PSNH PUBLIC SERVICE
Company of New Hampshire

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March 23, 1982

SBN-241
T.F. B 7.1.2

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

Attention: Mr. Frank J. Miraglia, Chief
Licensing Branch #3
Division of Licensing

References:
(a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444
(b) USNRC Letter, dated February 12, 1982, "Request for Additional Information," F. J. Miraglia to W. C. Tallman
(c) PSNH Letter, dated March 12, 1982, "Responses to 430 Series RAIs; (Power Systems Branch)"

Subject: Revised Responses; 430 Series RAIs

Dear Sir:

I have attached revised responses to the following RAIs which were previously submitted via Reference (c).

430.18, 430.24, 430.39, 430.40, 430.40A, 430.41, 430.42, 430.46, 430.47, 430.62, 430.66

It was discovered that inappropriate responses to the above had been inadvertently submitted with Reference (c).

Very truly yours,

J. DeVincentis
Project Manager

Attachment

B001
S/1

RAI 430.18 (8.3-1)

Diesel generator alarms in the control room: A review of malfuction reports of diesel generators at operating nuclear plants has uncovered that in some cases the information available to the control room operator to indicate the operational status of the diesel generator may be imprecise and could lead to misinterpretation. This can be caused by the sharing of a single annunciator station to alarm conditions that render a diesel generator unable to respond to an automatic emergency start signal and to also alarm abnormal, but not disabling, conditions. Another cause can be the use of wording of an annunciator window that does not specifically say that a diesel generator is inoperable (i.e., unable at the time to respond to an automatic emergency start signal) when in fact, it is inoperable for that purpose.

Review and evaluate the alarm and control circuitry for the diesel generators at your facility to determine how each condition that renders a diesel generator unable to respond to an automatic emergency start signal is alarmed in the control room. These conditions include not only the trips that lock out the diesel generator start and require manual reset, but also control switch or mode switch positions that block automatic start, loss of control voltage, insufficient starting air pressure or battery voltage, etc. This review should consider all aspects of possible diesel generator operational conditions, for example, test conditions and operation from local control stations. One area of particular concern is the unreset condition following a manual stop at the local station which terminates a diesel generator test and prior to resetting the diesel generator controls for enabling subsequent automatic operation.

Provide the results of your evaluation, and a tabulation of the following information:

a) all conditions that render the diesel generator incapable of responding to an automatic emergency start signal for each operating mode as discussed above;

b) the wording on the annunciator window in the control room that is alarmed for each of the conditions identified in (a);

c) any other alarm signals not included in (a) above that also cause the same annunciator to alarm;

d) any condition that renders the diesel generator incapable of responding to an automatic emergency start signal which is not alarmed in the control room; and

e) any proposed modification resulting from this evaluation.

RESPONSE:

Conditions that can render the diesel generator unable to respond to an emergency start signal have been evaluated. These conditions and the resulting alarm messages presented to the control room operator have been summarized in Table 430.18-1. The indicated conditions and alarm messages are typical of diesel generators A. Diesel generator B is similar.

Other conditions that can make emergency power unavailable, but do not necessarily render the diesel generator unable to respond to an automatic start signal, are presented in Table 430.18-2.

Table 430.18-1 and Table 430.18-2 list specific alarms actuated by disabling conditions as well as common alarms such as "Train A Emergency Power - INOP". The alarms listed in the tables are those which are actuated by disabling conditions. Each common alarm clearly indicates the status of the emergency diesel generator and emergency power system. All disabling conditions are clearly distinguishable from conditions that are abnormal but not disabling. All conditions that render the diesel generator incapable of responding to an automatic emergency start signal are alarmed at the control room CRT. We plan no modifications as a result of the evaluation.

TABLE 430.18-1
(Sheet 1 of 2)

