

SEABROOK STATION  
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April 21, 1982

SBN-260  
T.F. B 7.1.2

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

Attention: Mr. Frank J. Miraglia, Chief  
Licensing Branch No. 3  
Division of Licensing

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket  
Nos. 50-443 and 50-444  
(b) USNRC Letter, dated March 1, 1982, "Request for Additional  
Information," F. J. Miraglia to W. C. Tallman

Subject: Response to 210 Series RAIs; (Mechanical Engineering Branch)

Dear Sir:

We have enclosed responses to the subject RAIs which you forwarded in  
Reference (b).

The following RAIs are not included with this letter:

210.15, 210.18, 210.19, 210.30, 210.38, 210.39

The above 210 Series RAI responses (or a schedule for the response) will be  
submitted by May 7, 1982.

The following responses are within the NSSS (Westinghouse) scope of supply.  
The Westinghouse personnel responsible for providing these responses are  
currently heavily involved with NRC review meetings for Callaway and,  
therefore, were unable to support the Seabrook response schedule.  
Westinghouse has indicated that draft responses will be available for internal  
review by April 26, 1982. Westinghouse did discuss, with MEB, the possibility  
of providing these responses at the May 11-13, 1982 MEB Review Meeting. MEB  
was amenable to this form of response; therefore, these responses will be  
provided at the meeting or before (if available).

210.4, 210.8, 210.21, 210.22, 210.23, 210.24, 210.42-52

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

*John DeVincentis*  
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Project Manager

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Enclosure



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210.3

(3.2.1, Table 3.2-2, Sheet 4)

Justify the non-seismic classification of the containment recirculating filter system. Show that its failure will not impair either the fans or ductwork.

RESPONSE: The air cleaning or filter unit is not safety-related and is not listed as Seismic Category I. The unit is seismically anchored to restrain movement and is structurally identical to other ESF air cleaning units (containment enclosure and fuel storage building). Therefore, the unit casing will not fail during a seismic event.

Internal components of the air cleaning unit may fail structurally, but such a failure will be contained within the unit and will not impair operation of the safety-related fans, dampers and ductwork.

Describe methods used to confirm the structural integrity of non-seismic Category I components whose failure or collapse could result in loss of function of seismic Category I equipment.

- RESPONSE:
1. For non-Seismic Category I components, attachments to structural members (i.e., anchoring devices) are analyzed to demonstrate their ability to withstand applicable seismic loading. Each component's fundamental frequency in each of an X, Y and Z direction is determined and a conservative 1.5 times the corresponding accelerations from the applicable Amplified Response Spectra (ARS) curves are the applied seismic loadings. Equivalent static analysis methods (Section 3.7.3.1) are then used to determine anchorage loadings and stresses. Loadings from each earthquake direction are applied individually, and the square-root-of-the-sum-of-the-squares (SRSS) method is used for the determination of final results.
  2. For those non-Seismic Category I components which are not seismically supported, Failure Modes Effects Analysis (FMEA) are performed to assure that they are isolated by their location to prevent any potential impact on Seismic Category I components, should there be any failure or collapse of the non-Seismic Category I components.

210.6

(3.2.1, Table 3.2-2, Sheets 20 and 21)

Why are the computer room system components and the UE&C Primary Auxiliary Building dampers and ductwork not considered seismic Category I?

RESPONSE: The computer room air conditioning components are not required for safe plant shutdown. In the event of a failure of the equipment, provisions have been made to directly connect the computer room supply duct to the control room air conditioning supply air system. The latter system has sufficient capacity to furnish cooling to the computer room. The computer room ductwork is seismically supported, non-safety-related. Details of this system are contained in Section 9.4.1 and on Figure 9.4-1.

With the exception of that equipment associated with the PCCW pump area, the primary auxiliary building ventilation system is not safety-related. Where this system extends over or near safety-related equipment, the ductwork and components are seismically supported. Refer to Section 9.4.3 for further information and details.

