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SBN - 420
TF B7.1.2

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: G. W. Knighton, Chief
Licensing Branch 3
Division of Licensing

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444
(b) PSNH Letter SNB-289, dated July 2, 1982, "FSAR Section 8, Open Item List - Power Systems Branch (Electrical) J. DeVincentis to F. Miraglia

Subject: Additional Information On Open Items - Power System Branch (Electrical)

Dear Sir:

Transmitted herewith is additional information required to resolve certain open items that were discussed with PSB representatives during a meeting held in your office on 12/30/82.

B001

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J. DeVincentis
Project Manager

GTs/jl

cc: Atomic Safety and Licensing Board Service List

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OPEN ITEM 17 Automatic transfer of loads and electrical interconnections between redundant divisions

RESPONSE: The attached revised RAI 430.44 provides information addressing the above concern.

430.44 (8.3.1) (8.3.2) Redundant Buses E5 and E6 are interconnected through Bus E52, MCC 523, Charger ED-13C-2B, 125 V Bus 12B, UPS ED-I-2B and Bus E63. Either eliminate or justify this interconnection.

Provide the results of an analysis that identifies and justifies all electrical interconnections between redundant divisions.

RESPONSE: (11/82) The interconnection described above is imaginary and from a practical standpoint is nonexistent. For this interconnection to exist, multiple failures of diverse equipment would have to occur first, followed by a transformation from a 3-Wire AC System to a 2-Wire DC System and back again to a 3-Wire AC System. The safety divisions which are purported to be interconnected are in addition effectively isolated through the inherent blocking feature between input and output of the chargers, the current limiting feature of the UPS and the charger and the various protective devices. If this imaginary interconnection is to be given any credence, then so must the equally imaginary interconnection that could exist between redundant divisions through the common ground path and ground grid at the station.

We have performed an analysis to identify all other electrical interconnections between redundant divisions and it remains our position that there are no electrical interconnections between redundant divisions.

RESPONSE: (1/83) Although we still believe that the above interconnection does not violate RG 1.6, it has been decided to modify the power supplies to UPS ED-I-2B in order to eliminate the above concern.

A similar concern, as described above, exists with UPS ED-I-4; modification to the power supplies will also resolve this concern.

Our analysis indicates that we have no other electrical interconnections or automatic load transfers that violate RG 1.6.

We have instituted an investigation to verify if we have any violations of the physical independence between redundant divisions. Upon completion of our analysis, the results will be forwarded to you for your evaluation.

Rev 1/83

OPEN ITEM 20 The NRC requested that the load profiles for the safety-related batteries be included in the FSAR.

RESPONSE: (12/82) The FSAR has been revised accordingly to incorporate these profiles.

RESPONSE: (1/83) The following response is provided to satisfy further questions in regard to the connection of non-safety-related loads to the safety-related batteries. It is pointed out that these loads are connected to the dc buses with Class 1E breakers (refer to RAI 430.149).

Figure 8.3-37 shows two non-safety-related loads on the safety-related dc buses: Computer Inverter I-2A and Distribution Panel PP-1111B. Computer Inverter I-2A is included in the load profiles given in Figure 8.3-51. The attached Table 8.3-5 has been revised to list Computer Inverter I-2A as a load on the safety-related batteries. Distribution Panel PP-1111B was not included in the load profile given in Figure 8.3-52 because the panel feed was tripped on an accident signal. Since the panel feed will no longer be tripped (see response to RAI 430.30), Table 8.3-5 and Figure 8.3-52 will be updated when the actual panel load is finalized to include Distribution Panel PP-1111B as a load on the safety-related batteries. The estimated panel load is less than 10A.

Table 8.3-5 and Figure 8.3-51 show Computer Inverter I-2A tripped off of the dc bus after 15 minutes. This trip of the internal inverter dc circuit breaker is initiated from within the inverter by a timing relay which monitors the time the inverter draws power from the safety battery. The actual power to energize the shunt trip coil for the dc circuit breaker is from an internal dc control power supply which has an internal battery backup.

