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NUCLEAR POWER

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MFN 169-82

November 10, 1982

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555

Attention: Mr. D. G. Eisenhut, Director
Division of Licensing

Gentlemen:

SUBJECT: IN THE MATTER OF 238 NUCLEAR ISLAND
GENERAL ELECTRIC STANDARD SAFETY ANALYSIS REPORT (GESSAR II);
DOCKET NO. STN 50-447

Attached please find draft responses to the Commission's August 25, 1982 request for additional information on GESSAR II. These responses, provided in Attachment Nos. 1 through 8, reflect the NRC/GE information exchange meetings held in Bethesda from October 7, 1982 through October 26, 1982.

Essentially all questions are addressed in this transmittal. Unless otherwise noted in the attachments, draft responses will be provided for all remaining questions in December 1982. An amendment is scheduled for January 1982 to formalize the responses.

Sincerely,

Willa for

Glenn G. Sherwood, Manager
Nuclear Safety & Licensing Operation

GGS:ggt/52

Attachments

cc: F. J. Miraglia (w/o attachments)
M. D. Lynch (w/o attachments)
C. O. Thomas (w/o attachments)
L. S. Gifford (w/o attachments)

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ATTACHMENT NO. 1

DRAFT RESPONSES TO

STRUCTURAL ENGINEERING BRANCH

QUESTIONS

220.0 **STRUCTURAL ENGINEERING BRANCH**

220.01 (3.3.2) It is not clear in Section 3.3.2.2 of your FSAR how you combine the effects of the wind, the differential pressure and missiles all associated with a tornado. Clearly state the tornado loading combinations which you use in the design of all seismic Category I structures. A method of combining these effects which we find acceptable is given in Section 3.3.2 of the Standard Review Plan (SRP).

220.01 - Response

The tornado loading combination for which all seismic category I structures are designed is

$$U = D + L + T_o + R_o + W_t + H \text{ (static earth pressure, as applicable)}$$

noted in Sections 3.8.4.3.1.2(2), 3.8.4.3.2.2(2) and 3.8.4.3.2.3(2). [redacted] ~~See also~~ Sections 3.8.4.3.1.1 for the definition of the load W_t, and 3.8.4.5.1.2 for design criteria, ~~will be clarified as follows:~~ have been clarified accordingly.

3.8.4.3.1.1 Loads and Notations (Continued)

Y_m = missile impact equivalent static load on a structure generated by or during the postulated break, like pipe whipping, and including a calculated dynamic factor to account for the dynamic nature of the load.

W = wind force (Subsection 3.3.1.)

W_t = tornado load (Subsection 3.3.2) (tornado-generated missiles are described in Subsection 3.5.~~2.1.1~~1.4, and barrier design procedures in 3.5.3)

the pressure part of W_t is defined as either

(a) 360 mph velocity pressure with or without 1.5 psi negative pressure differential, or

(b) 3 psi negative pressure differential.

P_a = internal negative pressure of 3.0 psig due to tornado; accident pressure = 7 psig at main steam tunnel piping embedment

B = uplift forces created by th... water table

F_{eqs} = safe shutd...

$F_{e...}$ ...

... two

... ponent.)

... effects induced by normal ... existing rhrough the Shield ... wall and dome. Both summer and winter operating conditions are considered. In all cases the conditions are considered of long enough duration to result in a straight line temperature gradient. The temperatures are as follows:

(1) Summer operation:

(a) air temperature inside building - 120°F
(b) exterior temperature above El 50 ft - 115°F
(c) exterior temperature below El 50 ft - 90°F

3.8.4.5.1.2 Materials Criteria (Continued)

where

f'_c is the specified compressive strength of concrete and f_y is the specified yield strength of reinforcement.

Excessive deformation of the Shield Building could affect safet... related components. Hammering against other struct... of lines are recognized hazards.

For load combinations with Tornado, the above requirements are satisfied first without the tornado missile load. The effect of the concentrated missile load is then considered separately allowing local section reinforcement to reach the yield level and undergo ductile deformation. The ductility ratio ~~shall~~ does not exceed 10.

Maximum relative hor... ng and th... of ... ne...

3.8...

Struc... ...e AISC-1969 Specificat... ...ase does the allowable stress exceed ... minimum specified yield stress. The design ... preclude excessive deformation of the building. The clearances between the adjacent buildings are sufficient to prevent impact during a seismic event. The same method regarding the tornado load for the shield Building has been used.

3.8.4.5.3 Other Seismic Category I Structures

Structural acceptance criteria for Seismic Category I structures outside the Nuclear Island will be provided by the Applicant.

3.8.4.6 Materials, Quality Control, and Special Construction Techniques

3.8.4.6.1 Shield Building

See Subsection 3.8.3.6.1 and add the following special construction techniques.

220.02 (3.3.2) **In Section 3.3.2.1 of your FSAR, you state that you will vent the diesel-generator and auxiliary buildings. State whether the differential pressure associated with a tornado is transformed into an effective reduced pressure. If so, provide your proposed procedure to accomplish this.**

<u>220.02</u> Response

Section 3.3.2.1 [redacted] is not current. The Diesel Generator and Auxiliary Buildings are nonvented structures. The two buildings are protected from the negative tornado pressures by dampers on exhaust openings and backdraft dampers designed to withstand a negative 3 psi on the HVAC openings. The blow-out panels between the Auxiliary Building RHR (heat) exchanger rooms and steam tunnel are provided with locks which are locked during a tornado watch. Section 3.3.2.1 will be revised to reflect the current design.

220.03
(3,5,3)

In Section 3.5.3.1 of your FSAR, you indicate that you use the modified Petry formula for local damage prediction of concrete barriers. You also indicate that your proposed design procedures have been substantiated by full scale impact tests conducted by the Sandia National Laboratory. State whether the thicknesses of the concrete missile barriers which will be established using your proposed design procedures will in no case be less than those listed in Table 1, Section 3.5.3 of the SRP.

220.03 - Response

Nuclear Island
[redacted] walls are at least 24" thick, and roofs 19" thick where exposed to tornado missiles. These thicknesses meet the requirements of the SRP.

220.04 (3.5.3) You state in Section 3.5.3.2 of your FSAR that you use an analysis procedure similar to that in Reference 6 (Williamson & Alvy) to determine an equivalent static load representing the tornado missile. Describe the actual procedure by which tornado generated missiles are transformed into effective loads. Verify that your proposed design procedure produces static loads comparable to those determined using the Williamson & Alvy formula.

220.05 (3.5.3) Submit details of the methods and assumptions which you use in the evaluation of the overall response of concrete and steel barriers subjected to impactive and impulsive loads. If you use the ductility ratio concept, indicate the ductility ratios you assume and verify that you meet the criteria delineated in Appendix A of Section 3.5.3, Revision 1, of the SRP.

220.04 and 220.05 Responses

The structural response to this load is evaluated using equivalent static forces obtained by the procedure in Reference 6 for rigid missiles, and the procedure in Reference 7 for deformable missiles. Ductility of slabs and shapes is used. Ductility ratios do not exceed 10. The above text ~~would~~ will be added to Section 3.5.3.2, ~~of the SAR~~ and will meet the SRP requirements. For steel, ~~we will use~~ Appendix A of SRP Section 3.5.3 will be used.

(Reference 7

J D Riera, On the Stress Analysis of Structures Subjected to Aircraft Impact Forces, Nuclear Engineering and Design, North Holland Publishing Co., Vol. 8, 1968.)

Q. 220.06 (3.7.1)

State in Section 3.7.1.2 of your FSAR, your frequency range and the actual frequency values you use in generating the response spectra from the synthetic records. Compare these with the frequency range and frequency values indicated in Item II.1.b of Section 3.7.1 of the SRP.

Response

The frequency range used in generating the response spectra from the synthetic records is 0.2 to 33 Hz. The actual frequency intervals used in generating the response spectra is the same as given in Table 3.7.1-1 of SRP Section 3.7.1.

Section 3.7.1.2, paragraph 3 will be modified to reflect this response.

Q. 220.07(3.7.1)

In our review of Figures 3.7-7, 3.7-8, 3.7-13, 3.7-14, 3.7-19 and 3.7-20 of your FSAR, we note that for higher damping values, the response spectra from your synthetic time history are not in agreement with the enveloping values contained in Item II.1.6 of Section 3.7.1 of the SRP. Discuss in Section 3.7.1.3 of your FSAR, the effect of this apparent deviation from the response spectra contained in the SRP.

Response

The response spectra from the synthetic time histories for the damping values of 1, 2, 3 and 4 percent conform to the requirement for enveloping procedure provided in Item II.1.b of Section 3.7.1 of the SRP. However, the response spectra for the higher damping values of 7 and 10 percent show that there are some deviations from the SRP requirement. This deviation is considered inconsequential because -
(i) Generating an artificial time history whose response spectra would envelop design spectra for 5 different damping values would result in very conservative time histories for use as design basis input,
(ii) The response spectra from the synthetic time histories do envelop the design spectra for the lower damping values. This is very important because the loads on structures due to SSE earthquake which may require the use of 7 percent damping for concrete components is obtained by ratioing up the responses from the OBE analysis.
The OBE analyses uses only the lower damping values (up to 4%) and not the higher damping values. This is consistent with the SRP requirements.

220.08 (3.7.1) In Section 3.7.1.3 of your FSAR, you correctly quote our position in Section C.3 of Regulatory Guide 1.61. However, it is not clear whether you have complied with our position on this matter. Accordingly, clearly state whether you comply with this portion of Regulatory Guide 1.61. If so, indicate the mechanism used to assure this compliance. If not, justify your position.

220.08 - Response

[redacted]

The damping factors indicated in Table 3.7-1 were used in the response analysis of various structures and systems and in preparation of floor response spectra used as forcing inputs for piping and equipment analysis or testing and presented in Section 3.10. [redacted] These values are consistent with those given in NRC Regulatory Guide 1.61.

When developing seismic design data for the SSE, the higher damping values of Regulatory Guide 1.61 were not used. The SSE data was obtained by doubling the OBE values which were based on the lower damping values. In the design process, the stress levels have been assessed and found sufficiently high to justify the use of the damping factors in Table 3.7-1.

Section 3.7.1.3, 3.7.1.4 and Table 3.7-1 will be revised to reflect the above stated position.

Q. 220.09(3.7.1)

Our position regarding the soil-structure interaction is contained in Item II.4 of Section 3.7.2 of the SRP and states that in addition to a finite element method of analysis, the elastic half-space method should also be used. Accordingly, provide in Section 3.7.1.4 and Appendix 3A of your FSAR, your procedure and the results from an analysis using the elastic half-space approach, including a discussion on the effect of variations in soil properties.

Response

General Electric Company's Proprietary report, "Soil-Structure Interaction Analysis Finite Element Method vs. Compliance Spring Method", No. NEDE-25346 dt. December 1980 describes the work performed by GE to respond to this question. In brief, the report provides a comparison of results between the finite element and the compliance spring methods for four of the GESSAR II soil-structure interaction analyses cases and shows that, in general, the finite element method produced more conservative forces (shears, moments and accelerations) and response spectra particularly in the frequency range of interest than those obtained from the compliance spring method.

220.10 (3.7.2) **In Section 3.7.2.1.5.1.1 of your FSAR, you state that a study has been conducted which shows that the interaction between the steel containment vessel and the polar crane can be ignored and that the crane mass can be lumped into the containment model at that level. Provide this study.**

<u>220.10</u>

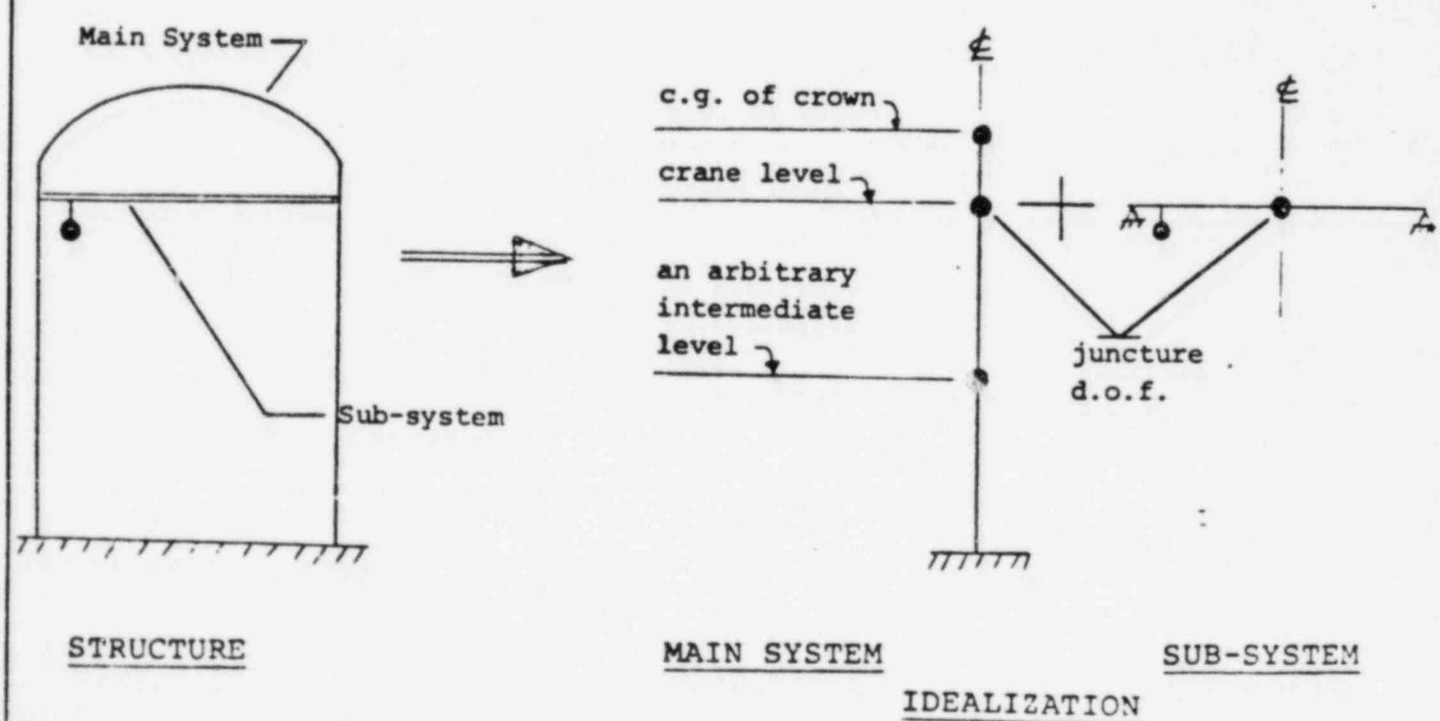
The report on the study of polar crane interaction with the steel containment is [redacted]. provided below.

DYNAMIC INTERACTION BETWEEN CONTAINMENT AND POLAR BRIDGE CRANE GIRDER

CONCEPT

Dynamic interaction between any two structural systems depends on their relative masses and stiffnesses.

The structural system in question, namely, the steel containment with the crane girder was divided into two systems. A main system consisting of the containment alone, and a sub-system consisting of the polar crane and the crane bridge. The main system was idealized as a 3-mass system with masses concentrated at the c.g. of the containment ellipsodial head, crane girder level and an intermediate level. The sub-system was idealized as a 2-mass system with masses concentrated at the center and at an extreme trolley position, the former representing the mass of the crane bridge and the later representing the trolley with L.L. To study dynamic interaction of the two systems in all possible modes of excitation, three different types of excitation were considered. They were vertical excitation, horizontal lateral excitation, and torsional excitation. For each of these excitations, the two systems were reduced to corresponding equivalent single d.o.f. systems by condensing out the non-juncture degrees of freedom. These effective masses and stiffnesses yielded the frequencies for the main system and for the sub-system for each of the three modes of excitation. Using the existing literature and the developed mass and frequency ratios, the percent error involved in decoupling the two systems and modifying the main system with the mass of the sub-system lumped into it was studied.



M P Badani
General Electric
S. Jose

CRANE GIRDER-CONTAINMENT INTERACTION
TVA STRIDE

November 5, 1974

SUMMARY OF RESULTS

	Main System			Sub-System			Mass Ratio M_S^*/M_M^*	Frequency Ratio $\frac{f_S}{f_M}$	% error in the eigenvalue for the modified main system compared with that of the complete system	Approximation Acceptable or not
	Effective Mass, M_M^*	Effective Stiffness, K_M^*	Frequency f_M	Effective Mass, M_S^*	Effective Stiffness, K_S^*	Frequency f_S				
Vertical Excitation	151.8 $\frac{K\text{-}SEC^2}{FT}$	1.20×10^6 K/FT	14.15 CPS	11.06 $\frac{K\text{-}SEC^2}{FT}$	2374 K/FT	2.33 CPS	0.07	0.16	< 10	Acceptable
Horizontal Lateral Excitation	151.8 $\frac{K\text{-}SEC^2}{FT}$	0.21×10^6 K/FT	5.88 CPS	11.06 $\frac{K\text{-}SEC^2}{FT}$	139 K/FT	0.56 CPS	0.07	0.10	< 10	Acceptable
Torsional Excitation	551,819 $\frac{K\text{-}SEC^2\text{-}FT}{RAD}$	15.84×10^8 K-FT/RAD	8.53 CPS	29,750 $\frac{K\text{-}SEC^2\text{-}FT}{RAD}$	0.5×10^6 $\frac{K\text{-}FT}{RAD}$	0.65 CPS	0.05	0.08	< 10	Acceptable

JH

In conclusion, interaction between the steel containment and the crane can be ignored and the mass of the crane etc can be lumped into the containment model at that level for all types of excitation.

OVALING MODES OF CRANE GIRDER

Due to the non-axisymmetric point loads resulting from the polar bridge crane, the crane ring-girder and the steel containment shell can exhibit ovaling modes of vibration.

The frequencies of these modes have been computed using standard formulae. The exact shape of a given ovaling mode of vibration consists of a curve which is a sinusoid on the developed circumference of the ring. For these computations the ring-girder is assumed to act as a structural composite with a tributary shell section. The results are summarized below.

OVALING MODES

MODE OF VIBRATION	WITHOUT CRANE		WITH CRANE	
	RAD/SEC	CPS	RAD/SEC	CPS
n* = 2	25.4	4.04	18.8	3.00
n = 3	71.9	11.44	53.3	8.48
n = 4	138.0	21.96	102.0	16.23

*n = number of full sine waves along the circumference.

In conclusion, judging from the high frequencies and nature of the respective mode shapes, the ovaling modes have very little modal responses as well as very small participation factors and hence are not significant. In addition, the ovaling modes have been found to have hardly any coupling with the beam modes of vibration.

220.11 Question

220.11 (3.7.2) At the time of this review, Appendix 3H which decribes the effect of the concrete between the containment and the shield building on the seismic analysis, is not available. Indicate when this appendix will be provided. This information should be made available prior to the forthcoming structural audit in December 1982.

220.11 Response

Draft response will be provided prior to the Structural audit in December 1982

220.12 (3.7.2) Your decoupling criteria between systems and subsystems are not clear in the discussion provided in Section 3.7.2.3 of your FSAR. Accordingly, demonstrate that your decoupling criteria are either equivalent to, or more conservative than, those given in Item II.3.b of Section 3.7.2 of the SRP.

<u>220.12</u> Response

[redacted] Section 3.7.2.3.1 will be affected. For the decoupling of the subsystem and the supporting system, the following criteria have been used:

(1) If $R_m \leq 0.01$, decoupling can be done for any R_f.

(2) If $0.01 \leq R_m \leq 0.1$, decoupling can be done if $R_f \leq 0.8$ or $R_f \geq 1.25$.

(3) If $R_m \geq 0.1$, an approximate model of the subsystem should be included in the primary system model.

Where R_m and R_f are defined as

$$R_m = \frac{\text{Total mass of the supported system}}{\text{Mass that supports the subsystem}}$$

$$R_f = \frac{\text{Fundamental frequency of the supported subsystem}}{\text{Frequency of the dominant support motion}}$$

These criteria are equivalent to the requirements of the SRP; they will be added to the text of Section 3.7.2.3.1

220.13 Questions

220.13 (3.7.2) It is not clear in the discussion provided in Sections 3.7.2.3 and 3.7.2.5 of your FSAR how you have accounted for the vertical flexibility of floors in the generation of the vertical response spectra. Accordingly, provide the procedures you have used to account for this phenomenon.

220.13 Response

Draft response will be provided in December 1982

220.14 Question

220.14 (3.7.2) In Section 3.7.2.11 of your FSAR, you indicate a method of analysis for torsional effects in your models. However, our position is that an additional eccentricity of five percent of the maximum building dimension at the level under consideration, be assumed in the design of seismic Category I structures to account for accidental torsion. This extra eccentricity is in addition to that which results from the actual geometry and mass distribution of the building. (Refer to Item II.11 in Section 3.7.2 of the SRP). State whether you comply with our position on this matter or whether you will pursue another method.

220.14 Response

Draft Response will be provided in December 1982

220.15 (3.7.3) Indicate in Section 3.7.3.10 of your FSAR whether, in performing a static analysis in lieu of the vertical dynamic analysis, a factor of 1.5 is applied to the peak acceleration of the applicable floor response spectrum. (Refer to Items II.1b(3) and II.10 of Section 3.7.2 of the SRP.)

220.15 Response

[redacted] Section 3.7.3.10 will be revised as indicated. This revision complies with the SRP.

3.7.3.8.2.1 Dynamic Analysis (Continued)

connected equipment are supported at more than two points located at different elevations in the building, the response spectrum analysis is performed using the envelope response spectrum of all attachment points. Alternatively, the multiple excitation analysis methods may be used where acceleration time histories or response spectra are applied at all the equipment and piping attachment points.

3.7.3.8.2.2 Effect of Differential Building Movements

The relative displacement between anchors is determined from the dynamic analysis of the structures. The results of the relative anchor-point displacement ...

A factor of 1.5 is applied to the peak acceleration of the applicable floor response spectrum when the static analysis is used.

3.7.3.10 Use of Constant Vertical Static Factors

All Seismic Category I subsystems and components are subjected to a vertical dynamic analysis with the vertical floor spectra or time histories defining the input. A static analysis is performed in lieu of dynamic analysis if the peak value of the floor spectra is used in the analysis. The vertical ground design response spectrum is used for equipment vertical seismic load determination if it can be shown that the structures supporting the equipment are rigid or quasi-rigid in vertical direction.

Q. 220.16(3A3.1)

For the fixed base cases (i.e., the plant founded on rock), describe the input motion you use at the base of the structure. Indicate whether the motion for the fixed base case was deconvolved from plant grade. Indicate how you account for the effect of embedment in this case.

Response

The input motion used for the fixed base case at the base of the structure is the design basis artificial time history for the 0.15 g OBE/0.3 g SSE corresponding to the Regulatory Guide 1.60 spectra without any deconvolution from the plant grade. For the fixed base case, the embedment effects are not accounted.

220.17 (3.7.2) **Describe your procedure to compute the dynamic lateral earth pressure and the hydrodynamic groundwater pressure during a seismic event.**

220.17 Response

The procedure for computing seismic lateral soil and groundwater pressure is taken from the following texts:

1 Design of Earth - Retaining Structures for Dynamic Loads, H Bolton Seed and Robert V Whitman in Lateral Stress in the Ground and Design of Earth-Retaining Structures, ASCE, June 1972.

2 Water Pressures on Dams During Earthquakes, H M Westergaard, ASCE Transactions, Vol 98, 1933.

3 Foundation Design, Wayne C Teng, Page 92 et seq.

220.18 (3.7.2)	Describe the procedures used in the seismic analysis of the polar crane. Discuss how you account for the effects of cable jerking.

220.18 Response.

The overall seismic analysis for the Reactor Building was performed using an axisymmetric model with the polar crane mass smeared around the containment. See Figure 3.7-24 and also our response to Question 220.10.

The seismic analysis of the polar crane was done using a multi-degree of freedom beam-element lumped-mass computer model. Acceleration response spectra were used as input. Cable jerking is accounted for by designing the hoists to support a static load three times the rated load.

220.19 (3.7.4) Describe your proposed in-service surveillance program for the seismic instrumentation, including a discussion of your proposed in-service inspection, testing and calibration. A program which we find acceptable is contained in Item II.5 of Section 3.7.4 of the SRP.

220.19 Response

Section 3.7.4.5 will be added; this program is in accordance with the program contained in the SRP.

3.7.4.4 Comparison of Measured and Predicted Responses (Continued)

seismic accelerations experienced at the location of major Seismic Category I structures and equipment. The measured responses from the time-history accelerographs, peak-recording accelerographs, and response spectrum recorders are used to determine the response spectra at the location of each Seismic Category I structure and system. These spectra are compared with those used in the design to determine whether the structure or system is still adequate for future use. Peak-recording accelerographs mounted on equipment are used to determine whether the design limitation of that specific equipment has been exceeded.

The theoretical structural responses and measured structural responses are compared to assess the degree of conservatism in the analytical predictions. Seismic levels are established to determine whether the plant can continue to operate or be shutdown. The criteria consider system design and dynamic analysis in establishing the acceptable levels for continued operation.

3.7.4.5 Inservice Surveillance

The inservice surveillance program for the seismic instrumentation including a discussion of the proposed inservice inspection, testing and calibration shall be provided by the applicant. The minimum requirements are as noted in the following table.

SEISMIC MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. Triaxial Time-History Accelerographs	M	R	SA
2. Triaxial Peak Accelerographs	NA	R	NA
3. Triaxial Seismic Switches	M	R	SA
4. Triaxial Response-Spectrum Recorders	M	R	SA

Legend:

M = Monthly
R = Refueling
SA = Once per 18 months
NA = Not Applicable

220.20 Question

220.20 (3.8.2) (3.8.3) (3BA8.4) Provide the following information applicable to pool dynamic loads, their load combinations and the analysis of these loads:

a. The procedures used to generate the in-structure response spectra at critical locations such as the reactor pressure vessel supports. Discuss how the effects of soil-structure interactions are accounted for in this analysis.

b. The extent, if any, to which structures adjacent to the reactor building will experience the effects of these loads.

c. Your procedures for combining static and alternating dynamic loads (Section 3BA.8.4) do not agree with our positions on this matter. (Refer to Sections 3.8.2 and 3.8.3 of the SRP.) Discuss the effect of this deviation. In addition, indicate whether your method of analysis includes the effects of fluid-structure interaction in the manner specified in the last paragraph of Item II.3.a of Section 3.8.3 of the SRP; i.e., whether you comply with the Appendix to Section 3.8.1 of the SRP. (Refer to Question 220.23)

d. Describe the analysis performed to determine the effects of negative pressures in the suppression pool on the containment and drywell lower liner plates, particularly when combined with the effects of high temperatures, seismic loads and cracking of the concrete.

220.20 Response

Draft response will be provided in December '80.

220.21 Question

2?0.21 (3.8.2) In Section 3.8.2.3.15 of your FSAR, you state that the structural design criteria for the steel containment vessel are consistent with our positions in Regulatory Guide 1.57. However, the stress intensity limits for various loading combinations presented in Table 3.8-2 of your FSAR do not clearly depict this. Accordingly, present these limits in a tabular form similar to that of Table 3.8.2-1 in Section 3.8.2 of the SRP. Verify that your stress intensity limits are consistent with our values in the SRP.

220.21 Response

Draft response will be provided in December 1982

220.22 Question

220.22 (3.8.2) In Table 3.8-1 of your FSAR, you present the proposed loading combination for the design of the steel containment vessel. However, the contents of this table are not clearly consistent with load combinations which are acceptable to us. Accordingly, provide the loading combinations in a tabular form which is consistent with the load combinations contained in Item II.3.b of Section 3.8.2 of the SRP. Verify that your proposed loading combinations are in agreement with those contained in the SRP.

220.22 Response

Draft response will be provided in December '80.

220.23 (3.8.2) In your proposed design and analysis procedures presented in Section 3.8.2.4 of your FSAR for the steel containment vessel, it is not clear how you have treated the nonaxisymmetric loads and the transient loads. Provided a detailed discussion of your procedures on these matters. (Refer to Part (c) of Question 220.20.)

<u>220.23</u> Response

~~We have treated the~~ Nonaxisymmetrical loads are treated by expanding the loads into a fourier series. ~~We have treated the~~ Transient loads are treated by using the time-history method.

220.24 Question

220.24 (3.8.2) The staff will review the ultimate capacity of the containment vessel with respect to internal pressure build-up due to accidents when we review the GESSAR PRA. However, for our review of your application for an FDA, state in Section 3.8.2.4 of your FSAR whether your proposed design of the steel containment vessel complies with our position on this matter as outlined in Item II.4.d of Section 3.8.2 of the SRP. You should be prepared to discuss this matter in detail at the forthcoming structural audit in December 1982.

220.24 Response

The ultimate capacity of the containment vessel with respect to internal pressure build-up is provided in Appendix G to Section 2 of Appendix 15D. The design of the steel containment vessel complies with Item II.4.d of Section 3.8.2 of the SRP.

220.25 Question

220.25 (3.8.2) Provide in Section 3.8.2.4 of your FSAR, a discussion of the localized deformations at penetrations in the steel containment vessel due to the internal pressure build-up resulting from postulated accidents. Discuss the effect of these internal pressure loads resulting from postulated accidents on the leak rates at the penetrations in the containment vessel.

220.25 Response

Response to this question will be provided during the review of the severe accidents.

220.26 (3.8.2) In Appendix 3F of your FSAR, you state that you use a value of 2.0 for the factor of safety against buckling which conforms to our position on this matter in Regulatory Guide 1.57. However, our current position differs from that presented in this regulatory guide and is provided in Attachment 1 to this set of questions. The factors of safety against buckling of steel containment vessels which we now find acceptable are:

a. For design conditions and Level A and B services limits, use a factor of safety of 3.0.

b. For Level C service limits, use a factor of safety of 2.5.

c. For Level D service limits, use a factor of safety of 2.0.

The safety factors cited above are independent of the knockdown factor. This factor is used to reduce to experimentally determined values of buckling stress, the calculated buckling stress obtained from the classical theory of buckling based on small displacements of a shell assumed to have no structural imperfections. Verify that your analyses of the steel containment vessel meet our current positions regarding the required factors of safety against buckling.

220.26 Response

[redacted] IN APPENDIX 3F, THE VALUE OF 2.0 FOR THE FACTOR OF SAFETY AGAINST BUCKLING WILL BE CHANGED TO FACTORS OF SAFETY AS FOLLOWS:

1. FOR DESIGN CONDITIONS AND LEVEL A AND B SERVICES LIMITS, USE A FACTOR OF SAFETY OF 3.0.
2. FOR LEVEL C SERVICE LIMITS, USE A FACTOR OF SAFETY OF 2.5.
3. FOR LEVEL D SERVICE LIMITS, USE A FACTOR OF SAFETY OF 2.0.

AN AXISYMMETRIC BIFURCATION ANALYSIS SHALL BE PERFORMED TO VERIFY THAT THE CORRESPONDING FACTOR OF SAFETY IS MET.

THE CONFIGURATION OF THE STEEL CONTAINMENT SHELL VESSEL SHOWN IN GESSAR II IS SIMILAR TO THAT OF PERRY's DESIGN. BASED ON JUDGEMENT, THE VESSEL IN GESSAR II DESIGNED ACCORDING TO CRITERIA CONFORMING TO REG. GUIDE 1.57 CAN MEET NRC's PRESENT POSITIONS. [redacted] THE APPLICANT [redacted] SHALL SUBMIT A COMPLETE STRESS REPORT OF CONTAINMENT PRESSURE VESSEL IN WHICH THE RESULTS OF AN AXISYMMETRIC BIFURCATION ANALYSIS SHALL BE INCLUDED.

220.27 Question

220.27 (3.8.3) (3.8.4) (3.8.5) In Sections 3.8.3, 3.8.4 and 3.8.5 of your FSAR, you state that the design of concrete internal structures, other seismic Category I structrues and foundations is performed in accordance with the requirements of ACI-318 (1971). Our present position on this matter is that you should use ACI-349, as augmented by Regulatory Guide 1.142. Evaluate and assess the impact of satisfying our position on this matter. Identify specific deviations from our present position. Indicate those areas where use of the ACI-318 (1971) Code produces a less conservative design. Discuss specific means for modifying those portions of your proposed structures which are less conservatively designed. Alternatively, justify their design adequacy.

220.27 Response

GESSAR II complies with ACI 349-76 and RG 1.142. See the following amended sections of the SAR.

SECTION	PAGES IN SECTION 3.8
3.8.3.3.1 (12)	56
3.8.3.3.6.1	64
3.8.3.4.7.1	75
3.8.3.5.7.1	79
3.8.3.6.1.7	85
3.8.4.2.1	98 & 99
3.8.4.3.1.2	104 & 105
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3.8.4.4.1.3	115
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3.8.4.4.2.5	118
3.8.4.4.3	120
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3.8.4.6.1 (3)	129
3.8.5.4.2	137
3.8.5.5.1.2	138
3.8.5.5.2	139
Fig 3.8-90	293/294

3.8.3.2.1 Drywell (Continued)

(e) SSPC-SP-6, Commercial Blast Cleaning; and

(f) SSPC-SP-10, Near-White Blast Cleaning;

(10) ACI-ASCE Committee 326, Shear and Diagonal Tension, ACI Manual of Concrete Practice, Part 2, 1972;

(11) Applicable ASTM Specifications for Materials and Standards, 1973 edition; and

(12) ACI 349-76 318-71 Building Code Requirements for Reinforced Concrete Nuclear Safety Related Concrete Structures.

3.8.3.2.2 Weir Wall

See Subsection 3.8.3.2.1.

3.8.3.2.3 Refueling Pool and Operating Floor

See Subsection 3.8.3.2.1.

3.8.3.2.4 Piping, CRD, and Recirculation Pump and Motor Support System

See Subsection 3.8.3.2.1 (2), (4), (7), (8), (9), and (11).

3.8.3.2.5 Reactor Pedestal

See Subsection 3.8.3.2.1 (1), (2), (4), (7a, c, d, g, h, i, j, k), (8b, c, d, e, g, h), (9), (11) and (12) plus ANSI N101.6-1972, Concrete Radiation Shield, as modified by Regulatory Guide 1.69, Concrete Radiation Shields for Nuclear Power Plants.

3.8.3.3.6.1 Definition of Terms and Nomenclature (Continued)

S = For structural steel, S is the required section strength based on the elastic design method and the allowable stresses defined in Part 1 of the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

U = For concrete, U is the section strength required to resist design loads and based on methods described in ACI 318-71. Concrete is non-structural in the reactor shield wall. 349-76

Y = For steel, Y is the section strength to resist design loads based on the plastic design method described in Part 2 of AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

3.8.3.3.6.2 Load Combinations for Concrete Structures and Acceptance Criteria

3.8.3.3.6.2.1 Load Combinations for Service Load Conditions

The strength, S, is based on the following load combinations and corresponds to the elastic working stress design method.

$$S = D + L. \quad (3.8\text{-}1)$$

$$S = D + L + F_{eqo}. \quad (3.8\text{-}2)$$

$$S = D + L + T_o + R_o. \quad (3.8\text{-}3)$$

$$S = D + L + T_o + R_o + F_{eqo}. \quad (3.8\text{-}4)$$

3.8.3.4.6 Reactor Shield Wall (Continued)

Design of the shield wall is based on the elastic working stress design method. In certain areas of the shield wall, where large loads are localized, plastic deformations can result. However, the yielding is localized and does not affect structural integrity. The structural design acceptability criteria are listed in Subsection 3.8.3.3.6.

It is assumed that the structural strength of the shield wall is due to the steel shell and does not act compositely with the concrete except as noted in the following paragraph. This assumption comes from a conservative judgment that concrete is for shielding purposes only and to resist local radial shear pressure loads such as LOCA and jet impingement.

The loaded shield wall behaves as an integral structure. Vertical diaphgrams welded radially between the inner and outer plates of the shield wall as well as the presence of concrete in the annular region ensure that loads on either the inner or outer plates are transferred to the rest of the structure, and the concrete aids in the buckling resistance of the plates (even through the concrete is not used structurally in a composite manner). The summary of stresses is shown in Figure 3.8-23.

3.8.3.4.7 Other Internal Structures

3.8.3.4.7.1 Design

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All other internal structures are covered by either the ACI 318-77 Code or the AISC Code and are designed in a conventional manner. These structures have no unusual features which would require other than generally accepted engineering procedures. The steam tunnel is designed using the finite-element computer program, NASTRAN.

3.8.3.5.5 Reactor Pedestal

The stress allowables are described in Subsection 3.8.3.5.6.

3.8.3.5.6 Reactor Shield Wall

The design of the shield wall is in accordance with AISC Code. The structural strength of the concrete in the shield wall is not considered in the design. For the normal operating conditions, the stress allowables for steel are the same as specified in the AISC Code. When thermal and pipe reaction loads are added, the stress allowables are increased by 50 percent. For the abnormal/extreme environmental load conditions, the stress allowables are increased by 60 percent from the basic AISC stress allowables. In summary, under design conditions, stress levels are such that failure of the structure is precluded. Furthermore, displacements are not sufficiently large enough to interfere with safety functions.

3.8.3.5.7 Other Internal Structures

3.8.3.5.7.1 General Criteria

The internal structures covered by Subsection 3.8.3.1.7 are a part of the general containment volume. None of the structures in this group is a pressure boundary or a fission product barrier; thus, the standard ACI 318-71 and AISC stress and strain criteria apply to the concrete and steel structural elements, respectively.

3.8.3.5.7.2 Deformation Criteria

One design feature of the containment above elevation (-)5 ft, in., and RPV pedestal is the absence of horizontal ties to any other structure. Thus, any member of the miscellaneous internal structures vertically supported on the containment wall and either

3.8.3.6.1.7 Construction Codes of Practice (Continued)

(5) ACI 305, 1972, Recommended Practice for Hot Weather Concreting;

(6) ACI 306, Recommended Practice for Cold Weather Concreting;

(7) ACI 308, 1971, Recommended Practice for Curing Concrete;

(8) ACI 309, 1972, Consolidation of Concrete;

(9) ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures;

(10) ACI ~~318, 1971,~~ 349-76 ~~Building~~ Code Requirements for ~~Reinforced Concrete;~~ Nuclear Safety Related Concrete Structures;

(11) ACI 347, 1956, Recommended Practice for Concrete Formwork;

(12) ACI SP-2, 1975, Manual of Concrete Inspection;

(13) ASTM 15-C, Manual on Quality Control of Materials

(14) ASTM C94, Ready-Mixed Concrete;

(15) ASTM C618, Class S, Specification for Fly Ash for Use as an Admixture in Portland Cement Concrete;

(16) ASME Code Section VIII, Boiler and Pressure Vessel Code,

(a) Subsection B, Requirements Pertaining to Methods of Fabrication of Pressure Vessels and

3.8.4.1.7 Other Seismic Category I Structures

Other Seismic Category I structures not within the Nuclear Island will be described by the Applicant.

3.8.4.2 Applicable Codes, Standards, and Specifications

3.8.4.2.1 Shield Building

The major portion of the Shield Building, while protective, is not subjected to the abnormal and severe accident conditions associated with a containment. ~~The Shield Building design is based on the ACI 318-71, Building Code Requirements for Reinforced Concrete.~~ A listing of applicable documents follows:

(1) ACI ~~318-1971~~ 349-76, ~~Building~~ Code Requirements for ~~Reinforced Concrete~~ Nuclear Safety Related Concrete Structures;

(2) AISC, Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, 1969;

(3) ASME Boiler and Pressure Vessel Code Section III, Subsection NE, Division 1, Class MC (winter 1975 addenda) (for design of main steam tunnel embedment piping anchorage only);

(4) AWS Structural Welding Code, AWS D1.1-1972;

(5) AWS Structural Welding Code, AWS D12.1-1966;

(6) NRC publications TID 7024-1963 and TID 25021-1967, Nuclear Reactors and Earthquakes and Summary of Current Seismic Design Practice for Nuclear Reactor Facilities;

(7) ASME Boiler and Pressure Vessel Code Section III, Division 2, Subsection CC (for design of lower wall up to elevation (-)5 ft, 3 in., only);

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3.8.4.2.1 Shield Building (Continued)

(8) NRC Regulatory Guides:

(a) Regulatory Guide 1.10, Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures;

(b) Regulatory Guide 1.15, Testing of Reinforcing Bars for Category I Concrete Structures;

(c) Regulatory Guide 1.28, Quality Assurance Program Requirements (Design and Construction);

(d) Regulatory Guide 1.29, Seismic Design Classification;

(e) Regulatory Guide 1.31, Control of Stainless Steel Welding;

(f) Regulatory Guide 1.44, Control of the Use of Sensitized Stainless Steel;

(g) Regulatory Guide 1.55, Concrete Placement in Category I Structures;

(h) Regulatory Guide 1.60, Design Response Spectra for Seismic Design of Nuclear Power Plants;

(i) Regulatory Guide 1.61, Quality Assurance Requirements for the Design of Nuclear Power Plants;

(k) Regulatory Guide 1.69, Concrete Radiation Shields for Nuclear Power Plants; and

(l) Regulatory Guide 1.76, Design Basis Tornado;

(m) Regulatory Guide 1.142, Safety-related Concrete Structures for Nuclear Power Plants (other than Reactor Vessels and Containments.

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3.8.4.3.1.1 Loads and Notations (Continued)

(2) Winter operation:

(a) air temperature inside building - 70°F

(b) exterior temperature above El 50 ft - (-) 40°F

(c) exterior temperature below El 50 ft - 60°F

(3) Winter shutdown

(a) air temperature inside building - 50°F

(b) exterior temperature above El 50 ft - (-) 40°F

(c) exterior temperature below El 50 ft - 60°F

For all cases as-constructed temperature is 60°F.

T_a = thermal effects (including T_o) which may occur d... a design accident at 165°F maximum 30 mi... LOCA

U = for concrete structure... required to resist des... design method describe...

3.8.4.3.1.2 Load Combinations

For the load combinations in this subsection, where any load reduces the effects of other loads, the corresponding coefficient for that load shall be taken as 0.9 if it can be demonstrated that the load is always present or occurs simultaneously with the other loads. Otherwise, the coefficient for that load shall be taken as zero.

(1) Normal operating conditions - The strength design method of ACI 318-71 is used for the following load combinations:

$$U = 1.4\ D + 1.7\ L + 1.3\ T_o + 1.7\ R_o. \quad (3.8\text{-}14)$$

$$U = 1.4\ D + 1.7\ L + 1.9\ F_{eqo} + 1.3\ T_o + 1.7\ R_o. \quad (3.8\text{-}15)$$

$$U = 1.4\ D + 1.7\ L + 1.7\ W + 1.3\ T_o + 1.7\ R_o. \quad (3.8\text{-}16)$$

3.8.4.3.1.2 Load Combinations (Continued)

delete

Both cases of L having its full value or being completely absent are checked and the following combinations are also satisfied:

$$U = 1.2\ D + 1.9\ F_{eqo}. \quad (3.8\text{-}17)$$

$$U = 1.2\ D + 1.7\ W. \quad (3.8\text{-}18)$$

(2) Abnormal/extreme environmental conditions - The strength design method of ACI 318-71 is modified by applying appropriate load factors for the following load combinations:

$$U = D + L + T_o + R_o + F_{eqs}. \quad (3.8\text{-}19)$$

$$U = D + L + T_o + R_o + W_t. \quad (3.8\text{-}20)$$

$$U = D + L + T_a + R_a + 1.5\ P_a. \quad (3.8\text{-}21)$$

$$U = D + L + T_a + R_a + 1.25\ P_a + Y_r + Y_j + Y_m + 1.25\ F_{eqo}. \quad (3.8\text{-}22)$$

$$U = D + L + T_a + R_a + 1.0\ P_a + Y_r + Y_j + Y_m + 1.0\ F_{eqs}. \quad (3.8\text{-}23)$$

Both cases of L having its full value or being completely absent are checked.

3.8.4.3.2 Auxiliary Building

3.8.4.3.2.1 Loads and Notations

The loads and notations are the same as in Subsection 3.8.4.3.1.1 except as follows:

L = conventional floor or roof life loads, movable equipment loads, and other variable loads such as construction loads. The following live loads are used:

Concrete floors and slabs (including roofs) - 200 psf

3.8.4.3.2.1 Loads and Notations (Continued)

Y_r = equivalent static load on the structure generated by the reaction on the broken high-energy pipe during the postulated break and including a calculated dynamic factor to account for the dynamic nature of the load

Y_j = jet impingement equivalent static load on a structure generated by the postulated break and including a calculated dynamic factor to account for the dynamic nature of the load

Y_m = missile impact equivalent static load on a structure generated by or during the postulated break, ~~like pipe~~ whipping, and including a calculated dy... account for the dynamic nat...

For the Load Combinations in this subsection, where any load reduces the effects of other loads, the corresponding coefficient for that load shall be taken as 0.9 if it can be demonstrated that the load is always present or occurs simultaneously with the other loads. Otherwise, the coefficient for that load shall be taken as zero.

For structural steel, S is th... the elastic design methods a... Part 1 of the AISC Specificati... ...ation and Erection of Structural Steel f... ..., February 12, 1969.

3.8.4.3.2.2 Load Combinations for Concrete Members

(1) Normal operating conditions - The strength design method is used and the following load combinations are satisfied:

$$U = 1.4\ D + 1.7\ L + 1.3\ T_o + 1.7\ R_o + 1.7\ H + 1.4\ B \quad (3.8\text{-}22)$$

$$U = 1.4\ D + 1.7\ L + 1.3\ T_o + 1.7\ R_o + 1.7\ H + 1.9\ F_{eqo} \quad (3.8\text{-}23)$$

$$U = 1.4\ D + 1.7\ L + 1.3\ T_o + 1.7\ R_o + 1.7\ H + 1.7\ W. \quad (3.8\text{-}24)$$

3.8.4.3.2.2 Load Combinations for Concrete Members (Continued)

For fluid pressure F, replace 1.7 H by 1.4 F in Equations 3.8-25 and 3.8-26.

In all load combinations (Eq. 3.8-24, -25, and -26), both cases of L having its full value or being completely absent are checked and the following conditions are also satisfied:

$$U = 1.2\ D + 1.9\ F_{eqo} \quad (3.8\text{-}27)$$

$$U = 1.2\ D + 1.7\ W. \quad (3.8\text{-}28)$$

(2) Abnormal/extreme environmental conditions - The strength design method is used and the following load combinations are satisfied:

$$U = D + L + T_o + R_o + H + B. \quad (3.8\text{-}29)$$

$$U = D + L + T_o + R_o + H + F_{eqs}. \quad (3.8\text{-}30)$$

$$U = D + L + T_o + R_o + H. \quad (3.8\text{-}31)$$

$$U = D + L + T_o + R_o + H + W_t. \quad (3.8\text{-}32)$$

$$U = D + L + T_a + R_a + 1.5\ P_a + H. \quad (3.8\text{-}33)$$

$$U = D + L + T_a + R_a + 1.25\ P_a + H + 1.25\ F_{eqo} + (Y_r + Y_j + Y_m). \quad (3.8\text{-}34)$$

$$U = D + L + T_a + R_a + P_a + H + F_{eqs} + (Y_r + Y_j + Y_m). \quad (3.8\text{-}35)$$

Both cases of L having its full value or being completely absent are considered.

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3.8.4.3.2.3 Load Combinations for Steel Members

(1) Normal operating conditions - The elastic working stress design method is used for the following load combinations:

$$S = D + L. \quad \text{(3.8-~~36~~ 32)}$$

$$S = D + L + F_{eqo}. \quad \text{(3.8-~~37~~ 33)}$$

$$S = D + L + W. \quad \text{(3.8-~~38~~ 34)}$$

Since thermal stresses due to T_o and R_o are present and are secondary and self-limiting in nature, the following combinations are also satisfied:

$$1.5\ S = D + L + T_o + R_o. \quad \text{(3.8-~~39~~ 35)}$$

$$1.5\ S = D + L + T_o + R_o + F_{eqs}. \quad \text{(3.8-~~40~~ 36)}$$

$$1.5\ S = D + L + T_o + R_o + W. \quad \text{(3.8-~~41~~ 37)}$$

In all these load conditions, both cases of L having its full value or being completely absent are checked.

(2) Abnormal/extreme environmental conditions - The elastic working stress design method is used and the following load combinations are satisfied:

$$1.6\ S = D + L + T_o + R_o + F_{eqs}. \quad \text{(3.8-~~42~~ 38)}$$

$$1.6\ S = D + L + T_o + R_o + W_t. \quad \text{(3.8-~~43~~ 39)}$$

$$1.6\ S = D + L + T_a + R_a + P_a. \quad \text{(3.8-~~44~~ 40)}$$

$$1.6\ S = D + L + T_a + R_a + 1.0\ F_{eqo} + P_a + (Y_j + Y_r + Y_m). \quad \text{(3.8-~~45~~ 41)}$$

$$1.6\ S = D + L + T_a + R_a + F_{eqs} + P_a + (Y_j + Y_r + Y_m). \quad \text{(3.8-~~46~~ 42)}$$

220.27

3.8.4.4.1.1 Static Analysis (Continued)

Local stresses around the equipment hatch and personnel air lock openings are analyzed by using a three-dimensional finite-element model analysis of a portion of the structure. The SAP computer program is used. Compatibility of displacements between the overall axi-symmetric analysis and the three-dimensional analysis is checked. A separate, detailed finite-element analysis is done for steam tunnel embedment using the NASTRAN computer program. The model is shown in Figure 3.8-30.

3.8.4.4.1.2 Seismic Analysis

Output from the overall time-history analyses of the Reactor Building is combined with the other loads defined in Subsection 3.8.4.3.1.1. No separate seismic analysis is needed for the Shield Building.

3.8.4.4.1.3 Design

349-76

The Shield Building is designed in accordance with applicable portions of ACI ~~318-71~~ above elevation (-)5 ft, 3 in. From the top of the mat foundation up to elevation (-)5 ft, 3 in., the Shield Building is designed in accordance with ASME Code Section III, Division 2, Subsection CC. Adequate reinforcing is determined for the walls, ring girder, and dome for stresses due to design loads. The summary of design is presented in Figure 3.8-31.

The steam tunnel area of the Shield Building requires special consideration due to increased thickness and protuberances for shielding purposes. The Shield Building resists the normal operating, shutdown, seismic, and accident anchor loads from the various pipelines such as main steam, feedwater, and RHR lines. These loads cause asymmetric deformation and large local bending moments in the steam tunnel area. A steel frame with stiffeners is designed for the steam tunnel area using the AISC Code. The summary of stresses is presented in Figure 3.8-32.

220.27

3.8.4.4.2 Auxiliary Building (Continued)

349-76

The design of the Auxiliary Building is based upon the AISC Design Specification as modified by Subsection 3.8.4.3.2.3 and ACI 318-7[illegible] codes. A lumped-mass stick model incorporating a three-dimensional parallel-element model of the building which includes weights, shear areas, stiffness of concrete walls, and weights of slabs, equipment, and materials is used in a time-history analysis done by the computer program STORY described in Appendix 3C. The resulting maximum shears, moments, and torques are distributed to each wall element in proportion to its relative stiffness. The results due to the three earthquake components are combined linearly in phase since the three-component time-histories are statistically independent. Wind force at each floor is also distributed in a manner similar to that for seismic shear.

3.8.4.4.2.1 Reinforced Concrete Foundation

The design and analysis procedures of the Auxiliary Building foundation are discussed in Subsection 3.8.5.4.2.

3.8.4.4.2.2 Reinforced Concrete Exterior Walls

At the subgrade level, the exterior walls of the Auxiliary Building are designed for lateral pressures from structural backfill, seismic forces, and design flood water effects as well as from vertical dead and live loads.

Above furnished grade, the exterior walls are designed for seismic forces, tornado depressurization loads, and tornado missile loads as well as for vertical dead and live loads. The exterior walls above finished grade have a minimum thickness of two ft in accordance with Subsection 3.3.2.

220.27

3.8.4.4.2.2 Reinforced Concrete Exterior Walls (Continued)

Auxiliary Building exterior walls are designed by manual calculations. The summary of design is presented in Figure 3.8-33.

3.8.4.4.2.3 Reinforced Concrete Interior Walls

The Auxiliary Building interior walls act in combination with the exterior walls to resist seismic load. They are also designed for the jet impingement, compartment pressures, thermal, dead, and live loads. Most of the wall thicknesses are governed by the shielding requirements.

3.8.4.4.2.4 Structural Steel Columns and Steel Floor Framing

Steel columns are designed to carry dead, live, seismic, and other vertical loads.

Each member of the structural steel beam/girder system is designed as a simple-span member to carry the concrete slab dead load and other construction loads. The composite section of the concrete slab acting integrally with the steel beam is designed to resist live, seismic, and other loads. Each beam frequency is calculated. Using the response spectra curve, inertia forces are obtained. The spacing of the beams is governed by the capacity of metal decking to carry wet concrete and construction loads.

3.8.4.4.2.5 Reinforced Concrete Floor Slabs and Roof

349-76

The structural concrete floor slabs are designed as one-way slabs spanning between the steel beams in accordance with ACI 318-71. Floor slabs are also designed as diaphragms to resist and transfer seismic loads to the shear walls.

Concrete roof slab thickness is 21 in. to resist tornado missiles in accordance with Subsection 3.3.2.

3.8.4.5.1.1 General Criteria (Continued)

The Shield Building SGTS is designed to keep the annulus between the steel containment and Shield Building at a negative pressure even after a LOCA. In order to achieve a maximum in-leakage rate of 100% per day under a pressure differential of five inches of water, the reinforcing steel is designed to remain elastic during the SSE load combinations. A leak rate of 100% of the annular space volume is approximately 300 cfm.

The Shield Building protects the steel containment by anchoring several large piping systems such as the main steamlines, feedwater lines, RHR, LPCS, and HPCS systems. The Shield Building resists the normal operating, shutdown, seismic, and accident anchor loads from these systems while experiencing deformations small enough to limit local cracking of the concrete and induced stresses in the containment shell, piping, guard pipe, and bellows assembly.

3.8.4.5.1.2 Materials Criteria

349-76

The required strength U and section proportioning criteria of ACI ~~318-71~~ fundamentally cover the structural requirements for the Shield Building. From the top of the mat foundation up to elevation (-)5 ft, 3 in., the Shield Building is designed in accordance with ASME Code Section III, Division 2, Subsection CC. For normal operating load combinations, the strength design method is used. For abnormal/extreme environmental load combinations, the strength design method is modified by assuming stresses linearly proportional to strain. The concrete and steel stresses are limited to

$$f_c = 0.85 f'_c, \text{ and} \qquad (3.8\text{-}43)$$

$$f_s = 0.9 f_y \qquad (3.8\text{-}44)$$

3.8.4.6.1 Shield Building (Continued)

(1) Cylindrical wall - The Shield Building wall is built using the jump-form method.

(2) Dome - The dome is constructed using the steel containment vessel as a temporary support. The formwork for the dome is erected using numerous support points on the steel dome. The bottom layer of reinforcement is placed and 6 inches of concrete are cast. The steel structure is designed for this load. The temporary form supports are removed when the concrete reaches its requisite strength. The remainder of the dome concrete is then cast using the first layer as a form.

(3) Splicing of reinforcement - ACI ~~318-71~~ 349-76 Code applies to lapped splices for bar sizes 11 and smaller. Bar sizes 14 and larger are spliced by mechanical connectors (cadwelds). Cadwelds are also used for splicing bar sizes 11 and smaller. The splice is designed to develop 125% of the specified minimum yield strength. Reinforcing spliced with mechanical connectors conforms to Subsection 3.8.3.6.1.6. Where accessibility or space limitations prohibit the use of the cadweld process, the specifications permit splicing by butt-welding performed in accordance with AWS Specification D12.1.

3.8.4.6.2 Auxiliary Building

Materials and quality control are covered in Subsection 3.8.3.6.1 except as modified by item (3), Subsection 3.8.4.6.1.

3.8.4.6.3 Fuel Building

Materials and quality control are covered in Subsection 3.8.4.6.2. Fuel liner plates are in accordance with ASTM A240, Type 304L, stainless steel.

3.8.5.4.1 Reactor Building Foundation (Continued)

The standard plant design is developed using a range of soil conditions. Details are given in Appendix 3A. Variations of physical properties of subgrade materials determined by actual testing are amply accounted for by the wide range of soil conditions used in the design. Factors of safety for overturning, sliding, and flotation are shown in Figure 3.8-75.

3.8.5.4.2 Auxiliary Building Foundation

The analysis and design of the Auxiliary Building foundation are performed using the STRUDL computer program (Appendix 3C). The three-dimensional finite-element model shown in Figure 3.8-76 is used. The reinforced concrete walls located on and integrally connected to the mat are modeled as stiffeners for the foundation. Vertical and horizontal soil springs are used at each grid point to simulate the subgrade reactions. The resulting forces and moments from the exterior and interior walls and equipment supports provide the loading input. The output is detailed information on moments, axial and shear forces at each grid point and in each plate element.

Both thermal gradient and growth through the base mat are applied to the finite-element model. Stresses at each grid point and elements for each load combination are obtained. Stress redistribution due to concrete cracking is included.

349-76

The Auxiliary Building foundation mat design is based on the strength design method in accordance with ACI 318-71, Building Code Requirements Concrete. Mat areas supporting the interior columns are additionally reinforced. Shear reinforcement is provided at critical sections as required in addition to the main reinforcement. The summary of design is presented in Figure 3.8-77. Factors of safety for overturning, sliding, and floatation are shown in Figure 3.8-75.

3.8.5.4.3 Fuel, Control, Radwaste, and Diesel Generator Buildings Foundations

See Subsection 3.8.5.4.2. The finite-element models are shown in Figures 3.8-78 through 3.8-82. The summaries of design are presented in Figures 3.8-83 through 3.8-87. Factors of safety for overturning, sliding, and floatation are shown in Figure 3.8-75.

3.8.5.5 Structural Acceptance Criteria

3.8.5.5.1 Reactor Building Foundation

3.8.5.5.1.1 General Criteria

Within the perimeter of the steel containment, the foundation mat is a support of the pressure boundary of the containment system. The main structural criterion is sufficient strength to resist loads and sufficient stiffness to protect the liner from excessive strain.

A further strength and proportioning criterion is the support of loads other than those associated with containment and pressure suppression structures (i.e., static and dynamic loads imposed by internal structures). The overall building stability is determined as described in Subsections 3.7.2.14, 3.8.5.4.1, and 3.8.5.4.2.

3.8.5.5.1.2 Materials Criteria

The required strength U and section proportioning criteria of ACI 318-7 fundamentally cover the structural requirements for the Shield Building. For normal operating load combinations, the strength design method is used. For abnormal/extreme environmental

3.8.5.5.1.2 Materials Criteria (Continued)

load combinations, the strength design method is modified by assuming stresses linearly proportional to strain. The concrete and steel stresses are limited to

$$f_c = 0.85 f'_c, \text{ and}$$

$$f_s = 0.9 f_y$$

where

f'_c is the specified compressive strength of concrete

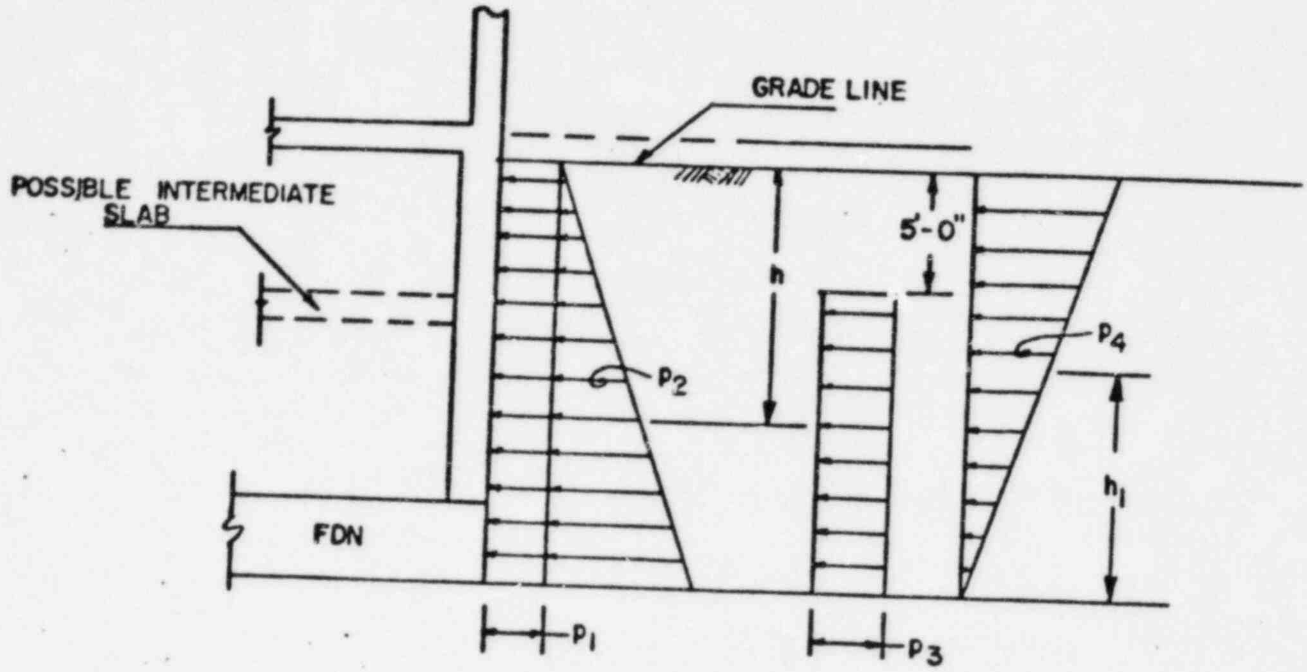
f_y is the specified yield strength of reinforcement.

3.8.5.5.2 Auxiliary, Fuel, Control, Radwaste, and Diesel Generator Buildings Foundations

Structural acceptance criteria are as defined in the AISC-1969 specification and ACI 349-76 318-71 Code. In no case does the allowable stress exceed 0.9 F_y, where F_y is the minimum specified yield stress. The design criteria preclude excessive deformation of the building foundations. The clearances between the adjacent buildings are sufficient to prevent impact during a seismic event.

3.8.5.6 Materials, Quality Control, and Special Construction Techniques

The foundations of Seismic Category I structures are constructed of reinforced concrete using proved methods common to heavy industrial construction (Subsections 3.8.3.6 and 3.8.4.6).



A. NORMAL OPERATION. NO FLOOD AND NO EARTHQUAKE

p_1= 150 psf;From 300 psf uniform surcharge

p_2= (65)h psf;Active soil pressure

B. CONSTRUCTION CONDITIONS. NO FLOOD AND NO EARTHQUAKE

p_2= (65)h psf

p_3= 615 psf,crawlers load surcharge

C. NORMAL OPERATION, DESIGN BASIC FLOOD, NO EARTHQUAKE

p_1= 150 psf,From 300 psf uniform surcharge

p_2= 50 ± 0.5 (48)h ± 62.4 (h-1),psf

D. NORMAL OPERATION AND OBE

p_1= 150 psf
p_2= (65)h psf
STATIC

p_1= 100 psf
p_4= (40)h_1 psf
OBE additional

NOTES: LOAD FACTORS IN DESIGN OF REINFORCED CONCRETE RETAINING STRUCTURES SHALL FOLLOW 197X (6) EDITION AC1318 (349) BUILDING CODE REQUIREMENTS

Figure 3.8-90. Designed Active Lateral Soil Pressure

220.28
(3.8.3)
CFB

Item (5) in Section 3.8.3.3.1.3.2 of your FSAR is the factored load combination for the abnormal/severe environmental condition and is given as:

$$D + L + F_{ego} + H_a + T_a$$

However, Item II.3.f of Section 3.8.3 of the SRP states our position that you should use Subsection CC-3000 of the ASME, Section III, Division 2 Code, which presents the corresponding load combination as:

$$D + L + F_{ego} + H_a + T_o$$

Explain this discrepancy. Verify that your load combination complies with our position on this matter.

220.28. Response

Item 5 contained a typographical error. GESSAR II will be revised as indicated on the attached GESSAR II page 3.8-62

3.8.3.3.1.3.2 Load Combinations for Factored Load Conditions (Continued)

(5) abnormal/severe environmental $1.0D + 1.0L + 1.0\ F_{eqo} + 1.0H_a + 1.0T_a$; ← T_o

(6) abnormal/extreme environmental $1.0D + 1.0L + 1.0P_a + 1.0T_a + 1.0\ F_{eqs} + 1.0R_a + 1.0\ (Y_r + Y_j + Y_m) + 1.0R_v$; and

(7) severe environmental $1.0D + 1.3L + 1.0T_o + 1.5\ F_{eqo} + 1.0R_o + 1.0P_v$.

Maximum values of P_a, T_a, R_a, Y_r, Y_j, and Y_m are applied simultaneously, as appropriate, in the applicable combinations based on a time-history analysis. Local stresses due to Y_r, Y_j, and Y_m may exceed the elastic limit allowables; however, there is no loss of function and elastic behavior is assured.

Load combinations and stress limits for steel portions, such as the drywell head and the personnel lock, that perform as pressure boundaries are in accordance with the ASME Code. The drywell refueling bellows design is in accordance with the Expansion Joints Manufacturers Association Code.

The lower portion of the drywell wall is a composite design. The steel plates act compositely with the concrete between them and the entire section becomes equivalent to a reinforced concrete section; hence, the preceding loads and load combinations apply.

3.8.3.3.2 Weir Wall

Refer to Subsection 3.8.3.3.1.

3.8.3.3.3 Refueling Pool and Operating Floor

Refer to Subsection 3.8.3.3.1.

220.29
(3.8.3)

In Section 3.8.3.5.1 of your FSAR, you state that a high degree of leak-tightness for the drywell is not a requirement since the drywell is not a fission product barrier and moderate leakage under accident conditions is tolerated by the pressure suppression process. State what de... e of leakage is considered tolerable and indicate the leak ra... ...c the drywell head, the equipment hatch and the personnel lock when the internal pressure build-up reaches the ultimate capacity of the drywell pressure boundary.

220.29 RESPONSE

[redacted]: THE DEGREE OF LEAKAGE THAT IS CONSIDERED TOLERABLE IS CALCULATED, EXPLAINED, AND PRESENTED IN DETAIL IN SECTIONS 6.2.1.1.5.1 THRU 6.2.1.1.5.5. THE TOLERABLE, i.e., THE ALLOWABLE BYPASS LEAKAGE, IS DEFINED AS THE AMOUNT OF STEAM WHICH COULD BYPASS THE SUPPRESSION POOL WITHOUT EXCEEDING THE STEEL CONTAINMENT VESSEL DESIGN PRESSURE OF 15 psig. THE ALLOWABLE DRYWELL LEAKAGE CAPABILITY HAS BEEN EVALUATED FOR THE COMPLETE SPECTRUM OF CREDIBLE PRIMARY SYSTEM RUPTURE AREAS TO ESTABLISH THE GOVERNING CONDITION.

SEE ALSO ANSWER TO NRC QUESTION 480.04 WHICH ALSO ADDRESSES BYPASS LEAKAGE CONCERNS.

THE ESTIMATED COMBINED LEAKAGE RATE OF THE DRYWELL CLOSURES, i.e., THE DRYWELL HEAD, THE EQUIPMENT HATCH, AND THE PERSONNEL LOCK, ARE EXPECTED TO BE LESS THAN 30 SCFH. THIS NUMBER WAS ESTABLISHED BY CONSIDERING THE 30 psig DBA, THE IBA, THE 3 psig SBE ALL WITH A STEAM MEDIUM AND THE 30 psig & 3 psig LEAKAGE RATE TESTS AND STRUCTURAL INTEGRITY TEST AT 1.15 (30) = 34.5 psig ALL WITH AN AIR MEDIUM. IT WAS CHOSEN TO ENVELOPE ALL THESE CONDITIONS.

BY COMPARISON OF THE TWO VALUES, i.e., THE ALLOWABLE BYPASS LEAKAGE VERSUS THE 30 SCFH, IT CAN BE READILY SEEN THAT THERE IS A HIGH FACTOR OF SAFETY AGAINST EXCESSIVE BYPASS LEAKAGE OCCURRING THROUGH THE DRYWELL STRUCTURE CLOSURES INTO THE STEEL CONTAINMENT VESSEL.

BASED ON [redacted] PAGE 6.2-43, THE SBA FOR A 6 HOUR DURATION RESULTS IN THE MOST SEVERE DRYWELL LEAKAGE REQUIREMENTS. THE "MAXIMUM ALLOWABLE LEAKAGE PATH AREA" UNDER THESE CIRCUMSTANCES IS AN $A/\sqrt{K}$ OF 0.02 SQ. FT. BASED ON THE ABOVE CALCULATED VALUES, THE "ALLOWABLE DRYWELL LEAKAGE RATE" AS ESTABLISHED BY THE SBA IS 200% OF DRYWELL VOLUME IN 6 HOURS AT 3 PSID.

THEREFORE, Q = 2 (274,960)/6 = 91,653.3 SCFH.

NOTE: 1. DRYWELL VOLUME = 274,960 CU. FT. FROM GESSAR II PAGE 6.2-161, TABLE 6.2-1.

2. Q = FLOW RATE.

FACTOR OF SAFETY = 91,653.3/30 = 3055 (HIGH)

220.30 (3.8.3) In Section 3.8.3.4.1.4 of your FSAR, you state that tangential shear from the drywell vent plates is transferred to the drywell base plate and in turn is transmitted to the foundation concrete through the shear lugs under the plates. Indicate the allowable values of tangential shear stress you have used. Verify whether your proposed allowable shear stresses comply with our position in Item II.5.a of Section 3.8.1 of the SRP.

220.30 Response

In the lower portion of the drywell, the allowable value of the tangential shear stress is in compliance with requirements in item II.5.a of Section 3.8.1 of the SRP. For the concrete mat below the base plate, the above item is not applicable. Through the shear lugs the tangential shear force is carried down to the mat by concrete bearing.

220.31 (3.8.2) Discuss, from a consideration of buckling, the effect of a postulated pipe break in the annulus region between the shield building and the containment vessel. Indicate to what elevation this could flood the annulus, thereby causing an external hydrostatic pressure on the steel containment vessel.

Response

Draft response will be provided in December 1981

220.32 (3.8.3) In Section 3.8.3.3.6.2.1 of your FSAR, you state that the load combination for service load conditions of concrete internal structures are:

$$S = D + L + T_o + R_o \quad (3.8\text{-}3)$$

$$S = D + L + T_o + R_o + F_{ego} \quad (3.8\text{-}4)$$

However, our position on this matter is contained in Item II.5 of Section 3.8.3 of the SRP which states that the stress limits for these cases to be 1.3 S. Indicate whether your proposed design of internal concrete structures satisfies our position in the SRP on this matter.

220.32 Response

GESSAR II will be revised as indicated below. The design satisfies the position in the SRP.

3.8.3.3.6.2 Load Combinations for Concrete Structures and Acceptance Criteria

3.8.3.3.6.2.1 Load Combinations for Service Load Conditions

The strength, S, is based on the following load combinations and corresponds to the elastic working stress design method.

$$S = D + L. \quad (3.8\text{-}1)$$

$$S = D + L + F_{eqo}. \quad (3.8\text{-}2)$$

$$1.3\,S = D + L + T_o + R_o. \quad (3.8\text{-}3)$$

$$1.3\,S = D + L + T_o + R_o + F_{eqo}. \quad (3.8\text{-}4)$$

220.33 (3.8.3) In Section 3.8.3.3.6.3.2 of your FSAR, you indicate that you satisfy three out of the four load combinations presented in Item II.3.c (ii)(a) of Section 3.8.3 of the SRP for the factored load conditions for steel structures using the elastic working stress design method. State why you omitted Equation (4) of Item II.3.c(ii)(a) and verify that you satisfy our position on the load combination represented by Equation (4).

220.33 Response

[redacted] Section 3.8.3.3.6.3.2 affected ~~for response~~. In the original GESSAR II section, Equation (4) of item II.3.C (ii) (a) was not omitted. Actually, Equation (3) was. Obviously, Equation (4) is more severe than Equation (3). However, Equation (3) was considered in the design.

GESSAR will be revised as indicated on page 3.8-66, [redacted]

3.8.3.3.6.3 Load Combinations for Steel Structures and Acceptance Criteria

3.8.3.3.6.3.1 Load Combinations for Service Load Conditions

The elastic working stress design method is used. The following load combinations are considered for the design:

$$S = D + L. \quad (3.8\text{-}1)\ (\text{Repeated})$$

$$S = D + L + F_{eqo}. \quad (3.8\text{-}2)\ (\text{Repeated})$$

$$1.5\ S = D + L + R_o + T_o \quad (3.8\text{-}9)$$

$$1.5\ S = D + L + F_{eqo} + R_o + T_o. \quad (3.8\text{-}10)$$

(T_o and R_o, when due to thermal effects, are secondary and self-limiting in nature.)

3.8.3.3.6.3.2 Load Combinations for Factored Load Conditions

The following load combinations are satisfied, using elastic working stress design method:

$$1.6\ S = D + L + T_o + R_o + F_{eqs}. \quad (3.8\text{-}11)$$

$$1.6\ S = D + L + T_a + R_a + P_a. \quad (3.8\text{-}12)$$

Add → $$1.6S = D + L + T_a + R_a + P_a + (Y_r + Y_j + Y_m) + F_{eqo} \quad (3.8\text{-}13a)$$

$$1.7\ S = D + L + T_a + R_a + P_a + (Y_r + Y_j + Y_m) + F_{eqs}. \quad (3.8\text{-}13b)$$

Thermal loads were investigated and found to be insignificant. In addition, they are secondary and self-limiting in nature and the material is ductile.

220.34
(3.8.3)

Describe the analytical and design techniques you use to determine the effect of annulus pressurizaton loads on the shield wall surrounding the reactor vessel. Indicate in this description how these pressurization loads are combined with other coincident loads, including the seismic loads and the LOCA and/or SRV loads assumed to be occurring coincidently in the suppression pool.

220.34 Response

~~See [illegible]~~ Subsections 3.8.3.3.6.1, 3.8.3.3.6.3.1 and 3.8.3.3.6.3.2 ~~for response.~~ as affected.

A NASTRAN model was used because of the many non-axisymmetric features: 0° structure, radial stiffeners, concentrated pipe loads etc. Pressure was applied in a pseudo-static fashion.

GESSAR II will be revised as indicated on the pages 3.8-63 and 3.8-66. ~~[illegible]~~

3.8.3.3.4 Piping, CRD, and Recirculation Pump and Motor Support System

3.8.3.3.4.1 Definition of Terms and Nomenclature

For definitions of terms and nomenclature, refer to Subsection 3.8.3.3.6.1.

3.8.3.3.4.2 Load Combinations and Acceptance Criteria

Pa= DBA pressure including the annular pressurization load. A uniform pressure of 65 psi is to be considered with a dynamic load factor (DLF) of 1.63 for the annular pressurization load. A separate case of asymmetric pressure extending over 180° of the shield wall is also to be considered for this load. This pressure various with the height of the shield wall in the following manner, El (-)16" to 232.5", 84.5 psi with a DLF of 1.57; El 323.5" to 352.5", 25 psi with DLF of 1.0; El 352.5" to 604.5", 8 psi with DLF of 1.0.

3.8.3.3.6.1 Definition of Terms and Nomenclature

The structure is designed to the AISC Code and as amplified herein. For definitions refer to Subsection 3.8.3.3.1.1.

L = Live loads - stairs and platforms are designed for 100 psf

S = For concrete structures, S is the required section strength based on the working stress design method and the allowable stresses defined in Section 8.10 of ACI 318-71. Concrete is non-structural in the reactor shield wall.

3.8.3.3.6.3 Load Combinations for Steel Structures and Acceptance Criteria

3.8.3.3.6.3.1 Load Combinations for Service Load Conditions

The elastic working stress design method is used. The following load combinations are considered for the design:

$$S = D + L. \qquad (3.8\text{-}1)\ \text{(Repeated)}$$

$$S = D + L + F_{eqo}. \qquad (3.8\text{-}2)\ \text{(Repeated)}$$

$$1.5\ S = D + L + R_o + T_o \qquad (3.8\text{-}9)$$

$$1.5\ S = D + L + F_{eqo} + R_o + T_o + R_V. \qquad (3.8\text{-}10)$$

(T_o and R_o, when due to thermal effects, are secondary and self-limiting in nature.)

3.8.3.3.6.3.2 Load Combinations for Factored Load Conditions

The following load combinations are satisfied, using elastic working stress design method:

$$1.6\ S = D + L + T_o + R_o + F_{eqs}. \qquad (3.8\text{-}11)$$

$$1.6\ S = D + L + T_a + R_a + P_a + R_V. \qquad (3.8\text{-}12)$$

$$1.6\ S = D + L + T_a + R_a + P_a + (Y_r + Y_j + Y_m) + F_{eqs} + R_V. \qquad (3.8\text{-}13)$$

Thermal loads were investigated and found to be insignificant. In addition, they are secondary and self-limiting in nature and the material is ductile.

220.35 (3.8.3) For materials, quality control and special construction techniques, you state in your FSAR that you satisfy the requirements of the ACI-318 (1971) Code. Indicate in Section 3.8.3.6 of your FSAR how you satisfy the requirements of ACI-349, as augmented by Regulatory Guide 1.142, which is our current position for the design of seismic Category I structures other than containment. Identify specific deviations from our position on this matter and justify the design adequacy for such areas.

Response

GESSAR II complies with ACI 349-76 and RG 1.142. See the following amended sections of the SAR.