It is the staff's position that certain important systems not identified in Regulatory Guide 1.26 should be classified Quality Group C, or its equivalent. Among these systems are: diesel fuel oil storage and transfer system, diesel engine cooling water system, diesel engine lubrication system, diesel engine starting system, and diesel engine combustion air intake and exhaust system. Justify the absence of a quality group classification of portions of those systems listed below:

- A. Diesel Generator Fuel Oil Storage and Transfer System
  - 1. Remaining on-engine equipment and piping.
- B. Diesel Generator Cooling Water System
  - 1. Auxiliary Coolant Pump
  - 2. Remaining on-engine equipment and piping.
- C. Diesel Generator Starting System
  - 1. Air compressor
  - 2. Remaining on-engine equipment and piping.
- D. Diesel Generator Lubrication System
  - 1. Auxiliary Lube oil pump
  - 2. Remaining on-engine equipment and piping.
- E. Diesel Generator Combustion Air Intake and Exhaust System
  - 1. Piping
  - 2. Air intake filter
  - 3. Exhaust silencer

RESPONSE: All of the piping and equipment associated with the diesel engine is designed to Seismic Category I requirements and is consistent with standards of Quality Group C or D of Regulatory Guide 1.26. The quality standards used for specific components are considered in compliance with Regulatory Guide 1.26, which states that systems such as diesel engine and auxiliary support systems should be designed to standards commensurate with the safety function to be performed. For the specific components identified, the following comments are noted:

- A. On-engine equipment and piping is considered integral with the engine, and is designed to manufacturer's standards, which is consistent with the engine itself.

- B. 1. The engine-driven pumps (coolant and lube oil) are the primary (and only) pumps required for emergency starting and operation of the diesel generator. A failure of these pumps is considered an engine failure. The auxiliary off-skid pumps are not expected to function under emergency conditions, but could be used administratively for back-up or maintenance purposes.
- 2. See Response A above.
- C. 1. The air compressors function is to maintain air receiver pressure between starts, but is not required for emergency starting and operation of the diesel generator. The air receiver pressure is monitored to provide ample warning for corrective actions or air compressor problems.
- 2. See Response A above.
- D. 1. See Response B.1 above.
- 2. See Response A above.
- E. There are no moving or rotating parts associated with the air intake filters, exhaust silencers, or interconnecting piping. All of these items are seismically supported within the diesel building.

210.9

(3.2.2.2, Table 3.2-2, Sheet 20)

Justify the absence of a quality group classification for the entire computer room air conditioning system.

RESPONSE: The computer room air conditioning system is not required for safe plant shutdown, therefore, it has no ANS safety class. Refer to our answer to RAI 210.6 which is directly related to this question.

Control room complex emergency cleanup filter system fans and filter unit have been given ANS safety classification Non-Nuclear Safety, and the ductwork no safety classification at all. This system is considered important to safety. Provide justification for your classification.

RESPONSE: The control room complex make-up air system from the redundant intakes (remotely spaced on opposite sides of the two units) to the control room complex emergency cleanup filter unit is ANS Safety Class 3. The placement of these air intakes essentially eliminates the possibility of having both inlets simultaneously exposed to accidentally released activity. This design considerably reduces the likelihood of the emergency filter ever being needed. We consider the remote air intake design to be our primary protection against the possibility of control room contamination. The filter system is, therefore, considered only as a backup and for recirculating cleanup.

The ductwork from the air cleaning unit to the associated fans and dampers, and finally to the air conditioning supply air duct, will be upgraded to ANS Safety Class 3, Seismic Category I; FSAR Table 3.2-2, sheet 20, will be revised to show this change.

The emergency cleaning unit fans are redundant, with Class 1E motors. While the filter units and associated fans are considered ANS Safety Class NNS, as they "can influence safe, normal operation" as defined in FSAR Section 3.2.2.1, they are not deemed essential to control room habitability.

As a matter of note, the overall design of the control room ventilation system was considered by the NRC in their August 1974 Safety Evaluation Report on Seabrook Station to meet the guidelines of General Design Criterion 19 with respect to potential radiation doses to control room personnel.



The following ventilation systems that serve the control room or engineered safety feature rooms have portions of their systems lacking a quality group classification. Assign an appropriate quality group classification or its equivalent or justify the nonclassification:

1. Control room complex ventilation system ductwork.
2. Fuel storage building ventilation system, ventilation fans, ductwork.