TABLE 8.3-5

BATTERY LOADING - SAFETY-RELATED BATTERIES

SAFETY-RELATED DC LOADS

Safety-Related Inverters	Load Size	Duration (1)	DC Bus
Vital Instrument Bus Inverter I-1A-1	75A	2 hours	11A
Vital Instrument Bus Inverter I-1B-1	75A	2 hours	11B
Vital Instrument Bus Inverter I-1C-1	75A	2 hours	11C
Vital Instrument Bus Inverter I-1D-1	75A	2 hours	11D
Vital Instrument Bus Inverter I-1E-1	75A	2 hours	11A
Vital Instrument Bus Inverter I-1F-1	75A	2 hours	11B
Reactor Protection and Safeguard Systems			
Train A Diesel-Generator Field Flashing	40A	1 min. (2)	11A
Train B Diesel-Generator Field Flashing	40A	1 min. (2)	11B
Train A Vital Solenoid Valves	30A	2 hours	11A
Train B Vital Solenoid Valves	30A	2 hours	11B
Train A Class 1E Power System Control Power	50A	1 min.	11A
Train B Class 1E Power System Control Power	50A	1 min.	11B
Train A Reactor Trip Swgr. Control Power	20A	1 min.	11A
Train B Reactor Trip Swgr. Control Power	20A	1 min.	11B
Train A Diesel-Generator Sequencer and Control	20A	2 hours	11A
Train B Diesel-Generator Sequencer and Control	20A	2 hours	11B

NON-SAFETY-RELATED DC LOADS

Computer Inverter I-2A	500A	15 min. (3)	11C
Distribution Panel PP-1111B	(Later)	2 hours	11B

(1) Duration - Time used with these loads for the design basis 2-hour discharge used to size the batteries.

(2) A 40A, 1 minute load in first 1 minute period for initial diesel start attempt and a 40A, 1 minute random load for a second attempt at diesel start during the design basis 2-hour discharge period.

(3) This load is tripped after 15 minutes.

OPEN ITEM 30 Additional information on bypass and inoperable status indication.

RESPONSE: The attached revised FSAR page, 8.1-6, provides additional information for the bypass and inoperable status indication of the Emergency Diesel Generator System. (Reference RG 1.47)

RG 1.9 (Rev. 2) "Selection of Diesel Generator Set Capacity for Standby Power Supplies"

Position C.4 requires that frequency should be restored to within 2% of nominal in less than 60% of each load sequence time interval. For diesel generators, frequency can only recover when load acceleration is completed. Load acceleration may, on rare occasions, exceed 60% of the load sequence time interval, therefore, frequency recovery in this time period is not possible. This fact presents no problem. The effect of extended load acceleration times has been considered in the diesel generator loading calculation. Voltage and frequency profiles, developed from the loading calculations and actual load test data, confirm that capability for successful load sequencing is not compromised by extended load acceleration times. Refer to Subsection 8.3.1.

Position C.14 requires that the engine run at full load for 22 hours following 2 hours at short time rated load. For Seabrook, a "Load Capability Qualification" test was performed per IEEE 387-1977. The engine was run at full load for 24 hours after reaching equilibrium temperature, but before 2 hours short time rated load test.

RG 1.22 (Rev. 0) "Periodic Testing of Protection System Actuation Functions"

The design is in accordance with RG 1.22 as supplemented by Regulatory Guide 1.108, Rev. 1, entitled "Periodic Testing of Diesel Generator Units Used as On-Site Electric Power Systems at Nuclear Power Plants". Refer to Subsection 8.3.1

RG 1.32 (Rev. 2) "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants"

Physical independence of electric systems is in accordance with Attachment "C" of AEC letter, dated December 14, 1973, entitled "Physical Independence of Electric Systems" (Appendix 8A). Refer to Subsection 8.3.1.

RG 1.47 (5/73) "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems"

With the exception of the Emergency Diesel Generator System, the Electric Power System is not required to have inoperable status indication because it is not expected to be bypassed or deliberately induced inoperable more frequently than once per year. Reference regulatory position C.3(b).