SECTIONS	PAGES IN SECTION 3.8
3.8.3.6.1.1	81
3.8.3.6.1.2	81
3.8.3.6.1.4	82 & 83

220.35

3.8.3.6.1.1 Concrete (Continued)

All concrete not dependent on shores or bottom face forms for support is designed to attain its required compressive strength in 90 days. The quantities of fly ash and cement used are determined by laboratory testing of trial mixes.

All concrete work is done in accordance with ACI ~~318-71~~ 349-76, ~~Building~~ Code Requirements for ~~Reinforced~~ Nuclear Safety Related Concrete Structures ~~Concrete~~, and with the following specifications.

Material	ASTM Specification
Cement Type I	C150
Cement Type II, low alkali	C150
Aggregate	C33
Fly ash	C618
Air-entraining admixture	C260
Water-reducing agents	C494

3.8.3.6.1.2 Reinforcing Bars

Reinforcing for concrete structures is by deformed bars which meet the requirements of ASTM A615 Grade 60, except for bend tests, which meet the requirements of ACI 349-76. Placing and splicing of bars is in accordance with the requirements of ASME Code Section III, Division 2. For mechanical (cadweld) splices for reinforcing bars, see Subsection 3.8.3.6.1.6.

Milltest results, in accordance with ASTM A615, are obtained from the reinforcing steel supplier for each heat of steel to substantiate the required compositions, strength, and ductility. Certified reports of chemical and physical tests performed are submitted to the constructor for approval. All reports are documented and submitted. The tests document yield, ultimate strength, percent elongation and chemical composition.

220.35

3.8.3.6.1.2 Reinforcing Bars (Continued)

In addition, a full section of bar, as rolled, is tested to substantiate strength and ductility. One test is performed for every 50 tons of reinforcing or at least one test in each heat. The tension test is made on each bar size in the heat. To assure adequate ductility, two full-size bars of each size from each heat are subjected to ~~90 degree~~ bend tests. ~~using a pin diameter 10 times the diameter of the bar being bent.~~

3.8.3.6.1.3 Structural Steel

The structural steel materials conform to all applicable requirements of the AISC Manual of Steel Construction and comply with the following specifications.

Material	ASTM Specification
Structural steel, various supports and anchors	A36
High-strength structural steel plates	A572

3.8.3.6.1.4 Control Tests for Concrete

The following routine concrete control tests are made on the concrete sampled from the discharge of the mixer. Sampling and testing are performed for each 100 cubic yards of concrete production except as noted under (5) below. add

(1) temperature of concrete;

(2) slump of concrete (ASTM C143);

(3) air content (ASTM C143);

(4) plastic unit weight of concrete (ASTM C138); and

220.35

3.8.3.6.1.4 Control Tests for Concrete (Continued)

(5) compressive strength of concrete (ASTM C31 tested in accordance with ASTM C39 (sufficient 6 by 12-inch concrete cylinders are molded for tests at three, 28, and 90 days).

Add:

Samples for strength tests of concrete shall be taken at least once every shift for each class of concrete placed or at least once for each 100 cu yd of concrete placed. When the standard deviation for 30 consecutive tests of a given class is less than 600 psi, the amount of concrete placed between tests may be increased by 50 cu yd for each 100 psi the standard deviation is below 600 psi, except that the minimum testing rate shall not be less than one test for each shift when concrete is placed on more than one shift per day or less than one test for each 200 cu yd of concrete placed. The test frequency shall revert back to each 100 cu yd placed as soon as the test data of any 30 consecutive tests indicate a higher standard deviation than the value controlling the decreased test frequency.

3.8.3.6.1.5 Evaluation of Test Resul[ts]

(1) Concrete cylinders - A stre[...] the strengths of the two sp[...] tested at the acceptance ag[...] all strength tests and the [...]tive strength tests shall [...] the specified strength.

(2) Splices of reinforcement [...] Division 2, Article CC-3000[...] for bar sizes 11 and smaller. Bar sizes 14 and larger are spliced by mechanical connectors (cadwelds). Cadwelds are also used for splicing bar sizes 11 and smaller. The splice is designed to develop the specified minimum ultimate [str]ength. Reinforcing spliced with mechani[...] conforms to Sub[...] accessibility or space [...]e of the cadweld process, [...]mit splicing by butt-welding per [a]ccordance with AWS Specification D12.1.

Add:
ACI 349-76 applies to splices in areas of membrane tension.

3.8.3.6.1.6 Mechanical (Cadweld) Splices for Reinforcing Bars

All mechanical splices are made by the cadweld process, using clamping devices, sleeves, and charges as specified by the Cadweld Splice Instruction Sheets for B- and T-series connections. C-series materials are not permitted.

220.36 (3.8.3) In Section 3.8.3.7 of your FSAR, although certain of your test requirements are acceptable to us, there are some portions in the description of your proposed testing which differ from our position on the testing of the concrete and steel internal structures of the containment. Our position on testing and in-service surveillance requirements for the drywell in a Mark III containment is presented in Item II.7 of Section 3.8.3 of the SRP. Verify that your proposed test procedures in the FSAR comply with our position on this matter in the SRP.

220.36 Response

The drywell acceptance test procedures match those depicted in Item II.7 of Section 3.8.3 of the SRP.

220.37
(3.8.3)
(3.8.4)

In Section 3.8.3 and 3.8.4 of your FSAR, revise your list of applicable codes and standards to include Regulatory Guides 1.94, 1.115 and 1.142, as applicable. Identify any exceptions and deviations you have taken and provide justification for them.

220.37 Response

See Sections 3.8.3.2.1 and 3.8.4.2.1 regarding Regulatory Guide 1.94. Regulatory Guide 1.115 does not apply because no turbine missiles are postulated for the nuclear island. See Sections 3.8.3.2.1 and 3.8.4.2.1 and our response to Questions 220.27 and 220.35 concerning Regulatory Guide 1.142.

GESSAR II will be revised as indicated on the pages 3.8-54 and 3.8-99. [illegible]

3.8.3.2.1 Drywell (Continued)

(d) Regulatory Guide 1.29, Seis...

(e) Regulatory ...
Wel...

Add: (l) Regulatory Guide 1.142, Safety-Related Concrete Structures for Nuclear Power Plants (Other than Reactor Vessels and Containments)

(m) Regulatory Guide 1.94, Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants;

...or Seismic

...ide 1.64, Quality Assurance Require-
...s for the Design of Nuclear Power Plants; and

(k) Regulatory Guide 1.69, Concrete Radiation Shields for Nuclear Power Plants;

(8) ANSI:

(a) ANSI A58.1-1972, Building Code Requirements for Minimum Design Loads in Buildings and Other Structures;

(b) ANSI N5.12-1972, Protective Coatings (Paint) for the Nuclear Industry;

3.8.4.2.1 Shield Building (Continued)

(8) NRC Regulatory Guides:

(a) Regulatory Guide 1.10, Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures;

(b) Regulatory Guide 1.15, Testing of Reinforcing Bars for Category I Concrete Structures;

(c) Regulatory Guide 1.28, Quality Assurance Program Requirements (Design and Construction);

(d) Regulatory Guide 1.29, Seismic De... Classification;

(e) Regulator... We...

Add:

(m) Regulatory Guide 1.142, Safety-Related Concrete Structures for Nuclear Power Plants (Other than Reactor Vessels and Containment)

(n) Regulatory Guide 1.94, Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants;

...cs;

...ality Assurance Require-

...gn of Nuclear Power Plants;

...gulatory Guide 1.69, Concrete Radiation Shields for Nuclear Power Plants; and

(l) Regulatory Guide 1.76, Design Basis Tornado;

220.38 (3.8.4) In Section 3.8.4 of your FSAR, you don't indicate whether masonry construction is utilized in your proposed structures. If seismic Category I masonry walls will not be used in your proposed design, so indicate. If you will use seismic Category I masonry walls, identify any differences between the criteria for safety-related masonry walls which we find acceptable (refer to Appendix A in Section 3.8.4 of the SRP) and your proposed criteria for materials, testing, analysis, design and construction of this type of structure.

220.38

GESSAR Subsection 3.8.4 ~~for response~~ is affected and will be revised as indicated on page 3.8-60. ~~attached~~

3.8.3.7.7 Other Internal Structures

See Subsection 3.8.3.7.6.

3.8.4 Other Seismic Category I Structures

Other Seismic Category I structures which constitute the Nuclear Island are the Shield Building, Auxiliary Building, Fuel Building, Control Building, Diesel Generator Buildings, and the Radwaste Building substructure. Figure 1.2-1 shows the spatial relationship of these buildings. The only balance of plant (BOP) structures in close proximity to these structures are the Turbine Building and Service Facility. They are separated from the Nuclear Island structures by a seismic gap.

Seismic Category I structures within the Nuclear Island, other than the containment, which contain high-energy pipes are the Shield Building and Auxiliary Building. Guard pipes and the steam tunnel walls protect the Shield Building from impact by the high-energy pipes. The Shield Building is designed to accommodate the guard pipe support forces.

The Auxiliary Building, steam tunnel, and Residual Heat Removal (RHR) System, Reactor Water Cleanup (RWCU) System, and Reactor Core Isolation Cooling (RCIC) System rooms are designed to handle the consequences of high energy pipe breaks. The RHR, RCIC, and RWCU rooms are designed for 5 psid pressure, with the associated temperature rise and jet force. Steam generated in the RHR com-

Seismic Category I masonry walls are not used in the design.

Other Seismic Category I structures which do not belong to the Nuclear Island will be identified by the Applicant.

220.39 (3.8.4) In Section of 3.8.4.3.2.3 of your FSAR, the load combination in Equation 3.8-40 includes the SSE. We beleive that you actually intend this load combination to include the OBE instead of the SSE, similar to the combination presented in Item II.3.b(i)(a) of Section 3.8.4 of the SRP. If this equation is in error, correct it. If this equation is not, state why you consider this load combination.

<u>220.39</u> Response

[redacted] Subsections 3.8.4.3.2.3 is affected. ~~for response~~.

The equation is in error. GESSAR II will be corrected as indicated on page 3.8-109, [redacted].

3.8.4.3.2.3 Load Combinations for Steel Members

(1) Normal operating conditions - The elastic working stress design method is used for the following load combinations:

$$S = D + L. \quad (3.8\text{-}36)$$

$$S = D + L + F_{eqo}. \quad (3.8\text{-}37)$$

$$S = D + L + W. \quad (3.8\text{-}38)$$

Since thermal stresses due to T_o and R_o are present and are secondary and self-limiting in nature, the following combinations are also satisfied:

$$1.5\ S = D + L + T_o + R_o. \quad (3.8\text{-}39)$$

$$1.5\ S = D + L + T_o + R_o + F_{eqs}. \quad (3.8\text{-}40)$$

Feqo.

$$1.5\ S = D + L + T_o + R_o + W. \quad (3.8\text{-}41)$$

In all these load conditions, both cases of L having its full value or being completely absent are checked.

(2) Abnormal/extreme environmental conditions - The elastic working stress design method is used and the following load combinations are satisfied:

$$1.6\ S = D + L + T_o + R_o + F_{eqs}. \quad (3.8\text{-}42)$$

$$1.6\ S = D + L + T_o + R_o + W_t. \quad (3.8\text{-}43)$$

$$1.6\ S = D + L + T_a + R_a + P_a. \quad (3.8\text{-}44)$$

$$1.6\ S = D + L + T_a + R_a + 1.0\ F_{eqo} + P_a + (Y_j + Y_r + Y_m). \quad (3.8\text{-}45)$$

$$1.6\ S = D + L + T_a + R_a + F_{eqs} + P_a + (Y_j + Y_r + Y_m). \quad (3.8\text{-}46)$$

220.4Q (3.8.4)

In Section 3.8.4.1.3 of your FSAR, discuss in detail the design of your proposed spent fuel pool racks. Explain how the racks are attached to the fuel pool and indicate how you ensure that these racks withstand seismic forces. Our positions on this matter are attached for your use (Attachment 2). Modify your analysis and design, if necessary, to comply with our positions.

Response

Draft Response will be provided in December '82

220.41 (3.8.4) In Section 3.8.4 of your FSAR, you have not furnished information regarding the design and analysis of the cable tray and conduit supports. Describe in detail the methods used in the design and analysis of seismic Category I cable tray and conduit supports, including references to the codes and standards which you propose to use.

Response

Draft response will be provided in December 1982

220.42 (3.8.5) **Our position regarding the foundation design of all seismic Category I structures is presented in Item II.3 and II.5 of Section 3.8.5 of the SRP and states that some additional load combinations should be checked to determine if the factors of safety against sliding, overturning and floatation are within acceptable limits. It is not clear in your FSAR whether you have checked these additional load combinations. Verify that the foundations of all seismic Category I structures are analyzed for these additional loading combinations (i.e., Item II.3) and ensure their design adequacy (Item II.5).**

220.42 Response

The load combinations listed in SRP 3.8.5.II.3 are met and exceeded by the following GESSAR equations in Subparagraph 3.8.4.3.2.2.

	SRP COMBINATION	GESSAR EQUATION
a	D + H + E	3.8-34
b	D + H + W	3.8-32
c	D + H + E′	3.8-30
d	D + H + W_t	3.8-32
e	D + F'	3.8-29

For a discussion of SRP 3.8.5.II.5, see answer to question 220.43.

220.43 (3.8.5) Your calculated factors of safety for seismic Category I structures against sliding, overturning and floatation are given in Figure 3.8-75 of your FSAR. We note that you state the factors of safety against sliding for the reactor, the auxiliary and the control buildings are 1.01, 1.02 and 1.04, respectively. Inasmuch as these values are below our minimum acceptance criteria of 1.1, we find them unacceptable. Accordingly, revise your proposed design and demonstrate with calculations, including all your assumptions, that you satisfy our acceptance criteria on this

Response

Draft Response will be provided in December 1982

Question 220.44 (3A.5.2, Fig. 3A-18)

In Section 3A.5.2(1) of your FSAR, you indicate use of deconvolution analysis (i.e., FLUSH) to determine the motion which would have to be developed in an underlying bedrock formation to produce the specified control motion at the finished grade in the free field. We consider this approach not sufficiently conservative and, therefore, unacceptable. Our position on this matter is that the control motion should be applied at the foundation level in the free field when performing a deconvolution analysis. Indicate whether your analysis will conform to our position on this matter. (Refer to Item II.4.iii of Section 3.7.3 of the SRP.)

Response

The Regulatory Guide 1.60 response spectrum shape, which was used in this study, was developed by statistical analysis of response spectra of accelerograms recorded essentially at the ground surface. Consequently, response spectra defined by RG 1.60, or by any similar statistical analysis of ground surface recordings, are applicable to the finished grade rather than to some depth below the finished grade within the soil mass.

If a design response spectrum and associated control motion defined on the basis of ground surface recordings is placed at depth in a soil mass, then unrealistic motions will be calculated at other points in the mass. The motions calculated at the ground surface will be greatly amplified, particularly when the input motion at depth has a broad band response spectrum such as RG 1.60. A typical result of placing the design control motion at a depth of 40 feet is shown in Figure 1. The design peak acceleration of 0.15 g is amplified to 0.50 g at the ground surface, or more than three times the design basis. The response spectrum amplification is even greater at some frequencies, so that the resulting response spectrum at ground surface is completely inconsistant with the design basis. For the above two reasons, several recent studies have strongly recommended that the control motion be specified at the ground surface in the free field. Among these studies are: the ad hoc committee report on SSI published by ASCE and the report by D'Appolonia (NUREG/CR693) completed for the NRC.

The design for GESSAR II incorporates the envelope of responses calculated for a wide range of subsurface soil profiles. Figure 3A-22 of GESSAR II (Figure 2 attached) shows the computed response spectra at the foundation level in the free field. The design response spectrum (RG 1.60 anchored to the OBE peak acceleration of 0.15 g) has been added to Figure 2. The current Standard Review Plan (SRP) requires that the design response spectrum be enveloped at the free field foundation level. It can be seen in Figure 2 that the computed response spectra essentially envelope the design response spectrum, indicating that the GESSAR II analyses essentially conform to the SRP.

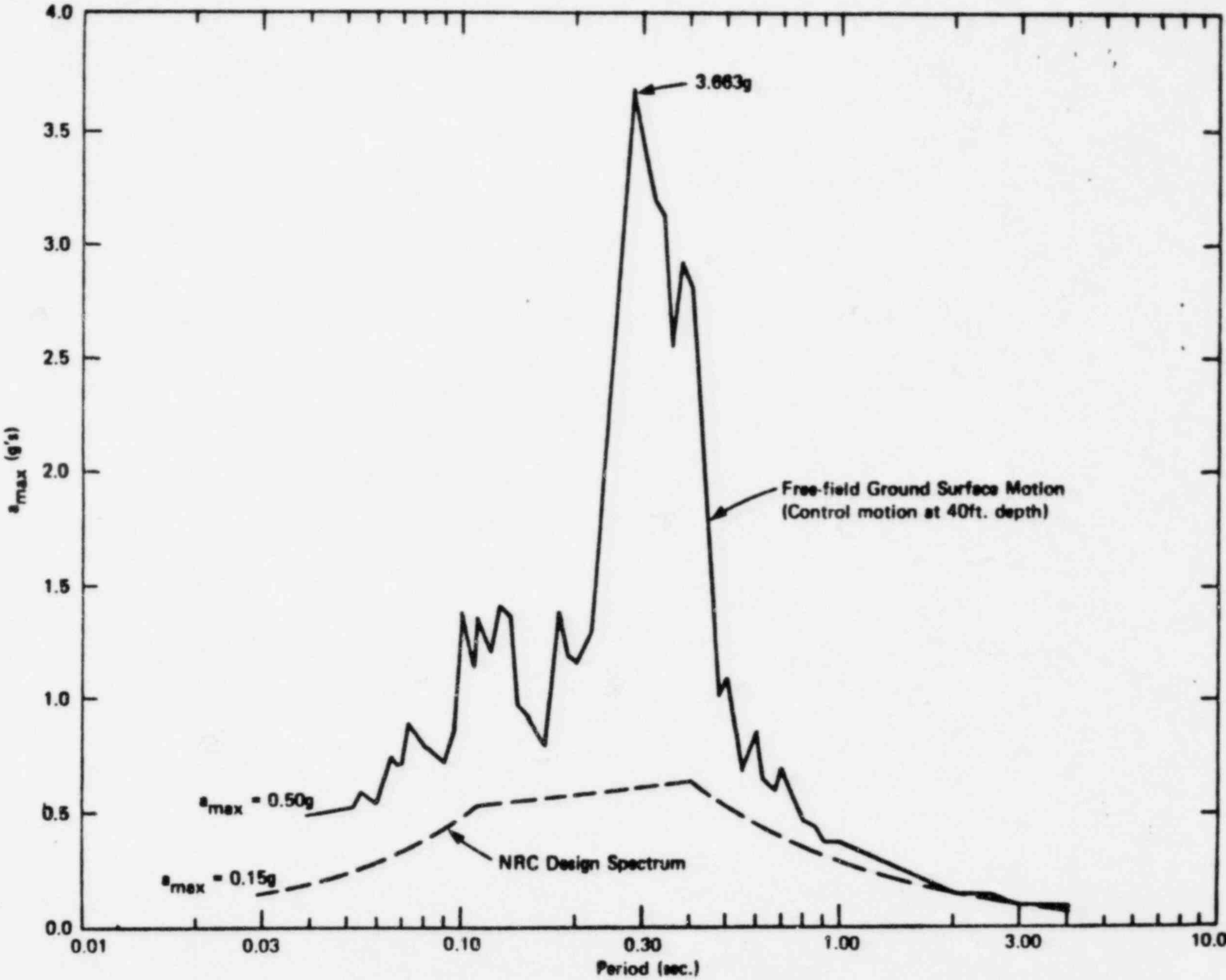
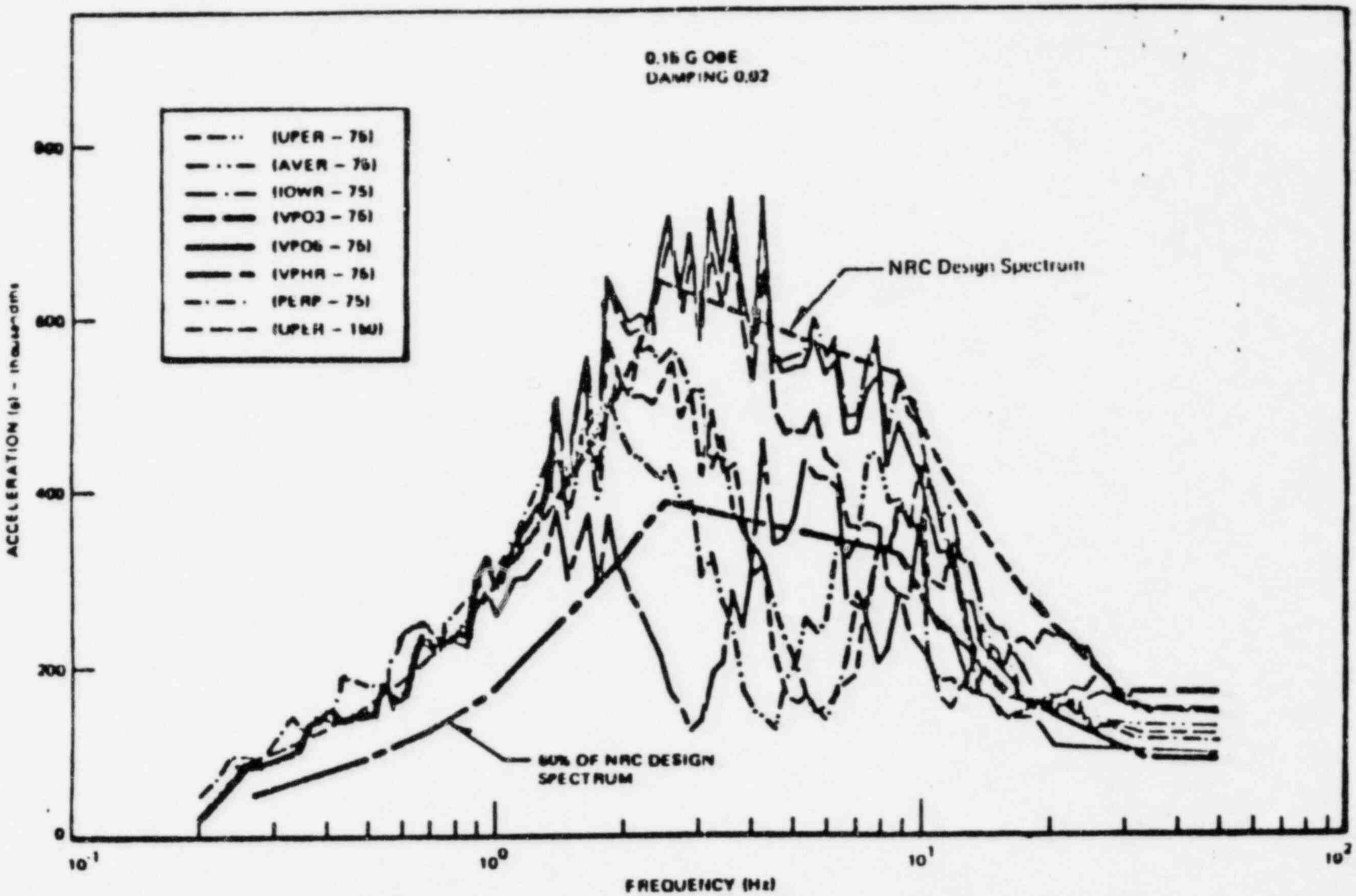


Fig. 1 – COMPARISON OF RESPONSE SPECTRUM OF FREE-FIELD GROUND SURFACE MOTION WITH NRC DESIGN SPECTRUM



Free-Field Response Spectra at Basemat Level

Figure 2

ATTACHMENT NO. 2

DRAFT RESPONSES TO

HYDROLOGIC AND GEOTECHNICAL ENGINEERING BRANCH

QUESTIONS

240.01 (2.4.1) You state in Section 2.4.1.1 of your FSAR that the total design of safety-related structures is compatible with plant sites having groundwater levels up to two feet below grade. Indicate the actual design basis groundwater level. In this regard, some plants select plant grade for the design basis groundwater level to conservatively bound groundwater fluctuations or to account for nearby flooding effects even though the ambient groundwater level may be somewhat lower. State whether your proposed design will be modified on a site specific basis to accomodate the plant under these circumstances.

Response

Response to this question is provided in Subsection 2.4.1.1.

240.02 State whether the groundwater level which will be used as the design basis for subsurface hydrostatic loading will also be used in combination with other extreme environmental loadings such as an earthquake or a tornado or whether a lower groundwater level will be used. If a lower groundwater level is to be used in your proposed standardized design as the design basis for extreme environmental loadings, indicate what this level will be. Alternatively, indicate whether this level will be site specific. If so, state the interface requirement for this site specific requirement. If the combined loadings are site specific, state the purpose of having a standardized design basis groundwater level which is two feet below plant grade for hydrostatic loading only.

Response

Response to this question is provided in Subsection 2.4.1.1.

240.03 (2.4.1) State in Section 2.4.1.1 of your FSAR whether the design basis flood level established at one foot below plant grade includes coincident wind-generated wave activity. If not, indicate how this will be accomodated in your proposed design. Indicate the wave runup your proposed design can withstand.

Response

Response to this question is provided in Subsection 2.4.1.1.

Text changes for 240.01, 240.02 and 240.03

2.4 HYDROLOGY ENGINEERING

The safety design basis of the Nuclear Island provides that structures of safety significance will be unaffected by the hydrology defined below.

2.4.1 Hydrologic Description

2.4.1.1 Site and Facilities

The structures of safety significance will be located on the site such that: (1) the total design is compatible with existing ground water levels up to 2 ft below grade; (2) the flood level associated with the design basis flood is at or below an elevation corresponding to approximately 1 ft below plant grade; and (3) the loading on these structures does not include simultaneous flood levels and seismic events.

← INSERT "A" (next page)

The specific description of the site and all safety-related elevations, structures, exterior accesses, equipment and systems from the standpoint of hydrology considerations will be provided by the Applicant. Refer to Section 1.9 for interfaces.

2.4.1.2 Hydrosphere

The major hydrologic feature on or near the site is the body of water which provides the ultimate heat sink for the Nuclear Island. No upstream or downstream river control structures are present which will cause either groundwater levels or flood water levels to exceed the values given in (1) and (2) above.

The Applicant will provide a detailed description of all major hydrologic features on or in the vicinity of the site.

INSERT A

As indicated in Table 2.0-1, the design basis groundwater level is 2 feet below grade. It is anticipated that the Nuclear Island buildings can accomodate higher groundwater levels on an overall loading basis. However, in the event that a site has a higher groundwater level, and this in combination with other site-unique conditions, indicates that portions of the Nuclear Island buildings may be inadequate, confirming calculations and analyses will be made with the site-specific conditions using the loading combinations and allowable stresses given in Section 3.8. The Nuclear Island buildings will be modified if necessary to accomodate these conditions (see Section 2.0). 240.01

The groundwater level of 2 feet below grade is used as the design basis for subsurface hydrostatic loading (Table 2.0-1). This groundwater level is also used in combination with other extreme envirommental loadings. If a particular site has a groundwatwer level higher than 2 feet below grade, its effect on the design of the Nuclear Island buildings will be treated as indicated above. 240.02

~~Response~~
~~(Insert to Subsection 2.4.1.1)~~

~~Since~~ The design basis flood level is 1 foot below grade and does not include allowances for ~~("dry" site), there is no wind-generated wave activity and consequently no~~ wave runup. If a particular site ~~has an actual flood level above grade~~ produces wave run up in excess of the design basis flood level, or static water level, its effect on the Nuclear Island buildings may be affected by will also be treated as indicated above. ~~Refer to Section 1.9 for interface~~ 240.03

240.04 (2.4.2) State in Section 2.4.2.3 of your FSAR whether you plan to have parapets on the roofs of the safety-related structures. If so, indicate whether the parapets will have scuppers or openings to limit the depth of water buildup resulting from a local Probable Maximum Precipitation (PMP). State the design basis load on roofs. Indicate the maximum short duration rainfall intensity that the scuppers or openings can handle. State what credit is taken for roof drains in determining this rainfall intensity. You should note that we assume roof drains are blocked with debris during the design basis event.

Response

Response to this question is provided in subsection 2.4.2.

240.05 (2.4.11) State whether the ultimate heat sink will be a site specific item with regard to the source of emergency cooling water or whether there will be some standard components such as mechanical draft cooling towers, cooling ponds or spray ponds.

Response

Response to this question is provided in subsection 2.4.11.

Text addition for 240.04

2.4.2 Floods

The structures of safety significance are designed for a design basis flood, as defined in Regulatory Guide 1.59, up to an elevation 1 ft below plant grade including allowance for the effects of coincident waves and the resultant runup as calculated from site unique parameters.

As described in Subsection 2.3.1.2, roof parapets are provided on the Nuclear Island buildings with drain openings to the outside of the buildings to limit the standing water on the roof to a maximum of 9.5 inches. The openings are designed for a precititation rate of 4 inches/hour with no credit taken for roof drains. Refer to Section 1.9 for Info.

2.4.2.1 Floo[illegible]

Date, level [illegible] related information for major historica[illegible] region will be provided by the Applican[illegible]

2.4.2.2 Flood [illegible]

Seismic Category I stru[illegible] design basis floods are designed to with[illegible] Section 2.4, using the "hardened" flood [illegible] the hardened protection approach, struct[illegible] rated in the plant's design to protect sa[illegible]es, systems and components from postulated floodi[illegible] Category I structures required for safe shutdown [illegible]cessible during all flood conditions.

Safety-related systems and components are flood protected either because of their location above the design flood level, or because they are enclosed in reinforced concrete Seismic Category I structures which have the following requirements:

(1) wall thicknesses below flood level of not less than 2 ft;

(2) water-stops provided in all construction joints below flood level;

Text change for 240.05

2.4.11 Low Water Considerations

The following low water topics will be addressed by the Applicant:

(1) Low Flow in Streams;

(2) Low Water Resulting from Surges, Seiches, or Tsunami;

(3) Historical Low Water;

(4) Future Controls;

(5) Plant Requirements; and

(6) Heat Sink Dependability Requirements.

2.4.12 Dispersion, Dilution and Travel Times of Accidental Releases of Liquid Effluents in Surface Waters

The ability of the surface water environment to disperse, dilute, or concentrate liquid releases of radioactive effluents relative to existing or potential future water users will be addressed by the Applicant.

2.4.13 Groundwater

The following groundwater information will be provided by the Applicant:

(1) Description and Onsite Use;

(2) Sources;

(3) Accident Effects;

The ultimate heat sink is not within the scope of the Nuclear Island; it is the responsibility of the Applicant. Refer to section 1.3 for interfaces.

ATTACHMENT NO. 3

DRAFT RESPONSES TO

CHEMICAL ENGINEERING BRANCH

QUESTIONS

281.01 (5.4.8)

Recognizing that resins may enter the reactor recirculation system in the event of a failure of a filter-demineralizer resin support septum, we established a design criterion (Item II.2.f) in Section 5.4.8 of the Standard Review Plan (SRP) that a strainer should be provided on the outlet of each filter-demineralizer unit. In addition, we established a design criterion in the SRP that the reactor water cleanup system (RWCS) should have provisions for monitoring differential pressures to assure that the design limits on filter-demineralizer septums and resin strainers are not exceeded. Describe how your design is consistent with these requirements.

Response

The strainer is described in Subsection 5.4.8.2 and shown as Part Number D013 on Figure 5.4-17. The high differential pressure monitors across each strainer and each filter demineralizer is described in ~~paragraph~~ Subsection 5.4.8.2. The differential pressure switches are shown on Figure 5.4-17, Part N005 for the strainer and part N014 for the filter-demineralizer.

281.02 (5.4.9)

Your description of the RWCS does not indicate that you will use a holding pump to maintain flow through each filter-demineralizer in the event of low flow or loss of flow in the system. Indicate whether you propose to use a holding pump in the system or plan to achieve this function in some other manner. (Refer to Item II.2.c of Section 5.4.8 of the SRP).

Response

Use of a holding pump is described in Subsection 5.4.8.2 and shown on Figure 5.4-17 as item C001.

COMMENT 281.03

Verify that provisions have been made for draining and venting the components of the RWCS through a closed system in accordance with the requirements of General Design Criteria (GDC) 60 and 61 of Appendix A to 10 CFR Part 50.

Response:

The following Table lists RWCS components and the vent and drain routing for the component.

RWCS COMPONENTS

	Drain	Vent
Filter-demineralizer	Backwash Receiving Tank	
Backwash Receiving Tank	Phase Sep.	Charcoal filter
Drain Pump Base and Casing	DRW	--
Holding Pump Base and Casing	DRW	--
Regn. Heat Exchanger - Shell	CRW	CRW
- Tube	CRW	CRW
Non-Regn. Heat Exchanger - Shell	CRW	CRW
- Tube	CRW	-
Recirculation Pump	CRW	CRW
RWCS Process Piping	CRW	CRW
Valves F039, F054, and F004	-	CRW

Vents and drains routed to the CRW are closed; only the pump base and casing drains routed to the DRW are open. The water from vents and drains routed to the CRW and DRW is processed by the Radwaste System. CRW sumps are vented through a charcoal filter (see note 16, Figure 11.2-3a). The DRW sump is in containment and vented with provisions for a cartridge filter if required (see note 2, Figure 11.2-4a). The backwash receiving tank is routed to the Radwaste System, and it is vented through a charcoal filter, Part No. D0120, Figure 5.4-17.

281.04 (6.1.1)

Demineralized water from the condensate storage tank or the suppression pool, with no additives, is used in the containment sprays and to inject core cooling water. Indicate the limits you will place on the conductivity, the chlorides and the pH of this water to minimize stress corrosion cracking of unstabilized austenitic stainless steel components.

Response:

The water quality requirements for the condensate storage tank are given in Subsection 9.2.6.2, and for the suppression pool in Subsection 9.5.9.1.2.

281.05 (6.1.2)

Indicate the total amounts of protective coatings and organic materials inside containment which do not meet the requirements of ANSI N101.2 (1972) and which do not comply with our position in Regulatory Guide 1.54. Evaluate the generation rates and total quantity of combustible gases that can be formed from these unqualified organic materials in the event of a design basis accident (DBA). Evaluate the volume of solid debris which can be formed from these unqualified organic materials under DBA conditions and which can reach the containment sump. Provide the technical basis and the assumptions you use for this evaluation.

Response:

Compliance with Regulatory Guide 1.54 and appropriate ANSI Standards are reviewed in ~~Section~~ Subsection 6.1.2.1 for protective coating.

The remainder of this response is provided in revised Subsection 6.1.2.2.

Text addition for 281.05

6.1.2.1 Protective Coatings (Continued)

items as electronic/electrical trim, covers, face plates and valve handles. Other than these minor exemptions, all coatings within the containment are qualified to Regulatory Guide 1.54.

Major carbon steel components, such as containment steel, are protected with an inorganic zinc primer only, with no organic top coat.

6.1.2.2 Other Organic Materials

Materials used in or on the ESF equipment have been reviewed and evaluated in respect to radiolytic and pyrolytic decomposition and attendant effects on safe operation of the system. For example, fluorocarbon plastic (Teflon) is not permitted in environments that obtain temperatures greater than 300°F, or radiation exposures above 10^4 rads.

A listing of significant amounts of other exposed organic materials, such as insulation, lubricants, and plastics, within the Reactor Building is included in Table 6.1-2.

6.1.2.3 Safety Analysis

Plastic materials listed in Table 6.1-2 are not classified according to ANSI N4.1-1973. As an alternative, for each application the materials have been specified to withstand an appropriate radiation dose for their 40-year life, without suffering any significant radiation-induced damage. The specified integrated radiation doses are consistent with those listed in Section 3.11. The various suppliers have indicated their compliance with these requirements.

¶ Other organic materials in the containment are qualified to environmental conditions in the containment. Any exceptions to the use of unqualified organics will be identified by the Applicant. Refer to Section 1.9 for interface.

281.06 (9.1.3)

Describe the samples to be taken and the instrument readings, including their frequency of measurement, which will be used to monitor the water purity in the spent fuel pool (SFP) and to determine when the SFP cleanup system demineralizer resin and filter will need replacement. State the chemical and radiochemical limits of the SFP water which will initiate corrective actions, including the basis for establishing these limits. Your response should consider such variables as: boron concentration; gross gamma and iodine activity; demineralizer and/or filter differential pressure; demineralizer decontamination factor, pH; and crud level.

Response:

The sampling frequency, instrument readings, frequency of measurement, and operating chemical and radiochemical limits will be provided by the applicant, subject to the design limits and basis for water quality given in revised Subsection 9.1.3.2.

Grab samples are provided at the inlet and outlet to the filter demineralizer system. Continuous conductivity monitors are provided at the inlet and outlet of the fuel pool filter demineralizers. This instrumentation is described in Subsection 9.3.2.3.3.

Pressure drop across each filter demineralizer is signalled by differential pressure switch N001 and across each post strainer by pressure switch N002 (Figure 9.1-24a). As discussed in Subsection 9.1.3.2, when differential pressure exceeds the high alarm level by a predetermined value, the effluent valve automatically closes, and the appropriate corrective action is taken.

Text revision for 281.06

9.1.3.2 System Description (Continued)

drained from the inclined transfer tube during downward fuel transfer, as well as the volume of water above the skimmer weirs, which drains from the pools following a temporary loss of circulation.

Clarity and purity of the pool water are maintained by a combination of filtering and ion exchange. The filter-demineralizers maintain total dissolved heavy element content (Cu, Ni, Fe, Hg, etc.) at 0.1 ppm or less with a pH range of ~~6.0~~ 5.3 to 7.5 for compatibility with aluminum fuel storage racks and other equipment. Conductivity is maintained at less than 3 μmho/cm at 25°C, chlorides less than 0.5 ppm, and total insolubles less than 1 ppm (chosen to be consistent with reactor water quality limits). Each filter unit in the filter-demineralizer subsystem has adequate capacity to maintain the desired purity level of the pools under normal operating conditions. The flow rate is designed to be approximately that required for two complete water changes per day for the fuel transfer and storage pools. The maximum system flow rate is twice that needed to maintain the specified water quality. Water may be returned to condensate storage after being filtered and demineralized.

The FPCCU System is designed to remove suspended or dissolved impurities from the following sources:

(1) dust or other airborne particles;

(2) surface dirt dislodged from equipment immersed in the pool;

(3) crud and fission products emanating from the reactor during refueling;

(4) debris from inspection or disposal operations; and

(5) residual cleaning chemicals or flush water.

281.07 (9.3.2)

In Item II.1.b of Section 9.3.2 of the SRP, we state in part that the atmosphere and sumps inside containment should be sampled in order to satisfy the requirements of the relevant GDC. Accordingly, describe the provisions to sample inside containment in accordance with the requirements of GDC 64 of Appendix A to 10 CFR Part 50. Indicate how your design is consistent with the provisions of Regulatory Guide 1.97, Revision 2.

Response:

Containment Atmosphere. Item II.1b of Subsection 9.3.2 of the SRP does not require containment sampling for the Mark III. CDC 64 criteria to monitor the reactor containment effluent is described in subsection 11.5.2.1.2 for measuring the primary containment HVAC effluent which is normally continuously vented. When the containment is isolated, it may be vented through the Standby Gas Treatment System. The process radiation monitoring as discussed in ~~paragraph~~ subsection 11.5.2.1.5, will monitor the noble gas radioactivity of the Standby Gas Treatment System.

Sumps Inside Containment. The following sump pump dischargers are provided with local grab samples through valves indicated. All sumps are provided with this capability.

Sump	Sample Valve	Figure
RCIC Pump Room Equip. Drain	FF029	11.2-3a
Drywell Equip. Drain	FF020	11.2-3b
Containment Equip. Drain	FF008	11.2-3b
HPCS Pump Room Floor Drain	FF006	11.2-4b
RCIC Pump Room Floor Drain	FF015	11.2-4b
RHR Pump Room "A" Floor Drain	FF018	11.2-4b
RHR Pump Room "B" Floor Drain	FF009	11.2-4b
RHR Pump Room "C" Floor Drain	FF012	11.2-4b
LPCS Pump Room Floor Drain	FF021	11.2-4b
Drywell Floor Drain/Pedestal	FF028	11.2-4c
Containment Floor Drain	FF033	11.2-4c

Regulatory Guide 1.97. Item II.1.b of Section 9.3.2 of the SRP is applicable to the Process Sampling System (PSS) and not the Post-Accident Sampling System. Therefore, consistency with Regulatory Guide 1.97 is not necessary for PSS. However, an assessment of Regulatory Guide 1.97, Revision 2 is provided in Appendix 1D.

281.08 (9.3.2)

In Item 3.f of Section 9.3.2 of the SRP, we state that there should be passive flow restrictions to limit reactor coolant loss in the event of a rupture of the sample line. However, this criterion is not addressed in your FSAR. Accordingly, describe how your design is consistent with the design philosophy of maintaining exposures to "as low as is reasonable achievable" (ALARA) in the event of a rupture of the sample line containing contaminated primary coolant. The staff's position on this matter is also contained in Section C.2.1 (C) of Regulatory Guide 8.8, Revision 3 (June 1979).

Response:

The sample from the jet pump is taken from an instrumentation connection. Instrumentation connections are provided with a 0.25 inch inside diameter restricting orifice located as close as possible to the reactor coolant pressure boundary (Reference Figure 5-1.3a, note 29).

Sample probes for sampling reactor coolant from the RHR System are designed as described in subsection 9.3.2.2.3(3). Figure 9.3-4 depicts the general sample probe which is furnished with a 1/8" orifice. This small orifice complies with the passive flow restriction requirement.

281.09 (9.3.2)

Provide information demonstrating that you satisfy the requirements of Item II.B.3, "Post Accident Sampling Capability," of NUREG-0737. Specifically, demonstrate the capability to obtain and quantitatively analyze reactor coolant and containment atmosphere samples, without radiation exposure to any individual exceeding 5 rem to the whole body or 75 rem to the extremities (GDC-19) during, and following, an accident in which there is no core degradation. Additionally, you should: (1) review and modify, as necessary, your sampling, chemical analysis and radionuclide determination capabilities to comply with NUREG-0737, II.B3; (2) provide us with information pertaining to system design, analytical capabilities and procedures in sufficient detail to demonstrate that the requirements have been met. Materials to be analyzed and qualified include certain radionuclides that are indicators of the severity of core damage (e.g., noble gases, iodines, cesium and nonvolatile isotopes), hydrogen in the containment atmosphere and total dissolved gases or hydrogen, boron and chlorides in reactor coolant samples in accordance with the requirements of NUREG-0737.

In your detailed response, address the following ten matters:

a. Your compliance with all requirements of NUREG-0737, II.B.3, for sampling, chemical and radionuclide analysis capability, under accident conditions.

Response:

The Post Accident Sampling design and capability to respond to NUREG-0737 is discussed in [redacted] ~~Section 1A.21 and 1AB~~. Appendix 1A (Section 21 and Attachment 8).

The analytical methods, procedures and exposure necessary to comply with NUREG-0707 [redacted] will be supplied by the applicant.

b. Shielding to meet the requirements of GDC-19, assuming Regulatory Guide 1.3 source terms.

Response:

The analytical methods and procedures and the resulting exposure will be supplied by the Applicant.

The following exposure from sample collection operation has been calculated using Regulatory Guide 1.3 source terms, one hour after an accident, 3 feet from the source with exisiting shielding.

	m Rem/hr
Liquid Sample Station	105
Gas Sample Station	361
Small Liquid Sample, in cask	6.12
Large Liquid Sample, in cask	2.17
Gas Sample in cask	54

Existing shielding meets the requirements of GDC 19; no additional shielding is required.

c. Your compliance with the sampling and analysis requirements of Regulatory Guide 1.97, Revision 2.

Response:

Post Accident Sampling compliance with Regulatory Guide 1.97 is evaluated in [redacted] Subsection 1D.2.3.38. The applicant will provide evaluation of analytical procedures compliance in accordance with Regulatory Guide 1.97.

d. Verify that all electrically powered components associated with post-accident sampling are capable of being supplied with power and operated within thirty minutes of an accident in which there is core degradation, assuming a loss of off-site power.

Response:

The applicant will provide a timely and reliable power source for the PASS. The PASS design bases is that a reliable power source is available one hour after an accident.

e. Verify that valves which are not accessible for repair after an accident are environmentally qualified for the conditions in which they must operate.

Response:

Primary containment isolation valves are inaccessible for repair after an accident but are fully qualified including environmental qualifications as referenced in Subsection 6.2.4.2.5. Flow control valves located within the secondary containment have been selected to assure that materials in the valves will withstand the thermal and radiation environment required for PASS operation. There are no other inaccessible valves.

f. Provide a procedure for relating radionuclide gaseous and ionic species to estimated core damage.

Response:

The applicant will provide a procedure for relating radionuclide gaseous and ionic species to estimated core damage. BWR Owners' Group has sponsored work in this area.

g. State the design and/or operational provisions to prevent high pressure carrier gas from entering the reactor coolant system from on-line gas analysis equipment if it is used.

Response:

The GE sampling system does not have on-line gas analysis equipment and, therefore, no high pressure carrier gas.

h. Provide a method for verifying that reactor coolant dissolved oxygen is less than 0.1 ppm if reactor coolant chlorides are determined to be greater than 0.15 ppm.

Response:

The applicant will address analytical methods and procedures.

i. Provide information on: (1) testing frequency and type of testing to ensure long term operability of the Post-Accident Sampling System; and (2) operator training requirements for post-accident sampling.

Response:

(1) This is included in the operating procedures and will be supplied by the applicant.
(2) Operator training is the responsibility of the applicant.

j. Demonstrate that your proposed sample locations in the reactor coolant system and suppression pool will yield results which are representative of core conditions.

Response:

Reactor coolant samples obtained from a tap off the jet pump pressure instrument system will provide representative core coolant samples for accident conditions and samples are taken from this location.

In order to assure that this sample location provides a representative sample, sufficient core flow is needed to circulate water from the core to the jet pump intake. After a small break or non-break accident, the reactor water level is maintained at or near normal water level by the operator using emergency procedures. For decay power above 1% of rated power the core flow is estimated to be greater than 10% rated flow due to natural circulation. The entire reactor water inventory would be circulated through the jet pumps in about 3 to 4 minutes, thus assuring that representative samples of core coolant will be available at the jet pumps.

At power levels of less than 1% rated, a sample that is representative of core conditions would be obtained by increasing the reactor water level by 18 in. This will fully flood the stand pipes at the moisture separators and will provide a thermally induced recirculation flow path for mixing.

Makeup water does not significantly dilute the sample. Makeup water flow amounts to approximately 2% of the core flow for small steam line breaks or non-break accidents. For small liquid line breaks, the makeup water flow rate is estimated to be less than 18% of the core flow. Thus, no significant dilution occurs and the water circulating through the jet pump is representative of reactor coolant inventory for small break or non-break accidents.

Further, sample lines in the RHR system provide for a reactor coolant sample when the reactor is depressurized and at least one of the RHR loops is operating in the shutdown cooling mode.

Finally, for larger line breaks where reactor water level cannot be maintained, reverse flow through the core to the suppression pool is provided. Suppression pool samples are obtained from the RHR pump discharge.

Water is injected into the reactor pressure vessel by the ECCS systems. The injected water is from the condensate storage tank and/or from the suppression pool. The injected water floods the reactor vessel and flows through the break into the drywell. Approximately 9 minutes or less after the start of the event, the drywell cavity is full of water. Water flowing from the reactor vessel pipe break returns to the suppression pool by cascading over the weir wall and out through the drywell horizontal vents. At t = 30 minutes (the actual time would normally be less), the RHR system is manually initiated in the pool cooling mode and maintained in this mode unless containment spray is temporarily needed (1 or 2 loops available) to control containment pressure.

The RHR pool cooling system (i.e., suction and return line arrangement in the suppression pool, type of discharge device, etc.), is designed to assure adequate mixing of the suppression pool.

Based on the RHR pool cooling system design and the communication established between the primary coolant in the reactor vessel and the suppression pool, the proposed post-accident sampling of water from the RHR suppression pool suction line provides a representative water sample.

Last paragraph of 281.09

Your response should contain sufficient documentation to demonstrate compliance with our requirements on this matter. In addition to the information requested above, we request that you submit data supporting the applicability of each selected analytical chemistry procedure or on-line instrument. In the event our generic review determines a specific procedure is unacceptable, we will require you to make modifications as determined by our generic review.

Response:

Data supporting the applicability of each selected analytical chemistry procedure will be submitted by the applicant.

Text addition for 281.09

1A.21 POST-ACCIDENT SAMPLING CAPABILITY (NUREG-0737 Item II.B.3) (Cont'd)

NRC Position (Cont'd)

In addition to the radiological analyses, certain chemical analyses are necessary for monitoring reactor conditions. Procedures shall be provided to perform boron and chloride chemical analyses assuming a highly radioactive initial sample (Regulatory Guide 1.3 or 1.4 source term). Both analyses shall be capable of being completed promptly (i.e., the boron sample analysis within an hour and the chloride sample analysis within a shift).

Response

A post-accident sample system has been added to the 238 Nuclear Island design which meets the requirements of this position. A technical description of the post-accident sampling station is included as Attachment B.

¶ **Additional information on the post-accident sampling system is included in response to NRC question 281.09.**

281.10 (9.1.2) Provide the following information about your high density neutron absorber racks which you proposed to use for spent fuel storage:

a. Indicate the nature of the neutron absorber materials to be incorporated into these racks.

b. State whether the compartments in the racks containing the neutron absorber materials are vented or are exposed to the spent fuel pool environment.

c. Provide additional information on the frequency of inspection and the type of sampling used in monitoring this system.

<u>Response</u>

Response to this question is provided in revised subsections 9.1.2.3.2 and 9.1.2.4.

9.1.2.3.2 Structural Design and Material Compatibility Requirements

(1) The spent fuel pool contains 12 racks, four each of 13x13 racks and eight each of 13x17 racks, which provides storage for a maximum of 2444 fuel assemblies or bundles.

(2) The containment pool contains three 13x13 racks, which provides storages for a maximum 507 fuel assemblies or bundles.

(3) The fuel storage racks are designed to be supported above the pool floor by a support structure. The support structure allows sufficient pool water flow for natural convection cooling of the stored fuel. Since the modules are freestanding (i.e., no supports above the base), the support structure also provides the required dynamic stability.

(4) The racks include individual solid tube storage compartments, which provide lateral restraints over the entire length of the fuel assembly or bundle. The compartments in the racks containing neutron absorber materials are vented.

(5) The weight of the fuel assembly or bundle is supported axially by the rack fuel support.

"Boral" is used as a neutron absorber material in GE's high density spent fuel storage rack design. "Boral" is a Brooks and Perkins trademark for the dispersion of boron carbide in aluminum, the dispersion (or core) being clad in 1100 aluminum sheets.

9.1.2.3.2 Structural Design (Continued)

The fuel storage pools have adequate water shielding for the stored spent fuel. Adequate shielding for transporting the fuel is also provided. Liquid level sensors are installed to detect a low pool water level, and adequate makeup water is available to assure that the fuel will not be uncovered should a leak occur.

Since the fuel storage racks are made of noncombustible material and are stored under water, there is no potential fire hazard. The large water volume also protects the spent fuel storage racks from potential pipe breaks and associated jet impingement loads.

Delete - see 9.1.2.4 LLD 10/18/82

The spent fuel storage racks require no periodic special testing or inspection for nuclear safety purposes.

Fuel storage racks materials are made from stainless steel, in solution heat treated condition, in accordance with the latest issue of the applicable ASTM specification at the time of equipment order. The storage tube and the integral neutron absorber material are permanently marked with identification traceable to the material certifications. The fuel storage tube assembly containing the neutron absorber material is compatible with the environment of treated water and provides a design life of 40 years, including allowances for corrosion. 9.2

Regulatory Guide Compliance - Regulatory Guide 1.13

For commitment and revision number, see regulatory guide commitment matrix in Section 1.8. This regulatory guide is applicable to spent fuel storage facilities. The building containing the fuel storage facilities, including the storage racks and pool, is designed to protect the fuel from damage caused by:

(1) natural events such as earthquake, high winds and flooding, and

9.1.2.3.3 Protective Features of Spent Fuel Storage Facilities (Continued)

The FPCCU system described in Subsection 9.1.3 provides adequate and continuous cooling for the spent fuel.

From the foregoing analyses, it is concluded that the spent fuel storage arrangement and design meet the safety design bases and satisfy the intent of Regulatory Guide 1.13.

9.1.2.4 Testing Inspection

Frequency of inspection and type of sampling used in monitoring ~~The spent fuel storage racks require no periodic special testing or inspection for nuclear safety purposes.~~ this system will be supplied by the applicant.

9.1.2.5 Summary of Radiological Considerations

By adequate design and careful operational procedures, the safety design bases of the spent fuel storage arrangement are satisfied. Thus, the exposure of plant personnel to radiation is maintained well below published guideline values. Further details of radiological considerations, including those for the spent fuel storage arrangement, are presented in Chapter 12.

9.1.3 Fuel Pool Cooling and Cleanup System

9.1.3.1 Design Bases

9.1.3.1.1 Safety Design Bases

The Fuel Pool Cooling and Cleanup (FPCCU) System shall be designed to remove the decay heat from the fuel assemblies, maintain pool water level and remove radioactive materials from the pool and thus minimize the release of radioactive elements stored in the containment upper pool and the pools in the fuel building.

ATTACHMENT NO. 4

DRAFT RESPONSES TO
AUXILIARY SYSTEMS BRANCH
QUESTIONS

410.01 (3.4.1) In Section 3.4.1.1.2 of your FSAR, you state that in "(flooding) cases involving visual inspection of the affected areas followed by a remote or local operator action, a minimum of 30 minutes is allowed for the operator to take action." This implies that some areas of the plant may be protected against internal flooding sources only by visual operator inspection. If any of these areas are required for safe cold shutdown, revise your design so that positive means of flood detection are provided. Identify which areas of the plant rely on visual detection and verify that failure to discover the flooding condition will not result in flooding of safety-related equipment.

Response

Response to this question is provided in revised Subsection 3.4.1.1.2.

410.02 (3.4.1) All of your flooding analyses in Section 3.4.1.1.2 of your FSAR are based on either high-energy line breaks or leakage cracks in moderate-energy piping systems. Verify that flooding due to complete failure of a non-seismic Category I tank or piping system cannot result in conditions worse than those which you have analyzed. Note that complete piping system failures should be postulated in non-seismic moderate-energy piping systems rather than leakage cracks if the complete failure represents the worst case. As an example, your analysis of flooding in the control building assumes that the largest possible pipe break is from a crack in the six inch fire protection line. Verify that the fire protection piping in question is seismic Category I or analyze the consequences of a complete pipe break.

Response

Response to this question is provided in revised Subsection 3.4.1.1.2.

The safety-related components located below the design flood level inside a Seismic Category I structure are shown in Figure 1.2-2. All safety-related components located below the design flood level are protected using the hardened protection approach.

3.4.1.1.2 Compartment Flooding from Postulated Component Failures

ALL PIPING, VESSELS AND HEATEXCHANGERS WITH FLOODING POTENTIAL IN ALL STRIDE BUILDINGS ARE, WITH ONE EXCEPTION, SEISMICALLY QUALIFIED AND A COMPLETE FAILURE OF A NON-SEISMIC TANK OR PIPING SYSTEM IS NOT APPLICABLE. THE ONE EXCEPTION IS THE RADWASTE BUILDING WHICH CONTAINS NO SAFE SHUTDOWN EQUIPMENT. 410.02

Leakage cracks are postulated in any point of moderate-energy piping larger than one-inch nominal diameter. The leakage flow area is assumed to be a circular orifice with flow area equal to one-half of the pipe outside diameter multiplied by one-half of the pipe nominal wall thickness. Resulting leakage flow rates are approximated using Equation 3-2 from Reference 1 with a flow coefficient of 0.59 and a normal operating pressure in the pipe.

The only identified worst case of compartment flooding involving a high-energy line is a feedwater line break in the steam tunnel. All data necessary for evaluation of this case are taken from Section 15.1.

No credit is taken for operation of the drain sump pumps although they may be expected to operate during some of the postulated flooding events.

AFTER RECEIVING A FLOOD DETECTION ALARM, The operator has a 10-minute grace period to act (TO IDENTIFY THE SPECIFIC FLOODING SOURCE) in cases where flooding can be identified and terminated by a remote action from the control room. In cases involving visual inspection ~~of~~ IN the affected area (except ECCS areas) followed by a remote or local operator action, a minimum of 30 minutes is provided for the operator. 410.01

410.03 (3.4.1) In your flooding analyses of the steam tunnel, safe shutdown of the plant depends upon water level detection and normally closed isolation valves in the floor drainage system. With respect to these analyses, provide the following information:

a. Verify that your proposed detection system is designed to safety-grade requirements.

b. Verify that your proposed drainage system up to, and including the normally closed isolation valves, is designed to seismic Category I requirements.

c. Provide a Technical Specification or an interface requirement for a Technical Specification that the drainage system valves be locked in the closed position and verified closed as part of a monthly surveillance program.

Response

Response to this question is provided in revised subsection 3.4.1.1.2.4.5. Subsection 3.4.1.1.2 has been changed accordingly.

3.4.1.1.2.4.5 Steam Tunnel

From a flooding standpoint, the steam tunnel forms a 36-ft wide pool closed by the containment on one side and by the clean chase in the Turbine Building on the other side. The floor in the steam tunnel is at two elevations: El (+) 9 ft, 0 in., in the area adjacent to the containment; and El (+) 13 ft, 0 in., in the remainder of the steam tunnel. The elevation of the top of the clean chase is 23 ft, 0 in. The steam tunnel floor area is approximately 2500 ft^2.

The worst flood condition in the area is caused by a feedwater linebreak. Up to 900,000 lb of water are discharged into the steam tunnel area with the water level in the tunnel reaching elevation 17 ft, 1-1/2 in.

The largest leakflow from a crack in the steam tunnel area, postulated in a line other than the feedwater line, is from the 8-inch ESW line (130 gpm). The resulting flooding rate in this case is 5 inch/hour.

Floor drains from the steam tunnel area are routed into the RCIC room floor drain sump. To accommodate the large quantity of water from a feedwater line break without any damage to the ECCS rooms, the tunnel floor drainage is based on a seismically qualified normally closed drain and flood water detection instrumentation. THE LOCKED CLOSED DRAIN VALVE PORTION OF THE SYSTEM WILL BE VERIFIED CLOSED AS PART OF A REGULAR SURVEILLANCE PROGRAM. Under normal operation, the steam tunnel is not accessible and there is no flow of water into the floor drains. The normally closed drain line is therefore considered to be an acceptable approach. The only water that the flood drains in the steam tunnel can possibly receive under normal operation is from a break or a crack in a pipe. (410.03b) (410.03c)

The safety grade designed water detection instrumentation, in such a case, alerts the operator in the main control room. With the exception of a feedwater linebreak, there is always enough time for personnel either to control the situation by draining the water from the tunnel (410.03a)

3.4.1.1.2.4.5 Steam Tunnel (Continued)

through the RCIC floor drain sump or to initiate the plant shutdown to avoid any major secondary damage. In the case of a feedwater line break, the plant will be tripped automatically and the resulting large pool of water in the steam tunnel area will be drained out slowly by an operator after plant shutdown.

3.4.1.1.2.4.6 Electrical Equipment Area at El (+) 11 ft, 0 in., Zone 1

All equipment in this room is installed on 6-inch-high concrete pads. Also, all floor penetrations are either enclosed by a 6-inch-high curb or sealed. The floor drainage in the area is provided by eleven 4-inch drains which are routed to the normal waste system. The large pipes penetrating the room are enclosed by a wall and therefore are not a source of flooding for the room. The largest leakflow that can result from an unenclosed pipe in the area is from a crack postulated in the 3-inch ESW line (36 gpm). This quantity of water is drained by the nearest floor drain.

The electrical equipment area in Zone 2, from a flooding standpoint, is identical to Zone 1.

3.4.1.1.2.4.7 Mechanical Equipment Area at El (+) 28 ft, 6 in., Zone 1

The floor penetrations and openings (i.e., HVAC duct and pipe chase) in the area are enclosed by 6-inch-high curbs. The equipment removal hatch is sealed to protect electrical equipment on the lower floor from water damage. Floor drainage in the area is provided by either 4-inch floor drains.

The largest postulated leakflow in the area results from a crack in the 12-inch ESW line (225 gpm). For the worst flood condition, a rupture and an instantaneous release of water from nonseismically qualified tanks located in the area are also postulated. The total

3.4.1.1.2 Compartment Flooding from Postulated Componet Failures (Continued)

In all instances of compartment flooding, a single failure of an active component is considered for systems required to mitigate consequences of a particular flooding condition. The Emergency Core Cooling System (ECCS) rooms are also evaluated on the basis of a loss-of-coolant accident (LOCA) and a single active failure or a LOCA combined with a single passive failure 10 minutes or more after the LOCA.

Except for termination of the ESW System operation when necessary, there are no interface requirements made upon the balance of plant (BOP) from possible flooding in Nuclear Island buildings. Radwaste lines (CRW, DRW, and DD), if operable during postulated events, eventually drain to the Radwaste Building. Other lines, such as storm drains and normal waste lines, interface with BOP yard piping. However, provisions are made in these lines that, should the yard piping become plugged, crushed, or otherwise inoperable, they will vent onto the ground relieving any flooded condition.

3.4.1.1.2.1 Reactor Building

Failures of primary coolant piping are not postulated in this section. These incidents and their consequences are covered in Chapter 15.

Also, failures of ECCS piping are not postulated. In case of a post-LOCA operation, this incident does not cause worsening of the environmental conditions in the containment. A redundant ECCS is available to assure plant safety. In case of a piping failure during ECCS testing, the resulting condition is less severe than those covered in Chapter 15 or in the following paragraphs due to short duration of the test and early detection by the operating personnel performing the test.

410.04 (3.4.1) In your flooding analysis of the fuel building, you state that a crack postulated in the eight inch fuel pool cooling system line between the shutoff valve and the fuel storage pool can result in leakage of a large quantity of water from the pool with a potential for an unacceptable long-term loss of cooling. You further state that operator action (e.g., removal of a screen and installation of an inflatable plug) will be relied upon to correct this condition and that the dose rate calculated at the surface for plug installation is less than 10 mrem/hr.

a. Since you indicate that the fuel pool level will be maintained at its normal level, explain how the operator will install the inflatable plug.

b. Describe how the leak is detected and identify the time available for the operator to secure the leak, thereby limiting the total leakage to about 6800 cubic feet as you have indicated.

c. Verify that this leakage water will not damage any safety-related equipment. Describe where the water accumulates and how it is drained.

d. Verify that the calculated dose rate is based on your new high density spent fuel storage configuration.

Response

Response to this question is provided in revised Subsection 3.4.1.1.2.5.3.

3.4.1.1.2.5.3 Fuel Building at El (-) 5 ft, 3 in. (Continued)

A crack postulated in the 8-inch FPCC line between the shutoff valve and the fuel storage pool can result in TRANSFER OF A QUANITITY OF WATER FROM THE POOL TO THE LOWEST FLOOR IN THE FUEL BUILDING AT EL. (-) 32 FT. THE LEAK RATE FOR THIS INCIDENT IS 16 GPM GIVING THE OPERATOR ABOUT 40 HOURS TO MITIGATE THIS CONDITION BEFORE THE MAXIMUM ALLOWABLE FLOOD LEVEL IS REACHED. THE LEAKAGE OF THIS WATER WILL NOT DAMAGE ANY SAFETY RELATED EQUIPMENT IN ITS PATH TO THE FUEL BUILDING FLOOR. DETECTION OF FLOODING WILL BE BY THE SAFETY GRADE FLOOD LEVEL ALARM IN THE CONTROL ROOM. IF THE PUMPS ARE RUNNING, NO FLOOD LEVEL WILL BE ESTABLISHED SO EXCESSIVE RUNNING TIME OF THE PUMPS WOULD BE USED TO DETERMINE IF A PROBLEM EXISTED. 410.04

MAKE-UP WATER IS AVAILABLE TO ASSURE POOL COOLING.

TO MITIGATE THIS LEAKAGE CONDITION, A PATCH WOULD BE APPLIED TO THE CRACK. AS AN ALTERNATE, AN INFLATABLE PLUG COULD BE USED IN THE INLET OF THE PIPE. THE OPERATOR IN SUCH A CASE WOULD BE EXPOSED TO A MAXIMUM DOSE RATE OF 10 mREM/HR. THIS DOSE RATE IS BASED ON THE NEW HIGH DENSITY, SPENT FUEL STORAGE CONFIGURATION AND A CONSERVATIVE ASSUMPTION THAT THE POOL WATER IS LOWERED DOWN TO THE PIPE INLET LEVEL.

3.4.1.1.2.5.4 Fuel Building at El (-) 11 ft, 0 in.

The largest leak flow that can occur in the area is from a postulated crack in the 16-inch ESW line (282 gpm). Water is immediately drained from the area through floor drains and causes overfilling of the terminal sumps, flooding the floor at El (-)

410.05 (3.5.1) Provide in Section 3.5.1.1 of your FSAR, the results of your analysis to verify that the turbine drive of the reactor core isolation cooling (RCIC) system is not a missile source. Alternatively, verify that missiles from the turbine cannot damage safety-related equipment.

RESPONSE TO 410.05

The Response to this question is contained in the Revised GESSAR II Section 3.5.1.2.1. ([redacted])

3.5.1.2 Internally Generated Missiles (Inside Containment)

Internal missiles are those resulting from plant equipment failures within the Reactor Building. Potential missile sources from both rotating equipment and pressurized components are considered.

3.5.1.2.1 Rotating Equipment

The most substantial piece of rotating equipment is the recirculation pump and motor. An extensive analysis of the recirculation pump and motor under accident conditions is provided in Appendix 3D. This analysis demonstrates that, for the complete spectrum of breaks in piping on the discharge side of the pump, no overspeed conditions will exist. The analysis indicates that in the unlikely event of a completely offset guillotine suction break, potential overspeed may occur. However, an assessment (Appendix 3D) of potential missiles demonstrates that such missiles will not penetrate the pump or the motor and the only potential missile source is the pump impeller missile escaping through the pipe break. With regard to the evaluation of the probabilistic consequences of the pump impeller missile ejected from pipe breaks, it is concluded that no damage is possible to the containment dome, any major piping system, or an inboard main steam isolation valve. Absence of damage is due to the fact that trajectories of the postulated missiles do not intersect with these systems. Further, the only potential missile targets are the reactor vessel and the cylindrical portion of containment and neither can be penetrated by the postulated missile. Thus, it is concluded that the recirculation pump and motor can be dismissed as sources of credible missiles. The pump P_4 is less than 10^{-7} times per year and the motor P_1 is less than 10^{-7} times per year. The results of the assessment are summarized in Table 3.5-1.

¶ The RCIC drive turbine is not a credible source of missiles. It is provided with mechanical overspeed protection as well as automatic governing; very extensive industrial and nuclear experience with this model of turbine has never resulted in a missile which penetrated the turbine casing. 410.05

410.06 (3.5.1) With respect to internally generated missiles inside containment, evaluate the effects of gravitational missiles such as fuel handling equipment which may be generated by a seismic event. Provide in Section 3.5.1.2 of your FSAR, the results of your evaluation and verify that both safety-related equipment and stored fuel are protected in an acceptable manner.

<u>Response</u>

Response to this question is provided in new Subsection 3.5.1.2.4.

410.07 (3.5.1) In addition to the possible missile sources you have identified, verify in Section 3.5.1.2 of your FSAR, that your analyses inside containment have included the reactor vessel head bolts and the automatic depressurization system (ADS) accumulators.

<u>Response</u>

Response to the accumulator portion of this question is provided in revised Subsections 3.5.1.1.2.2 and 3.5.1.2.2. The potential for reactor vessel head bolt missile will be addressed in December 1982.

3.5.1.2.4 Evaluation of Potential Gravitational Missiles Inside Containment

Gravitational missiles inside the containment have been considered as follows:

Seismic Category I systems, components, and structures are not potential gravitational missile sources.

Non-seismic items and systems inside containment are classified as follows:

a. Cable Tray

All cable trays for both Class IE and non-class IE circuits are seismically supported whether or not a hazard potential is evident.

b. Conduit and Non-Safety Pipe 410.06

NON-CLASS IE CONDUIT IS SEISMICALLY SUPPORTED IF IT IS IDENTIFIED AS A POTENTIAL HAZARD TO SAFETY-RELATED EQUIPMENT. ALL REACTOR ISLAND NON-SAFETY CLASS PIPING IS SEISMICALLY ANALYZED WITH THE EXCEPTION OF THE RADWASTE BUILDING.

c. Equipment for Maintenance

All other equipment, such as hoists, that is required during maintenance will either be removed during operation, moved to a location where it is not a potential hazard to safety related equipment, or seismically restrained to prevent it from becoming a missile.

3.5.1.1.2.2 Missile Analyses (Continued)

divisional equipment makes the design acceptable. All safe shutdown functions in the Reactor Island design have redundant backups and these redundant items are separated either by considerable distance or a missile-proof barrier. Based on this, the probability of a valve bonnet missile striking both Division 1 and 2 vital targets for safe shutdown is extremely low making the resultant probability much less than 10^{-7} times per year.

(2) Valve Stems - All the isolation valves installed in the reactor coolant systems have stems with a back seat which eliminates the possibility of ejecting valve stems even if the stem threads fail. Since a double failure of highly reliable components would be required to produce a valve stem missile, the overall probability of occurrence is less than 10^{-7} times per year. Hence valve stems can be dismissed as a source of missiles.

(3) Pressure Vessels - Moderate energy vessels less than 275 psig are not credible missile sourse. The pneumatic system air bottles are designed for 2500 psig to ASME Code Section III requirements. The bottles are not considered a credible source of missiles for the following reasons: 410.07

(a) The bottles are fabricated from heavy-wall rolled steel.

(b) The operating orientation is vertical with the ends facing concrete slabs. The bottles are topped with steel covers thick enough to preclude penetration by a missile.

(c) The fill connection is protected by a permanent steel collar.

3.5.1.2.1 Rotating Equipment (Continued)

By an analysis similar to that in Subsection 3.5.1.1.1, it is concluded that no other items of rotating equipment inside the containment have the capability of potential missiles. All other pumps are incapable of achieving an overspeed condition.

3.5.1.2.2 Pressurized Components

FOR EXAMPLE, THE ADS ACCUMULATORS ARE DESIGNED FOR 200 PSIG UPSET PRESSURE (< 275 PSI) TO ASME SECTION III REQUIREMENTS AND ARE THEREFORE NOT CONSIDERED A CREDIBLE MISSILE SOURCE. 410.0

Identification of potential missiles and their consequences outside containment are specified in Subsection 3.5.1.1.2. The same conclusions may be drawn for pressurized components inside of containment. One additional item is control rod drives (CRD) under the reactor vessel. The CRD mechanisms are not credible missiles. The CRD housing supports (Section 4.6) are designed to prevent any significant nuclear transient in the event a drive housing breaks or separates from the bottom of the reactor vessel. Since these housing supports are in close proximity to the drive housing and the supports have been designed specifically for the separation event, there is no reason to consider the CRD mechanisms as credible missiles.

3.5.1.2.3 Missile Barriers and Loadings

Credit is taken in some cases of rotating and pressurized components generating missiles for missile-consequence mitigation by structural walls and slabs. Penetration of the following walls and slabs by potential missiles is not considered credible:

(1) drywell wall,
(2) weir wall,
(3) upper pool walls and floor,
(4) reactor pedestal, and
(5) other interior walls and slabs.

410.08 (3.5.2) Verify that the seismic Category I charcoal delay tanks are protected against tornado missiles. Alternatively, provide justification for the tanks not being protected.

Response

The Applicant will make provisions to protect the charcoal delay tanks against tornado missiles. Section 3.5.2 will be revised accordingly.

QUESTION 410.09

Demonstrate your compliance with the design criteria contained in Branch Technical Position ASB 3-1, attached to Section 3.6.1 of the Standard Review Plan (SRP), in accordance with the implementation section of ASB 3-1. Alternatively, demonstrate your compliance with Appendix C to ASB 3-1. Identify where your criteria differ from the criteria contained in the documents cited above. Provide justification for any deviations.

RESPONSE 410.09

The pipe break criteria is defined in Section 3.6.1.1. See response to Question 410.10 for revised text in this section.

410.10
(3.6.1)

In Section 3.6.1.1.3 of your FSAR, you state that where a pipe break event occurs in one of two or more redundant divisions or trains of an essential system, a single failure in the other trains or divisions of that system is not assumed, provided certain criteria are met. It is our position that the above single failure exclusion following a pipe break may only be used for a postulated crack in dual-purpose moderate-energy systems as defined in Branch Technical Position ASB 3-1. Verify that for all other systems, a single active failure can be assumed following a pipe break or crack and that safe shutdown will not be precluded.

Response

Response to this question is provided in revised Subsection 3.6.1.1.3.

3.6.1.1.2 Objectives

Protection against pipe break event effects was provided to fulfill the following objectives:

(1) Assure that the reactor can be shut down safely and maintained in a safe cold shutdown condition or mitigate the consequences of a LOCA.

(2) Assure that containment integrity is maintained.

(3) Assure that the radiological doses of a postulated piping failure remain below the limits of 10CFR100.

3.6.1.1.3 Assumptions

The following assumptions were used to determine the protection requirements:

(1) Pipe break events occur during normal plant conditions (i.e., reactor startup, operation at power, normal hot standby* or reactor cooldown to a cold shutdown).

(2) A pipe break event may occur simultaneously with a seismic event, however, a seismic event does not initiate a pipe break event. This applies to Seismic Category I and non-Seismic Category I piping.

(3) A SINGLE ACTIVE COMPONENT FAILURE SHOULD BE ASSUMED IN SYSTEMS USED TO MITIGATE CONSEQUENCES OF THE POSTULATED PIPING FAILURE AND TO SHUTDOWN THE REACTOR, EXCEPT AS NOTED IN ITEM (4) BELOW. THE SINGLE ACTIVE COMPONENT FAILURE IS ASSUMED TO OCCUR IN ADDITION TO THE POSTULATED PIPING FAILURE AND ANY DIRECT CONSEQUENCES OF THE PIPING FAILURE, SUCH AS UNIT TRIP AND LOSS OF OFFSITE POWER.

(4) WHERE THE POSTULATED PIPING FAILURE IS ASSUMED TO OCCUR IN ONE OF TWO OR MORE REDUNDANT TRAINS OF A DUAL-PURPOSE MODERATE-

410.10

*Normal hot standby is a normally attained zero power plant operating state (as opposed to a hot standby initiated by a plant upset condition) where both feedwater and main condenser are available and in use.

3.6.1.1.3 Assumptions (Continued)

ENERGY ESSENTIAL SYSTEM, i.e., ONE REQUIRED TO OPERATE DURING NORMAL PLANT CONDITIONS* AS WELL AS TO SHUT DOWN THE REACTOR AND MITIGATE THE CONSEQUENCES OF THE PIPING FAILURE, SINGLE FAILURE OF COMPONENTS IN THE OTHER TRAIN OR TRAINS OF THAT SYSTEM ONLY, NEED NOT BE ASSUMED PROVIDED THE SYSTEM IS DESIGNED TO SEISMIC CATAGORY I STANDARDS, IS POWERED FROM BOTH OFFSITE AND ONSITE SOURCES, AND IS CONSTRUCTED, OPERATED, AND INSPECTED TO QUALITY ASSURANCE, TESTING AND INSERVICE INSPECTION STANDARDS APPROPRIATE FOR NUCLEAR SAFETY SYSTEMS.

~~(5) Only Seismic Category I piping can be used to mitigate the consequences of the pipe break event (or any other event).~~

5 ~~(6)~~ If the pipe break event is the failure of non-Seismic Category I piping, the pipe break event must not result in failure to shut down the reactor and mitigate the consequences of the pipe break event considering a single active failure.

6 ~~(7)~~ If loss of offsite power is a direct consequence of the pipe break event (e.g. trip of the turbine-generator producing a power surge which in turn trips the main breaker), then a loss of offsite power occurs in a mechanistic time sequence. Otherwise, offsite power is available.

7 ~~(8)~~ A whipping pipe is not capable of rupturing impacted pipes of equal or greater nominal pipe diameter and equal or greater wall thickness.

8 ~~(9)~~ All available ~~safety~~ systems, including those actuated by operator actions, are available to mitigate the consequences of a pipe break event. In judging the availability of systems, account is taken of the pipe break event and its direct consequences such as unit trip and loss of offsite power. Although a pipe break event

410.11 (3.6.1)

Your assumption in Section 3.6.1.1 of your FSAR that only seismic Category I piping systems can be used to mitigate the consequences of a postulated pipe break may be unduly restrictive when used in conjunction with Branch Technical Position ASB 3-1. Your assumption is necessary when considering breaks in non-seismic Category I systems but it is not necessary for breaks in seismic Category I systems. Any non-seismic Category I system which will be available following a break in a seismic Category I system, may be relied upon to mitigate the consequences of that break.

Response

See answer to Question 410.10

410.12 (3.6.1) (RSP)

Your separation analyses in Section 3.6.1.3 of your FSAR is based on consequences which you find acceptable as a result of damage to only one division of a redundant system. These analyses are unacceptable since you did not consider a single active failure. Accordingly, revise your analyses to include protection against postulated high-energy system pipe breaks coincident with a single active failure.

Response

Response to this question is provided in revised Subsection 3.6.1.3.2.2.