- RESPONSE:
1. The control room air conditioning system ductwork located within the mechanical equipment room will be classified as ANS Safety Class 3, Seismic Category I. The remaining ductwork has no safety classification, but is seismically supported. Local failure of this ductwork will have no adverse effect on the safety-related components, equipment, or systems located in the control room complex. Table 3.2-2, sheet 20, will be changed to add a note reflecting this. Section 9.4.1 will be revised to agree with the statements above.
  2. As explained in the answer to RAI 410.36, Table 3.2-2, sheet 7 is being revised (Note 12) to state that the ductwork from the downstream side of the air cleaning units to the fan intakes and the discharge of the fans to the building boundaries is Safety Class 3. This is further clarified in Section 6.5.1.

210.12

(3.2.2.2, Table 3.2-2, Sheets 29, 30)

Explain the NNS ANS safety classification of the entire liquid and solid waste systems.

RESPONSE: The liquid and solid waste systems are classified as NNS since these systems perform no safety function and are not required for safe shutdown of the reactor. Table 3.2-3 lists the quality standards applicable to these systems per Regulatory Guide 1.143. These quality standards correspond to the NNS classification.

Confirm that the "elastically calculated basis" for loadings of operating plant conditions plus an operating basis earthquake is the maximum stress as calculated by equation 9 in Paragraph NB-3652 of the ASME Code, Section III.

RESPONSE: This criterion refers to Class 1 piping in the Seabrook plant design. Class 1 piping is all located inside containment, and therefore, the requirements of Regulatory Guide 1.46 must be met in postulating the locations of piping breaks in Class 1 piping.

The formula used in determining primary plus secondary stress intensities is equation 10 of NB-3652 of the 1971 ASME Code, Section III, with addenda up to and including Winter, 1972. This formula considers the primary plus secondary stress intensity range due to internal pressure and the range of moment loading due to thermal expansion, anchor movement, earthquake effects and other mechanical loads.

Equation 9, which is not required to be used for postulated break location, considers only the primary stress intensity due to internal pressure and moment loading due to earthquake, deadweight and other sustained design mechanical loads.

The elastically calculated basis referred to in FSAR Paragraph 3.6(B).2.1.a.1.(b) describes the criteria used to calculate the maximum stress range under the applicable load combinations, which is based upon the assumption that stresses are directly proportional to strains.

Provide drawings of all postulated pipe breaks, showing the type of break, structural barriers, restraint locations, and constrained directions in each restraint. Also provide a table showing calculated stress intensities, cumulative usage factors, and primary plus secondary stress ranges for each postulated break.

RESPONSE: Piping drawings are not available showing structural barriers. Drawings can be provided showing all other information. Stress intensities were calculated only for Class 1 lines, using generic stress data from Westinghouse and adding UE&C derived seismic and thermal stresses to provide very conservative values. Cumulative usage factors were assumed to exceed .1 at every fitting. In order to avoid performing an enormous number of calculations, we have postulated breaks at every fitting weld for Class 1 lines.

210.16 Inservice inspection of break-exclusion piping must include 100%  
3.6(B).2.1 volumetric examination of all pipe welds. Augment your inservice  
inspection description to include this requirement at intervals  
shown in IWA-2400, ASME Code, Section XI.

RESPONSE: All high energy pipe penetrations are analyzed for postulated pipe  
breaks. Augmented inservice inspection including 100% volumetric  
examination will be performed only as defined in FSAR Section 6.6,  
not on all high energy penetrations.

210.17

(3.6(B).2.3, Page 3.6(B)-14)

Justify the 90% of yield stress criteria in plastic restraint design. Provide examples of analysis of such a design.

RESPONSE: The reference to "plastic design" in this paragraph will be modified in Amendment 45 to "elasto-plastic design". The 90% of yield stress criteria for elasto-plastic design was selected to guarantee that uncontrolled plastic deformation of the pipe whip restraint will not occur when elastic design criteria would result in an impractical design. An example of such an analysis will be provided to the NRC by May 7, 1982.

210.20

(3.6(B).2.5, Page 3.6(B)-18)

In order to complete our review, we must examine Appendix 3B, "Line Designation Tabulation". Provide a copy of this appendix.

RESPONSE: Appendix 3B was incorporated into the FSAR as part of Amendment 44.

