to maintain terminal voltage levels within 90-110 percent of rated voltage during steady state operation, and at 80 percent or above during motor starting. The tap settings selected are based on the results of the analysis which calculates bus and terminal voltage levels for various worst case plant operating modes and loading conditions (normal, startup, LOCA, and shutdown). In the analysis, particular emphasis is placed on analyzing the voltage levels at those loads which are supplied through the standby transformer. The basis for this is that these loads will be susceptible to voltage variations in the offsite system (0.96-1.02 p.u.), as opposed to loads supplied through the unit auxiliary tap changer.

   Minimum steady state voltage levels were determined by considering the following:

   - Maximum loading of the standby transformers assuming that Unit 1 unit auxiliary transformer is not available.

   - Operation of Class 1E loads required during a LOCA.

   - Minimum system voltage (e.g. 0.96 p.u.).

   Minimum transient voltage levels were determined by considering the above scenario and emulating the Class 1E load starting profile of the ESF load sequencer, which includes the simultaneous starting of Class 1E 4.16kV and 480 V motors. Maximum bus voltage levels were determined by considering maximum anticipated grid voltage (1.02 p.u.) concurrent with each standby transformer winding exclusively supplying a safety related train under light load conditions (e.g. less than 25 percent of LOCA loads).

   The various interconnections to the offsite power system are documented and discussed in the analysis. Only those arrangements that are representative of the worst case conditions (e.g. max-min loading and system voltage levels), as discussed above, were analyzed in detail.

4. Field verification of the analytical techniques and assumptions used in the voltage analysis will be done when the station distribution buses, including all Class 1E buses down to the 120/108 volt level, can be loaded to at least 30%, approximately two months after fuel load.

Question 430.111N

Per section 8.1.14.1, two 4.16 kV ESF buses are supplied from the unit's standby transformer and the third 4.16 kV ESF bus is supplied from the unit auxiliary transformer during normal plant operation. For a reactor, turbine or generator trip, the generator circuit breaker automatically opens to maintain supply to the 4.16 kV ESF bus (the third bus) through the unit auxiliary transformer. In case the generator breaker fails to open thus tripping the switchyard breakers to isolate the unit, explain if the affected bus (third bus) will enter Mode II operation as stated in Section 8.3.1.1.4.4.2 while the other two 4.16 kV ESF buses operate with the offsite source from the standby transformer.

Response

In the event that ~~of~~ the unit generator switchyard 345 kV circuit breakers open~~ing~~ while the unit is in operation, all power to the auxiliary distribution system connected to the unit auxiliary transformer will be lost. Undervoltage relays of the affected Class 1E 4.16 kV bus will sense the loss of voltage and initiate the Engineered Safety Feature (ESF) load sequencer to automatically implement a Mode II operation as described in Section 8.3.1.1.4.4.2.

Conformance with position 3 of STP PSB-1 ~~will be~~ is provided in ~~a future Amendment as stated in~~ the response to Q430.20N.

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Question 430.121N

The voltage levels at the safety-related loads should be optimized for the maximum and minimum load conditions that Appendix 8A) are expected throughout the anticipated range of voltage variations of the offsite power sources. Perform a voltage analysis and verification by actual measurement in accordance with the guidelines of positions 3 and 4 of Branch Technical Position PSB-1 (NUREG-0800, Appendix 8A). Provide the voltage at the terminals of each Class 1E load as determined by analysis and by actual measurement for all modes of plant operation. Verify that all Class IE loads will operate at or within design voltage limits under all condition of operation. Where terminal voltage determined by analysis is not adequate to meet the design voltage rating of the equipment, provide justification.

Response

As stated in the response to Q430.20N, the STP design will comply with the requirement for undervoltage protection for Class 1E buses (PSB-1). We are presently performing a voltage study including analysis of worst case conditions and conformance with PSB-1 position 3 will be provided in a future Amendment. Conformance to PSB-1 position 4 will be provided when station loading is equivalent to 30 percent.