3.6.1.3.2.2 Separation (Continued)

requirements. No damage was assumed to occur due to jet impingement, since the impingement force becomes negligible beyond 30 feet. No further consequential damage evaluation was performed.

(3) Essential systems, components, and equipment at a distance less than 30 feet from any high-energy piping were evaluated to see the consequences of postulated piping failures ~~if damage could occur to more than~~ and a safe shutdown can be attained assuming a single active failure. ~~one essential division, preventing safe shutdown of the~~ Protection in the form of barriers, shields or embedments are ~~plant. If damage occurred to only one division of a~~ specified where the above can not be met. ~~redundant system, the requirement for redundant separation was met. Other redundant divisions are available for safe shutdown of the plant and no further evaluation was performed.~~ 410.12

~~(4) If damage could occur to more than one division of a redundant essential system within 30 ft of any high energy piping, other protection in the form of barriers, shields, or embedments was used. These method of protection are discussed in Subsection 3.6.1.3.2.3.~~

~~Due to the complexities of several divisions being adjacent to high-energy lines in the drywell and steam tunnel, the requirements for separation could not be evaluated using these simplifying HELSA assumptions. For these areas, specific break locations were determined in accordance with Paragraph 3.6.2.1.4.3. If spatial separation requirements (distance and/or arrangement to prevent damage) were not met based on the evaluation of specific breaks, barriers, enclosures, shields, or restraints was necessary. These methods of protection are discussed in Subsections 3.6.1.3.2.3 and 3.6.1.3.2.4.~~

410.13 (3.6.1) (RSP)

Revise Appendix 3G of your FSAR to consider single active failures coincident with postulated pipe breaks in all the high-energy systems analyzed. For all instances where a redundant system is relied upon in the event of a pipe break, verify that the single failure criterion is met. For example, in Section 3G.2 you state that Division 2 reactor heat removal (RHR) system piping and Division 1 ADS piping could be damaged due to a high-energy pipe break but, since each has a redundant system, no protection is required. It is our position that you must provide protection or demonstrate that a single active failure of one of the redundant systems is acceptable.

Response

Response to this question is provided in revised subsections 3G.2.1, 3G.2.2, 3G.2.3, 3G.2.4 and Table 3.6-7.

410.14 (3.6.1)

Appendix 3G to your FSAR does not include a pipe failure analysis of the main steam and feedwater lines inside the main steam tunnel. Accordingly, revise your FSAR to include these analyses. Identify the equipment in the main steam tunnel which must be environmentally qualified for these postulated pipe breaks.

Response

Response to this question is provided in revised Subsection 3.6.1.3.2.2

Text change for 410.13

3G.2.1 Containment (Continued)

(RHR) piping, and Division 1 Automatic Depressurization System (ADS) piping). A barrier will be provided to prevent damage to both divisions from the high energy line break. ~~Since each has a redundant system located elsewhere to shut the plant down safely, no protection is required.~~ 410.13

There are two divisions of power and control conduit that could be damaged by pipe rupture. Division 3 (D3V2-C3CAN-2, D3V2-C3CAP-2, D3V2-C3CAT-1, D3V-C3CAA-1-1/2, D3V5-C3CCJ-1-1/2, and D3V5-C3CCL-1-1/2) which are power and control cable for the High-Pressure Core Spray (HPCS) System have redundant backup systems to shut the plant down safely (i.e., two trains of ADS and the RCIC system). Division 2 (D2V2-C3BBY-3/4, D2V3-C3BCJ-1, D2V3-C3CBJ-1, D2V2-C3BBZ-3/4, D2V2-C3BBT-2, D2V3-C3BCX-1, D2V2-C3BHH-3/4, D2V3-C3BCY-1, D2V2-C3BHJ-3/4, and D2V2-C3BPZ-3/4) are conduits for the water positive-seal valves which are not needed to shut the plant down safely since, simultaneously, loss-of-coolant accident (LOCA) need not be assumed. No protection is required to prevent consequential effects due to pipe break. There are two divisions of cable trays that could be damaged by pipe rupture which will be (D1V1-T3AAD and D1V1-T3AAE) and Division 3 (R61-TT222 and R61-TTT221).

There are three divisions of instrumentation and fire protection conduits that could be damaged by pipe rupture which will be protected by barriers to prevent consequential effects: Division 2 (D2V1-C3BAR-1), Division 3 (D3VN-C3CAC-3, D3V1-C3CBK-1-1/2, D3V1-C3CBJ-2, D3V1-C3CBL-1, D3V1-C3CBP-3/4, D3V1-C3CBM-1, D3V1-C3CBN-1 affecting H22-P005 reactor pressure level panel, and H22-P042 main steam flow), and Division 4 (D4V1-C3DAF-1 affecting H22-P042).

There is no heating, venting, and air conditioning (HVAC) ducting in this part of containment so no protection is required.

3G.2.1 Containment (Continued)

There is only one division of instrumentation in the area that could possibly be damaged by pipe break which is Division 3 (3/4-MC24-EBB). A barrier will be provided to prevent damage to both divisions from the high energy line break. ~~No protection is necessary since there is redundant instrumentation elsewhere in the plant to allow safe shutdown.~~

High-Energy Line	Location
6 in. RWCU 138-DAC	From RWCU 8 to RWCU 139 (from 65 ft to 48 ft)
6 in. RWCU 139-DAC	From RWCU 138 to RWCU 9 (from 48 ft to 48 ft, 1 in.)
4 in. and 6 in. RWCU 6-EAC	From heat exchanger B001C to heat exchanger B002A (from 49 ft to 51 ft, 9 in.)
4 in. and 6 in. RWCU 7-DAC	From heat exchanger B002B to RWCU 201 and 202 (from 70 ft to 49 ft)
6 in. RWCU 8-DAC	From RWCU 203 and 204 to heat exchanger B001C (from 53 ft to 60 ft, 0 in.)
4 in. RWCU 12-EAC	From RWCU 73 to RWCU 9 (from 39 ft to 46 ft, 7 in.)
6 in. RWCU 13-DAC	From RWCU 7 to RWCU 8 (from 61 ft to 65 ft, 10 in.)
4 in. RWCU 15-DAB	From RWCU 14 (F028) to RWCU 140 (15 ft, 4 in.)

3G.2.2 Containment Steam Tunnel (Continued)

High Energy Line	Location
6 in. RWCU 73-EAC	From RWCU 72 (F053) to heat exchanger B001A (from 20 ft, 60 in., to 41 ft, 2 in.)
4 in. RWCU 14-DAC	From RWCU 13B to RWCU 15 (F028) (from 15 ft, 4 in. to 41 ft, 2 in.)

There is ~~only~~ one division of equipment (Division 2) in the immediate area of the high-energy lines that could be damaged due to pipe rupture. A barrier will be provided to prevent damage. ~~therefore, there would be other available systems to shut the plant down safely. No protection is required to prevent consequential effects~~. 410.13

Division 2 power and control conduit are routed in the steam tunnel area. There are no ESF divisional instrumentation and fire protection conduit or cable trays located in the steam tunnel, so no protection is required. ~~Since there is only one division that could be damaged due to pipe break, protection against consequential effects is not required.~~ 410.13

There is no ESF HVAC ducting located in the steam tunnel, so no protection is required. There is no ESF instrumentation located in the steam tunnel, so no protection is required.

3G.2.3 Auxiliary Building

High-Energy Line	Location
10 in MS201-ECB (to F052A&B)	From MS33 (Valve F064) to MS252 (F087A,B and F051A,B)

A high-energy line could affect two ESF divisions (APS3-ADB - Division 1, and APS18-ADB - Division 2). The ~~ADS~~ APS system supplies air to the RHR air-operated valves in loop A (Division 1) and loop B (Division 2) utilized during shutdown. This system supplies air as a backup to containment air locks. A barrier will be provided to prevent damage to both divisions in the event of pipe rupture. 410.13

The high-energy line is routed into the RHR pump rooms where there is only one ESF division; therefore, A barrier will be provided to prevent dam ~~no protection is required for~~ to the cable trays, instrumentation and fire protection conduit, and power and control conduit, from the high energy line break. 41

There are no divisional ESF ducting in the area of the high-energy line so no protection against pipe whip is required.

There is only one ESF division instrumentation near the high-energy line; ~~therefore, no protection against damage is required.~~ A barrier will be provided to prevent damage in the event of pipe rupture. 41

High-Energy Line	Location
4 in. and 6 in. MS202-ECB (upstream of F045)	From MS201 to Turbine E51-C002 (-)28 ft to 9 ft

There are two divisions of the Reactor Core Isolation Cooling (RCIC) System that could be damaged due to pipe break of the high-energy line. Most of the RCIC is Division 1 except for the 3-inch RCIC 22-ACB line located at El 3 ft, 8 in. This line acts as the vacuum vent for the RCIC System and for Division 2 RHR B via

3G.2.3 Auxiliary Building (Continued)

2-inch RCIC 4-ACB, so it will be protected by a barrier. The Division 1 piping will ~~not~~ be protected by barrier from the high energy line break ~~since other systems are available to shut the plant down safely.~~ 410.13

There are no divisional cable trays in the vicinity of high-energy line. The instrumentation and fire protection conduit are non-divisional hence no protection is required. Division 1 and 2 power and control conduits in the pipe chase could be impacted by jet impingement which are D2V2-C1ACB, D2V3-C1ACJ, and D1V2-C1ABN. These lead to the following Leak Detection System instruments. The power and control conduits are protected by barriers to prevent consequential damage.

There are no divisional ESF ducting in the area of the high-energy line; therefore, no protection is required to protect against consequential damage.

A high-energy line break in the pipe chase could cause damage to the instrumentation leading to panel 1I22-P0201. These lines are E12-PTN028 (Division 2), E51-PTN083B (Division 1), and E51-PTN055B and F (Division 2). The instrumentation is protected by barriers to prevent consequential damage since the Leak Detection System is required to mitigate pipe break consequences. In the RCIC cubicle, there are two divisions of instrumentation that will also be affected should the high-energy line pipe break (i.e., E31-dPT-N083A and B). The instrumentation in the RCIC cubicle is separated by a barrier to protect against consequential damage.

High-Energy Line	Location
6 in. RWCU 4-EAC	From RWCU 134 to C001 A and B (-)4 ft, 10 in. to 2 ft, 2 in.

3G.2.3 Auxiliary Building (Continued)

High-Energy Line	Location
4 in. and 6 in. RWCU 5-EAC	From pumps C001 A and B to RWCU 285 (-)4 ft, 10 in. to 3 ft, 2 in.

The high-energy lines are routed down from the steam tunnel floor into the RWCU pump room where they are separated from all divisional piping except one line that is Division 1 in the Zone 1 area. Proper barrier will be provided to prevent damage from high energy line break. ~~No requirements are necessary to protect against consequential damage.~~ 410.13

Only one division of cable trays exists near the high-energy line which will be protected by box-out barriers. ~~requires no protection against consequential damage should the line break.~~ In Zone 1, Division 1 and 2, instrumentation and fire protection conduits could be damaged due to pipe break (i.e., D1V1-C1ABL, D1V1-C1ABM, and D2V1-C1ABH). These will be protected by box-out barriers. Division 1 and 2 power and control conduit can also be damaged due to pipe break (i.e., D1V2-C1ABN, D2V2-C1ACD and D2V3-C1ACJ). These will also be protected using box-out barriers. 410.13

In Zone 1 there are two divisions of instrumentation that could be affected by pipe break (E31-TEN037A&B). In Zone 2 there are also two divisions of instrumentation that could be damaged by pipe break (E31-TEN040A&B). The instruments are protected using box-out barriers.

3G.2.4 Fuel Building

High-Energy Line	Location
2 in. CRD1-FCD	From C001-A&B pumps to D003-A&B filters (-)29 ft to (-)21 ft

The line routing is primarily in the control rod drive (CRD) pump room which is isolated from any ESF divisional lines. The high-energy line leads to the CRD water filters that are near Division 2 piping. A barrier will be provided to prevent damage from high energy line break. ~~No protection is required since there is only one division in that area.~~ 410.13

Division 1 and 2 power and control conduits are located outside the CRD water pump room separated by a wall from the high-energy line so no protection is required. There are no ESF divisional cable trays nor instrumentation and fire protection conduits near the high-energy line.

There is no ESF HVAC ductwork in the area of the high energy line; therefore no protection is required.

Division 1 and 2 instrumentation in the CRD water pump cubicle could be impacted by a high-energy line break. These are identified as X-63, dPT, NN005A, and NN005B. It was concluded that the loss of a signal from these instruments would not affect the ability to shut the plant down safely; therefore, no protection is necessary.

High-Energy Line	Location
2 in. CRD2-FBD	From D003-A&B Filters to CRD3 (-)32 ft to 14 ft
2 in. CRD3-FBB	From CRD2 (F083) to CRD4 (FF215)

3G.2.4 Fuel Building (Continued)

Pipe break of the high energy line could damage redundant piping in Division 1 and 2 in Zone 1 (2-in. ESW 127-ADC, Division 1, and 2-in. ESW-130-ADC, Division 2). Since the high-energy lines are of the same size and thickness, the damage to the ESW piping would be limited to cracking the pipe and causing flooding. Barriers are provided to protect the ESW piping from damage. In Zone 2, damage could occur to two divisions of piping: 2-inch ESW 127-ADC (Division 1), 3/4-inch ADS 43-ADC (Division 2), and 10-inch ESW 46-ADC (Division 2). ~~Since these systems have redundant trains remote from the high-energy lines that could be utilized to shut the plant down in the event of pipe break, no protective devices are required.~~ *A barrier will be provided to prevent damage to both divisions from the high energy line break.*

Divisions 1 and 2 power and control conduits in Zone 2 can be damaged due to pipe break (i.e., Division 3 C2B[illegible], D1V2-C2BDB, and D2V3-T2CAA, D2V2-T2CAA). These will be protected by barriers to prevent consequential damage. There are two divisions of power cable from the conduits described that feed to (SPCU) containment isolation valves (G38-FF003 and FF004). Since the valves are only required during post-LOCA and the power cable that feeds them will have a breaker, no protection is required to prevent consequential damage. The power and control conduits are protected by barriers to prevent consequential damage. ~~The cable trays are Division 2 only in the area of the high-energy line; therefore, no protection will be required. Division 3 instrumentation and fire protection conduit are located near the high-energy line which require no protection in Zone 2.~~ There are, however, Division 1 and 2 conduit in Zone 1 which could be damaged by the high-energy line (i.e., D1V1-C2BCE, D1V1-C2BCD, and D2V1-C2AAA); therefore, barriers are utilized to prevent consequential damage.

There is no ESF HVAC ductwork in the area of the high energy line; therefore, no protection is required.

Table 3.6-7
HIGH-ENERGY PIPING OUTSIDE CONTAINMENT

Auxiliary Building

10" MS 201-ECB
(to F052)
4", 6" MS 202-ECB
(Upstream of F045)
6" RWCU 4-EAC
4", 6" RWCU 5-EAC

Fuel Building

2" CRD1-FDC
2" CRD2-FBD
2" CRD3-FBB

Relocated from 3.6-68

Auxiliary Building Steam Tunnel

20" FW1-EDD
20" FW2-EDB
20" FW3-EDA
20" FW4-EDB
20" FW5-EDA
20" FW6-EDA
20" FW7-EDB
20" FW8-EDB
26" MS3-ECA
26" MS4-ECA
26" MS5-ECA
26" MS6-ECA
26" MS7-ECB
26" MS8-ECB
26" MS9-ECB
26" MS10-ECB
10" MS33-ECA
2", 3", MS35-ECA
3", 6", MS36-ECD
3", 6", MS37-ECD
3" MS42-ECD
2" MS43-ECD
2" MS44-ECD
2" MS45-ECD
2" MS46-ECD
1-1/2", 2" MS48-ECA
1-1/2", 2" MS49-ECA
1-1/2", 2" MS50-ECA
1-1/2", 2" MS51-ECA
1-1/2", 2" MS52-ECA
2" MS53-DCD
2" MS54-EDC
2" MS55-ECD
2" MS56-ECD
2" MS57-ECD
3" MS58-ECD
3" MS59-ECD

3" MS99-ECD
26" MS103-ECD
26" MS104-ECD
26" MS105-ECD
26" MS106-ECD
26" MS106-ECD
6" MS202-ECB
2" PLCS14-ECB
2" PLCS15-ECB
2" PLCS16-ECB
2" PLCS17-ECB
14" RHR11-EAB
14" RHR17-EAB
6" RWCU3-EAC
6" RWCU 10-EAB
4" RWCU 15-DAB
4" RWCU16-DAD
6" RWCU68-EAB
6" RWCU70-EAB
6" RWCU72-EAB
6" RWCU134-EAC
4" RWCU140-DAC
4", 6" RWCU285-EAC

Table 3.6-7

HIGH-ENERGY PIPING OUTSIDE CONTAINMENT (Continued)

Diesel Generator Building

6" CO1-BAD
(Upstream of FF001)
6" CO2-BAD
(Upstream of FF002)

26" MS9-ECB
26" MS10-ECB
10" MS33-ECA
2", 3", MS35-ECA
3", 6", MS36-ECD
3", 6", MS37-ECD
3" MS42-ECD
2" MS43-ECD
2" MS44-ECD
2" MS45-ECD
2" MS46-ECD
1-1/2", 2" MS48-ECA
1-1/2", 2" MS49-ECA
1-1/2", 2" MS50-ECA
1-1/2", 2" MS51-ECA
1-1/2", 2" MS52-ECA
2" MS53-DCD
2" MS54-EDC
2" MS55-ECD
2" MS56-ECD
2" MS57-ECD
3" MS58-ECD
3" MS59-ECD

6" RWCU3-EAC
6" RWCU 10-EAB
4" RWCU 15-DAB
4" RWCU16-DAD
6" RWCU68-EAB
6" RWCU70-EAB
6" RWCU72-EAB
6" RWCU134-EAC
4" RWCU140-DAC
4", 6" RWCU285-EAC

Relocated to 3.6-67

3.6.1.3.2.2 Separation

Text change for 410.14

The plant arrangement provided separation to the extent practicable to maintain the independence of redundant safety systems (including their auxiliaries) in order to prevent the loss of safety function due to any single postulated event. Redundant trains (e.g., A and B trains) and divisions were located in separate compartments to the extent possible. Separation between redundant safety systems with their related auxiliary supporting features, therefore, was the basic protective measure incorporated in the design to protect against the dynamic effects of postulated pipe failures.

Due to the complexities of several divisions being adjacent to high-energy lines in the drywell and auxiliary building steam tunnel, the requirements for separation could not be evaluated using these ~~simplifying~~ HELSA ~~assumptions~~. For these areas, specific break locations were determined in accordance with Paragraph 3.6.2.1.4.3. If spatial separation requirements (distance and/or arrangement to prevent damage) were not met based on the evaluation of specific breaks, barriers, enclosures, shields, or restraints was necessary. These methods of protection are discussed in Subsections 3.6.1.3.2.3 and 3.6.1.3.2.4. 410.14

~~Initially, a High-Energy Line-Separation Analysis (HELSA) was made to determine which high-energy lines met the separation requirements and which lines would require further protection. The evaluation was done as follows~~: In addition, the following evaluation was done to determine which high energy line met the separation requirement and which lines would require further protection:

(1) For the HELSA evaluation, no particular break points were identified. Cubicles or areas through which the high-energy lines pass were examined in total. Breaks were postulated at any point in the piping system.

(2) Essential systems, components, and equipment at a distance greater than thirty feet from any high energy piping were considered as meeting spatial separation

3.6.1.3.2.2 Separation (Continued)

requirements. No damage was assumed to occur due to jet impingement, since the impingement force becomes negligible beyond 30 feet. No further evaluation was performed.

(3) Essential systems, components, and equipment at a distance less than 30 feet from any high-energy piping were evaluated to see if damage could occur to more than one essential division, preventing safe shutdown of the plant. If damage occurred to only one division of a redundant system, the requirement for redundant separation was met. Other redundant divisions are available for safe shutdown of the plant and no further evaluation was performed.

(4) If damage could occur to more than one division of a redundant essential system within 30 ft of any high energy piping, other protection in the form of barriers, shields, or embedments was used. These method of protection are discussed in Subsection 3.6.1.3.2.3.

Due to the complexities of several divisions being adjacent to high-energy lines in the drywell and steam tunnel, the requirements for separation could not be evaluated using these simplifying assumptions. For these areas, specific break locations were determined in accordance with Paragraph 3.6.2.1.4.3. If spatial separation requirements (distance and/or arrangement to prevent damage) were not met based on the evaluation of specific breaks, barriers, enclosures, shields, or restraints was necessary. These methods of protection are discussed in Subsections 3.6.1.3.2.3 and 3.6.1.3.2.4.

410.15 (6.2.6.1)

In Section 6.2 of your FSAR, you provide the results of subcompartment pressure analyses for some areas outside containment which are considered part of the secondary containment. In order that we may evaluate the adequacy of the environmental qualification of the equipment in these subcompartments, provide the temperature profiles resulting from these postulated pipe breaks. Verify that the equipment necessary to mitigate the consequences of a postulated pipe break, including a single active failure, will be environmentally qualified. Perform additional analyses for any safety-related areas outside containment which are not considered part of the secondary containment.

Section 6.2.3.3.1 describes the design basis of secondary containment compartment pressurization. The methodology included is described in ~~sub~~section 6.2.1.2 and the analysis is included in this section. However, ~~we will revise~~ subsection 6.2.3.3.1.1 has been revised to clarify this. ~~[illegible]~~

The temperature profile resulting from the postulated pipe break are shown in figures 6.2-57 through 6.2-61 as referenced in subsection 6.2.3.3.1.3

The equipment necessary to mitigate the consequences of a postulated pipe break, including a single active failure are environmentally qualified. Refer to section 6.3.11.2.1.3.1.5

~~We do not have any~~ There is no safety related area outside containment and secondary containment subject to subcompartment pressurization except the steam tunnel. Analysis is shown in section 6.2 with results shown in Fig. 6.2-61

6.2.3.3.1 Compartment Pressurization

6.2.3.3.1.1 Design Basis

The design of the secondary containment compartments with respect to pressurization is based upon the worst-case design base accident (DBA) of a high or moderate energy line postulated to occur in each compartment. For a detailed synopsis of the methodology involved ~~and the analysis performed~~, see Subsection 6.2.1.2. ~~The analysis are shown in this section.~~ 410.1

Table 6.2-31 details the high or moderate energy line breaks postulated as DBAs for the compartment pressurization analysis. The break producing the greatest blowdown mass and enthalpy is selected for the analysis of each compartment.

To determine the adequacy of the design of the compartment walls, a 40% margin is applied to the differential pressures in the preliminary design. For the final design, the peak differential pressures are not to exceed the design differential pressure.

6.2.3.3.1.2 Design Features

The following paragraphs are brief descriptions of the compartments analyzed in the Auxiliary Building pressurization analyses. A more detailed description will be found in Subsection 3.8.4. Figure 6.2-53 shows the schematic layout of the Auxiliary Building compartments with the interconnected vent paths. Figures 6.2-40 through 6.2-46 are the plan and elevation drawings showing component and equipment locations and vent locations and configurations. Tables 6.2-31 and 6.2-32 tabulate the compartment free volumes and initial room conditions, flow path parameters and blowout panel characteristics.

THERE ARE NO SAFETY RELATED AREAS OUTSIDE CONTAINMENT AND SECONDARY CONTAINMENT SUBJECT TO SUBCOMPARTMENT PRESSURIZATION EXCEPT THE STEAM TUNNEL. 410.15

410.16 (4.6) In your letter dated February 12, 1982, you state that the review base for Section 4.6 of your FSAR is the Clinton plant. Revise your FSAR to include the additional information provided on the Clinton docket in the course of the Clinton review, including that additional information which was submitted to close the open items in this portion of the Clinton SER.

Response

This information will be added to Section 4.6 in January 1983.

410.17
(5.2.5)

Verify that there are no differences between your reactor coolant pressure boundary and your proposed ECCS leakage detection system and those which we have reviewed and accepted on the Clinton docket. Revise your FSAR, as necessary, to be consistent with Clinton.

The GESSAR II ECCS leak detection system is consistent with the Clinton ECCS leak detection system, except that GESSAR II does not utilize differential temperature detection in the equipment rooms.

The measurement of temperature differential between inlet and outlet HVAC ducts is effective with ECCS equipment room arrangements that rely on external sources of air for room cooling.

For GESSAR II, however, ECCS equipment rooms are cooled by local fan coil units, as described in Section 9.4. With this arrangement, differential temperature measurement is not effective: Ambient temperature measurements, in combination with flow measurements and sump level monitoring, are utilized to detect ECCS leaks.

Although Figures 5.2-15a, b, and c are correct, the text of Section 5.2.5. of GESSAR II [redacted] contains [redacted] references to differential temperature monitoring. Subsection 5.2.5 will be modified accordingly.

410.18 (6.7) Revise Section 6.7 of your FSAR to reference Regulatory Guide 1.96 instead of Branch Technical Position APCSB 6-1 since this regulatory guide has replaced APCSB 6-1. Address all of the acceptance criteria contained in Section 6.7 of the SRP.

T

410.18 RESPONSE

The design complies with R.G. 1.96 AND the TEXT pg 6.7-1 ~~will BE changed. (See ATTACHED)~~ has been modified accordingly.

6.7 MAIN STEAM POSITIVE LEAKAGE CONTROL SYSTEM (MSPLCS)

The MSPLCS prevents the release of fission products in the event of leakage through the closed main steam isolation valves (MSIV) and main steam drain lines (MSDL) after a design-basis LOCA. The system establishes a pressurized volume in the main steamlines by maintaining a pressure of at least 10% over that of the reactor at post-LOCA condition.

6.7.1 Design Bases

6.7.1.1 Safety Criteria

The following criteria represent system design and safety and performance requirements:

(1) The MSPLCS and all necessary subsystems are designed in accordance with Seismic Category I and Quality Group B requirements, with the exception of any portion of the MSPLCS piping that connects to the main steam system piping between the inner and outer containment isolation valves for either single or dual-barrier containment structures. Such piping, up to and including the first isolation valve in the MSPLCS piping, is designed in accordance with Regulatory Guide 1.96 Seismic Category I and Quality Group A requirements. ~~supplemented by NRC Branch Technical Position APCSB6-1, Appendix A.~~ 410.18

(2) The MSPLCS (and any necessary subsystem) is capable of performing its safety function, when necessary, considering effects from a LOCA, including: (a) missiles that may result from equipment failures; (b) dynamic effects associated with pipe whip and jet forces from LOCA; and (c) normal operating and accident-caused local

410.19 (9.1.1) (9.1.2) In your letter of February 12, 1982, you state that the new and spent fuel storage facilities which you propose for your nuclear island are the same as those for the Perry Nuclear Power Plant. However, your FSAR describes high density new and spent fuel storage facilities which were not evaluated during the Perry review. Correct this apparent discrepancy.

410.19 RESPONSE

THE GESSAR II NEW AND SPENT FUEL STORAGE RACKS WILL BE HIGH DENSITY. SOME MODIFICATION IN THE WRITE-UP WILL OCCUR AS A RESULT OF QUESTION 410.23 RESPONSE.

THE LETTER OF FEB 12, 1982 WAS ~~NOT CORRECT~~ incorrect WITH RESPECT TO FUEL STORAGE.

410.20 (9.1.1) In accordance with Section 9.1.1 of the SRP, identify any deviations in your new fuel storage facility design from the criteria specified in ANS 57.1, "Design Requirements for LWR Fuel Handling Systems," and ANS 57.3, "Design Requirements for New LWR Fuel Storage Facilities," as they relate to the prevention of criticality and to the aspects of radiological control.

410.20 RESPONSE

SRP 9.1.1 DOES NOT SPECIFICALLY ADDRESS ANS 57.1 AND 57.3 BUT WITH RESPECT TO ANS 57.1 (1980) AND ANS 57.3 (NOV 1981 DRAFT) GENERAL ELECTRIC'S NUCLEAR CRITICALITY EVALUATIONS ARE COMPATABLE WITH THE NUCLEAR DESIGN CRITERIA CONTAINED IN THESE DOCUMENTS.

410.21 (9.1.2) For your proposed spent fuel storage facilities, identify deviations from the acceptance criteria of Section 9.1.2 of the SRP including the appropriate portions of Standard ANS 57.2, "Design Objectives for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Stations."

410.21 RESPONSE

THERE ARE NO DEVIATIONS. GESSAR COMPLIES.

QUESTION/RESPONSE 410.22 (9.1.2)

QUESTION 410.22

Add the spent fuel pool and the pool liner to Table 3.2-1 of your FSAR If the liner will not be designed to seismic Category 1 requirements, verify that a failure of the liner plate resulting from a seismic even will not result in unacceptable damage as discussed in the review procedures of Section 9.1.2 of the SRP.

RESPONSE 410.22

The fuel pool liner is designed, fabricated and erected to seismic Category 1 requirements. Design drawings with the back-up calculation: are prepared by the Engineer. A procurement specification provides the requirements for fabrication and erection.

TABLE 3.2-1 ~~WILL BE CHANGE~~ has been revised TO SHOW SEISMIC CATEGORY I REQUIREMENTS. (SEE ATTACHED)

Table 3.2-1

EQUIPMENT CLASSIFICATION (Continued)

Principal Component[a]	Safety Class[b]	Location[c]	Quality Group Classification[d]	Quality Assurance Requirement[e]	Seismic Category[f]	Comments
LIII Civil Structures						
1. Containment	2			B	I	
2. Shield Building	2			B	I	
3. Auxiliary Building	2			B	I	
4. Fuel Building	2			B	I	
5. Control Building	3			B	I	
6. Diesel Generator Building	3			B	I	(p)
7. Radwaste substructure below grade	3			B	I	(p)
8. Cooling water intake structure	3			B	I	
9. Diesel fuel storage facilities	3			B	I	
10. Turbine Building	Other			-	N/A	
11. SPENT FUEL POOL & LINER	2	R	–	B	I	

410.22

410.23
(9.1.2)
[redacted]

Your FSAR does not contain sufficient information regarding the design of your high density storage racks nor does it reference any report where the information can be found. It appears that the design of the spent fuel racks may be the same as the design which was reviewed and accepted for Hatch, Units 1 and 2. Provide either a reference to an appropriate docket or provide a report where the detailed design information may be found. Alternatively, verify that the proposed design of your high density storage racks is identical to that of the Hatch facility.

RESPONSE TO 410.23

GESSAR SECTIONS 9.1.1 AND 9.1.2 WILL BE REVISED TO INCLUDE SPECIFIC INFORMATION PRESENTLY CONTAINED IN TOPICAL REPORT NEDE-24076-P. The EXTENT OF TECHNICAL INFORMATION Presented WILL BE SIMILIAR TO THAT PROVIDED FOR THE HATCH DOCKET.

410.24 (9.1.3) Verify that the information provided in Section 9.1.3 of your FSAR is based on the new high density spent fuel pool storage capacity. Provide additional information regarding the spent fuel decay heat load for the maximum, normal and abnormal heat loads as discussed in Items 1.d and 1.h of the review procedures in Section 9.1.3 of the SRP.

410.24 RESPONSE

- Paragraph 9.1.3.1.2(4) for the Power Generation Design Basis states that the heat load is the sum of 1) the 37% core batch just removed at the last 18-month equilibrium fuel cylce, with four year exposure, and 2) the 37% core batch from the previous refueling outage. The heat load, therefore, is a function of two 37% batches which means that the entire heat capacity of the fuel storage pool does not enter the design. The fresh core supplies about 90% of the heat load and the aged core fraction supplies the other 10% of the design load. The density of the fuel racks would change the heat load calculation only if all of the potential batches stored within the pool are used toward the total design value. Even under these conditions, the design value would be only slightly affected.

Paragraph 9.1.3.2 describes that the above design core load for heat capacity is based upon maintaining 125°F in the pool. This is the system design maximum load and temperature combination. However, if conditions exist as described in paragraph 9.1.3.3, wherein up to a full reactor core is placed into the pool, instead of the 37% batch, the pool may go to 150°F. But adding the RHR cooling capacity will keep the temperature at a maximum of 125°F.

There is no paragraph 1.h. in the Review Procedures section.

410.25 (9.1.3) GE — In Section 9.1.3.2 of your FSAR, you describe the chemistry of the water with regard to its compatibility with the aluminum storage racks. Revise this section of your FSAR to be consistent with your new high density stainless steel racks described in Section 9.1.2 of your FSAR.

410.25 RESPONSE

THE WRITE-UP WILL BE CHANGED TO BE CONSISTENT WITH THE HIGH DENSITY STAINLESS STEEL JACKETED RACKS. This will be available in December 1982.

410.26 (9.1.3) (RSP) — In Section 9.1.3.3 of your FSAR, you state that the reactor heat removal (RHR) system will be used only to supplement the fuel pool cooling system when the reactor is shutdown. It is our position that the reactor should be in a cold shutdown condition prior to using the RHR system for supplemental fuel pool cooling.

Response

The RHR supplemental cooling for those heat loads in the fuel pool that exceed the design basis will be applied when the reactor is in the cold shutdown condition. Subsection 9.1.3.3 has been clarified.

9.1.3.2 System Description (Continued)

Heat from pool evaporation is handled by the building ventilation system. Makeup water is provided through a remote-operated valve.

Irradiated fuel shall not be stored in the upper containment storage pool during reactor operation.

9.1.3.3 Safety Evaluation

The maximum possible heat load is the decay heat of the full core load of fuel at the end of the fuel cycle plus the remaining decay heat of the spent fuel discharged at previous refuelings. The temperature of the fuel pool water may be permitted to rise to approximately 150°F under these conditions. During COLD shutdown conditions, if it appears that the fuel pool temperature will exceed 125°F, the operator connects the FPCCU System to the RHR System. 410.26
Combining the capacities enables the two systems to keep the water temperature below 125°F. The RHR System will be used only to supplement the fuel pool cooling when the reactor is shut down. The reactor will not be started up whenever portions of the RHR systems are needed to cool the fuel pool. The connecting piping from the fuel storage pool to the RHR system is designed Seismic Category I and is completely independent of the fuel pool system piping. These connections may also be utilized during emergency conditions to assure cooling of the spent fuel regardless of the availability of the fuel pool cooling system. The volume of water in the storage pool is such that there is enough heat absorption capability to allow sufficient time for switching over to the RHR system for emergency cooling.

The 150°F temperature limit is set to assure that the fuel building environment does not exceed equipment environmental limits.

410.27 (9.1.3) Provide the design parameters for the spent fuel pool cooling system including the cooling water temperature at which the heat exchangers are rated at 8.8×10^6 btu/hr. Verify that this heat removal rate is sufficient to maintain the pool water temperature at 125°F as stated in your FSAR for the high density storage conditions described in Section 9.1.2 of your FSAR.

Response

Two heat exchangers are each rated at 8.8×10^6 BTU/hr for a total of 17.6 BTU/hr. This is based upon having the capability of storing nine reload batches of 37% of core with 18 months between shutdown cycles. Then the heat exchangers would be designed to remove this quantity of heat based upon a 125°F process water inlet temperature and a cooling water inlet temperature that is determined by the individual site. Each heat exchanger process water rate is 1100 gpm. Subsection 9.1.3.2 has been changed accordingly.

9.1.3.2 System Description

The FPCCU System (Figures 9.1-23a,b,c and 9.1-24a,b) maintains the containment pool, the spent fuel and cask storage pool and the fuel transfer pool below a desired temperature, at an acceptable radiation level and at a degree of clarity necessary to transfer and service the fuel bundles. It also maintains the containment pool temperature, radiation level and clarity necessary to transfer and service the reactor internals and fuel bundles.]

The FPCCU System cools the fuel storage pool by transferring the spent fuel decay heat through two 8.8 x 10^6 Btu/hr heat exchangers to the essential service water system. This is based upon having the capability of storing nine reload batches of 37% of core with 18 months between shutdown cycles. Then the heat exchangers would be designed to remove this quantity of heat based upon a 125°F process water inlet temperature and a cooling water inlet temperature that is determined by the individual site. 410.27

Each of the two heat exchangers is designed to transfer one half the system design heat load. The system utilizes two parallel 1100 gpm pumps to provide a system design flow of 2200 gpm. Each pump is suitable for continuous duty operation. The major portion of the equipment is located in the Fuel Building except for the valves, piping and instrumentation associated with the containment pool. This equipment is located in the reactor building.

The system pool water temperature is maintained at or below 125°F. The decay heat released from the stored fuel is transferred to the essential service water system. The Residual Heat Removal (RHR) System supplements the FPCCU to remove abnormal heat loads such as when a larger batch than normal is removed from the core.

410.28 (9.1.4) Verify that in the event any of the light loads (i.e., those which weigh less than a fuel assembly and its handling tool) were to be dropped over the fuel pool from their maximum normal elevation, they would cause less damage than a dropped fuel assembly. (We assume damage to be in proportion to the kinetic energy on impact.)

Response

Response to this question is provided in revised Subsection 9.1.4.3.

410.29 (9.1.4) Provide the same information for the fuel handling system as is requested in Question 410.17 for the leak detection system since your FSAR is not consistent with the Perry FSAR.

Response

Response to this question will be provided in December 1982.

9.1.4.3 Safety Evaluation of Fuel-Handling System (Continued)

cask is loaded, the fuel storage pool is gated closed and the cask removal procedure reversed. A decontamination area is provided.

Applicant will describe any deviations to this arrangement. 9.5

In summary, the fuel-handling system complies with General Design Criteria 2, 3, 4, 5, 61, 62 and 63, and applicable portions of 10CFR50.

A failure modes and effects analysis for the Reactor and Fuel Servicing/Inclined Fuel Transfer System is given in Appendix 15C. 9.4

The safety evaluation of the new and spent fuel storage is presented in Subsections 9.1.1.3 and 9.1.2.3.

LIGHT LOADS SUCH AS THE BLADE GUIDE, FUEL SUPPORT CASTING, CONTROL ROD OR CONTROL ROD GUIDE TUBE WEIGH CONSIDERABLY LESS THAN A FUEL BUNDLE AND ARE ADMINISTRATIVELY CONTROLLED TO ELIMINATE THE MOVEMENT OF ANY LIGHT LOAD OVER THE FUEL POOL ABOVE THE ELEVATION REQUIRED FOR FUEL ASSEMBLY HANDLING. THUS THE KINETIC ENERGY OF ANY LIGHT LOAD WOULD BE LESS THEN A FUEL BUNDLE AND WITH LESS DAMAGE BEING INDUCED. 410.2

Secondly, To satisfy NUREG 0554, the equipment handling components over the fuel pool ~~must be~~ IS designed to meet the single failure proof criteria.

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C F BRAUN & CO

F W Christiansen

General Electric

San Jose

GESSAR
ROUND 1 QUESTIONS

Project 6382-P
October 7, 1982

QUESTION/RESPONSE 410.30 (9.1.5)

QUESTION 410.30

With regards to the overall heavy load handling systems within the scope of your proposed nuclear island, verify that your design meets the guidelines of NUREG 0612. In your response, provide sufficient information so that we can make an independent evaluation of whether you meet the guidelines of NUREG 0612.

RESPONSE 410.30

Attached is the Braun report for the review of NUREG 0612, Control of Heavy Loads. It has been updated to include the necessary design changes resulting from the review. THIS WILL BE ADDED TO GESSAR AS APPENDIX 9B.

~~REPORT 475-01~~

NUREG-0612 CONTROL OF HEAVY LOADS

~~TVA STRIDE~~

THIS APPENDIX [illegible] THE REVIEW OF THE NUCLEAR ISLAND OVERHEAD HEAVY LOAD HANDLING [illegible] SYSTEMS AND PRESENTS THE DESIGN CRITERIA FOR EACH SYSTEM.

Table 1 is a list of cranes, hoists, and trolleys to be reviewed, as required by Section 2.1.1, to NUREG-0612. (Table 1 is on page 2).

A preliminary review of the list indicates that the following handling facilities in the list can be eliminated from further review for the reasons indicated.

ITEM NUMBER	TITLE	ELIMINATION CATEGORY	LOCATION REFERENCE
X72-EE002	LPCS Maint Hoist/Trolley	1	Figure 1
X72-EE003	RHR A Maint Trolley	1	Figure 1
X72-EE004	RHR B Maint Trolley	1	Figure 1
X72-EE005	RHR C Maint Trolley	1	Figure 1
X72-EE006	RCIC Maint Hoist/Trolley	1	Figure 1
X72-EE007	HPCS Maint Hoist/Trolley	1	Figure 1
X72-EE008	AB Equip Trolley/Hoist	1	Figure 4
X72-EE009	AB Equip Trolley/Hoist	1	Figure 4
X72-EE010	CRD Maint Bridge Crane	1	Figure 2
X31-EE005	DG Bridge Crane	2	Div 1-DG Building
X31-EE006	DG Bridge Crane	2	Div 2-DG Building
X31-EE007	DG Bridge Crane	2	Div 3-DG Building
X62-EE003	Fuel Unload Jib Crane and Trolley Hoist	1	Figure 2
X62-EE005	Loading Dock Hoist/Trolley	1	Figure 2
X72-EE011	Equip Hoist/Trolley	1	Figure 3
X72-EE012	Equip Hoist/Trolley	1	Figure 3
X62-EE006	FB Equip Hoist/Trolley	1	Figure 3
X62-EE004	Fuel Insp Jib Crane/Trolley	1	Figure 2

ELIMINATION CATEGORY

1 Review indicates that crane failure and load drop will not result in the loss of safe shutdown or decay heat removal.

2 System redundancy and separation precludes loss of capability of the redundant safety related system to function in the event of hoist failure.

SC

TABLE 1

ITEM NUMBER	SERVICE
X72-EE001	Steam Tunnel Maintenance Bridge Crane
X72-EE002	LPCS Maintenance Hoist and Trolley
X72-EE003	RHR A Maintenance Trolley
X72-EE004	RHR B Maintenance Trolley
X72-EE005	RHR C Maintenance Trolley
X72-EE006	RCIC Maintenance Hoist and Trolley
X72-EE007	HPCS Maintenance Hoist and Trolley
X72-EE008	AB Equipment Hoist and Trolley
X72-EE009	AB Equipment Hoist and Trolley
X72-EE010	CRD Maintenance Bridge Crane
X72-EE011	Equipment Hoist and Trolley with Monorail
X72-EE012	Equipment Hoist and Trolley with Monorail
T31-EE001	Reactor Building Polar Crane
T31-EE003	CRD Removal Jib Crane and Trolley Hoist
T31-EE004A	Recirc Motor Hoist and Trolley
T31-EE004B	Recirc Motor Hoist and Trolley
T31-EE005	Drywell Maintenance Hoist and Trolley
T31-EE006	Valve Handling Monorail System
T31-EE007A	Valve Handling Hoist and Trolley
T31-EE007B	Valve Handling Hoist and Trolley
T31-EE009	Containment Maintenance Hoist and Trolley
T31-EE010	Coil Handling Hoist and Trolley
T31-EE011	Coil Removal Hoist and Trolley
T31-EE012	Coil Removal Hoist and Trolley
X31-EE005	DG Bldg Bridge Crane - Division 1
X31-EE006	DG Bldg Bridge Crane - Division 2
X31-EE007	DG Bldg Bridge Crane - Division 3
X62-EE001	Fuel Bldg Cask Crane
X62-EE002	Fuel Bldg Maintenance Crane
X62-EE003	Fuel Unloading Jib Crane and Trolley Hoist
X62-EE004	Fuel Inspection Jib Crane and Trolley Hoist
X62-EE005	Loading Dock Hoist and Trolley
X62-EE006	FB Equipment Hoist and Trolley

The following listed cranes, hoists and trolleys require a review for compliance with NUREG-0612, Section 5.1.1. These lifting systems are all located in either the Steam Tunnel, Fuel or Reactor Building.

ITEM NUMBER	ITEM	LOCATION
X72-EE001	Steam Tunnel Maint Bridge Crane	Figure 4
T31-EE001	RB Polar Crane 125T/25T	Figure 6
T31-EE003	CRD Removal Jib Crane/Trolley	Figure 2
T31-E004A	Recirc Motor Hoist/Trolley	Figure 2
T31-E004B	Recirc Motor Hoist/Trolley	Figure 2
T31-EE005	Drywell Maint Hoist/Trolley	Figure 2
T31-EE006	Valve Handling Monorail System	Figure 4
T31-EE007A	Valve Handling Hoist/Trolley	Figure 4
T31-EE007B	Valve Handling Hoist/Trolley	Figure 4
T31-EE009	Cont Maint Hoist/Trolley	Figure 2
T31-EE010	Coil Handling Hoist/Trolley	Figure 4
T31-EE011	Coil Removal Hoist/Trolley	Figure 4
T31-EE012	Coil Removal Hoist/Trolley	Figure 4
X62-EE001	Fuel Bldg Cask Crane 125T/15T	Figure 4
X62-EE002	Fuel Bldg Maint Crane	Figure 4

The below listed drawings identify and locate each crane or hoist listed. The safe load paths are identified adjacent to safety related equipment and spent fuel areas. These drawings are attached.

Equipment Removal Routing - Plan at El (-) 32'-0"	Figure 1
Equipment Removal Routing - Plan at El (-) 6'-10"	Figure 2
Equipment Removal Routing - Plan at El 11'-0"	Figure 3
Equipment Removal Routing - Plan at El 28'-6"	Figure 4
Equipment Removal Routing - Plan at El 50'-0"	Figure 5
Equipment Removal Routing - Plan at El 84'-7"	Figure 6

The building arrangement drawings will further identify crane or hoist locations. These drawings are:

TITLE	GESSAR FIG.	NUMBER
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at El(-)32'-0"	1.2-2	~~K015~~
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at El(-)6'-10"	-3	~~K016~~
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at El 11'-0"	-4	~~K017~~
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at El 28'-6"	-5	~~K018~~
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at El 50'-0"	-6	~~K019~~
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at El 84'-7"	-7	~~K020~~
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at El Partial Plan	-8	~~K021~~
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at Section A-A	-9	~~K022~~
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at Section B-B	-10	~~K023~~

TITLE	NUMBER
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at Section C-C	K024
Reactor, Auxiliary, and Fuel Bldg Arrgmt Plan at Section D-D	K025

With respect to the design and operation of heavy load handling systems, the definition of heavy load is taken from NUREG-0612, Paragraph 1.2, Definitions.

HEAVY LOAD Any load, carried in a given area after a plant becomes operational, that weighs more than the combined weight of a single spent fuel assembly and its associated handling tool for the specific plant in question.

The combined weight of a new fuel element and its associated handling tool for these specific plants is 900 pounds. Any loads exceeding 900 pounds are, for the purposes of this review, heavy loads.

Braun has provided safe load paths for the movement of equipment by hoists and cranes as well as on air skids or other material handling equipment. Written procedures for these or deviation from the safe load paths is the responsibility of the owner-applicant.

Braun has designed the lifting capacity of each crane or hoist to either criteria supplied by General Electric or the maximum actual or anticipated weight of equipment in a given area serviced by the hoist or crane. The tabulation of heavy loads to be handled by each hoist or crane, its designated lifting device and written handling procedures in accordance with NUREG 5.1.1(2) is the responsibility of the owner-applicant.

Verification that lifting devices comply with the requirements of ANSI N14.6-1978, ANSI B30.9-1971, NUREG-0612, Section 5.1.1(4) or 5.1.1(5) is the responsibility of General Electric for lifting devices designed by General Electric and by the owner-applicant for their devices.

For the purposes of this report, lifting devices are the equipment that attaches the load hook of the crane or hoist to the load to be lifted and transported.

Verification that ANSI B30.2-1976, Chapter 2.2 has been invoked with respect to crane inspection, testing and maintenance is the responsibility of the owner-applicant.

Crane designs comply with CMAA Specification #70, #74, and ANSI B30.2-1976 Chapter 2-1.

Exceptions, if any, taken to ANSI B30.2-1976 with respect to operation training, qualification, and conduct is the responsibility of the owner-applicant.

It is recommended that all specially designed lifting devices such as strongbacks and lifting fixtures as well as shackles, eyes and slings used for significant lifts be examined and proof tested prior to the lift. This equipment should be serialized and stored separately from routine maintenance material handling equipment. Subsequent lifts such as the reactor pressure vessel head or recirculation pump motors may require the need for non-destructive examination of lifting equipment such as dye penetrant or magnetic particle tests to verify the integrity of the devices.

Arranged by building areas, the following pages provide a detailed review of each lifting system.

AUXILIARY BUILDING

X72-EE001 STEAM TUNNEL MAINTENANCE BRIDGE CRANE

Capacity - 5 tons

Bridge Span - 33'-6"

Electric Wire Rope Hoist Lift - 37'-0"

Speed - 12 to 20 FPM/30 to 40 FPM

Reference Specification - CMAA 74

Radiation - Rads Ethylene 2.8 x 10^5

Seismic Category - 1L

Track Locks Required

Heaviest Single Lift - MSIV Approximately 6000 pounds

Frequency of Use - For MSIV Maintenance, used only when reactor is shutdown.

This bridge crane operates only when the reactor is in the safe cold shutdown mode. The steam tunnel is not accessible during reactor operation because of high radiation levels. The main function is to assist in MSIV installation and removal. The actual removal of an MSIV is through a roof hatch via mobil crane from the ground or lifting equipment on the roof of the Auxiliary Building. This lifting equipment is the responsibility of the owner-applicant. There is a 20" RHR water line near the floor of the steam tunnel that may be in use while the reactor is in the shutdown mode. This line is protected by permanent steel grating and scaffold from any hazard that might develop from crane operation in the steam tunnel.

REACTOR BUILDING - CONTAINMENT

The following two items are physically capable of carrying loads over spent fuel in the storage pool or in the reactor vessel.

FUEL HANDLING EQUIPMENT

This machine together with its carrier and indexing devices, hoisting equipment and appurtenances is a part of the NSSS supplied equipment and therefore the analysis is the responsibility of General Electric.

REACTOR BUILDING POLAR CRANE T31-EE001

Capacity - Main Hoist - 125 tons
- Auxiliary Hoist - 25 tons

Bridge Span - 114'-0"

Electric Wire Rope Hoist Lift - Main Hoist 120'-0"
- Auxiliary Hoist 120'-0"

Speed - Main Hoist - 0 to 5 FPM, Bridge - 0 to 50 FPM
- Auxiliary Hoist - 0 to 25 FPM, Trolley - 0 to 30 FPM

Reference Specification - CMAA 70

Radiation - None

Seismic Category 1L

The 125 ton portion of crane is used to remove the reactor drywell head, pressure vessel head and internals, but is not used for fuel handling. Crane paths and lay down areas are clearly defined and do not require the load to traverse the fuel storage pool or transfer tube. The design of this crane must satisfy single failure proof criteria.

The 25 ton portion of this crane is for general use within the Reactor Building such as floor plug removal, to raise and lower equipment through clear paths to the lower levels of the Reactor Building, but not into the drywell. It may also be used for maintenance on the fuel handling machine.

Both hooks of this crane are capable of movement over the spent fuel pool and the reactor vessel. To design and install interlocks to permanently prevent movement over the reactor vessel and fuel pool would preclude the necessary free movement of the crane.

Therefore, to satisfy NUREG 0554 the 25 ton crane of the polar crane system must meet the single failure proof requirements.

T31-EE009 CONTAINMENT MAINTENANCE HOIST AND TROLLEY

Hoist

Capacity	1 ton
Lift	10'-0"
Speed	16 to 26 FPM

Trolley

Capacity	1 ton
Speed	10 to 40 FPM
Track Locks Required	
Standards	HMI 100 ANSI B30.16 and B30.11

Seismic Category 1L
Radiation Rads Ethylene 1×10^4
Location Containment
Top of Monorail 7'-0"
Monorail runs from azimuth 020° to azimuth 220°

The travel path is over the suppression pool, the loss of a lift into the pool may damage spargers and relief valve piping. This damage will not prevent continued control of facility operation in the shutdown mode.

REACTOR BUILDING - DRYWELL

T31-EE005 DRYWELL MAINTENANCE HOIST AND TROLLEY

Hoist

Capacity	2 tons
Lift	30'-0"
Speed	14 to 21 FPM

Trolley

Capacity	2 tons
Speed	10 to 40 FPM
Standards	HMI 100 ANSI B30.16 ANSI B30.11

Seismic Category 1L
Radiation Rads Ethylene 6.2×10^7
Location Drywell
Top of Monorail 14'-3/4"
Monorail runs from azimuth 045° and ends at azimuth 350°

This hoist and trolley shares the monorail with T31-EE004A and B, and is used for the removal of components from the recirculation pump motors. It may also be used for lifts in areas not covered by the valve handling monorail system. The travel path is adjacent to equipment and piping necessary to maintain safe cold shutdown.

Therefore, this hoist and trolley must meet the single failure proof requirements of NUREG 0554.

T31-EE006 VALVE HANDLING MONORAIL SYSTEM

Monorail systems are not addressed by either NUREG-0612 or NUREG-0554.

The monorail system is located in the drywell at elevation 51'-1". The system contains seven electrically or pneumatic slide switches that allow the movement of T31-EE007A and B as well as T31-EE010 onto various tracks of the system.

A failure mode and effects analysis (FMEA) will be performed on the successful supplier's design to assure that all open rails in the system have been positively stopped regardless of the switch position in its movement. The analysis will result in changes, if necessary, to preclude the trolley of any hoist on the system from falling from the system.

T31-EE003 CRD REMOVAL JIB CRANE AND TROLLEY

Hoist

Capacity	10 tons
Lift	30'-0"
Speed	8 to 20 FPM

Trolley

Capacity	10 tons
Speed	10 to 40 FPM
Track Locks Required	

Standards	HMI 100 ANSI B30.11 ANSI B30.16

Seismic Category 1L
Radiation - Rads Ethylene 6.2 x 10^7
Location - Drywell at azimuth 195°, elevation 11'-6 3/4"
Boom Length 16'-1"
Drywell Floor to Boom 15'-1 3/4"

This crane is used for control rod drive removal and shield cask handling. The area traversed by the boom swing and trolley movement is non-interfacing to any system that may affect safe cold shutdown. The boom is locked into a storage position when not in use.

Therefore, this crane does not need to be considered for single failure proof criteria.

T31-EE004A AND B RECIRCULATION PUMP MOTOR HOISTS AND TROLLEYS

Hoist

Capacity	15 tons
Lift	16'-0"
Speed	2 speed, 0.10 to 0.20 FPM and 1.5 to 2.5 FPM

Trolley

Capacity	15 tons
Speed	10 to 40 FPM
Track Locks Required	

Standards HMI 100
ANSI B30.16
ANSI B30.11

Seismic Category 1L
Radiation Rads Ethylene 6.2×10^7
Location Drywell
Top of Monorail 14'-3/4"
Monorail starts at azimuth 045° and ends at azimuth 350°

These hoists and trolleys share the monorail with T31-EE005. These hoists are used in tandem with a lifting device to install and remove the recirculation pump motor. The combined weight of the motor and its lifting device is approximately 30 tons.

The method for lifting this motor requires close coordination between two independent hoists and operators. Since the lift is 30 tons and two 15 ton capacity hoists are utilized, a minor operator error may inadvertently shift more weight to one of the hoists thereby exceeding the design capacity of the hoist. The travel path is adjacent to equipment and piping necessary to maintain cold safe shutdown.

Therefore, these hoists and trolleys must meet the single failure proof criteria of NUREG 0554.

T31-EE007A AND B VALVE HANDLING HOIST AND TROLLEY

Hoist

Capacity	3 tons	
Lift	50'-0"	
Speed	2 speed	10 to 22 FPM
		30 to 50 FPM

Trolley

Capacity	3 tons	
Speed	2 speed	8 to 12 FPM
Track Locks Required		24 to 36 FPM

Standards HMI 100
ANSI B30.16
ANSI B30.11

Seismic Category 1L
Radiation Rads Ethylene 3.1×10^7
Location Drywell at elevation 51'-1"

These hoists operate, along with T31-EE010, from the monorail system T31-EE006. These hoists are used for steam relief valve and main steam valve maintenance. The travel path is adjacent to systems and piping that may affect safe cold shutdown.

Therefore, these hoists must meet the single failure proof requirement of NUREG 0554.

T31-EE010 COIL HANDLING HOIST AND TROLLEY

Hoist

Capacity	1 ton
Lift	50'-0"
Speed	16 to 26 FPM

Trolley

Capacity	1 ton
Speed	10 to 40 FPM
Track Locks Required	

Standards	HMI 100 ANSI B30.11 ANSI B30.16

Seismic Category 1L
Radiation Rads Ethylene 3.1×10^7
Location Drywell

This hoist as well as T31-EE007A and B operate from monorail system T31-EE006 which is located at elevation 51'-1" in the drywell.

This hoist is used to raise and lower air conditioning coils from the drywell floor to the A/C unit platforms. The travel path is adjacent to equipment and piping necessary to maintain safe cold shutdown.

Therefore, this hoist must meet the single failure proof criteria of NUREG 0554.

T31-EE0011 and T31-EE012 COIL REMOVAL HOIST AND TROLLEY

Hoist

Capacity	0.5 tons
Lift	12'-0"
Manual Chain Drive	

Trolley

Capacity	0.5 tons
Push Type Trolley	
Track Locks Required	

Standards	HMI 100 ANSI B30.16 ANSI B30.11

Radiation Rads Ethylene 3.1×10^7
Location Drywell at elevation 51'-1"

These hoists and trolleys, as well as their monorail, are portable. They are used to aid in the removal and installation of the air conditioning unit coils located at elevation 40'-0" of the drywell. The A/C units are located on platforms and the clear path for coil removal is within the platform perimeter and weight capacity. The coils are raised and lowered to and from the drywell floor by T31-EE010, a single failure proof hoist. Failure of these hoists would not jeopardize safe cold reactor shutdown.

Therefore, these hoists do not need to be considered for single failure proof criteria.

FUEL BUILDING

X62-EE002 FUEL BUILDING MAINTENANCE CRANE

Crane

Capacity	5 tons
Speed - Hook	49 FPM
Bridge	200 FPM
Trolley	125 FPM
Lift	72'-0"

Standard	CMAA-70

X62-EE002 FUEL BUILDING MAINTENANCE CRANE Continued

Seismic Category 1L
Radiation - None
Location - Elevation 40'-9"

This crane has free movement over the spent fuel storage pool.

Therefore, this crane must meet the single failure proof criteria of NUREG 0554.

X62-EE001 FUEL BUILDING CASK CRANE

Crane

Capacity	- Main Hook	125 tons
	- Auxiliary Hook	15 tons
Speed	- Main Hook	0 to 5 FPM
	- Auxiliary Hook	0 to 25 FPM
	- Bridge	0 to 50 FPM
	- Trolley	0 to 30 FPM
Lift	- Main Hook	63'-0"
	- Auxiliary Hook	62'-0"
Standards		CMAA 70

Seismic Category 1L
Radiation - None
Location - Elevation 28'-0"

The crane rails for this crane terminate before the crane can reach the spent fuel storage pool.

Therefore, the cranes do not need to be considered for single failure proof criteria.

ITEM NUMBER	SERVICE	CAPACITY	SEISMIC CATEGORY	NUREG 0612 ELIMINATION CATEGORY	SINGLE FAILURE PROOF
T31-EE001	Reactor Building Polar Crane	125/25 Tons	IL	Reviewed	Yes
T31-EE003	CRD Removal Jib Crane & Trolley Hoist	10 Tons	IL	Reviewed (1)	No
T31-EE004A&B	Recirc Pump Motor Hoist/Trolley	15/15 Tons	IL	Reviewed	Yes
T31-EE005	Drywell Maintenance Hoist/Trolley	2 Tons	IL	Reviewed	Yes
T31-EE007A&B	Valve Handling Hoist/Trolley	3/3 Tons	IL	Reviewed	Yes
T31-EE009	Containment Maintenance Hoist/Trolley	1 Ton	IL	Reviewed (1)	No
T31-EE010	Coil Handling Hoist/Trolley	1 Ton	IL	Reviewed	Yes
T31-EE011	Coil Removal Hoist/Trolley	1/2 Ton	Non	Reviewed (1)	No
T31-EE012	Coil Removal Hoist/Trolley	1/2 Ton	Non	Reviewed (1)	No
X31-EE005	DG Building Bridge Crane - Div 1	3 Tons	IL	(2)	No
X31-EE006	DG Building Bridge Crane - Div 2	3 Tons	IL	(2)	No
X31-EE007	DG Building Bridge Crane - Div 3	3 Tons	IL	(2)	No
X62-EE001	Fuel Building Cask Crane	125/15 Tons	IL	Reviewed (1)	No
X62-EE002	Fuel Building Maintenance Crane	5 Tons	IL	Reviewed	Yes
X62-EE003	Fuel Loading Jib Crane & Trolley/ Hoist	2 Tons	Non	(1)	No
X62-EE004	Fuel Inspection Jib Crane & Trolley Hoist	1 1/2 Ton	Non	(1)	No
X62-EE005	Loading Dock Hoist/Trolley	5 Tons	Non	(1)	No
X62-EE006	Fuel Building Equipment Hoist/ Trolley	15 Tons	Non	(1)	No

(1) Crane or hoist/trolley failure and load drop will not result in loss of safe shutdown or decay heat removal.

(2) System redundancy and separation precludes loss of capability of the redundant safety related system to function in the event of hoist failure.

ITEM NUMBER	SERVICE	CAPACITY	SEISMIC CATEGORY	NUREG 0612 ELIMINATION CATEGORY	SINGLE FAILURE PROOF
X72-EE001	Steam Tunnel Maintenance Bridge Crane	5 Tons	IL	Reviewed (1)	No
X72-EE002	LPCS Maintenance Hoist/Trolley	10 Tons	IL	(1)	No
X72-EE003	RHR A Maintenance Trolley	10 Tons	IL	(1)	No
X72-EE004	RHR B Maintenance Trolley	10 Tons	IL	(1)	No
X72-EE005	RHR C Maintenance Trolley	10 Tons	IL	(1)	No
X72-EE006	RCIC Maintenance Hoist/Trolley	5 Tons	IL	(1)	No
X72-EE007	HPCS Maintenance Hoist/Trolley	15 Tons	IL	(1)	No
X72-EE008	Aux Building Equipment Hoist/Trolley	7 1/2 Tons	IL	(1)	No
X72-EE009	Aux Building Equipment Hoist/Trolley	7 1/2 Tons	IL	(1)	No
X72-EE010	CRD Maintenance Bridge Crane	1/2 Ton	Non	(1)	No
X72-EE011	Aux Building Equipment Hoist/Trolley	7 1/2 Tons	IL	(1)	No
X72-EE012	Aux Building Equipment Hoist/Trolley	7 1/2 Tons	IL	(1)	No

QUESTION/RESPONSE 410.31 (9.1.5)

QUESTION 410.31

For the fuel servicing equipment and cranes listed in Table 3.2-1 (Table 9.1-2) of your FSAR which are characterized as non-seismic Category 1, verify that they are designed not to be a missile source as a result of a safe shutdown earthquake.

RESPONSE 410.31

The Fuel Prep Machine will be identified in Table 9.1-2 as Category 1. All other hoists, tools and equipment used for servicing shall either be removed during operation, moved to a location where it is not a potential hazard to safety related equipment, or seismically restrained to prevent it from becoming a missile. Subsection 9.1.4.2.3 and Table 3.2-1 are revised accordingly.

9.1.4.2.3 Fuel Servicing Equipment

The fuel servicing equipment described below has been designed in accordance with the criteria listed in Table 9.1-2. ITEMS NOT LISTED AS SEISMIC CATEGORY I SUCH AS HOISTS, TOOLS AND OTHER EQUIPMENT USED FOR SERVICING SHALL either be removed during operation, moved to a location where it is not a potential hazard to safety related equipment, or seismically restrained to prevent it from becoming a missile. 410.31

Table 3.2-1

EQUIPMENT CLASSIFICATION (Continued)

Principal Component[a]	Safety Class[b]	Location[c]	Quality Group Classification[d]	Quality Assurance Requirement[e]	Seismic Category[f]	Comments
XVI (Continued)						
4. Pumps	2	A	B	B	I	
5. Pump motors	2	A	B	B	I	
6. Valves - outer isolation and within	1,2	D	A/B	B	I	(g)
7. Valves - return test line to condensate storage beyond second isolation valve and vacuum pump discharge line to containment isolation valves	Other	O,A	D	N/A	N/A	(g)
8. Valves - other	2	C,A	B	B	I	(g)
9. Turbine	2	A	N/A	B	I	(m)
10. Electrical modules with safety function	2	A,X	N/A	B	I	
11. Cable with safety function	2	D,A,X	N/A	B	I	
XVII Fuel Servicing Equipment						
1. Fuel preparations machine	Other	C,R	N/A	B	I	410.31
2. General purpose grapple	Other	C,R	N/A	B	N/A	

Table 9.1-2

FUEL SERVICING EQUIPMENT

No.	Component Identification	Essential Classification (a)	Safety Classification (b)	Quality Group (c)	Seismic Category (d)	
1	Fuel Prep Machine	NE	0	E	I	410.31
2	New Fuel Inspection Stand	PE	2	E	I	
3	Channel Bolt Wrench	NE	0	E	NA	
4	Channel-Handling Tool	NE	0	E	NA	
5	Fuel Pool Sipper	NE	0	E	NA	
6	General-Purpose Grapple	NE	0	E	NA	
7	Jib Crane	PE	2	E	I	
8	Fuel-Handling Platform		2	E	I	
9	Channel-Handling Boom	NE	0	E	NA	

Notes:

(a) NE = Nonessential
PE = Passive Essential

(b) 0 = Other

(c) B = ASME Code Section III Class 2
D = ANSI B31.1
E = Industrial Code Applies
I = Electrical Codes Apply

(d) NA = No Seismic Requirements
I = Class I

410.32 (9.1.5) CFB For your fuel handling and heavy load handling systems, address each of the acceptance criteria identified in Sections 9.1.4 and 9.1.5 of the SRP for the equipment within the scope of your proposed nuclear island.

RESPONSE TO 410.32

FOR FUEL HANDLING SYSTEMS REFER TO GESSAR 9.1.4.3 AND RESPONSE TO QUESTION 410.28 AND 410.31

FOR OVERHEAD HEAVY LOAD HANDLING SYSTEMS REFER TO GESSAR APPENDIX 9B AND RESPONSE TO QUESTION 410.32. APPENDIX 9B SPECIFIES THE SEISMIC DESIGN CRITERIA AND NUREG-0554 REQUIREMENT FOR THE VARIOUS SYSTEMS AS THE RESULT ON A REVIEW OF THE NI DESIGN IN ACCORDANCE WITH NUREG-0612.

410.33 (9.1.5) In Section 9.1.4 of your FSAR, you state that the cask and containment polar cranes will be supplied by the applicant. However, you also list these cranes in your equipment classification in Table 3.2-1 of your FSAR. State who is responsible for these cranes. If supplied by the applicant, provide the interface requirements for these cranes with respect to any assumptions you make such as the maximum lift heights, the rail travel limitations and other interlocks. Identify the specific portions of the system within your scope of design such as the crane rails or the load blocks.

RESPONSE TO 410.33

THESE CRANES ARE WITHIN GESSAR SCOPE.

Reactor Building Polar crane, Spent Fuel Cask crane & Fuel Building maintenance crane are ~~will be~~ included in revised the section 9.1.4.2.2. [illegible] [illegible] [illegible].

3/3/82

9.1.4.2.2 OVERHEAD BRIDGE CRANES

~~9.1.4.2.2 REACTOR BUILDING CRANES~~

9.1.4.2.2.1 ~~9.1.4.2.2.1~~ REACTOR BUILDING POLAR CRANE

The Reactor Building polar crane is A seismically analyized piece of ~~designed as seismic category~~ ~~I~~ equipment. The crane consists of two crane girders and a trolley which carries two hoists and an operator's cab. The circular runway track, which supports the crane girders, is supported from the containment walls at elevation 111'-9" and provides for 360° rotation of the crane. The trolley travels laterally on the crane girders carrying the main hoist - 125 tons capacity, and the auxiliary hoist - 25 tons capacity.

The Reactor Building polar crane is used to move all of the major components (reactor vessel head, shroud head and separator, dryer assembly and pool gates) as required by plant operations. The polar crane will also be used during the construction phase of the plant for handling major pieces of equipment. The polar crane is not used for fuel handling purposes.

The principal design criteria for the containment polar crane is as follows.

a The crane generally conforms to specifications for electric overhead traveling Class C1-cranes in Crane Manufacturing Association of America (CMMA) Specification 70; ANSI STD B30.2.0-1967 Safety Code for Cranes; applicable portions of 29 CFR 1910.179 and Regulations for Construction Title 29,

9.1.4.2.2.1

~~9.1.4.2.2.1~~ REACTOR BUILDING POLAR CRANE Continued

Chaper VII, Part 1926; and in accordance with the following standards, codes, and regulations: AFBMA, AGMA, AISE, ASCE, ASTM, AWS, IEEE, NEC, NEMA, OSHA, AND SAE.

b Seismic design criteria is as follows.

Reactor Building polar crane and girder shall be designed to seismic category I excepting the requirements to remain operable after a seismic event. It shall meet performance requirements following the operating basis earthquake (OBE = 1/2 SSE) and shall not fail structurally during and following the seismic disturbance. If a seismic event comparable to safe shutdown earthquake (SSE) occurs, the bridge shall remain immobile on the runway, and the trolley with load shall remain immobile on the crane girders.

NORMAL LOAD COMBINATIONS The elastic working stress design methods of part 1 of AISC Code shall be used and the following load combinations shall be satisfied.

(1) $S = D + L + I + H_L$

(2) $S = D + L + F_{eqo} + R_V$

Both cases of L having its full value or being completely absent shall be checked.

F_{eqo} and R_V loads may be combined by using the square root of the sum of the squares method.

~~9.1.4.2.2.1~~ 9.1.4.2.2.1 REACTOR BUILDING POLAR CRANE Continued

ABNORMAL/EXTREME LOAD COMBINATIONS The elastic working stress design methods of part 1 of AISC Code will be used and the following load combinations will be satisfied.

(3) $1.6\ S = D + L + 2.75\ H_t + H_L$

(4) $1.6\ S = D + L + F_{eqs}$

(5) $1.6\ S = D + L + R_V + F_{eqs}$

In the load conditions above, cases of L having its full value or being completely absent shall both be checked. In no case shall the allowable stress exceed 0.9 F_y, where F_y is the minimum specified yield stress. However, the loads R_V and F_{eqs} may be combined by using the square root of the sum of square's method.

LOADS AND LOAD COMBINATIONS The following notations are used in defining loads and loading combinations for design of the structural portion of the polar crane and trolley.

D = Weight of the crane, bridge girder and other permanent loads.

L = Live load. Rated lift-load.

H_L = Lateral load on the crane runway shall be 20 percent of the maximum total wheel loads radially, and a tangential load of 10 percent of the maximum total wheel loads, all applied at the top of the rail, one half on each end of the bridge and shall be considered as acting in either direction normal or tangential to runway rail.

H_t = Load due to stall torque.

I = Impact load.

F_{eqo} = Operating basis earthquake force. Assume as one-half of safe shutdown earthquake and as defined by the containment response spectra. In addition to the inertial forces, seismically induced pendulum action and swinging forces from the rated lift-load shall also be considered.

Seismic forces can occur in any two orthogonally horizontal directions and one vertical direction at any time. The horizontal acceleration response spectra for 2 percent damping given in this specification shall be used for both the horizontal directions. The vertical acceleration response spectra for 2 percent damping shall be used for the vertical direction.

F_{eqs} = Safe shutdown, earthquake force.
The response spectra to qualify the equipment for the SSE shall be obtained by doubling the acceleration values of the 4 percent damping response spectra for OBE provided in this specification. The horizontal acceleration response spectra should be used for both the horizontal directions.

R_V = Safety relief valve discharge load. As defined by the containment response spectra for various combinations of valve actuation.

~~9.1.4.2.2.~~1 REACTOR BUILDING POLAR CRANE Continued
9.1.4.2.2.1

This load can occur in any radial direction as well as the vertical direction at any time.

S = Required section strength based on the elastic methods and the allowable stresses defined in part 1 of AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Building", February 12, 1969.

c The bridge and trolley will not derail as a result of abnormal conditions and/or seismic conditions and are provided with earthquake restrainers.

d The equipment is capable of withstanding, without damage, the containment internal test pressure.

e In the event of loss of power, the equipment and its load, will remain in a safe condition.

f The crane hoist is equipped with an adjustable load limiting device for 125 tons.

Load Drop Analysis data is being added to the General Electric needs list by Bob Meichle. 3/23

~~9.1.4.2.2.2~~ 9.1.4.2.2.1 SPENT FUEL CASK CRANE

The primary purpose of the spent fuel cask crane is to handle the spent fuel cask between the cask transport vehicle, the cask pool and the cask decontamination vault in the Fuel Building. The secondary purpose will involve handling loads related to maintenance and replacement of equipment being shipped or received through the railcar loading facility in the Fuel Building.

The cask crane is an overhead traveling bridge crane with a 125 ton capacity main hoist, a 15 ton capacity auxiliary hoist and a span of ~~33'~~ 42'-10 9/16". Elevation of the crane rails is 28'-0". The travel of the crane is limited to 40'-~~5~~ 8 1/2" between the railroad car and the cask pool.

The cask crane will be a Class C crane as defined by the Crane Manufacturers Association of America Specification No 70.

Operation of the cask crane is from the cab for all motions. A portable 2-way radio allows the crane operator to communicate with the floor operator and the cask decon operator inside the decontamination vault.

The structure of the crane bridge consists of welded box-type girders with truck saddles and truck frames of welded-steel construction. The trolley side frames, sheave frames, and truck frames are of structural steel welded construction. High strength friction-type bolts are used for major field connections for bridge and trolley assembly.

9.1.4.2.2.2 ~~9.1.4.2.2.2~~ SPENT FUEL CASK CRANE Continued

The rated full-load capacities, lifts and full-load speeds are as follows.

MAIN HOOK

Rated full-load capacity, tons (2000 lbs)	125
Hook travel, ft	63
Hoisting speed, fpm at full load	0 to 5

AUXILIARY HOOK

Rated full-load capacity, tons (2000 lbs)	15
Hook travel, ft	62
Hoisting speed, fpm at full load	0 to 25

TRAVEL SPEEDS

Trolley travel speed, fpm at full load	0 to 30
Bridge travel speed, fpm at full load	0 to 50

SAFETY FEATURES Single failure protection is designed into the cask crane components in order to assure safe handling of the spent fuel cask and other heavy plant equipment. This protection is provided by the following features.

a The hoist drums are supported by through shafts and roller bearings. In addition, safety plates are provided at each end and at the center of the drum. In the unlikely event of failure of the shaft, bearings, or any part of the drum, these plates will limit the drum movement in the horizontal or vertical directions to 1/4 inch.

b The main hoist is equipped with one gearing system consisting of a pinion driven through a gear reducer and mating with a ring gear mounted on one end of the drum.

c On the main hoist an integral machined disk is included on one end of the drum to act as a gripping surface for the caliper disk brakes. The disk is designed and constructed with sufficient thermal capacity to lower the rated load from the upper hook position to floor level without stopping.

d A load sensing and readout system is provided for the main hoist. The system includes a sensor with a range of 0 to 150 percent of rated crane capacity.

e Each hoisting system includes two holding brakes. These are shoe brakes applied to the high speed motor shaft. A regenerative type control brake is also provided for both hoists and the main hoist includes an emergency disk brake system. This brake applies to the end of the hoist drum by means of two spring actuated air-released calipers.

f Each bridge and trolley truck is equipped with a drop bar which limits the drop to 1/2 inch in event of failure of any part of the wheel assembly.

g The bridge and trolley are both equipped with double flanged wheels. The trolley is equipped with bolted lugs which extend around both sides of the rail head and positively prevent the trolley from leaving the rails.

h All the crane controls are spring-returned to "off".

i The crane is provided with a manual-magnetic main power supply contactor that can be operated manually from the cab by a pushbutton in the cab. This contactor controls the power supply for all motions.

j The torque of all motors is limited by a current limiting device to 200 percent rated for the hoists and to 150 percent rated for all travel motions.

k Undervoltage protection is provided on all motions to sense low, or loss of, control voltage and cause the driven equipment to stop.

Overload protection is provided by instantaneous overcurrent relays on the dc motors set at about 250 percent rated current to back up the torque limiting device and by inverse time delay overload devices on the a-c motors of the ~~m-g~~ MG sets set to trip at 150 percent full load current.

l Minimum motor shunt field protection monitors the loss of motor field current and stops the respective drive if the motor loses field current.

m A torque proving circuit checks that current is actually flowing in the main auxiliary hoist motor's armatures before the motor brakes are permitted to be released.

n Two overhoist limit switches and one down travel limit switch are provided on each hoist.

o A mechanical overspeed switch is provided on the main and auxiliary hoist drive motors to trip at 125 percent of top rated speed in either direction to stop the hoist motor and set the holding brakes.

p A monitor is provided to sense phase reversal or loss of one phase of the ac power supply. If loss of one phase or phase reversal were to occur, the drive cannot be started if it is stopped and the drive will be stopped if running.

q An operational check circuit is provided to back up the operator's command to the control whereby in case the drive does not react to the operator's command within a preset time the drive will be automatically stopped.

r A second and separate contactor, or circuit breaker, is provided in the power supply to the main crane feed rails which can be operated by three emergency stop pushbuttons on the operating floor.

s The spent fuel cask is transferred through a canal with the base of the cask approximately 13 feet below the Fuel Building operations floor level (floor elevation +11'-0"). Wheel stops on the crane rail prevent the crane from moving the cask past the center of the cask pool and electrical interlocks prevent handling heavy loads over the new fuel vault with the cask crane. Thus, the cask is never moved into a position where accidental drop could damage the spent fuel in the fuel storage pool or the new fuel in the new fuel vault.

t The gates into the fuel storage pool are recessed such that pendulum action of the cask, while suspended on the hook, could

9.1.4.2.2.2 SPENT FUEL CASK CRANE Continued
9.1.4.22.2

contact only the concrete structure at the entrance to the canal.