210.25

(3.7.3.1: P3.7(B)-11)

What criteria is used to determine the number of degrees of freedom in your dynamic analysis?

RESPONSE: Each lumped mass will have specified for it those degrees of freedom which represent the possible and/or predominant directions of motions. In some circumstances, individual masses need not be lumped for short, stiff members which exhibit rigid range behavior. An example model of a typical cable tray assembly is shown in Figure 3.7(B)-32.



210.26

(3.7.3.1, P3.7(R)-11)

Demonstrate that the equivalent static load method analysis you have used accounts for relative motion between all parts of support.

RESPONSE: When significant relative motions among the parts of any supporting system are encountered, their effects are determined statically and superimposed with other analytical results associated with any particular dynamic event.

210.27

Are there any reactor coolant pressure boundary, ASME Code Class 1 or CS components in BOP? If so, provide or reference an appropriate design transient list.

RESPONSE: Yes; see Subsection 3.9(N).1.1 for design transient list applicable to BOP Class 1 components.

NUREG-0800 requires that computer programs in analyses of seismic Category I Code and non-Code items have the following information provided to demonstrate their applicability and validity:

- a. The author, source, dated version and facility.
- b. A description and the extent and limitation of its application.
- c. Solutions to a series of test problems which shall be demonstrated to be substantially similar to solutions obtained from any one of sources 1 through 4, and source 5:
  1. Hand calculations.
  2. Analytical results published in the literature.
  3. Acceptable experimental tests.
  4. By an MEB acceptable similar program.
  5. The benchmark problems prescribed in Report NUREG/CR-1677, "Piping Benchmark Problems".

Demonstrate compliance with these requirements and provide summary comparisons for the computer programs used in seismic Category I analyses.

RESPONSE: The above information, except for Item C5 as it relates to the in-house version of the piping analysis program, ADLPIPE, is documented and available for review for all structural analysis computer programs used by UE&C. The verification package for the in-house version of ADLPIPE will be supplemented by Problem #4 from NUREG/CR-1677. A commitment for completing this effort will be supplied at the next meeting with the MEB (tentatively May 10, 1987).

210.29

(3.9(B).1.4, P3.6(b)-6)

Where is AISC criteria used in evaluation of faulted conditions?  
Justify its use.

RESPONSE: The AISC criteria were used in the support designs of the following mechanical components:

Service Water Strainers

Containment Spray Pumps

Primary Component Cooling Water Pumps

Spent Fuel Pool Pumps

Primary Component Cooling Water Head Tank

Cation Bed Demineralizer Tank

Mixed Bed Demineralizer Tank

Containment Spray Heat Exchanger

Spent Fuel Pool Cooling Heat Exchanger

Emergency Feed Pumps

(see the response to 210.39 for justification).

210.31

(3.9(B).2.1, Page 3.9(B)-8)

What are the acceptance limits for steady state and transient vibration? The program must include a list of different flow modes and a list of selected locations for visual inspection and measurements.

RESPONSE: The preoperational and startup vibration test program is under development and is scheduled to be available in October, 1982. For acceptance limits, refer to this program.

210.32

(3.9(B).2.1, Page 3.9(B)-10)

What Code-allowable stress limits are used for acceptability of motion due to dynamic effects?

RESPONSE: See answer to RAI 210.31.

210.33

(3.9(B).3.1, Page 3.9(B)-13)

What piping systems are not designed according to ASME Section III? What design criteria was used for these systems?

RESPONSE: Any non-safety-related system is designated NNS. All piping systems designated as NNS are designed to ANSI-B31.1 requirements.

Regulatory Guide 1.67 does not address closed systems or systems with a water slug. How was 1.67 used for the installation and design of pressure relief devices?

RESPONSE: Although Regulatory Guide 1.67 does not address closed systems, Paragraph 3.9(B).3.3c of the FSAR addresses the evaluation of auxiliary system relief valves for closed and open systems on pages 3.9(B)-23 and 24.

The only relief valves presently having a water seal which would introduce a water slug are the pressurizer relief valves. However, an alternate method of piping has been developed, and will be implemented, which will eliminate the water slug concern. Paragraph 3.9(B).3.3a will be revised to reflect this change.



210.35

(3.9(B).3.3, Page 3.9(B)-23)

Was Regulatory Guide 1.67 used to determine the spacing of the safety valves on the main steam lines?