The response to question 430.20N addresses our compliance with BTP PSB-1.

Question 040.9

Recent operating experience has shown that adverse effects on the safety-related power system and safety related equipment and loads can be caused by sustained low or high grid voltage conditions. We therefore require that your design of the safety related electrical system meet the following staff positions. Supplement the description of your design in the FSAR to show how it meets these positions or provide appropriate analyses to justify non-conformance with these positions.

(1) We require that an additional level of voltage protection for the onsite power system be provided and that this additional level of voltage protection shall satisfy the following criteria:

(a) The selection of voltage and time set points shall be determined from an analysis of the voltage requirements of the safety-related loads at all onsite system distribution levels;

(b) The voltage protection shall include coincidence logic on a per bus basis to preclude spurious trips of the offsite power source;

(c) The time delay selected shall be based on the following conditions:

(i) The allowable time delay, including margin, shall not exceed the maximum time delay that is assumed in the FSAR accident analyses;

(ii) The time delay shall minimize the effect of short duration disturbances from reducing the availability of the offsite power source(s); and

(iii) The allowable time duration of a degraded voltage condition at all distribution system levels shall not result in failure of safety systems or components;

(d) The voltage sensors shall automatically initiate the disconnection of offsite power sources whenever the voltage set point and time delay limits have been exceeded;

(e) The voltage sensors shall be designed to satisfy the applicable requirements of IEEE Std. 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations"; and

(f) The Technical Specifications shall include limiting condition for operation, surveillance requirements, trip set points with minimum and maximum limits, and allowable values for the second-level voltage protection sensors and associated time delay devices.

(2) We require that the current system designs automatically prevent load shedding of the emergency buses once the onsite sources are supplying

power to all sequenced loads on the emergency buses. The design shall also include the capability of the load shedding feature to be automatically reinstated if the onsite source supply breakers are tripped. The automatic bypass and reinstatement feature shall be verified during the periodic testing identified in Position 3.

In the event an adequate basis can be provided for retaining the load shed feature when loads are energized by the onsite power syutem, we will require that the setpoint value in the Technical Specifications, which is currently specific as "...equal to or greater than..." be amended to specify a value having maximum and minimum limits. The licensee bases for the setpoints and limits selected must be documented.

(3) We require that the Technical Specifications include a test requirement to demonstrate the full functional operability and independence of the onsite power sources at least once per 18 months during shutdown. The Technical Specifications shall include a requirement for tests that simulate loss of offsite power, simulate loss of offsite power in conjunction with a safety feature actuation signal; and simulate interruption and subsequent reconnection of onsite power sources to their respective buses. Proper operation shall be determined by:

(a) Verifying that on loss of offsite power the emergency buses have been de-energized and that the loads have been shed from the emergency buses in accordance with design requirements.

(b) Verifying that on loss of offsite power the diesel generators start on the autostart signal, the emergency buses are energized with permanently connected loads, the auto-connected shutdown loads are energized through the load sequencer, and the system operates for five minutes while the generators are loaded with the shutdown loads.

(c) Verifying that on a safety features actuation signal (without loss of offsite power) the diesel generators start on the autostart signal and operate on standby for five minutes.

(d) Verifying that on loss of offsite power in conjunction with a safety features actuation signal the diesel generators start on the autostart signal, the emergency buses are energized with permanently connected loads, the auto-connected emergency (accident) loads are energized through the load sequencer, and the system operates for five minutes while the generators are loaded with the emergency loads.

(e) Verifying that on interruption of the onsite sources the loads are shed from the emergency buses in accordance with design requirements and that subsequent loading of the onsite sources is through the load sequencer.