Inoperable status indication is provided for the Emergency Diesel Generator System as a result of data provided by the NRC indicating that Diesel Generator Systems have been declared inoperable more frequently than once per year. For additional information on the design provided, refer to ICSB RAI 420.10.

RG 1.63 (Rev. 2) "Electric Penetration Assemblies in Containment Structures for Water-Cooled Nuclear Power Plants"

The electrical penetration assemblies are designed to withstand, without loss of mechanical integrity, the maximum fault current vs. time conditions that could occur as a result of single random failures of circuit overload devices. In addition to the 15 kV switchgear breakers, the medium voltage 15 kV penetrations are also protected by fuses inserted in the feeders outside containment.

OPEN ITEM 33 Compliance with Regulatory Guide 1.63

RESPONSE: Our submittals SBN-322, dated September 9, 1982, and SBN-367, dated November 12, 1982, addressed the above subject.

Questions in regard to adequate justification for the X/R ratio of four are addressed in FSAR Section 8.3.1.2b4.

RG 1.63 requires an X/R ratio of eight to be used as a conservative value if no specific system parameters are known. As stated in the FSAR, the exact system parameters for Seabrook have been calculated and are therefore being used. The calculations for the Seabrook design show that the X/R ratio is less than four.

OPEN ITEM 32 Compliance with IEEE Standard 317-1976

RESPONSE: In our submittal SBN-376, dated November 12, 1982, where we addressed compliance to the above standard, we had stated that some minor electrical penetrations might not meet all the most recent requirements of the 1976 version of the standard and that it was our engineering judgment that they will perform their safety function.

The attached revised RAI 430.3 clarifies the extent of the noncompliance.

430.3 (8.1) Section 8.1.5.2 of the FSAR indicates that the Seabrook design is in conformance with IEEE Standard 387-1972. Section 8.1.5.3 of the FSAR, on the other hand, implies that the Seabrook design is also in conformance with 387-1977 by reference to Regulatory Guide 1.9 (Revision 1). Similar inconsistencies exist between Sections 8.1.5.2 and 8.1.5.3 of the FSAR for IEEE Standard 308-1971 and Regulatory Guide 1.32 (Revision 2), IEEE Standard 317-1972 and Regulatory Guide 1.63 (Revision 2), IEEE Standard 384-1974 and Regulatory Guide 1.75 (Revision 2), IEEE Standard 338-1975 and Regulatory Guide 1.118 (Revision 2), IEEE Standard 484-1975 and Regulatory Guide 1.128 (Revision 1), and IEEE Standard 450-1972 and Regulatory Guide 1.129 (Revision 1).

Correct the inconsistencies and describe and justify each exception taken to IEEE Standards 308-1974, 387-1977, 317-1976, 384-1974, 338-1977, 484-1975 and 450-1975.

RESPONSE: The basic commitments to various industry standards pertinent to the electrical design of the Seabrook project have been established at the PSAR stage. We have and plan to adhere to these commitments as shown in Section 8.1.5.2. It should be pointed out that IEEE Standard 338-1975 and IEEE 379-1972 are additions to the PSAR listed standards as are the upgrading of IEEE Standards 344-1971 to 344-1975.

Over and above these commitments, it was decided at the FSAR stage to evaluate the extent of compliance to the most recent Regulatory Guides and Branch Technical Positions at the date of issuance of the FSAR. This evaluation is reflected in Sections 8.1.5.3 and 8.5.1.4 and in no way should be construed to reflect a commitment to the Regulatory Guide. We are aware that the listed Regulatory Guides often reference a later issue of an industry standard; however, Regulatory Guides such as 1.30, 1.40, 1.41, 1.53, etc., continue to reference superseded issues of industry standards in spite of the publication of revised standards. This unfortunate lack of coordination will always exist unless simultaneous revisions are made by industry and the NRC. It is obvious that the problem is not easily resolvable, and for this reason, we have established the ground rules reflected in the discussion above. The evaluation of the Seabrook design against the most recent Regulatory Guides provides an indication of how Seabrook design complies with recent NRC requirements.