The ambient temperature under which the crane is to operate does not exceed 40°C. Stresses in all structural and mechanical parts will be far below the endurance limits for infinite life of the various materials for both the rated crane capacity and the test load of 125 percent capacity. All loads to be handled are below rated crane capacity. Therefore, stresses should never reach allowable working stresses. Loads on the structural parts will vary but will not reverse. The only critical parts with stress reversals will be the rotating parts, and these are provided with single failure protection. Since the crane is to operate under normal temperature conditions and since the stress levels are below the endurance limits for infinite life, testing of the crane to 125 percent of rated capacity provides reasonable assurance that the crane will not fail while handling a spent fuel cask.

During an earthquake, the crane bridge and the trolley could be displaced but they will not leave the rails. The bridge rails are firmly attached to the supporting concrete and steel superstructure and the trolley rails are firmly attached to the bridge girders. In addition the end trucks of the bridge and the carriage of the trolley are provided with seismic or upkick lugs to ensure they do not leave the rails.

After erection in the Fuel Building, the cask crane will be tested

9.1.4.2.2.2

~~9.1.4.2.2.2~~ SPENT FUEL CASK CRANE Continued

to 125 percent of rated capacity (156.25 tons for the main hoist and 18.75 tons for the auxiliary hoist). The ability of the crane to perform all its intended functions will be demonstrated during these tests.

Operational tests and visual inspections are to be made at periodic intervals during the life of the crane to demonstrate its ability to safely perform its functions. The crane hooks are to be inspected by the dye-penetrant method. These inspections and tests will be scheduled tc precede major fuel-handling activities.

The crane, except for wire ropes, are completely shop assembled and the components operated to assure the accuracy of fabrication and the quality of workmanship. The main and auxiliary hooks are tested to 200 percent of their rated capacity. Tests on the main hook will be made with a load suspended. After the load tests, the hooks and sheaves will be checked by magnetic particle inspection and for any dimensional change.

9.1.4.2.2.3 FUEL BUILDING MAINTENANCE CRANE

The Fuel Building mainterance crane is a 5 ton capacity, top-riding cab operated unit with the following characteristics.

Hook Lift = 72 feet ✓

CMAA to Class B ✓

Hoist Speed - 40 fpm maximum ✓

Bridge Span - 43 feet - 2 inches ✓

Crane Travel - 170 feet ✓

9.1.4.2.2.3 FUEL BLDG MAINTENANCE CRANE ~~9.1.4.2.2.2 SPENT FUEL CASK CRANE~~ Continued

The 5 tone crane has a range which covers the entire fuel handling area of the Fuel Building. The crane rails run above the cask crane rails and are supported by reinforced concrete and steel columns.

410.34
(9.2.1)
CFB

In Section 9.2.1.2 of your FSAR, you state that a differential flow switch is used to detect leakage in the nonsafety-related portion of the service water system. Verify that this detection device and the associated isolation capability will be designed to safety-grade requirements.

RESPONSE TO 410.34

The detection device and assoc. isolation capability is safety grade. ~~See attached text change~~. This is reflected in revised subsection 9.2.1.2.

9.2.1.2 System Description (Continued)

The nonsafety-related parts of the ESW System are not required for safe shutdown and, hence, are not safety systems. Isolation valves separate the ESW System from the nonsafety-related subsystem during a LOCA, in order to assure the integrity and safety functions of the safety-related parts of the system. Nonsafety-related parts of the ESW System should be operated during all other modes, including the emergency shutdown following an LOPP.

Instrumentation is provided to detect significant leakage in the nonsafety-related subsystem. The water flow is measured in both entrance and exit pipes. Any significant leakage shows up as a difference between the two flow measurements. A differential flow switch detects leakage and isolates this subsystem, thus assuring continued operability of the safety-related services. Instruments, controls and isolation valves are located in the safety-related part of the ESW-system and designed to safety-grade requirements as stated in design base (4) of section 9.2.1.1.1. 410.34

The Applicant is to provide description of the service water system outside of the Nuclear Island.

The ESW flow rates establish interface flow requirements from the BOP. Description of the ESW pumps is included in Subsection 9.2.5 (Ultimate Heat Sink). This description is within the scope of the Applicant.

9.2.1.3 Safety Evaluation

9.2.1.3.1 Failure Analysis

A system failure analysis of passive and active components of the ESW System is presented in Table 9.2-3. Any of the assumed failures of the ESW System are detected in the control room by variations of and/or alarms from the various system instruments and also from the Leak Detection System sensing leakage in the ECCS pump and heat exchanger areas.

410.35 (9.2.6) Provide the results of an analysis to show that a postulated failure of the 7000 gallon condensate supply surge tank, located in the auxiliary building, does not result in damage by flooding to any safety-related equipment. Verify that the level instrumentation on the surge volume which initiates alarms and automatic switchover of the HPCS and RCIC suction to the suppression pool, will be designed to safety-grade requirements.

Response

The analysis of a postulated failure of the 7000 gallon condensate tank is covered in Section 3.4.1.1.2.4.2. The subject tank is called "36-inch condensate header".

The level instrumentation in the HPCS and RCIC systems which initiates the automatic switchover of the RCIC and HPCS suction from the condensate header to the suppression pool is designed to safety grade requirements, refer to Figure 7A.3-1f for HPCS and to Figure 7A.4-1k for RCIC.

410.36 (9.2.8) Verify that you have performed analyses of postulated failures of the heated water distribution system and that its failure will not damage any safety-related equipment due to the resulting environmental conditions.

Response

All equipment required for safe shutdown and subjected to the ~~temp~~ environment resulting from the postulated failure of the Heated Water Distribution System ~~and required for a safe shutdown~~ will be ~~E~~ environmentally qualified for this condition.

410.37
(6.8)
(9.3.1)

In Section 9.3.1.2 of your FSAR, you state that the instrument air supplied to the main steam safety relief valves and isolation valves is filtered to remove all particles larger than 50 microns. To be consistent with Section 9.3.1 of the SRP and ANSI MC11.1-1976, this air should be filtered to 3 microns or less. Revise your design to meet this criterion. Address, as an interface requirement if necessary, the maximum total oil content of the air supply to these valves and their accumulators in accordance with Section 9.3.1 of the SRP. These same requirements should also be addressed for the pneumatic supply system.

RESPONSE TO 410.37

THE TEXT ~~WILL BE~~ has been CHANGED TO REFLECT THE 3 micron filtering. This will require the line upstream of the filter to be changed from CARBON STEEL TO GALVANIZED. The P&ID WILL BE CHANGED ACCORDINGLY.

WITH RESPECT TO AIR QUALITY SEE RESPONSE 410.38.

9.3.1.2 System Description (Continued)

Instrument air to the Main Steam SRVs and isolation valves is filtered to less than 3 microns. Corrosion-resistant materials are used UPSTREAM AND downstream of the filter. 410.37

All accumulators are constructed of corrosion-resistant material and include low point drains. Accumulator mounting orientation is with the major axis in a vertical direction. Accumulators are located in a manner which prevents their failure from generating missiles or impairing the function of any surrounding safety-related equipment.

The accumulator support structure is designed to sustain the maximum thrust loads developed during a failure of the largest line connected to the accumulator. A flexible section of austenitic stainless steel pipe is installed in the piping from the accumulators of the Main Steam SRVs and MSIVs to the associated actuators. This pipe section accommodates the relative motion of the steamline with respect to the accumulator.

Air supply lines to the accumulators include a checkvalve to prevent backleakage upon loss of supply line pressure. The checkvalve is constructed of corrosion-resistant material and is spring loaded with a resilient seal for "bubbletight" shutoff. Pipe between the MSIV air control valves and accumulators is 1 1/4 in. diameter minimum and 10 ft maximum equivalent length, to maintain valve response.

9.3.1.3 Safety Evaluation

The operation of the Instrument and Service Air Systems is not required to assure of any of the following:

(1) integrity of the reactor coolant pressure boundary;

410.38 (6.8) (9.3.1) Identify the testing requirements and frequency of tests for the safety-related accumulators and check valves provided in the compressed air system and pneumatic supply system. To assure continuous reliable functioning of the instrument air system and the pneumatic supply system, provide a procedure or an interface requirement for a procedure which requires periodic testing of the air quality for both the instrument air system and the pneumatic supply system.

Response

Response to this question is provided in Subsection 9.3.1.4.

410.39 (9.4.1) You indicate in Figure 9.4-1b of your FSAR that there are many single fire dampers which could fail closed resulting in a loss of direct ventilation flow to either the control room, the cable rooms, the computer room, the electrical equipment rooms or the control equipment room. Verify that adequate cooling would still exist for these various rooms following a loss of direct ventilation. Alternatively, verify that there will be adequate time and capability to manually reopen these dampers. Adequate accessibility should be assured if you take credit for manual reopening of these dampers.

RESPONSE TO 410.39

FIRE DAMPERS WILL BE ELIMINATED IN SAFETY GRADE SINGLE DUCT SYSTEMS AND THREE-HOUR RATED DUCTWORK WILL BE USED INSTEAD. IT IS EXPECTED THAT The Present DUCTING WILL QUALIFY FOR The Three hour RATING. ~~CORRECTED~~ Updated DRAWINGS WILL BE ~~SUBMITTED LATER~~ provided in January 1982.

9.3.1.3 Safety Evaluation (Continued)

energy in the building environment generates missiles nor impairs the functioning of safety-related equipment. Containment isolation valves and associated accumulators are located a minimum distance from the containment wall.

(6) All of the accumulators, piping connecting the accumulators and the actuator supply line and support structures for the accumulators are designed, built, installed and tested to ASME Code, Section III, Safety Class 3 and Seismic Category I.

(7) Support structures are designed to absorb the thrust loads that would be developed assuming a failure of the largest pipe connected to the accumulator.

9.3.1.4 Inspection and Testing Requirements

The Instrument Air System and Service Air System are proved operable by their use during normal plant operation. Portions of both systems normally closed to airflow can be tested to ensure operability and integrity of each system. AIR QUALITY SHALL BE TESTED PERIODICALLY TO ASSURE COMPLIANCE WITH ANSI ME11.1-1976. 410.38

The air supply system to the MSIV and main steam SRV shall be subjected to preoperational tests in accordance with Chapter 14, AFTER WHICH PERIODIC TESTS OF THE CHECK VALVES AND ACCUMULATORS SHOULD BE CONDUCTED TO ASSURE VALVE OPERABILITY. 410.38

The motor-operated isolation valves are capable of being tested to assure their operational integrity by manual actuation of a switch located in the control room and by observation of associated position indication lights. Test and vent connections are provided at the isolation valve penetrations in order to verify their leaktightness.

410.40 (9.4.1) In addition to the scenario described in Question 410.39, consider the consequences of an actual fire closing the damper. Demonstrate that the safety-related areas downstream of the closed fire damper can receive adequate ventilation to allow safe reactor shutdown. Describe how such ventilation is accomplished. Note that to maintain adequate ventilation, it may be necessary to eliminate some fire dampers and use three-hour rated ductwork for some areas. It may also be necessary to rely on your remote shutdown capability. In this case, you must ensure credit is not taken for equipment downstream of the closed damper.

Response

See response to 410.39.

410.41 (9.5.1) Provide the details of your proposed design to demonstrate that you satisfy the criteria of Sections III.G and III.L of Appendix R to 10 CFR Part 50. In your response, provide the following information:

a. Describe the methodology used to verify that proper separation is provided for the safe shutdown capability in accordance with the requirements of Section III.G.2 of Appendix R. Provide the area arrangement drawings showing the safe shutdown system, including the cable routing.

b. Address the means you will provide for assuring the proper functioning of your safe shutdown capability, assuming fire induced failures in the associated circuits. Attachment 1 provides our concerns with associated circuits. This attachment also provides guidance for reviewing the associated circuits of concern and the additional information we need. Your response should specifically address Part II.C of this attachment.

c. Confirm that your proposed design will have the capability to achieve cold shutdown conditions within 72 hours and maintain cold shutdown thereafter, as defined in Section III.L of Appendix R to 10 CFR Part 50 and Section 5.C of Branch Technical Position CMEB 9.5-1, assuming that offsite power is not available.

d. Commit to develop and implement alternate shutdown procedures. These procedures should address the manpower requirements and the manual actions required to accomplish shutdown. Submit a summary of these procedures.

e. With respect to those repairs required to achieve safe shutdown, it is our position that systems and components used to achieve and maintain hot shutdown conditions must be free of fire damage with no credit taken for repairs. Systems and components used to achieve and maintain cold shutdown should be either free of fire damage or the fire damage should be limited so that repairs can be made and cold shutdown achieved within 72 hours. Develop repair procedures for cold shutdown systems. Material for repair should be maintained onsite. Electrical or pneumatic jumpers are not a suitable method of repair to achieve cold shutdown.

Responce

An evaluation of the GESSAR II Fire Hazzard Analysis (Appendix 9A) against Appendix R to 10CFR Part 50 is contained in Subsection 1C.2.3 of Appendix 1C. It is concluded in Subsection 1C.2-3 that the GESSAR II design meets the requirements of Appendix R.

410.42 (10.4.7) Revise Section 10.4.7 of your FSAR to describe and evaluate only those portions of the main feedwater system within the scope of your design. All other information in this section of your FSAR which you consider necessary for the condensate and feedwater system design (e.g., chemistry, temperature, capacity and pressure) should be specifically identified as interface requirements.

<u>Response</u>

Section 10.4.7 has been revised accordingly.

Text revision for 410.42

10.4.7 Condensate and Feedwater Systems

Revised

The feedwater lines description, criteria, and design contained within the scope of the Nuclear Island (inboard of the seismic interface restraint structure ~~locat~~ which is located between the outboard feedwater line shutoff valve and the Auxiliary Building/Turbine Building interface) are presented in Subsection 5.4.9. The remainder of feedwater system will be provided by the Applicant. Refer to Section 1.9 for interfaces.

ATTACHMENT NO. 5

DRAFT RESPONSES TO

POWER SYSTEMS BRANCH

QUESTIONS

430.01 (8.3.1) Describe in Section 8.3.1.1.2 of your FSAR, the interlocking scheme provided on the crosstie circuit breakers between Division 1, bus F1 and Division 2, bus E1. State whether these circuit breakers are interlocked with the bus supply breakers. It is our position that bus ties compromise the independence and redundancy of the onsite electrical power supplies required by General Design Criterion 17 of Appendix A to 10 CFR Part 50. Accordingly, justify why Divisions 1 and 2 ac power supplies cannot be made completely independent by eliminating this crosstie.

Response

Figure 8.3-15 ~~will be~~ is revised to show the interlocking scheme in a more detailed form.

For the interlocking scheme description, refer to revised subsection ~~the [redacted]~~ 8.3.1.1.2 ~~(copy attached).~~

The ~~STRIDE~~ GESSAR II design meets all the NRC requirements, IEEE Standards and regulatory guides without providing the tie breakers. The only reason the tie breakers are provided is to give the operator extra flexibility in maintenance during plant shutdown.

Text change for 430.01

8.3.1.1.2 480V Distribution System

Power for 480V auxiliaries is supplied from load centers consisting of 6.9-kV/480V transformers and associated metal clad switchgear.

Class 1E 480V load centers supplying Class 1E loads are arranged as independent radial systems, with each 480V bus fed by its own power transformer. Each 480V Class 1E bus in a division is physically and electrically independent of the other 480V buses in other divisions. A manual crosstie is provided between redundant buses of Division 1 and Division 2 and is equipped with a normally open circuit breaker in each substation. The ties are manually initiated and are guarded by key interlock to prevent paralleling of the two divisions.

Under normal operation, division 1 breaker "110A" is closed, (Bus E1 is fed from Bus E), division 2 breaker "210A" is closed, (Bus F1 is fed from Bus F) and the two tie breakers between divisions 1 and 2 are open (breaker 110F for Division 1 and breaker 210F for Division 2).

If during plant shutdown, the operator needs to close the tie breakers for maintenance flexibility, the following sequence has to take place.

- Trip breaker "110A"/bus E1, and lock it open.
- Remove the key from lock (A4) at breaker 110A/Bus E1. Key is removable only when breaker is locked open.
- Insert key in lock (A4) at breaker 210F (Bus F1)
- With key (A3) in its respective lock, breaker 210F/Bus F1 may be closed.
- Remove key from lock (A5) at breaker 110A/Bus E1.
- Insert key in lock (A5) at breaker 110F/Bus E1.
- With key (A2) in its repective lock, breaker 110F/Bus E1 may be closed.

Main breaker 210A/Bus F1 is now feeding Buses E1 & F1 while main breaker 110A/Bus E1 is locked open. Similar steps could be taken in order to feed buses E1 & F1 from main breaker 110A while breaker 210A is locked open.

When Bkr 110A/Bus E1 or Bkr 210A/Bus F1 are open, an indicating light will be initiated in the control Room.

Interchanges A2 & A3 are provided to safeguard against personnel coming into contact with live bus in the rear of the cubicle.

The operator has to:

- Trip and lock out tie breakers 110F/Bus E1 & 210F/Bus F1. Then remove keys A2 & A3.
- Both keys must be inserted into their respective locks on rear door of the cubicle at breaker 110F/Bus E1 (or breaker 210F/Bus F1) in order to open the rear door to work in the Bus compartment.

The 480V unit substation breakers supply 460V motor loads up to and including 400 hp, and motor control centers. Switchgear for the 480V load centers is of indoor, metal-enclosed type with drawout circuit breakers. Control power is from the Class 1E 125VDC power system of the same division. The HPCS 480V auxiliaries are supplied from an independent Class 1E 6.9-kV bus and transformer in Division 3.

The 480V MCCs feed motors 100 hp and smaller, control power transformers, process heaters, motor-operated valves and other small electrically operated auxiliaries, including 480-120V and 480-240V transformers. Class 1E control centers are isolated in separate load groups corresponding to divisions established by the 480V unit substations. Current limiting reactors are used, when required, to limit short circuit currents to less than 25,000A. MCC branch circuit protection for all loads is provided by molded case circuit breakers.

Starters for the control of 460V motors 100 hp and less are the MCC-mounted, across-the-line magnetically operated, air break type. The starters are a combination type with circuit breakers of 25,000A, symmetrical interrupting capacity and a magnetic contactor to provide overload and undervoltage protection. Class 1E MOVs have molded case breakers with thermal magnetic protection, since the overload elements of the starter are in the circuit during testing although bypassed during normal plant operation. Circuits leading from the electrical penetration assemblies into the containment area have a fuse in series with the circuit breakers as a backup protection for a fault current in the penetration in the event of circuit breaker overcurrent or fault protection failure.

460V
FLA 173.3
LRA 1060
START. RUN
150W

Figure Change for 430.01

VPF 3856-45-263

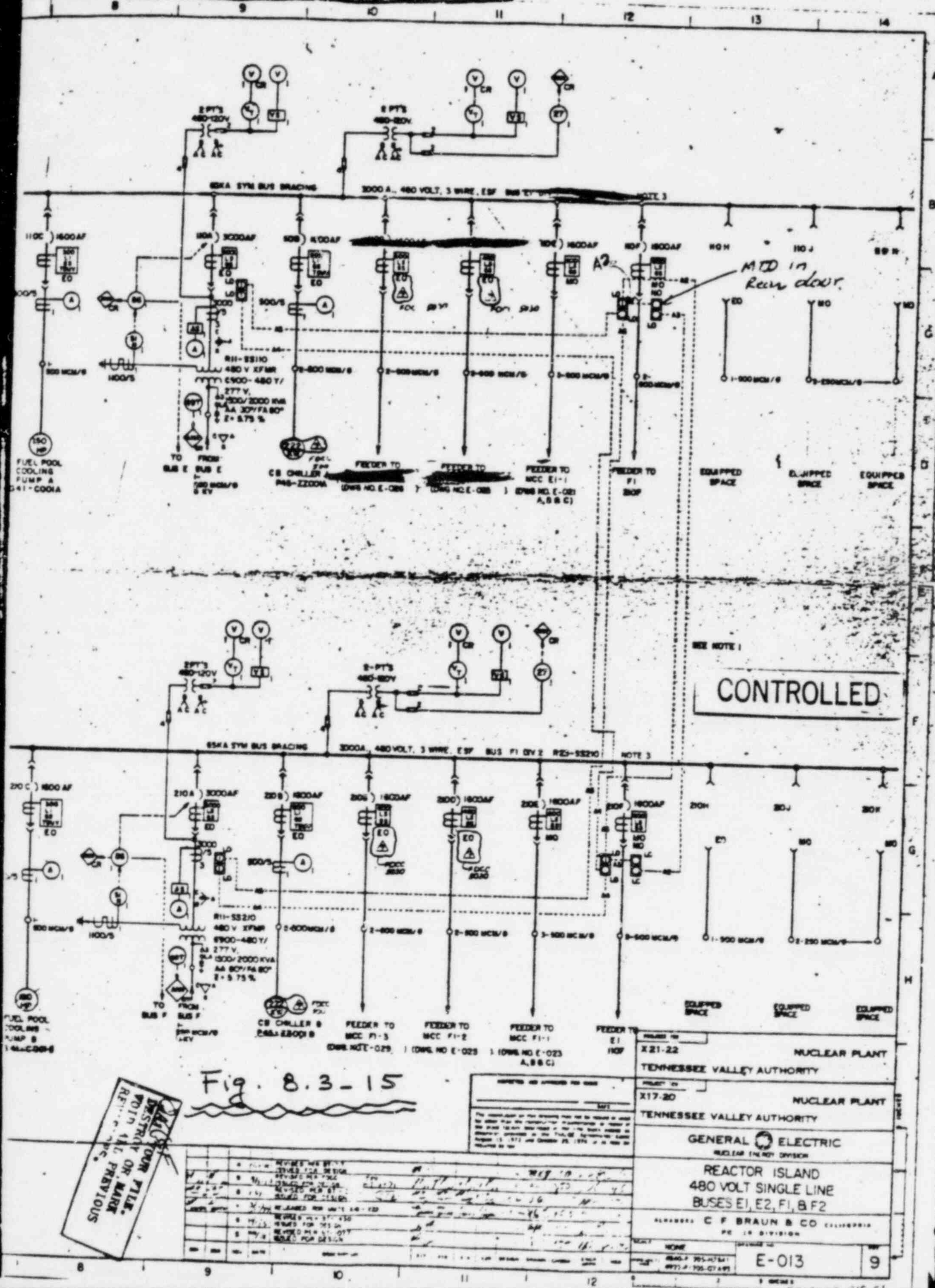

Fig. 8.3-15

430.02 (8.3.1) You state in Section 8.3.1.1.5.1, part (4) of your FSAR that Class 1E indicating light circuits do not require any special analysis or test since they do not extend past the Class 1E equipment and raceways. Explain this statement.

Response

~~GESSAR II~~ Paragraph (4) of ~~section~~ Subsection 8.3.1.1.5.1 (second paragraph) states that "The wiring for all Class IE equipment indicating lights is an integral part of the Class IE cables used for control of the same equipment."

Since these circuits are class IE and not associated circuits, they ~~do not need to meet the~~ must meet all of the requirements of Class IE circuits and not the requirements for ~~the~~ associated circuits listed in ~~the~~ IEEE standard 384 section 4.5.1 part (3).

That explains the statement. Since the circuits (class IE, Equipment indicating light circuits) do not extend past the Class IE equipment and raceways no special analysis or test is required.

430.03 (8.3.1) Provide the minimum starting voltage of the Class 1E, Division 1 and 2 motors. Indicate the minimum difference between the motor torque and pump torque of the Class 1E, Division 1 and 2 motors, during acceleration. Explain the sentence in section 8.3.1.1.5.3, part (2) of your FSAR in which you state: "In some cases, motor sizing torque and load requirements are accomodated to limitations imposed by the circumstances of the system or specific functional requirements."

Response

Minimum starting voltage for all motor operated valve (MOV) motors is 80%, for all other safety related motors is 75%, recovering to 90% within 2 seconds in each case.

As stated in subsection 8.3.1.1.5.3(1), motors are sized in accordance with NEMA standards including starting, pull-in and driving torque requirements.

430.04 (8.3.1) The undervoltage relaying described in Section 8.3.1.1.7 of your FSAR, by itself, will not protect the Class 1E equipment against a degraded voltage condition. Branch Technical Position PSB-1 contained in Chapter 8 of the Standard Review Plan (SRP) requires that a second level of undervoltage protection be provided to protect Class 1E equipment against degraded voltage conditions. Describe your compliance with this position for Class 1E, Divisions 1, 2 and 3.

Response

Response to this question is provided in a new paragraph (8) to Subsection 8.3.1.1.7.

Text addition for 430.04

8.3.1.1.7 Load shedding and sequencing on class 1E buses (continued)

(8) Protection against degraded voltage

For protecting rotating electric equipment against the effects of a sustained degraded voltage, the normal and alternate BOP feeder voltages are monitored.
When the voltage degrades to 90%*or below of its rated value, after a time delay (for not to be triggered by transients), undervoltage will be annunciated in the control room.
Simultaneously a 5 minute timer is started, to allow the operator to take corrective action.
After 5 minutes the respective feeder breaker with the undervoltage is tripped.
Should a LOCA occur at the same time, the feeder breaker with the undervoltage will be tripped instantly.
Subsequent bus transfer will be as described above.

*Setpoint is subject to confirmation by applicant.

430.05 (8.3.1) Provide the following information regarding the load shedding and sequencing discussed in Section 8.3.1.1.7 of your FSAR:

a. Indicate what sequence of events occurs if the alternate preferred power source is lost when it is powering the Class 1E buses and the diesel is running in standby. State whether the residual bus voltage is allowed to decay to less than 30 percent as is done when transferring from the primary preferred source.

b. For the loss of preferred power during the diesel-generator parallel testing event, indicate what will automatically trip the diesel-generator circuit breaker. You state that if the alternate preferred source is used for load testing the diesel-generator and it is lost, the diesel-generator circuit breaker will be tripped and the bus will be re-energized by local manual control only. This results in a loss of the Class 1E bus. Explain why this bus is not automatically re-energized.

c. If the diesel-generator is powering the safety buses and offsite power is subsequently restored, indicate whether the safety buses automatically transfer back to the offsite source.

d. Describe the load sequencer logic, circuitry and components. Since the emergency loads are sequenced on both the offsite and onsite power sources, we require that you either provide a separate sequencer for offsite and onsite power for each electrical division. Alternatively, provide a detailed analysis to demonstrate that there are no credible sneak circuits or common failure modes in the sequencer design which could render both onsite and offsite power sources unavailable. In addition, provide additional information concerning the reliability of your sequencer and reference the design detailed drawings.

<u>Response</u>

Response to this question is provided in revised subsection 8.3.1.1.7!

Text revision for 430.05

8.3.1.1.6.4 Protection Requirements (Continued)

relay protection has voltage restraint so that disturbances in the plant auxiliary power system which result in excessive voltage drops will not damage the diesel generator.

In general, relay settings are coordinated so that loss of service is not communicated to a "higher" level involving equipment other than that immediately affected by the fault or overload. Trip levels and time-delay settings are selected so that faults are not passed through to circuit breakers upstream in a chain leading to the power supply. Backup relaying includes, within its protective zone, the next adjoining system interfacing element. Circuit protection functions are illustrated in Figures 8.3-2, 8.3-3 and 8.3-14 through 8.3-16.

8.3.1.1.7 Load Shedding and Sequencing on Class 1E Buses

This subsection addresses only Class 1E Divisions 1 and 2. Bus transfer, load shedding and sequencing on a 6.9-kV Class 1E bus is initiated on loss of bus voltage. Non-Class 1E loads (Buses E2 and F2) are tripped off and thereby automatically isolated from the Class 1E buses only by a LOCA signal.

Load shedding and sequencing is performed by the control system for the circuit breakers and by the control logic and LOPP signals (loss of preferred power undervoltage signals).

(1) LOCA - The existence of the LOCA condition is signalled by redundant one-out-of-two-twice sensor circuits originating from NSSS equipment. This is the same signal that initiates the ECCS described in Subsection 7.3.1.1.1.

The LOCA signal will trip the isolation breakers to the non-Class 1E buses (E2 and F2). The LOCA signal will also terminate diesel-generator testing (if this is in

430.05 cont

8.3.1.1.7 Load Shedding and Sequencing on Class 1E Buses (Continued)

progress), disable [redacted] protective diesel-generator protective relays except generator differential and diesel over-speed, start the diesel generator and start the ECCS motors in sequence as shown in Table 8.3-4 if not already running.

A load sequencer is not used. All load application, with or without time delay, is controlled separately for each large pump feeder breaker.

(2) Loss of Preferred Power (LOPP) - The 6.9-kV Class 1E buses are normally energized from the normal preferred power supply. Should the bus voltage decay to below 70% of its nominal rated value for a predetermined time (actuating one-out-of-two [redacted] undervoltage logic), a bus transfer is initiated and a signal will trip the supply breaker, & start the diesel generator [redacted] When the bus voltage decays to below 30% of its normal rated value, large pump motor breakers are tripped. [redacted] A closure signal to the alternate preferred power supply initiates transfer to the alternate preferred supply. If the alternate supply is not available, or subsequently lost (i.e., as sensed by the under-voltage relays as above), the transfer proceeds to the diesel generator. If the standby diesel generator is ready to accept load (i.e., voltage and frequency are within normal limits and no lockout exists, and the normal and alternate preferred supply breakers are open), then the diesel-generator breaker is signalled to close, accomplishing automatic transfer of the class 1E [redacted] bus to the diesel generator. Large motor loads will be sequence started as required and as shown on Table 8.3-4.

Load Shedding and Sequencing on Class 1E Buses
(Continued)

(2a) When the alternate preferred power is lost, while it is powering the class 1E bus, with the diesel generator in standby, loss of preferred power (LOPP) exists. The same, as during LOCA, diesel generator trips are disabled, except for generator differential and engine overspeed. At 70% of the rated bus voltage, the alternate feeder breaker trips. Diesel start initiation occurs, but is ineffective, since the diesel generator is running.

At 30% of the rated bus voltage, large pump motor breakers are tripped. Providing, that the diesel generator is ready for loading, the diesel generator breaker will close and supply power to the class 1E bus.

(3) LOPP following LOCA - If the bus voltage (normal preferred power) is lost during post-accident operation, transfer to alternate preferred power occurs as described in (2) above. Once voltage is restored, the loss-of-voltage sequencing procedure repeats itself with respect to starting motor loads. Since system reset is not a function of the presence or absence of bus voltage, no change to valve position occurs. Therefore, the restarting duty is less severe, because motor-operated valve power is not required.

(4) LOCA following LOPP - If a LOCA occurs after the automatic transfer of power to the diesel-generator as described in (2), following loss of both normal preferred power supplies, the LOCA signal starts ESF equipment as required. Automatic (LOCA + LOPP) time delayed load blocking assures that the diesel generator will not be overloaded.

8.3.1.1.7 Load Shedding and Sequencing on Class 1E Buses (Continued)

(5) LOCA when diesel generator is parallel with preferred power source during test - If a LOCA occurs when the diesel generator is undergoing routine testing, the diesel-generator-circuit breaker is automatically tripped to terminate the testing and with preferred power available, the LOCA sequencing procedure starts as described in (1). If the diesel-generator breaker does not trip to terminate the test, the preferred power line breaker will trip (after a brief time delay) to terminate the test, and LOCA sequencing will proceed as described in (1) with the diesel generator as the power source.

(6) LOPP during diesel-generator paralleling test - If the normal preferred power supply is lost during the diesel-generator paralleling test, the diesel-generator circuit breaker is automatically tripped [redacted] on overcurrent. Transfer to the alternate preferred power supply proceeds as described in (2).

[redacted] If the alternate preferred source is used for load testing the diesel generator, and the alternate preferred source is lost (and no LOCA signal exists), the diesel generator bkr will trip on overcurrent, and LOPP condition will exists. Load shedding and bus transfer will proceed as described in (2a).

(7) Restoration of BOP (offsite) power

Upon restoration of BOP power, the class 1E bus(es) can be transferred back to the BOP source by manual operation only.

8.3.1.1.8 Standby AC Power System (Continued)

Each standby power system division, including the diesel-generator, its auxiliary systems and the distribution of power to various Class 1E loads through the 6.9-kV and 480V systems, is segregated and separated from other system divisions. No automatic interconnection is provided between the Class 1E divisions. Each diesel-generator set is operated independently of the other sets and is connected to the utility power system by manual control only during testing or for energized bus transfer and then only one division at a time.

8.3.1.1.8.1 Redundant (Division 1 and Division 2) Standby AC Power Supplies

8.3.1.1.8.1.1 General

The diesel generators comprising the Divisions 1 and 2 standby AC power supplies are designed to quickly restore power to their respective Class 1E distribution system divisions as required to achieve safe shutdown of the plant and/or to mitigate the consequences of a LOCA in the event of a coincident LOPP. Figure 8.3-2 shows the interconnections between the preferred power supplies and the Divisions 1 and 2 diesel-generator standby power supplies.

~~Separate unit station service transformers and separate reserve station service transformers are used for each division normal and alternate preferred supplies.~~

A detailed discussion of the Division 3 diesel-generator system (HPCS) standby AC power supply is presented in Subsection 8.3.1.1.9.1.

8.3.1.1.8.1.2 Ratings and Capability

The diesel generators for Divisions 1 and 2 each have a continuous nameplate rating of 7,000 kW on an 8,760-hr basis (with 10% overload permissible for 2 hr out of every 24). This exceeds the loads required at one time, as derived from Tables 8.3-1 and 8.3-2.

430.06
(8.3.1)

In Section 8.3.1.1.8.1.1 of your FSAR, you state that separate unit station service transformers and separate reserve station service transformers are used for the normal and alternate preferred power supplies for each division. Indicate whether this arrangement is specified by the interface requirements. State whether there are other arrangements permissible under the interface specifications. Indicate why there is only one feeder from the preferred power sources provided for Division 3 while two are provided for Divisions 1 and 2.

The BOP transformer arrangement stated in ~~[illegible]~~ section 8.3.1.1.8.1.1 is not specified by the interface requirements, and will be deleted ~~from the~~ ~~[illegible]~~ as indicated.

Other arrangements are permissible.

RESPONSE:

Division 1 and division 2 power supplies are standby power supplies, whereas division 3 is not a standby power supply but a dedicated power source for only HPCS mode of the emergency core cooling systems. The other modes of the ECC systems are powered from division 1 & 2 buses alongwith other divisional loads. Minimum two, independent, automatically actuated cooling systems are required for ECC protection. This is accomplished by either division 1 or division 2 power supply. Therefore a greater degree of reliability is achieved by providing two preferred sources for division 1 and division 2, ~~besides~~ in addition to the individual DG feeder; Division 3 (HPCS) bus is not required to have more than one preferred source besides the DG feeder.

430.07 (8.3.1) Provide the following information regarding the Divisions 1 and 2 diesel-generator qualification testing discussed in Section 8.3.1.1.8.5 of your FSAR:

a. You state in Section 8.3.1.1.8.5 that the 300 start tests have been run on similar units. If the tests were not performed on identical units, the Divisions 1 and 2 diesel-generators must be requalified in accordance with the requirements of Sections 5.4.2, 5.4.3 and 5.4.4 of IEEE Std. 387-1977.

b. The load capability test was conducted in reverse order from our position stated in Item C.14 of Regulatory Guide 1.9, Revision 2. Provide justification for this difference.

c. Provide the test results for our review.

Response

Subsection 8.3.1.1.8.5 has been revised in response to this question.

430.08 (8.3.1) In Section 8.3.1.1.6.4 of your FSAR, you state that the diesel-generator overcurrent relay protection has a voltage restraint so that disturbances in the plant auxiliary power system which result in excessive voltage drops, will not damage the diesel-generator. Indicate how far into the plant distribution system from the diesel-generator the relays will sense a disturbance. State whether these relays are sensitive to voltage transients created by normal power system evolutions such as motor starting.

Response

The 51V relays (very inverse time overcurrent relays with voltage restraint), will sense a disturbance at the 6.9KV system level only.

These relays are not sensitive to voltage transients, created by normal power system evolutions, such as motor starting.

This time overcurrent protection is typical for diesel generators division 1, 2 & 3.

¶ ~~FSAR Section~~ Subsection 8.3.1.1.6.4 has been revised accordingly. ~~and that statement has been reworded (see attached copy)~~

Text revision for 430.07

8.3.1.1.8.5 Prototype Reliability Qualification Testing

The [redacted] qualification tests are performed on one Division 1 or 2 diesel generator [redacted] per IEEE Std. 387 as modified by Reg. guide 1.9 requirements

(1) 300 Start Test - Test has been run on similar units. Vendor to submit a report.

(2) Margin Test - Test demonstrates ability of the set to accept a load 10% greater than the most severe single-step load within the design load sequence.

(3) Load Acceptance Test - Test demonstrates ability to accept design load in required sequence and time duration.

(4) Load Capability Test - Test demonstrates ability to carry rated load:

(a) 7,000 kW for 22 hr after water and lube oil reach operating temperature, and

(b) 7,700 kW for 2 hr immediately following run of 7,000 kW.

(5) Load Rejection Test - Test demonstrates capability of rejecting 7,000 kW load without exceeding speed of 500 rpm.

Test results will be provided by the Applicant. Refer to Section 1.9 for interface.

QUESTION 430.08
(8.3.1)

In Section 8.3.1.1.6.4 of your FSAR, you state that the diesel-generator overcurrent relay protection has a voltage restraint so that disturbances in the plant auxiliary power system which result in excessive voltage drops, will not damage the diesel-generator. Indicate how far into the plant distribution system from the diesel-generator the relays will sense a disturbance. State whether these relays are sensitive to voltage transients created by normal power system evolutions such as motor starting.

RESPONSE

For HPCS (Division 3) DG the overcurrent relays with voltage restraint will sense the voltage drops reflected on the HPCS bus only. This relay will operate during a DG overcurrent condition and voltage dropping to a preset value. However, this condition will not trip the DG when loss of coolant accident signal is present. The DG trip signal is bypassed inorder to make the HPCS DG available during LOCA condition. Any voltage transient created by normal power system evolution such as motor starting on Division 1 and/or Division 2 will have no effect on the Division 3 (HPCS) overcurrent relays with voltage restraint.

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Test revision for 430.08

8.3.1.1.6.4 Protection Requirements

When the diesel-generators are called upon to operate during loss of preferred power (LOPP) or LOCA conditions, the only protective devices are the generator differential relays and engine overspeed trip device. The generator differential relays and overspeed trip device are retained under accident conditions to protect against possible, significant damage. Other protective relays, such as loss of excitation, antimotoring (reverse power) overcurrent voltage restraint, high jacket water temperature and low lube oil pressure, are used to protect the machine when operating in parallel with the normal power system, during periodic tests. The relays are automatically isolated from the tripping circuits during LOPP or LOCA conditions. In addition to these protective relays, a normal time-delay overcurrent relay senses generator overload, and alarms. Another time-delay overcurrent relay is provided with a voltage restraint which enables the relay to distinguish between normal operating over-load currents and short circuit currents of the same magnitude. This discrimination is accomplished by the fact that as opposed to short circuit conditions, the magnitude of generator voltage remains relatively high during operating load conditions, so that the relay's voltage - restraining element is able to keep the current element from operating the relay during overloads*. All the bypassed trip devices listed in Subsection 8.3.1.1.8.1.5 alarm in the Main Control Room.

The means are provided for synchronizing and paralleling the diesel generators with the preferred power supply system, for load testing of the diesel generator.

In general, relay settings are coordinated so that loss of service is not communicated to a "higher" level involving equipment other than that immediately affected by the fault or overload. Trip levels and time-delay settings are selected so that faults are not passed through to circuit breakers upstream in a chain leading to the power supply. Backup relaying includes, within its protective zone, the next adjoining system interfacing element. Circuit protection functions are illustrated in Figures 8.3-2, 8.3-3 and 8.3-14 through 8.3-16.

430.09 (8.3) A review of malfunction reports of diesel-generators at operating nuclear plants has disclosed 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: (1) alarm conditions that render a diesel-generator unable to respond to an automatic emergency start signal; and (2) alarm abnormal, but not disabling, conditions. Another cause can be the use of wording in an annunciator window which does not specifically indicate 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 this purpose.

Accordingly, review and evaluate the alarm and control circuitry for the diesel-generators in your proposed nuclear island to determine how each condition which 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 which block automatic start. Other conditions in this category are loss of control voltage, insufficient starting air pressure or low battery voltage. Your review should consider all aspects of possible diesel-generator operational conditions (e.g., test conditions and operation from a local control station). 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 of the diesel-generator controls to permit subsequent automatic operation.

Provide the details of your evaluation, the results and your conclusions, including the following information:

a. All conditions which 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 which is alarmed for each of the conditions identified in your response to Item (a) above.

c. Any other alarm signals which are not included in Item (a) above and which also cause the same annunciator to alarm.

d. Any condition which renders the diesel-generator incapable of responding to an automatic emergency start singal and which is not alarmed in the control room.

e. Any modifications you propose following your evaluation of these matters.

RESPONSE 430.09

- The details of the evaluation, the results and conclusions, are included in the following information table for parts a. and b. and the following text for parts

Div 1 & 2 (Division 1 is shown, Division 2 is identical except where noted otherwise)

a. (INOPERATIVE CONDITIONS)	b. (WORDING ON THE CONTROL ROOM STATUS LIGHT)	b. (WORDING ON THE CONTROL ROOM ANNUNCIATOR)
1- Engine Fuel Oil Shutoff Valve Closed	"ENG FUEL OIL SOV CLOSED"	"DIESEL GEN OUT OF SERVICE"
2- Out of Service Switch Actuated	"DG CONT SYSTEM OUT OF SERVICE"	
3- Local Control Only (Details by Applicant)	"DG SYST LOCAL CONTROL ONLY"	
4- BOP (Fuel Oil) Out of Service (Details by Applicant)	"BOP OUT OF SERVICE"	
5- Control Room Logic Fault	"DG LOGIC FAULT"	
6- Remote Shutdown Portion Actuated (Div 1 only)	"DG SYST LOCAL CONTROL ONLY"	
7- Unit Unavailable for Emergency (Details by Applicant - See Note)	"EMERG START INOP"	

NOTE - Typical unit unavailable conditions are: local control only, low starting air pressure, generator differential trip, emergency stop, engine overspeed trip, in maintenance mode, DC power failure, both fuel oil transfer pumps have motor overload/power loss or controls in OFF.

Normal, or test, start and stop do not make the unit unavailable.

c. Other alarm signals which are not included in Item (a) above do not cause the same annunciator to alarm. They go to separate alarms.

d. Open-circuited or short-circuited conditions could render the diesel-generator incapable of responding to an automatic emergency start signal and may not alarm automatically in the control room. (However, such conditions are detected through manual testing and alarmed manually in the control room by actuating the "Out of Service Switch".)

e. No modifications are proposed.

Div 3 - By GE.

QUESTION 430.10
(8.3.1)

The prototype qualification test discussed in Amendment 3 to NEDO-10905 and referenced in Section 8.3.1.1.9.5.6 of your FSAR was conducted on a 4160 volt diesel-generator and a high pressure core spray (HPCS) pump combination. However, you indicate in Section 8.3.1.1.9.5 and Figures 8.3-1, 8.3-3a and 8.3-3b of your FSAR that you propose to use a 6900 volt diesel-generator and a HPCS pump combination. Since these are not the same units reported on in Amendment 3 to NEDO-10905, it is our position that the qualification test must be conducted on the actual diesel-generator and pump combination you propose for your nuclear island. Figure 8.3-14a of your FSAR indicates use of a 4160 volt HPCS diesel-generator and switchgear. Correct this error.

RESPONSE Qualification of a specific diesel generator set is plant unique and therefore the responsibility of the applicant.

QUESTION 430.11
(8.3.1)

Provide the following additional information regarding the loading of the HPCS diesel-generator:

a. If the HPCS is operating on the preferred power source with the diesel-generator in standby, indicate the sequence of events following a loss of the preferred power sources. State whether the residual bus voltage is allowed to decay or whether a synchronizing scheme is utilized.

Reponse

The residual bus voltage is allowed to decay and there is no synchronization scheme for this mode. The following sequence occurs:

1) Offsite power breaker to safety bus (6900 volt HPCS G Division 3) "trips", when the bus voltage drops below 70% of normal rated value. ~~After~~ 3 seconds ~~following~~ after the bus trip The ~~DG~~ receives a start signal.

2) Division 3 diesel generator accelerates to rated voltage and frequency while the residual voltage on the safety bus (6900 volt HPCS Bus G Division 3) decays.

3) The Division 3 diesel generator circuit breaker will close automatically when all of the following permissives are satisfied.

   a) the safety bus (6900 volt HPCS Bus G Division 3) voltage decays below 70% of the nominal bus voltage,
   b) the offsite source feeder breaker remains tripped in the open position,
   c) the diesel generator Division 3 has reached rated ~~shield~~ speed and voltage.

b. State whether diesel-generator will automatically separate from the test mode if an accident signal is received. Indicate the sequence of events.

Response

Diesel generator (HPCS, Div. 3) will separate from the test mo return to standby condition upon receipt of the accident signa

1. Diesel generator breaker will open.

2. The accident signal will override the test signal.

3. Diesel generator will keep operating and will be ready to accept load if required.

c. Indicate the sequence of events if the diesel-generator is on test in parallel with the offsite source and the offsite source is lost. Indicate whether the HPCS bus will require re-energization by local manual control in a manner similar to the Divisions 1 and 2 buses.

Response

Upon loss of offsite power during test mode the offsite feeder breaker will open. The diesel generator will keep operating. The diesel generator governor control be charged from droop to the isochronous mode and the voltage regulator to be set to automatic mode. Following these actions, the diesel generator will continue feeding power to the HPCS (Division 3) bus.

d. If the diesel-generator is powering the HPCS and offsite power is subsequently restored, state whether the safety buses automatically transfer back to the offsite source.

Response

If the diesel generator is powering the HPCS bus and the offsite power is subsequently restored, then the bus will not transfer back to the offsite source.

QUESTION 430.12
(8.3.1)

The separation you describe in Sections 8.3.1.4.2.3.1 and 8.3.1.4.2.3.2 of your FSAR for the scram solenoid circuits and the main steam line (MSL) isolation valve circuits must be justified by analysis, based on tests, to show that there is no detrimental effect on Class 1E circuits with which these circuits are run. Additionally, demonstrate that the function of the scram solenoid circuits and MSL isolation circuits will not be impaired by this arrangement. Explain how isolation is maintained between the Class 1E power supply feeding the "A" solenoids and the non-Class 1E power supply feeding the "B" solenoids since these circuits are run in a common conduit.

Explain the use of the D1 through D4 inputs shown in Figure 8.3-23 of your FSAR, coming via isolators into the load drivers of the "B" scram solenoid circuits.

Response

The scram solenoid and MSIV circuits are run in conduits. GE has performed an analysis justifying the use of conduits for these circuits. The analysis for Clinton project PGCC design has been reviewed by the NRC. The STRIDE design is same as used for Clinton Project.

Optical isolators has been provided for electrical isolation within the panel between 1E and non 1E interfaces of the logic circuits. The power supply feeding "B" solenoids is of the [same] type as [the] one feeding ~~to~~ "A" solenoids. Solenoid "A" is fed from Bus "A" non-1E power via inverter and an EPA assembly. The power is maintained within 1E parameters and the equipment used for power supply scheme is of high quality.

Solenoid "B" is fed from Bus B non-1E power supply similar to Bus "A". It is acceptable to run "A" and "B" solenoid power circuits together since the isolation is provided in the logic cabinets. Figure 8.3-23 [will] ~~maye~~ ~~need~~ [be] correct[ed] ~~ion~~ based on above discussion.

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QUESTION 430.14

State in Section 8.3.1.1 of your FSAR, whether the nuclear system protection system (NSPS) non-Class 1E power supplies which feed the "B" scram solenoids have a separate and redundant Class 1E protective package installed between the power supply and bus consisting of overvoltage, undervoltage and underfrequency protection. If not, this package should be installed to protect the solenoids against a condition which could fail them in the unsafe direction. Discuss the susceptibility of the load drivers to power supply anomalies such as over/undervoltage, over/underfrequency, voltage transients, voltage spikes, EMI and harmonics. The protective package must provide protection against any conditions which would fail the load drivers in the unsafe (i.e., shorted or closed) direction.

RESPONSE

~~STRIDE system does not meet requirement for separation and isolation.~~ Current ~~Improved~~ design by GE ~~(for future BWR 6 plants)~~ includes an inverter and protection assembly ~~(ECA-810108-1)~~. This will monitor bus voltage and frequency.

New design (solid state) has two buses similar to M-G sets to maintain voltage between certain parameters using inverters. A protection assembly is built into the inverter, which monitors voltage and frequency and trips output of ~~M-G sets~~ the inverter. Output of inverter is 1E, input to inverter is non-1E. Inverter and protection assembly acts as an isolator. ~~and mitigates the effects of any harmonics or EMI influence on the input power supply.~~ The new load driver cards are designed to meet IEEE-Std 472 and are capable of operation within voltage variations of 24–200V, AC or DC power. They are fast acting type and can handle power in KHz frequency range.

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QUESTION 430.15
(8.3.1)

State whether the penetrations described in part (6) of Section 8.3.1.4.2.2.3 of your FSAR, carry an electrical cable or wire. If so, explain how the penetration seal can prevent a fire being initiated in both divisions assuming a fault of the wire which induces a short circuit current to flow in the wire on both sides of the penetration.

RESPONSE

The electrical penetrations between the subdivisions of an enclosure are provided for carrying electrical cable or wires where unavoidable. However, each divisional subpanel is dedicated to a divisional wiring. Wherever the wires of one division intrude into the ~~author~~ another divisional subpanel, via such electrical penetration, the cable or wire is physically separated from the other divisional wiring or is ~~being~~ run ~~into~~ in conduits in accordance with the applicable separation requirements. Thus, the fire potential due to fault on one side of the penetration will not disable the circuit of the other division located on the other side of the penetration.

430.16 (8.3.1) The penetration layout shown in Figure 8.3-12 of your FSAR shows that the vertical separation between some Class 1E and non-Class 1E circuits is less than four feet rather than the five feed required by IEEE Std. 384-1974. According, it is our position that an analysis, based on tests, is required to verify that the smaller separation which you propose, is acceptable.

Response

PER IEEE STD 384.1974, SECT 5.1.4 where separation distance of different divisions cannot be maintained at three foot horizontal and five foot vertical, the redundant circuits shall be run in enclosed raceways that qualify as barriers or other barriers shall be provided between redundant circuits. The minimum distance between these redundant enclosed raceways and between barriers and raceways shall be 1 inch,. Figures 2, 3, 4, and 5 of IEEE STD Illustrate examples of acceptable arrangement of barriers and enclosed raceways where minimum separation distance cannot be maintained.

For electrical containment penetrations the cables are routed in totally enclosed sheet metal cable trays or rigid steel conduits to sheet metal electrical penetration boxes.

This design exceeds the 1 inch minimum separation requirement listed in the IEEE Standard.

Additional information on physical separation is provided in the ~~refer to the~~ revised version subsection 8.3.1.1.5.1.

MP:csc/I10146-7
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Test revision for 430.16

8.3.1.1.4.2.3 Operating Configuration (Continued)

MSIV solenoids for isolation. The nonessential 120 VAC bus is normally lined up to the preferred 480 VAC nondivisional power supply. Transfer to the alternate nondivisional power supply is done automatically on loss of preferred power or manually for maintenance. Control room annunciation is provided for transfer to the alternate source.

8.3.1.1.5 Class 1E Electric Equipment Considerations

The following guidelines are utilized for Class 1E equipment.

8.3.1.1.5.1 Physical Separation and Independence

Equipment of one division is segregated from equipment of other divisions and nondivisional equipment, in accordance with IEEE Std 384-1974, Regulatory Guide 1.75 and General Design Criterion 17. The overall design objective is to locate the divisional equipment and its associated control, instrumentation, electrical supporting systems and interconnecting cabling such that separation is maintained among all divisions. Divisional separation is achieved through the use of barriers, ~~and~~ spatial separation, + ~~The latter is enhanced by~~ totally enclosed raceways.

Redundant divisions of electric equipment and cabling are located in separate fire rooms or areas wherever possible. ~~In some instances~~ ~~and/or are provided with~~ spatial separation is provided, such that no single event may disable more than one of the redundant divisions or prevent safe shutdown of the plant.

Cables entering the drywell area from the containment area utilize a standard conduit sleeve and conduit seal. The seals are located in each divisional sector and at elevations required to serve the equipment inside the drywell and to maintain acceptable spatial separation

430.17 (1.8) Provide the following additional information regarding the exceptions you take in Section 1.8 of your FSAR, to Regulatory Guide 1.75:

a. You state with respect to Position C.1 in this regulatory guide that interrupting devices actuated only by a fault current are not considered to be isolation devices unless acceptable coordination can be verified by tests. However, you should first provide justification why the non-Class 1E load must be connected to the Class 1E system and cannot be tripped on an accident signal. If suitably justified, such a design must provide two isolation devices in series, each coordinated with the upstream bus feeder circuit breaker, and periodic testing of the coordination of these devices must be performed. Provide a complete list of the non-Class 1E loads connected to Class 1E systems and identify those loads which are not tripped on a signal indicating a loss-of-coolant accident (LOCA).

<u>Response</u>

The ~~reactor~~ Nuclear island ~~part of the [illegible] design~~ does not take any exception to Reg. guide 1.75. All non class IE loads that are connected to class IE equipment~~s~~ are isolated from the class IE systems in an accident condition by means of a LOCA signal that trips the class IE feeder breaker. The only exception taken is the lighting as stated in ~~the FSAR~~ revised Part IV.2.4 of Section 1.8

b. You state with respect to Position C.4 of this regulatory guide that associated circuits will be subject to the same requirements as Class 1E circuits unless it can be demonstrated that the Class 1E curcuits are not degraded below an acceptable level by the absence of such requirements. Identify each area where this exception is taken and provide an analysis showing that the absence of Class 1E requirements will not significantly reduce the availability of the Class 1E circuits.

<u>Response</u>

The following nondivisional loads are connected to the class 1E system and will be disconnected by a LOCA signal:

- -E2 Load Center
- -F2 Load Center
- -R43-S001A -3 DG 1 Jacket Water Heater (480V)
- \- -11 DG 1 Lube Oil Heater
- \- -18 DG 1 Space Heater
- -R43-S001B -3 DG 2 Jacket Water Heater
- \- -11 DG 2 Lube Oil Heater
- \- -18 DG 2 Space Heater
- -E31-PP001 Leak Detection Panel
- -E51-C002 RCIC Turb. Gland Seal Compr. 7.5hp 125Vd-c
- \- SOME 120V MOTOR SPACE heaters connected to MCC's E1-1 & F1-1

Associated circuits are treated the same as Class 1E circuits.

c. The exception you take to Position C.6 of this regulatory guide is unacceptable. Specifically, identify all areas where independence or separation is less than that required by IEEE Std. 384-1974. Provide an analysis based on tests.

d. Justify the exception you take to Position C.7 of this regulatory guide by an analysis demonstrating that Class 1E circuits are not degraded below an acceptable level. Provide this analysis.

e. Explain the exceptions taken to Positions C.8 and C.11 of this regulatory guide since they appear to be only a slightly reworded statement of the criteria in the guide.

Response b, c, d & e

GESSAR II follows RG 1.75 with no exceptions. Section 1.8 has been revised.

Text change for 430.17

IV.2.4 Regulatory Guide 1.75, Revision 1, Dated January 1975

Title: Physical Independence of Electric Systems

This guide sets forth criteria for the separation of circuits and equipment. It states that the guidance in IEEE Standard 384-1974 is acceptable to the NRC staff when supplemented by additional requirements included in the guide.

Evaluation

The GESSAR design is in compliance with the regulatory position through the incorporation of the following alternate approach, and GESSAR Sections 7.1.2.8 and 7.1.2.10.

The proposed design criterion for the separation of redundant safety equipment was set forth in GESSAR Section 7.1.2.8 and meets General Design Criteria 3, 17, and 21 pertaining to the physical independence of Class 1E circuits and the regulatory position of Regulatory Guide 1.75. ~~Exceptions in the GESSAR design to the regulatory position follow:~~

(1) Position C.1 - Interrupting devices actuated only by fault current are not considered to be isolation devices unless acceptable coordination can be verified by tests.

(2) Position C.4 - Associated circuits installed in accordance with Section 4.5 should be subject to the requirements of Class 1E circuits for cable derating, environmental qualification, flame retardance splicing restrictions, and raceway fill unless it can be demonstrated that Class 1E circuits are not degraded below an acceptable level by the absence of such requirements.

(3) Position C.6 - Specific submittals of information will be based on NRC requests.

(430.17 cont)

IV.2.4 Regulatory Guide 1.75, Revision 1, Dated January 1975 (Continued)

Delete - GE to confirm

(4) Position C.7 - Non-Class 1E instrumentation circuits can be exempted from the provisions of Section 4.6.2 provided they are not routed in the same raceway as power and control cables or are not routed with associated cables of a redundant division.

(5) Position C.8 - Section 5.1.1.1 should not be construed to imply that adequate separation of redundant circuits can always be achieved with a confined space such as a cable tunnel that is effectively unventilated.

(6) Position C.11 - Add "...and should preclude the need to frequently consult reference..."

Certain non-Class 1E loads important to orderly shutdown and surveillance such as emergency lighting are not disconnected upon a LOCA signal.

430.18
(8.3.1) Describe in Section 8.3.1.4 of your FSAR, the cable spreading area and the separation of cables in this area with respect to the requirements contained in Section 5.1.3 of IEEE Std. 384-1974 as modified by Regulatory Guide 1.75. State whether: (1) this area contains high-energy equipment such as switchgear, transformers and rotating equipment or piping (both high and moderate-energy) which could be a potential source of missiles or pipe whip; (2) flammable materials are stored in this area; (3) power cables are routed through this area; and (4) redundant cable spreading areas are utilized. Provide the cable tray plan for this area and the electrical equipment room areas.

Response

FSAR Section 8.3.1.4.2.3.2 will be revised to provide additional information as shown in the attachment.

Text Change For 430.18

8.3.1.4.2.3.2 Other Safety-Related Systems (Continued)

(8) Detailed design basis, description, and safety evaluation aspects for a power generation control complex (PGCC) System shall be as comprehensively documented and presented in GE Topical Report, Power Generation Control Complex, NEDO-10466A and its amendments.

PGCC consists of control room panels, racks, floor sections, and termination cabinets. The floor sections are divided into ducts and the termination cabinets have metallic barriers to separate redundant Class 1E wiring.

The floor section ducts are designed so that each duct acts as a raceway and has adequate fire barriers and will contain wiring of only one division. The ducts have solid metal walls and floors and a removable solid metal covers.

Cable access to the two PGCC areas is provided through two cable rooms located on either side of the control room. Each cable room contains two divisions, divisional separation is maintained by routing one division in enclosed solid sheet metal cable trays, while the other division is routed in rigid steel conduits which are completely embedded in concrete walls or floors to provide 3 hour fire rated separation.
The cable rooms do not contain any high energy equipment, rotating equipment, or piping which could be a potential source of missiles or pipe whip. No flammable, materials are stored in these rooms. Low voltage power cables (V3) are routed through both cable rooms to provide power for lighting transformers, regulating transformers and instrument buses within the control building. The areas are utilized for cable tray and conduit routing only, no other major equipment is housed within the cable rooms.

See figures 8.3.30, 8,3,31 and 8.3.32 for physical layouts of the area.

QUESTION 430.19
(8.3.1)

In Section 8.3.1.3.2 of your FSAR, you state that associated cables are uniquely identified by a longitudinal stripe and/or the data on the cable. This cable should be marked, preferrably color coded at least every five feet, in accordance with our position on this matter in Regulatory Guide 1.75. We hold the same position for the cables installed in the power generation control center (PGCC) floor sections discussed in Section 8.3.1.3.2.1(6) of your FSAR.

RESPONSE 430.19

The cables in the PGCC to be identified as "associated" every five feet with color coding of the division they are associated with.

Panel interior lights, utility receptacle circuits and fire detection circuits are run in non-divisional ducts. All associated circuits are run with only one division they are associated with.

The responsibility for marking cables external to the control room is by the applicant.

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430.20 (1.8) You have provided insufficient detail in your discussion of Regulatory Guide 1.128 in Section 1.8 of your FSAR to permit us to evaluate your compliance with this guide. Accordingly, provide a response which specifically addresses compliance with each position of this guide.

Response

FSAR Subsection 8.3.2.2.1.2.8 will be revised in accordance your request. Note attached copy of expanded compliance statement for Regulatory Guide 1.128.

Response to 430.20

8.3.2.2.1.2.8 Compliance with Regulatory Guide 1.128 - Installation Design and Installation of Large Storage Batteries for Nuclear Power Plant

~~Compliance with this regulatory guide is discu~~ 8-2.

430.20

The Class IR batteries are specified and located in accordance with IEEE Standard 484-1975, as modified and augmented by Regulatory Guide 1.128, revision 1, with the exception that the DIV 4 battery (Battery H) are three-tiered rather than two-tiered. Space limitation for access necessitated this exception. No deleterious effects are anticipated and maintenance activities were evaluated to be acceptable.

Compliane with Safety, Installation Procedures and Records Section of IEEE 484-1975, as modified and augmented by Regulatory Guide 1.128 is the responsibility of the applicant.

8.3.2.2.1.2.9 Compliance with R ... nce, Testing and R ... teries f

The Nuc ...

of ... is the

... gulatory Guide 1.131 - ... Tests of Electric Cables, Field ... and Connections for Light-Water-Cooled ... lear Power Plants

The Nuclear Island design complies with this Guide as discussed in Table 1.8-2.

8.3.2.2.1.3 Compliance with IEEE Standards

8.3.2.2.1.3.1 Compliance with IEEE Standard 308-1971 - Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations

See Subsections 8.3.1.2.1.3.1 and 8.3.1.2.1.3.2 for compliance of Class 1E systems with IEEE Standards 279-1971 and 308-1971.

8.3.2.2.1.3.2 Compliance with IEEE Standard 384-1974 - Trial Use Standard Criteria for Separation of Class 1E Equipment and Circuits

Each Class 1E division has its own 125 VDC battery. Each battery is installed in a separate room which has fire-resistive walls.

430.21 (8.3.2) State in Section 8.3.2.2 of your FSAR, whether the alternate chargers provided for the Class 1E dc systems were intended to be used to avoid a limiting condition of operation (LCO) on loss of the normal charger. Since the alternate chargers are powered from the non-Class 1E ac system, we allow no credit for their use. Accordingly, the plant will have to enter the limiting conditioning of operation status when the normal charger is lost even though the alternate charger is available.

<u>Response</u>

FSAR Subsection 8.3.2.2.1.1.1 will be revised to clarify use of the alternate chargers. A copy of the mark-up sheet is attached.

8.3.2.2.1.1.1 Compliance With General Design Criterion 17 (Continued)

or emergency steady-state loads. The normal battery charger supply is from Class 1E motor control centers in its division. The Division 4 battery is charged and float charged from the Division 2 AC system. Standby battery chargers are supplied from non-ESF sources appropriate for diversity (Figure 8.3-1). ~~Since the~~ When needed, these chargers will provide extra flexibility during the maintenance period when it is required to take the battery charger or the battery out of service. The availability of the alternate chargers however should not be used to avoid a limiting condition of operation on loss of the normal chargers. Since the DC power systems are operated ungrounded, a ground detection feature is provided. Indicators are provided in the control room to monitor the status of the battery charger supply. This instrumentation includes indication of output voltages, output current and battery ground status. Battery chargers are provided with disconnecting means and feedback protection. Periodic tests are performed to assure the readiness of the system to deliver the power required. A qualified ground detector system provides indication of any grounds which occur on the system.

8.3.2.2.1.1.2 Compliance with General Design Criterion 18

The DC power system is designed to permit inspection and testing of all important areas and features, especially those which have a standby function and whose operation is not normally demonstrated. The design has provided for the following testing:

(1) Every four months, voltage measurements of each cell to the nearest 0.1V, specific gravity of each cell, electrolyte level of each cell, float voltage and temperature of every fifth cell are made. These measurements are logged.

(2) The batteries are subject to a performance discharge test. The specific gravity and voltage of each cell are measured after discharge tests and after recharge and are logged.

~~AUG 2 5 1982~~

430.22 (8.3.2.2) Both the conclusion contained in NUREG-0666, "A Probabilistic Safety Analysis of DC Power Supply Requirements for Nuclear Power Plant" and operating experience indicate that bus ties between redundant dc divisions are a prime contributor to dc system unreliability. As a result, we recommend in NUREG-0666 eliminating the use of a bus tie breaker between redundant buses. Based on the findings in NUREG-0666 and the fact that bus ties compromise the independence and redundancy of the onsite electric power supplies required by Criterion 17 of the GDC it is our position to prohibit the use of bus ties between redundant dc divisions in new plant designs. Accordingly, justify in Section 8.3.2.2 of your FSAR why dc Divisions 1 and 2 cannot be made completely independent by eliminating the interconnecting bus tie shown in your proposed design.

Response

We refer to FSAR Figure 8.3-18 coordinates B-1 and E-1. A double breaker bus tie is provided between Div 1 and Div 2, 125V d-c buses for maintenance and testing purpose only.

The operation of the tie breakers is protected by kirk key interlock. The two circuit breakers are NORMALLY OPEN.

This arrangement has not been changed, since the PSAR approval by the NRC.

For the individual d-c tie breakers for division 1 and division 2 a "manual close" indication is provided in the control room.

Refer to FSAR Section 8.3.2.2.1.

8.3.2.2 Analysis

8.3.2.2.1 General DC Power Systems

The 480 VAC power supplies for the divisional battery chargers are from the individual Class 1E MCC to which the particular 125 VDC system belongs (Figure 8.3-1). In this way, separation between the independent systems is maintained and the AC power provided to the chargers can be from either preferred or standby AC power sources. The DC system is so arranged that the probability of an internal system failure resulting in loss of that DC power system is extremely low. Important system components are either self-alarming on failure or capable of clearing faults or being tested during service to detect faults. Each battery set is located on its own ventilated battery room as shown in Figures 8.3-8, 8.3-9, and 8.3-13. All abnormal conditions of important system parameters such as charger failure or low bus voltage are annunciated in the Main Control Room.

Cross connection between the independent 125 VDC systems is limited to manual breakers between Division 1 and Division 2 distribution panels. Key interlocks are used to enforce operating procedures. One breaker is furnished at each end of the cross tie to meet single-failure requirements. A control room indication is provided for each Tie-breaker in the "close" position.

AC and DC switchgear power circuit breakers in each division receive control power from the batteries in the respective load groups ensuring the following:

(1) The unlikely loss of one 125 VDC system does not jeopardize the supply of preferred and standby AC power to the Class 1E buses of the other load groups.

(2) The differential relays in one division and all the interlocks associated with these relays are from one

430.23 (8.3.2.1) The specific requirements for monitoring the dc power system derive from the generic requirements embodied in Section 5.3.2(4), 5.3.4(5) and 5.3.3(5) of IEEE Std. 308-1974 and the guidance we provide in Regulatory Guide 1.47. In summary, these general requirements state that the dc system composed of batteries, distribution systems and chargers shall be monitored to the extent that it can be shown to be ready to perform its intended function. Accordingly, the guidelines used in our review of the dc power system designs are that the following indications and alarms of the Class 1E dc power system should be provided in the control room:

- Battery current (ammeter-charge/discharge)
- Battery charger output current (ammeter)
- DC bus voltage (voltmeter)
- Battery charger output voltage (voltmeter)
- Battery discharge
- DC bus undervoltage and overvoltage alarm
- DC bus ground alarm (for ungrounded systems)
- Battery breaker(s) or fuse(s) open alarm
- Battery charger output breaker(s) or fuse(s) open alarm
- Battery charger trouble alarm (one alarm for a number of abnormal conditions which are usually indicated locally)

We conclude that the monitoring cited above, augmented by the periodic test and surveillance requirements included in the Technical Specifications, provide reasonable assurance that the Class 1E dc power system is ready to perform its intended safety function. Indicate your compliance with these provisions for monitoring the Class 1E prower system. Alternatively, justify any deviation.

Response

We provide a local and/or remote indication for all of the items listed. For further information see the revised version of FSAR Section 8.3.2.2.1, paragraph 1 (see copies attached).

8.3.2.2 Analysis

8.3.2.2.1 General DC Power Systems

The 480 VAC power supplies for the divisional battery chargers are from the individual Class 1E MCC to which the particular 125 VDC system belongs (Figure 8.3-1). In this way, separation between the independent systems is maintained and the AC power provided to the chargers can be from either preferred or standby AC power sources. The DC system is so arranged that the probability of an internal system failure resulting in loss of that DC power system is extremely low. Important system components are either self-alarming on failure or capable of clearing faults or being tested during service to detect faults. Each battery set is located on its own ventilated battery room as shown in Figures 8.3-8, 8.3-9, and 8.3-13. All abnormal conditions of important system parameters such as charger failure or low bus voltage are annunciated in the Main Control Room and/or locally (See Table 8.3-12).

Cross connection between the independent 125 VDC systems is limited to manual breakers between Division 1 and Division 2 distribution panels. Key interlocks are used to enforce operating procedures. One breaker is furnished at each end of the cross tie to meet single-failure requirements. A control room indication is provided for each Tie-breaker in the "close" position.

AC and DC switchgear power circuit breakers in each division receive control power from the batteries in the respective load groups ensuring the following:

(1) The unlikely loss of one 125 VDC system does not jeopardize the supply of preferred and standby AC power to the Class 1E buses of the other load groups.

(2) The differential relays in one division and all the interlocks associated with these relays are from one

Table 8.3-12

DC SYSTEM INDICATION AND ALARMS

BUS	CONDITION	INDICATION	LOCATION
DC-E	UNDERVOLTAGE, OVERVOLTAGE, GROUND FAULT OPEN BATTERY MAIN BREAKER OPEN BATTERY DISCONNECT SWITCH LOW BATTERY CHARGER DC VOLT & AMPS LOW BATTERY CHARGER AC INPUT VOLTS	D1 125VDC BUS DC-E TROUBLE	CONTROL RM. ANNUNCIATOR PNL.
		D1 125VDC BUS DC-E & MCC DC-E1 & DC-E2 TROUBLE	CONTROL RM. STATUS LIGHT PNL.
	BUS VOLTAGE	VOLTMETER	LOCAL & CONTROL RM.
	BUS AMMETER BATTERY AMP & VOLTS	VOLT AND AMMETER	LOCAL
DC-F	UNDERVOLTAGE, OVERVOLTAGE, GROUND FAULT OPEN BATTERY MAIN BREAKER OPEN BATTERY DISCONNECT SWITCH LOW BATTERY CHARGER DC VOLT & AMPS LOW BATTERY CHARGER AC INPUT VOLTS	D2 125VDC BUS DC-F TROUBLE	CONTROL RM. ANNUNCIATOR PNL.
		D2 125VDC BUS DC-F & MCC DC-F1 TROUBLE	CONTROL RM. STATUS LIGHT PNL.
	BUS VOLTAGE	VOLTMETER	LOCAL & CONTROL RM.
	BUS AMMETER BATTERY AMP & VOLTS	VOLT AND AMMETER	LOCAL
DC-H	UNDERVOLTAGE, OVERVOLTAGE, GROUND FAULT OPEN BATTERY MAIN BREAKER OPEN BATTERY DISCONNECT SWITCH LOW BATTERY CHARGER DC VOLT & AMPS LOW BATTERY CHARGER AC INPUT VOLTS	D4 125VDC BUS DC-H TROUBLE	CONTROL RM. ANNUNCIATOR PNL.
			CONTROL RM. STATUS LIGHT PNL.
	BUS VOLTAGE	VOLTMETER	LOCAL & CONTROL RM.
	BUS AMMETER BATTERY AMP & VOLTS	VOLT AND AMMETER	LOCAL.
DC-J	UNDERVOLTAGE, OVERVOLTAGE, GROUND FAULT OPEN BATTERY MAIN BREAKER OPEN BATTERY DISCONNECT SWITCH LOW BATTERY CHARGER DC VOLT & AMPS LOW BATTERY CHARGER AC INPUT VOLTS	ND 125VDC BUS TROUBLE	CONTROL ROOM ANNUNCIATOR PANEL
	BUS VOLTAGE	VOLTMETER	LOCAL & CONTROL RM.
	BUS AMMETER BATTERY AMP & VOLTS	VOLT AND AMMETER	LOCAL
DC-E1	UNDERVOLTAGE GROUND FAULT	D1 125VDC MCC DC-E1 TROUBLE	CONTROL RM. ANNUNCIATOR
		D1 125VDC BUS DC-E & MCC DC-E1 & MCC DC-E2 TROUBLE	CONTROL RM. STATUS LIGHTS
	BUS VOLTAGE & CURRENT	VOLTMETER & AMMETER	LOCAL & CONTROL RM.
DC-F1	UNDERVOLTAGE GROUND FAULT	D2 125VDC MCC DC-F1 TROUBLE	CONTROL RM. ANNUNCIATOR
		D2 125VDC BUS DC-F & MCC DC-F1 TROUBLE	CONTROL RM. STATUS LIGHTS
	BUS VOLTAGE & CURRENT	VOLTMETER & AMMETER	LOCAL & CONTROL RM.
DC-E2	UNDERVOLTAGE GROUND FAULT	D1 125VDC MCC DC-E2 TROUBLE	CONTROL RM. ANNUNCIATOR
		D1 125VDC DC-E & MCC DC-E1 & MCC DC-E2 TROUBLE	CONTROL RM. STATUS LIGHTS
	BUS VOLTAGE & CURRENT	VOLTMETER & AMMETER	LOCAL & CONTROL RM.

430.24 (8.3.2) Explain the statement in Section 8.3.2.1.3.1 of your FSAR that: "The normal dc supply is from the battery two nondivisional buses."

Response

The description shown in Section 8.3.2.1.3.1 "125VDC Systems Configuration" is misworded. The sentence beginning with "Two battery chargers are.....", and those that are shown after that ~~should~~ will be deleted.

The remainder of that paragraph ~~should~~ will be revised to read as follows:

> Two divisional battery chargers are used to supply each divisional DC distribution panel bus and its associated battery. The divisional DC distribution panel's ~~battery chargers~~ are normally fed from divisional 480V MCC buses. The redundant alternate supply to those panels is fed from non-divisional 480V MCC buses.
>
> The non-divisional DC distribution panel (DC-J) has two sections (sections X and Y) which are each connected to non-divisional battery chargers. Each battery charger is fed from separate non-divisional 480V MCC buses for the normal and the redundant alternate supplies.

430.25 (8.3.2) Verify that the periodic testing of the ac and dc electrical distribution system will be in accordance with the Standard Technical Specifications applicable to your proposed design.

Response

The Applicant must verify that the periodic testing of the AC and DC electrical distribution will be in accordance with the IEEE Standards and NRC General Design Criteria as outlined in Section 8.3.2. The Applicant must also provide any supplemental information regarding their periodic maintenance and testing programs (Reference 8.3.2.1.3.4 and 8.3.2.1.3.5).

430.26 (8.3.2) Since the feeder from the Class 1E dc systems to the balance of plant test equipment could compromise the independence of the Class 1E dc systems, provide a feeder circuit breaker which is locked open during plant operation and annunciates in the control room when the circuit breaker is closed. Revise section 8.3.2.2 of your FSAR accordingly.

<u>Response</u>

Since the feeder circuit breaker to the balance of plant (BOP) test equipment is key interlocked with the battery main circuit breaker, the status of the BOP test feeder circuit breaker need ~~to~~ not annunciated in the control room.

Plant operating personnel ~~will have to~~ must manually open (indicated in the control room) and key lock out the main battery breaker before they can unlock (with the same key) and close the BOP test feeder breaker. The Applicant must verify that their plant operating procedures include notifying the control room by the plant maintenance and/or operating personnel whenever they have to close the BOP test feeder breaker.

430.27 (8.3.2) Provide the specified operating voltage range of the Class 1E dc loads. Provide the maximum equalizing charge voltages for the Class 1E batteries and the dc system minimum discharge voltage at the end of the two hour design discharge. Provide the rating of the Division 3 battery charger and indicate the number of cells in each Class 1E battery. State whether the Division 3 battery charger will be affected by the voltage sag which occurs when the HPCS pump is started on the diesel-generator.

Response

See GESSAR II section 8.3.2.1.1 & Fig. 8.3-18

The number of cells in each battery bank (either Class 1E or non-Class 1E) is 60 cells, for the divisions 1, 2, and 4 and the non-divisional batteries.

The operating voltage range for Division 3 (HPCS) Class 1E dc loads is 112.5V to 137.5V with 125V dc nominal voltage. The maximum equalizing charge voltage for Division 3 (HPCS) 125Vdc battery is 137.4 volts. Voltage at the end of two-hour design discharge will be provided by the applicant. Division 3 battery charger is rated for 240/480V AC input with 132 volts (nominal), 100 amps dc output. Division 3 dc battery has 60 cells.

The charger is also capable of automatically regulating output voltage within ±1/2% of its rated value at any load between 0 and 100%, with the ac power feeding the charger deviating from the rated voltage by ±10%. Thus the Division 3 battery charger will not be affected by the voltage sag which occurs when the HPCS pump is started on the DG. The 125V DC battery will be able to maintain the bus voltage.