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(4) The voltage levels at the safety-related buses should be optimized for the full load and minimum load conditions that are expected throughout the anticipated range of voltage variations of the offsite power source by appropriate adjustment of the voltage tap settings of the intervening transformers. We require that the adequacy of the design in this regard be verified by actual measurement and by correlation of measured values with analysis results. Provide a description of the method for making this verification; before initial reactor power operation, provide the documentation required to establish that this verification has been accomplished.

Response See response to Question 430.20N

The South Texas Project onsite electrical distribution system has been designed to minimize deviations from the nominal operating voltage. This design has been aided by connection of an offsite power source having maximum expected deviations within 2 percent above and 4 percent below the anticipated operating voltage and a normal operating range restricted to within 1 percent above and below the anticipated operating voltage. These values are the result of analysis of anticipated normal system grid conditions and single contingency operation. An analysis of the effects of the offsite power voltage deviations upon the onsite safety-related distribution system is being conducted with the results of this analysis being used to establish specific protective relay and transformer tap settings to prevent damage to or undesirable operation of the safety-related systems. Because of the limited overvoltage conditions anticipated, no overvoltage relay protection has been provided for STP nor is any necessary. Undervoltage protection is described below in response to specific points raised in Question 040.9.

1. Undervoltage protection shall be provided in accordance with the requirements of IEEE 279-1971 and selected to prevent operation of the safety-related power system outside of the limits on voltage level and time delay assumed in the FSAR accident analysis. Specific voltage level and time delay settings for the undervoltage relays will be established upon completion of the onsite distribution system analysis. Refer to revised Section 8.3.1.1.4.6(3). 36

2. The ESF Load Sequencer prevents load shedding of the safety-related accident loads once the sequencer has determined a loss of offsite power coincident with receipt of an SI signal and has completed the initial loading of the onsite power source. The automatic load shedding feature can only be reinstated by a manual reset of the load sequencer.

   Tripping of the onsite source breaker following the initial loading of the safety related loads onto the DG can only be the result of a DG differential or an engine overspeed. It is therefore only possible to reinstate the automatic load shedding feature by a manual reset of the load sequencer. 36

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Response (Continued)

3. Refer to revised Section 8.3.1.1.4.7. concerning Standby Diesel Generator Procedures. The STP Technical Specifications are scheduled to be submitted in mid 1985 and will contain the appropriate DG tests. | 36

4. The onsite distribution analysis will optimize the distribution voltage levels required for supplying the maximum and minimum load conditions while being supplied with offsite power varying over the range of its anticipated voltages. Due to the extremely low variations in offsite power voltage and the safety margins inherent in the design of the onsite safety related distribution system, effects of offsite power verification variations on the onsite buses by actual measurement and by correlation of measured values with analysis results is not considered necessary.

Response to PSB Informal Questions

Question: Reviewer expressed concern regarding STP's proposed use of jumpers during operation as stated in Q430.32N.

Response: Jumpers will be used on safety-related systems only during maintenance and testing. Q430.32N will be revised (see attached).

Question: Reviewer requested that FSAR Table 8.3-3 identify that the 2000-hour DG rating is not to be exceeded by the total of the automatic and manual loads.

Response: Footnote will be added to Table 8.3-3 as shown on the attached.

Question: Discussion provided in FSAR section 8.3.1.4.4.4.3 was considered unclear by reviewer.

Response: Section 8.3.1.4.4.4.3 will be reworded (see attached).

Question: Reviewer requested further clarification of the response to Q430.117N regarding the minimum battery and bus voltage.

Response: The minimum battery voltage at the 2-hour duty cycle is 106vdc. The voltage drop from the battery to the switchboard is 1vdc. Therefore, the minimum voltage of the switchboard is 105vdc.

Question: Reviewer requested further information regarding spare battery capacity (Q430.136) relative to IEEE 450-1975 and 485-1978.

Response: Response to Q430.136N will be revised as shown in the attached. STP design complies with the recommendation of IEEE 450-1975 having the batteries' capacity at least 125% of the load expected at the end of their service life. In addition, the design margin of the batteries comply with the recommendations of section 6.2.2 of IEEE 485-1978.