CONDITIONS THAT CAN RENDER DIESEL GENERATOR INCAPABLE OF RESPONDING TO AN AUTOMATIC EMERGENCY START SIGNAL

CONDITION	SPECIFIC ALARM ON CRT	COMMON ALARM ON CRT	COMMON ALARM MONITORING LIGHTS
Barring device engaged	DG-A barring device engaged - YES	DG-A Operational - NO TRN A Emerg Power - INOP	A-Diesel Ready for Auto Start - OFF
D-G differential protection	DG-A Primary Prot - L/O	DG-A Operational - NO TRN A Emerg Power - INOP	A-Diesel Ready for Auto Start - OFF
Mode selector switch in maintenance position	DG-A Cont. Select Switch in - MAINT.	DG-A Close Ckt - INOP DG-A Operational - NO TRN A Emerg Power - INOP.	A-Diesel Ready for Auto Start - OFF A-Diesel Maintenance-ON
D-G control panel power lost	DG-A Control Power - LOSS	DG-A Operational - NO	A-Diesel Ready for Auto Start - OFF
Engine shutdown due to high lube oil temperature (Note 1)	DG-A lube oil temp. - HIGH		
Engine shutdown due to high jacket coolant temperature (Note 1)	DG-A jacket water temp. - HIGH		
No starting air pressure	DG-A starting air pressure - LOW	TRN-A Emerg power - INOP	A-Diesel Ready for Auto Start - OFF

TABLE 430.18-1
(Sheet 2 of 2)

CONDITION	SPECIFIC ALARM ON CRT	COMMON ALARM ON CRT	COMMON ALARM MONITORING LIGHTS
Engine shutdown due to low lube oil pressure (2/3 logic)	DG-A lube oil press - LOW (Note 2)	---	---
Engine shutdown due to overspeed	DG-A engine speed - HIGH	---	---
Engine fail to start	DG-A engine start - FAIL	---	---

NOTES:

(1) Diesel generator is operational under accident (safety injection) conditions; interlocks bypassed.

(2) Alarm received prior to start of auxiliary oil pump and engine shutdown.

TABLE 430.18-2

OTHER CONDITIONS THAT MAKE EMERGENCY POWER UNAVAILABLE

CONDITION	SPECIFIC ALARM ON COMPUTER	COMMON ALARM ON COMPUTER
DG breaker control power lost	-	DG-A Close ckt - INOP TRN-A emerg. power - INOP
Bus fault protection	BUS E5 - FAULT	TRN-A emerg. power - INOP
DG breaker control switch in "Pull to Lock" position	-	TRN A emerg. power - INOP DG-A close ckt - INOP
EPS loss of power	EPS LOP/clock fault - YES (Note 2)	TRN-A emerg. power - INOP
Mode selector switch in local position	DG-A cont. select. switch in - LOCAL	DG-A close ckt - INOP TRN A Emerg. Power - INOP
DG back-up protection (Note 1)	DG a backup prot. L/O	DG-A close ckt. INOP TRN A emerg. power - INOP
DG loss of field (Note 1)	4.16 kV BUS E5 - A-field - LOST (Note 2)	DG-A Backup prot. - L/O DG-A close ckt. - INOP TRN A emerg. power - INOP
DG breaker in test position	-	DG-A close ckt. - INOP TRN A emerg. power INOP

NOTES:

(1) Diesel generator is operational under accident (safety injection) conditions, interlocks bypassed.

(2) Existing wording; under review for clarity

RAI 430.24

It has been noted during past reviews that pressure switches or other devices were incorporated into the final actuation control circuitry for large horsepower safety-related motors which are used to drive pumps. These switches or devices preclude automatic (safety signal) and manual operation of the motor/pump combination unless permissive conditions such as lube oil pressure are satisfied. Accordingly, identify any safety-related motor/pump combinations which are used in the Seabrook design that operate as noted above. Also, describe the redundancy and diversity which are provided for the pressure switches or permissive devices that are used in this manner.

RESPONSE:

All large horsepower safety-related motors are on buses 5 and 6. These motors have no pressure switch, or this process interlocks which would interfere with the automatic, or manual operation of these pumps and fans.

RAI 430.39

Based on a review of the Seabrook separation criteria, it appears that isolation devices (circuit breakers) are used to separate Non-Class 1E circuits from Class 1E circuits. It also appears that Non-Class 1E circuits that have been isolated are again routed with Class 1E circuits in non-compliance of separation criteria (Section 4.5.b of Appendix 8A to the FSAR). Justify this apparent non-compliance.

RESPONSE:

Isolation devices (circuit breakers) are not used to separate non-class 1E circuits from class 1E circuits. Separation between these two circuit classifications is achieved by complying with section 4.6.2 and 4.5a of Appendix 8A.

In a few cases, where it is impractical to comply with the above criteria, isolation devices (circuit breakers) tripped on accident signal are utilized.