In addition, an evaluation of the Seabrook design has been performed to the standards listed below having more recent issue dates than those listed in the FSAR. The purpose of the evaluation was to determine if there are any requirements of safety significance that the Seabrook design does not meet and which are included in the standards. The results of the evaluation are outlined below:

IEEE 308-1974: It is our engineering judgment that the Seabrook design meets the requirements of this standard. On test intervals for batteries and diesel generators, our design (Technical Specifications) exceeds the requirements of this standard because the intervals have been specified to meet even more recent industry standards such as IEEE-387 on diesel generators and IEEE-450 on batteries.

IEEE 387-1977: The basic difference between the 1977 version of the standard and the 1972 version is the incorporation of type testing requirements for diesel generators. Because the FSAR commits to the type test program of IEEE 387-1977, it is our engineering judgment that the Seabrook design meets this standard.

IEEE 317-1976: All major electrical containment penetrations were manufactured to meet the 1976 version of the standard. Some minor electrical penetrations, 3/4" to 1" size which are associated with the personnel air lock, the equipment hatch and the containment recirculation sump isolation valve encapsulation tank, were manufactured to meet the 1972 version. It is our engineering judgment that these minor penetrations meet all the important design requirements necessary to perform their safety function. Requirements that may be lacking are in the areas of QA documentation, Service Classification documentation, and definition of certain production tests.

IEEE 384-1974: The Seabrook design meets the requirements of this standard.

IEEE 338-1977: The Seabrook design meets the requirements of this standard.

IEEE 484-1975: Refer to RAI 430.31 for comments on this standard.

IEEE 450-1975: The Seabrook design meets the requirements of this standard.

OPEN ITEM 27 Compliance with the guidelines of NUREG-0737

RESPONSE: The attached revised RAI 430.53 provides additional information on the power supplies of the PORVs and PORV block valves.

430.53 Describe how the Seabrook design complies with the guidelines of NUREG-0737, Items II.E.3.1 and II.G.1.

RESPONSE: Item II.E.3.1

The Seabrook design complies with the guidelines of NUREG-0737 and the "clarification" of NUREG-0737. A description of the pressurizer heaters is provided in FSAR Section 5.4.

One pressurizer heater bank can be supplied from the Train A diesel generator and one bank can be supplied from the Train B diesel generator during loss of off-site power. Each bank can establish and maintain natural circulation at hot standby conditions. Each bank can be supplied from either off-site power or from one diesel generator.

As demonstrated in FSAR Table 8.3-1, the standby power supply has the capacity to supply the pressurizer heaters without load shedding.

Changeover of the pressurizer heaters from normal off-site power to emergency on-site power can be accomplished manually in the Control Room.

Motive and control power connections to the Class 1E buses for the pressurizer heaters are through Class 1E devices.

Because of our design (see RAI 430.149), the pressurizer heaters are not automatically shed from the emergency buses upon the occurrence of a safety injection actuation signal.

Item II.G.1

The design complies with the guidelines of NUREG-0737 and the "clarifications" to NUREG-0737.

Motive and control components of the PORVs and the PORV block valves can be supplied from the off-site power source or the on-site power source.

Motive and control power connections to the Class 1E buses for the PORVs and block valves are through Class 1E devices.

The pressurizer level indication instrument channels are powered from the vital instrument buses. The vital buses can be powered from the off-site power sources or on-site power sources.

The design of the PORV block valves provides the capability to close the valves and retains to the extent practical the capability to open the valves.

These capabilities are maintained by providing two redundant motor-operated PORV block valves located in parallel flow paths. One PORV block valve is supplied power from the Train A emergency bus and the other PORV block valve is supplied power by the Train B emergency bus.

The motive and control power for the block valves is from a different emergency bus from the source supplying the PORVs. See Figure 430.53.

Changeover of power to the PORV and block valves from off-site power to on-site power can be accomplished from the Control Room.