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Questions 430.32N

Provide the results of a review of your operating, maintenance, and testing procedures to determine the extent of usage of jumpers or other temporary forms of bypassing functions for operating, testing, or maintaining of safety related systems. Identify and justify any cases where the use of the above methods cannot be avoided. Provide the criteria for any use of jumpers for testing.

Response

The problems associated with use of jumpers are recognized and administrative controls have been developed to control their use. In general, jumpers and temporary bypasses will only be used in safety-related systems when no other practical means is available to accomplish a necessary operating, maintenance, or testing function. If it becomes necessary to use a jumper or temporary bypass in a safety system, such use will be controlled by approved procedures. Incorporation of the safeguards test features described in FSAR Section 7.3.1.2.2.5.4 should minimize such occurrences. 51

TABLE 8.3-3

EMERGENCY ELECTRICAL LOADING REQUIREMENTS

STEP 13 (270 Seconds After Diesel Generator Breaker Is Closed)

EQUIPMENT	IDENT. NO.	RATED HP	B.H.P	MOTOR EFF.	MOTOR P.F. START P.F.	LOAD (kW)	MOTOR LRC (AMPS)	LOCA - NOTES A&D TR'A' (kW)	TR'B' (kW)	TR'C' (kW)	MSLB - NOTES B&D TR'A' (kW)	TR'B' (kW)	TR'C' (kW)	LOOP - NOTE C TR'A' (kW)	TR'B' (kW)	TR'C' (kW)	REMARKS
Essential Chillers	3V111VCH005 006	393.0 (kW)	-	-	.946 .24	-	381	-	393.0	393.0	-	393.0	393.0	-	393.0	393.0	Note 5

	LOCA TR'A'	LOCA TR'B'	LOCA TR'C'	MSLB TR'A'	MSLB TR'B'	MSLB TR'C'	LOOP TR'A'	LOOP TR'B'	LOOP TR'C'
Loads from Steps 1-12 (Kilowatts)	5344.0	4804.8	4741.7	5344.0	4804.8	4741.7	4524.4	3405.8	3563.5
Loads in Step 13 (Kilowatts)	-	393.0	393.0	-	393.0	393.0	-	393.0	393.0
Total Loads at the end of 270 Seconds (Kilowatts)*	5215.4	5069.2	5006.1	5215.4	5069.2	5006.1	4395.8	3670.2	4127.9
D/G Rating (Kilowatts)	5500.0	5500.0	5500.0	5500.0	5500.0	5500.0	5500.0	5500.0	5500.0
Margin (Kilowatts)**	284.6	430.8	493.9	284.6	430.8	493.9	1104.2	1829.8	1372.1
Margin (Percent)**	5.2	7.8	9.0	5.2	7.8	9.0	20.1	33.3	24.9

* Intermittent Loads (Step 2, 128.6 Kilowatts) Have Been Deducted from Total Loads

** The total load (automatic plus manual) on the Diesel Generator shall not exceed the 2000hr rating of the Diesel Generator (5935 kW).

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Both ac and dc circuits rated 600 V and below utilize 600 V class cables. The 600 V class ac and dc power cables are routed in common cable trays. Control cables are routed in cable trays separate from power circuits as much as possible but they may be combined in one tray due to physical restraints. Instrumentation cables and other low-level signal cables are routed in separate raceways from power and control cables.

~~Redundance~~ Class 1E circuits of redundant separation groups are routed in separate penetrations, cable trays, conduits, and ~~ducts~~ other totally enclosed raceways to assure complete separation. Separation of raceway systems is as follows.

8.3.1.4.4.1 Cable Spreading Areas Tray Separation: Cable spreading areas consist of the control room, the relay room and the cable spreading rooms on Elevations 21'-0", 60'-0", and 74'-9". ~~excepting the cable chases.~~

The separation distance in these areas is based on open cable tray of either the ladder or solid bottom type. The minimum horizontal separation distance between different separation group trays is 1 ft. The minimum vertical separation distance between different separation group trays is 3 ft.