RAI 430.40

Section 8.3.1.4a of the FSAR states that " . . . all train B associated (non-vital) power circuits are de-energized during an accident condition upon receipt of a safety injection (SI) signal. In this way, the signal failure criterion is met, in that only Train A is vulnerable to effects of a single incident which may effect non-safety related raceways of both separation groups A and B." Based on this statement, it appears that associated cables from train A and B are routed together in a common non-safety related raceway with non-class 1E cables. This does not meet section 4.6 of Appendix 8A of the FSAR. Justify the non-compliance.

RESPONSE:

Seabrook design is in compliance with Options 4.5a and 4.6.2 of Appendix 8A of the FSAR. All non-safety circuits are treated as associated circuits. The design does not allow associated cables from Train A and Train B to be routed together in a common raceway.

Cables associated with Train A are run in separation Group A raceways, while cables associated with Train B are run in separation Group B raceways. For further information, see answer to RAI 430.40A.

Enclosed is revised Section 8.3.1.4a which corrects an error in the earlier writeup.

Nuclear instrumentation cables are routed in steel conduits for their entire distance.

The two redundant trains (Train A and B) and the four redundant channels (Channels I, II, III and IV) are routed through four physically separated raceway systems, called separation groups, as shown in Table 8.3-4. Physical separation of the four groups is maintained by means of one or more of the following:

1. Separate exposed rigid metal conduits, or

2. Separate concrete-encased plastic or metal ducts in the same duct bank, or

3. Cable trays separated by a wall, a floor, or an equivalent barrier with a three-hour fire rating, or

4. Separate cable trays in the same room where a minimum of three feet horizontal or five feet vertical separation exists between trays of redundant systems.

5. Separate cable trays in the cable spreading room (as defined in Appendix 8A, Section 5.1.3) where a minimum of one foot horizontal and three feet vertical separation exists between trays of redundant systems.

All non-safety-related circuits are associated with either Train A or Train B, in accordance with Option 4.5 of Appendix 8A. Train B associated circuits are kept to a minimum,consisting essentially of support equipment for Train B safety-related equipment, such as the diesel generator. To further enhance the separation of groups A and B, all Train B associated (non-vital) power circuits are de-energized during an accident condition upon receipt of a safety injection (SI) signal. In this way, the single failure criterion is met in that only Train A is vulnerable to effects of a single incident which may affect non-safety-related circuits of either separation Group A or B.

b. Selection of Cable Insulation

Insulation systems for cables comprise materials or combinations of materials for primary insultation, jackets, shielding, tapes, fillers and armoring. The factors considered in selecting a cable insultation system include stability and length of life, dielectric properties, resistance to ionization and corona, resistance to high temperatures, resistance to moisture, resistance to chemicals, resistance to radiation, mechanical strength, flexibility, self-extinguishing and non-propagating fire characteristics, and general environmental considerations.

RAI 430.40A

Identify each difference between the separation criteria of regulatory guide 1.75 (IEEE Standard 384 1974) and separation criteria identified in Appendix 8A of the FSAR.

RESPONSE

It is apparent from RAIs 430.39, 430.40, 430.42, and 430.59, that a few basic misconceptions may exist regarding the Seabrook separation design philosophy. The following summary of the separation design is provided to clarify any misconceptions, and help answer questions:

Background

The separation criteria outlined in FSAR Appendix 8A, Physical Independence of Electric Systems, was provided by the NRC in question 8.15 to the Seabrook PSAR. At that time it was called Attachment C and defined the staff position, in the form of criteria for implementing the separation requirements of IEEE standards 279-1971, 308-1971 and general design criteria 17 and 21. In the interest of standardization Seabrook adopted NRC's Attachment C as the criteria for physical independence of electric systems.

To familiarize the NRC with Seabrook's unique method of separation, and to preclude later misunderstandings and misconceptions, a presentation to the PSB Branch Chief and his staff was made on October 17, 1978. This presentation illustrated and discussed in great detail the method used for Seabrook. At the time, the NRC indicated that the method met with separation requirements and indicated general concurrence with Seabrook's approach to implementation of NRC criteria for physical independence of electric systems. A copy of the NRC meeting summary is provided as Attachment 430.40A.

Separation Design Philosophy

In Seabrook there are two safety related load Trains A and B, four distinct safety related instrumentation channels, I, II, III, IV, and the balance of plant non-safety related loads and circuits. On Seabrook we elected to group the safety related circuits into four separation groups.