RESPONSE: Spacing of the safety valves on the main steam lines is in compliance with Regulatory Guide 1.67 and referenced Code Case 1569.

210.36

(3.9(B).3.3, Page 3.9(B)-24)

Provide a schedule for completion of dynamic analyses results.

RESPONSE: The information now indicated as "later" on FSAR Tables 3.9(B)-19 and 3.9(B)-20 will be provided by September 15, 1982.

The values presently shown on these two tables may no longer be representative of the as-built designs and will be updated accordingly.

RAI 210.37 (3.9(B).3.4), Page 3.9(B)-26)

Provide your interpretation of jurisdictional boundaries as they pertain to NF supports. Justify your position.

RESPONSE:

Jurisdictional boundaries of supports designed and fabricated to Subsection NF requirements as shown in NF-100 for plates, welding and bolting is as follows:

1. Plates

- A. Support plates that are embedded in concrete with integral embedded anchors (studs) do not fall under NF jurisdiction, whether or not they protrude from the surface of concrete.
- B. Loose or adjustable base plates which only support compressive loads do not fall under NF jurisdiction.
- C. Loose plates that are welded to component supports do fall under NF jurisdiction. (Surface mounted plates)

2. Welding

- A. The weld used to attach NF supports to building steel, supplementary steel or intervening members is considered to fall within the jurisdiction of NF.

3. Bolting

- A. Embedded custom-designed anchor bolts are designed and purchased to AISC requirements and the additional materials, Certification and NDE Examination Requirements of ASME Subsection NF.
- B. Standard expansion anchors which are manufactured and stocked as catalogue items such as hilti-kwik bolts, fall under the jurisdiction of Subsection NF.

210.40

(3.9(B).3.4, Page 3.9(B)-26)

Provide design criteria for any snubbers.

RESPONSE: A revised FSAR Section 3.9(B).3.4 incorporating snubber design criteria will be provided in FSAR Amendment 45.

210.41 As required by 10 CFR 50.55 a(g), we request that you submit your  
(3.9(B).6) preservice and initial 120 month inservice testing program for  
pumps and valves. Attachment A provides a suggested format for  
this submittal and a discussion of information we require to  
justify any relief requests.

RESPONSE: The scope of pumps and valves operability testing, including  
adherence to ASME Boiler and Pressure Vessel Code, Section XI and  
10 CFR 50.55 a(g), is provided in FSAR Section 3.9(B).6. 10 CFR  
50.55 a(g) does not specify a submittal date for a preservice or  
inservice testing program for pumps and valves; however, the pump  
and valve test program will be submitted, with the Inservice  
Inspection Program, within six months of the anticipated date for  
commercial operation. This submittal date is consistent with  
previous NRC staff guidance.

There are several safety systems connected to the reactor coolant pressure boundary that have design pressure below the rated reactor coolant system (RCS) pressure. There are also some systems which are rated at full reactor pressure on the discharge side of pumps but have pump suction below RCS pressure. In order to protect these systems from RCS pressure, two or more isolation valves are placed in series to form the interface between the high pressure RCS and the low pressure systems. The leak tight integrity of these valves must be ensured by periodic leak testing to prevent exceeding the design pressure of the low pressure systems thus causing an inter-system LOCA.

Pressure isolation valves are required to be category A or AC per IWV-2000 and to meet the appropriate requirements of IWV-3420 of Section XI of the ASME Code except as discussed below.

Limiting Conditions for Operation (LCO) are required to be added to the technical specifications which will require correction action; i.e., shutdown or system isolation when the final approved leakage limits are not met. Also surveillance requirements, which will state the acceptable leak rate testing frequency, shall be provided in the technical specifications.

Periodic leak testing of each pressure isolation valve is required to be performed at least once per each refueling outage, after valve maintenance prior to return to service, and for systems rated at less than 50% of RCS design pressure each time the valve has moved from its fully closed position unless justification is given. The testing interval should average to be approximately one year. Leak testing should also be performed after all disturbances to the valves are complete, prior to reaching power operation following a refueling outage, maintenance, etc.