8.3.1.4.4.2 General Plant Areas Tray Separation: The separation distance in general plant areas is based on open cable tray of either the ladder or solid bottom type. The minimum horizontal separation distance between trays of different separation groups ~~trays~~ is 3 ft. The minimum vertical separation distance between different separation group trays is 5 ft. 36 043 19N 04C

8.3.1.4.4.3 Conduit-to-Conduit Separation - All Areas: The minimum horizontal, vertical or diagonal separation between conduits of different separation groups is 1 in.

8.3.1.4.4.4 Class 1E Conduit-to-Open Tray Separation:

8.3.1.4.4.4.1 Cable Spreading Areas - The minimum horizontal separation between conduit of any one Class 1E separation group and open cable trays of any other separation group is 1 ft. The minimum vertical separation between conduit of any one Class 1E separation group and open cable trays of any other separation group is 3 ft.

8.3.1.4.4.4.2 General Plant Areas - The minimum horizontal separation between conduit of any one Class 1E separation group and open cable trays of any other separation group is 3 ft. The minimum vertical separation between conduit of any one Class 1E separation group and open cable trays of any other separation group is 5 ft.

8.3.1.4.4.4.3 Class 1E Conduit to Solid Bottom and/or Solid Top Tray Separation - The minimum separation distance between a Class 1E conduit and solid bottom and/or solid top of a tray is 1 in. INSERT "A"

8.3.1.4.4.4.4 Non-Class 1E Conduit to Open Tray Separation - All Areas - The minimum horizontal or vertical separation between totally enclosed raceway (described in Section 8.3.1.4.4.7) of non-Class 1E separation Groups N or M and open ventilated cable trays or cables in free air of any ~~Cable~~ Class 1E separation group is 1 in.

Insert "A"

If the conduit is located above the tray, a top tray cover is placed on the tray. If the conduit is located below the tray, a bottom cover is placed on the tray. If the conduit is located at the side of the tray, top and bottom tray covers are placed on the tray.

Question 430.136N

IE Information Notices 83-11 and 84-83 addressed to holders of operating license (OL) and construction permit (CP) reported failure and/or degradation of batteries at various power plants. This has been attributed to swollen positive plates and/or cracked cases of the battery cells. A seismic event might accelerate the degration of the battery and could cause a common mode failure of the plant dc systems. Conform that the IE notices and the concerns therein were evaluated for their impact on the STP design of Class 1E batteries and the seismic capability of its racks.

Response

Information Notice 83-11 expresses a concern that old lead-acid storage batteries may fail during a seismic event and cause a common mode failure of plant dc systems.

The STP specification for Class 1E lead storage batteries requires the batteries to be qualified in accordance with IEEE 535-1979. This document requires that the increased seismic vulnerability of old batteries be reflected in a battery's qualified life.

Therefore, this concern has been evaluated and should have no impact on the STP.

Information Notice 84-83 expresses concerns of overloading dc buses and solvent induced battery case cracking. STP is continuing the review of the loading to ensure that adequate capacity is maintained.

All STP batteries are sized and designed to carry all loads connected to the associated action including 20 percent spare capacity for future loads, for a period of two hours. The Class 1E battery manufacturer's (GNB) instruction manual includes a "CAUTION" against the use of solvent as a cleaning agent for plastic battery cells, jars, and battery covers. This manual also includes procedures for cleaning the battery posts.

The concerns contained in Information Notices 83-11 and 84-83 were evaluated and are not applicable to STP.

dc bus. The design complies with the recommendation of IEEE 450-1975, having the batteries' capacity at least 125 percent of the load expected at the end of their service life. In addition, the design margin of the batteries complies with the recommendations of Section 6.2.2 of IEEE 485-1978.