SEPARATION GROUP	ALLOWABLE CIRCUITS
A	Channel I & Train A
B	Channel II & Train B
C	Channel III
D	Channel IV

Various acceptable methods for the treatment of the balance of plant non-safety related loads and cirucits are described in Appendix 8A, Section 4.5 "associated circuits" and Section 4.6 "non-Class 1E circuits."

Accordingly, Seabrook elected to follow 4.5(a) and 4.6.2, and designated all non-safety related circuits and loads as associated with either Train A or Train B.

The great majority of circuits are associated with Train A, and a few with Train B. The few non-safety related loads and circuits associated with Train B are auxiliaries to support the B Train power supply (diesel auxiliaries) and NSSS preference loads. This concept of association results in only four basic separation groups:

SEPARATION GROUP	ALLOWABLE CIRCUITS
A	Channel I & Train A & Train A associated
B	Channel II & Train B & Train B associated
C	Channel III
D	Channel IV

These four separation groups meet the requirements for physical independence of electric systems in Appendix 8A. Therefore, associated Train A circuits are routed totally separate from associated Train B circuits and do not share the same raceway. Since the Seabrook raceway and cable design utilizes the 4.5(a) option of Appendix 8A for associated circuits, they are uniquely identified as such, remain with and are separated the same as the Class 1E circuits with which they are associated, and meet the requirements placed on 1E circuits in cable derating, environmental qualification, flame retardance, splicing restrictions and raceway fill. In a few instances, isolation devices are used to maintain the separation philosophy. These isolation devices are circuit breakers tripped on an accident signal and conform to the requirements of Regulatory Guide 1.75. To further enhance the design, all the B Train associated circuits will be de-energized in this manner upon receipt of a safety injection signal. Furthermore, all associated circuits connected to Class 1E buses are connected by qualified Class 1E circuit breakers.

Compliance with Regulatory Guide 1.75

Regulatory guide 1.75 and IEEE standard 384-1974 were not issued at the time Attachment C was adopted as Seabrook's separation design criteria. We have addressed compliance with RG 1.75 in FSAR Section 8.1 and 8.3.1.2.b.5. Certain erroneous statements in these sections have been clarified. FSAR, pages 8.1-7 and 8.3-28 have been revised accordingly.

qualified by experience and seismic testing. The 600 volt system x/R ratio used in specifying the electrical penetrations is 4. Calculations show that this value is conservatively applied because the actual ratio is considerably less than 4. Refer to Subsection 8.3.1.2

RG 1.75
(Rev 2)

"Physical Independence of Electric Systems"

The design is consistent with the criteria for physical independence of electric systems established in Attachment "C" of AEC letter dated December 14, 1973, and is in general conformance with Regulatory Guide 1.75, except as follows:

1. Battery Room Ventilation. The four Class 1E batteries, located in four safety class structures, are served by two safety-related ventilation systems which have a cross-tie to allow one system to serve all four batteries in case of failure of the other system. Each room can be isolated by fire dampers.

Refer to Subsection 8.3.1.2.

RG 1.108
(Rev 1)

"Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants"

The diesel generator testing is in conformance with the recommendations of Regulatory Guide 1.108 with one clarification:

The requirements of position C.2.a(5) will be met every 18 months as follows:

> The functional capability at full load temperature will be demonstrated at least every 18 months by performing the test outlined in position C.2.c(1) and (2) immediately following the full load carrying capability test described in position C.2.a(3). The full load carrying capability of position C.2.c(2) shall be demonstrated for greater than or equal to five minutes.

low energy circuits, is provided with dual Class 1E overload protective devices. For more details refer to Subsection 8.3.1.1c. 15kV penetrations are protected by seismically qualified Class 1E fuses. Additional protection is provided by two non-Class 1E breakers in series. These breakers are coordinated and derive their control power from different batteries. For more details refer to Subsection 8.3.1.1a.

5. Regulatory Guide 1.75 - Physical Independence of Electric Systems

The design is consistent with the criteria for physical independence of electric systems established in Attachment "C" of AEC (NRC) letter dated December 14, 1973. Attachment "C" is incorporated as Appendix 8A.

In a few cases, isolation devices between Class 1E and associated circuits as required by Regulatory Guide 1.75 are provided. All circuits which are not Class 1E are considered to be associated circuits. All isolation devices are considered to be associated circuits. All isolation devices are classified Class 1E circuit breakers tripped on accident signal and meet the necessary qualification requirements.