All dc loads connected on the division 3 dc bus are rated for operation in the voltage range of 112.5V to 137.5V.

430.28 (8.3) Provide the one-line diagrams for the motor control centers and buses fed from the 480 volt load centers and the 125V dc distribution panels.

Response

The one-line diagrams for the 480V and 125Vdc mcc and distribution panels. (Figures 8.3-16a-n, and p-w and 8.3-18a) are provided in Attachment No. 8.

430.29 (8.3.1) Provide the following additional information regarding diesel-generator load sequencing:

a. The method for determining the loading of motor-operated valves in Tables 8.3-1 and 8.3-2 of your FSAR is not consistent between Divisions 1 and 2. Indicate the total loading in these tables and in Table 8.3-3. Revise these three tables.

Response

a The total loading will be by applicant. It will differ per selected supplier. The referenced tables have been revised. Descripency between tables 8.3-1 and 8.3-2 in determining the loading of motor-operated valves has been taken care of.

430.29

b. The actual load sequencing times should be given in Table 8.3-4 of your FSAR rather than the maximum allowable time. Indicate the totals and subtotals for each load sequencing step. Provide a revised Table 8.3-4 incorporating the above comments.

Response

b Load sequencing during LOCA + LOPP is determined as a function of equipment motor starting current, and Diesel Generator size and load handling characteristic. For subsequent future reactor islands, suppliers and values will be different.

For the purpose of licensing, we feel that the maximum allowable time for load sequencing as listed in table 8.3-4 is sufficient.

The referenced tables have been revised.

430.29 c. Table 8.3-5 of your FSAR seems to imply that all the safety loads except RHR pumps A and B and one ESW pump are block loaded on the diesel-generators at time zero. Explain this matter in the text of your FSAR.

Response

c Table 8.3-5 has been revised (see attached copy). Please note that the quoted applied LOCA loads included the 3 divisions.

Table 8.3-1

LOADS ON DIESEL-GENERATOR 1

(DIVISION 1)

Description	Number on Bus	Total Horsepower Connected to Bus	Operating kW	Basis for kW Required	Maximum Inrush kVA	kW Connected During [redacted]	Emergency Shutdown	LOCA
Engineered Safety Features Loads on Div 1 Bus E1								
LPCS pump	1	1750	1400	Rating	10105	[redacted]	-	1400
LPCS fill pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
RCIC fill pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
RHR A pump	1	900	750	Rating	5190	[redacted]	750*	750
Standby liquid control pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
Control Rm AC water chiller unit	1	222 kW	100	Rating	1530	[redacted]	100	100
AC unit elect heating coil, part of CB HVAC	1	200 kW	200	Rating	200	[redacted]	-	200
Control Bldg HVAC	set	275 (c)	200	Rating	1475	[redacted]	220	220
H_2 Mixing	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]
Standby Gas Treatment System	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]
Aux Bldg (Part)	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Diesel-Generator Bldg HVAC	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]
Diesel emergency power auxiliaries	set	228 (c)	170	Rating	700	[redacted]	-	170
MSIV Leakage Control 1 System	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]
Hydrogen Recombiner System	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Pneumatic air supply	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Fuel pool cooling pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Nuclear Island standby** lighting	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Nuclear Island motor-operated valves	set	[redacted] (a)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Essential service water pumps***	2	2266	906	Rating	6230	[redacted]	1800	906
Battery Room fans	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Instrument transformers	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

NOTE: Non specified electrical power values to be supplied by applicant.

Table 8.3-1

LOADS ON DIESEL-GENERATOR 1 (Continued)

(DIVISION 1)

Description	Number on Bus	Total Horsepower Connected to Bus	Operating kW	Basis for kW Required	Maximum Inrush kVA	kW Connected During		
						[redacted]	Emergency Shutdown	LOCA
Non-Engineered Safety Features Loads Bus E2								
Lighting transformers	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Battery charger ND	1	150 kVA	150	Rating	150	[redacted]	150	(e)
DACODA feeder***	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
SLC mixing heater	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Non-Engineered Safety Features Loads Bus E2								
Reactor water cleanup pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Reactor Bldg CCW circulation pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Drywell cooling fans	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Drywell water chiller unit	1	418 kW	335	Rating	2390	[redacted]	335	(e)
Drywell chilled water pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Drywell chilled water booster pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Reactor water cleanup pump room fan	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Steam tunnel fan	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Air compressor	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
HVAC fans	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Starting air compressor	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Starting air aftercooler	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)
Instrument transformers	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(e)

Note: Non specified electrical power values to be supplied by applicant.

Table 8.3-1

LOADS ON DIESEL-GENERATOR 1 (Continued)

(DIVISION 1)

Description	Number on Bus	Total Horsepower Connected to Bus	Operating kW	Basis for kW Required	Maximum Inrush kVA	kW Connected During Emergency [redacted]	Shutdown	LOCA
Engineered Safety Features Loads								
Substation XFMR	1	225 kVA	95 kVA	Load	-	[redacted]	95 kVA	95 kVA
ESF battery charger, Div 1	1	500A x 125V	62 kW	Rating	120	[redacted]	100	80

Table 8.3-1 Notes:

*RHR, LPCS not required for first hour for load rejection; forced shutdowns on RHR required after one hour.

**Standby lighting is connected to the ESF bus E1. Circuits connected to the lighting fixtures are treated as divisional associated. The fixtures and lamps are not, of themselves, Class 1E equipment. However, it is highly desirable that standby lighting be available during LOCA, and failure mode during a SSE is judged to be in the open rather than the faulted mode. This justifies the use of buses which are not disconnected during a LOCA.

***Loads outside Nuclear Island specified by applicant.

(a) Short time loads of 1 minute or less duration. ~~Intermittent loads~~. Simultaneous loading estimated.
(b) Used during smoke removal.
(c) Contains heater loads.
(d) Heater on thermostat - ambient temperature is usually sufficient to keep sodium pentaborate solution to within proper temperature limits.
(e) Shed at time of LOCA. Reconnected manually as required after 10 minutes.
(f) On battery bus - continuously available.

Table 8.3-2

LOADS ON DIESEL-GENERATOR 2

(DIVISION 2)

Description	Number on Bus	Total Horsepower Connected to Bus	Operating kW	Basis for kW Required	Maximum Inrush kVA	kW Connected During	*Emergency*	
						[redacted]	Shutdown	LOCA
Engineered Safety Features Loads on Div 2 Bus F1								
RHR B pump	1	900	750	Rating	5190	[redacted]	750	750
RHR C pump	1	900	750	Rating	5190	[redacted]	–	750
RHR fill pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Standby liquid control pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Control Bldg HVAC	set	265 (c)	220	Rating	754	[redacted]	220	220
Control room AC water chiller unit, part of control Bldg HVAC	1	222 kW	110	Rating	1530	[redacted]	100	100
AC unit electric heating coil, part of Control Bldg HVAC	1	200 kW (b)	200	Rating	200	[redacted]	–	200
H_2 mixing	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	–	[redacted]
Standby Gas Treatment System, part of Fuel Bldg HVAC	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Aux Bldg (Part)	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Diesel-Generator Bldg HVAC	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Diesel emergency power auxiliaries	set	228	170	Rating	700	[redacted]	–	170
MSIV Leakage Control System	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	–	[redacted]
Hydrogen Recombiner System	set	[redacted] (c) [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Fuel pool cooling pump	1	150	130	Rating	600	[redacted]	130	130
Nuclear Island standby lighting*	set	135 kVA	30	Rating	40	[redacted]	[redacted]	30
Nuclear Island motor-operated valves	set	[redacted] (a)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Battery Room fans	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Instrument transformers	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

NOTE: Non specified electrical power values to be supplied by applicant.

Table 8.3-2

LOADS ON DIESEL-GENERATOR 2 (Continued)

(DIVISION 2)

Description	Number on Bus	Total Horsepower Connected to Bus	Operating kW	Basis for kW Required	Maximum Inrush KVA	kW Connected During [redacted]	Emergency [redacted] Shutdown	LOCA
Engineered Safety Feature Loads								
***Essential service water pumps	2	2266	1800	Rating	6230	[redacted]	1800/2700	906
***Substation XFMR	1	225 kVA	95 kVA	Rating	-	[redacted]	95 kVA	95 kVA
ESF Battery chargers, Div 2 and Div 4	2	300A/125V	37	Rating	118	[redacted]	118	118
Non-Engineered Safety Features Loads on Non-Div Bus F2								
Inclined Fuel Transfer System	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	(d)
Refueling equipment	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	(d)
Reactor water cleanup pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
RWCU MOV	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
Reactor Bldg CCW circulation pump	1	100	80	Rating	520	[redacted]	80	(d)
Drywell cooling fans	3	120	90	Rating	610	[redacted]	90	(d)
Drywell water chiller unit	1	418 kW	335 kW	Rating	2390	[redacted]	335	(d)
Drywell chilled water pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Drywell water chiller oil pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Drywell chilled water booster pump	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Reactor water cleanup Pump Room fan	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Neutron monitoring motor module	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	(d)
Steam tunnel fan	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Air compressor	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)

Note: Nonspecified electrical power values to be supplied by applicant.

Table 8.3-2

LOADS ON DIESEL-GENERATOR 2 (Continued)

Description	Number on Bus	Total Horsepower Connected to Bus	Operating kW	Basis for kW Required	Maximum Inrush kVA	kW Connected During ~~Normal Operation~~	Emergency ~~Normal~~ Shutdown	LOCA
Non-Engineered Safety Features Loads on Non-Div Bus F2								
HVAC fans	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		
Starting air compressor	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Starting air aftercooler	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Instrument transformers	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Lighting transformers	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Equipment cranes	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
SLC operating heater	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	(d)
Personnel locks	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(d)
Pneumatic Supply System	set	[redacted]	-	[redacted]	-	-	-	-

Table 8.3-2 Notes:

* Standby lighting is connected to the ESF bus F1. Circuits connected to the lighting fixtures are treated as divisional associated. The fixtures and lamps are not, of themselves, Class 1E equipment. However, it is desirable that standby lighting be available during LOCA, and this justifies the use of buses which are not disconnected during a LOCA.

[redacted]

*** ESF loads outside Nuclear Island specified by applicant.

(a) short time loads of 1 minute or less duration Intermittent loads. Simultaneous loading estimated.

(b) Used during smoke removal.

(c) Contains heater loads.

(d) Shed at time of LOCA, by a LOCA signal. Reconnected as required after 10 minutes.

Table 8.3-3

LOADS ON DIESEL-GENERATOR 3

(DIVISION 3)

Description	Number on Bus	Total Horsepower Connected to Bus	Operating kW	Inrush kVA	kW Connected During [redacted]	Emergency Shutdown	LOCA
HPCS pump motor	1	3000	2420	16,000		-	2300**
Diesel cooling water pump	1	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]
Motor operated valves* (a)	set	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]
Diesel auxiliaries	set	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]
125 V DC battery charger	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
HPCS Pump Room fan	1	[redacted]	-	[redacted]	[redacted]		[redacted]
Diesel Room HVAC	set	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Standby Water Leg Pump	1	[redacted]	[redacted]	[redacted]	[redacted]		
Line fill pump					[redacted]		
HPCS strainer	1		[redacted]		[redacted]		
Battery Room fan	1	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]
HPCS SWGR Room fans	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Fuel Storage Pump Room fans	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Lighting transformers	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Instrument transformers	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Note 1: All loads are considered ESF

(a)* [redacted] short time loads of 1 minute or less duration. Simultaneous loading is estimated.

** actual 94% efficiency

HPCS DIESEL-GENERATOR RATINGS

Continuous: 2600 kW
2000 hrs : 2850 kW
30 min : 3030 kW

Table 8.3-4

DIESEL-GENERATOR 1 AND 2 LOAD APPLICATION

Description	Number on Bus	Redundant Equip. Ident.	Total Load Size (HP)	Minimum Operating Requirements: Emergency Shutdown: Number Required	Emergency Shutdown: Time to Start	Emergency Shutdown: Time to Stop	LOCA: Number Required	LOCA: Allowable* Time to Start (1)	LOCA: Time to Stop
Engineered Safety Features Loads on Div Bus E1									
LPCS pump	1	Div 2 Sys (5)	1750	-	-	-	1	0 sec [redacted]	(4)
LPCS fill pump	1	None	[redacted]	-	-	-	1	0 sec [redacted]	(4)
RCIC fill pump	1	None	[redacted]	1	60 sec (3)	(4)	-	0 sec	-
RHR A pump	1	RHR 'B' (5)	900	1	10 min (4)	(4)	RHR A or B	5 sec [redacted]	(4)
Standby liquid control pump	1	SLC Div 2	[redacted]	1	(4)	(4)	1	(4)	(4)
Control Bldg HVAC	set	Div 2 CB HVAC	(10) 173	set	15 sec	(4)	set	15 sec	(4)
Control Room AC water chiller unit, part of Control Bldg HVAC	2	Div 2 Unit	222 kW	1	15 sec	(4)	1	15 sec	(4)
AC unit electrical heating coil, part of Control Bldg HVAC	1	Div 2 Heater	(9) 200 kW	1	15 sec	(4)	1	15 sec	(4)
Control Bldg HVAC	set	Div 2	(10) 275	set	15 sec	(4)	set	15 sec	(4)
H_2 mixing	set	Div 2 RB HVAC	[redacted]	set	-	-	-	-	-
Standby Gas Treatment System, part of Fuel Bldg HVAC	set	Div 2	[redacted]	set	5 sec	(4)	set	5 sec	(4)
Aux Bldg HVAC (Part)	set	Div 2 AB HVAC	[redacted]	set	10 sec	(4)	set	10 sec	(4)
Diesel-General Bldg HVAC	set	Div 2 DG HVAC	[redacted]	set	15 sec (3)	(4)	set	15 sec [redacted]	(4)
Diesel emergency power auxiliaries	set	Div 2	228	part set	15 sec (3)	(4)	part set	15 sec [redacted]	(4)
MSIV Leakage Control System	set	Div 2 System	[redacted]	-	-	-	set	0 sec	(4)
Hydrogen Recombiner System	set	Div 2 System	[redacted]	part set	-	(4)	set	-	(4)
Pneumatic air supply	set	Div 2 System	[redacted]	set	-	(4)	set	-	(4)
Fuel pool cooling pump	set	Div Pump	150	1	20 sec plus	(4)	1	20 sec [redacted]	(4)

*Times shown are maximum allowable and do not necessarily denote actual time delay circuits.

NOTE: - Non specified electrical power values to be supplied by applicant.
- Allowable starting time for the LPCS & the RHR (A) pumps denote the actual time delay circuits

Table 8.3-4

DIESEL-GENERATOR 1 AND 2 LOAD APPLICATION (Continued)

				Minimum Operating Requirements					
				Emergency Shutdown			LOCA		
Description	Number on Bus	Redundant Equip. Ident.	Total Load Size (HP)	Number Required	Time to Start	Time to Stop	Number Required	Allowable* Time to Start	Time to Stop
Engineered Safety Features Loads on Div Bus E1									
Nuclear Island standby** lighting	set	Div 2 System	[redacted]	set	0 sec	(4)	set	20 sec	(4)
Nuclear Island motor-operated valves	set	Div 2 System	[redacted]	part set	0 sec [redacted]	(2)	part set	0 sec [redacted]	(4)
Essential service water pump	2	Div 2 Pump	1133	1	10/15 sec	(4)	1	10/15 sec	(4)
Instrument transformers	set	None	[redacted]	set	-	-	set	0 sec	-
Substation XFMR*	1	Div 2 XFMR	225 kVA	1	0 sec	(4)	1	0 sec	(4)
ESF battery charger, Div 1	1	Div 2 and 3	100 kW	1	20 sec	(4)	1	20 sec	(4)
Battery Room fans	1	None	[redacted]	1	1 hr	(4)	1	1 hr	(4)
Non-Engineered Safety Features Loads on Non-Div Bus E2									
Reac water cleanup pump	1	(11)	[redacted]	1	0 sec	(4)	(12)	(4)	-
Reactor Bldg CCW circ pump	1	(11)	100	1	0 sec	(4)	(12)	(4)	-
Drywell cooling fans	3	(11)	[redacted]	2	0 sec	(4)	(12)	(4)	-
Drywell water chiller unit	1	(11)	418 kW	1	0 sec	(4)	(12)	(4)	-
Drywell chilled water pump	1	(11)	[redacted]	1	0 sec	(4)	(12)	(4)	-
Drywell chilled water booster pump	1	(11)	[redacted]	1	0 sec	(4)	(12)	(4)	-
Reactor water cleanup Pump Room fan	1	(11)	[redacted]	1	0 sec	(4)	(12)	(4)	-
Steam tunnel fan	1	(11)	[redacted]	1	0 sec	(4)	(12)	(4)	-
Air compressor	1	(11)	[redacted]	1	0 sec	(4)	(12)	(4)	-

Note: Non specified electrical power values to be supplied by applicant.

Table 8.3-4

DIESEL-GENERATOR 1 AND 2 LOAD APPLICATION (Continued)

Description	Number on Bus	Redundant Equip. Ident.	Total Load Size (HP)	Minimum Operating Requirements: Emergency Shutdown — Number Required	Emergency Shutdown — Time to Start	Emergency Shutdown — Time to Stop	LOCA — Number Required	LOCA — Time to Start	LOCA — Time to Stop
Non-Engineered Safety Features Loads on Non-Div Bus E2									
HVAC fans	set	(11)	[redacted]	set	10 sec	(4)	(12)	-	-
Starting air compressor	2	Div 2	[redacted]	2	10 sec	(4)	(12)	-	-
Starting air aftercooler	2	Div 2	[redacted]	2	10 sec	(4)	(12)	-	-
Instrument transformers	set	-	[redacted]	set	10 sec	(4)	(12)	-	-
Lighting transformers	set	-	[redacted]	set	10 sec	(4)	(12)	-	-
AB equipment hoist	set	(11)	[redacted]	set	10 sec	(4)	(12)	-	-
Battery charger ND	1	(11)	150 kVA	1	10 sec	(4)	(12)	-	-
DACODA feeder	1	None	[redacted]	1	10 sec	(4)	(12)	-	-
SIC mixing heater	1	(11)	[redacted]	1	10 sec	(4)	(12)	-	-
Engineered Safety Features Loads on Div 2 Bus F1									
RHR B pump	1	RHR A (5)	900	1, RHR A or B	10 min (4)	(4)	1, RHR A or B(5)	5 sec [redacted]	(4)
RHR C pump	1	RHR A (5)	900	1, RHR A or B	10 min (4)	(4)	1, RHR A, B or C(6)	0 sec	(4)
RHR Water leg pump	1	None	[redacted]	1	60 sec (3)	(4)	-	0 sec	-
Standby liquid control pump	1	Div 1 Pump	[redacted]	1	(4)	(4)	1	(4)	(4)
Control Bldg HVAC fans and pumps	set	Div 1 CB HVAC	(10) 265	set	15 sec	(4)	set	15 sec	(4)
Control Room AC water chiller unit, part of Control Bldg HVAC	1	Div 1 Unit	22? kW	1	15 sec	(4)	1	15 sec	(4)

Note: - Non specified electrical power values to be supplied by applicant
- Allowable starting time for the RHR (B) & (C) pumps denote the actual time delay circuits

Table .3-4

DIESEL-GENERATOR 1 AND 2 LOAD APPLICATION (Continued)

				Minimum Operating Requirements					
				Emergency Shutdown			LOCA		
Description	Number on Bus	Redundant Equip. Ident.	Total Load Size (HP)	Number Required	Time to Start	Time to Stop	Number Required	Time to Start	Time to Stop
Engineered Safety Features Loads on Div 2 Bus F1									
AC unit elect heating coil, part of Control Bldg HVAC	1	Div 1 Heater	(9) 200 kW	1	15 sec	(4)	1	15 sec	(4)
H_2 mixing	set	Div 1 RB HVAC	[redacted]	set	15 sec	(4)	set	15 sec	(4)
Standby Gas Treatment System	set	Div 1	[redacted]	set	5 sec	(4)	set	5 sec	(4)
Aux Bldg HVAC (Part)	set	Div 1 AB HVAC	155	set	10 sec	(4)	set	10 sec	(4)
Diesel-Generator Bldg HVAC	set	Div 1 DG HVAC	[redacted]	set	15 sec (3)	(4)	set	15 sec [redacted]	(4)
Diesel emergency power auxiliaries	set	Div 1 System	228	part set	15 sec (3)	(4)	part set	15 sec [redacted]	(4)
MSIV Leakage Control System	set	Div 1 System	[redacted]	-	-	-	set	0 sec [redacted]	(4)
Hydrogen Recombiner System	set	Div 1 System	[redacted]	part set	10 sec (3)	(4)	set	0 sec [redacted]	(4)
Engineered Safety Features Loads									
Pneumatic Supply System	set	Div 1 System	[redacted]	set	5 sec	(4)	set	5 sec	(4)
Fuel pool cooling pump	1	Div 1 Pump	150	1	20 sec	(4)	1	20 sec	(4)
Nuclear Island standby** lighting	set	Div 1 Set	[redacted]	set	20 sec	(4)	set	20 sec	(4)
Nuclear Island motor-operated valves	set	Div 1 System	[redacted]	part set	0 sec (3)	(2)	part set	0 sec [redacted]	(4)
Essential service water* pumps	2	Div 1 Pump	1133	1	10/15 sec	(4)	1	10/15 sec	(4)
Substation XFMR*	1	Div 1 XFMR	225 kVA	1	0 sec	(4)	1	0 sec	(4)
ESF battery chargers, Div 2 and 4	2	Div 1	118 kW	1	20 sec	(4)	1	20 sec	(4)
Battery Room fans	2	None	[redacted]	1	1 hr	(4)	1	1 hr	(4)
Instrument transformers	set	None	[redacted]	set	0 sec		set	0 sec	

Note: Non specified electrical power values to be supplied by applicant.

Table 8.3-4

DIESEL-GENERATOR 1 AND 2 LOAD APPLICATION (Continued)

Description	Number on Bus	Redundant Equip. Ident.	Total Load Size (HP)	Minimum Operating Requirements: Emergency Shutdown: Number Required	Emergency Shutdown: Time to Start	Emergency Shutdown: Time to Stop	LOCA: Number Required	LOCA: Time to Start	LOCA: Time to Stop
Non-Engineered Safety Features Loads on Non-Div Bus F2									
Inclined Fuel Transfer System	set	None	[redacted]	-	-	-	-	-	-
Refueling equipment	set	None	[redacted]	-	-	-	-	-	-
Reactor water cleanup pump	1	(11)	[redacted]	1	10 sec	(4)	(12)	-	-
Reactor Bldg CCW circulation pump	1	(11)	100	1	10 sec	(4)	(12)	-	-
Drywell cooling fans	3	(11)	120	2	10 sec	(4)	(12)	-	-
Drywell water chiller unit	1	(11)	418 kW	1	10 sec	(4)	(12)	-	-
Drywell chilled water pump	1	(11)	[redacted]	1	10 sec	(4)	(12)	-	-
Drywell chilled water booster pump	1	(11)	[redacted]	1	10 sec	(4)	(12)	-	-
Reactor water cleanup pump room fan	1	(12)	[redacted]	1	10 sec	(4)	(12)	-	-
Neutron monitoring motor module	1	None	[redacted]	1	10 sec	(4)	(12)	-	-
Steam tunnel fan	1	Div 1 fan	[redacted]	1	10 sec	(4)	(12)	-	-
Air compressor	1	Div 1	[redacted]	1	10 sec	(4)	(12)	-	-
HVAC fans	set		[redacted]	set	10 sec	(4)	(12)	-	-
Starting air compressor	2	Div 1	[redacted]	2	10 sec	(4)	(12)	-	-
Starting air aftercooler	2	Div 1	[redacted]	2	10 sec	(4)	(12)	-	-
Instrument transformers	set	None	[redacted]	set	10 sec	(4)	(12)	-	-
Lighting transformers	set	(11)	[redacted]	set	10 sec	(4)	(12)	-	-
Equipment cranes	set	None	[redacted]	set	10 sec	(4)	(12)	-	-
SLC operating heater	1	Div 1	[redacted]	1	10 sec	(4)	(12)	-	-
Personnel locks	2	None	[redacted]	2	10 sec	(4)	(12)	-	-

Note: Non specified electrical power values to be supplied by applicant.

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Table 8.3-4

DIESEL-GENERATOR 1 AND 2 LOAD APPLICATION (Continued)

Table 8.3-4 Notes:

*ESF loads outside Nuclear Island specified by applicant

**Standby lighting is connected to the ESF buses, E1 and F1. Circuits connected to the lighting fixtures are treated as divisional [redacted] The fixtures and lamps are not, of themselves, Class 1E equipment. However, it is desirable that standby lighting be available during LOCA, and this justifies the use of buses which are not disconnected during a LOCA.

(1) Time in sequence for starting loads after voltage established on bus following emergency core cooling signal. Maximum time after LOCA for signal to start diesel-generator and voltage to be established on bus is 10 sec.

(2) Motors stop automatically when valve action completed.

(3) Start and/or stop automatically with associated pump, diesel, or pressure or temperature switch, etc.

(4) Started and/or stopped manually by operator.

(5) If HPCS is available, Divisions 1 and 2 are functionally redundant to each other. Divisions 1 and 2 together provide functional core cooling redundancy to the HPCS.

(6) If HPCS is not available, all three RHR pumps required at time shown for each.

(7) Categories of loads on Engineered Safety Features buses are tabulated on the basis of currently estimated values for Reactor Island. Other loads generally connected are listed by description only, for information purposes.

(8) Basis for kW requirements is rated load.

(9) Used during smoke removal.

(10) Includes heater loads.

(11) Redundant equipment from diverse non-ESF source.

(12) Shed at the time of LOCA.

Table 8.3-5

SEQUENCE OF EVENTS IN AUTOMATIC APPLICATION OF EMERGENCY AC LOADS UPON LOSS OF COOLANT

Event	Time (sec)	Comment
Design basis LOCA signal	(-10.03 sec)	Solid-state drivers 33 ms propagation time
Signal to start diesel	(-10 sec)	
Standby and HPCS diesels ready to load; start LPCS pump & RHR pump C ~~m~~; apply power to selected 480V auxiliaries and motor-operated valves	0	By definition (bus energized) LPCS ~~(RHRC)~~ HPCS, RH Auxiliaries (E1 and F1 buses)
Start RHR pumps A & B	5	Bus E2 and F2 * ~~RHR (RHRB)~~
Start ESW pump 1	10	
~~Start one ESW pump~~	~~15~~	
All ECCS pumps at rated speed	25	Completes ECCS starting sequence
Injection valves fully open	40	

*Tripped off by LOCA signal.

430.30 (8.3.1) Explain note 8 of Figure 8.3-2 in your FSAR, particularly the phrase "for BUS E Normal Feeder Backfeed."

Response

Note 8 of fig 8.3.-2 will be revised to delete "or for Bus E NORMAL Feeder Backfeed".

For explanation of this note refer to Section 8.3.1.1.8.4.

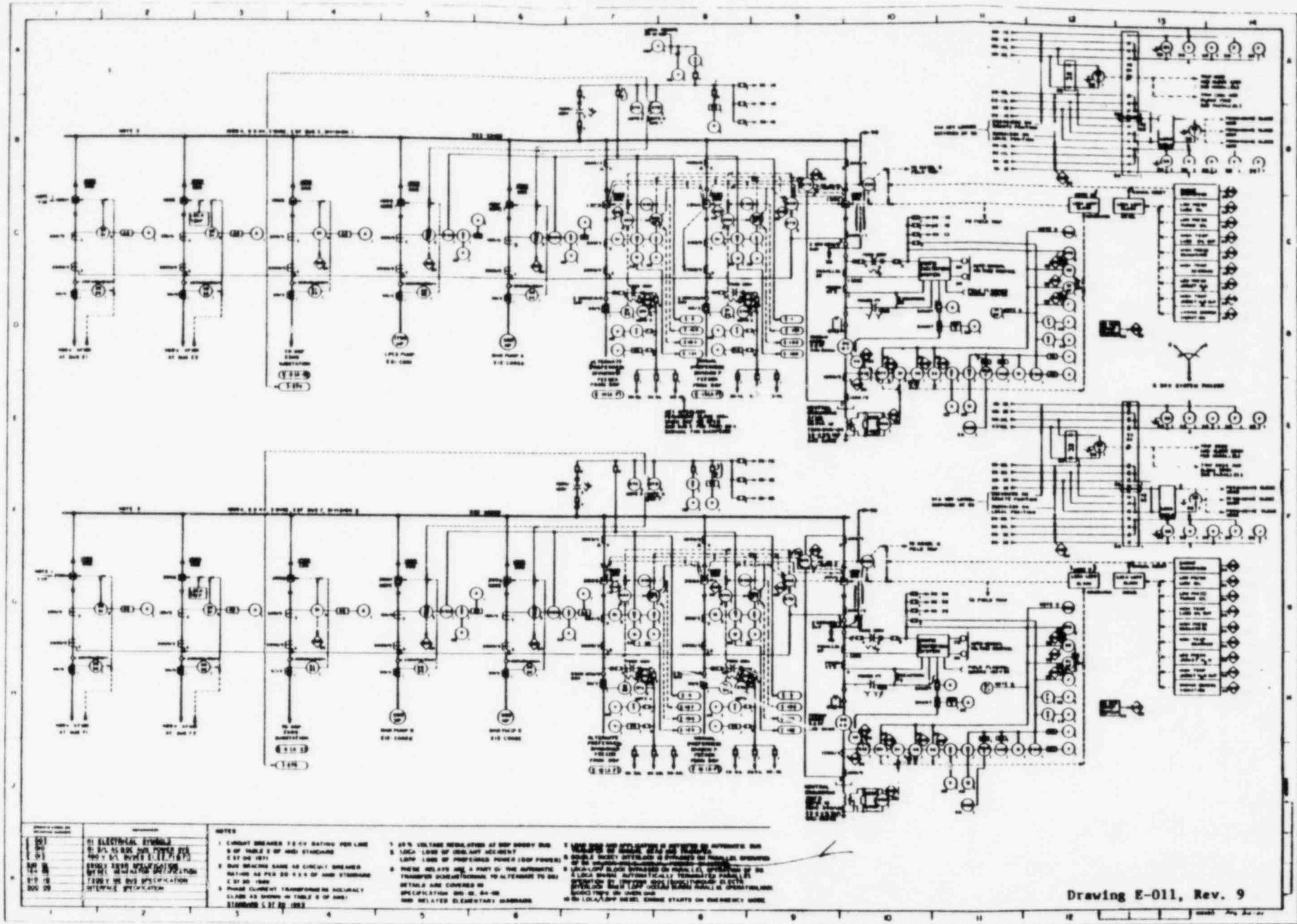

Figure 8.3-2. Nuclear Island 6900 Volt Single Line Buses E & F

430.31 (1.8) Provide the following additional information regarding the protection ~~regarding the protection~~ of containment electrical penetrations:

a. You indicate in Part I.2.13 of Section 1.8 of your FSAR that an analysis is required for circuits normally protected by small fuses or breakers such as control circuits, alarms and solenoids. Provide this analysis.

Response

The requested analysis will be pro[illegible] as Subsection I.2.13.1 in RESSAR II. Ref[illegible] to attached copy.

430.31

b. In this same portion of the FSAR, you also indicate that where very low currents are involved such as in instrumentation circuits, thermocouples and annunciators, no action is required and that conformance with the provisions of Regulatory Guide 1.63 is accomplished by inspection. Explain what is meant by the phrases "no action required" and "conformance by inspection." It is our position that if the fault current available from these circuits is greater than the continuous current rating of the penetrators, the penetrations must be protected by at least two fault current interrupting devices.

Response

The summary table will be clarified as shown in attached copy. This is accepted by section D of the analysis in I.2.13.1.

I.2.13 Regulatory Guide 1.63, Revision 1, Dated May 1977 (Continued)

of the redundant protective elements so that no event causing a need for the protection can disable the protective function.

I.2.13.1 Analysis of circuits penetrating primary containment.

A. 6.9 kV cricuits for recirculation pump motors are protected by two circuit breakers in series.

B. Power circuits for motor control center loads are protected by a circuit breaker and a fuse per phase in series. The application of penetration wire protecting devices is shown on the MCC single line diagrams.

C. MCC control circuits have dual fusing for NEMA size 3 and size 4 motor starters. For NEMA size 1 and size 2 motor starters only one fuse per control circuit is specified, sin the available control transformer short circuit current is l than the control wire current rating.
125V d-c instrument circuits will be protected by 2-pole circuit breakers.
120V a-c instrument circuits and space heater circuits will have one single pole breaker and one fuse in series.

D. Specific circuits, having a limited power source, that canno produce any short circuit current, damaging to the conductor insulation, do not require a protective device.

Included in these special circuits are:

°Thermocouple circuits
°Shielded cables for low level signals (4 to 20 mA - LPRM, IRM, SRM, RPIS instru mentation circuits)

°Annunciator circuits

I.2.13 Regulatory Guide 1.63, Revision 1, Dated May 1977 (Continued)

Summary Table of Conformance with Regulatory Guide 1.63 for Circuits Penetrating Primary Containment

	Use of Two Interrupting Devices in Series	Analysis Required	Very Low Currents Involved ~~No Action Required Conformance by Inspection~~ No interrupting device required. circuit is self protecting.
Recirculation pumps	X		
Power Circuits on motor control centers	X		
Control circuits, alarm, solenoids, etc. - circuits, normally protected by small fuses or breakers		X	
Instrumentation circuits, thermocouples, annunciator - all low-current-level applications			X

c. Provide the fault current clearing-time curves of the primary and secondary current interrupting devices for the penetrations plotted against the thermal capability (I^2t) curve of the penetration. Our concern in this matter is the maintenance of mechanical integrity. Provide a simplified one-line diagram showing the location of the protective devices in the penetration circuit and indicate the maximum available fault current of the circuit. If the overcurrent protection is not fault current actuated, identify the power source to the trip circuits. It is our position that the power source for the primary protection device should be from a division different from that supplying the secondary protection device.

Response

The fault current clearing-time curves of the primary and secondary current interrupting devices is by the applicant.

The thermal capability (I^2t) curves of the penetrations must be in accordance with standard IPCEEA P-32-382.

All overcurrent protection is fault current actuated.

430.32
(1.8)

In Part I.2.27 of Section 1.8 of your FSAR, you state that your design thermal overload devices are active only when the equipment is in the test mode and are bypassed when the equipment is in the normal mode. Provide details of the means used to bypass the overloads. State whether indication is provided in the control room that the bypass is removed. Provide a schematic of the bypassing and indication scheme.

Response

The valve motor operator thermal overload normally closed (NC) contact.(which opens on an overload condition only) is bypassed by a NC contact of a 95 relay (a Potter-Brumfield type MDR 134-1 relay, or equal). A GE type CR2940 keylock switch is used for the valve test switch.

When the test switch (located on a Control Room panel) is placed from the normal to the test position, the 95 relay will be energized. This then opens the NC contact paralleling the motor thermal overload contact, thereby providing thermal overload protection to the valve motor operator. At the same time another 95 relay contact closes and an amber status light, marked "MOV in Test" is lit on the same Control Room panel. In addition to the status light, there is an amber "Out of Service" light lit on the annunciator panel.

Example schematics can be found on the system elementaries in Appendix 7A. For example Figure 7A.3-6n for the Main Steam Positive Leakage Control System shows the test switch and the 95 relay. Figures 7A.3-61 and 7A.3-6m show the annunciator panel for this system and figures 7A.3-6j and 7A.3-6k show the status light configurations. Also refer to the revised version of FSAR ~~Section~~ Figures 7A.8-1 [illegible] given in [illegible] Attachment No. 8.

430.33 (8.3.3) In Section 8.3.3.2 of your FSAR, you state that cable tunnels in the control building are divisionalized. Describe how they are "divisionalized" and explain how this complies with Position C.8 of Regulatory Guide 1.75.

Response

Cable Tunnels in the Control Building are divisionalized by separating Division 2 & 3 in one tunnel and Division 1 & 4 in another tunnel. Increased separation within the Division 2 & 3 tunnel is obtained by routing Division 2 cables in totally enclosed sheet metal cable trays, while Division ~~2~~ 3 cables are routed in Embedded Rigid Steel Conduits.

In the Divsion 1 & 4 tunnel, Division 1 cables are routed in totally enclosed sheet metal cable trays and Division 4 cables are routed in Embedded Rigid Steel Conduits.

In addition to the separation of different cable divisions, the tunnels are ventilated ~~with~~ the HVAC Ductwork system and ~~installed~~ provided with Fire Detectors. The tunnels do not have any potential hazards such as high pressure piping, missiles, flammable materials, flooding or wiring that is not flame retardent. Divisional Power Cables are routed in these tunnels but they are of lower voltage (480V) to serve the Lighting Transformers and Instrument Buses in the Control Room.

For additional information on localization of fires refer to the revised version of FSAR Section 8.3.3.2 copy attached.

8.3.3.2 Localization of Fires (Continued)

from the main switchgear rooms is also provided. Separation is provided between the divisional cables and between divisional cables and nondivisional cables being routed throughout the plant via separate fire rated compartments or embedments. Local instrument panels and racks are located to facilitate adequate spatial separation of cabling. This separation is maintained all the way to the Power Generation Control Complex (PGCC) termination cabinets in the Main Control Room and in the Control Equipment Room.

Cable Tunnels in the Control Building are divisionalized by separating Division 2 & 3 in one tunnel and Division 1 & 4 in another tunnel. Increased separation within the Division 2 & 3 tunnel is obtained by routing Division 2 cables in totally enclosed sheet metal cable trays, while Division 2 cables are routed in Embedded Rigid Steel Conduits.

In the Divsion 1 & 4 tunnel, Division 1 cables are routed in totally enclosed sheet metal cable trays and Division 4 cables are routed in Embedded Rigid Steel Conduits.

In addition to the separation of different cable divisions, the tunnels are ventilated with HVAC Ductwork and installed with Fire Detectors. The tunnels do not have any potential hazards such as high pressure piping, missiles, flammable materials, flooding or wiring that is not flame retardent. Divisional Power Cables are routed in these tunnels but they are of lower voltage (480V) to serve the Lighting Transformers and Instrument Buses in the Control Room.

Cables entering the drywell area from the containment area utilize a standard field installed conduit sleeve and conduit seal design concept described and justified in Appendix 3C, which addresses qualification.

8.3.3.3 Fire Detection and Protection Systems

All areas except the diesel-generator rooms are protected by product of combustion detectors. The diesel-generator rooms are protected by carbon dioxide suppression, which is actuated by compensated rate of heat rise and ultraviolet flame detectors.

Automatic wet standpipe, sprinklers, hose reels and manual pull boxes for the operator's initiation of fire signals are provided in areas as described in Subsection 9.5.1, which includes areas where cables and cable trays are routed.

430.34 (8.3.1) Recent experience with protective relays for Class 1E electrical system equipment in nuclear power plants has established that the relay trip setpoint of conventional relays drifts from its initial setting. This in turn, has resulted in premature trips of redundant safety-related system pump motors when the safety system was required to be operative. While the basic need for proper protection for feeders/equipment against permanent faults is recognized, it is our position that total non-availability of redundant safety systems due to spurious trips in protective relays, is not acceptable. Accordingly, provide a description of your circuit protection criteria for safety systems/equipment to avoid: (1) an incorrect selection of the initial setpoint; and (2) the drifting of the trip setpoint of protective relays

Response

The reported setpoint drift probably is related to the application of solid state type protective relaying. The ~~STRIDE~~ GESSAR II Equipment Specifications include a setpoint drift free requirement. Conventional electro-mechanical type relays, having no setpoint drift may be utilized, providing that they meet the seismic requirements.

If the supplier could not state or verify that his relays are "setpoint drift free", then the amount of drift will be accounted for in the coordination study.

The subsequent verification, that the setpoint drift is within the limits used in the coordination study is the responsibility of the applicant in accordance with his Technical Specifications.

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QUESTION 430.35

We have noted during our reviews of other applications that pressure switches or other devices were incorporated into the final actuation control circuitry for large horsepower safety-related motors used to drive pumps. These switches or devices preclude automatic (i.e., upon receipt of a safety signal) and manual operation of the affected motor/pump combination unless permissive conditions such as lube oil pressure are satisfied. Accordingly, identify all safety-related motor/pump combinations which you propose to incorporate in your nuclear island and which operate as noted above. Describe the redundancy and diversity which is provided for the pressure switches or permissible devices used in this manner.

RESPONSE 430.35

SAFETY-RELATED MOTOR/PUMP COMBINATIONS WITH PERMISSIBLE DEVICES

ITEM 1 FUEL POOL COOLING AND CLEANUP (FPCCU) SYSTEM.

PERMISSIBLE DEVICES DRAIN TANK LOW-LOW LEVEL SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE FPCCU PUMP MOTORS, AS DESCRIBED IN SECTION 7.6.1.7.C1

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.6.1.7.C3

ITEM 2 STAND-BY LIQUID CONTROL SYSTEM

PERMISSIBLE DEVICES STORAGE TANK OUTLET VALVES OPEN LIMIT SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE STAND-BY LIQUID PUMP MOTORS AS DESCRIBED IN SECTION 7.4.1.2.G

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.4.1.2.H

RESPONSE 430.35 (CONTINUED)

ITEM 3 DIESEL GENERATOR ROOM VENTILATION SYSTEMS 1 AND 2

PERMISSIBLE DEVICES CARBON DIOXIDE FIRE PROTECTION SYSTEM ACTIVATED SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE VENTILATION SYSTEMS 1 AND 2 SUPPLY AND EXHAUST FAN MOTORS. EXHAUST FAN MOTOR RUNNING CONTACTS ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE VENTILATION SYSTEMS 1 AND 2 SUPPLY FAN MOTORS. THESE ARE DESCRIBED IN SECTION 7.3.1.1.13.2.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.13.2.C4

ITEM 4 DIESEL GENERATOR ROOM VENTILATION SYSTEM 3

PERMISSIBLE DEVICES CARBON DIOXIDE FIRE PROTECTION SYSTEM ACTIVATED SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE VENTILATION SYSTEM 3 RECIRCULATION AND EXHAUST FAN MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.13.2.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.13.2.C4

ITEM 5 SWITCHGEAR ROOM SUMMER VENTILATION SYSTEM DIVISION 3

PERMISSIBLE DEVICE DIVISION 3 SWITCHGEAR ROOM SUMMER VENTILATION SYSTEM FAN INLET DAMPER OPEN LIMIT SWITCH IS INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE FAN MOTOR, AS DESCRIBED IN SECTION 7.3.1.1.13.2.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.13.2.C4

RESPONSE 430.35 (CONTINUED)

ITEM 6 DIVISION 3 SWITCHGEAR ROOM SUMMER/WINTER VENTILATION SYSTEM

PERMISSIBLE DEVICE DIVISION 3 SWITCHGEAR ROOM SUMMER/WINTER VENTILATION SYSTEM INLET DAMPER OPEN LIMIT SWITCH IS INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR SWITCHGEAR ROOM SUMMER/WINTER VENTILATION SYSTEM SUPPLY FAN MOTOR, AS DESCRIBED IN SECTION 7.3.1.1.13.2.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.13.2.C4

ITEM 7 CONTROL BUILDING CHILLED WATER SYSTEM

PERMISSIBLE DEVICES CHILLED WATER EXPANSION TANK LOW-LOW LEVEL SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE CHILLER EVAPORATOR CHILLED WATER PUMP MOTOR, AS DESCRIBED IN SECTION 7.3.1.1.18.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.18.C4

ITEM 8 CONTROL BUILDING CHILLED WATER SYSTEM

PERMISSIBLE DEVICES ESW LOW-LOW FLOW SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE CHILLER CONDENSER ESW BOOSTER PUMP MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.18.C

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.18.C4

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RESPONSE 430.35 (CONTINUED)

ITEM 9 STAND-BY GAS TREATMENT SYSTEM (SGTS)

PERMISSIBLE DEVICES SGTS EXHAUST FAN INLET VALVE, SGTS FILTER INLET VALVE AND SGTS INLET EMERGENCY CLOSURE OPEN LIMIT SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE SGTS EXHAUST FAN MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.18.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.8.C4

ITEM 10 STAND-BY GAS TREATMENT SYSTEM (SGTS)

PERMISSIBLE DEVICES SGTS HEAT REMOVAL FAN INLET VALVE AND SGTS HEAT REMOVAL AIR INTAKE INBOARD SHUT-OFF VALVE OPEN LIMIT SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE SGTS HEAT REMOVAL FAN MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.8.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.8.C4

ITEM 11 HYDROGEN MIXING SYSTEM

PERMISSIBLE DEVICES HYDROGEN MIXING BLOWER DISCHARGE DRYWELL INBOARD INTEGRITY VALVE OPEN LIMIT SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE BLOWER MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.7.1.C2

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.7.1.C4

RESPONSE 430.35 (CONTINUED)

ITEM 12 SHIELD ANNULUS RETURN/EXHAUST SYSTEM

PERMISSIBLE DEVICES SHIELD ANNULUS RETURN/EXHAUST FAN INLET VALVE OPEN LIMIT SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE FAN MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.9.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.9.C4

ITEM 13 AIR POSITIVE SEAL SYSTEM

PERMISSIBLE DEVICES AIR POSITIVE SEAL AIR COMPRESSOR MOTOR RUNNING CONTACTS ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR AREA COOLING FAN MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.15.1.C FOR DIV.2 AND 7.3.1.1.15.2.C FOR DIV.1.

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.15.1.C4 FOR DIV.2 AND 7.3.1.1.15.2.C4 FOR DIV.1.

ITEM 14 RHR-LPCI/CONTAINMENT SPRAY/SUPPRESSION POOL COOLING SYSTEM

PERMISSIBLE DEVICES MOTOR POWER BUS UNDERVOLTAGE MONITOR CONTACTS ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE RHR PUMP MOTORS, AS DESCRIBED IN SECTIONS 7.3.1.1.1.4.C3, 7.3.1.1.4.C3 AND 7.3.1.1.5.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTIONS 7.3.1.1.1.4.C4, 7.3.1.1.4.C4 AND 7.3.1.1.5.C4

RESPONSE 430.35 (CONTINUED)

ITEM 15 LOW PRESSURE CORE SPRAY (LPCS) SYSTEM

PERMISSIBLE DEVICES MOTOR POWER BUS UNDERVOLTAGE MONITOR CONTACTS ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE LPCS PUMP MOTOR, AS DESCRIBED IN SECTION 7.3.1.1.1.3.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.1.3.C4

ITEM 16 HIGH PRESSURE CORE SPRAY (HPCS) SYSTEM

PERMISSIBLE DEVICES MOTOR POWER BUS UNDERVOLTAGE MONITOR CONTACTS ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE HPCS PUMP MOTOR, AS DESCRIBED IN SECTION 7.3.1.1.1.1.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.1.1.C4

ITEM 17 CONTROL BUILDING HVAC SYSTEMS

PERMISSIBLE DEVICES CONTROL BUILDING AIR CONDITIONING UNIT FAN MOTOR RUNNING CONTACTS WITH AIR PRESSURE CONTROL AND NORMAL RETURN OR SMOKE REMOVAL EXHAUST DAMPERS OPEN LIMIT SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE FAN MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.17.C3

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.17.C4

RESPONSE 430.35 (CONTINUED)

ITEM 18 CONTROL BUILDING HVAC SYSTEMS

PERMISSIBLE DEVICES THE FOLLOWING PERMISSIBLE DEVICES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE OUTDOOR AIR CLEANUP (OAC) SYSTEM FAN MOTORS, AS DESCRIBED IN SECTION 7.3.1.1.17.C3

1. CONTROL BUILDING AIR CONDITIONING UNIT FAN MOTOR RUNNING CONTACTS.

2. CONTROL BUILDING EXHAUST/RETURN FAN MOTOR RUNNING CONTACTS.

3. CONTROL BUILDING OAC SYSTEM DISCHARGE AND ALTERNATE OR NORMAL DAMPERS OPEN LIMIT SWITCHES.

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.17.C4

ITEM 19 DIESEL GENERATOR SYSTEM

PERMISSIBLE DEVICES FUEL OIL 7 DAYS TANK LEVEL LOW-LOW SWITCHES ARE INCORPORATED INTO THE FINAL ACTUATION CONTROL CIRCUITRY FOR THE DIESEL GENERATORS, AS DESCRIBED IN SECTION 7.3.1.1.13.1.C1

REDUNDANCY AND DIVERSITY IS DESCRIBED IN SECTION 7.3.1.1.13.1.C2

GENERAL NOTE WHERE EQUIPMENT IS SUPPLIED IN A PACKAGE, THERE MAY BE PERMISSIBLE DEVICES WITHIN THE PACKAGE. PACKAGE DETAILS ARE BY APPLICANT.

7.3.1.1.1.1.C High Pressure Core Spray System Instrumentation and Controls (Continued)

The valves in the test line to the condensate storage tank are interlocked closed, if the suppression pool suction valve is not fully closed, to maintain the quantity of water in the suppression pool.

The HPCS pump is interlocked with a corresponding bus undervoltage monitor. The pump motor circuit breaker will not close unless the voltage on the bus supplying the motor is above the set point of the undervoltage monitor.

4. Redundancy and Diversity

The HPCS is actuated by reactor vessel low water level or drywell high pressure. Both of these conditions may result from a design basis loss-of-coolant accident.

The HPCS system logic requires two independent reactor vessel water level measurements to concurrently indicate the high water level condition. When the high water level condition is reached following HPCS operation and drywell pressure is below the trip setting, these two signals are used to stop HPCS flow to the reactor vessel by closing the injection valve until such time as the low water level initiation setpoint again is reached. Should this latter condition recur, HPCS will be initiated to restore water level within the reactor.

5. Actuated Devices

All motor-operated valves in the HPCS system are equipped with remote-manual functional test feature. The entire system can be manually operated from the main control room. Motor-operator valves are provided with limit switches to turn off the motor when the full open or closed positions are reached. Torque switches also control valve motor forces while the valves are seating.

The HPCS valves must be opened sufficiently to provide design flow rate within 27 seconds from receipt of the initiation signal.

7.3.1.1.1.3.C Low Pressure Core Spray Instrumentation and Controls (Continued)

3. Bypasses and Interlocks

The LPCS pump motor and injection valve are provided with manual override controls which permits the operator manual control of the system following automatic initiation.

The LPCS pump is interlocked with a corresponding bus undervoltage monitor. The pump motor circuit breaker will not close unless the voltage on the bus supplying the motor is above the set point of the undervoltage monitor.

Two pressure transmitters are installed in the pump discharge pipeline upstream of the pump discharge check valve. This pressure signal is used in the automatic depressurization system to indicate that the LPCS pump is running.

4. Redundancy and Diversity

The LPCS is actuated by either reactor vessel low water level and/or drywell high pressure. Both of these conditions may result from a design basis loss-of-coolant accident. As described in Subsection 7.3.1.1.1.3., Paragraph C-2, "Logic and Sequencing," if one low level transmitter or trip unit fails, either high drywell pressure or a combination of low level and drywell pressure transducers will initiate LPCS. If one high dry-well pressure transmitter or trip unit fails, either low level or a combination of low level and high drywell pressure trip units will initiate the LPCS system. LPCS is a single pump system but is backed up by LPCI A within ECCS Division 1. A unique logic arrangement is provided for testing of the LPCS injection valve. Two pressure transmitters monitor the pressure between the injec-tion valve and the testable check valve. Each pressure transmitter sends a signal to trip units. These trip devices are arranged in series to become a permissive for injection valve manual operation. A one-out-of-two-twice logic combination is used to prevent any single failure from allowing operation of the LPCS injection valve under adverse conditions.

7.3.1.1.1.4.C Low Pressure Coolant Injection Instrumentation and Controls (Continued)

c) Valves used in other RHR modes are automatically positioned so that water pumped from the suppression pool is routed for LPCI operation.

d) When nuclear system pressure has dropped to a value at which the LPCI system pumps are capable of injecting water into the vessel, the LPCI injection valves automatically open, and water is delivered to the reactor vessel until the vessel water level is adequate to provide core cooling and the LPCI pumps are manually shut off.

LPCI A initiation logic is common to the LPCS and is separated from the initiation logic for LPCI B and LPCI C. Each initiation uses the same logic form; however, LPCI A uses only Division 1 logic, and LPCI B and LPCI C use only Division 2 logic. Each logic consists of two level instrument channels and two drywell high pressure instrument channels. After an initiation signal is received by the LPCI control circuitry, the signal is sealed in until manually reset. The seal-in feature is shown in Figure 7.3-5.

3. Bypasses and Interlocks

The LPCI pump motor and injection valve are provided with manual override controls which permit the operator manual control of the system following automatic initiation.

The RHR pumps are interlocked with corresponding bus under voltage monitors. The pump motor circuit breakers will not close unless the voltage on the bus supplying the motors is above the set point of the undervoltage monitors.

4. (LPCI) Redundancy and Diversity

The LPCI is actuated by reactor vessel low water level and/or drywell high pressure. Both of these conditions may result from a design basis loss-of-coolant accident and may result from lesser LOCAs. As described in Subsection 7.3.1.1.1.3.4.

7.3.1.1.4.C RHR/Containment Spray Mode Instrumentation and Controls (Continued)

3. Bypasses and Interlocks

No bypasses are provided for the containment spray system.

The RHR pumps are interlocked with corresponding bus under voltage monitors. The pump motor circuit brakers will not close unless the voltage on the bus supplying the motors is above the set point of the undervoltage monitors.

Interlocks are provided to correctly line up RHR system valves to perform the containment spray functions. These are shown in Figure 7.3-5.

4. Redundancy and Diversity

Redundancy is provided for the containment spray function by two separated divisional loops. Redundancy of initiation sensors is described in Subsection 7.3.1.1.1.4.

5. Actuated Devices

Figure 7.3-5 shows functional control arrangement of the containment spray system.

The RHR A and B loops are utilized for containment spray. Therefore, the pump and valves are the same for LPCI and containment spray except that each has its own discharge valve. See Subsection 7.3.1.1.1.4 ("LPCI Actuated Devices") for specific information.

6. Separation

Separation of the CS-RHR is in accordance with criteria stated in Subsection 8.3.1.4.2.

7.3.1.1.5.C RHR/Suppression Pool Cooling Mode - SPC-RHR Instrumentation and Control (Continued)

The RHR pumps are interlocked with corresponding bus under voltage monitors. The pump motor circuit breakers will not close unless the voltage on the bus supplying the motors is above the set point of the undervoltage monitors.

7.3.1.1.8.C Standby Gas Treatment System Instrumentation and Controls (Continued)

coil are opened. The fan draws outdoor air through ductwork, then through the SGTS train, and then discharges the air to the atmosphere. The fan, fan controls and fan inlet valve are powered from a different electrical division than that which powers the train.

2. Logic and Sequencing

Initiation of the SGTS also de-energizes the pressure control supply and the exhaust fans of the Auxiliary and Fuel Buildings and closes the area isolation valves.

3. Bypasses and Interlocks

SGTS fan is interlocked to stop when either fan inlet valve or the filter inlet valve or the system inlet emergency closure valve closes. Conversely, the fan and filter inlet valves are interlocked with the fan to open before the fan starts.

Differential pressure indicators show the pressure drop across the prefilters and the HEPA filters. A differential pressure-indicating switch measures the combined pressure drop across the filters. If the pressure drop exceeds a preset limit, the standby unit is started automatically. The switch initiates a main control room alarm on high pressure drop.

A differential pressure switch, located in the exhaust fan suction duct, starts the standby unit if the differential pressure across the filter unit exceeds a preset limit.

SGTS heat removal fan is interlocked to stop when either inlet valve or its air intake inboard shutoff valve closes. Conversely, these valves are interlocked with the fan before the fan starts.

4. Redundancy and Diversity

Two independent and redundant standby gas treatment trains are provided, including independent and redundant logic and mechanical equipment. The two logic systems and their associated mechanical devices are powered from separate ESF buses. Physical and electrical separation is maintained between the two systems.

7.3.1.1.9.C Shield Building Annulus Mixing Instrumentation and Controls (Continued)

the fan starts, but the exhaust damper stays closed. In the normal pressure control mode, the exhaust and recirculation dampers start modulation when the fan starts. The fan is interlocked to stop when its inlet damper closes. Conversely the inlet damper is interlocked with the fan to open before the fan starts.

4. Redundancy and Diversity

The Shield Annulus Return and Exhaust System is separated into two completely independent and redundant subsystems. The two logic subsystems are powered from separate ESF buses (Division 1 or Division 2). Each redundant fan has 100% of the required capacity and has instrumentation and controls which are separated and independent of each other.

Diversity is provided to the control system by both automatic and manual initiation.

5. Actuated Devices

The actuated dampers in the Shield Annulus Return and Exhaust System are provided with pneumatic operators. A system electrical failure causes the exhaust damper to assume the fail-close position and the recirculation damper to assume the fail-open position.

All motor-operated and pneumatic operated valves and dampers are provided with status lights or position indicators in the main control room.

6. Separation

The instrumentation, controls and sensors of each operating division have physical and electrical separation in

7.3.1.1.13.1.C Diesel Generator Auxiliaries (Continued)

Divisions 1 and 2. Local pressure and temperature gages are placed at appropriate locations on the fuel lines to and from each engine and plant storage tank.

1. Bypasses and Interlocks

The Diesel Generator Starting Air System compressors are interlocked to shut down upon initiation of the Diesel Generator Room carbon dioxide fire protection system.

The Diesel Fuel Oil Transfer System pumps are interlocked to shut down upon detection of low level in the plant diesel fuel oil shortage tanks.

2. (DGA) Redundancy and Diversity

The redundancy of the diesel generator auxiliary system instrumentation and controls is based on the redundant nature of the diesel generator standby power system. A failure of only one component results in no worse than the loss of an auxiliary system to only one diesel generator. The loss of one diesel generator and its associated load group does not prevent safe shutdown of the plant.

3. Environmental Consideration

Environmental considerations are the same for both normal and accident conditions, because there are no high-energy systems in the area (see Tables 3.11-1, 3.11-2 and 3.11-3).

4. Operational Considerations

The diesel generator operator is provided with alarm annunciators to monitor the performance of the diesel generator auxiliary systems. A diesel generator trouble annunciator, common to all diesel generator room annunciators, is provided in the main

7.3.1.1.13.2.C Diesel Generator Building Heating and Ventilating System Instrumentation and Controls (Continued)

3. Bypasses and Interlocks

The Diesel Generator Room ventilation system 1 and 2 exhaust fans are interlocked with the corresponding supply fans and intake dampers. The dampers open and close in response to the actions of the supply fans. The supply fans start and stop in response to the actions of the exhaust fans.

The Diesel Generator Room ventilation system 3 supply/recirculation fan is interlocked with the corresponding diesel generator and fresh air damper. The supply/recirculation fan starts in response to the action of the Diesel Generator. The fresh air damper is permitted to modulate open and closes in response to the actions of the supply/recirculation fan. The Diesel Generator Room fume control fan is interlocked with the corresponding intake damper to stop when the damper closes. Conversely the damper is interlocked with the fan to open before the fan starts.

The room ventilation supply and exhaust fans and intake dampers, supply recirculation fan and fresh air damper, fume control fan and intake damper and the day tank room exhaust fan are interlocked to the carbon dioxide fire protection system. Under fire conditions, the fans stop and the dampers close to prevent the dilution of the carbon dioxide atmosphere. When the signal from the fire protection system is not present, the systems return to their normal operating mode.

The Division 3 Switchgear Room Summer and Summer/Winter Ventilation System fans are interlocked with the corresponding intake dampers to stop when the dampers close. Conversely the dampers are interlocked with the fans to open before the fans start.

4. Redundancy and Diversity

Protective redundancy is accomplished by the fact that the Division 1, 2, and 3 diesel generator systems are redundant and separate, standby power systems. In this arrangement, the instrumentation and controls within any one division meet single-failure critiera without redundancy, for each instrument or control device.

5. Actuated Devices

All fans and dampers in the Diesel Generator Building Heating and Ventilating System have running lights or position indicating lights in the control room.

7.3.1.1.17.C Control Building Atmospheric Control System Instrumentation and Controls (Continued)

When the smoke removal mode is manually initiated, the exhaust fans are automatically changed to low speed, the stack exhaust damper is opened and the return air damper to the air conditioning unit is closed. The area differential pressure controller also goes to full open position during the smoke removal mode.

3. Bypass and Interlocks

The Control Building air conditioning unit and exhaust/return fans are interlocked so that they will run at slow speed during the smoke removal mode, or if their redundant fan is concurrently running. The air conditioning unit temperature control system is interlocked with the fan, and is activated only when the fan is running.

The return/exhaust fans are interlocked to run only if the air conditioning unit fan is running with the air pressure control damper and either the smoke removal exhaust damper or normal return damper open. The differential pressure control system is interlocked with the return exhaust fans and is activated only when the fans are running. The outdoor air clenup system fan is interlocked to run only if the air conditioning unit fan and both return/exhaust fans are running, with the OAC System discharge damper and either the OAC air intake normal or alternate damper open

The outdoor air cleanup system heater and heater controls are interlocked with the fan, and are activated only when the fan is running.

The smoke removal mode controls are interlocked so that the system cannot be activated if the isolation mode is in operation or if the return exhaust fans are not running.

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[redacted]

QUESTION 430.36

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

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

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

c. Any proposed design changes resulting from this analysis.

RESPONSE 430.36

ALL OF THE [redacted] ELECTRICAL EQUIPMENT, BOTH SAFETY AND NON-SAFETY, THAT MAY BECOME SUBMERGED AS A RESULT OF A LOCA ARE IDENTIFIED IN TABLE (A) [redacted]. AN ANALYSIS FOR ALL SUCH EQUIPMENT THAT IS NOT QUALIFIED FOR SERVICE IN THIS ENVIRONMENT IS ALSO PROVIDED IN TABLE (A) [redacted] THE ANALYSIS DETERMINES THE FOLLOWING.

a. THE SAFETY SIGNIFICANCE OF THE FAILURE OF THIS ELECTRICAL EQUIPMENT (e.g., SPURIOUS ACTUATION OR LOSS OF ACTUATION FUNCTION) AS A RESULT OF SUBMERGENCE.

b. THE EFFECTS ON CLASS 1E ELECTRICAL POWER SOURCES SERVING THIS EQUIPMENT AS A RESULT OF SUCH SUBMERGENCE.

c. ANY PROPOSED DESIGN CHANGES RESULTING FROM THIS ANALYSIS.

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TABLE (A)

REPORT 111 ALL CABLES SORTED BY BUILDING, ELEV
TODAY'S DATE IS: 10/27/82

Notes: 1- The failure of the Non-Safety electrical Equipment has no safety significance

2. Class IE Electrical power source do not serve the non class IE Equipment.

3. study includes equipments up to elevation (+)8'-6" inside the Drywell and up to elevation (+) 18'-10" inside the containment.

a b c

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQU	Safety	Submersion Qualification Required
						No	No
RB	-00 01	32	A1 -D21A-[redacted]NDV2	AUDIO ALARM CH 1	D21 S001 01	No	BY GE
RB	-00 01	32	A1 -D21A-[redacted]NDV2	AUX UNIT CH 2	D21 S001 02		
RB	-00 01	32	A1 -D21A-[redacted]NDV3	AUDIO ALARM CH 1	D21 S001 01		
RB	-00 01	32	A1 -D21A-[redacted]NDV3	AUX UNIT CH 2	D21 S001 02		
				TOTAL QUANTITY THIS ROW	4		
RB	-00 01	33	A1 -D21A[redacted]NDV1	TIP DR INDEX AUX UN CH 1	D21 K091		
RB	-00 01	33	A1 -D21A[redacted]NDV1	~~PERSON LOCK AUX UN CH 2~~	~~D21 K071~~		
RB	-00 01	33	A1 -D21A[redacted]NDV1	PERSON LOCK AUX UN CH 2	D21 K071		
RB	-00 01	33	A1 -D21A[redacted]NDV1	SENSOR & CONVERTER CH 2	D21 N071		
RB	-00 01	33	A1 -D21A[redacted]NDV1	MOIST SEP AUX UN CH 4	D21 K021		
RB	-00 01	33	A1 -D21A[redacted]NDV1	~~MOIST SEP AUX UN CH 1~~	~~D21 K021~~		
RB	-00 01	33	A1 -D21A[redacted]NDV1	TIP DR INDEX AUX UN CH 1	D21 K091		

RUN NUMBER 08-8
RUN BEGIN DATE: 12/10/81

CABL ROGRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELE
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQ	Safety	Submersion Qualification Required
RB	-00 01	33	A1 -D21A-[redacted]-NDV1	SENSOR & CONVERTER CH 1	D21 N091	NO	NO
RB	-00 01	33	A1 -D21A-[redacted]-NDV2	~~[illegible]~~	~~D21 K091~~		
RB	-00 01	33	A1 -D21A-[redacted]-NDV2	~~[illegible]~~	~~D21 K071~~		
RB	-00 01	33	A1 -D21A-[redacted]-NDV2	~~[illegible]~~	~~D21 K021~~		
				TOTAL QUANTITY THIS ROW	11		
RB	-00 01	35	~~A1 -T41A-2035~~-NDV1	LOWER LVL DRYWELL TEMP	T41 NN006B		
				TOTAL QUANTITY THIS ROW	1		
RB	-00 01	36	A1 -D21A-[redacted]-NDV1	EQUIP HATCH AUX UN CH 3	D21 K072		
RB	-00 01	36	A1 -D21A-[redacted]-NDV1	SENSOR & CONVERTER CH 3	D21 N072		
RB	-00 01	36	A1 -D21A-[redacted]-NDV1	EQUIP HATCH AUX UN CH 3	D21 K072		
RB	-00 01	36	A1 -D21A-[redacted]-NDV2	EQUIP HATCH AUX UN CH 3	D21 K072		
RB	-00 01	36	A1 -D21A-[redacted]-NDV2	AUDIO ALARM CH 3	D21 S001 03		
RB	-00 01	36	A1 -D21A-[redacted]-NDV3	AUDIO ALARM CH 3	D21 S001 03		
				TOTAL QUANTITY THIS ROW	6		
RB	-00 01	50	A1 -D21A-[redacted]-NDV1	TIP DR UNIT AUX UN CH17	D21 K074		
RB	-00 01	50	A1 -D21A-[redacted]-NDV1	SENSOR & CONVERTER CH17	D21 N074		
RB	-00 01	50	A1 -D21A-[redacted]-NDV1	TIP DR UNIT AUX UN CH17	D21 K074		
RB	-00 01	50	A1 -D21A-[redacted]-NDV2	TIP DR UNIT AUX UN CH17	D21 K074		
RB	-00 01	50	A1 -D21A-[redacted]-NDV2	AUDIO ALARM CH 17	D21 S001 17		
RB	-00 01	50	A1 -D21A-[redacted]-NDV3	AUDIO ALARM CH 17	D21 S001 17		
				TOTAL QUANTITY THIS ROW	6		
				TOTAL QUANTITY THIS ELEVATION	;		
RB	-00 03	48	A1 -P55 [redacted]-NDV3	CONT EQUIP DRN SUMP PUMP	P55 CC014A	NO	NO
RB	-00 03	48	A1 -P55 -[redacted]-NDV3	CONT EQUIP DRN SUMP PUMP	P55 CC014B		
				TOTAL QUANTITY THIS ROW	2		
				TOTAL QUANTITY THIS ELEVATION			
RB	-00 09	37	A1 -R51 [redacted]-NDV1	SOUND PWR PHONE JACK	R51 J7 10		
RB	-00 09	37	A1 -R51 [redacted]-NDV1	~~SOUND PWR PHONE JACK~~	~~R51 J7 10~~		
RB	-00 09	37	A1 -R51 [redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3K0J		
RB	-00 09	37	A1 -R51 -[redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3K0J~~		
RB	-00 09	37	A1 -R51 -[redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3K0J~~		
RB	-00 09	37	A1 -R51 -[redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3K0J~~		
RB	-00 09	37	A1 -R51 -[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8 5		
RB	-00 09	37	A1 -R51 -[redacted]-NDV1	~~SOUND PWR PHONE JACK~~	~~R51 J8 5~~		
RB	-00 09	37	A1 -R51 -[redacted]-NDV1	~~SOUND PWR PHONE JACK~~	~~R51 J8 5~~		
				TOTAL QUANTITY THIS ROW	9		
RB	-00 09	43	A1 -E51A-[redacted]-DIV1	SUPP POOL WTR LT	E51 N036A	yes	Yes ~~BY-E~~
RB	-00 09	43	A1 -E51A[redacted]-DIV1	SUPP POOL WTR LT	E51 N036E	4	Yes

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABL_ PROGRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEV
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQU	Safety	Subm. Qualification Required
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B	NO	NO
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	B33 THERMOCOUPLE J BOX A	B33 C001AJB		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	B33 THERMOCOUPLE J BOX A	B33 C001AJB		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV2	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV2	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV2	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV2	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV3	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV3	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV3	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV3	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP B DRIVE MOTOR	B33 C001B		
RB	-01 07	24	A1 -B33A-[redacted]-NDV4	RECIRC PMP B DRIVE MOTOR	B33 C001B		
				TOTAL QUANTITY THIS ROW	58		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 THERMOCOUPLE J BOX B	B33 C001BJB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 THERMOCOUPLE J BOX B	B33 C001BJB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		
RB	-01 07	42	A1 -B33A-[redacted]-NDV1	B33 MTR COND BOX B	B33 C001BCB		

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE . . OGRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVA
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI	Safety	Subm. Quali
				TOTAL QUANTITY THIS ROW	2		
RB	-00 09	45	A1 -P55 [redacted]-NDV1	CONTMNT DRN SUMP LVL	P55 NN045	NO	NO
RB	-00 09	45	A1 -P56A[redacted]-NDV1	CONTAIN FL DRAIN SUM LVL	P56 NN053	"	"
				TOTAL QUANTITY THIS ROW	2		
				TOTAL QUANTITY THIS ELEVATION	1:		
RB	-01 03	29	A1 -B33A[redacted]-NDV2	RECIRC MTR A WTR LOW FL	B33 N008A	NO	
				TOTAL QUANTITY THIS ROW	1		
RB	-01 03	41	A1 -R51 [redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3KAA	NO	NO
RB	-01 03	41	A1 -R51 [redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3KAA~~		
RB	-01 03	41	A1 -R51 [redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3KAA~~		
RB	-01 03	41	A1 -R51 [redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3QEC		
RB	-01 03	41	A1 -R51 [redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3QEC~~		
RB	-01 03	41	A1 -R51 [redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3QEC~~		
				TOTAL QUANTITY THIS ROW	6		
				TOTAL QUANTITY THIS ELEVATION	:		
RB	01 06	29	A1 -B33A[redacted]-NDV2	RECIRC MTR B WTR LOW FL	B33 N008B	NO	
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION	1		
RB	-01 07	24	A1 -B33A[redacted]-NDV1	B33 THERMOCOUPLE J BOX A	B33 C001AJB	NO	
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	~~B33 THERMOCOUPLE J BOX A~~	~~B33 C001AJB~~		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	~~B33 MTR COND BOX A~~	~~B33 C001ACB~~		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	~~B33 MTR COND BOX A~~	~~B33 C001ACB~~		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	~~RECIRC PMP A DRIVE MOTOR~~	~~B33 C001A~~		
RB	-01 07	24	A1 -B33A-[redacted]-NDV1	~~B33 MTR COND BOX A~~	~~B33 C001ACB~~		
RB	-01 07	24	A1 -B33A[redacted]NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A[redacted]NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A[redacted]NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A[redacted]NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A[redacted]NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A[redacted]-NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A[redacted]NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A[redacted]NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	RECIRC PMP A DRIVE MOTOR	B33 C001A		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A-[redacted]NDV1	B33 MTR COND BOX A	B33 C001ACB		
RB	-01 07	24	A1 -B33A[redacted]NDV1	~~B33 MTR COND BOX A~~	~~B33 C001ACB~~		

UMBER 58-8
EGIN DATE: 12/10/81

CABLE PROGRA..
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVAT
TODAY'S DATE IS: 10/27/82

ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM. QUALFD	
-01 07	42	~~A1 -B33A-210[illegible]-NDV1~~	B33 MTR COND BOX B	B33 C001BCB	NO	NO	[redacted]
-01 07	42	~~A1 -B33A-2115-NDV1~~	B33 THERMOCOUPLE J BOX B	B33 C001BJB			
-01 07	42	~~A1 -B[illegible]-2115-NDV1~~	~~B33 MTR COND BOX B~~	~~B33 C001BCB~~			
-01 07	42	~~A1 -B33A-[illegible]16-NDV1~~	~~B33 THERMOCOUPLE J BOX B~~	~~B33 C001BJB~~			
-01 07	42	~~A1 -B33A-21[illegible]-NDV1~~	~~B33 MTR COND BOX B~~	~~B33 C001BCB~~			
			TOTAL QUANTITY THIS ROW	18			
			TOTAL QUANTITY THIS ELEVATION	76			
-01 08	59	[redacted]-D2V2	SPCU SEC CONT ISO VV	G38 FF045	Yes	yes	
~~-01 08~~	~~59~~	~~A1 -G38 -[illegible]-D2V3~~	~~SPCU SEC CONT ISO VV~~	~~G38 FF045~~			
			TOTAL QUANTITY THIS ROW	2			
			TOTAL QUANTITY THIS ELEVATION	2			
-01 09	17	A1 -[redacted]-D2V2	SHUTDOWN MAN SUCT VLV	E12 F010	yes	yes	
			TOTAL QUANTITY THIS ROW	1			
			TOTAL QUANTITY THIS ELEVATION	1			
-02 00	34	~~A1 -P55 -301[illegible]-D2V2~~	CRW I/B ISO VALVE	P55 FF021	yes	yes	
-02 00	34	~~A1 -P55 -3025-D2V2~~	~~CRW I/B ISO VALVE~~	~~P55 FF021~~			
-02 00	34	~~A1 -P55 -3066-D2V2~~	~~CRW I/B ISO VALVE~~	~~P55 FF021~~			
-02 00	34	~~A1 -P55 -40[illegible]-D2V3~~	~~CRW I/B ISO VALVE~~	~~P55 FF021~~			
			TOTAL QUANTITY THIS ROW	4			
			TOTAL QUANTITY THIS ELEVATION	4			
-02 03	36	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J7 11	NO	NO	[redacted]
			TOTAL QUANTITY THIS ROW	1			
-02 03	41	~~A1 -R51 -22[illegible]-NDV1~~	SOUND PWR PHONE PULL BOX	R51 P3QEA	"	"	[redacted]
-02 03	41	~~A1 -R51 -2225-NDV1~~	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3QEA~~			
-02 03	41	~~A1 -R51 -2226-NDV1~~	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3QEA~~			
-02 03	41	~~A1 -R51 -22[illegible]-NDV1~~	SOUND PWR PHONE JACK	R51 J17 13			
			TOTAL QUANTITY THIS ROW	4			
-02 03	47	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8 9	"	"	[redacted]
			TOTAL QUANTITY THIS ROW	1			
-02 03	55	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8 7	"	"	[redacted]
			TOTAL QUANTITY THIS ROW	1			
			TOTAL QUANTITY THIS ELEVATION	7			
-02 05	18	[redacted]-D1V2	VLV C41 F008	C41 F008	yes		[redacted]

NUMBER 58-8
BEGIN DATE: 12/10/81

CABLE PROG 1
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI
TODAY'S DATE IS: 10/27/82

ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBMERSION QUALFD Required	Analysis
			TOTAL QUANTITY THIS ROW 1				
			TOTAL QUANTITY THIS ELEVATION 1				
-03 05	17	[illegible]-B21A-20[illegible]-NDV1	BOTTOM HD DRAIN TC	B33 N021A	No		
-03 05	17	A1 -[illegible]-2034-NDV1	BOTTOM HD DRAIN TC	B33 N021B	No		
-03 05	17	A[illegible] -B33A-20[illegible]-NDV1	VESSEL BOTTOM DRA LI TEM	B33 N022	No		
			TOTAL QUANTITY THIS ROW 3				
			TOTAL QUANTITY THIS ELEVATION 3				
-04 00	46	A1 -C51 -20[illegible]-NDV1	DRIVE MECHANISAM-J001A	C51 J001A	↓		
-04 00	46	A[illegible]-C51 -2023-NDV1	DRIVE MECHANISAM-J001C	C51 J001C	↓		
-04 00	46	A1 -[illegible]-3038-NDV2	~~DRIVE MECHANISAM-J001A~~	~~C51 J001A~~	↓		
-04 00	46	A1 -[illegible]-3044-NDV2	~~DRIVE MECHANISAM-J001C~~	~~C51 J001C~~	↓		
-04 00	46	A1 -C51 -[illegible]-NDV3	~~DRIVE MECHANISAM-J001A~~	~~C51 J001A~~	↓		
-04 00	46	A[illegible] -C51 -400[illegible]-NDV3	~~DRIVE MECHANISAM-J001C~~	~~C51 J001C~~	↓		
			TOTAL QUANTITY THIS ROW 6				
			TOTAL QUANTITY THIS ELEVATION 6				
-04 03	42	[illegible] -G51 -20[illegible]-D1V1	THERMOCOUPLE QUADRANT 1	G51 NN001A			
-04 03	42	[illegible] -G5[illegible] -20[illegible]-D1V1	THERMOCOUPLE QUADRANT 2	G51 NN001E			
-04 03	42	[illegible]-G51 -2[illegible]-D1V1	THERMOCOUPLE QUADRANT 2	G51 NN002E			
-04 03	42	[illegible]-G51 -[illegible]-D1V1	THERMOCOUPLE QUADRANT 3	G51 NN001J			
-04 03	42	[illegible] -[illegible]51 -200[illegible]-D1V1	THERMOCOUPLE QUADRANT 3	G51 NN002J			
-04 03	42	[illegible] -[illegible] -200[illegible]-D1V1	THERMOCOUPLE QUADRANT 4	G51 NN001N			
-04 03	42	[illegible] -G5[illegible]-200[illegible]-D1V1	THERMOCOUPLE QUADRANT 4	G51 NN002N			
-04 03	42	[illegible] -G5[illegible]-201[illegible]-D2V1	THERMOCOUPLE QUADRANT 1	G51 NN002B			
-04 03	42	[illegible] -G5[illegible]201[illegible]-D2V1	THERMOCOUPLE QUADRANT 2	G51 NN001F			
-04 03	42	[illegible] -G5[illegible]-[illegible]01[illegible]-D2V1	THERMOCOUPLE QUADRANT 2	G51 NN002F			
-04 03	42	[illegible] -G[illegible]1 -2[illegible]-D2V1	THERMOCOUPLE QUADRANT 3	G51 NN001K			
-04 03	42	[illegible] -[illegible]51 -20[illegible]-D2V1	THERMOCOUPLE QUADRANT 4	G51 NN001P			
-04 03	42	[illegible] G51 -20[illegible]-D2V1	THERMOCOUPLE QUADRANT 4	G51 NN002P			
-04 03	42	[illegible]-G51 -202[illegible]-D2V1	THERMOCOUPLE QUADRANT 2	G51 NN003B	yes	yes	[redacted]
			TOTAL QUANTITY THIS ROW 14				
-04 03	43	[redacted]D2V1	THERMOCOUPLE QUADRANT 3	G51 NN002K			
			TOTAL QUANTITY THIS ROW 1				
-04 03	49	[redacted]-D1V1	THERMOCOUPLE QUADRANT 1	G51 NN002A			
			TOTAL QUANTITY THIS ROW 1				
-04 03	56	[redacted]D2V1	THERMOCOUPLE QUADRANT 1	G51 NN001B			
			TOTAL QUANTITY THIS ROW 1				
			TOTAL QUANTITY THIS ELEVATION 17				

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE F. .GRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELE
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQ	SAFETY	SUBM. QUAL.	[redacted]
RB	-04 05	18	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016F3	NO	NO	
RB	-04 05	18	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005F3			
				TOTAL QUANTIT" THIS ROW	2			
				TOTAL QUANTITY THIS ELEVATION				
RB	-04 09	45	[redacted]-NDV2	CONTMNT FL DRAIN SUM LVL	P56 NN029			
				TOTAL QUANTITY THIS ROW	1			
RB	-04 09	48	[redacted]-NDV2	CONTMNT EQUIP DRN SUMP	P55 NN036			
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION				
RB	-05 03	6	[redacted]-NDV1	SENSOR CHANNEL 2	B13 L002			
				TOTAL QUANTITY THIS ROW	1			
RB	-05 03	7	[redacted]-NDV1	SENSOR CHANNEL 1	B13 L001			
				TOTAL QUANTITY THIS ROW	1			
RB	-05 03	35	[redacted]-NDV2	PROXIMITY SW C51 N004A	C51 N004A			
RB	-05 03	35	[redacted]-NDV2	PROXIMITY SW C51 N004B	C51 N004B			
RB	-05 03	35	[redacted]-NDV2	PROXIMITY SW C51 N004C	C51 N004C			
RB	-05 03	35	[redacted]-NDV2	PROXIMITY SW C51 N004D	C51 N004D			
RB	-05 03	35	[redacted]-NDV2	PROXIMITY SW C51 N004E	C51 N004E			
				TOTAL QUANTITY THIS ROW	5			
RB	-05 03	37	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5A-5			
RB	-05 03	37	[redacted]-NDV2	~~CAP SYSTEM SPEAKER~~	~~[illegible]~~			
RB	-05 03	37	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5B-6			
RB	-05 03	37	[redacted]-NDV2	~~CAP SYSTEM SPEAKER~~	~~[illegible]~~			
				TOTAL QUANTITY THIS ROW	4			
RB	-05 03	41	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5A-3			
RB	-05 03	41	[redacted]-NDV2	~~CAP SYSTEM SPEAKER~~	~~[illegible]~~			
RB	-05 03	41	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5A-4			
RB	-05 03	41	[redacted]-NDV2	~~CAP SYSTEM SPEAKER~~	~~[illegible]~~			
				TOTAL QUANTITY THIS ROW	4			
RB	-05 03	42	[redacted]-D1V1	THERMOCOUPLE QUADRANT 3	G51 NN003E	Yes	Yes	[redacted]
RB	-05 03	42	[redacted]-D2V1	~~THERMOCOUPLE QUADRANT 4~~	~~G51 NN003F~~			
				TOTAL QUANTITY THIS ROW	2			
RB	-05 03	43	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5B-5	NO	NO	[redacted]

8-

CABLE PROGRAM

RUN NUMBER 58-8 08

RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVA

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI	Safety	Submersion Qualification Required
B	-05 03	43	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5B-5		NO
				TOTAL QUANTITY THIS ROW	2		
B	-05 03	47	[redacted]-NDV3	Contmnt Fl Drain Sum Pum ~~CONTMNT FL DRAIN SUM PUM~~	P56 CC016A		
				TOTAL QUANTITY THIS ROW	1		
B	-05 03	48	[redacted]-P56A-403[redacted]-NDV3	CONTMNT FL DRAIN SUM PUM	P56 CC016B		
B	-05 03	48	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5B-4		
B	-05 03	48	[redacted]-R52 -34[redacted]-NDV2	~~CAP SYSTEM SPEAKER~~	~~R52 C5B-4~~		
				TOTAL QUANTITY THIS ROW	3		
B	-05 03	52	[redacted]-DIV1	THERMOCOUPLE QUADRANT 1	G51 NN003A		
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION			
B	-06 10	37	[redacted]-X99A-30[redacted]-NDV2	AIR LOCK DRYWELL J BOX	X99 AL3JBE	No	
B	-06 10	37	[redacted]-NDV3	AIR LOCK DRYWELL J BOX	X99 AL3JBH		
B	-06 10	37	[redacted]-NDV3	~~AIR LOCK DRYWELL J BOX~~			
B	-06 10	37	[redacted]-X99A-40[redacted]-NDV3	AIR LOCK DRYWELL J BOX	X99 AL3JBF		
				TOTAL QUANTITY THIS ROW	4		
B	-06 10	41	[redacted]-NDV2	FUEL BLDG SHIELD PLUG	X99 AL3PLG		
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION			
B	-08 00	30	[redacted]-NDV2	RECIRC PMP A WTR LOW FL	B33 N004A		
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION			
B	-08 03	32	[redacted]-R51 -22[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3KDK		
B	-08 03	32	[redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3KDK~~		
B	-08 03	32	[redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3KDK~~		
B	-08 03	32	[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3EEN		
B	-08 03	32	[redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3EEN~~		
B	-08 03	32	[redacted]-R51 -22[redacted]-NDV1	~~SOUND PWR PHONE PULL BOX~~	~~R51 P3EEN~~		
				TOTAL QUANTITY THIS ROW	6		
				TOTAL QUANTITY THIS ELEVATION			
B	-08 06	27	[redacted]-NDV1	PUMP A SL COOL WTR TE	B33 N003A		
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION			

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE P[illegible]GRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVA
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI	SAFETY	SMBM. QUALFD	[redacted]
B	-09 00	17	[illegible] -C51C-30[illegible]-D1V2	SRM MOTOR MODULE A	C51 S001A	yes	Req'd yes	[redacted]
B	-09 00	17	A[illegible] -C51C-3[illegible]-D2V2	SRM MOTOR MODULE B	C51 S001B			
B	-09 00	17	A[illegible] -C51C-[illegible]0[illegible]-D4V2	SRM MOTOR MODULE D	C51 S001D			
B	-09 00	17	A[illegible] -C51C-301[illegible]-D3V2	SRM MOTOR MODULE G	C51 S001G			
B	-09 00	17	A[illegible] -[illegible]51C-301[illegible]-D1V2	SRM MOTOR MODULE J	C51 S001J			
B	-09 00	17	A1 -[illegible]C-302[illegible]-D3V2	SRM MOTOR MODULE L	C51 S001L			
B	-09 00	17	A[illegible] -[illegible]C-400[illegible]-NDV3	[illegible]	[illegible]	NO	No	
B	-09 00	17	A[illegible] -C51[illegible]-400[illegible]-NDV3	SRM [illegible]OR MODULE B	C5[illegible] S001B			
B	-09 00	17	A[illegible] -C51C[illegible]4007[illegible]-NDV3	SRM MOTOR MO[illegible]E D	C51 S001D			
B	-09 00	17	A[illegible] -C51C-[illegible]013[illegible]-NDV3	SRM MOTOR MO[illegible]E G	C51 S001G			
B	-09 00	17	A[illegible] -C51C-4[illegible]7[illegible]-NDV3	SRM MO[illegible] MODULE J	[illegible] S001J			
B	-09 00	17	A[illegible] -C51C-402[illegible]-NDV3	[illegible]	[illegible]			
				TOTAL QUANTITY THIS ROW	12			
B	-09 00	19	A1 -B33A-2104-NDV1	PUMP B SL COOL WTR TE	B33 N003B			
				TOTAL QUANTITY THIS ROW	1			
B	-09 00	31	[illegible]-C51 -30[illegible]-NDV2	INDEXING MECH J002B	C51 J002B			
B	-09 00	31	[illegible]1 -[illegible]304[illegible]-NDV2	INDEXING MECH J002C	C51 J002D			
B	-09 00	31	A1 -C[illegible]305[illegible]-NDV2	PROXIMITY SW C51 N005B	C51 N005B			
B	-09 00	31	A[illegible] -C51 -30[illegible]-NDV2	PROXIMITY SW C51 N005D	C51 N005D			
				TOTAL QUANTITY THIS ROW	4			
				TOTAL QUANTITY THIS ELEVATION				
B	-09 02	25	[illegible]-R51 -2[illegible]-NDV1	SOUND PWR PHONE JACK	R51 J7 7			
B	-09 02	25	[illegible]1 -R5[illegible]221[illegible]-NDV1	SOUND PWR PHONE JACK	R51 J7 9			
				TOTAL QUANTITY THIS ROW	2			
B	-09 02	29	[illegible]-NDV1	SOUND PWR PHONE JACK	R51 J7 8			
				TOTAL QUANTITY THIS ROW	1			
B	-09 02	30	[illegible]-NDV1	SOUND PWR PHONE JACK	R51 J7 6			
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION				
B	-09 08	1	[illegible]-C51A-20[illegible]-D1VN	IRM DET CHAN E	C51 N002E	yes	Yes	[redacted]
B	-09 08	1	A[illegible] -C51A-2[illegible]-D4VN	IRM DET CHAN D	C51 N002D			
B	-09 08	1	A[illegible] -C5[illegible]222[illegible]-D4VN	APRM CH D DET 32-33B	C51 N012 37			
B	-09 08	1	A[illegible] -C[illegible]B-2238[illegible]D3VN	APRM CH C DET 32-33A	C51 N011 27			
B	-09 08	1	A[illegible] -C51B-2[illegible]15[illegible]D1VN	APRM CH A DET 32-33C	C51 N013 05			
B	-09 08	1	A[illegible] -C51B-247[illegible]D2VN	APRM CH B DET 32-33D	C51 N014 15			
				TOTAL QUANTITY THIS ROW	6			
B	-09 08	2	A[illegible]-D2VN	IRM DET CHAN F	C51 N002F			

UN NUMBER 58-8 08 CABLE P[illegible] RAM
UN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEV[illegible]
TODAY'S DATE IS: 10/27/82

LDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQU	SAFETY	SUBM QUAL.	[redacted]
B	-09 08	2	-C51A-20[illegible]-D3VN	IRM DET CHAN C	C51 N002C	Yes	Yes	[redacted]
B	-09 08	2	-C51B-2[illegible]-D4VN	APRM CH D DET 24-33A	C51 N011 36			
B	-09 08	2	-C51B-22[illegible]-D3VN	APRM CH C DET 32-25B	C51 N012 27			
B	-09 08	2	C51B-225[illegible]-D2VN	APRM CH B DET 32-25A	C51 N011 17			
B	-09 08	2	[illegible]51[illegible]-226[illegible]-D2VN	APRM CH B DET 24-25B	C51 N012 14			
B	-09 08	2	[illegible]B-228[illegible]-D1VN	APRM CH A DET 24-25A	C51 N011 04			
B	-09 08	2	-C[illegible]B-229[illegible]-D1VN	APRM CH A DET 24-33B	C51 N012 05			
B	-09 08	2	[illegible]5[illegible]-245[illegible]-D1VN	APRM CH A DET 32-25D	C51 N014 05			
B	-09 08	2	C51B-246[illegible]-D2VN	APRM CH B DET 24-33C	C51 N013 14			
B	-09 08	2	-C51B-[illegible]48[illegible]-D3VN	APRM CH C DET 24-25C	C51 N013 23			
B	-09 08	2	-C51B-2[illegible]-D3VN	APRM CH C DET 24-33D	C51 N014 24			
B	-09 08	2	-C51B-25[illegible]-D4VN	APRM CH D DET 32-25C	C51 N013 36			
B	-09 08	2	-C51B-252[illegible]-D4VN	APRM CH D DET 24-25D	C51 N014 33			

TOTAL QUANTITY THIS ROW 14

LDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQU
B	-09 08	3	-C51B-22[illegible]-D4VN	APRM CH D DET 40-33A	C51 N011 39
B	-09 08	3	-C51B-22[illegible]-D3VN	APRM CH C DET 32-41B	C51 N012 28
B	-09 08	3	-C51B-2[illegible]-D2VN	APRM CH B DET 32-41A	C51 N011 18
B	-09 08	3	C51B-2[illegible]-D2VN	APRM CH B DET 24-41B	C51 N012 15
B	-09 08	3	[illegible]51B-22[illegible]-D2VN	APRM CH B DET 40-25B	C51 N012 18
B	-09 08	3	[illegible]1B-22[illegible]-D1VN	APRM CH A DET 24-41A	C51 N011 05
B	-09 08	3	-C[illegible]-22[illegible]-D1VN	APRM CH A DET 40-25A	C51 N011 08
B	-09 08	3	-C[illegible]B-22[illegible]-D1VN	APRM CH A DET 40-33B	C51 N012 08
B	-09 08	3	-C[illegible]-245[illegible]-D1VN	APRM CH A DET 32-41D	C51 N014 06
B	-09 08	3	-C[illegible]-246[illegible]-D2VN	APRM CH B DET 40-33C	C51 N013 17
B	-09 08	3	[illegible]51B-248[illegible]-D3VN	APRM CH C DET 24-41C	C51 N013 24
B	-09 08	3	C51B-248[illegible]-D3VN	APRM CH C DET 40-25C	C51 N013 27
B	-09 08	3	-C51B-[illegible]49[illegible]-D3VN	APRM CH C DET 40-33D	C51 N014 27
B	-09 08	3	-C51B-2[illegible]-D4VN	APRM CH D DET 32-41C	C51 N013 37
B	-09 08	3	-C51B-25[illegible]-D4VN	APRM CH D DET 24-41D	C51 N014 34
B	-09 08	3	-C51B-253[illegible]-D4VN	APRM CH D DET 40-25D	C51 N014 37

TOTAL QUANTITY THIS ROW 16

LDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQU
B	-09 08	4	-C51A-20[illegible]-D3VN	SRM DET CHAN C	C51 N001C
B	-09 08	4	-C51A-2[illegible]-D4VN	SRM DET CHAN D	C51 N001D
B	-09 08	4	-C51B-[illegible]21[illegible]-D4VN	APRM CH D DET 24-17A	C51 N011 35
B	-09 08	4	C51B-[illegible]21[illegible]-D4VN	APRM CH D DET 40-17A	C51 N011 38
B	-09 03	4	C51[illegible]-22[illegible]-D4VN	APRM CH D DET 16-33B	C51 N012 34
B	-09 08	4	[illegible]51[illegible]-22[illegible]-D4VN	APRM CH D DET 32-17B	C51 N012 36
B	-09 08	4	[illegible]B-22[illegible]-D3VN	APRM CH C DET 16-33A	C51 N011 24
B	-09 08	4	-C[illegible]B-22[illegible]-D3VN	APRM CH C DET 32-17A	C51 N011 26
B	-09 08	4	[illegible]B-22[illegible]-D3VN	APRM CH C DET 16-25B	C51 N012 24
B	-09 03	4	[illegible]5[illegible]-22[illegible]-D2VN	APRM CH B DET 16-25A	C51 N011 14
B	-09 08	4	C51[illegible]-22[illegible]-D2VN	APRM CH B DET 40-41B	C51 N012 19
B	-09 08	4	C51[illegible]-22[illegible]-D1VN	APRM CH A DET 40-41A	C51 N011 09
B	-09 08	4	C51[illegible]-22[illegible]-D1VN	APRM CH A DET 24-17B	C51 N012 04
B	-09 08	4	-C51B-[illegible]22[illegible]-D1VN	APRM CH A DET 0-17B	C51 N012 07
B	-09 08	4	-C51B-[illegible]1[illegible]-D1VN	APRM CH A DET 16-33C	C51 N013 02
B	-09 08	4	-C51B-2[illegible]-D1VN	APRM CH A DET 32-17C	C51 N013 04

CABLE P[illegible]GRAM

RUN NUMBER 58-8 08

RUN BEGIN DATE: 12/10/81

REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM QUAL.
RB	-09 08	4	A1 -C51B-24[illegible]-D1VN	APRM CH A DET 16-25D	C51 N014 02	yes	yes
RB	-09 08	4	[illegible]-C51B-2[illegible]-D2VN	APRM CH B DET 24-17C	C51 N013 13		
RB	-09 08	4	[illegible]-C51B-[illegible]-D2VN	APRM CH B DET 40-17C	C51 N013 16		
RB	-09 08	4	[illegible]C51B-247[illegible]-D2VN	APRM CH B DET 16-33D	C51 N014 12		
RB	-09 08	4	[illegible]-247[illegible]-D2VN	APRM CH B DET 32-17D	C51 N014 14		
RB	-09 08	4	[illegible]B-248[illegible]-D3VN	APRM CH C DET 40-41C	C51 N013 28		
RB	-09 08	4	[illegible]-249[illegible]-D3VN	APRM CH C DET 24-17D	C51 N014 23		
RB	-09 08	4	A[illegible]C51[illegible]249[illegible]-D3VN	APRM CH C DET 40-17D	C51 N014 26		
RB	-09 08	4	A[illegible]-C51B-[illegible]-D4VN	APRM CH D DET 16-25C	C51 N013 33		
RB	-09 08	4	A1 -C51B-25[illegible]-D4VN	APRM CH D DET 40-41D	C51 N014 38		

TOTAL QUANTITY THIS ROW 26

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM QUAL.
RB	-09 08	5	A[illegible]A-20[illegible]-D1VN	SRM DET CHAN A	C51 N001A		
RB	-09 08	5	[illegible]-C51[illegible]01[illegible]-D2VN	SRM DET CHAN B	C51 N001B		
RB	-09 08	5	[illegible]-C5[illegible]-D4VN	APRM CH D DET 24-49A	C51 N011 37		
RB	-09 08	5	[illegible]1B-22[illegible]-D4VN	APRM CH D DET 40-49A	C51 N011 40		
RB	-09 08	5	[illegible]C51B-[illegible]-D4VN	APRM CH D DET 16-17B	C51 N012 33		
RB	-09 08	5	[illegible]C51B[illegible]22[illegible]-D4VN	APRM CH D DET 32-49B	C51 N012 38		
RB	-09 08	5	A1 -[illegible]-223[illegible]-D4VN	APRM CH D DET 48-33B	C51 N012 40		
RB	-09 08	5	A1 -C[illegible]B-22[illegible]-D3VN	APRM CH C DET 16-17A	C51 N011 23		
RB	-09 08	5	A1 -[illegible]-D3VN	APRM CH C DET 32-49A	C51 N011 28		
RB	-09 08	5	A1 C51B[illegible]241[illegible]-D3VN	APRM CH C DET 48-33A	C51 N011 30		
RB	-09 08	5	A1 -C51[illegible]245[illegible]-D3VN	APRM CH C DET 16-41B	C51 N012 25		
RB	-09 08	5	[illegible]-C5[illegible]B-2[illegible]-D3VN	APRM CH C DET 48-25B	C51 N012 31		
RB	-09 08	5	A[illegible]1B-22[illegible]-D3VN	APRM CH C DET 48-41B	C51 N012 32		
RB	-09 08	5	A1 [illegible]51B-2[illegible]-D2VN	APRM CH B DET 16-41A	C51 N011 15		
RB	-09 08	5	[illegible]1B-226[illegible]-D2VN	APRM CH B DET 48-25A	C51 N011 21		
RB	-09 08	5	[illegible]-C[illegible]226[illegible]-D2VN	APRM CH B DET 48-41A	C51 N011 22		
RB	-09 08	5	[illegible]1 -C[illegible]B-229[illegible]-D1VN	APRM CH A DET 24-49B	C51 N012 06		
RB	-09 08	5	[illegible]1 -[illegible]-22[illegible]-D1VN	APRM CH A DET 40-49B	C51 N012 09		
RB	-09 08	5	[illegible]1 C51[illegible]441[illegible]-D1VN	APRM CH A DET 16-17C	C51 N013 01		
RB	-09 08	5	[illegible]-C51[illegible]2446[illegible]D1VN	APRM CH A DET 32-49C	C51 N013 06		
RB	-09 08	5	[illegible]1 -C[illegible]B[illegible]44[illegible]-D1VN	APRM CH A DET 48-33C	C51 N013 08		
RB	-09 08	5	[illegible]1 [illegible]51B-[illegible]-D1VN	APRM CH A DET 16-41D	C51 N014 03		
RB	-09 08	5	[illegible]-C51B-[illegible]58[illegible]-D1VN	APRM CH A DET 48-25D	C51 N014 09		
RB	-09 08	5	[illegible]-C51B-2459[illegible]-D1VN	APRM CH A DET 48-41D	C51 N014 10		
RB	-09 08	5	[illegible]-C5[illegible]B-2467[illegible]-D2VN	APRM CH B DET 24-49C	C51 N013 15		
RB	-09 08	5	[illegible]1B-24[illegible]-D2VN	APRM CH B DET 40-49C	C51 N013 18		
RB	-09 03	5	[illegible]1B-[illegible]47[illegible]-D2VN	APRM CH B DET 16-17D	C51 N014 11		
RB	-09 08	5	[illegible]1 -C5[illegible]-247[illegible]-D2VN	APRM CH B DET 32-49D	C51 N014 16		
RB	-09 08	5	[illegible]1 -C[illegible]2479[illegible]-D2VN	APRM CH B DET 48-33D	C51 N014 18		
RB	-09 08	5	[illegible]C51B[illegible]49[illegible]-D3VN	APRM CH C DET 24-49D	C51 N014 25		
RB	-09 08	5	[illegible]-C51B-[illegible]-D3VN	APRM CH C DET 40-49D	C51 N014 28		
RB	-09 08	5	[illegible]1 -C51B-2[illegible]-D4VN	APRM CH D DET 16-41C	C51 N013 34		
RB	-09 08	5	[illegible]1 -C[illegible]B-25[illegible]-D4VN	APRM CH D DET 48-2[illegible]C	C51 N013 40		
RB	-09 08	5	[illegible]C51B-2[illegible]-D4VN	APRM CH D DET 48-41C	C51 N013 41		

TOTAL QUANTITY THIS ROW 34

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM QUAL.
RB	-09 08	6	A1 -C51A-2007-D2VN	IRM DET CHAN B	C51 N002B		

IN NUMBER 58-8
IN BEGIN DATE: 12/10/81

CABLE PR[illegible]RAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATI[illegible]
TODAY'S DATE IS: 10/27/82

DG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM QUALFD	
	-09 08	6	A1 -C51A-2[illegible]-D3VN	IRM DET CHAN G	C51 N002G	yes	yes	
	-09 08	6	A1 -C51B-22[illegible]-D4VN	APRM CH D DET 08-33A	C51 N011 33			
	-09 08	6	A1 -C5[illegible]B-22[illegible]-D4VN	APRM CH D DET 16-49B	C51 N012 35			
	-09 08	6	A1 -C51B-22[illegible]-D4VN	APRM CH D DET 48-17B	C51 N012 39			
	-09 08	6	A1 -C51B-2[illegible]-D4VN	APRM CH D DET 48-49B	C51 N012 41			
	-09 08	6	A1 -C51B-23[illegible]-D4VN	APRM CH D DET 16-09C	C51 N013 32			
	-09 08	6	A1 -C51[illegible]223[illegible]-D3VN	APRM CH C DET 16-49A	C51 N011 25			
	-09 08	6	A1 -C5[illegible]B-224[illegible]-D3VN	APRM CH C DET 48-17A	C51 N011 29			
	-09 08	6	A1 -[illegible]51B-224[illegible]-D3VN	APRM CH C DET 48-49A	C51 N011 31			
	-09 08	6	A1 -C51B-2[illegible]-D3VN	APRM CH C DET 16-09B	C51 N012 23			
	-09 08	6	A1 -C51B-22[illegible]-D3VN	APRM CH C DET 32-09B	C51 N012 26			
	-09 08	6	A1 -C5[illegible]B-225[illegible]-D3VN	APRM CH C DET 08-25C	C51 N013 20			
	-09 08	6	A1 -[illegible]51B-22[illegible]-D3VN	APRM CH C DET 08-41C	C51 N013 21			
	-09 08	6	A1 -C51B-[illegible]-D2VN	APRM CH B DET 16-09A	C51 N011 13			
	-09 08	6	A1 -C51B-22[illegible]-D2VN	APRM CH B DET 32-09A	C51 N011 16			
	-09 08	6	A1 -C5[illegible]B-22[illegible]-D2VN	APRM CH B DET 08-25B	C51 N012 11			
	-09 08	6	A1 -[illegible]51B-22[illegible]7-D2VN	APRM CH B DET 08-41B	C51 N012 12			
	-09 08	6	A1 -C51B-2[illegible]-D2VN	APRM CH B DET 24-09B	C51 N012 13			
	-09 08	6	A1 -C51B-22[illegible]-D2VN	APRM CH B DET 40-09B	C51 N012 17			
	-09 08	6	A1 -C5[illegible]-22[illegible]-D1VN	APRM CH A DET 08-25A	C51 N011 01			
	-09 08	6	A1 -[illegible]51B-227[illegible]-D1VN	APRM CH A DET 08-41A	C51 N011 02			
	-09 08	6	A1 -C51B-23[illegible]-D1VN	APRM CH A DET 24-09A	C51 N011 03			
	-09 08	6	A1 -C51B-[illegible]28[illegible]-D1VN	APRM CH A DET 40-09A	C51 N011 07			
	-09 08	6	A1 -C5[illegible]-229[illegible]-D1VN	APRM CH A DET 08-33B	C51 N012 02			
	-09 08	6	A1 -[illegible]51B-244[illegible]-D1VN	APRM CH A DET 16-49C	C51 N013 03			
	-09 08	6	A1 -C51B-244[illegible]-D1VN	APRM CH A DET 48-17C	C51 N013 07			
	-09 08	6	A1 -C51B-2[illegible]-D1VN	APRM CH A DET 48-49C	C51 N013 09			
	-09 08	6	A1 -C51[illegible]-24[illegible]-D1VN	APRM CH A DET 16-09D	C51 N014 01			
	-09 08	6	A1 -C[illegible]B-245[illegible]-D1VN	APRM CH A DET 32-09D	C51 N014 04			
	-09 08	6	A1 -C51B-24[illegible]-D2VN	APRM CH B DET 08-33C	C51 N013 11			
	-09 08	6	A1 -C51B-2[illegible]-D2VN	APRM CH B DET 16-49D	C51 N014 13			
	-09 08	6	A1 -C5[illegible]-24[illegible]-D2VN	APRM CH B DET 48-17D	C51 N014 17			
	-09 08	6	A1 -[illegible]51B-24[illegible]-D2VN	APRM CH B DET 48-49D	C51 N014 19			
	-09 08	6	A1 -C51B-24[illegible]-D3VN	APRM CH C DET 24-09C	C51 N013 22			
	-09 08	6	A1 -C51B-2[illegible]-D3VN	APRM CH C DET 40-09C	C51 N013 26			
	-09 08	6	A1 -C51B-[illegible]-D3VN	APRM CH C DET 08-33D	C51 N014 21			
	-09 08	6	A1 -C5[illegible]-25[illegible]-D4VN	APRM CH D DET 32-09C	C51 N013 35			
	-09 08	6	A1 -C51B-25[illegible]-D4VN	APRM CH D DET 08-25D	C51 N014 30			
	-09 08	6	A1 -C51B-25[illegible]-D4VN	APRM CH D DET 08-41D	C51 N014 31			
	-09 08	6	A1 -C51B-[illegible]-D4VN	APRM CH D DET 24-09D	C51 N014 32			
	-09 08	6	A1 -C5[illegible]-25[illegible]-D4VN	APRM CH D DET 40-09D	C51 N014 36			
				TOTAL QUANTITY THIS ROW	42			
	-09 08	7	A1 -C11A-2029-D1V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	A1 -C11A-2042-D1V1	CHAN B POS IND PROBE	B13 D12[illegible]			
	-09 08	7	A1 -C11A-2043-D1V1	CHAN B POS IND PROBE	B13 D12[illegible]			
	-09 08	7	A1 -C11A-2044-D1V1	CHAN B POS IND PROBE	B13 D12[illegible]			
	-09 08	7	A1 -C11A-2045-D1V1	CHAN B POS IND PROBE	B13 D12[illegible]			
	-09 08	7	A1 -C11A-2046-D1V1	CHAN B POS IND PROBE	B13 D12[illegible]			
	-09 08	7	A1 -C11A-2047-D1V1	CHAN B POS IND PROBE	B13 D124			

IN NUMBER 58-8
IN BEGIN DATE: 12/10/81

CABLE PR [illegible]AM
08
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATI[illegible]
TODAY'S DATE IS: 10/27/82

DG	ELEV	ROW		CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM. QualF.	Analysis
	-09 08	7	AI	-C11A-2478-D2V1	CHAN B POS IND PROBE	B13 D124	yes	[redacted]	[redacted]
	-09 08	7	AI	-C11A-2479-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2480-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2481-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2482-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2483-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2484-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2485-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2486-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2487-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2488-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2489-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2490-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2491-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2492-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2493-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2494-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2495-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2496-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2497-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2498-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2499-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2500-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2501-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2502-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2503-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2504-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2505-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2506-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2507-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2508-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2509-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2510-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2511-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2512-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2513-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2514-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	AI	-C11A-2515-D2V1	CHAN B POS IND PROBE	B13 D12[illegible]			
	-09 08	7	AI	-C11A-2516-D2V1	CHAN B POS IND PROBE	B13 D12[illegible]			
	-09 08	7	AI	-C11A-2517-D2V1	CHAN B POS IND PROBE	B13 D12[illegible]			
	-09 08	7	AI	-C11A-[illegible]-D2V1	CHAN B POS IND PROBE	B13 D124			
	-09 08	7	[illegible]	-C51A-20[illegible]-D1VN	IRM DET CHAN A	C51 N002A	yes	yes	
	-09 08	7	[illegible]	-C51A-[illegible]-D4VN	IRM DET CHAN H	C51 N002H			
	-09 08	7	[illegible]	-[illegible]1B-22[illegible]-D4VN	APRM CH D DET 08-17A	C51 N011 32			
	-09 08	7	[illegible]	-C5[illegible]-22[illegible]-D4VN	APRM CH D DET 08-49A	C51 N011 34			
	-09 08	7	[illegible]	-C5[illegible]-23[illegible]-D4VN	APRM CH D DET 56-33A	C51 N011 41			
	-09 08	7	A[illegible]	-C51B-22[illegible]-D3VN	APRM CH C DET 32-57B	C51 N012 29			
	-09 08	7	A[illegible]	-C51B-[illegible]-D3VN	APRM CH C DET 48-09B	C51 N012 30			
	-09 08	7	A[illegible]	-C51B-22[illegible]-D2VN	APRM CH B DET 32-57A	C51 N011 19			
	-09 08	7	A[illegible]	-C51B-22[illegible]-D2VN	APRM CH B DET 48-09A	C51 N011 20			
	-09 08	7	A[illegible]	-C51B-22[illegible]-D2VN	APRM CH B DET 24-57B	C51 N012 16			

CABLE P. GRAM

RUN NUMBER 58-8 08
RUN BEGIN DATE: 12/10/81

REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVAT
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BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM. QUALF.
B	-09 08	7	-C51B-22[illegible]-D2VN	APRM CH B DET 40-57B	C51 N012 20	yes	yes
B	-09 08	7	-C51B-22[illegible]-D1VN	APRM CH A DET 24-57A	C51 N011 06		
B	-09 08	7	-C51B-22[illegible]-D1VN	APRM CH A DET 40-57A	C51 N011 10		
B	-09 08	7	-[illegible]51B-2[illegible]8[illegible]-D1VN	APRM CH A DET 56-25A	C51 N011 11		
B	-09 08	7	-[illegible]51B-[illegible]28[illegible]-D1VN	APRM CH A DET 56-41A	C51 N011 12		
B	-09 08	7	-C[illegible]1B-[illegible]28[illegible]-D1VN	APRM CH A DET 08-17B	C51 N012 01		
B	-09 08	7	-C[illegible]1B-229[illegible]-D1VN	APRM CH A DET 08-49B	C51 N012 03		
B	-09 08	7	-C5[illegible]B-244[illegible]-D1VN	APRM CH A DET 56-33B	C51 N012 10		
B	-09 08	7	-C5[illegible]-245[illegible]-D1VN	APRM CH A DET 32-57D	C51 N014 07		
B	-09 08	7	-C5[illegible]-245[illegible]-D1VN	APRM CH A DET 48-09D	C51 N014 08		
B	-09 08	7	-C51[illegible]-246[illegible]-D2VN	APRM CH B DET 56-25B	C51 N012 21		
B	-09 08	7	-C51[illegible]-246[illegible]-D2VN	APRM CH B DET 56-41B	C51 N012 22		
B	-09 08	7	-C5[illegible]-246[illegible]-D2VN	APRM CH B DET 08-17C	C51 N013 10		
B	-09 08	7	-C5[illegible]B-246[illegible]-D2VN	APRM CH B DET 08-49C	C51 N013 12		
B	-09 08	7	-C5[illegible]B-247[illegible]-D2VN	APRM CH B DET 56-33C	C51 N013 19		
B	-09 08	7	-C[illegible]1B-248[illegible]-D3VN	APRM CH C DET 24-57C	C51 N013 25		
B	-09 08	7	-C[illegible]1B-248[illegible]-D3VN	APRM CH C DET 40-57C	C51 N013 29		
B	-09 08	7	-[illegible]51B-[illegible]48[illegible]-D3VN	APRM CH C DET 56-25C	C51 N013 30		
B	-09 08	7	-[illegible]51B-[illegible]49[illegible]-D3VN	APRM CH C DET 56-41C	C51 N013 31		
B	-09 08	7	-C51B-[illegible]49[illegible]-D3VN	APRM CH C DET 08-17D	C51 N014 20		
B	-09 08	7	-C51B-2[illegible]9[illegible]-D3VN	APRM CH C DET 08-49D	C51 N014 22		
B	-09 08	7	-C51B-2[illegible]0[illegible]-D3VN	APRM CH C DET 56-33D	C51 N014 29		
B	-09 08	7	-C51B-2[illegible]1[illegible]-D4VN	APRM CH D DET 32-57C	C51 N013 38		
B	-09 08	7	-C51B-25[illegible]-D4VN	APRM CH D DET 48-09C	C51 N013 39		
B	-09 08	7	-C51B-25[illegible]-D4VN	APRM CH D DET 24-57D	C51 N014 35		
B	-09 08	7	-C51B-25[illegible]-D4VN	APRM CH D DET 40-57D	C51 N014 39		
B	-09 08	7	-C51B-25[illegible]-D4VN	APRM CH D DET 56-41D	C51 N014 41		
B	-09 08	7	-C51B-25[illegible]-D4VN	APRM D DET POS 56-41D	C51 N014		

TOTAL QUANTITY THIS ROW 392
TOTAL QUANTITY THIS ELEVATION 530

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM. QUALF.
B	-10 00	27	-B33A-20[illegible]-NDV1	VALVE POS SWITCH	B33 F060A	No	
B	-10 00	27	-B33A-20[illegible]-NDV1	~~VALVE POS SWITCH~~	~~B33 F060A~~		
B	-10 00	27	-B33A-[illegible]-NDV1	VALVE POS SWITCH	B33 F060B		
B	-10 00	27	-B33A-203[illegible]-NDV1	~~VALVE POS SWITCH~~	~~B33 F060B~~		
B	-10 00	27	-[illegible]-211[illegible]-NDV1	~~VALVE POS SWITCH~~	~~B33 F060A~~		
B	-10 00	27	-B[illegible]A-212[illegible]-NDV1	~~VALVE POS SWITCH~~	~~B33 F060B~~		
B	-10 00	27	-[illegible]A-313[illegible]-NDV2	VALVE POS SWITCH	~~B33 F060A~~		
B	-10 00	27	-B33[illegible]-313[illegible]-NDV2	VALVE POS SWITCH	~~B33 F060A~~		
B	-10 00	27	-B33A-[illegible]13[illegible]-NDV2	~~VALVE POS SWITCH~~	~~B33 F060B~~		
B	-10 00	27	-B33A-[illegible]3[illegible]-NDV2	~~VALVE POS SWITCH~~	~~B33 F060B~~		

TOTAL QUANTITY THIS ROW 10
TOTAL QUANTITY THIS ELEVATION 10

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP
B	-11 00	17	-C51C-[illegible]-D3V2	SRM MOTOR MODULE C	C51 S001C
B	-11 00	17	-[illegible]-30[illegible]-D1V2	SRM MOTOR MODULE E	C51 S001E
B	-11 00	17	-[illegible]C-30[illegible]-D2V2	SRM MOTOR MODULE F	C51 S001F
B	-11 00	17	-C51[illegible]-3[illegible]5-D4V2	SRM MOTOR MODULE H	C51 S001H
B	-11 00	17	-C51C-[illegible]-D2V2	SRM MOTOR MODULE K	C51 S001K

CABLE F[illegible]GRAM

RUN NUMBER 58-8 08
RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVA[illegible]
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI[illegible]	Safety	Submersion Qualification Required
RB	-11 00	17	[illegible] -C51C-30[illegible]-D4V2	SRM MOTOR MODULE M	C51 S001M	Yes	yes
RB	-11 00	17	-C51C-[illegible]-NDV3	SRM MOTOR MODULE C	C51 S001C	No	No
RB	-11 00	17	A1 -C51C-400[illegible]-NDV3	SRM MOTOR MODULE E	C51 S001E		
RB	-11 00	17	A1 -[illegible]C-401[illegible]-NDV3	SRM MOTOR MODULE F	C51 S001F		
RB	-11 00	17	A1 -[illegible]C-401[illegible]-NDV3	SRM MOTOR MODULE H	C51 S001H		
RB	-11 00	17	[illegible] -C51C-40[illegible]-NDV3	SRM MOTOR MODULE K	C51 S001K		
RB	-11 00	17	A1 -C51C-40[illegible]-NDV3	SRM MOTOR MODULE M	C51 S001M		

TOTAL QUANTITY THIS ROW 12
TOTAL QUANTITY THIS ELEVATION 1[illegible]

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI[illegible]
RB	-11 04	28	[illegible]-E31Y-[illegible]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016B4
RB	-11 04	28	[illegible]-E31[illegible]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005B4

TOTAL QUANTITY THIS ROW 2
TOTAL QUANTITY THIS ELEVATION [illegible]

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI[illegible]
RB	-12 00	23	[illegible] -B33A-20[illegible]-NDV1	DISCH BLOCK VLV	B33 F067A
RB	-12 00	23	-B33A-2[illegible]-NDV1	DISCH BLOCK VLV	B33 F067B
RB	-12 00	23	[illegible]-B33A-30[illegible]-NDV2	~~DISCH BLOCK VLV~~	~~B33 F067A~~
RB	-12 00	23	[illegible]-B33A-303[illegible]-NDV2	~~DISCH BLOCK VLV~~	~~B33 F067A~~
RB	-12 00	23	[illegible]-B3[illegible]-304[illegible]-NDV2	~~DISCH BLOCK VLV~~	~~B33 F067B~~
RB	-12 00	23	[illegible]-B3[illegible]-304[illegible]-NDV2	~~DISCH BLOCK VLV~~	~~B33 F067B~~
RB	-12 00	23	[illegible]-B[illegible]3A-308[illegible]-NDV2	~~DISCH BLOCK VLV~~	~~B33 F067A~~
RB	-12 00	23	A[illegible]-B33A-[illegible]9[illegible]-NDV2	~~DISCH BLOCK VLV~~	~~B33 F067B~~
RB	-12 00	23	A[illegible]-B33A-40[illegible]-NDV3	~~DISCH BLOCK VLV~~	~~B33 F067A~~
RB	-12 00	23	A[illegible]-B33A-403[illegible]-NDV3	~~DISCH BLOCK VLV~~	~~B33 F067B~~

TOTAL QUANTITY THIS ROW 10

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI[illegible]
RB	-12 00	31	-C51 -3[illegible]-NDV2	INDEXING MECH J002A	C51 J002A
RB	-12 00	31	[illegible]-C51 -[illegible]5-NDV2	INDEXING MECH J002C	C51 J002C
RB	-12 00	31	[illegible]-C51 -30[illegible]-NDV2	INDEXING MECH J002E	C51 J002E
RB	-12 00	31	[illegible]-C[illegible]-30[illegible]-NDV2	PROXIMITY SW C51 N005C	C51 N005C
RB	-12 00	31	[illegible]-C51 -30[illegible]5-NDV2	PROXIMITY SW C51 N005A	C51 N005A
RB	-12 00	31	A[illegible]-C51 -30[illegible]-NDV2	PROXIMITY SW C51 N005E	C51 N005E

TOTAL QUANTITY THIS ROW 6
TOTAL QUANTITY THIS ELEVATION 16

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI[illegible]
RB	-12 09	20	A1 -B33A-2[illegible]-NDV1	SUCTION VLV B	B33 F023B
RB	-12 09	20	-B33A-[illegible]-NDV2	~~SUCTION VLV B~~	~~B33 F023B~~
RB	-12 09	20	[illegible]-B33[illegible]-304[illegible]-NDV2	~~SUCTION VLV B~~	~~B33 F023B~~
RB	-12 09	20	[illegible]-B[illegible]-308[illegible]-NDV2	~~SUCTION VLV B~~	~~B33 F023B~~
RB	-12 09	20	[illegible]-B33A-[illegible]13[illegible]-NDV2	~~SUCTION VLV B~~	~~B33 F023B~~
RB	-12 09	20	[illegible]-B33A-40[illegible]-NDV3	~~SUCTION VLV B~~	~~B33 F023B~~

TOTAL QUANTITY THIS ROW 6
TOTAL QUANTITY THIS ELEVATION 6

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI[illegible]
RB	-13 00	5	~~A1 -T41A-[illegible]~~-NDV1	CRD AREA DRYWELL TEMP	T41 NN030

CABLE PROGRAM

N NUMBER 58-8
08
N BEGIN DATE: 12/10/81
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVAT
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Submersion Qualification Required
				TOTAL QUANTITY THIS ROW	1		
	-13 00	9	[redacted]-NDV2	CRD MAINT RM BRE AIR PSL	P65 NN002	No	No
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION			
	-13 03	19	[redacted]-NDV1	PUMP A SUCTION VLV	B33 F023A		
	-13 03	19	[redacted]-NDV2	~~PUMP A SUCTION VLV~~	~~B33 F023A~~		
	-13 03	19	[redacted]-NDV2	~~PUMP A SUCTION VLV~~	~~B33 F023A~~		
	-13 03	19	[redacted]-NDV2	~~PUMP A SUCTION VLV~~	~~B33 F023A~~		
	-13 03	19	[redacted]-NDV2	~~PUMP A SUCTION VLV~~	~~B33 F023A~~		
	-13 03	19	[redacted]-NDV3	~~PUMP A SUCTION VLV~~	~~B33 F023A~~		
	-13 03	19	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016B1		
	-13 03	19	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005B1		
				TOTAL QUANTITY THIS ROW	8		
				TOTAL QUANTITY THIS ELEVATION			
	-14 00	9	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J45 2		
	-14 00	9	[redacted]-NDV1	~~SOUND PWR PHONE JACK~~	~~R51 J45 2~~		
	-14 00	9	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J45 3		
	-14 00	9	[redacted]-NDV1	~~SOUND PWR PHONE JACK~~	~~R51 J45 3~~		
	-14 00	9	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J45 4		
	-14 00	9	[redacted]-NDV1	~~SOUND PWR PHONE JACK~~	~~R51 J45 4~~		
	-14 00	9	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J45 5		
	-14 00	9	[redacted]-NDV1	~~SOUND PWR PHONE JACK~~	~~R51 J45 5~~		
	-14 00	9	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J45 6		
	-14 00	9	[redacted]-NDV1	~~SOUND PWR PHONE JACK~~	~~R51 J45 6~~		
	-14 00	9	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J45 7		
				TOTAL QUANTITY THIS ROW	11		
	-14 00	10	[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3EKF		
	-14 00	10	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8 8		
	-14 00	10	[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3EKF		
	-14 00	10	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8 6		
				TOTAL QUANTITY THIS ROW	4		
	-14 00	17	[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3EKE		
	-14 00	17	[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3EKE		
				TOTAL QUANTITY THIS ROW	2		
	-14 00	18	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016B7		
				TOTAL QUANTITY THIS ROW	1		
	-14 00	28	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J45 1		

IN NUMBER 58-8
IN BEGIN DATE: 12/10/81

CABLE PROGRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVAT
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Submersion Qualification Required
				TOTAL QUANTITY THIS ROW	1		
3	-14 00	30	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016B3	No	No
3	-14 00	30	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005B3		
				TOTAL QUANTITY THIS ROW	2		
				TOTAL QUANTITY THIS ELEVATION	21		
3	-15 00	20	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016B2		
3	-15 00	20	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005B2		
				TOTAL QUANTITY THIS ROW	2		
				TOTAL QUANTITY THIS ELEVATION	2		
3	-15 04	21	[redacted]-NDV2	RECIRC PMP A STG H/L FL	B33 N007A		
				TOTAL QUANTITY THIS ROW	1		
3	-15 04	28	[redacted]-NDV2	RECIRC PMP B HI SEAL LKG	B33 N002B		
				TOTAL QUANTITY THIS ROW	1		
3	-15 04	29	[redacted]-NDV2	RECIRC PMP A HI SEAL LKG	B33 N002A		
3	-15 04	29	[redacted]-NDV2	RECIRC PMP B STG H/L FL	B33 N007B		
				TOTAL QUANTITY THIS ROW	2		
				TOTAL QUANTITY THIS ELEVATION	4		
3	-16 00	32	[redacted]-AIV1	T-C,DRYWELL	E31 N017A		
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION	1		
3	-16 08	23	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016B8		
3	-16 08	23	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005B8		
				TOTAL QUANTITY THIS ROW	2		
				TOTAL QUANTITY THIS ELEVATION	2		
3	-17 06	21	[redacted]-NDV1	RECIR PMP A SUCT TEMP	B33 N028A		
3	-17 06	21	[redacted]-NDV1	[redacted]	[redacted]		
3	-17 06	21	[redacted]-NDV1	[redacted]	[redacted]		
				TOTAL QUANTITY THIS ROW	3		
3	-17 06	22	[redacted]-NDV1	RECIR PMP B SUCTION TEMP	B33 N028B		
3	-17 06	22	[redacted]-NDV1	[redacted]	[redacted]		
3	-17 06	22	[redacted]-NDV1	[redacted]	[redacted]		

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CABLE P...GRAM

RUN NUMBER 58-8
08
RUN BEGIN DATE: 12/10/81
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATI
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP			Safety	Submersion Qualification Required
				TOTAL QUANTITY THIS ROW		3			
RB	-17 06	23	[redacted]-A2V1	FLOW TRANSMITTER	E31 N021			X	- Shed on LOCA (Associated)
				TOTAL QUANTITY THIS ROW		1			
RB	-17 06	24	[redacted]-NDV1	T-C-3/PUMP SUC TEMP-B	B33 N023B			No	No
RB	-17 06	24	[redacted]-NDV1	~~T-C-3/PUMP SUC TEMP-B~~	~~B33 N023B~~				
RB	-17 06	24	[redacted]-NDV1	~~T-C-3/PUMP SUC TEMP-B~~	~~B33 N023B~~				
				TOTAL QUANTITY THIS ROW		3			
				TOTAL QUANTITY THIS ELEVATION			10		
RB	-18 00	17	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8	3			
RB	-18 00	17	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8	3			
RB	-18 00	17	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8	4			
RB	-18 00	17	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J8	4			
				TOTAL QUANTITY THIS ROW		4			
RB	-18 00	22	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005B7				
				TOTAL QUANTITY THIS ROW		1			
				TOTAL QUANTITY THIS ELEVATION			5		
RB	-18 05	23	[redacted]-NDV1	RTD-2/PUMP SUC TEMP-A	B33 N023A				
RB	-18 05	23	[redacted]-NDV1	~~RTD-2/PUMP SUC TEMP-A~~	~~B33 N023A~~				
RB	-18 05	23	[redacted]-NDV1	~~RTD-2/PUMP SUC TEMP-A~~	~~B33 N023A~~				
				TOTAL QUANTITY THIS ROW		3			
				TOTAL QUANTITY THIS ELEVATION			3		
RB	-18 06	20	[redacted]-NDV1	TEMP ELEMENT	P42 NN011				
				TOTAL QUANTITY THIS ROW		1			
RB	-18 06	21	[redacted]-NDV2	CRW RECIRC VALVE	P55 FF023				
RB	-18 06	21	[redacted]-NDV2	~~CRW RECIRC VALVE~~	~~P55 FF023~~				
RB	-18 06	21	[redacted]-NDV2	~~CRW RECIRC VALVE~~	~~P55 FF023~~				
RB	-18 06	21	[redacted]-NDV3	~~CRW RECIRC VALVE~~	~~P55 FF023~~				
				TOTAL QUANTITY THIS ROW		4			
				TOTAL QUANTITY THIS ELEVATION			5		
RB	-19 00	23	[redacted]-NDV1	RWCU RECIRC SUCT THROTTL	G33 F102				
RB	-19 00	23	[redacted]-NDV2	~~RWCU RECIRC SUCT THROTTL~~	~~G33 F102~~				
RB	-19 00	23	[redacted]-NDV3	~~RWCU RECIRC SUCT THROTTL~~	~~G33 F102~~				
				TOTAL QUANTITY THIS ROW		3			

CABLE PROGRAM

RUN NUMBER 58-8 08
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BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Submersion Qualification Required
B	-19 00	29	[redacted]NDV2	RECIRC PMP B WTR LOW FL	B33 N004B	NO	No
				TOTAL QUANTITY THIS ROW 1			
				TOTAL QUANTITY THIS ELEVATION 4			
B	-19 03	25	[redacted]-NDV1	RWCU RECIRC LOOP B SUCT	B33 F106		
B	-19 03	25	[redacted]NDV2	~~RWCU RECIRC LOOP B SUCT~~	~~B33 F106~~		
B	-19 03	25	[redacted]NDV3	~~RWCU RECIRC LOOP B SUCT~~	~~B33 F106~~		
				TOTAL QUANTITY THIS ROW 3			
				TOTAL QUANTITY THIS ELEVATION 3			
B	-19 06	26	[redacted]-NDV1	RWCU RECIRC LOOP A SUCT	B33 F100		
B	-19 06	26	[redacted]-NDV2	~~RWCU RECIRC LOOP A SUCT~~	~~B33 F100~~		
B	-19 06	26	[redacted]-NDV3	~~RWCU RECIRC LOOP A SUCT~~	~~B33 F100~~		
				TOTAL QUANTITY THIS ROW 3			
				TOTAL QUANTITY THIS ELEVATION 3			
B	-21 00	18	[redacted]NDV2	DW EQUIP DRN SUMP LEVEL	P55 NN028		
				TOTAL QUANTITY THIS ROW 1			
B	-21 00	21	[redacted]A2V1	FLOW XMTR DRYWELL SUMP	E31 NN007	shed on LOCA (Associated)	
B	-21 00	21	[redacted]-NDV2	DW FL DRAIN SUMP LVL SW	P56 NN023	No	No
	-21-00	21	A2V1	DW FL Drain Sump LVL	P56 NN051	shed on LOCA. (Associated)	
				TOTAL QUANTITY THIS ROW 2			
B	-21 00	22	[redacted]NDV2	LVL SW	P56 NN055	NO	No
				TOTAL QUANTITY THIS ROW 1			
				TOTAL QUANTITY THIS ELEVATION 4			
B	-22 00	22	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016F2		
B	-22 00	22	[redacted]NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005F2		
				TOTAL QUANTITY THIS ROW 2			
				TOTAL QUANTITY THIS ELEVATION 2			
B	-22 05	25	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016F4		
B	-22 05	25	[redacted]NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016F5		
B	-22 05	25	[redacted]NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005F4		
B	-22 05	25	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005F5		
				TOTAL QUANTITY THIS ROW 4			
				TOTAL QUANTITY THIS ELEVATION 4			
B	-23 07	19	[redacted]NDV1	DW EQUIP DRN SUMP LEVEL	P55 NN043		
				TOTAL QUANTITY THIS ROW 1			

CABLE P[illegible]GRAM

RUN NUMBER 58-8 08

RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATI

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Submersion Qualification Required
RB	-23 07	20	A[redacted]-NDV1	DW EQUIP DRN SUMP TEMP	P55 NN027	No	No
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION	2		
RB	-27 00	19	[redacted]-NDV3	DW EQUIP DRN SUMP PUMP	P55 CC012A		
				TOTAL QUANTITY THIS ROW	1		
RB	-27 00	21	[redacted]-NDV3	CONT EQUIP DRN SUMP PUMP	P55 CC012B		
				TOTAL QUANTITY THIS ROW	1		
RB	-27 00	23	[redacted]A2V1	PREAMP	E31 N021 1	No	No
RB	-27 00	23	[redacted]A2V1	~~PREAMP~~	~~E31 N021 1~~		
				TOTAL QUANTITY THIS ROW	2		
				TOTAL QUANTITY THIS ELEVATION	4		
RB	-32 00	22	[redacted]-NDV3	PED FL DRAIN SUMP PUMP	P56 CC021A	No	No
RB	-32 00	22	[redacted]NDV3	PED FL DRAIN SUMP PUMP	P56 CC021B		
				TOTAL QUANTITY THIS ROW	2		
RB	-32 00	24	[redacted]-NDV3	DW FL DRAIN SUMP PUMP	P56 CC015A		
RB	-32 00	24	[redacted]NDV3	DW FL DRAIN SUMP PUMP	P56 CC015B		
				TOTAL QUANTITY THIS ROW	2		
RB	-32 00	65	[redacted]-NDV1	SEISMIC SWITCH	X99 002		
RB	-32 00	65	[redacted]NDV2	RESP SPEC HORZ N/S REC	X99 004AP1		
RB	-32 00	65	[redacted]-NDV2	RESP SPEC VERT RECORDER	X99 004AP2		
RB	-32 00	65	[redacted]NDV2	RESP SPEC HORZ E/W REC.	X99 004AP3		
				TOTAL QUANTITY THIS ROW	4		
				TOTAL QUANTITY THIS ELEVATION	8		
RB	+00 00	21	A[redacted]-NDV1	BOTTOM HEAD DRAIN VLV	B33 F101		
RB	+00 00	21	[redacted]NDV2	~~BOTTOM HEAD DRAIN VLV~~	~~B33 F101~~		
RB	+00 00	21	A[redacted]NDV3	~~BOTTOM HEAD DRAIN VLV~~	~~B33 F101~~		
				TOTAL QUANTITY THIS ROW	3		
RB	+00 00	46	A1[redacted]-NDV1	DRIVE MECH J001B PWR	C51 J001B		
RB	+00 00	46	A[redacted]NDV1	DRIVE MECHANISAM-J001D	C51 J001D		
RB	+00 00	46	A[redacted]NDV2	~~DRIVE MECH J001B PWR~~	~~C51 J001B~~		
RB	+00 00	46	A[redacted]NDV2	~~DRIVE MECHANISAM J001D~~	~~C51 J001D~~		
RB	+00 00	46	[redacted]-NDV3	~~DRIVE MECH J001B PWR~~	~~C51 J001B~~		
RB	+00 00	46	[redacted]-NDV3	~~DRIVE MECHANISAM J001D~~	~~C51 J001D~~		

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE PROGRAM
06
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVA
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUI	SAFETY	SUBM. QUAL.	[redacted]
				TOTAL QUANTITY THIS ROW	6			
RB	+00 00	60	[redacted]-NDV1	RWCU NON-REG HT EXCH FLW	P42 NN015	NO.	NO.	[redacted]
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION	1			
RB	+00 03	45	[redacted] NDV1	CONTMNT EQUIP DRN SUMP	P55 NN035	NO →	↓	→
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION				
RB	+01 07	31	[redacted] NDV1	MOTOR B WNG COOL WTR TE	B33 N009B	NO →	↓	→
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION				
RB	+01 09	8	[redacted]-NDV1	BOTTOM HEAD TC	B21 N030A	NO →	↓	→
RB	+01 09	8	[redacted]-NDV1	BOTTOM HEAD TC	B21 N030B			
				TOTAL QUANTITY THIS ROW	2			
				TOTAL QUANTITY THIS ELEVATION				
RB	+02 03	46	[redacted] NDV2	CRW RECIRC PUMP VALVE	P55 FF016	NO →	↓	→
RB	+02 03	46	[redacted] NDV2	CRW RECIRC PUMP	P55 FF016			
RB	+02 03	46	[redacted] NDV2	CRW RECIRC PUMP	P55 FF016			
RB	+02 03	46	[redacted] NDV3	CRW RECIRC PUMP	P55 FF016			
				TOTAL QUANTITY THIS ROW	4			
RB	+02 03	48	[redacted]-NDV2	CRW VALVE	P55 FF022	NO →	↓	→
RB	+02 03	48	[redacted] NDV2	CRW VALVE	P55 FF022			
RB	+02 03	48	[redacted]-NDV2	CRW VALVE	P55 FF022			
RB	+02 03	48	[redacted]-NDV3	CRW VALVE	P55 FF022			
				TOTAL QUANTITY THIS ROW	4			
				TOTAL QUANTITY THIS ELEVATION				
RB	+02 06	29	[redacted] NDV1	MOTOR A BRG COOL WTR TE	B33 N001A	NO →	↓	→
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION	1			
RB	+02 09	36	[redacted] NDV1	COMMUNICATION CCTV JB	R54 J3EJN	NO →	↓	→
RB	+02 09	36	[redacted]-NDV1	COMMUNICATION CCTV JB	R54 J3EJN			
RB	+02 09	36	[redacted] NDV2	COMMUNICATION CCTV JB	R54 J3EJN			
RB	+02 09	36	[redacted]-NDV2	COMMUNICATION CCTV JB	R54 J3EJN			

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

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08
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVAT
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM. QUAL. Required
				TOTAL QUANTITY THIS ROW	4		
				TOTAL QUANTITY THIS ELEVATION	4		
RB	+03 00	29	[redacted]-NDV1	MOTOR A WINDING COOL WTR	B33 N009A	NO	NO
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION	1		
RB	+03 03	30	[redacted]-NDV1	MOTOR B BRG COOL WTR TE	B33 N001B	NO	NO
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION	1		
RB	+03 06	45	[redacted] DIV2	DW O/B ISO VALVE	P42 FF050	yes	yes
RB	+03 06	45	[redacted]	[redacted]	~~P42 FF050~~		
				TOTAL QUANTITY THIS ROW	2		
RB	+03 06	65	-B33A-60[illegible] NDV4	NONDIV PENET P 200 INBD	R61 TT200 I	NO	NO
RB	+03 06	65	1 B33A-[redacted]	[redacted]	~~TT200~~ I		
RB	+03 06	65	1 -B[illegible]601	[redacted]	~~TT200~~ I		
RB	+03 06	65	1 -B[illegible]601	[redacted]	~~TT200~~ I		
RB	+03 06	65	1 B33A-[illegible]02	[redacted]	~~TT200~~ I		
RB	+03 06	65	-B33A-60[redacted]	[redacted]	~~TT200~~ I		
				TOTAL QUANTITY THIS ROW	6		
				TOTAL QUANTITY THIS ELEVATION	8		
RB	+04 00	35	[illegible]-D2V2	CONTMNT ISO VALVE	P42 FF061	yes	yes
RB	+04 00	35	P42 -40[illegible] ~~D2V3~~	[redacted]	~~P42 FF061~~		
				TOTAL QUANTITY THIS ROW	2		
RB	+04 00	58	P56A-3[illegible] D2V2	DRW I/B ISO VALVE	P56 FF036	yes	yes
RB	+04 00	58	A -[illegible]306[illegible] ~~D2V2~~	~~DRW I/B ISO VALVE~~	~~P56 FF036~~		
RB	+04 00	58	A -P56A-400[illegible] ~~D2V3~~	~~DRW I/B ISO VALVE~~	~~P56 FF036~~		
				TOTAL QUANTITY THIS ROW	3		
				TOTAL QUANTITY THIS ELEVATION	5		
RB	+04 08	25	E31Y-2[illegible] NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016C1	NO	NO
RB	+04 08	25	E31Y-[illegible]01 NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005C1		
				TOTAL QUANTITY THIS ROW	2		
RB	+04 08	30	A B21H-2[illegible]-D2V2	NS INBD SUCT ISO NS4 VLV.	E12 F009	yes	yes
RB	+04 08	30	A [illegible]411 ~~B2V3~~	[redacted]	[redacted]		
RB	+04 08	30	A E12A-30[illegible] ~~D2V2~~	[redacted]	[redacted]		

RUN NUMBER 56-8
RUN BEGIN DATE: 12/10/81

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08
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATI(
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBM. QUAL.
				TOTAL QUANTITY THIS ROW	3		
B	+04 08	56	[redacted]-D2V2	CONDENSATE SUPPLY CONTAI	P46 FF183		
				TOTAL QUANTITY THIS ROW	1		
B	+04 08	65	1 -B33A-60 -NDV4	NONDIV PENET P 201 INBD	R61 TT201 I	NO	NO
B	+04 08	65	-B33A	~~NONDIV PENET P 201 INBD~~	~~R61 TT201 I~~		
B	+04 08	65	1 -B33A-60	~~NONDIV PENET P 201 INBD~~	~~R61 TT201 I~~		
B	+04 08	65	1 A-60	~~NONDIV PENET P 201 INBD~~	~~R61 TT201 I~~		
B	+04 08	65	-B33 -602	~~NONDIV PENET P 201 INBD~~	~~R61 TT201 I~~		
B	+04 08	65	1 -B33A-	~~NONDIV PENET P 201 INBD~~	~~R61 TT201 I~~		
				TOTAL QUANTITY THIS ROW	6		
				TOTAL QUANTITY THIS ELEVATION	12		
B	+06 00	32	[redacted]-A1V1	T-C, DRYWELL	E31 N017B	No	No
				TOTAL QUANTITY THIS ROW	1		
B	+06 00	45	[redacted]-D1V2	DW O/B ISO VALVE	P42 FF103		
B	+06 00	45	[redacted]	~~DW O/B ISO VALVE~~	~~P42 FF103~~		
				TOTAL QUANTITY THIS ROW	2		
				TOTAL QUANTITY THIS ELEVATION	3		
B	+06 01	42	-P50 - -D2V1	SUPP POOL WATER TEMP	P50 NN005B	yes	yes
B	+06 01	42	-200 -D2V1	SUPP POOL WATER LEVEL	P50 NN003B		
B	+06 01	42	-200 -D2V1	SUPP POOL WATER LEVEL	P50 NN004B		
				TOTAL QUANTITY THIS ROW	3		
B	+06 01	43	[redacted]-D3V1	SUPPRESSION POOL	E22 N055B	yes	yes
				TOTAL QUANTITY THIS ROW	1		
				TOTAL QUANTITY THIS ELEVATION	4		
B	+06 04	35	[redacted]-D2V2	DRW I/B ISO VALVE	P56 FF025	yes	
B	+06 04	35	[redacted]	~~DRW I/B ISO VALVE~~	~~P56 FF025~~		
B	+06 04	35	[redacted]	~~DRW I/B ISO VALVE~~	~~P56 FF025~~		
				TOTAL QUANTITY THIS ROW	3		
				TOTAL QUANTITY THIS ELEVATION	3		
B	+06 07	58	-P55 -30 -D2V2	CRW I/B ISO VALVE	P55 FF011	Yes	
B	+06 07	58	1 -P55 -302	~~CRW I/B ISO VALVE~~	~~P55 FF011~~		
B	+06 07	58	1 -P55 -306	~~CRW I/B ISO VALVE~~	~~P55 FF011~~		
B	+06 07	58	-P55 -40	~~CRW I/B ISO VALVE~~	~~P55 FF011~~		

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RUN BEGIN DATE: 12/10/81

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08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	SAFETY	SUBMERG. QUALFD	[redacted]
				TOTAL QUANTITY THIS ROW	4			
				TOTAL QUANTITY THIS ELEVATION	4			
RB	+06 09	42	[redacted]-D3V1	SUPPRESSION POOL	E22 N055C	yes	yes	[redacted]
				TOTAL QUANTITY THIS ROW	1			
RB	+06 09	43	1 -P50 -2[illegible]-DIV1	SUPP POOL WATER TEMP	P50 NN005A	yes	yes	[redacted]
RB	+06 09	43	1 -[illegible]-200[illegible]-DIV1	SUPP POOL WATER LEVEL	P50 NN003A			
RB	+06 09	43	[illegible]-P50 -2[illegible]-DIV1	SUPP POOL WATER LEVEL	P50 NN004A			
				TOTAL QUANTITY THIS ROW	3			
				TOTAL QUANTITY THIS ELEVATION	4			
RB	+07 00	50	[redacted]-NDV3	CONT MAIN HOIST	T31 EE009	No	No	
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION	1			
RB	+08 00	52	[illegible]-X99C-23[illegible]-NDV1	WET STANDPIPE GATE VALVE	X43 FF135			
RB	+08 00	52	1 -X99C-233[illegible]-NDV1	~~[illegible]~~	~~[illegible]~~			
RB	+08 00	52	1 -X99[illegible]-272[illegible]-NDV1	~~[illegible]~~	~~[illegible]~~			
RB	+08 00	52	[illegible]-X99C-[illegible]2-NDV1	~~[illegible]~~	~~[illegible]~~			
				TOTAL QUANTITY THIS ROW	4			
				TOTAL QUANTITY THIS ELEVATION	4			
RB	+10 00	26	[redacted]-NDV3	CRD REMOVAL JIB HOIST	T31 EE003			
				TOTAL QUANTITY THIS ROW	1			
RB	+10 00	32	[redacted]-NDV1	LOWER LEVEL DRYWELL TEMP	T41 NN006A			
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION	2			
RB	+11 00	41	[illegible]-R52 -34[illegible]-NDV2	CAP SYSTEM SPEAKER	R52 C5B-2			
RB	+11 00	41	[illegible]-R52 -3[illegible]-NDV2	CAP SYSTEM SPEAKER	~~R52 C5B-2~~			
				TOTAL QUANTITY THIS ROW	2			
RB	+11 00	42	[illegible]-C71A-30[illegible]-D2VS	J BOX GROUP 2 SIDE 1	C71 J3BBM	yes	yes	
RB	+11 00	42	[illegible]-C71A-3[illegible]-D2VS	~~J BOX GROUP 2 SIDE 1~~	~~C71 J3BBM~~			
RB	+11 00	42	1 -C71A-305[illegible]-D3VS	J BOX GROUP 3 SIDE 1	C71 J3CAG			
RB	+11 00	42	1 -C[illegible]-305[illegible]-D3VS	~~J BOX GROUP 3 SIDE 1~~	~~C71 J3CAG~~			
RB	+11 00	42	1 -C7[illegible]-316[illegible]-D2VS	~~J BOX GROUP 2 SIDE 1~~	~~C71 J3BBM~~			
RB	+11 00	42	[illegible]-C[illegible]A-316[illegible]-D2VS	~~J BOX GROUP 2 SIDE 1~~	~~C71 J3BBM~~			
RB	+11 00	42	[illegible]-C71A-3[illegible]-D2VS	~~J BOX GROUP 2 SIDE 1~~	~~C71 J3BBM~~			
RB	+11 00	42	[illegible]-C71A-31[illegible]-D2VS	~~J BOX GROUP 2 SIDE 1~~	~~C71 J3BBM~~			
RB	+11 00	42	[illegible]-C71A-317[illegible]-D2VS	~~J BOX GROUP 2 SIDE 1~~	~~C71 J3BBM~~			

CABLE P[illegible]GRAM

RUN NUMBER 58-8 08
RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATIO
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP		Safety	Submersion Qualification Required
RB	+11 00	42	A1 -C71A-3[illegible] -D2VS	J BOX GROUP 2 SIDE 1	C71 J3BBL		yes	yes
RB	+11 00	42	A1 -C71A-317[illegible]	J BOX GROUP 2 SIDE 1	C71 J3BBL			
RB	+11 00	42	-C71A-317 -D2VS	J BOX GROUP 2 SIDE 1	C71 J3BBL			
RB	+11 00	42	-C71A-320 -D2VS	J BOX GROUP 2 SIDE 1	C71 J3BBL			
RB	+11 00	42	-C71A-320 -D2VS	J BOX GROUP 2 SIDE 1	C71 J3BBL			
RB	+11 00	42	-C71A-32[illegible] -D2VS	J BOX GROUP 2 SIDE 1	C71 J3BBL			
RB	+11 00	42	-C71A-[illegible]	J BOX GROUP 2 SIDE 1	C71 J3BBL			
RB	+11 00	42	-C71A-[illegible] -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAE			
RB	+11 00	42	-C71A-325[illegible]	J BOX GROUP 3 SIDE 2	C71 J3CAE			
RB	+11 00	42	-C71A-325 -D3VS	J BOX GROUP 3 SIDE 1	C71 J3CAG		yes	
RB	+11 00	42	-C71A-[illegible]	J BOX GROUP 3 SIDE 1	C71 J3CAG			
RB	+11 00	42	-C71A-32[illegible]	J BOX GROUP 3 SIDE 1	C71 J3CAG			
RB	+11 00	42	A1 -C71A-32[illegible] -D3VS	J BOX GROUP 3 SIDE 1	C71 J3CAH		yes	
RB	+11 00	42	A1 -C71A-326[illegible]	J BOX GROUP 3 SIDE 1	C71 J3CAG			
RB	+11 00	42	-C71A-326 -D3VS	J BOX GROUP 3 SIDE 1	C71 J3CAH			
RB	+11 00	42	-C71A-326 -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAE			
RB	+11 00	42	A1 -C71A-32[illegible] -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAE			
RB	+11 00	42	A1 -C71A-320 -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAE			
RB	+11 00	42	A1 -C71A-320 -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAE			
RB	+11 00	42	A1 -C71A-3[illegible] -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAE			
RB	+11 00	42	-C71A-326 -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAF			
RB	+11 00	42	A1 -C71A-32[illegible]	J BOX GROUP 3 SIDE 2	C71 J3CAE			
RB	+11 00	42	A1 -C71A-328 -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAF		yes	
RB	+11 00	42	A1 -C71A-328[illegible]	J BOX GROUP 3 SIDE 1	C71 J3CAH			
RB	+11 00	42	A1 -C71A-328 -D3VS	J BOX GROUP 3 SIDE 1	C71 J3CAH			
RB	+11 00	42	A1 -C71A-32[illegible] -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAF			
RB	+11 00	42	A1 -C71A-332 -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAF			
RB	+11 00	42	A1 -C71A-333 -D3VS	J BOX GROUP 3 SIDE 2	C71 J3CAF			
RB	+11 00	42	A1 -C71A-3[illegible]	J BOX GROUP 3 SIDE 2	C71 J3CAF			

TOTAL QUANTITY THIS ROW 38

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	
RB	+11 00	44	[redacted] -NDV1	JET PUMP A LOCAL PANEL	H22 P010	A
RB	+11 00	44	[redacted] -NDV1	JET PUMP A LOCAL PANEL	H22 P010	A

TOTAL QUANTITY THIS ROW 2

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP		Safety	Submersion Qualification Required
RB	+11 00	45	-B21A-20[illegible] -NDV1 D2V1	RV LVL & PRESS B LOC PNL	H22 P027	A	Yes	Yes
RB	+11 00	45	-B21C-[illegible] -D2V1	RV LVL & PRESS B LOC PNL	H22 P027	A		
RB	+11 00	45	-B21C-[illegible] -D2V1	RV LVL & PRESS B LOC PNL	H22 P027	A		
RB	+11 00	45	-B21H-200[illegible] -D2V1	RV LVL & PRESS B LOC PNL	H22 P027	A		
RB	+11 00	45	-B21H-200[illegible]	RV LVL & PRESS C LOC PNL	H22 P005	A		
RB	+11 00	45	-B33[illegible]-20[illegible] -NDV1	RECIRC PUMP A LOCAL PNL	H22 P006	A	No	No
RB	+11 00	45	-B[illegible]A-20[illegible] -D2V1	RV LVL & PRESS B LOC PNL	H22 P027	A		
RB	+11 00	45	-B[illegible]A-20[illegible] -D2V1	RV LVL & PRESS B LOC PNL	H22 P027	A		
RB	+11 00	45	-B[illegible]-20[illegible] -NDV1	RV LVL & PRESS B LOC PNL	H22 P027	A		
RB	+11 00	45	-B33[illegible]-20[illegible] -NDV1	RV LVL & PRESS B LOC PNL	H22 P027	A		
RB	+11 00	45	-B33A-21[illegible] -NDV1	RECIRC PUMP A LOCAL PNL	H22 P006	A		
RB	+11 00	45	-C11A-2[illegible] -NDV1	BRANCH JUNCTION MODULE	BJM24		No	No
RB	+11 00	45	-C11A-25[illegible] -NDV1	BRANCH JUNCTION MODULE	BJM24			
RB	+11 00	45	-C11A-25[illegible] -NDV1	BRANCH JUNCTION MODULE	BJM14 BJM14			

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CABLE PROGRAM

RUN NUMBER 58-8   08

RUN BEGIN DATE: 12/10/81   REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATIO

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Submersion Qualification Required
RB	+11 00	45	[illegible] NDV1	BRANCH JUNCTION MODULE	BJM14	No	No
RB	+11 00	45	1 -C11A-401 NDV3	BRANCH JUNCTION MODULE	BJM24	No	No
RB	+11 00	45	1 -C11A-40[illegible] NDV3	BRANCH JUNCTION MODULE	BJM24	↓	↓
RB	+11 00	45	1 -C11A-[illegible] NDV3	BRANCH JUNCTION MODULE	BJM14		
RB	+11 00	45	1 -C34A-003 NDV1	RV LVL & PRESS B LOC PNL	H22 P027		
RB	+11 00	45	1 -C34A-20[illegible] NDV1	RV LVL & PRESS C LOC PNL	H22 P005		
RB	+11 00	45	1 -C34A-3[illegible] NDV2	RV LVL & PRESS B LOC PNL	H22 P027		
RB	+11 00	45	1 -C71A-200 D2V1	RV LVL & PRESS B LOC PNL	H22 P027		
RB	+11 00	45	1 -C71A-200 D3V1	RV LVL & PRESS C LOC PNL	H22 P005		
RB	+11 00	45	1 -C71A-20[illegible] D2V1	RV LVL & PRESS B LOC PNL	H22 P027		
RB	+11 00	45	1 -C71A-20[illegible] D3V1	RV LVL & PRESS C LOC PNL	H22 P005		
RB	+11 00	45	1 -C71A-203 D2V1	RV LVL & PRESS B LOC PNL	H22 P027		
RB	+11 00	45	1 -C71A-203 [illegible]	RV LVL & PRESS C LOC PNL	H22 P005		
RB	+11 00	45	1 -C71A-311 D1VS	SCRAM VV DIVISION 1 GR 1	C71 F2207	yes	yes
RB	+11 00	45	1 -C71A-31[illegible] D4VS	SCRAM VV DIVISION 1 GR 1	C71 F2207	↓	↓
RB	+11 00	45	1 -C71A-312 D4VS	SCRAM VV DIVISION 1 GR 1	C71 F2207		
RB	+11 00	45	1 -C71A-312 D1VS	SCRAM VV DIVISION 1 GR 1	C71 F2207		
RB	+11 00	45	1 -C71A-313 D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1401		
RB	+11 00	45	1 -C71A-31[illegible] D4VS	SCRAM VV DIVISION 1 GR 1	C71 F1401		
RB	+11 00	45	1 -C71A-3[illegible] D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1401		
RB	+11 00	45	1 -C71A-314 D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1401		
RB	+11 00	45	1 -C71A-321 D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2206		
RB	+11 00	45	1 -C71A-32[illegible] D3VS	SCRAM VV DIVISION 2 GR 2	C71 F2206		
RB	+11 00	45	1 -C71A-3[illegible] D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2206		
RB	+11 00	45	A -C71A-321 D3VS	SCRAM VV DIVISION 2 GR 2	C71 F2206		
RB	+11 00	45	A -C71A-32[illegible] D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0307		
RB	+11 00	45	A -C71A-33[illegible] D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0307		
RB	+11 00	45	A -C71A-3[illegible] D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0307		
RB	+11 00	45	A -C71A-331 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0308 (stet)		
RB	+11 00	45	A -C71A-331 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0307		
RB	+11 00	45	A -C71A-33[illegible] D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0308		
RB	+11 00	45	A -C71A-3[illegible] D4VS	SCRAM VV DIVISION 3 GR 3	C71 F0308		
RB	+11 00	45	A -C71A-331 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0308		
RB	+11 00	45	A -C71A-332 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0208		
RB	+11 00	45	A -C71A-332 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0208		
RB	+11 00	45	A -C71A-332 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0208		
RB	+11 00	45	A -C71A-3[illegible] D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0208		
RB	+11 00	45	A -C71A-333 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1308		
RB	+11 00	45	A -C71A-333 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1308		
RB	+11 00	45	A -C71A-334 D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1308		
RB	+11 00	45	A -C71A-334 D4VS	SCRAM VV DIVISION 3 GR 3	C71 F1308		
RB	+11 00	45	A -C71A-33[illegible] D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3208		
RB	+11 00	45	A -C71A-3[illegible] D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3208		
RB	+11 00	45	A -C71A-336 D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3208		
RB	+11 00	45	A -C71A-336 D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3207 (stet)		
RB	+11 00	45	A -C71A-336 D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3208		
RB	+11 00	45	A -C71A-33[illegible] D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3207		
RB	+11 00	45	A -C71A-3[illegible] D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0207		
RB	+11 00	45	A -C71A-347 D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0207		
RB	+11 00	45	A -C71A-340 D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2308		
RB	+11 00	45	A -C71A-340 D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2308	↓	↓