The staff's present position on leak rate limiting conditions for operation must be equal to or less than 1 gallon per minute for each valve (GPM) to ensure the integrity of the valve, demonstrate the adequacy of the redundant pressure isolation function and give an indication of valve degradation over a finite period of time. Significant increases over this limiting value would be an indication of valve degradation from one test to another.

Leak rates higher than 1 GPM will be considered if the leak rate changes are below 1 GPM above the previous test leak rate or system design precludes measuring 1 GPM with sufficient accuracy. These items will be reviewed on a case by case basis.

The Class 1 to Class 2 boundary will be considered the isolation point which must be protected by redundant isolation valves.

In cases where pressure isolation is provided by two valves, both will be independently leak tested. When three or more valves provide isolation, only two of the valves need to be leak tested.

Provide a list of all pressure isolation valves included in your testing program along with four sets of Piping and Instrument Diagrams which describe your reactor coolant system pressure isolation valves. Also discuss in detail how your leak testing program will conform to the above staff position.

RESPONSE: A valve test program is in preparation and, when completed, will address inservice testing of valves whose function is to perform pressure isolation between high pressure reactor coolant and low pressure systems. Specific information regarding valve testing criteria, frequency, and exceptions will be made available to the NRC Project Manager for review by January 1, 1983. This date is consistent with the previously stated submittal date for information relative to the Inservice Inspection Program.

210.54

It is the staff's position that all essential safety-related instrumentation lines should be included in the vibration monitoring program during pre-operational or start-up testing. We require that either a visual or instrumented inspection (as appropriate) be conducted to identify any excessive vibration that will result in fatigue failure.

Provide a list of all safety-related small bore piping and instrumentation lines that will be included in the initial test vibration monitoring program.

RESPONSE: Section 3.9(B).2, Dynamic Testing and Analysis, is presently undergoing an extensive review to define scope and programmatic requirements. An update of this section, in conjunction with applicable portions of Chapter 14, will be provided to the NRC by October, 1982.



Due to a long history of problems dealing with inoperable and incorrectly installed snubbers, and due to the potential safety significance of failed snubbers in safety related systems and components, it is requested that maintenance records for snubbers be documented as follows:

#### Pre-service Examination

A pre-service examination should be made on all snubbers listed in Tables 3.7-4a and 3.7-4b of Standard Technical Specifications 3/4.7.9. This examination should be made after snubber installation but not more than six months prior to initial system pre-operational testing, and should as a minimum verify the following:

1. There are no visible signs of damage or impaired operability as a result of storage, handling, or installation.
2. The snubber location, orientation, position setting, and configuration (attachments, extensions, etc.) are according to design drawings and specifications.
3. Snubbers are not seized, frozen or jammed.
4. Adequate swing clearance is provided to allow snubber movement.
5. If applicable, fluid is to be recommended level and is not leaking from the snubber system.
6. Structural connections such as pins, fasteners and other connecting hardware such as lock nuts, tabs, wire, cotter pins are installed correctly.

If the period between the initial pre-service examination and initial system pre-operational test exceeds six months due to unexpected situations, re-examination of items 1, 4, and 5 shall be performed. Snubbers which are installed incorrectly or otherwise fail to meet the above requirements must be repaired or replaced and re-examined in accordance with the above criteria.

#### Pre-Operational Testing

During pre-operational testing, snubber thermal movements for systems whose operating temperature exceeds 250°F should be verified as follows:

- a. During initial system heatup and cooldown, at specified temperature intervals for any system which attains operating temperature, verify the snubber expected thermal movement.
- b. For those systems which do not attain operating temperature, verify via observation and/or calculation that the snubber will accommodate the projected thermal movement.

- c. Verify the snubber swing clearance at specified heatup and cooldown intervals. Any discrepancies or inconsistencies shall be evaluated for cause and corrected prior to proceeding to the next specified interval.

The above described operability program for snubbers should be included and documented by the pre-service inspection and pre-operational test programs.

The pre-service inspection must be a prerequisite for the pre-operational testing of snubber thermal motion. This test program should be specified in Chapter 14 of the FSAR.

- RESPONSE: The response to this RAI was included in our November 27, 1981, submittal in response to the Acceptance Review RAIs and was subsequently incorporated into FSAR Amendment 44 (Section 3.9(B).3.4(d)).