Physical separation and identification of circuits are described in detail in Subsections 8.3.1.3 and 8.3.1.4, respectively.

c. Environmental Effects on Safety-Related Electric Equipment

All safety related equipment that must operate in a hostile environment during and/or subsequent to a design basis event are identified with their ambient environmental conditions, and their qualifications are discussed in Section 3.11.

8.3.1.3 Physical Identification of Safety Related Equipment

All cables, raceways and safety related equipment are assigned to a particular channel or train. There are two redundant trains of power and controls, and four redundant channels of instrumentation. Each channel or train is assigned a particular color, as shown below:

Separation Group	Raceway or Equipment Nameplate or Tag	Cable Color
a. Channel I and Train A	Red	Red
*Train A Associated	*Black	*Black w/Red Tracer
b. Channel II and Train B	White	White
*Train B Associated	*Black	*Black w/White Tracer
c. Channel III	Blue	Blue
d. Channel IV	Yellow	Yellow

*Not applicable to raceways.

MEETING SUMMARY NOV 2 1978

Docket File
NRC PDR
Local PDR
TIC
NRR Reading
LWR #4 File
E. Case
R. Boyd
R. DeYoung
D. Vassallo
J. Stolz
K. Kniel
O. Parr
S. Varga
L. Crocker
D. Crutchfield
F. Williams
R. Mattson
H. Denton
D. Muller
Project Manager: C. Moon
Attorney, ELD
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IE (3)
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L. Dreher
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NRC Participants: R. Fitzpatrick
F. Rosa
H. Balukjian
H. Daniels
B. Stright

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 2 1978

Docket Nos: 50-443
50-444

FACILITY: Seabrook Station Units 1 and 2

APPLICANT: Public Service Company of New Hampshire

SUBJECT: SUMMARY OF MEETING HELD ON OCTOBER 17, 1978 TO DISCUSS PHYSICAL INDEPENDENCE OF ELECTRICAL SYSTEMS

Representatives of Public Service Company of New Hampshire (Lead applicant) met with members of the Nuclear Regulatory Commission staff in Bethesda, Maryland on October 17, 1978 to describe the implementation of criteria for physical independence of electrical systems in the design of Seabrook Station, Units 1 and 2. The criteria reviewed and found acceptable by the staff during the construction permit review were included in the Preliminary Safety Analysis Report PSAR as Appendix A 8.15 to Answer 8.15, Supplemental Information, page S8.28. Appendix A 8.15 is the same as Attachment C to Question 8.15 "Physical Independence of Electric Systems," provided as criteria acceptable to the staff for implementing the separation requirements of IEEE Std 279-1971, IEEE Std 308-1971, and General Design Criteria 17 and 21. Attachment C corresponds to Regulatory Guide 1.75, "Physical-Independence of Electric Systems," February, 1974. An attendance list is enclosed.

Significant points discussed during the meeting are summarized below:

1. Station Arrangement

   The Seabrook Station uses the "slide along" arrangement wherein the arrangement within the second unit is identical to the arrangement within the first unit and the orientation is the same, i.e. the plan on a station drawing for Unit 2 looks like the plan for Unit 1 except for being moved to one side. There are no electrical connections between units. Each unit is served by four auxiliary transformers which feed two circuits to each of two safety buses.

Each unit is provided with two diesel generators. The capacity of each diesel generator is equal to approximately 110 percent of the sum the required engineered safety loads and additional non-safety related loads. The diesel generators are of a new size and will be subjected to prototype start reliability testing.

Each unit will be provided with four batteries with a total capacity equal to twice the capacity required for normal operation.

The seismic Category I cooling tower structure and the seismic Category I service water intake structure are each shared by the two units. However, pumps and fans are not shared between units and there is no electrical connection between the two units within either of these structures.

2. Circuit Types and Separation Groups

The applicant has identified five basic circ... types as follows:

Train A Load and Channel I Instrumentation (Class 1E)

Train B Load and Channel II Instrumentation (Class 1E)

Channel III Instrumentation (Class 1E)

Channel IV Instrumentation (Class 1E)

Non-Safety Related Loads and Instrumentation Circuits (Non Class 1E)

The five basic circuit types have been placed into the following four separation groups:

A. Channel I, Train A, Associated Circuits, and all remaining non Class 1E circuits

B. Channel II, Train B, and Associated Circuits

C. Channel III

D. Channel IV

The applicant has classified all balance of plant non-Class 1E circuits as associated circuits and grouped them into Separation group A. This meets the NRC cable separation requirements in a manner that allows the applicant to design the plant with one less separation group.