CABLE [illegible]GRAM

RUN NUMBER 58-8 08

RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI(

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP		
RB	+11 00	45	[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0107	yes	yes
RB	+11 00	45	-C71A-3[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0107~~		
RB	+11 00	45	-C71A-[illegible]42-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0107~~		
RB	+11 00	45	1 C71A-342-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0107~~		
RB	+11 00	45	1 -[illegible]A-343-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0207		
RB	+11 00	45	1 -[illegible]A-343-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0207~~		
RB	+11 00	45	-[illegible]A-344-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0207~~		
RB	+11 00	45	A C7[illegible]-344-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0207~~		
RB	+11 00	45	A -E12A-201-D2V1	RV LVL & PRESS B LOC PNL	~~H22 P027~~		
RB	+11 00	45	A -E12A-[illegible]01-D2V1	RV LVL & PRESS B LOC PNL	~~H22 P027~~		
RB	+11 00	45	-E22A-2[illegible]2-D3V1	RV LVL & PRESS C LOC PNL	~~H22 P006~~		
				TOTAL QUANTITY THIS ROW	76		
RB	+11 00	46	[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F3308		
RB	+11 00	46	A1 -C71A-3[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	~~C71 F3308~~		
RB	+11 00	46	A1 -C71A-[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	~~C71 F3308~~		
RB	+11 00	46	A1 -C71A-309-D1VS	SCRAM VV DIVISION 1 GR 1	~~C71 F3308~~		
RB	+11 00	46	A1 -C71A-311-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F2307		
RB	+11 00	46	A1 -C71[illegible]-311-D1VS	SCRAM VV DIVISION 1 GR 1	~~C71 F2307~~		
RB	+11 00	46	A1 -C7[illegible]-317-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1206		
RB	+11 00	46	A1 -C7[illegible]A-317-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F1206~~		
RB	+11 00	46	A1 -C[illegible]1A-319-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2401		
RB	+11 00	46	A1 -[illegible]1A-319-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F2401~~		
RB	+11 00	46	A1 -[illegible]71A-321-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2107		
RB	+11 00	46	A1 -[illegible]71A-321-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F2107~~		
RB	+11 00	46	A1 -C71A-321-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F2107~~		
RB	+11 00	46	A C71A-321-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F2107~~		
RB	+11 00	46	A C71A-322-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1206		
RB	+11 00	46	A C71A-322-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F1206~~		
RB	+11 00	46	A C71A-328-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3107		
RB	+11 00	46	A1 C71A-328-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3107~~		
RB	+11 00	46	A1 C71A-328-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3107~~		
RB	+11 00	46	A1 C71A-328-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3107~~		
RB	+11 00	46	A1 C71A-334-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1207		
RB	+11 00	46	A 71A-334-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F1207~~		
RB	+11 00	46	A -C[illegible]A-334-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F1207~~		
RB	+11 00	46	A -C7[illegible]A-331-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F1207~~		
RB	+11 00	46	A -C7[illegible]-337-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3307		
RB	+11 00	46	-C71A-337-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F3307~~		
RB	+11 00	46	1 -C71A-[illegible]38-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F3307~~		
RB	+11 00	46	1 -C71A-3[illegible]8-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F3307~~		
RB	+11 00	46	1 -C71A-34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2108		
RB	+11 00	46	-C71A[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F2108~~		
				TOTAL QUANTITY THIS ROW	30		
RB	+11 00	47	-C71A-[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1309		
RB	+11 00	47	1 -[illegible]-317-D1VS	SCRAM VV DIVISION 1 GR 1	~~C71 F1309~~		
RB	+11 00	47	1 -[illegible]-31[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	~~C71 F1309~~		
RB	+11 00	47	1 -C71A-31[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	~~C71 F1309~~		

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE ,ROGRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI(
TODAY'S DATE IS: 10/27/82

yes yes

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP
RB	+11 00	47	[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0206
RB	+11 00	47	1 -C71A-315[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0206
RB	+11 00	47	1 -C71[illegible]-315[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0306
RB	+11 00	47	-C7[illegible]A-315[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0306
RB	+11 00	47	1 -C[illegible]A-3[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0306
RB	+11 00	47	1 -[illegible]71A-[illegible]16[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0306
RB	+11 00	47	1 -C71A[illegible]16[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBK
RB	+11 00	47	1 -C71[illegible]-316[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBK
RB	+11 00	47	-C7[illegible]A-316[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3206
RB	+11 00	47	-C[illegible]A-316[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3206
RB	+11 00	47	A1 -[illegible]71A-317[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBK
RB	+11 00	47	1 -C71A-3[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBK
RB	+11 00	47	1 -C71A-[illegible]17[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBK
RB	+11 00	47	-C71A[illegible]31[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBK
RB	+11 00	47	-C71[illegible]-31[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBK
RB	+11 00	47	-C7[illegible]A-31[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBJ
RB	+11 00	47	-C[illegible]A-31[illegible]7-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBK
RB	+11 00	47	1 -[illegible]71A-31[illegible]7-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBJ
RB	+11 00	47	1 -C71A-31[illegible]8-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3206
RB	+11 00	47	-C71A-3[illegible]9-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3206
RB	+11 00	47	-C71A-[illegible]2[illegible]8-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1307
RB	+11 00	47	-C71A[illegible]32[illegible]9-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1307
RB	+11 00	47	A1 -C71[illegible]-32[illegible]0-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1307
RB	+11 00	47	A1 -C7[illegible]A-32[illegible]1-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1307
RB	+11 00	47	A1 -C[illegible]1A-32[illegible]8-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0106
RB	+11 00	47	A1 -[illegible]71A-3[illegible]9-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0106
RB	+11 00	47	A1 -C71A-[illegible]0-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBJ
RB	+11 00	47	A1 -C71A[illegible]32[illegible]1-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBJ
RB	+11 00	47	A[illegible] -C71[illegible]-32[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBJ
RB	+11 00	47	-C7[illegible]A-32[illegible]-D2VS	J BOX GROUP 2 SIDE 2	C71 J3BBJ
RB	+11 00	47	-C[illegible]1A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2208
RB	+11 00	47	1 -[illegible]71A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2208
RB	+11 00	47	1 -C71A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2208
RB	+11 00	47	-C71A-3[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2309
RB	+11 00	47	-C71A[illegible]2[illegible]7-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2208
RB	+11 00	47	-C71[illegible]-32[illegible]7-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2309
RB	+11 00	47	-C7[illegible]A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2309
RB	+11 00	47	-[illegible]71A-327[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2309
RB	+11 00	47	-C71A-329[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3209
RB	+11 00	47	-C71A-3[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3209
RB	+11 00	47	-C71A-[illegible]29[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3209
RB	+11 00	47	-C71A[illegible]329[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3209
RB	+11 00	47	1 -C71[illegible]-332[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1402
RB	+11 00	47	1 -C7[illegible]A-332[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1402
RB	+11 00	47	1 -[illegible]71A-33[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1402
RB	+11 00	47	1 -C71A-3[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1402
RB	+11 00	47	1 -C71A-[illegible]3[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1205
RB	+11 00	47	-C71[illegible]-33[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1205
RB	+11 00	47	-C[illegible]A-334[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1205
RB	+11 00	47	1 -C71A-334[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1205
RB	+11 00	47	A1 -C71A-33[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2205

CABLE [illegible]GRAM

RUN NUMBER 58-8 08

RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATIO

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	
RB	+11 00	47	[illegible]-C71A-33[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2205	.
RB	+11 00	47	[illegible]1-C71A-3[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1306	.
RB	+11 00	47	[illegible]1-[illegible]71A-342[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F1306~~	.
RB	+11 00	47	[illegible]1-[illegible]-342[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F1306~~	.
RB	+11 00	47	[illegible]1-C[illegible]-342[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F1306~~	.
RB	+11 00	47	[illegible]1-C71[illegible]-344[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0309	.
RB	+11 00	47	[illegible]1-C71A-[illegible]44[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0309~~	.
RB	+11 00	47	[illegible]-C71A-[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0309~~	.
RB	+11 00	47	A1-C71A-34[illegible]3-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F0309~~	.
				TOTAL QUANTITY THIS ROW	64	
RB	+11 00	48	[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F3406	.
RB	+11 00	48	[illegible]-C71A-[illegible]7-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F3406~~	.
RB	+11 00	48	A[illegible]-C7[illegible]30[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F3406~~	.
RB	+11 00	48	A[illegible]-[illegible]1A-30[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F3406~~	.
RB	+11 00	48	A[illegible]C71A-3[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F2402	.
RB	+11 00	48	A[illegible]C71A[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F2402~~	.
RB	+11 00	48	A[illegible]-C71[illegible]31[illegible]2-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F2402~~	.
RB	+11 00	48	A[illegible]-C[illegible]A-31[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F2402~~	.
RB	+11 00	48	A[illegible]C71A-31[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F2106	.
RB	+11 00	48	A[illegible]-C71A-3[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F2106~~	.
RB	+11 00	48	[illegible]-C71[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F2106~~	.
RB	+11 00	48	[illegible]-C71[illegible]312[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F2106~~	.
RB	+11 00	48	[illegible]1-C7[illegible]A-312[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F1105	.
RB	+11 00	48	[illegible]1-[illegible]1A-312[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F1105~~	.
RB	+11 00	48	[illegible]C71A-31[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F1105~~	.
RB	+11 00	48	[illegible]-C71A-3[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F1105~~	A
RB	+11 00	48	[illegible]-C71A[illegible]314[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F0209	A
RB	+11 00	48	[illegible]1-C71[illegible]314[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F0209~~	A
RB	+11 00	48	[illegible]1-C7[illegible]A-315[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F0209~~	A
RB	+11 00	48	[illegible]-[illegible]1A-315[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	~~C71 F0209~~	A
[illegible]B	+11 00	48	[illegible]C71A-31[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3106	A
RB	+11 00	48	[illegible]-C71A-3[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F3106~~	A
RB	+11 00	48	[illegible]-C71A-[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F3106~~	A
RB	+11 00	48	[illegible]-C71A[illegible]31[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	~~C71 F3106~~	A
RB	+11 00	48	[illegible]1-C7[illegible]A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3309	A
RB	+11 00	48	[illegible]1-[illegible]71A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3309~~	A
RB	+11 00	48	[illegible]C71A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3309~~	A
RB	+11 00	48	[illegible]-C71A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3306	A
RB	+11 00	48	[illegible]1-C71A-[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3309~~	A
RB	+11 00	48	[illegible]1-C71A[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3306~~	A
RB	+11 00	48	[illegible]1-C7[illegible]-33[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3306~~	A
RB	+11 00	48	[illegible]1-[illegible]1A-33[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	~~C71 F3306~~	A
RB	+11 00	48	[illegible]C71A-34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2306	A
RB	+11 00	48	[illegible]-C71A-34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F2306~~	A
RB	+11 00	48	[illegible]1-C71A-3[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F2306~~	/
RB	+11 00	48	A1-C71[illegible]340[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F2306~~	/
RB	+11 00	48	A1-C7[illegible]-341[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1208	/
RB	+11 00	48	[illegible]1-[illegible]71A-341[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F1208~~	/
RB	+11 00	48	[illegible]-C71A-341[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	~~C71 F1208~~	

yes yes

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CABLE PROGRAM

RUN NUMBER 58-8 08

RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVAT

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP
RB	+11 00	48	[illegible]-C71A-34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1208
RB	+11 00	48	1 -[illegible]1A-34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1106
RB	+11 00	48	1 -C[illegible]-341[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	[illegible]
RB	+11 00	48	1 -C71A-[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	[illegible]
RB	+11 00	48	1 -C71A-34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	[illegible]
				TOTAL QUANTITY THIS ROW	44
RB	+11 00	49	[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F3205
RB	+11 00	49	1 -C71A-[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	1 -C71[illegible]-309[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	1 -C7[illegible]A-30[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F3210
RB	+11 00	49	1 -[illegible]1A-[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	1 -C71A-309[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	1 -C71[illegible]-310[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	1 -C[illegible]A-310[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	1 -[illegible]1A-311[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F2310
RB	+11 00	49	1 -C71A-31[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	1 -C71A-[illegible]1[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	[illegible]-C71A-[illegible]11[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	[illegible]-C71A-313[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F1305
RB	+11 00	49	A -C7[illegible]A-313[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	A -[illegible]1A-313[illegible]-DIVS	[illegible]	[illegible]
RB	+11 00	49	A -C71A-31[illegible]-DIVS	[illegible]	[illegible]
RB	[illegible]11 00	49	A -C71A-3[illegible]7[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1310
RB	+11 00	49	A -C71A-[illegible]175[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -C71A-320[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2209
RB	+11 00	49	A -C71[illegible]-320[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -C[illegible]A-321[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2109
RB	+11 00	49	A -[illegible]71A-3[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -C71A-[illegible]21[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -C71A-321[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -C71[illegible]-322[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -C[illegible]A-322[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -[illegible]71A-325[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0305
RB	+11 00	49	A -C71A-[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -C[illegible]1A-[illegible]25[illegible]-D2VS	[illegible]	[illegible]
RB	+11 00	49	A -C71A-[illegible]25[illegible]-D2VS	[illegible]	[illegible]
[illegible]	+11 00	49	A -C71[illegible]-327[illegible]-D3VS	SCRAM VV DIVISION 3 GR [illegible]	C71 F2204
	[illegible]11 00	49	A -C7[illegible]A-327[illegible]-D3VS	[illegible]	[illegible]
	[illegible] 00	49	A -[illegible]1A-327[illegible]-D3VS	[illegible]	[illegible]
[illegible]	[illegible]	49	A -C71A-3[illegible]-D3VS	[illegible]	[illegible]
RB	[illegible]	49	A -C71A-[illegible]32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0105
RB	+11 [illegible]	49	A -C71A-[illegible]32[illegible]-D3VS	[illegible]	[illegible]
RB	+11 00	49	A -C71[illegible]-333[illegible]-D3VS	[illegible]	[illegible]
RB	+11 00	49	A -C[illegible]A-333[illegible]-D3VS	[illegible]	[illegible]
RB	+11 00	49	A -[illegible]1A-335[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1104
RB	+11 00	49	A -C71A-[illegible]-D3VS	[illegible]	[illegible]
RB	+11 00	49	A -C[illegible]1A-33[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3105
RB	+11 00	49	A -C71A-33[illegible]-D4VS	[illegible]	[illegible]
RB	+11 00	49	A -C71[illegible]-342[illegible]-D4VS	[illegible]VV DIVISION 4 GR 4	C71 F1403

yes yes

CABLE . OGRAM
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RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATI
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP
RB	+11 00	49	-C71A-34[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1403~~
RB	+11 00	49	1-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1403~~
RB	+11 00	49	1-[illegible]A-343[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1403~~
RB	+11 00	49	A1-C7[illegible]34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0405
RB	+11 00	49	A1-[illegible]71A-[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0405~~
RB	+11 00	49	A1-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0405~~
RB	+11 00	49	[illegible]-C71A-34[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0405~~
				TOTAL QUANTITY THIS ROW	50
RB	+11 00	50	[illegible]-B21H-2[illegible]-D3VI	MAIN STEAM FLOW D LOCAL	H22 P041
RB	+11 00	50	1-B21[illegible]20[illegible]-D4VI	~~MAIN STEAM FLOW D LOCAL~~	~~H22 P041~~
RB	+11 00	50	1-[illegible]H-20[illegible]7-D3VI	~~MAIN STEAM FLOW D LOCAL~~	~~H22 P041~~
RB	+11 00	50	[illegible]B21H-20[illegible]9-D4VI	~~MAIN STEAM FLOW D LOCAL~~	~~H22 P041~~
RB	+11 00	50	[illegible]-B33A-[illegible]2-NDVI	~~MAIN STEAM FLOW D LOCAL~~	~~H22 P041~~
RB	+11 00	50	[illegible]-B33[illegible]20[illegible]2-NDVI	RECIRC PUMP LOCAL PANEL	H22 P022
RB	+11 00	50	1-C[illegible]A-00[illegible]2-NDVI	~~MAIN STEAM FLOW D LOCAL~~	~~H22 P041~~
RB	+11 00	50	1-C51B-[illegible]2-D3VI	~~MAIN STEAM FLOW D LOCAL~~	~~H22 P041~~
RB	+11 00	50	A1-C[illegible]B-[illegible]-D4VI	~~MAIN STEAM FLOW D LOCAL~~	~~H22 P041~~
RB	+11 00	50	A[illegible]-C71[illegible]30[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F3305
RB	+11 00	50	A1-C[illegible]A-30[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3305~~
RB	+11 00	50	A1-C71A-30[illegible]2-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3305~~
RB	+11 00	50	A1-C71A-30[illegible]3-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3305~~
RB	+11 00	50	[illegible]-C71[illegible]2-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F2110
RB	+11 00	50	[illegible]1-C71A-3[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F2110~~
RB	+11 00	50	[illegible]1-C71A[illegible]31[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1204
RB	+11 00	50	[illegible]1-C71[illegible]31[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1204~~
RB	+11 00	50	[illegible]1-C[illegible]A-31[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1204~~
RB	+11 00	50	[illegible]1-C71A-31[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1204~~
RB	+11 00	50	[illegible]1-C71A-31[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3310
RB	+11 00	50	[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3310~~
RB	+11 00	50	A1-C71A-3[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3310~~
RB	+11 00	50	A1-C71A[illegible]31[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3310~~
RB	+11 00	50	A1-C7[illegible]A-32[illegible]2-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2305
RB	+11 00	50	A1-[illegible]71A-32[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2305~~
RB	+11 00	50	A1-C71A-32[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2305~~
RB	+11 00	50	[illegible]-C71A-32[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2305~~
RB	+11 00	50	[illegible]A-32[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1209
RB	+11 00	50	A1-C71A-3[illegible]5-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1209~~
RB	+11 00	50	A1-C71A[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1209~~
RB	+11 00	50	A1-C7[illegible]-32[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1209~~
RB	+11 00	50	A1-[illegible]1A-32[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0210
RB	+11 00	50	A1-C71A-32[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0210~~
RB	+11 00	50	A[illegible]-C71A-324[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0210~~
RB	+11 00	50	[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0210~~
RB	+11 00	50	A1-C71A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2105
RB	+11 00	50	A1-C71A-325[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F2105~~
RB	+11 00	50	A1-C71[illegible]326[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F2105~~
RB	+11 00	50	A1-C[illegible]A-326[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F2105~~
RB	+11 00	50	A1-C71A-328[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2403
RB	+11 00	50	[illegible]-C71A-328[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F2403~~

yes yes

CABLE PROGRAM

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP
B	+11 00	50	-C71A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2403
B	+11 00	50	-C71A-[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F2403~~
B	+11 00	50	1 -C71[illegible]330[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3405
B	+11 00	50	-C[illegible]A-330[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F3405~~
B	+11 00	50	1 -C71[illegible]-331[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0205
B	+11 00	50	-C71A-[illegible]31[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0205~~
B	+11 00	50	1 -C71A-3[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0205~~
B	+11 00	50	1 -C71A-332[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0205~~

TOTAL QUANTITY THIS ROW 49

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP
B	+11 00	51	[illegible]-D3V1	MAIN STEAM FLOW C LOCAL	H22 P042
B	+11 00	51	1 -B21H-20[illegible]-D4V1	~~MAIN STEAM FLOW C LOCAL~~	~~H22 P042~~
B	+11 00	51	1 -B2[illegible]H-202[illegible]-D3V1	~~MAIN STEAM FLOW C LOCAL~~	~~H22 P042~~
B	+11 00	51	1 B21H-203[illegible]-D4V1	~~MAIN STEAM FLOW C LOCAL~~	~~H22 P042~~
B	+11 00	51	-C11B-3[illegible]-NDV2	CRD DRIVE WATER PC VLV	C11 F003
B	+11 00	51	1 -C11B-[illegible]00[illegible]-NDV3	~~CRD DRIVE WATER PC VLV~~	~~C11 F003~~
B	+11 00	51	1 -C34[illegible]-200[illegible]-NDV1	~~MAIN STEAM FLOW C LOCAL~~	~~H22 P042~~
B	+11 00	51	1 -C[illegible]B-200[illegible]-D4V1	~~MAIN STEAM FLOW C LOCAL~~	~~H22 P042~~
B	+11 00	51	1 -[illegible]51B-202[illegible]-D3V1	~~MAIN STEAM FLOW C LOCAL~~	~~H22 P042~~
B	+11 00	51	-C71A-31[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F2203
B	+11 00	51	-C71A-[illegible]11[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F2203~~
B	+11 00	51	-C71[illegible]311[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F2203~~
B	+11 00	51	A1 -C[illegible]1A-311[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F2203~~
B	+11 00	51	A1 -C71A-312[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1107
B	+11 00	51	A1 -C71A-[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1107~~
B	+11 00	51	-C71[illegible]312[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1107~~
B	+11 00	51	A1 -C[illegible]A-313[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1107~~
B	+11 00	51	A1 -C71A-31[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0104
B	+11 00	51	-C71A-31[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0104~~
B	+11 00	51	A1 -C71A-[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0104~~
B	+11 00	51	A1 -C71[illegible]31[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0104~~
B	+11 00	51	A1 -C7[illegible]A-316[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0406
B	+11 00	51	A1 -[illegible]71A-316[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0406~~
B	+11 00	51	1 -C71A-31[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0406~~
B	+11 00	51	-C71A-[illegible]1[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0406~~
B	+11 00	51	1 -C71[illegible]-32[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1404
B	+11 00	51	1 -C[illegible]A-323[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1404~~
B	+11 00	51	-C71A-32[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1404~~
B	+11 00	51	-C71A-32[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1404~~
B	+11 00	51	1 -C71A-[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0310
B	+11 00	51	1 -C71[illegible]-32[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0310~~
B	+11 00	51	1 -C[illegible]A-325[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0310~~
B	+11 00	51	-[illegible]71A-325[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0310~~
B	+11 00	51	1 -C71A-32[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3204
B	+11 00	51	1 -C71A-3[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F3204~~
B	+11 00	51	1 -C71A-[illegible]29[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F3204~~
B	+11 00	51	A1 -C71[illegible]-329[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F3204~~
B	+11 00	51	A1 -[illegible]1A-331[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0311
B	+11 00	51	A1 -C71A-331[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0311~~
B	+11 00	51	-C71A-3[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0311~~

yes yes

CABLE PR[illegible]RAM

IN NUMBER 58-8
08
IN BEGIN DATE: 12/10/81
REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATI[illegible]
TODAY'S DATE IS: 10/27/82

DG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP		
3	+11 00	51	-C71A-3[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0311	yes	yes
3	+11 00	51	-C71A-33[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1304		
3	+11 00	51	-C[illegible]A-33[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1304~~		
3	+11 00	51	-C71A-33[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1108		
3	+11 00	51	-C71A-[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1108~~		
3	+11 00	51	-C71[illegible]335[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1108~~		
3	+11 00	51	-C[illegible]A-335[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1108~~		
3	+11 00	51	-[illegible]1A-335[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3211		
3	+11 00	51	-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3211~~		
3	+11 00	51	-C71A[illegible]36[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3211~~		
3	+11 00	51	-C71[illegible]336[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3211~~		
3	+11 00	51	-C[illegible]A-338[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3407		
3	+11 00	51	-C71A-33[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3407~~		
3	+11 00	51	-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3407~~		
3	+11 00	51	-C71A[illegible]338[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3407~~		
3	+11 00	51	-C7[illegible]-339[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2210		
3	+11 00	51	-[illegible]1A-339[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2210~~		
3	+11 00	51	-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2210~~		
3	+11 00	51	-C71A[illegible]39[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2210~~		
3	+11 00	51	-C7[illegible]-339[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2210~~		
3	+11 00	51	-[illegible]1A-339[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2210~~		
3	+11 00	51	-C71A-33[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2311		
3	+11 00	51	-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2311~~		
3	+11 00	51	-C71A[illegible]340[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2311~~		
3	+11 00	51	-C71[illegible]-340[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2011~~		
3	+11 00	51	-C[illegible]A-341[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1103		
3	+11 00	51	-C71A-341[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1103~~		
3	+11 00	51	-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1103~~		
3	+11 00	51	-C71A[illegible]341[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1103~~		
3	+11 00	51	-C[illegible]A-342[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1311		
3	+11 00	51	-C71A-342[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1311~~		
3	+11 00	51	-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1311~~		
3	+11 00	51	-C71A[illegible]342[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1311~~		
3	+11 00	51	-C[illegible]A-344[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0304		
3	+11 00	51	-C71A-344[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0304~~		
3	+11 00	51	-C71A-344[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0304~~		
3	+11 00	51	-C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0304~~		
				TOTAL QUANTITY THIS ROW	77		
3	+11 00	52	[illegible]-D1V1	MAIN STM FLOW LOCAL PN B	H22 P025A		
3	+11 00	52	-B21H-20[illegible]-D2V1	~~MAIN STM FLOW LOCAL PN B~~	~~H22 P025A~~		
3	+11 00	52	-B21[illegible]-D1V1	~~MAIN STM FLOW LOCAL PN B~~	~~H22 P025A~~		
3	+11 00	52	-[illegible]21H-20[illegible]-D2V1	~~MAIN STM FLOW LOCAL PN B~~	~~H22 P025A~~		
3	+11 00	52	-B33A-2[illegible]-NDV1	~~MAIN STM FLOW LOCAL PN B~~	~~H22 P025A~~		
3	+11 00	52	-B3[illegible]21[illegible]-NDV1	RECIRC PUMP B LOCAL PNL	B33 P022	No	No
3	+11 00	52	-[illegible]11B-20[illegible]-NDV1	LOCAL INSTRUMENT RACK	C11 2020	No	No
3	+11 00	52	-C11B-20[illegible]-NDV1	~~LOCAL INSTRUMENT RACK~~	~~C11 2020~~		
3	+11 00	52	-C11B-[illegible]-NDV1	~~LOCAL INSTRUMENT RACK~~	~~C11 2020~~		
3	+11 00	52	-C[illegible]B-30[illegible]-NDV2	VLV C11 F002B POS SW	C11 F002B	No	No
3	+11 00	52	-C34A-0[illegible]-NDV1	~~MAIN STM FLOW LOCAL PN B~~	~~H22 P025A~~		

CABLE PR[illegible]AM

IN NUMBER 58-8 08

IN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATIO

TODAY'S DATE IS: 10/27/82

BG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP		
	+11 00	52	[redacted] -D2V1	MAIN STM FLOW LOCAL PN B	H22 P025A	YES	YES
	+11 00	52	[redacted] -D1V1	~~MAIN STM FLOW LOCAL PN B~~	~~H22 P025A~~		
	+11 00	52	[redacted] -D1VS	SCRAM VV DIVISION 1 GR 1	C71 F2304		
	+11 00	52	[redacted] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F2304~~		
	+11 00	52	[redacted] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F2304~~		
	+11 00	52	[redacted] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F2304~~		
	+11 00	52	[redacted] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3404		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3404~~		
	+11 00	52	[redacted] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2404		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2404~~		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3404~~		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2404~~		
	+11 00	52	[redacted] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2104		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2104~~		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2104~~		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2104~~		
	+11 00	52	[redacted] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1203		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1203~~		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1203~~		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1203~~		
	+11 00	52	[redacted] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0403		
	+11 00	52	[redacted] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0403~~		
	+11 00	52	[redacted] -D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3104		
	+11 00	52	[redacted] -D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F3104~~		
	+11 00	52	[redacted] -D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F3104~~		
	+11 00	52	[redacted] -D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F3104~~		
	+11 00	52	[redacted] -D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1210		
	+11 00	52	[redacted] -D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1210~~		
	+11 00	52	[redacted] -D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1210~~		
	+11 00	52	[redacted] -D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1210~~		
	+11 00	52	[redacted] -D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3311		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3311~~		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3311~~		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3311~~		
	+11 00	52	[redacted] -D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3304		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3304~~		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3304~~		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3304~~		
	+11 00	52	[redacted] -D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0211		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0211~~		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0211~~		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0211~~		
	+11 00	52	[redacted] -D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0204		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0204~~		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0204~~		
	+11 00	52	[redacted] -D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0204~~		
				TOTAL QUANTITY THIS ROW	57		
	+11 00	53	[redacted] -NDV1	JET PUMP B LOCAL PANEL	H22 P009	NO	NO
	+11 00	53	[redacted] -NDV1	JET PUMP B LOCAL PANEL.	~~H22 P009.~~		

CABLE PR[illegible]RAM

[illegible]UN NUMBER 58-8 08

[illegible]UN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATIO[illegible]

TODAY'S DATE IS: 10/27/82

[illegible]LDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP
B	+11 00	53	1 -B33B-[illegible] -NDV1	JET PUMP B LOCAL PANEL	H22 P009
B	+11 00	53	1 -C11A-300[illegible] -NDV2	STABILIZING VALVE	C11 F007A-A
B	+11 00	53	1 -C[illegible]A-301[illegible] -NDV2	STABILIZING VALVE	C11 F007A-B
B	+11 00	53	1 -[illegible]11A-301[illegible] -NDV2	STABILIZING VALVE	C11 F007B-A
B	+11 00	53	1 -C11A-301[illegible] -NDV2	STABILIZING VALVE	C11 F007B-B
B	+11 00	53	[illegible] -[illegible]A-3[illegible] -NDV2	STABILIZING VALVE	C11 F007C-A
B	+11 00	53	[illegible] -C11A-[illegible]01[illegible] -NDV2	STABILIZING VALVE	C11 F007C-B
B	+11 00	53	A1 -C1[illegible]-301[illegible] -NDV2	STABILIZING VALVE	C11 F007D-A
B	+11 00	53	A1 -C[illegible]A-301[illegible] -NDV2	STABILIZING VALVE	C11 F007D-B
B	+11 00	53	A1 -C71A-308[illegible] -D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1312
B	+11 00	53	A1 -C71A-[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1312~~
B	+11 00	53	[illegible]71A-3[illegible]9[illegible] -D1VS	SCRAM VV DIVISION 1 GR 1	C71 F3203
B	+11 00	53	A1 -C71A-309[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3203~~
B	+11 00	53	A1 -C7[illegible]-309[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0203~~
B	+11 00	53	A1 -[illegible]1A-309[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0203~~
B	+11 00	53	A1 -C71A-313[illegible] -D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1312
B	+11 00	53	A[illegible] -C71A-313[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1312~~
B	+11 00	53	A1 -C71A-315[illegible] -D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0312
B	+11 00	53	[illegible] -C71A-31[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0312~~
B	+11 00	53	A1 -C71A-3[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0312~~
B	+11 00	53	A1 -C71A-[illegible]15[illegible] -D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0303
B	+11 00	53	A1 -C7[illegible]-315[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0312~~
B	+11 00	53	A1 -[illegible]1A-315[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0303~~
B	+11 00	53	A1 -C71A-315[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0303~~
B	+11 00	53	[illegible] -C71A-315[illegible] -D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0303~~
B	+11 00	53	A1 -C71A-318[illegible] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3408
B	+11 00	53	A1 -C71A-[illegible]8[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3408~~
B	+11 00	53	A1 -C71A-[illegible]18[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3408~~
B	+11 00	53	A1 -C7[illegible]-318[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0408~~
B	+11 00	53	A1 -C[illegible]1A-319[illegible] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3212
B	+11 00	53	A1 -C71A-[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3212~~
B	+11 00	53	A1 -C7[illegible]A-3[illegible]9[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3212~~
B	+11 00	53	[illegible] -C71A-[illegible]19[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3212~~
B	+11 00	53	A1 -C7[illegible]-320[illegible] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2312
B	+11 00	53	A1 -C[illegible]1A-320[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2312~~
B	+11 00	53	A1 -C71A-320[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2312~~
B	+11 00	53	A1 -C71A-[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F2312~~
B	+11 00	53	A[illegible] -C7[illegible]-3[illegible] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1102
B	+11 00	53	[illegible] -C71A-322[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1102~~
B	+11 00	53	A1 -C71[illegible]-323[illegible] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0103
B	+11 00	53	A1 -C7[illegible]A-323[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0103~~
B	+11 00	53	A1 -[illegible]71A-323[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0103~~
B	+11 00	53	A1 -C71A-[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0103~~
B	+11 00	53	[illegible] -[illegible]1A-3[illegible] -D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0203
B	+11 00	53	[illegible] -C71A-324[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0203~~
B	+11 00	53	A1 -C7[illegible]-324[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0203~~
B	+11 00	53	A1 -[illegible]1A-324[illegible] -D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0203~~
B	+11 00	53	[illegible] -C71A-[illegible] -D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0407
B	+11 00	53	[illegible] -[illegible]71A-32[illegible] -D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0407~~
B	+11 00	53	[illegible] -C71A-[illegible]26[illegible] -D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2111
B	+11 00	53	[illegible] -C71[illegible]-326[illegible] -D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F2111~~

No No

yes yes

CABLE PRO[illegible]M

[illegible] NUMBER 58-8 — 08

[illegible] BEGIN DATE: 12/10/81 — REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI[illegible]

TODAY'S DATE IS: 10/27/82

[illegible]G	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP
	+11 00	54	[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F3103
	+11 00	54	1 -C71A-[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F1211
	+11 00	54	1 -C71A-[illegible]13[illegible]-D1VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	1 -C7[illegible]-3132-D1VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	1 -C[illegible]A-3133-D1VS	[illegible]	[illegible]
	+11 00	54	[illegible]71A-3146-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0212
	+11 00	54	-C71A-314[illegible]-D1VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	-C[illegible]A-31[illegible]-D1VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	-C71A-[illegible]149-D1VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	-C71[illegible]-317[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3312
	+11 00	54	-C7[illegible]A-317[illegible]-D2VS	[illegible]	[illegible]
	+11 00	54	[illegible]71A-318[illegible]-D2VS	[illegible]	[illegible]
	+11 00	54	-C71A-[illegible]-D2VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	[illegible]71A-318[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3409
	+11 00	54	-C71A-3[illegible]-D2VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	-C71A-[illegible]18[illegible]-D2VS	[illegible]	[illegible]
	+11 00	54	-C71[illegible]318[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3403
	+11 00	54	-C7[illegible]A-318[illegible]-D2VS	[illegible]	[illegible]
	+11 00	54	[illegible]71A-318[illegible]-D2VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	C71A-31[illegible]-D2VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	[illegible]71A-318[illegible]-D2VS	[illegible]	[illegible]
	+11 00	54	-C71A-32[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0404
	+11 00	54	-C71A-[illegible]25[illegible]-D2VS	[illegible]	[illegible]
	+11 00	54	-C71[illegible]-325[illegible]-D2VS	[illegible]	[illegible]
	+11 00	54	-C[illegible]A-325[illegible]-D2VS	[illegible]	[illegible]
	+11 00	54	[illegible]71A-[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2211
	+11 00	54	-[illegible]A-32[illegible]-D3VS	[illegible]	[illegible]
	+11 00	54	-C71A-[illegible]27[illegible]-D3VS	SCRAM VV DIVISION [illegible]	[illegible]
	+11 00	54	-C71[illegible]327[illegible]-D3VS	[illegible]	[illegible]
	+11 00	54	-C7[illegible]A-327[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2303
	+11 00	54	-[illegible]A-327[illegible]-D3VS	[illegible]	[illegible]
	+11 00	54	[illegible]71A-[illegible]-D3VS	[illegible]	[illegible]
	+11 00	54	C7[illegible]-32[illegible]-D3VS	[illegible]	[illegible]
	+11 00	54	-C71A-[illegible]338[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2405
	+11 00	54	-C71[illegible]-338[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	-C7[illegible]A-338[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	[illegible]71A-338[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	C7[illegible]A-34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1202
	+11 00	54	C71A-34[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	-C71A-[illegible]41[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	-C71[illegible]341[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	-C[illegible]A-341[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1109
	+11 00	54	[illegible]71A-34[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	-C71A-34[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	-C71A-34[illegible]-D4VS	[illegible]	[illegible]
	+11 00	54	-E12A-2[illegible]-D1V1	RV LVL & PRESS A LOC PNL	H22 P004
	+11 00	54	-E21A-20[illegible]-D1V1	RV LVL & PRESS A LOC PNL	[illegible]
	+11 00	54	-E2[illegible]A-20[illegible]-D1V1	RV LVL & PRESS A LOC PNL	H22 P004
	+11 00	54	[illegible]E22A-2[illegible]-D4V1	RV LVL & PRESS D LOC PNL	H22 P026
	+11 00	54	-E31A-23[illegible]-D1V1	RV LVL & PRESS A LOC PNL	[illegible]
	+11 00	54	[illegible]E32A-20[illegible]-D2V1	MAIN STEAM FLOW B LOCAL	H22 P025

yes yes

RUN NUMBER 58-8 CABLE P[illegible]GRAM
RUN BEGIN DATE: 12/10/81 C8

REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATI[illegible]

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Subm. Quali'	Analysis
B	+11 00	54	A1 -E51A-2001-DIV1	RV LVL & PRESS A LOC PNL	H22 P004			
				TOTAL QUANTITY THIS ROW	74			
B	+11 00	55	[illegible]-NDV2	VLV C11 F002A POS SW	C11 F002A	NO	No	
B	+11 00	55	A1 -C71A-3[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F3302	Yes	Yes	
B	+11 00	55	A1 -C71A-[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~	↓	↓	↓
B	+11 00	55	A1 -C7[illegible]-310[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F2313			
B	+11 00	55	[illegible]A-310[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]C71A-310[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F2212			
B	+11 00	55	[illegible]-C71A-[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]A-31[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A-[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A-311[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F2212			
B	+11 00	55	[illegible]-C7[illegible]A-311[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]A-313[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F1201			
B	+11 00	55	[illegible]C71A-313[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]C71A-31[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F1406			
B	+11 00	55	[illegible]-C7[illegible]-31[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]71A-[illegible]4[illegible]-DIVS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A[illegible]14[illegible]-DIVS	~~[illegible]~~	~~[illegible] F1406~~			
B	+11 00	55	[illegible]-C71[illegible]-319[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3213			
B	+11 00	55	[illegible]-C7[illegible]A-319[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]A-319[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]C71A-319[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A-320[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2302			
B	+11 00	55	[illegible]A-3[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A-3[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A-[illegible]20[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2201			
B	+11 00	55	A1 -C71A[illegible]20[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71[illegible]320[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C7[illegible]-320[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C7[illegible]A-320[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]A-323[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1302			
B	+11 00	55	[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]A-3[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A-323[illegible]-D2VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A[illegible]328[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F2406			
B	+11 00	55	[illegible]-C7[illegible]-328[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	A1 -C[illegible]A-329[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	A1 [illegible]71A-329[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3202			
B	+11 00	55	A1 -C71A-[illegible]29[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]71A-32[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	A1 -C71A-[illegible]29[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	A1 -C71A[illegible]329[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	A1 -C7[illegible]A-330[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0402			
B	+11 00	55	A1 -[illegible]A-330[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]C71A-331[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A-331[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0302			
B	+11 00	55	[illegible]-C71A-33[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~			
B	+11 00	55	[illegible]-C71A[illegible]33[illegible]-D3VS	~~[illegible]~~	~~[illegible]~~	↓	↓	↓

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVAT
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Subm. Quali	Analysis
RB	+11 00	55	A1 -C71A-3[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0313~~	yes	yes	BY GE
RB	+11 00	55	A1 -C71A-331[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0313			
RB	+11 00	55	A1 -C71A-331[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	55	A1 -C71A-331[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	55	A1 -C71A-333[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1313~~			
RB	+11 00	55	A1 -C71A-3335-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1313			
RB	+11 00	55	A1 -C71A-3[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	55	A1 -C71A-3[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	55	A1 -C71A-3[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1101			
RB	+11 00	55	A1 -C71A-3[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1101~~			
RB	+11 00	55	A1 -C71A-334[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1101~~			
RB	+11 00	55	A1 -C71A-334[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1101~~			
RB	+11 00	55	A1 -C71A-336[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1314			
RB	+11 00	55	A1 -C71A-336[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1314~~			
RB	+11 00	55	A1 -C71A-337[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3313			
RB	+11 00	55	A1 -C71A-33[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3313~~			
RB	+11 00	55	A1 -C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0313~~			
RB	+11 00	55	A1 -C71A-337[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0313~~			
RB	+11 00	55	A1 -C71A-338[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3402			
RB	+11 00	55	A1 -C71A-338[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3402~~			
RB	+11 00	55	A1 -C71A-338[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3102			
RB	+11 00	55	A1 -C71A-338[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3102~~			
RB	+11 00	55	A1 -C71A-338[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0102~~			
RB	+11 00	55	A1 -C71A-338[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0102~~			
RB	+11 00	55	A1 -C71A-340[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2102			
RB	+11 00	55	A1 -C71A-340[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2102~~			
RB	+11 00	55	A1 -C71A-34[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2102			
RB	+11 00	55	A1 -C71A-3[illegible]07-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F2102~~			
RB	+11 00	55	A1 -C71A-[illegible]410-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1314			
RB	+11 00	55	A1 -C71A-3411-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1314~~			
RB	+11 00	55	A1 -C71A-343[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0102			
RB	+11 00	55	A1 -C71A-343[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0102~~			
RB	+11 00	55	A1 -C71A-344[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0408			
RB	+11 00	55	A1 -C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0408~~			
RB	+11 00	55	A1 -C71A-34[illegible]8-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0408~~			
RB	+11 00	55	A1 -C71A-3[illegible]9-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0408~~			
				TOTAL QUANTITY THIS ROW	83			
RB	+11 00	56	A1 -B21H-20[illegible]-DIV1	MAIN STEAM FLOW A LOCAL	H22 P015			
RB	+11 00	56	A1 -B21H-20[illegible]-DIV1	~~MAIN STEAM FLOW A LOCAL~~	~~H22 P015~~			
RB	+11 00	56	A1 -B21H-20[illegible]-DIV1	~~MAIN STEAM FLOW A LOCAL~~	~~H22 P015~~			
RB	+11 00	56	A1 -B21H-20[illegible]-D2V1	~~MAIN STEAM FLOW A LOCAL~~	~~H22 P015~~			
RB	+11 00	56	A1 -C34A-20[illegible]-NDV1	~~MAIN STEAM FLOW A LOCAL~~	~~H22 P015~~			
RB	+11 00	56	A1 -C51B-20[illegible]-D2V1	~~MAIN STEAM FLOW A LOCAL~~	~~H22 P015~~			
RB	+11 00	56	A1 -C51B-20[illegible]-DIV1	~~MAIN STEAM FLOW A LOCAL~~	~~H22 P015~~			
RB	+11 00	56	A1 -C71A-307[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F3410			
RB	+11 00	56	A1 -C71A-307[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3410~~			
RB	+11 00	56	A1 -C71A-307[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F3214			
RB	+11 00	56	A1 -C71A-307[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3214~~			
RB	+11 00	56	A1 -C71A-308[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3410~~			

CABLE P.OGRAM

RUN NUMBER 58-8 08

RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Subm. Quali	[redacted]
RB	+11 00	56	[redacted]-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3410~~	yes	yes	[redacted]
RB	+11 00	56	[redacted]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F3214	↓	↓	↓
RB	+11 00	56	[redacted]-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F3214~~			
RB	+11 00	56	[redacted]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F0101			
RB	+11 00	56	[redacted]-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0101~~			
RB	+11 00	56	[redacted]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F0314			
RB	+11 00	56	[redacted]-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0314~~			
RB	+11 00	56	[redacted]-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0314~~			
RB	+11 00	56	[redacted]-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F0314~~			
RB	+11 00	56	[redacted]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1212			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1212~~			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1212~~			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1212~~			
RB	+11 00	56	[redacted]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F1407			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1407~~			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1407~~			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F1407~~			
RB	+11 00	56	[redacted]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0201			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0201~~			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0201~~			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0201~~			
RB	+11 00	56	[redacted]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F0201~~			
RB	+11 00	56	[redacted]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F0301			
RB	+11 00	56	[redacted]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F2314~~			
RB	+11 00	56	[redacted]-D3VS	~~TO/FROM DIVISION 3 GR 3~~	~~C71 F0314~~			
RB	+11 00	56	[redacted]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0213			
RB	+11 00	56	[redacted]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0213~~			
RB	+11 00	56	[redacted]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0213~~			
RB	+11 00	56	[redacted]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F0213~~			
RB	+11 00	56	[redacted]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1301			
RB	+11 00	56	[redacted]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1301~~			
RB	+11 00	56	[redacted]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F1301			
RB	+11 00	56	[redacted]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F1301~~			
RB	+11 00	56	[redacted]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F1110			
RB	+11 00	56	[redacted]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F1110~~			
RB	+11 00	56	[redacted]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0202			
RB	+11 00	56	[redacted]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0202~~			
RB	+11 00	56	[redacted]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0202~~			
RB	+11 00	56	[redacted]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0202~~			
RB	+11 00	56	[redacted]-D2V1	MAIN STEAM FLOW A LOCAL	H22 P015			
RB	+11 00	56	[redacted]-DIV1	~~MAIN STEAM FLOW A LOCAL~~	~~H22 P015~~			
RB	+11 00	56	[redacted]-D2V1	~~MAIN STEAM FLOW A LOCAL~~	~~H22 P015~~	↓	↓	↓
				TOTAL QUANTITY THIS ROW	54			
RB	+11 00	57	[redacted]-NDV1	BRANCH JUNCTION MODULE	BJM22	NO	NO	[redacted]
RB	+11 00	57	[redacted]-NDV1	~~BRANCH JUNCTION MODULE~~	~~BJM22~~	↓	↓	↓
RB	+11 00	57	[redacted]-NDV1	~~BRANCH JUNCTION MODULE~~	~~BJM22~~			
RB	+11 00	57	[redacted]-NDV1	~~BRANCH JUNCTION MODULE~~	~~BJM22~~			
RB	+11 00	57	[redacted]-NDV1	BRANCH JUNCTION MODULE	BJM11			
RB	+11 00	57	[redacted]-NDV1	~~BRANCH JUNCTION MODULE~~	~~BJM11~~	↓	↓	↓

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE [illegible] JGRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATI
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Subm. Quali	[redacted]
RB	+11 00	57	[illegible]A-2[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~	NO	NO	
RB	+11 00	57	A1 -C11A-2[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM12			[redacted]
RB	+11 00	57	A1 -C11A-254[illegible] NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C1[illegible]-2549 NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C[illegible]A-2550 NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -[illegible]1A-2551 NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 C11A-40[illegible] NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible] -[illegible]1A-[illegible]16 NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible] C11A[illegible]402 NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C1[illegible]-402 NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C[illegible]A-402 NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -[illegible]1A-402 NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C71A-310[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F2407	yes	yes	[redacted]
RB	+11 00	57	[illegible]1 -C7[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F2407~~			
RB	+11 00	57	[illegible] -C71A-3[illegible]-D1VS	SCRAM VV DIVISION 1 GR 1	C71 F0401			
RB	+11 00	57	[illegible] -C71A-3[illegible]-D1VS	~~SCRAM VV DIVISION 1 GR 1~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C71A-[illegible]18[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F3201			
RB	+11 00	57	A[illegible] -C71A[illegible]318[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C71[illegible]-319[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C7[illegible]A-319[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~C71 F3201~~			
RB	+11 00	57	A[illegible] -C[illegible]A-321[illegible]-D2VS	SCRAM VV DIVISION 2 GR 2	C71 F2101			
RB	+11 00	57	A[illegible] [illegible]C71A-321[illegible]-D2VS	~~SCRAM VV DIVISION 2 GR 2~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C71A-330[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3314			
RB	+11 00	57	A[illegible] -[illegible]71A-330[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C71A-[illegible]30[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C71A-[illegible]30[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F3401			
RB	+11 00	57	A[illegible] -C71A[illegible]330[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C71[illegible]-330[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C7[illegible]A-330[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~C71 F3401~~			
RB	+11 00	57	A[illegible] -C[illegible]A-330[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -[illegible]71A-332[illegible]-D3VS	SCRAM VV DIVISION 3 GR 3	C71 F0214			
RB	+11 00	57	A[illegible] [illegible]C71A[illegible]-D3VS	~~SCRAM VV DIVISION 3 GR 3~~	~~[illegible]~~			
RB	+11 00	57	[illegible] [illegible]71A-33[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3101			
RB	+11 00	57	[illegible]1 -C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C71A-[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3301			
RB	+11 00	57	[illegible]1 -C71A[illegible]33[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C71[illegible]-33[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~[illegible]~~			
RB	+11 00	57	[illegible]1 -C[illegible]A-33[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F3301~~			
RB	+11 00	57	[illegible]1 -[illegible]71A-338[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F3101			
RB	+11 00	57	[illegible]1 [illegible]C71A-33[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~[illegible]~~			
RB	+11 00	57	[illegible] -C71A-339[illegible]-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F2301			
RB	+11 00	57	[illegible] -[illegible]71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C71A-3[illegible]-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~[illegible]~~			
RB	+11 00	57	A[illegible] -C71A-[illegible]4[illegible]8-D4VS	SCRAM VV DIVISION 4 GR 4	C71 F0409			
RB	+11 00	57	A[illegible] -C71[illegible]-34[illegible]9-D4VS	~~SCRAM VV DIVISION 4 GR 4~~	~~C71 F0409~~			
RB	+11 00	57	A[illegible] -R52 -34[illegible]0-NDV2	CAP SYSTEM SPEAKER	R52 C5B-3	NO	NO	[redacted]
RB	+11 00	57	[illegible] -[illegible]-NDV2	~~CAP SYSTEM SPEAKER~~	~~R52 C5B-3~~			

TOTAL QUANTITY THIS ROW 54

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE . JGRAM
08
REPORT III ALL CABLES SORTED BY BUILDING,ELEVATI(
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety.	Subm. Quali	[redacted]
RB	+11 00	58	[illegible]-DIVS	SCRAM VV DIVISION 1 GR 1	C71 F1111	yes	yes	[redacted]
RB	+11 00	58	AI -C71A-3[illegible]-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1111~~	$	$	
RB	+11 00	58	AI -C71[illegible]2-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1111~~			
RB	+11 00	58	AI -C[illegible]-312-DIVS	~~SCRAM VV DIVISION 1 GR 1~~	~~C71 F1111~~			
				TOTAL QUANTITY THIS ROW	4			
RB	+11 00	59	AI -C[illegible]-25[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM31	NO	NO	[redacted]
RB	+11 00	59	AI -C11A-2[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-252[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C[illegible]-252[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM32			
RB	+11 00	59	AI -[illegible]1A-253[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-253[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM32			
RB	+11 00	59	AI -C11A-[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~BJM32~~			
RB	+11 00	59	AI -C11A-25[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~BJM33~~			
RB	+11 00	59	AI -C11A-[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~BJM32~~			
RB	+11 00	59	AI -C11A-253[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM33			
RB	+11 00	59	AI -C11[illegible]253[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C[illegible]A-253[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM34			
RB	+11 00	59	AI -[illegible]1A-253[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-253[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM21			
RB	+11 00	59	AI -[illegible]-2[illegible]8[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-2[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-254[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM23			
RB	+11 00	59	AI -C11A-254[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C1[illegible]-254[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C[illegible]A-254[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -[illegible]1A-255[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM13			
RB	+11 00	59	AI -C11A-255[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C[illegible]-25[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-255[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-25[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM01			
RB	+11 00	59	AI -C11A-25[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-25[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM02			
RB	+11 00	59	AI -C11[illegible]-25[illegible]0-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C[illegible]A-25[illegible]0-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -[illegible]1A-25[illegible]0-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-25[illegible]0-NDV1	BRANCH JUNCTION MODULE	BJM03			
RB	+11 00	59	AI -C11A-25[illegible]-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-25[illegible]-NDV1	BRANCH JUNCTION MODULE	BJM03			
RB	+11 00	59	AI -C11A-25[illegible]2-NDV1	~~BRANCH JUNCTION MODULE~~	~~BJM03~~			
RB	+11 00	59	AI -C11A-25[illegible]2-NDV1	BRANCH JUNCTION MODULE	BJM04			
RB	+11 00	59	AI -C11A-25[illegible]3-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-[illegible]3-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11A-25[illegible]0-NDV1	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C11[illegible]-25[illegible]0-NDV1	BRANCH JUNCTION MODULE	BJM34			
RB	+11 00	59	AI -C1[illegible]A-40[illegible]1-NDV3	BRANCH JUNCTION MODULE	BJM31			
RB	+11 00	59	AI -C[illegible]1A-40[illegible]2-NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
RB	+11 00	59	AI -C[illegible]1A-40[illegible]2-NDV3	BRANCH JUNCTION MODULE	BJM32			
RB	+11 00	59	AI -C11A-[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			

CABLE PR[illegible]RAM

UN NUMBER 58-8
UN BEGIN DATE: 12/10/81

08

REPORT III ALL CABLES SORTED BY BUILDING,ELEVATIO
TODAY'S DATE IS: 10/27/82

DG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety.	Subm. Quali	[redacted]
3	+11 00	59	[illegible]40[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM33	NO	NO	[redacted]
3	+11 00	59	1 -C11A-4[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
3	+11 00	59	1 -C11A-[illegible]0[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
3	+11 00	59	1 -C11A[illegible]40[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM21			
3	+11 00	59	1 -C1[illegible]A-40[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
3	+11 00	59	1 -C[illegible]A-40[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM23			
3	+11 00	59	1 -[illegible]11A-401[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
3	+11 00	59	1 -C11A-402[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM04			
3	+11 00	59	1 -C11A-402[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM13			
3	+11 00	59	1 -C11[illegible]2[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
3	+11 00	59	1 -C11A-4[illegible]2[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM01			
3	+11 00	59	1 -C11A-[illegible]2[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~BJM01~~			
3	+11 00	59	1 -C11A-[illegible]02[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM02			
3	+11 00	59	1 -C11A[illegible]402[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~BJM02~~			
3	+11 00	59	1 -C11[illegible]402[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM03			
3	+11 00	59	1 -C1[illegible]-402[illegible]-NDV3	~~BRANCH JUNCTION MODULE~~	~~[illegible]~~			
3	+11 00	59	A1 -C1[illegible]A-402[illegible]-NDV3	BRANCH JUNCTION MODULE	BJM04			
3	+11 00	59	A1 -C[illegible]1A-304[illegible]-D1VS	J BOX GROUP 1 SIDE 1	C71 J3ABG	yes	yes	[redacted]
3	+11 00	59	A1 -[illegible]71A-[illegible]-D1VS	~~J BOX GROUP 1 SIDE 1~~	~~C71 J3ABG~~			
3	+11 00	59	A1 -C71A-3[illegible]-D4VS	J BOX GROUP 4 SIDE 1	C71 J3DAK			
3	+11 00	59	A1 -C71A-[illegible]-D4VS	~~J BOX GROUP 4 SIDE 1~~	~~C71 J3DAK~~			
3	+11 00	59	A1 -C71A-[illegible]0[illegible]-D1VS	J BOX GROUP 1 SIDE 2	C71 J3ABF			
3	+11 00	59	A1 -C71A[illegible]307[illegible]-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~C71 J3ABF~~			
3	+11 00	59	1 -C7[illegible]A-307[illegible]-D1VS	J BOX GROUP 1 SIDE 1	C71 J3ABG			
3	+11 00	59	1 -C[illegible]1A-307[illegible]-D1VS	~~J BOX GROUP 1 SIDE 1~~	~~[illegible]~~			
3	+11 00	59	1 -[illegible]71A-307[illegible]-D1VS	~~J BOX GROUP 1 SIDE 1~~	~~[illegible]~~			
3	+11 00	59	1 -C71A-307[illegible]-D1VS	~~J BOX GROUP 1 SIDE 1~~	~~[illegible]~~			
3	+11 00	59	[illegible]C71A-307[illegible]-D1VS	J BOX GROUP 1 SIDE 1	C71 J3ABH			
3	+11 00	59	1 -C71A-307[illegible]-D1VS	~~J BOX GROUP 1 SIDE 1~~	~~[illegible]~~			
3	+11 00	59	[illegible]C71A-[illegible]07[illegible]-D1VS	J BOX GROUP 1 SIDE 1	C71 J3ABH			
3	+11 00	59	1 -C71A-[illegible]08[illegible]-D1VS	J BOX GROUP 1 SIDE 2	C71 J3ABF			
3	+11 00	59	1 -C71A[illegible]308[illegible]-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~C71 J3ABF~~			
3	+11 00	59	1 -C71[illegible]-308[illegible]-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~C71 J3ABF~~			
3	+11 00	59	[illegible] -C7[illegible]A-308[illegible]-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~[illegible]~~			
3	+11 00	59	[illegible] -C[illegible]1A-308[illegible]-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~[illegible]~~			
3	+11 00	59	[illegible] -[illegible]71A-308[illegible]-D1VS	J BOX GROUP 1 SIDE 2	C71 J3ABE			
3	+11 00	59	A[illegible]C71A-308[illegible]-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~[illegible]~~			
3	+11 00	59	A[illegible]C71A-308[illegible]-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~[illegible]~~			
3	+11 00	59	A[illegible]C71A-310[illegible]-D1VS	J BOX GROUP 1 SIDE 1	C71 J3ABH			
3	+11 00	59	A -C71A-[illegible]10[illegible]-D1VS	~~J BOX GROUP 1 SIDE 1~~	~~[illegible]~~			
3	+11 00	59	A -C71A-[illegible]1[illegible]-D1VS	~~J BOX GROUP 1 SIDE 1~~	~~[illegible]~~			
3	+11 00	59	A -C71A-[illegible]1[illegible]-D1VS	~~J BOX GROUP 1 SIDE 1~~	~~[illegible]~~			
3	+11 00	59	A -C71A[illegible]1[illegible]-D1VS	J BOX GROUP 1 SIDE 2	C71 J3ABE			
3	+11 00	59	A -C71A[illegible]31[illegible]7-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~C71 J3ABE~~			
3	+11 00	59	A -C71[illegible]-31[illegible]2-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~[illegible]~~			
3	+11 00	59	A -C[illegible]1A-31[illegible]3-D1VS	~~J BOX GROUP 1 SIDE 2~~	~~C71 J3ABE~~			
3	+11 00	59	A -[illegible]71A-33[illegible]2-D4VS	J BOX GROUP 4 SIDE 2	C71 J3DAG			
3	+11 00	59	A[illegible]C71A-33[illegible]3-D4VS	~~J BOX GROUP 4 SIDE 2~~	~~[illegible]~~			
3	+11 00	59	A1 [illegible]-33[illegible]1-D4VS	J BOX GROUP 4 SIDE 1	C71 J3DAK			
	+11 00	59	A1 -C71A-3[illegible]5-D4VS	~~J BOX GROUP 4 SIDE 1~~	~~[illegible]~~			

CABLE PROGRAM

RUN NUMBER 58-8 — 08

RUN BEGIN DATE: 12/10/81

REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATION

TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Subm. Quali	[redacted]
RB	+11 00	59	[redacted]-D4VS	J BOX GROUP 4 SIDE 1	C71 J3DAK	yes	yes	[redacted]
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	J BOX GROUP 4 SIDE 1	C71 J3DAJ			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	J BOX GROUP 4 SIDE 2	C71 J3DAG			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	J BOX GROUP 4 SIDE 2	C71 J3DAF			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	J BOX GROUP 4 SIDE 1	C71 J3DAJ			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
RB	+11 00	59	[redacted]-D4VS	J BOX GROUP 4 SIDE 2	C71 J3DAF			
RB	+11 00	59	[redacted]-D4VS	[illegible]	[illegible]			
				TOTAL QUANTITY THIS ROW	115			
RB	+11 00	60	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5A-1	NO	NO	[redacted]
RB	+11 00	60	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5A-1			
RB	+11 00	60	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5A-2			
RB	+11 00	60	[redacted]-NDV2	CAP SYSTEM SPEAKER	R52 C5A-2			
				TOTAL QUANTITY THIS ROW	4			
				TOTAL QUANTITY THIS ELEVATION	956			
RB	+12 00	46	[redacted]-NDV1	DRIVE MECHANISAM-J001E	C51 J001E			
RB	+12 00	46	[redacted]-NDV2	DRIVE MECHANISAM-J001E	C51 J001E			
RB	+12 00	46	[redacted]-NDV3	DRIVE MECHANISAM-J001E	C51 J001E			
				TOTAL QUANTITY THIS ROW	3			
				TOTAL QUANTITY THIS ELEVATION	3			
RB	+13 00	22	[redacted]-NDV2	Z4 DW CLG SUP AIR TEMP	T41 NN048A			
				TOTAL QUANTITY THIS ROW	1			
RB	+13 00	60	[redacted]-D2V2	INBD CONDEN BLOCK HAND	P60 FF007	yes	yes	
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION	2			
RB	+13 04	41	[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3QAN	NO	NO	[redacted]
RB	+13 04	41	[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3QAN			
RB	+13 04	41	[redacted]-NDV1	SOUND PWR PHONE PULL BOX	R51 P3QAN			

CABLE PI .RAM

UN NUMBER 58-8 08
UN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATION
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP		Safety	Subm. Quali	[redacted]
				TOTAL QUANTITY THIS ROW	3				
				TOTAL QUANTITY THIS ELEVATION	3				
:B	+13 06	34	[redacted]-D2V2	REAC WTR SAMPLE VLV	B33 F019	A	Yes		[redacted]
				TOTAL QUANTITY THIS ROW	1				
:B	+13 06	43	[redacted]D1V2	REAC WTR SAMPLE VLV	B33 F020	A	yes		[redacted]
:B	+13 06	43	[redacted]D1V2	~~REAC WTR SAMPLE VLV~~	~~[illegible]~~	A	yes		[redacted]
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	3				
:B	+14 00	28	[redacted]-NDV3	RB MAINT HOIST MONORAIL	T31 EE005		NO	NO	[redacted]
				TOTAL QUANTITY THIS ROW	1				
:B	+14 00	41	[illegible] NDV1	SOUND PWR PHONE JACK	R51 J6 10				
:B	+14 00	41	-R51 -22 NDV1	~~SOUND PWR PHONE JACK~~	~~[illegible]~~				
:B	+14 00	41	-R51 -22 NDV1	SOUND PWR PHONE JACK	R51 J8 11				
:B	+14 00	41	-R51 -222 NDV1	~~SOUND PWR PHONE JACK~~	~~[illegible]~~				
:B	+14 00	41	-R51 -223 NDV1	SOUND PWR PHONE JACK	R51 J8 12				
:B	+14 00	41	-R5 -225 NDV1	SOUND PWR PHONE JACK	R51 J22 12				
:B	+14 00	41	-225 NDV1	~~SOUND PWR PHONE JACK~~	~~[illegible]~~				
:B	+14 00	41	-225 NDV1	~~SOUND PWR PHONE JACK~~	~~[illegible]~~				
:B	+14 00	41	-R5 -225 NDV1	SOUND PWR PHONE PULL BOX	R51 P3QAB				
:B	+14 00	41	-R51 -225 NDV1	~~SOUND PWR PHONE PULL BOX~~	~~[illegible]~~				
:B	+14 00	41	-R51 225 NDV1	~~SOUND PWR PHONE PULL BOX~~	~~[illegible]~~				
:B	+14 00	41	-R51 -225 NDV1	SOUND PWR PHONE JACK	R51 J22 14				
:B	+14 00	41	-R51 -225 NDV1	~~SOUND PWR PHONE JACK~~	~~[illegible]~~				
:B	+14 00	41	A1 -R51 -22 NDV1	~~SOUND PWR PHONE JACK~~	~~[illegible]~~				
:B	+14 00	41	A1 -R51 -226 NDV1	~~SOUND PWR PHONE JACK~~	~~[illegible]~~				
				TOTAL QUANTITY THIS ROW	15				
:B	+14 00	46	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J22 16				
				TOTAL QUANTITY THIS ROW	1				
:B	+14 00	50	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J22 13				
				TOTAL QUANTITY THIS ROW	1				
:B	+14 00	51	A[redacted]D2V2	WPS IVLCS VALVE	P60 FF020		yes	yes	
:B	+14 00	51	[redacted]	~~WPS IVLCS VALVE~~	~~[illegible]~~				
				TOTAL QUANTITY THIS ROW	2				
:B	+14 00	53	[redacted]-D2V2	WPS CONT ROD DRIVE SEAL	P60 FF055			yes	
:B	+14 00	53	[redacted]-D2V2	~~WPS CONT ROD DRIVE SEAL~~	~~[illegible]~~				

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE P...GRAM
08
REPORT 1(1 ALL CABLES SORTED BY BUILDING, ELEVATION /
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	--	Safety	Subm. Quali	[redacted]
				TOTAL QUANTITY THIS ROW	2				
RB	+14 00	54	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J22 11	A1	NO	NO	[redacted]
RB	+14 00	54	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J22 15	A'	NO	NO	[redacted]
				TOTAL QUANTITY THIS ROW	2				
RB	+14 00	57	[redacted]-D2V2	BACK-UP SCRM PILOT VLV B	C11 F110B	A	yes	yes	[redacted]
				TOTAL QUANTITY THIS ROW	1				
RB	+14 00	59	[redacted]D1V2	BACK-UP SCRM PILOT VLV A	C11 F110A	A	yes	yes	[redacted]
				TOTAL QUANTITY THIS ROW	1				
				TOTAL QUANTITY THIS ELEVATION	26				
RB	+14 02	17	[redacted]-NDV1	SENSOR CHANNEL 3	B13 L003	/	NO	NO	[redacted]
RB	+14 02	17	[redacted]-NDV1	SENSOR CHANNEL 4	B13 L004	/	NO	NO	[redacted]
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	2				
B	+14 06	55	[redacted]-D2V2	CONTMNT ISO VALVE	P42 FF020	/	yes	yes	
B	+14 06	55	[redacted]-D&V3	~~CONTMNT ISO VALVE~~	~~P42 FF020~~	/	~~yes~~		
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	2				
B	+14 09	28	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016C2	/	NO	NO	[redacted]
B	+14 09	28	[redacted]-NDV2	~~LEAK-OFF DET LIN SOL VAL~~	~~E31 [illegible]~~	/	~~NO~~		[redacted]
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	2				
B	+15 00	57	[redacted]-D2V2	CRD I/B ISO VALVE	C11 FF215	.	yes	yes	
B	+15 00	57	[redacted]D2V3	~~CRD I/B ISO VALVE~~	~~C11 FF215~~		~~yes~~		
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	2				
B	+15 03	33	[redacted]D2V2	RWCU ISO VLV	G33 F001		yes	yes	[redacted]
B	+15 03	33	[redacted]D2V2	~~RWCU ISO VLV~~	~~G33 F001~~				[redacted]
B	+15 03	33	[redacted]D2V3	~~RWCU ISO VLV~~	~~G33 F004~~				
				TOTAL QUANTITY THIS ROW	3				
B	+15 03	57	[redacted]-D2V2	WPS IVLCS VALVE	P60 FF005		yes	yes	
B	+15 03	57	[redacted]D2V3	~~WPS IVLCS VALVE~~	~~P60 FF005~~		~~yes~~		

CABLE F GRAM

RUN NUMBER 58-8 08
RUN BEGIN DATE: 12/10/81

REPORT 111 ALL CABLES SORTED BY BUILDING, ELEVATION
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP		Safety	Subm. Quali	[redacted]
				TOTAL QUANTITY THIS ROW 2					
RB	+16 06	55	[redacted]-D2V2	INBD CCW RETURN BLOCK	P60 FF018	/	yes	yes	
				TOTAL QUANTITY THIS ROW 1					
				TOTAL QUANTITY THIS ELEVATION 3					
RB	+16 07	42	[redacted]-DIV1	CONTMNT TO DW AIR DP	T41 NN019A	/	yes	yes	[redacted]
				TOTAL QUANTITY THIS ROW 1					
				TOTAL QUANTITY THIS ELEVATION 1					
RB	+17 00	43	[redacted]-DIV2	DW O/B ISO VALVE	P52 FF042	/	yes	yes	
RB	+17 00	43	[redacted]-DIV3	[illegible]	[illegible]	/			
				TOTAL QUANTITY THIS ROW 2					
				TOTAL QUANTITY THIS ELEVATION 2					
RB	+17 03	56	[redacted]-D2V2	WPS IVLCS VALVE	P60 FF004	/	yes	yes	
RB	+17 03	56	[redacted]	[illegible]	[illegible]	/			
				TOTAL QUANTITY THIS ROW 2					
				TOTAL QUANTITY THIS ELEVATION 2					
RB	+17 06	57	[redacted]-D2V2	FUEL POOL DRAIN ISO VLV	G41 F044	/	yes	yes	[redacted]
RB	+17 06	57	[redacted]	[illegible]	[illegible]	/			
				TOTAL QUANTITY THIS ROW 2					
				TOTAL QUANTITY THIS ELEVATION 2					
RB	+19 04	32	A1 -E51A-3141-D2V2	STM L WARM UP L INBD	E51 F076	/			
RB	+19 04	32	A1 -E51A-3144-D2V2	STM L WARM UP L INBD	~~E51 F076~~	/			
RB	+19 04	32	A1 -E51A-4008-D2V3	STM L WARM UP L INBD	~~E51 F076~~	/			
				TOTAL QUANTITY THIS ROW 3					
				TOTAL QUANTITY THIS ELEVATION 3					
RB	+19 06	29	A1 -E51A-3141-D2V2	RCIC STEAM ISO VLV	E51 F063	/			
RB	+19 06	29	A1 -E51A-3199-D2V2	RCIC STEAM ISO VLV	~~E51 F063~~	/			
RB	+19 06	29	A1 -E51A-3220-D2V2	RCIC STEAM ISO VLV	~~E51 F063~~	/			
RB	+19 06	29	A1 -E51A-4006-D2V3	RCIC STEAM ISO VLV	~~E51 F063~~	/			
RB	+19 06	29	A1 -P61 -3045-D2V2	RCIC STEAM ISO VLV	~~E51 F063~~	/			
				TOTAL QUANTITY THIS ROW 5					
RB	+19 06	65	A1 -B21C-2037-DIV1	DIV 1 PENET P 203 INBD	R61 TT203	I			
RB	+19 06	65	A1 -B21C-2040-DIV1	DIV 1 PENET P 203 INBD	R61 TT203	I			
RB	+19 06	65	A1 -B21C-3002-DIV2	DIV 1 PENET P 204 INBD	R61 TT204	I			
RB	+19 06	65	A1 -B21C-3016-D2V2	DIV 2 PENET P 213 INBD	R61 TT213	I			
RB	+19 06	65	A1 -B21C-3082-DIV2	DIV 1 PENET P 204 INBD	R61 TT204	I			

CABLE . GRAM

RUN NUMBER 58-8 08
RUN BEGIN DATE: 12/10/81 REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATION A
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	--	Safety	Subm. Quali	[redacted]
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	5				
RB	+15 04	57	[redacted]-D2V2	RWCU ISLN VLV	G33 F028	A1	yes	yes	[redacted]
RB	+15 04	57	[redacted]-D2V3	~~RWCU ISLN VLV~~	~~G33 F028~~	A1	"		"
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	2				
RB	+15 06	21	[redacted]-NDV1	SOUND PWR PHONE JACK	R51 J3 19	A	NO	NO	[redacted]
				TOTAL QUANTITY THIS ROW	1				
				TOTAL QUANTITY THIS ELEVATION	1				
RB	+15 07	35	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016A8	A	} NO	No	[redacted]
RB	+15 07	35	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005A8	A			
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	2				
RB	+15 08	34	[redacted]-D2V2	MAIN STM DRAIN ISO VLV	B21 F016	A	yes	yes	[redacted]
RB	+15 08	34	[redacted]-D2V3	~~MAIN STM DRAIN ISO VLV~~	~~B21 F016~~	A			
				TOTAL QUANTITY THIS ROW	2				
				TOTAL QUANTITY THIS ELEVATION	2				
RB	+15 11	48	[redacted]-D1V2	RHR INJECTION VLV	E12 F042A	A	yes	yes	[redacted]
RB	+15 11	48	A1 [redacted]3185-D1V2	~~RHR INJECTION VLV~~	~~E12 F042A~~	A			
RB	+15 11	48	[redacted] E12A-[redacted]2-D1V3	~~RHR INJECTION VLV~~	~~E12 F042A~~	A			
				TOTAL QUANTITY THIS ROW	3				
				TOTAL QUANTITY THIS ELEVATION	3				
RB	+16 00	34	[redacted]-NDV1	LEAK-OFF DET LIN SOL VAL	E31 N016F1	A	NO	No	[redacted]
RB	+16 00	34	[redacted]-NDV2	LEAK-OFF DET LIN SOL VAL	E31 F005F1	A			
				TOTAL QUANTITY THIS ROW	2				
RB	+16 00	43	[redacted]-NDV1	PREAMP	E31 N023C 1		NO	No	[redacted]
RB	+16 00	43	[redacted]-NDV1	~~PREAMP~~	~~E31 N023C 1~~				
				TOTAL QUANTITY THIS ROW	2				
RB	+16 00	54	[redacted]-D2V2	INBD CCW SUPPLY BLOCK	P60 FF016		yes	yes	[redacted]
				TOTAL QUANTITY THIS ROW	1				
RB	+16 00	59	[redacted]-NDV1	CONTAIN TO ATMOS DIFF	T41 NN040B		NO	NO	[redacted]

RUN NUMBER 58-8
RUN BEGIN DATE: 12/10/81

CABLE . .OGRAM
08
REPORT 111 ALL CABLES SORTED BY BUILDING,ELEVATION
TODAY'S DATE IS: 10/27/82

BLDG	ELEV	ROW	CABLE NUMBER	TO/FROM DESCRIPTION	TO/FROM EQUIP	Safety	Subm. Quali	[redacted]
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION	6			
RB	+16 01	46	[redacted]-D2V2	RHR B INJECTION VLV	E12 F042B	yes	yes	[redacted]
RB	+16 01	46	[redacted]-D2V2	RHR B INJECTION VLV	~~E12 F042B~~			
RB	+16 01	46	[redacted]-D2V3	RHR B INJECTION VLV	~~E12 F042B~~			
				TOTAL QUANTITY THIS ROW	3			
				TOTAL QUANTITY THIS ELEVATION	3			
RB	+16 02	42	[redacted]-NDV1	CRD MAS CONT AUX UN CH14	D21 K027	No	No	[redacted]
RB	+16 02	42	[redacted]-NDV1	SENSOR & CONVERTER CH14	D21 N027	↓	↓	↓
RB	+16 02	42	[redacted]-NDV1	CRD MAS HYD AUX UN CH15	D21 K028			
RB	+16 02	42	[redacted]-NDV1	SENSOR & CONVERTER CH15	D21 N028			
RB	+16 02	42	[redacted]-NDV1	CRD MAS HYD AUX UN CH16	D21 K029			
RB	+16 02	42	[redacted]-NDV1	SENSOR & CONVERTER CH16	D21 N029			
RB	+16 02	42	[redacted]-NDV1	CRD MAS CONT AUX UN CH14	D21 K027			
RB	+16 02	42	[redacted]-NDV1	CRD MAS HYD AUX UN CH15	D21 K028			
RB	+16 02	42	[redacted]-NDV1	CRD MAS HYD AUX UN CH16	D21 K029			
RB	+16 02	42	[redacted]-NDV2	CRD MAS CONT AUX UN CH14	D21 K027			
RB	+16 02	42	[redacted]-NDV2	AUDIO ALARM CH 14	D21 S001 14			
RB	+16 02	42	[redacted]-NDV2	CRD MAS HYD AUX UN CH15	D21 K028			
RB	+16 02	42	[redacted]-NDV2	AUDIO ALARM CH 15	D21 S001 15			
RB	+16 02	42	[redacted]-NDV2	CRD MAS HYD AUX UN CH16	D21 K029			
RB	+16 02	42	[redacted]-NDV2	AUDIO ALARM CH 16	D21 S001 16			
RB	+16 02	42	[redacted]-NDV3	AUDIO ALARM CH 14	D21 S001 14			
RB	+16 02	42	[redacted]-NDV3	AUDIO ALARM CH 15	D21 S001 15			
RB	+16 02	42	[redacted]-NDV3	AUDIO ALARM CH 16	D21 S001 16			
RB	+16 02	42	[redacted]-D1V1	DIV 1 DW PRESSURE	T41 NN025A	yes	yes	[redacted]
RB	+16 02	42	[redacted]-D2V1	DIV 2 DW PRESSURE	T41 NN025B	"	"	[redacted]
				TOTAL QUANTITY THIS ROW	20			
RB	+16 02	43	[redacted]-D2V1	CONTMNT TO DW AIR DP	T41 NN019B	yes	yes	[redacted]
				TOTAL QUANTITY THIS ROW	1			
RB	+16 02	59	[redacted]-D2V1	SHLD ANNUL TO CONTMT AIR	T41 NN031B	yes	yes	[redacted]
				TOTAL QUANTITY THIS ROW	1			
RB	+16 02	60	[redacted]-D1V1	SHLD ANNUL TO CONTMT AIR	T41 NN031A	yes	yes	[redacted]
				TOTAL QUANTITY THIS ROW	1			
				TOTAL QUANTITY THIS ELEVATION	23			
RB	+16 06	44	[redacted]-D1V2	WET STANDPIPE GATE VALVE	X43 FF133	yes	yes	
RB	+16 06	44	[redacted]-D1V3	~~WET STANDPIPE GATE VALVE~~	~~X43 FF133~~			

430.37 (8.3) Provide the results of a review of your operating, maintenance, and testing procedures to determine the extent of usage of jumpers or other temporary means of bypassing functions for operating, testing, or maintenance of safety-related systems. Identify and justify any cases where the use of temporary bypasses cannot be avoided. Provide criteria for any use of jumpers when testing.