Additional information regarding compliance with NUREG-0737 has been provided in our letter, SBN-212, to the NRC, dated February 12, 1982, to the attention of: Mr. F. Miraglia, Chief, Licensing Branch #3.

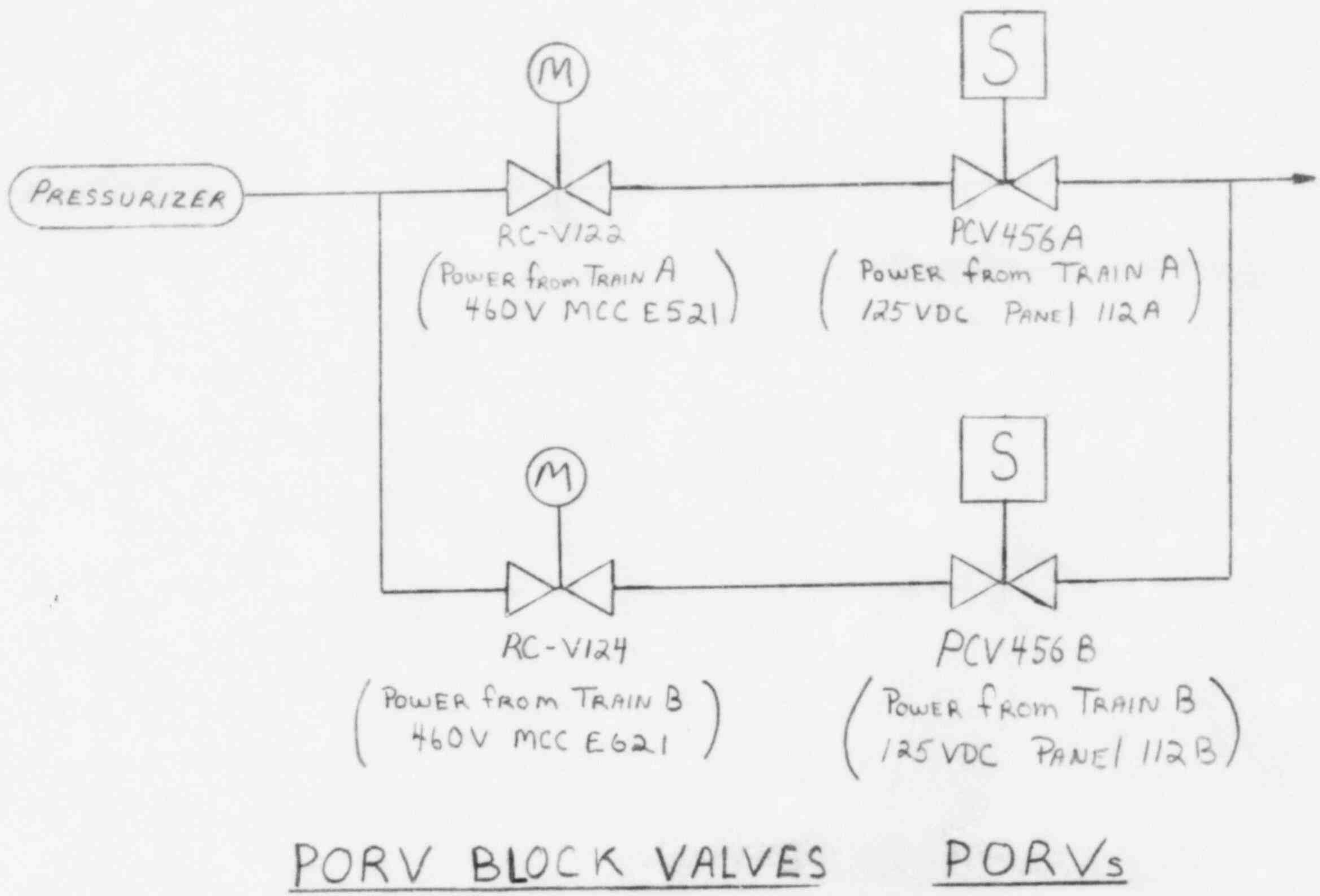

FIGURE 430.53