Other than the non-Class 1E circuits discussed above, Separation groups A and B are comprized of redundant load groups. The one other difference being that the Group B associated circuits (i.e. those powered from the B train emergency busses) are automatically tripped upon an accident signal whereas the Group A associated circuits are not.

All circuits are designed to Class 1E standards and will be distinguished from the Class 1E circuits in the following way. Color striping of black cable will be used to associate cable for non-Class 1E loads with cabling of the same solid color for Class 1E loads.

3. Physical Separation

The applicant showed numerous examples of physical separation. The applicant will utilize three-hour barriers and spatial separation of five or more feet vertically and three or more feet horizontally. Within containment a vertical barrier is provided by a floor with one train above and one train below. The staff reminded the applicant that analyses of exposure fires should be provided when only spatial separation is provided.

4. Remote Shutdown Panels

One remote shutdown panel will be provided for each of the A and B trains. The staff inquired about potential communication difficulties with separated stations. The applicant indicated that separated stations had been found acceptable by the staff and the Advisory Committee on Reactor Safeguards during the review of the New England Units 1 and 2 replication application.

5. Summary

The staff indicated general concurrence with the applicant's approach to implementation of its criteria for physical independence of electrical systems. The staff indicated some interest in whether it might be desirable to trip A train associated loads on an accident signal. The applicant already proposes to trip B associated loads on an accident signal.

The applicant plans to submit a Final Safety Analysis Report about mid-1980. The staff noted that areas in which sufficient information has not been provided in other FSARs tendered recently include (1) effects of degraded grid voltage, (2) electric penetrations in containment (Regulatory Guide 1.63), and (3) environmental qualification of equipment.

The staff noted and thanked the applicant for a presentation that was unusually well organized and effective in communicating significant information to the staff in a short time period. Copies of illustrations used in the presentation were provided for each NRC participant.

Calvin W. Moon

Calvin W. Moon, Project Manager
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
As stated

cc: See next page

NOV 2 1972

ATTENDANCE LIST

C. Moon	NRC
R. Fitzpatrick	NRC
F. Rosa	NRC
H. Balukjian	NRC
H. Daniels	NRC
D. Maidrand	Yankee Atomic
J. Haseltine	Yankee Atomic
G. Tsouderos	Yankee Atomic
R. McCoy	Yankee Atomic
F. Baxter	Yankee Atomic
G. Cole	United Engineers
E. Rothong	United Engineers
W. Robinson	United Engineers
G. Aggarwall	United Engineers
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NOV 2 1978

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RAI 430.41

Section 8.3.1.4 of the FSAR indicates that separation of redundant cables with control and all other field mounted racks is discussed in Section 7.1 of the FSAR. The referenced separation discussion is not provided in Section 7.1 of the FSAR. Provide a description of separation between redundant Class 1E cables, between Class 1E and Non-Class 1E cables, and between Non-Class 1E and associated cables.

Describe and justify each exception to Section 5.6 of Appendix 8A of the FSAR.

RESPONSE

Independence of redundant safety-related systems is discussed in Subsection 7.1.2.2 of the FSAR. All cabling to control and field-mounted racks is physically identified as being either Class 1E or associated. The cables for these circuits are qualified to Class 1E requirements. Therefore, non-Class 1E cables are not utilized at Seabrook. There are no exceptions taken to Section 5.6 of Appendix 8A of the FSAR.

RAI 430.42

Section 8.3.1.4.a of the FSAR states that "all non-safety related circuits are associated with either train A or train B. Based on this statement, it appears that non Class 1E cables and raceways do not exist at the Seabrook plant, and that all cables are color coded as defined in Section 8.3.1.3 of the FSAR. Provide clarification and define the separation provided between associated cables and non-class 1E cables.

RESPONSE:

The observation that non-Class 1E cables and raceways do not exist at Seabrook is correct. Since all non-safety related circuits are treated as associated circuits in compliance with paragraph 4.6.2 of Appendix 8A, separation between associated cables and non-class 1E cables is not germaine. Separation between associated circuits of different trains is explained in FSAR Section 8.3.1.4. See response to RAI 430.40A for further details.

RAI 430.46

Non-Class 1E space heaters are provided in Class 1E motor control centers and are powered from Class 1E power sources as indicated on Figure 8.3-45 of the FSAR. It is the staff position that the Class 1E circuits may be degraded below an acceptable level as a result of a failure in the Non-Class 1E heater circuits. It is the staff position that the applicant either demonstrate that the space heater circuit arrangement will not degrade the Class 1E circuits below an acceptable level or provide a design that satisfies IEEE Standard 384-1974 as supplemented by regulatory guide 1.75 (revision 2). Describe the degree of compliance with this position.

RESPONSE:

Please refer to our response to RAI 430.40A which outlines our design criteria for non-1E loads fed from Class 1E power sources.

RAI 430.47

Compliance to the guidelines of Regulatory Guide 1.118, Revision 1, and IEEE Standard 338-1975 is unclear. Section 8.1.5.3 of the FSAR indicates that the design of the electric power systems is to be in conformance with Regulatory Guide 1.118, Revision 2. Section 1.8 of the FSAR also indicates that the BOP electric power system testing will comply with Regulatory Guide 1.118, Revision 1; for NSSS supplied electric power systems, the recommendations of Regulatory Guide 1.118, Revision 1, will only be followed at the NSSS suppliers discretion. In addition, Section 8.3.1.1.j of the FSAR implies or addresses only compliance with IEEE Standard 308 and GDC 18. Provide clarification and clearly state that the onsite ac and dc Class 1E power systems meet the guidelines of Regulatory Guide 1.118 and IEEE Standard 338 in Sections 8.3.1 and 8.3.2 of the FSAR.

RESPONSE:

The onsite ac and dc electric power system design, as stated in FSAR Subsection 8.1.5.3, is in conformance with Regulatory Guide 1.118, Rev. 2, and IEEE Std. 338-1975. Sections 1.8, 8.3.1.1 and 8.3.2.1 of the FSAR have been revised to incorporate compliance of the design to these criteria.

The NSSS supplier position regarding Regulatory Guide 1.118, as stated in Section 1.8 of the FSAR, does not apply to the NSSS-supplied "electric power system." These power systems are uninterruptable power supplies whose normal feed is from a plant as source. Automatic uninterrupted output on loss of ac source can be tested by opening the normal ac source circuit breaker.

greater than the required 10^{-3}. For further discussion, refer to Subsection 3.5.1.3.

Regulatory Guide 1.116 (Rev. 0-R, 6/76, 5/77) — Quality Assurance Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems

Endorses ANSI N45.2.8-1975

The guidance of this Regulatory Guide has been used in the installation, inspection and testing of mechanical equipment and systems. For further discussion, refer to Sections 17.1.2 and 17.2.

Regulatory Guide 1.117 (Rev. 1, 4/78) — Tornado Design Classification

The plant design complies with Regulatory Guide 1.117, Rev. 1.

Although the condensate storage tank is not designed for missiles or a pressure drop, the system will function if the tank fails because the shield wall is designed for missiles and is waterproofed to contain water from the tank.

The ultimate heat sink cooling tower is not designed for tornado missiles in the fill area. The primary source for water is the Atlantic Ocean through the underground tunnels, which will function during a tornado event.

For further discussion on this subject, refer to Section 3.5.

Regulatory Guide 1.118 (Rev. 2, 6/78) — Periodic Testing of Electric Power and Protection Systems

The onsite ac and dc Class 1E electric power system testing will comply with Rev. 2 of this regulatory guide and IEEE-338-1975.

For protection system testing, the NSSS supplier will treat all "should" statements in IEEE-338-1975 as recommendations to be followed only at its discretion. Detailed positions on the regulatory positions are presented below:

a. Regulatory Position C.1

The NSSS supplier will provide a means to facilitate response time testing from the sensor input at the protection rack to and including the input to the actuation device. Examples of actuation devices are the protection system relay or bistable.

for motors is NEMA Class B as a minimum, with the actual insulation class selected on the basis of environment and service conditions in which the motor is required to operate. The factors taken into consideration in selection of the insulation system are resistance to radiation, resistance to moisture, resistance to chemicals, ambient temperature and pressure. The motor enclosure is selected to protect against adverse environmental conditions. Winding temperature detectors and bearing thermocouples are provided on large motors to alarm high temperature conditions.

The motor suppliers are required to verify that actual test data confirm that the torque margin is equal to or greater than that of the calculated data. A further check of motor capability is the preoperational testing conducted at the site under plant light load conditions, to simulate the maximum voltage practically obtainable, and under plant heavy load conditions, to simulate the minimum voltage practically obtainable (reference Section 14.2.6, exceptions to Regulatory Guide 1.68).

j. Provisions for Periodic Testing and Maintenance

The onsite ac distribution system for engineered safety features loads is designed and installed to permit periodic inspection and testing in accordance with General Design Criterion 18, IEEE Standard 308-1971, Regulatory Guide 1.118, Rev. 2 and IEEE 338-1975 to ensure:

1. The operability and functional performance of the components of the system, and

2. The operability of the system as a whole under design conditions.

Switchgear and accessories for the auxiliary power system are easily accessible for inspection and testing.

The 13.8 kV, 4160 volt and 480 volt switchgear circuit breakers may be tested when the individual equipment is deenergized. The breakers can be placed in the test position and tested functionally.

The first and second level undervoltage schemes (see Subsection 8.3.1.1.b.4) are designed to permit periodic testing during normal plant operation.

Breakers for engineered safety features auxiliaries are exercised on a schedule similar to that for the auxiliaries controlled by the breakers. Transfer schemes can be exercised during normal operation, or by simulation of the necessary conditions. Timing checks can be performed on transfer schemes. Protective relays are provided with test plugs or test switches to permit testing and calibrating the devices.

e. DC Power System Testing

The batteries and other equipment associated with the dc system are easily accessible for periodic testing and inspection. Surveillance and testing are performed in accordance with the plant Technical Specifications in compliance with the guidelines of IEEE Standard 338, 450, Regulatory Guide 1.118 Rev. 2 and 1.129.

The preoperational testing of the safety related portion of the dc system will be performed in accordance with Regulatory Guides 1.68 and 1.41.

f. Surveillance and Monitoring

The operator is provided with indications and alarms for monitoring the state of the dc system as listed in Table 8.3-6.

8.3.2.2 Analysis

The DC System Failure Mode and Effect Analysis is found in Table 8.3-7.

a. Compliance with General Design Criteria

1. Criterion 2 - Design Basis for Protection Against Natural Phenomena

(a) The components of the onsite dc power system are located in seismic Category I structures which provide protection from the effects of tornadoes and external floods, and other natural phenomena.

(b) These components are Class 1E.

(c) These components have been designed to be fully qualified for the seismic and natural environmental conditions appropriate to their location. See Section 3.11.

2. Criterion 4 - Environmental and Missile Design Bases

(a) The components of the onsite dc power system are located in seismic Category I structures which provide protection from the effects of tornado missiles, turbine missiles and other events and conditions which may occur outside the nuclear power unit.

(b) These components are class 1E.

(c) These components are designed to accommodate the effects of and be compatible with or are protected against the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents including loss-of-coolant accidents. Criteria are presented in Chapter 3. Environmental conditions are presented in Chapters 3 and 6.

RAI 430.62

Identify all electrical equipment, both safety and non-safety, that may become submerged as result of a LOCA. For all such equipment that is not qualified for service in such an environment provide an analysis to determine the following:

1. The safety significance of the failure of this electrical equipment (e.g., spurious actuation or loss of actuation function) as a result of flooding.

2. The effects on Class 1E electrical power sources serving this equipment as a result of such submergence; and

3. Any proposed design changes resulting from this analysis.

RESPONSE

A response will be provided by April 9, 1982.

RAI 430.66

Tables 8.3-1 and 8.3-2 of the FSAR show that upon an emergency diesel engine start the following diesel generator components are left in the operating mode for Train A, but automatically turned off for Train B:

a. Prelube and filter pump

b. Crankcase exhauster

c. Rocker arm prelube pump

d. Main and recirculating seal pump (turbine generator or diesel generator; cannot tell from tables)

e. Auxiliary lube oil pump - signal to initiate pump start.

f. Auxiliary fuel oil pump - signal to initiate pump start.

Items a and c should be turned off upon engine start, items b, d (if it is referring to the diesel engine), e and f should be left on for both trains since they are needed for proper operation of the diesel or serve as back up to the primary system pumps in the event of their failure. Revise your design accordingly.

RESPONSE:

Design is being revised to trip items a and c on engine start. These loads are now deleted from diesel loading tables. Item d pertains to the main turbine generator.

According to the diesel generator manufacturer, items b, e, and f are not required to operate for the diesel generator to perform its safety function. Therefore, these loads are non-Class 1E, and the motors have been specified as non-Class 1E motors. As with other non-Class 1E loads on Train B, they are tripped on a safety injection signal.