Response

Test, operating and maintenance procedures will be by applicant.

The present ~~STRIDE~~ GESSAR II design minimizes to the extent practicable the use of jumpers during testing and maintenance procedures.

430.38 (8.1.) Incidents have occurred at operating nuclear power plants which indicate a deficiency in the design of the electrical control circuitry. These incidents include the inadvertent disabling of a component by racking out the circuit breakers for a different component. Accordingly, review the electrical control circuits of all safety-related equipment in your proposed nuclear island to assure that disabling of one component does not, through incorporation in other inter-locking or sequencing controls, render other components inoperable. All modes of test. operation and failure should be considered. Provide the results of your review.

Response

Refer to GESSAR II, section 8.1.3.2.1.1 with additional clarification per attached copy.

8.1.2.1.2.2 HPCS Power System Loads

The HPCS power system loads consist of the HPCS pump/motor and associated 480 VAC auxiliaries such as motor-operated valves, engine cooling water pumps, engine auxiliary loads and other miscellaneous loads. Table 8.3-3 shows the Division 3 loads required during normal operation, normal shutdown, forced shutdown and LOCA.

8.1.2.2 Balance-of-Plant Power System

(Provided by Applicant)

8.1.3 Design Bases

8.1.3.1 Safety Design Bases - Offsite Power

(Provided by Applicant)

8.1.3.2 Safety Design Bases - Onsite Power

8.1.3.2.1 Nuclear Island-General Functional Requirements

8.1.3.2.1.1 Onsite Power Systems - General

Each unit's total safety-related load shall be divided into three divisional load groups. Each load group shall be fed by an independent 6.9-kV Class 1E bus, and each load group shall have access to two offsite and one onsite power source.

Two normally energized power feeders each shall be provided for the Division 1 and Division 2 Class 1E systems. The normal preferred feeder is used when operational, with the alternate preferred feeder used when the former is not available. One normally energized normal preferred feeder which can be supplied from either

8.1.3.2.1.1 Onsite Power Systems - General (Continued)

of two offsite sources shall be provided for the Division 3 (HPCS) system. Additionally, one independent redundant Class 1E 6.9-kV diesel-generator and one independent redundant Class 1E 125 VDC system are provided for each divisional load group. A separate 125 VDC system is provided for Division 4 instrumentation and control.

The redundant Class 1E electrical load groups (Divisions 1 and 2) shall be provided with separate onsite standby AC power supplies, electric buses, distribution cables, controls, relays and other electrical devices. Redundant parts of the system shall be physically separated to the extent that a single credible event, including a single electrical failure, cannot cause loss of power to redundant load groups. Independent raceway systems shall be provided to meet load group cable separation requirements for Divisions 1 and 2, as well as for the HPCS System (Division 3) and NSPS (Divisions 1, 2, 3 and 4).

Division 1 and 2 standby AC power supplies shall have sufficient capacity to provide power to all the required Division 1 or 2 loads. Loss of the preferred power supplies, as detected by 6.9-kV Class 1E bus under-voltage relay, shall cause the standby power supplies to start and connect automatically, in sufficient time to maintain the reactor in a safe condition, safely shut down the reactor or limit the consequences of a DBA to acceptable limits. The standby power supply shall be capable of being started and stopped manually and shall not be stopped automatically during emergency operation unless required to preserve integrity. Automatic start will also occur on receipt of a LOCA signal.

Switchgear circuit breaker control circuits for the ~~STRIDE~~ GESSAR II design utilize cell switches to assure that control logic is not altered when the circuit breakers are racked into the test position or removed for maintainance.

8.1.3.2.1.1 Onsite Power Systems - General (Continued)

The 6.9-kV Division 1 and 2 switchgear buses, and associated 6.9-kV diesel generators, 480 VAC distribution systems, 120 VAC and 125 VDC power and control systems shall conform to Seismic Category 1 requirements and shall be housed in Seismic Category 1 structures. Detailed descriptions of equipment seismic design and capabilities are contained in Section 3.10.

10/22/82 Superceded by → EXW 11-01-82

C F BRAUN & CO

JOB NOTE

CUSTOMER	PAGES	PAGE
APPARATUS	JOB 6382-P	
DATE	BY	ITEM

~~To Electrical~~

- QUESTION 430.39

Provide a listing of all motor-operated valves in your proposed nuclear island which require power lock-out in order to satisfy our single failure criterion. Indicate the features of your design which permit you to satisfy this requirement.

RESPONSE 430.39

Response to this question is included in Subsection 9.5.9.3, Safety Evaluation, and 9.5.9.5, Instrumentation Requirements, ~~due to~~ there ~~being~~ is only one motor-operated valve which requires power lock-out to satisfy the single failure criterion.

9.5.9.2 Systems Description (Continued)

In the event of a LOCA, the SPCU System function is automatically terminated to accomplish containment isolation. Power for the SPCU System pumps (and valves) is supplied only from the preferred power buses. Containment isolation valves are provided with Class 1E preferred and standby power.

The SPCU System, consisting of piping, valves and instrumentation, is shown in Figure 9.5-18 (K-172). The system has no unique major components.

9.5.9.3 Safety Evaluation

The system has no safety-related function as previously defined. Failure of the system does not compromise any safety-related system or component and does not prevent safe reactor shutdown.

However, the system does incorporate some features that assure reliable operations over the full range of normal plant operations. These features consist primarily of instrumentation that monitors and/or controls SPCU operation and performance.

Portions of the SPCU System that penetrate the containment are provided with isolation valves which are automatically closed by an isolation signal.

The containment isolation signal logic receives reactor low-water-level signals and drywell high-pressure signals. These inputs isolate the SPCU System to prevent containment bypass leakage.

Emergency power is supplied by Class 1E buses to (containment) isolation valves and leak detection instrumentation for the DBA and for LOPP events.

A portion of the SPCU System that penetrates the secondary containment is provided with an isolation valve, G38-FF038, which is normally closed and its power locked-out in order to satisfy the single failure criterion. This valve isolates the SPCU System to prevent secondary containment bypass leakage.

9.5.9.5 Instrumentation Requirements (Continued)

turn it off using a hand selector switch located in the control room. (See Subsection 7.7.1.13 for details.)

The containment isolation valves are supplied with position indication in the control room and remote-manual as well as automatic operation. (See Subsection 7.3.1 for details.)

9.5.10 Nuclear Island - BOP Interface

9.5.10.1 Nuclear Island Fire Protection System - BOP Interface

The Applicant shall provide the water and CO_2 supplies for the Nuclear Island Fire Suppression System.

9.5.10.1.1 Design Criteria

Fire water supply for the Nuclear Island shall be provided by the BOP Fire Water System, Essential Service Water System and Condensate Transfer System. The Essential Service Water System provides a backup Seismic Category I source of water for hose reels for essential equipment. Condensate is the preferred source of water for the Wet Standpipe System inside the containment. The ESW and condensate connections and actuation and isolation provisions are within the scope of the Nuclear Island design.

CO_2 shall be supplied to the Nuclear Island at a sufficient rate and duration for the Diesel Generator Building CO_2 Fire Suppression System.

The classification of the BOP Fire Water and CO_2 Supply System for the Nuclear Island may be Quality Group D and nonseismic Category I. The secondary containment isolation valve, G38-FF030, is supplied with a position indication alarm in the control room and local-manual operation with a second separate key-locked switch which disconnects power to the valve motor operator. to prevent a single failure from causing an undesirable valve action.

QUESTION 430.40
(8.3)

Certain nuclear power plants which have two-cycle turbocharged diesel engines manufactured by the Electromotive Division (EMD) of General Motors driving emergency generators, have experienced a significant number of turbocharger mechanical gear drive failures. These failures have occurred as a result of running the emergency diesel-operators at no-load or light-load operation for extended periods. This type of operation could occur during periodic equipment testing or during accident conditions when offsite power is available. When this equipment is operated under no-load conditions, the volume of exhaust gas is insufficient to operate the turbocharger. As a result, the turbocharger is driven mechanically from a gear drive in order to supply enough combustion air to the engine to maintain its rated speed. However, the turbocharger and mechanical drive gear normally supplied with these engines are not designed for the standby service encountered in nuclear power plants where the equipment may be called upon to operate at no-load or light-load conditions at full-rated speed for a prolonged period. (The EMD equipment was originally designed for locomotive services where no-load speeds for the engine and generator are much lower than full-load speeds. The locomotive turbocharged diesel hardly even runs at full speed except at full load.) Accordingly, the EMD has strongly recommended that this particular diesel engine not be operated at no-load or light-load conditions at full-rated speed for extended periods due to the short life expectancy of the turbocharger mechanical gear drive unit normally furnished. No-load or light-load operation also causes a general deterioration in any diesel engine. To cope with the severe service to which the equipment is normally subjected when installed in nuclear power plants and in the interest of reducing failures and increasing the availability of its equipment, EMD has developed a heavy-duty turbocharger drive gear unit which can replace existing equipment. This is available as a replacement kit; engines can also be ordered with the heavy-duty turbocharger drive gear assembly.

To assure optimum availability of the emergency diesel-generators on demand, it is our position that you should only supply the heavy duty turbocharger mechanical drive gear assembly if you intend to order emergency generators driven by two-cycle diesel engines manufactured by EMD. This position is consistent with the recommendation by EMD for the class of service encountered in nuclear power plants. Confirm your compliance with this requirement.

RESPONSE

GE agrees with the NRC position. All future HPCS, DG driven by two-cycle diesel engines manufactured by GM/EMD will be ~~ordered~~ specified with the heavy duty turbocharger.

MP:csc/I10146-22
11/4/82

430.41 (8.3) Diesel-generators with a high degree of reliability are an essential part of the safety systems for nuclear power plants. Accordingly, provide a discussion of the level of training which will be required for the applicant's personnel to ensure that diesel-generator reliability levels inherent in your nuclear island will be maintained. As applicable, state your recommendations for the types of personnel to be trained; i.e., operators, maintenance crew, quality assurance personnel and supervisors. In your discussion, identify the amount and kind of training you recommend for each of the above categories

Response

A draft response to this question will be provided in December 1982.

QUESTION 430.42
(8.3)

The availability on demand of an emergency diesel-generator is dependent upon, among other things, the proper functioning of its controls and monitoring instrumentation. This equipment is generally mounted on panels and in some instances, the panels are mounted directly on the diesel-generator skid. Major diesel engine damage has occurred at some operating plants from vibration induced wear on skid-mounted control and monitoring instrumentation. This sensitive instrumentation is not made to withstand and function accurately for prolonged periods under the continuous vibrational stresses normally encountered with internal combustion engines. Operation of sensitive instrumentation under this environment rapidly deteriorates the calibration, the accuracy and the control signal output.

Accordingly, except for sensors and other equipment which must be directly mounted on the engine or associated piping, it is our position that the controls and monitoring instrumentation should be installed on a free-standing floor-mounted panel separate from the engine skids and located on a floor area free from vibration.

If the floor is not free of vibration, the panel shall be equipped with vibration mounts. Confirm your compliance with this requirement. Alternatively, provide justification for noncompliance.

430.42 Response

All enclosed panels and/or cabinets were specified to be freestanding equipment. The above statement will be added to GESSAR in section 8.3.1.1.8.1.1 page 8.3-20. Marked-up page 8.3-20 is attached herewith.

The diesel-generator has a monolithic foundation and an adequate mass of concrete (approximately 8 ft thick slab) to absorb vibration and prevent transmission of damaging vibration into the panels and cabinets. Also, the diesel-generator set is designed to withstand any anticipated vibration conditions. See GESSAR p. 8.3-51.

Space for future addition of vibration mounting/brace will be included in the design. Vibration will be measured and vibration mount/brace will be added, if needed. This will be added in page 8.3-20 of the FSAR, as attached.

8.3.1.1.8 Standby AC Power System (Continued)

Each standby power system division, including the diesel-generator, its auxiliary systems and the distribution of power to various Class 1E loads through the 6.9-kV and 480V systems, is segregated and separated from other system divisions. No automatic interconnection is provided between the Class 1E divisions. Each diesel-generator set is operated independently of the other sets and is connected to the utility power system by manual control only during testing or for energized bus transfer and then only one division at a time.

8.3.1.1.8.1 Redundant (Division 1 and Division 2) Standby AC Power Supplies

8.3.1.1.8.1.1 General

The diesel generators comprising the Divisions 1 and 2 standby AC power supplies are designed to quickly restore power to their respective Class 1E distribution system divisions as required to achieve safe shutdown of the plant and/or to mitigate the consequences of a LOCA in the event of a coincident LOPP. Figure 8.3-2 shows the interconnections between the preferred power supplies and the Divisions 1 and 2 diesel-generator standby power supplies.

Separate unit station service transformers and separate reserve station service transformers are used for each division normal and alternate preferred supplies.

All enclosed panels and/or cabinets shall be freestanding equipment.

A detailed discussion of the Division 3 diesel-generator system (HPCS) standby AC power supply is presented in Subsection 8.3.1.1.9.1.

3 Space for future addition of vibration mounting/brace will be included in the design. Vibration will be measured and vibration mount/brace will be added, if needed.

8.3.1.1.8.1.2 Ratings and Capability

The diesel generators for Divisions 1 and 2 each have a continuous nameplate rating of 7,000 kW on an 8,760-hr basis (with 10% overload permissible for 2 hr out of every 24). This exceeds the loads required at one time, as derived from Tables 8.3-1 and 8.3-2.

A crankcase breather system is provided by the Seller.

430.43
(9.5.2)

Identify all working stations in your proposed nuclear island where it may be necessary for plant personnel to communicate with the control room or the emergency shutdown panel during and/or following transients or accidents in order to mitigate the consequences of the event or attain safe plant shutdown. Provide a tabulation of these working stations.

Response

All working stations for the sound powered phone system are shown in Figures 9.5-4 of through 9.5-9 of ~~the~~ GESSAR II.

For additional information refer to the revised version of FSAR Section 9.5.2.2.2.3 (copy attached).

9.5.2.2.2.3 Sound-Powered Phone System

A sound-powered telephone system is provided for intraplant communications and other fixed-type emergency communications. The system provides communication between the Control Building and equipment being maintained, calibrated or tested, or between specific equipment locations.

The system has 14 master stations on a common circuit for communications between the control room (see Figure 9.5-6), remote shutdown panel and other major operating areas. Each of these master stations are equipped with a selector switch, and a magneto ringing device for calling other selected master stations on the same circuit (see Figure 1.7-1b). Two master stations are provided on a separate circuit for fuel transfer purposes only. (See Table 9.5-5 Reactor Island Sound Powered Phone Master Stations). The Control Building; Auxiliary Building; Division 1, 2, and 3 Diesel Buildings, and the Division 1 and 2 ESW Pumping Stations can all communicate on the Master Station "M1" circuit. The Fuel Building and Reactor Building can communicate on the Master Station "M21" circuit. There are no master stations in the Radwaste Building or in the balance of plant (BOP). The total system has capacity for expansion though, since up to 16 Master Stations can be connected on one circuit. The system also includes 23 circuits of fixed telephone jacks for Reactor Island systems. The circuits are routed to a patch panel located in the control room. Twelve space connections are provided on the patch panel for Turbine Island use.

In order to communicate on this system the caller must turn the selector switch to the master station the caller wants to call. The caller then rings this selected station by means of the turn crank magneto ringer. Either calling or answering station can then patch into any of the various jack circuits to provide communication to working locations remote from the master stations.

An independent sound-powered phone system is provided for the Waste Treatment Facility.

Table 9.5-5

Reactor Island Sound Powered Phone Master Stations

Item Number	Location: Building	Location: EL	Location: Address	Master Station
1	Auxiliary	6'-10"	Remote Shutdown Panel	M1-2
2	Auxiliary	11'-0"	Electrical Equip. Room - Zone 1	M1-8
3	Auxiliary	11'-0"	Electrical Equip. Room - Zone 2	M1-7
4	Control Rm.	6'-10"	Fuel Benchboard H13-P877	M1-1
5	Control Rm.	11'-0"	Electrical Equip. Room Div I	M1-9
6	Control Rm.	11'-0"	Electrical Equip. Room Div IV	M1-10
7	Control Rm.	28'-6"	Mechanical Equip. Room Div I	M1-11
8	Control Rm.	28'-6"	Mechanical Equip. Room Div II	M1-12
9	Diesel Generator	6'-10"	Diesel Gen. Div I	M1-3
10	Diesel Generator	6'-10"	Diesel Gen. Div III	M1-4
11	Diesel Generator	6'-10"	Switchgear Rm.	M1-5
12	Diesel Generator	6'-10"	Diesel Generator Div II	M1-6
13	Pump Station		Unit 1 MCC-Div I	M1-13
14	Pump Station		Unit 1 MCC-Div II	M1-14
15	Reactor	84'-7"	Fuel transfer control panel	S21-1
16	Fuel	11'-0"	Fuel transfer control panel	M21-1

Note: Master Station numbers M1-2

device number

m- w/selector

430.44 (9.5.2) In Section 9.5.2.2.2.3 of your FSAR, you state that sound-powered phones are used for intraplant fixed-type emergency communications. The arrangement for the sound-powered phones is presented in Figures 9.5.4 through 9.5.9 of your FSAR. Based on our review of these drawings, we conclude that there is no master station in the control building nor are any of the numerous jack stations equipped with ringing devices. Considering these two facts, explain how communications are established between the control room and any specific jack station serving a working station identified in your response to Question 430.43 during and/or following transients or accidents.

Response

The response to this question is contained in our response to question 430.43.

AUG 2 5 1982

430.45 (9.5.2) Provide a diagram showing the locations of the loud speakers associated with the coded-call automatic paging (CAP) system. Identify the source of power for the CAP system. State what, if any, function the system serves in establishing intraplant communications during and/or following transients or accidents. (Intraplant communications beyond the nuclear island, interplant communications, and plant to offsite communications will be evaluated as plant specific items.)

Response

The location of loud speakers associated with the (CAP) system to be selected by the applicant, and a diagram showing these locations to be supplied by applicant.

Power is supplied from a distribution panel located in the BOP and is the responsibility of the applicant.

The (CAP) system function in establishing interplant communications is integrated with the other communication systems, it is controlled from the BOP and is the responsibility of the applicant.

For additional information on communication systems refer to the revised version of FSAR Section 9.5.2.2.2.1 copy attached.

9.5.2.2.2.1 Coded-call Automatic Paging (CAP) (Continued)

The location of loud speakers associated with the (CAP) system to be selected by the applicant, and a diagram showing these locations to be supplied by applicant.

Power is supplied from a distribution panel located in the BOP and is the responsibility of the applicant.

The (CAP) system function in establishing interplant communications is integrated with the other communication systems, it is controlled from the BOP and is the responsibility of the applicant.

9.5.2.2.2.2 Private Automatic Exchange (PAX)

The PAX System provides telephone communication throughout the entire facility. The PAX system phones have access to the paging system. In addition, phone jacks are located at selected work stations so that a portable phone can be plugged in when desired. Individual telephone bells are located in areas where required to call personnel to the telephone. An intercom system between the fuel handling platforms in the Reactor Building and the main control room is a portion of the system. The telephone exchange for the system is located in the Central Service Facility. Power is supplied to the PAX system. from the BOP

The location of the private automatic exchange (PAX) system phones and jacks to be selected by the applicant, and a diagram showing these locations to be supplied by applicant.

The (PAX) system function in establishing interplant communications is integrated with the other communication systems, it is controlled from the BOP and is the responsibility of the applicant.

The specification, design type, and seismic category of the (PAX) system, is the responsibility of the applicant.

430.46 (9.5.2) Provide a diagram showing the location of the private automatic exchange (PAX) system phones and phone jacks. State what, if any, function the PAX system serves in establishing intraplant communications during and/or following transients or accidents. State whether the PAX system is designed to seismic Category I requirements. Alternatively, describe the device(s) which will isolate the PAX system from its Class 1E power source following a design basis seismic event.

Response

The location of the private automatic exchange (PAX) system phones and jacks has been selected by the applicant, and a diagram showing these locations should be supplied by applicant.

The (PAX) system function in establishing interplant communications is integrated with the other communication systems, it is controlled from the Central Service Facility and is the responsibility of the applicant.

The specification, design type, and seismic category of the (PAX) system, is the responsibility of the applicant.

Note: The statement "Class 1E power is supplied to the PAX system" is not correct. The power source for the PAX system is from the BOP and is the responsibility of the Applicant. Therefore this sentence ~~should~~ will be deleted from ~~the~~ GESSAR II per attached.

9.5.2.2.2.2 Private Automatic Exchange (PAX)

The PAX System provides telephone communication throughout the entire facility. The PAX system phones have access to the paging system. In addition, phone jacks are located at selected work stations so that a portable phone can be plugged in when desired. Individual telephone bells are located in areas where required to call personnel to the telephone. An intercom system between the fuel handling platforms in the Reactor Building and the main control room is a portion of the system. The telephone exchange for the system is located in the Central Service Facility. ~~Class 1E~~ Power is supplied to the PAX system from the BOP

9.5.2.2.2.3 Sound-Powered Phone System

A sound-powered telephone system is provided for intraplant communications and other fixed-type emergency communications. The system provides communication between the Control Building and equipment being maintained, calibrated or tested, or between specific equipment locations.

The system has 14 master stations located in major operating areas, each equipped with selector switches so that each station may talk to any other station. Each master station has a magneto ringing device for calling other selected master stations. The system also includes 23 circuits of fixed telephone jacks for Reactor Island systems. The circuits are routed to a patch panel located in the control room. Twelve space connections are provided on the patch panel for Turbine Island use. The individual jack plug circuits may be interconnected by using the circuit path panel provided in the main control room. An independent sound-powered phone system is provided for the Waste Treatment Facility.

430.47 (9.5.2) Provide a discussion of the communications between the emergency or remote shutdown panel and the remainder of the plant. Show how communications between this area and working stations throughout the plant will be established during and/or following transients or accidents.

Response

Communication is established between the Remote Shutdown Panel and the remainder of the plant within the Reactor Island thru the PAX system, the CAP system, the Sound-Powered Phone System or thru the Radio Control Unit.

A surface mounted PAX telephone PP15 is located inside the Remote Shutdown Panel Room, it is controlled from the BOP and is the responsibility of the applicant.

An Evacuation Alarm Station R52-A036 and a Paging Control Station R52-A037 are located inside the Remote Shutdown Panel Room, they operate in conjunction with the CAP system and are the responsibility of the applicant.

There are three (3) sound-powered telephone jacks, J3-3, J2-19 and J15-2 mounted on the wall inside the Remote Shutdown Panel Room to be used in connection with hand or head-chest sound-powered phone sets. These phone jacks are wired to the sound-powered phone patch panel inside the Control Room in the Control Building.

All other phone jack circuits in the Reactor Island are also wired to the Control Room sound-powered phone patch panel except the "J45" circuit which is located under the Reactor Pressure Vessel of the Reactor Building and the "J46" circuit which is located in the CRD maintenance room of the Auxiliary Building. Communication between different phone jack circuits is established through the patch panel operator using the PAX system for signalling to make the necessary connections. Where communications is to be established between phone jacks of the same circuit, the PAX system or master stations (if available) will be used for momentary signalling.

In case of transients or accidents, communication is established between the Remote Shutdown Panel and the remainder of the plant by means of the sound-powered phone system. Twelve (12) master stations, "M1" circuit, are located in different areas within the Reactor Island for shutdown operation. These areas are as follows:

1) Control Room H13-P877 Panel
2) Remote Shutdown Panel Room
3) Diesel Generator Bldg Div 1
4) Diesel Generator Bldg Div 3
5) Switchgear Room in the Diesel Generator Bldg Div 3
6) Diesel Generator Bldg Div 2
7) Auxiliary Bldg Electrical Equipment Room Div 2
8) Auxiliary Bldg Electrical Equipment Room Div 1
9) Control Bldg Electrical Equipment Room Div 1 & 4
10) Control Bldg Electrical Equipment Room Div 2 & 3
11) Control Bldg Mechanical Equipment Room Div 1
12) Control Bldg Mechanical Equipment Room Div 2

Two (2) other master stations in the "M1" circuit are located outside the Reactor Island and used during shutdown operation also. They are located in the Div 1 and Div 2 ESW Pumping Stations.

Each master station consists of a magneto generator, a rotary selector switch and a howler for signalling a selected station in the same circuit. A separate talking circuit with jacks are provided at each of the above stations, in this case, the "J15" circuit.

Communication between the Remote Shutdown Panel Room and other areas can be established by using the M1 sound-powered phone master station circuit and jack circuits during and/or following transients or accidents.

A Radio Control Unit is located inside the Remote Shutdown Panel Room. it is controlled from the BOP and is the responsibility of the applicant.

430.48 (9.5.2) Provide a tabulation of the communication system(s) extensions to the balance of plant which will be required in order to provide adequate communications under all operating conditions, including transients and accidents. Identify the nuclear island/balance of plant interfaces of these communication system(s) extensions.

Response

For information on cable size and raceway interface numbers, refer to the revised version of FSAR Section 9.5.2.2.4 (copy attached).

The applicant must provide a discussion of the use of these circuits under the various operating conditions, including transients and accidents.

9.5.2.2.3 Interplant Communication System and Plant to Offsite Communication System

(Applicant to provide.)

9.5.2.2.4 System Operation

Diverse systems are provided to assure means of intraplant and interplant communications under all operating conditions. Intraplant communication systems have adequate flexibility to keep the plant personnel informed of plant operational status at all times. The CAP System is divided into A and B stations so that, if half the system is inoperative, the remaining half conveys the message. Each station of the PAX System has direct access to other stations so that, if one station is inoperative, it does not substantially interfere with continued communications.

(System power by applicant. System cable interfaces to the BOP are listed in Table 9.5-6.)

9.5.2.2.5 Safety Evaluation

The system has no safety-related function as discussed in Section 3.2. Failure of the system does not compromise any safety-related system or component and does not prevent safe reactor shutdown. However, to ensure communication availability, the CAP system has redundant components, and the sound-powered phones require no electrical power to function.

9.5.2.3 Inspection and Testing Requirements

Communication systems of the types described above are conventional and have a history of successful operation. The routine use of the normal operation communication systems ensures that the systems are serviceable and available on a day-to-day basis. Measurements or tests required to guard against long-term deterioration

Table 9.5-6

Communication Cable Interfaces to BOP

System	From	Raceway Interface	To	Number of Pairs
CAP	Aux	R-30	BOP	12 Pk. #22
	Control	R-31	BOP	33 Pr. #22
	Radwaste	R-143	BOP	6 Pr. #22
PAX	Aux	R-30	BOP	200 Pr. #22
		R-31	BOP	100 Pr. #22
	Control	R-134	BOP	225 Pr. #22
	Radwaste	R-142	BOP	50 Pr. #22
Sound Power	Control	R-119	BOP	12 Pr. #22

430.49 (9.5.3) Provide in Section 9.5.3.1.2(1) of your FSAR, a numerical value for the term "approximating" as used in connection with IES recommended illumination levels. Provide justification for not conforming with IES recommedations.

~~On NRC QUESTION 430.49~~
Response

Lighting design is based on IES recommended illumination levels, these levels are used as a minimum for lighting design requirements.

For additional information on lighting systems refer to the revised version of FSAR Section 9.5.3.1.1 item (1) copy attached.

File

9.5.2.3 Inspection and Testing Requirements (Continued)

shall be accomplished on a periodic basis. Periodic inspection and testing shall be performed on the emergency use systems, including sound-powered systems, to ensure their availability and operability should safety-related incidents arise.

The applicant will perform functional analyses or testing for conditions that simulate maximum plant noise levels being generated during the various operating conditions, to demonstrate system effectiveness.

9.5.3 Lighting Systems

The plant lighting system provides adequate illumination during both normal and accident operating conditions.

9.5.3.1 Design Bases

9.5.3.1.2 General Design Bases

The general design bases for the Nuclear Island portion of the lighting systems are as follows:

(1) The lighting design shall be based on IES recommended intensities. These shall be in-service values after applying a maintenance factor of .75 for relatively dirty areas, and .85 for clean areas such as offices, etc. The values are average horizontal footcandles on a horizontal plane 30 inches above the floor, ground, or platform, or average footcandles on instruments mounted on the vertical surface of a board. Reflected glare will be minimized.

(2) Control room lighting is designed with respect to reduction of glare and shadows on the control boards and is provided with dimming control for this purpose.

(3) Lighting systems and components are in conformity with the electrical standards of NFPA and OSHA as applicable for safety of personnel, plant and equipment.

430.50 (9.5.3) Provide a tabulation of the vital areas where emergency lighting is needed for: (1) safe shutdown of the reactor; (2) to maintain it in a safe shutdown condition; and (3) for evacuation of personnel in the event of an accident. In this tabulation, indicate the access routes to and from safety-related areas.

Response

The following is a tabulation fo the vital areas where emergency lighting is needed for: 1) Safe shutdown of the reactor; 2) To maintain it in a safe shutdown condition; and 3) For evacuation of personnel in the event of an accident.

Vital areas where emergency lighting is needed for safe shutdown of the Reactor.

1 Main Control Room including Computer Room, Equipment & Panel Rooms.

2 Switchgear Rooms

3 Remote Shutdown System Area

4 Fuel Handling Area

5 Diesel Generator Bldgs

6 Battery Rooms

Vital Areas where emergency lighting is needed to maintain the Reactor in a safe shutdown condition.

1 Main Control Room including Computer Room, Equipment & Panel Rooms.

2 Switchgear Rooms

3 Remote Shutdown System Area

4 Fuel Handling Area

5 Diesel Generator Bldgs

6 Battery Rooms

7 RHR Rooms

The following are evacuation routes to be taken from the vital areas listed.

1 Main Control Room and Computer Room (Control Bldg EL(-) 6'-10") Equipment and Panel Romms (Control Bldg EL 11'-0").

For evacuation of the Main Control and Computer Rooms exit to the corrider then through the vestibule doors to the access corridor between DG 1 and Control Bldg through the door to the outside. From the Equipment and Panel Rooms at EL 11'-0", exit to the corridor, then down either of the two stairways to the EL (-)6'-10" corridor, remaining directions are as described for Main Control and Computer Rooms.

2 Switchgear Rooms (Aux Bldg EL 11'-0" Zone 1 and 2).

For evacuation of the Switchgear Room Zone 1 EL 11'-0", exit through the emergency door into the Control Building.

From Zone 2 exit through the vestibule emergency exit to the Turbine Building.

3 Remote Shutdown Room (Aux Bldg EL(-) 6'-10").

For evacuation of the Remote Shutdown Room exit from the room to the personnel access door thru the corridor running between the Control Building and DG 1 to the outside.

4 Fuel Handling Area (Fuel Bldg EL 11'-0" Zone 1 and 2).

For evacuation of the Fuel Handling Area exit down either stairway to EL(-) 6'-10".

From Zone 1 exit to the Aux Bldg then through the personnel access door to the corridor running between the Control Bldg and DG 1 to the outside.

From Zone 2 exit through the vestibule and emergency exit to the exterior of the Fuel Building.

5 Diesel Generator Buildings.

For evacuation of the DG 1 Bldg exit through the emergency exit door to the corridor running between DG 1 and the Control Bldg to the outside.

For evacuation of the DG 2 Bldg exit through the emergency exit door to the exterior of the DG 2 Bldg.

For evacuation of the DG 3 Bldg exit through the emergency exit door into the Aux Bldg at (-)6'-10" elevation, and then through the personnel access door to the exterior of the Aux Bldg.

6 Battery Rooms (Aux Bldg EL 11'-0" Zone 1 and 2).

For evacuation of the Battery Rooms exit to the Switchgear Rooms and follow directions given in paragraph 2.

7 RHR Rooms (Aux Bldg EL(-)6'-10" Zone 1 and 2).

For evacuation of the RHR Rooms, use stairways to reach the EL(-)7'-0" platform, exit through the vestibule door to the corridor. From Zone 1 exit through the personnel access door to the corridor running between the Control Bldg and DG 1 to the outside. From Zone 2 exit through the personnel access door to the exterior of the Auxiliary Building.

For additional information on emergency lighting refer to the revised version of FSAR Section 9.5.3.2.3 copy attached.

9.5.3.2.3 Emergency Lighting (Continued)

The emergency lighting fixtures are of three types:

(1) Two incandescent sealed beams with self-contained battery, charger and transfer switch - The sets are normally connected to the Class 1E buses to maintain the batteries fully charged. Upon loss of the AC source, the sets are automatically switched on and fed by the batteries. The batteries have a minimum 8-hr capacity (in accordance with Branch Technical Position APCSB 9.5-1). The emergency sets are installed in stairways, exit routes and major control areas such as the control rooms, switchgear rooms, remote shutdown panel area, fuel-handling area and Diesel-Generator Buildings.

(2) Incandescent emergency lighting fixtures provide minimum operational illumination and are fed from 125VDC Division E or F, Class 1E buses - The batteries supplying the buses have a minimum 2-hr capacity. The emergency lighting fixtures are provided in switchgear rooms and fuel-handling areas, in addition to the self-contained emergency lighting sets.

(3) 2 ft x 2 ft recessed AC fluorescent fixtures with an addition of two 125VDC incandescent lamps fed from a separate outlet box, which is an integral part of the fixture. The DC portion of the fixtures is fed from 125VDC Division E or F, Class 1E buses. The fixtures are a portion of the integrated ceiling in the main control room.

(4) The following is a tabulation fo the vital areas where emergency lighting is needed for: 1) Safe shutdown of the reactor; 2) To maintain it in a safe shutdown condition; and 3) For evacuation of personnel in the event of an accident.

Vital areas where emergency lighting is needed for safe shutdown of the Reactor.

1 Main Control Room including Computer Room, Equipment & Panel Rooms.

2 Switchgear Rooms

3 Remote Shutdown System Area

4 Fuel Handling Area

5 Diesel Generator Bldgs

6 Battery Rooms

Vital Areas where emergency lighting is needed to maintain the Reactor in a safe shutdown condition.

1 Main Control Room including Computer Room, Equipment & Panel Rooms.

2 Switchgear Rooms

3 Remote Shutdown System Area

4 Fuel Handling Area

5 Diesel Generator Bldgs

6 Battery Rooms

7 RHR Rooms

The following are evacuation routes to be taken from the vital areas listed.

1 Main Control Room and Computer Room (Control Bldg EL(-) 6'-10") Equipment and Panel Romms (Control Bldg EL 11'-0").

For evacuation of the Main Control and Computer Rooms exit to the corrider then through the vestibule doors to the access corridor between DG 1 and Control Bldg through the door to the outside. From the Equipment and Panel Rooms at EL 11'-0", exit to the corridor, then down either of the two stairways to the EL (-)6'-10" corridor,remaining directions are as described for Main Control and Computer Rooms.

2 Switchgear Rooms (Aux Bldg EL 11'-0" Zone 1 and 2).

For evacuation of the Switchgear Room Zone 1 EL 11'-0", exit through the emergency door into the Control Building.

From Zone 2 exit through the vestibule emergency exit to the Turbine Building.

3 Remote Shutdown Room (Aux Bldg EL(-) 6'-10").

For evacuation of the Remote Shutdown Room exit from the room to the personnel access door thru the corridor running between the Control Building and DG 1 to the outside.

4 Fuel Handling Area (Fuel Bldg EL 11'-0" Zone 1 and 2).

For evacuation of the Fuel Handling Area exit down either stairway to EL(-) 6'-10".

From Zone 1 exit to the Aux Bldg then through the personnel access door to the corridor running between the Control Bldg and DG 1 to the outside.

From Zone 2 exit through the vestibule and emergency exit to the exterior of the Fuel Building.

5 Diesel Generator Buildings.

For evacuation of the DG 1 Bldg exit through the emergency exit door to the corridor running between DG 1 and the Control Bldg to the outside.

For evacuation of the DG 2 Bldg exit through the emergency exit door to the exterior of the DG 2 Bldg.

For evacuation of the DG 3 Bldg exit through the emergency exit door into the Aux Bldg at (-)6'-10" elevation and then through the personnel access door to the exterior of the Aux Bldg.

6 Battery Rooms (Aux Bldg EL 11'-0" Zone 1 and 2).

For evacuation of the Battery Rooms exit to the Switchgear Rooms and follow directions given in paragraph 2.

7 RHR Rooms (Aux Bldg EL(-)6'-10" Zone 1 and 2).

For evacuation of the RHR Rooms, use stairways to reach the EL(-)7'-0" platform, exit through the vestibule door to the corridor. From Zone 1 exit through the personnel access door to the corridor running between the Control Bldg and DG 1 to the outside. From Zone 2 exit through the personnel access door to the exterior of the Auxiliary Building.

9.5.3.3 Inspection and Testing Requirements

Since the normal AC lighting circuits are energized and maintained continuously, they require no periodic testing. The standby and

430.51 (9.5.3) Provide the following information regarding the standby lighting system:

a. State whether all transformers, panels, and cable trays associated with the system are designed to seismic Category I requirements.

b. State whether all standby lighting system light fixtures are seismically supported.

c. If the standby lighting system components are not seismically qualified, provide a discussion of the isolation devices which will be used to disconnect the standby lighting system from its Class 1E power source following a design basis seismic event.

Response

For additional information on the Standby Lighting System refer to the revised version of FSAR Section 9.5.3.2.2 (copy attached).

The ~~STRIDE~~ GESSAR II design does not isolate the standby Lighting System from the Class IE power following a design basis seismic event.

9.5.3.2.2 Standby Lighting

The AC standby lighting systems are fed from Class 1E buses through separate lighting panels. Fixtures are distributed in areas used during shutdown and accidents, and in access areas. The fixtures provide a reduced lighting level adequate to support personnel movement and observation of equipment after interruption of the normal lighting system. In the event of a LOPP, the standby lighting system is automatically fed from the diesel-generator sets. (See Subsection 8.3.1.1.3 for bus transfer during loss of normal preferred and/or alternate preferred power.)

The standby lighting transformers and panels are seismically qualified to keep their structural integrity and stability during and after an SSE. Standby lighting cables up to the lighting panels are classified as Class IE circuits and are routed in seismic category I raceways. Circuits from the lighting panels to the individual fixtures are wired and routed by the Applicant.

All standby lighting fixtures are seismically supported.

430.52 (9.5.3) Provide a following information regarding the emergency lighting system:

a. The seismic qualification of the self-contained emergency lighting sets.

b. The seismic qualification of the panels, cable trays, breakers, and other components of the emergency lighting system(s) connected to the Division E and F, Class 1E, 125 V dc station battery.

c. State whether the emergency lighting system light fixtures are seismically supported.

d. If the emergency lighting system components are not seismically qualified, provide a discussion of the isolation devices which will be used to disconnect the emergency lighting system from its Class 1E power source following a design basis seismic event.

Response

For additional information on the Emergency Lighting System refer to the revised version of FSAR Section 9.5.3.2.3 (copy attached).

The ~~STRIDE~~ GESSAR II design does not isolate the DC Emergency Lighting System from its Class IE power source following a design basis seismic event.

9.5.3.2.3 Emergency Lighting

DC Emergency lighting fixtures are installed for stairways, exit routes and major control areas such as the main control room and remote shutdown panel area. Each of the emergency lighting fixtures has two incandescent sealed-beam lamps, a self-contained battery, charger and an initiating switch which energizes the ~~figure~~ fixture from the battery in the event of loss of the AC power supply, and de-energizes the fixture upon return of AC power. The power supply AC source is fed from the standby lighting system. The self contained emergency lighting sets are seismically qualified to keep their structural integrity and stability during and after an SSE.

In addition to the above, DC emergency lighting fixtures are provided for control rooms, switchgear rooms and fuel handling areas. The fixtures are fed from the DC distribution panels DC-E & DC-F. The feeder breakers are normally open. The loss of voltage to the standby AC lighting panels will initiate a signal to close the DC Emergency panels feeder breakers. Cables feeding the DC emergency panels are Class IE circuits and routed in seismic category I raceways.

The DC emergency panels are seismically qualified to keep their structural integrity and stability during and after an SSE. the emergency lighting fixtures are seismically supported.

The emergency lighting fixtures provide backup illumination for periods after the loss of preferred power and until the diesel-generators energize the standby lighting systems, as well as in the event of loss of all the AC lighting sources.

9.5.3.2.3 Emergency Lighting (Continued)

The emergency lighting fixtures are of three types:

(1) Two incandescent sealed beams with self-contained battery, charger and transfer switch - The sets are normally connected to the Class 1E buses to maintain the batteries fully charged. Upon loss of the AC source, the sets are automatically switched on and fed by the batteries. The batteries have a minimum 8-hr capacity (in accordance with Branch Technical Position APCSB 9.5-1). The emergency sets are installed in stairways, exit routes and major control areas such as the control rooms, switchgear rooms, remote shutdown panel area, fuel-handling area and Diesel-Generator Buildings.

(2) Incandescent emergency lighting fixtures provide minimum operational illumination and are fed from 125VDC Division E or F, Class 1E buses - The batteries supplying the buses have a minimum 2-hr capacity. The emergency lighting fixtures are provided in switchgear rooms and fuel-handling areas, in addition to the self-contained emergency lighting sets.

(3) 2 ft x 2 ft recessed AC fluorescent fixtures with an addition of two 125VDC incandescent lamps fed from a separate outlet box, which is an integral part of the fixture. The DC portion of the fixtures is fed from 125VDC Division E or F, Class 1E buses. The fixtures are a portion of the integrated ceiling in the main control room.

9.5.3.3 Inspection and Testing Requirements

Since the normal AC lighting circuits are energized and maintained continuously, they require no periodic testing. The standby and

430.53 (9.5.3) If the standby and emergency lighting systems are not seismically qualified, provide a discussion of how adequate lighting will be provided for safe plant shutdown after an elapsed time of 8 hours following a design basis seismic event.

Response ~~On NRC QUESTION 430.53~~

The ~~STRIDE~~ GESSAR II design provides the adequate lighting for safe plant shutdown after a design basis seismic event. For additional information refer to the new GESSAR Section 9.5.3.2.4. (copy attached).

9.5.3.2.4. Emergency Operation Failure Analysis.

Because of the redundancy provided by the systems described above, the probability of complete loss of lighting in any of the critical areas is extremely remote. The standby lighting system, on loss of the normal lighting system and emergency lighting system, on loss of both, normal and standby lighting systems, provide totally independent low level illumination in areas vital to safe shutdown of the reactor and evacuation or access by personnel should the need occur. This is specifically demonstrated by the analysis shown in Table 9.5-1.

430.54 (9.5.3) Demonstrate that the control room and the remote shutdown panel illumination levels under emergency conditions are in conformance with the applicable sections of NUREG-0700.

Response

A draft response to this question will be provided in December 1982.

430.55 (9.5.3) In order that we may understand Table 9.5-1 of your FSAR, provide the following additional information:

a. Indicate the percentage of plant lighting which is connected to the normal ac lighting system, and the percentage which is connected to the standby ac lighting system.

b. Indicate how many main circuits for normal lighting are included in your plant design and their source of power.

c. Indicate how many main circuits for standby lighting are included in your plant design and their source of power.

d. Indicate the minimum number of different normal and standby lighting circuits that will be utilized in providing lighting for any safety-related area.

e. Indicate the source of "auxiliary" power for normal lighting in the event of loss of standby lighting power.

f. Indicate the electrical separation criteria which has been used in the design of the normal, standby and emergency plant lighting system. State whether the safety-related lighting systems are treated the same way as plant Class 1E circuits. Indicate in which trays the safety-related and nonsafety-related systems are installed.

Response

For information on plant lighting and Table 9.5-1 refer to the revised versions of FSAR Section 9.5.3.1.1 part (4) (e); Section 9.5.3.2.2; and Section 9.5.3.2.3 paragraph 1 and 2 (see copies attached).

9.5.2.3 Inspection and Testing Requirements (Continued)

shall be accomplished on a periodic basis. Periodic inspection and testing shall be performed on the emergency use systems, including sound-powered systems, to ensure their availability and operability should safety-related incidents arise.

The applicant will perform functional analyses or testing for conditions that simulate maximum plant noise levels being generated during the various operating conditions, to demonstrate system effectiveness.

9.5.3 Lighting Systems

The plant lighting system provides adequate illumination during both normal and accident operating conditions.

9.5.3.1 Design Bases

9.5.3.1.1 General Design Bases

The general design bases for the Nuclear Island portion of the lighting systems are as follows:

(1) The lighting design shall be based on IES recommended intensities. These shall be in-service values after applying a maintenance factor of .75 for relatively dirty areas, and .85 for clean areas such as offices, etc. The values are average horizontal footcandles on a horizontal plane 30 inches above the floor, ground, or platform, or average footcandles on instruments mounted on the vertical surface of a board. Reflected glare will be minimized.

(2) Control room lighting is designed with respect to reduction of glare and shadows on the control boards and is provided with dimming control for this purpose.

(3) Lighting systems and components are in conformity with the electrical standards of NFPA and OSHA as applicable for safety of personnel, plant and equipment.

9.5.3.1.1 General Design Bases (Continued)

(4) Each of the normal, standby or emergency lighting systems has the following features:

(a) adequate capacity and rating for the operation of all loads connected to the system;

(b) independent wiring and power supply;

(c) overcurrent protection for conductors and fixtures using circuit breakers; and

(d) wiring conductors with 600V insulation and not smaller than No. 12 AWG. Insulated conductors and lighting fixtures are appropriate for the environmental condition in the area installed.

(e) Main feeders for the stand-by and emergency lighting system transformers and/or distribution panels are installed in their appropriate divisional cable raceway. Non-safety related systems are installed in non-divisional raceways.

Branch wiring by applicant.

- Normal Lighting - non-div cable raceway.
- Standby Lighting - Div 1, 2 or 3 cable raceway.
- Emergency Lighting - Div 1, 2 or 3 cable raceway.

9.5.3.1.12 Safety-Related Design Bases

Nuclear safety-related design bases for the Nuclear Island lighting systems are as follows:

(1) Mercury vapor fixtures and mercury switches are not used where a broken fixture or switch may result in introducing mercury into the reactor coolant system.

(2) Adequate lighting for any safety related areas, such as areas used during emergencies or shutdowns, including those along the appropriate access or exit routes, are provided from 3 different lighting circuits (normal AC; Standby AC; 125Vdc or Self-contained battery fixtures).

(3) Conduit, boxes and fixtures located in Seismic Category I structures are provided with supports as required to meet the safe shutdown earthquake requirements of the plant.

9.5.3.1.2 Safety-Related Design Bases (Continued)

(4) Circuits of standby and emergency lighting systems are associated circuits as defined in IEEE Std 384-1974. The circuits are designed and installed per requirements of IEEE Std 384-1974.

See Table 9.5-1 for failure analysis of critical area lighting.

9.5.3.2 System Description

Plant lighting is divided into three subsystems:

(1) normal lighting (AC);

(2) standby lighting (AC); and

(3) emergency lighting (DC).

Lighting fixtures that contain mercury are not used inside the Reactor Building or in any other location where a broken fixture may introduce mercury into the reactor coolant system.

9.5.3.2.1 Normal Lighting

The AC normal lighting system provides the major portion of general lighting throughout the plant and is fed from non-Class 1E, interruptible auxiliary power distribution buses (See Table 9.5-1a). The balance of general lighting throughout the plant is a separate standby lighting system fed from the Class 1E buses. The portion of the normal lighting system fed from interruptible buses is not available during loss of preferred power.

9.5.3.2.2 Standby Lighting

The AC standby lighting systems are fed from Class 1E buses through separate lighting panels. Fixtures are ~~distributed in~~ areas used during shutdown and accidents, and in access areas. The fixtures provide a reduced lighting level adequate to support personnel movement and observation of equipment after interruption of the normal lighting system. In the event of a LOPP, the standby lighting system is automatically fed from the diesel-generator sets. (See Subsection 8.3.1.1.3 for bus transfer during loss of normal preferred and/or alternate preferred power.)

9.5.3.2.3 Emergency Lighting

DC Emergency lighting fixtures are installed for stairways, exit routes and major control areas such as the main control room and remote shutdown panel area. Each of the emergency lighting fixtures has two incandescent sealed-beam lamps, a self-contained battery, charger and an initiating switch which energizes the figure from the battery in the event of loss of the AC power supply, and de-energizes the fixture upon return of AC power. The power supply AC source is fed from the standby lighting system.

In addition to the above, DC emergency lighting fixtures are provided for control rooms, switchgear rooms, and fuel handling areas. The fixtures are connected to DC distribution panels, which are switched by contactor. The initiating signal is the loss of voltage to a standby AC lighting distribution panel.

The emergency lighting fixtures provide backup illumination for periods after the loss of preferred power and until the diesel-generators energize the standby lighting systems, as well as in the event of loss of all the AC lighting sources.

9.5.3.2.3 Emergency Lighting (Continued)

The emergency lighting fixtures are of three types:

(1) Two incandescent sealed beams with self-contained battery, charger and transfer switch - The sets are normally connected to the Class 1E buses to maintain the batteries fully charged. Upon loss of the AC source, the sets are automatically switched on and fed by the batteries. The batteries have a minimum 8-hr capacity (in accordance with Branch Technical Position APCSB 9.5-1). The emergency sets are installed in stairways, exit routes and major control areas such as the control rooms, switchgear rooms, remote shutdown panel area, fuel-handling area and Diesel-Generator Buildings.

(2) Incandescent emergency lighting fixtures provide minimum operational illumination and are fed from 125VDC Division E or F, Class 1E buses - The batteries supplying the buses have a minimum 2-hr capacity. The emergency lighting fixtures are provided in switchgear rooms and fuel-handling areas, in addition to the self-contained emergency lighting sets.

(3) 2 ft x 2 ft recessed AC fluorescent fixtures with an addition of two 125VDC incandescent lamps fed from a separate outlet box, which is an integral part of the fixture. The DC portion of the fixtures is fed from 125VDC Division E or F, Class 1E buses. The fixtures are a portion of the integrated ceiling in the main control room.

Table 9.5-1a

Normal and Standby AC Lighting

Power Sources

	Normal			Standby		
Item	Transformer Number	Bus Number	Div	Transformer Number	Bus Number	Div
1	LT-A	E2-1	ND	LT-G	E1-1	1
2	LT-C	A1-1		LT-R	F1-1	2
3	LT-D	B1-1		LT-X	F1-1	2
4	LT-E	A1-1		LT-Y	F1-1	2
5	LT-F	B1-1		LT-Z	F1-1	2
6	LT-H	A1-1		LT-BB	E1-3	1
7	LT-K	A1-1		LT-HH	E1-2	1
8	LT-M	B2-1		LT-KK	F1-2	2
9	LT-N	B2-1		LT-LL	G1-2	3
10	LT-S	B2-1		LT-NN	E1-3	1
11	LT-V	B1-1				
12	LT-W	B1-1				
13	LT-AA	A1-2				
14	LT-CC	B1-2				
15	LT-FF	F2-1				
16	LT-GG	A1-1				
17	LT-JJ	B1-1				
18	LT-RR	E2-1				
19	LT-WA	A3-1				
20	LT-WB	B3-1				
21	LT-WC	A3-1				
22	LT-WD	A3-1				
23	LT-WE	B3-1				

NOTE: The percentage of plant lighting connected to the normal AC lighting system is 82%. The remainder is connected to the stand-by AC lighting system.

AUG 25

430.56 (9.5.3) (Lighting systems for the balance of plant beyond the nuclear island will be reviewed as plant specific items.) Provide the interface data for continuation of normal, standby and/or emergency lighting to the balance of plant.

Response

The ~~STRIDE~~ GESSAR II design does not include any lighting circuits to BOP. All lighting in BOP is Responsibility of the Applicant.

HF CL

QUESTION 430.57
(9.5.4)

In Section 9.5.4.2 of your FSAR, you state that the diesel-generator fuel oil booster pumps operate with a flooded suction and that the fuel oil day tanks have a minimum capacity sufficient for two hours of diesel-generator operation at full load. However, you show in Figures 1.2-21 and 1.2-22 of your FSAR that the bottom of the Divisions 1 and 2 fuel oil day tanks are below the diesel engine base. Accordingly, provide the following information for the Divisions 1 and 2 diesel-generator fuel oil system:

a. The overall capacity of the day tanks.

b. The capacity of the day tanks at the level at which the diesel engine fuel oil booster pump would no longer be flooded.

c. The positive suction head requirements for the diesel engine fuel oil booster pump.

d. The diesel engine fuel oil consumption rate at maximum load.

e. The day tank capacity at the low-level alarm point.

Provide the day tank capacity, the diesel engine consumption rate at maximum load and the day tank capacity at the low-level alarm point for Division 3.

430.57 Response

The bottom of the fuel oil day tanks for DIV 1 and 2 are at elev. (-) 0'6" per section B-B of Figure 1.2-21 and 1.2-22. The DIV 3 fuel oil day tank is above elev. 13'-0". The diesel-generator base is at floor elev. (-) 6'-10". Therefore, the bottom of the day tanks are above the diesel engine base. NOTE that the DIV 1 & 2 fuel oil day tanks are seating in concrete pedestals on floor elev. (-) 6'-10".

a. It [redacted] is specified that the DIV 1 & 2 fuel oil day tank capacity shall not exceed 1100 gallons each per Reg. Guide 1120. This will be added to [redacted] par. 9.5.4.1.1(7) of page 9.5-24. [redacted]. The exact capacity of the fuel oil day tank is by the ~~Vendor~~ Applicant for DIV 1 & 2. Page 9.5-25 [redacted] ~~stated~~ states that each diesel-generator set has its own day tank, which holds a capacity of fuel oil sufficient to operate its corresponding diesel-generator set for a minimum of two hours at full load.

The capacity of the DIV 3 fuel oil day tank is 550 gallons

430.57 (CONT'D)

b. The fuel oil booster pumps are all the time flooded. Section 9.5.4.2 of GESSAR on page 9.5-25 ~~[illegible]~~ states that "Day tank elevation is such that the fuel oil booster pump operates with flooded suction."

c. The positive suction head requirements for the diesel engine fuel oil booster pumps ~~were~~ are to be provided by the ~~[illegible]~~ Applicant and the elevation of the fuel oil day tanks ~~were~~ will be verified to be adequate to meet the required NPSH. The bottom of the day tank shall never be lower than the pump suction centerline. Compliance shall be by the Applicant. See attached p. 9.5-25.

d. The diesel engine specific fuel consumption was specified not to exceed 0.38 pounds of fuel per net horsepower hour. This will be added to ~~[illegible]~~ section 9.5.4.1.2. ~~[illegible]~~.

e. It was specified that the setting of the low level alarm shall provide fuel for at least 60 minutes of DG operation of 100 percent load with 10 percent margin between the alarm and the suction line inlet. This will be added to ~~[illegible]~~ section 9.5.4.5. ~~[illegible]~~

3| Th[illegible] Applicant.

Division 3 day tank capacity, day tank low level alarm point and diesel engine fuel consumption rate at full load will be dependent on the specific diesel engine selected for the service. This data to be furnished by the applicant after the selection of the diesel engine for the (HPCS) division 3 service.

Text change for 430.57c

9.5.4.2 System Description (Continued)

The Diesel-Generator Fuel Oil System for each engine consists of a fuel oil day tank, engine-driven fuel oil booster pump, suction strainer, duplex filter, instrumentation and controls, and the necessary interconnecting pipe and fittings. A bleed line returns excess fuel oil from the day tank for recirculation to the yard storage tank. Day tank elevation is such that the fuel oil booster pump operates with flooded suction. The bottom of the day tank shall never be lower than the pump suction centerline. Each diesel-generator set has its own day tank, which holds a capacity of fuel oil sufficient to operate its corresponding diesel-generator set for a minimum of two hours at full load. Fuel oil is supplied by transfer pump to each day tank from the yard storage system. Pumping power is supplied by the diesel-generator under conditions requiring its operation.

These transfer pumps may be operated with manual control switches; however, they are normally operated automatically by level switches on the day tanks. A "low" level switch starts the first transfer pump, a "low-low" level switch starts the standby transfer pump and a "high" level switch stops both pumps.

An engine-driven fuel oil booster pump supplies fuel from the day tank to the diesel engine fuel manifold. Piping is ASME, Section III, Class 3, Seismic Category I.

9.5.4.3 Safety Evaluation

The overall Diesel-Generator Fuel Oil Storage and Transfer System is designed so that failure of any one component may result in the loss of fuel supply to only one diesel generator. The loss of one diesel generator does not preclude adequate core cooling under accident conditions.

430.58 (9.5.4) Provide the quality group classification for the diesel fuel oil day tanks.

Response

The quality group classification for the diesel fuel oil day tanks is quality group C. Refer to Item XLVI (1) of Table 3.2-1

430.59 Provide the following additional information:

a. Revise Figure 9.5-10 of your FSAR to show the interface between the fuel oil system piping and the diesel engine mounted piping/components. Provide quality group classifications for all system piping and components and, if applicable, identify all changes in piping/component quality group classifications at the interface.

b. Explain the purpose of the duplex strainer, the blind flanges, the relief valve and the instrumentation in the line parallel to the engine driven fuel oil booster pump.

c. The duplex strainer in the two inch diesel fuel oil supply line from the balance of plant is monitored with a switch indicating pressure differential. Indicate where the differential pressure indication appears and where the associated high differential pressure alarm annunciates. If this alarm does not annunciate in the control room, provide the rationale for your proposed design. (This paragraph is applicable to the Division 1, 2 and 3 diesel-generator fuel systems as shown on Figures 9.5-10 and 9.5-11 of your FSAR.)

d. The duplex strainer in the fuel oil booster pump suction line is monitored with a differential pressure switch. Indicate whether this switch activates an alarm and, if so, where the alarm annunciates. If the alarm does not annunciate in the control room, or no alarm is provided, provide justification for your proposed design.

e. The duplex filter on the fuel oil booster pump discharge is monitored with a differential pressure indicator. State where the high differential pressure indication appears. Provide your rationale for not using audible alarms as part of the filter differential pressure monitoring.

Response

430.59

a. The fuel oil system is designed and constructed in accordance with ASME code Section III, class 3, quality group C, and Seismic category I requirements. See FSAR section 9.5.4.1.1 (3) and 9.5.4.3. This includes all tanks, pumps, piping and valves except the engine and components which form an integral part of the engine which are per DEMA standards.

2 The fuel oil piping interface with the diesel engine mounted piping is at the diesel engine outline boundaries. ~~Since~~ All piping is ASME III ~~at each interface point are both Section III piping, therefore~~ Figure 9.5-10 is complete and will not be revised. Figure 9.5-10 is not intended to show complete detail of the components in the engine and engine mounted components which are part of the scope of supply by the Applicant. The Applicant is to provide details of components and piping including quality group classification on the engine and engine mounted components.

430.59 (cont'd)

b. The purpose of the blind flanges is to close-out the suction and discharge line of the motor-driven fuel oil booster pump which was deleted at the later part of the design for the
2 reasons explained in ~~430.60a~~ 430.66. The duplex strainer is ~~supposed~~ to protect the pump from large foreign particles. The relief valve is ~~supposed~~ to give protection from overpressurizing the piping and components. The instrumentation is ~~supposed~~ to give local pressure indication for the motor-driven fuel oil booster pump system.

A motor driven fuel oil booster pump is optional.

The diesel engine components inside the boundary lines are design unique for engine manufacturers.

430. 59 (cont'd)

c. The differential pressure for the fuel oil duplex strainer is indicated locally for Div 1, 2 & 3 diesel generators.

The high differential pressure alarms are annunciated in the control room. See response to 430.09 and revised FSAR section 8.3.1.1.5.1.5.

430.59 (CONT'D)

d. The Div 1 & 2 duplex strainer high differential pressure are alarmed locally and also, alarm is indicated in the control room. See response to 430.09 and revised FSAR section 8.3.1.1.8.1.5.

2 e. The differential pressure for the Div 1 + 2 duplex filter at the fuel oil booster pump discharge is indicated locally. Alarm is local and indicated in the control room. See response to 430.0 and revised section 8.3.1.1.8.1.5 of FSAR.

QUESTION 430.60

Provide the following additional information:

a. Revise Figure 9.5-11 of your FSAR, to show the interface between the fuel oil system piping and the diesel engine mounted piping/components. Provide the quality group classifications for all system piping and components and, if applicable, identify all changes in piping/component quality group classifications at the interface.

b. We note that there are significant differences between the Divisions 1 and 2 diesel fuel oil system instrumentation and controls and that of the Division 3 diesel fuel oil system as shown in Figures 9.5-10 and 9.5-11 of your FSAR. These differences are in the areas of the day tank high and low level switches, the day tank level indicators/ transmitters, the booster pump suction strainer differential pressure monitoring. Morever, the Division 3 diesel-generator is equipped with an electric fuel oil-booster pump in addition to the engine-driven booster pump and both of these pumps are fitted with simplex suction strainers. Conversely, the Divisions 1 and 2 diesel-generators have only the engine-driven fuel oil booster pump but are fitted with duplex suction strainers. Provide your rationale behind this design approach, with particular attention as to why monitoring and alarms are not required on the Division 3 diesel-generator fuel oil booster pump suction strainers and duplex fuel oil filters. State why the instrumentation, controls, and components cannot be identical for all 3 divisions. (Refer to Question 430.110.)

RESPONSE

a. The interfaces between the fuel oil system piping and the diesel engine mounted piping/components are located at the diesel engine outline boundaries. All system piping and components as well as engine mounted components for division 3 are quality group "C". Therefore no revision to Figure 9.5-1 is required.

b. The pressure switches and local low pressure alarms provided for Division 3 fuel pump discharge line (low pressure) and fuel oil duplex filter low pressure alarm are sufficient to monitor the fuel oil pressure and provide enough indication for any clogged filters. Division 3 DG is supplied by different manufacturer and can be different in component design. However, all three diesel generators are functionally equivalent.

430.61 (9.5.4) You show on Figures 9.5-10 and 9.5-11 of your FSAR, the day tank vents terminating somewhat outside the diesel-generator room. However, it is not clear from Figures 9.5-10 and 9.5-11 nor from Figures 1.2-18 through 1.2-22 of your FSAR, exactly where the Divisions 1, 2, and 3 day tank vents terminate. Accordingly, provide additional information on these vents. Show vent the terminations on appropriate views in Figures 1.2-18 through 1.22 of your FSAR and provide details of the terminations which show that they are protected from tornados, floods and the effects of severe weather conditions.

Response

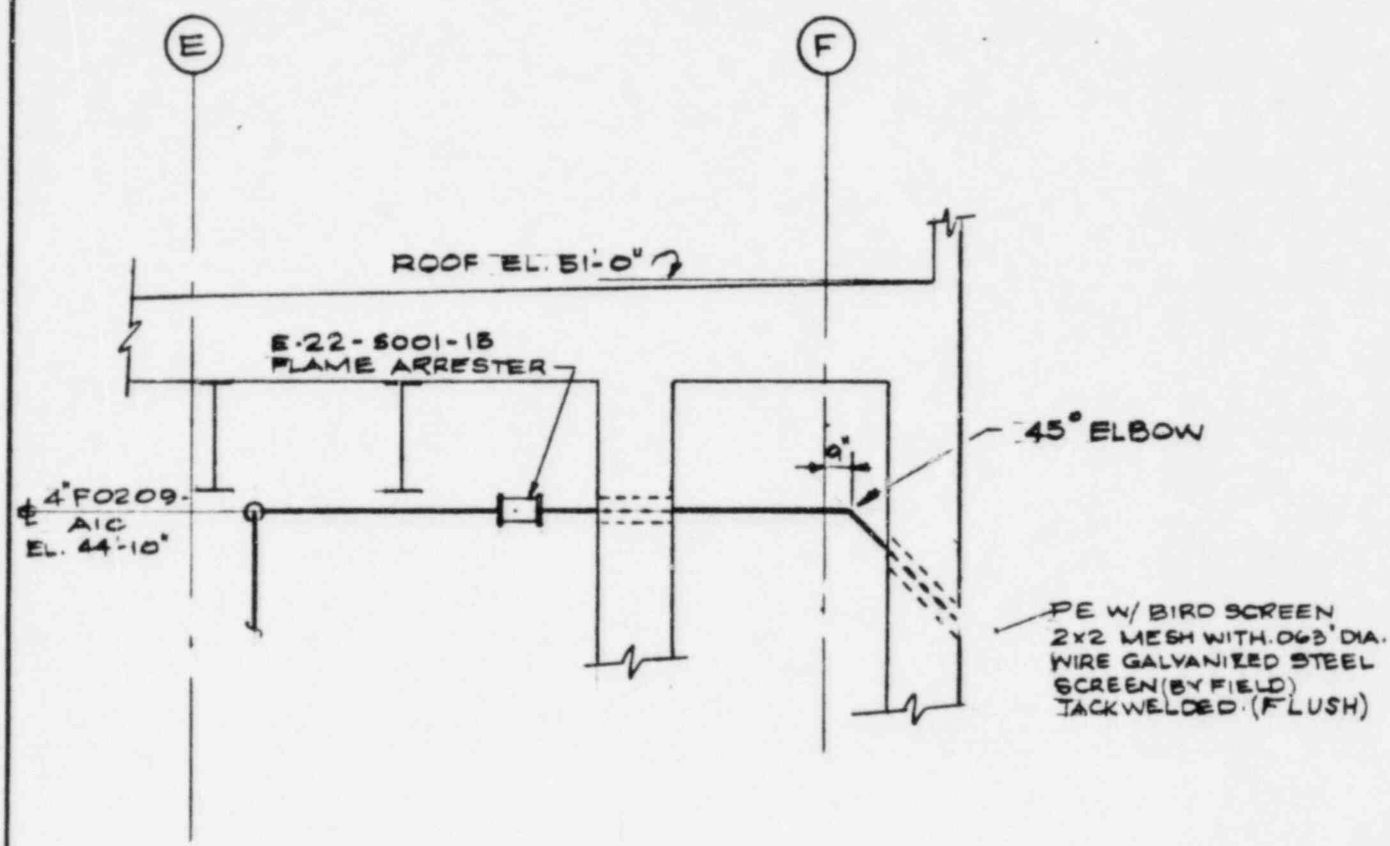
Division 1 and 2 day tank vents terminate 6-inches beyond building wall into the dock area. These terminations are protected by the roof over the dock area and by the wall around the dock area. Division 3 vent terminates on a 45 degree down slope at the outside surface of the Diesel Generator Building wall. Bird screens cover all three terminations.

C F BRAUN & CO

R W Christiansen

General Electric San Jose	GESSAR ROUND 1 QUESTIONS	Project 3382-P September 29, 1982

QUESTION 430.61



SECTION H-H

430.62 (9.5.4) (9.5.5) (9.5.6) (9.5.7 (9.5.8) Identify all high and moderate-energy lines and systems which will be installed in the diesel-generator room. Discuss the measures which will be taken in the design of the diesel-generators to protect the safety-related systems, piping and components from a postulated failure of either a high or moderate-energy line. Our concern is the availability of the diesel-generators when needed.

Response

There are no high-energy lines in the diesel-generator rooms. See section 3.6. The moderate-energy lines are the diesel starting air, fuel oil, intake air, lube oil vent, essential service water and the equipment drain systems. All the above moderate-energy lines are only associated with their respective divisions.

430.63 (9.5.4) Discuss what precautions have been taken in the design of the fuel oil system when selecting the location of the fuel oil day tank and the connecting fuel oil piping in the diesel-generator room. Our concern is the possible exposure of these components to ignition sources such as open flames and hot surfaces.

<u>Response</u>

The fuel oil day tank is located in a separate room with 3-hour fire rating concrete walls. This will be added in [redacted] section 9.5.4.3 on page 9.5-26 as shown in the attached marked-up page 9.5-26.

Also, the fuel oil pipe routing is away from hot surfaces of the diesel engine and exhaust piping to avoid possible exposure.

9.5.4.3 Safety Evaluation (Continued)

Day tank fuel oil feed to the booster pump is by gravity. There are no powered components to fail. A suction strainer prevents foreign matter from entering the pump and causing malfunction. A component failure analysis of the Diesel-Generator Fuel Oil Storage and Transfer System is given in Table 9.5-2. The system is safety related and is designed and constructed in accordance with the ASME Code Section III, Class 3, and Seismic Category I requirements.

The Diesel-Generator Fuel Oil Storage and Transfer System is designed to withstand the adverse loadings imposed by earthquakes, tornadoes and winds. Earthquake protection is provided by the Seismic Category I construction. Tornado and wind protection is provided by locating system components either underground or within the Diesel-Generator Buildings. All underground piping is covered with protective coating and wrapping to guard against corrosion.

All storage and day tanks are located at a sufficient distance away from the plant control room to preclude any danger to control room personnel or equipment resulting from an oil tank explosion and/or fire. The fuel oil day tank is located in a separate room with 3-hour fire rating concrete walls.

9.5.4.4 Tests and Inspection

Diesel Generator Fuel Oil Storage and Transfer System operability is demonstrated during the regularly scheduled operational tests of the diesel generators. Test frequency is given in Chapter 16.

ASTM standard fuel sample tests are conducted at regular intervals to ensure compliance with fuel composition limits recommended by the diesel engine manufacturer. The "Standard Specification for Diesel Fuel Oils ANSI/ASTM D975" is the governing specification. Fuel oil may normally be stored by a minimum of six months without deterioration.

430.64 (9.5.4) (9.5.5) (9.5.6) (9.5.7) (9.5.8) You state in the text and in Table 3.2-1 of your FSAR that the components and piping systems for the diesel-generator auxiliaries (e.g., the fuel oil cooling water, lubrication, air starting, and intake and combustion systems) are mounted on auxiliary skids which are designed to seismic Category I requirements and are built to ASME Section III, Class 3 quality standards. You also state that engine-mounted components and piping are designed and manufactured to DEMA standards and are designed to seismic Category I requirements. However, this is not in accordance with our position in Regulatory Guide 1.26 in which we state that all the diesel-generator auxiliary systems should be designed to ASME Section III, Class 3 or Quality Group D standards. Provide the industry standards which you will use in the design, manufacture, and inspection of the engine mounted piping and components. Show on the appropriate P&I diagrams where the Quality Group Classification changes from Quality Group C.

Response

The engine mounted components ~~and piping~~ were designed and manufactured to DEMA standards because ASME Section III engine components and piping were not commercially available. The GESSAR Text will be revised to conform with Reg. Guide 1.26.

The quality group classification for fuel oil transfer system is answered in 430.59a and 430.60a, in 430.84 for the starting air system, in 430.94 + 430.154 for the lube oil system, and in 430.113 for the air intake and exhaust ducting system.

For the diesel engine cooling water system Figure 9.5-12 will be revised to delete the ASME III-3 + non-ASME III interface as shown on the attached marked-up page 9.5-77/9.5-78. Black, heavy arrows will be deleted.

430.6U ATTACHMENT

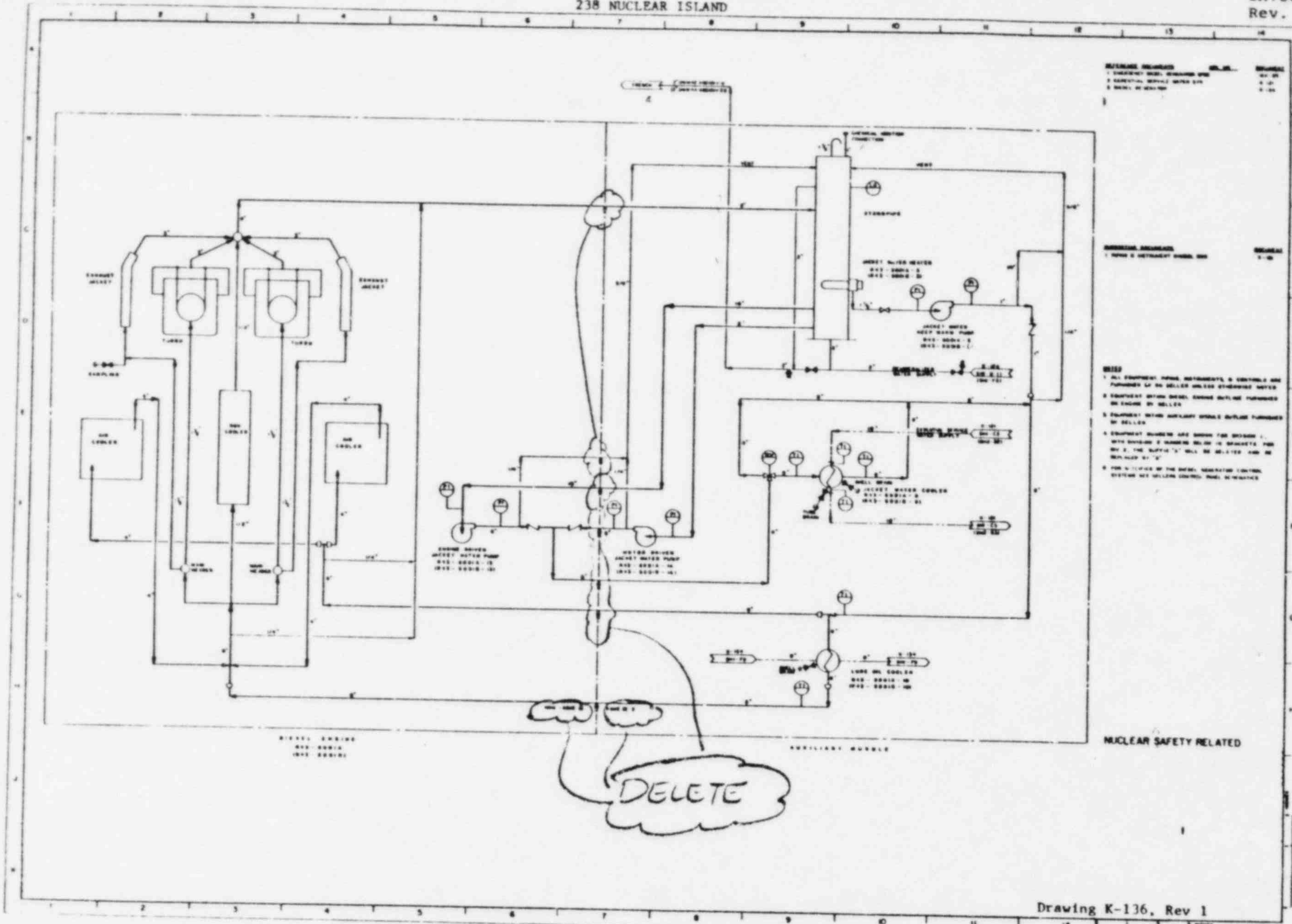


Figure 9.5-12. Division 1 and 2 Diesel-Generator Jacket Water System P&I Diagram

430.65
(9.5.4)

In your description of the emergency diesel engine fuel oil storage and transfer system (EDEFSS) in Section 9.5.4.1 of the FSAR, you do not specifically reference ANSI Standard N195, "Fuel Oil Systems for Standby Diesel Generators." Indicate if you intend to comply with this standard in your design of the EDEFSS. Alternatively, provide justification for noncompliance.

Response

ANSI Standard N195, "Fuel Oil Systems for Standby Diesel Generators" will be added to section 9.5.4.1.1 (3) as shown on the attached marked-up p. 9.5-23.

9.5.3.3 Inspection and Testing Requirements (Continued)

emergency lighting systems will be inspected and tested periodically (as determined by the applicant) to ensure operability of lights and switching circuits.

9.5.4 Diesel-Generator Fuel Oil Storage and Transfer System

9.5.4.1 Design Bases

9.5.4.1.1 Safety Design Bases

(1) Each engine shall be supplied by a separate Diesel-Generator Fuel Oil Storage and Transfer System. All fuel oil transfer equipment shall be designed, fabricated and qualified to Seismic Category I requirements. Failure of any one component could result in loss of fuel supply to only one diesel-generator.

(2) Minimum onsite storage capacity of the system shall be sufficient for operating each diesel-generator for a minimum of seven days while supplying post-LOCA maximum load demands.

(3) Design and construction of the Diesel-Generator Fuel Oil Storage and Transfer System shall conform to the IEEE Criteria for Class 1E Electrical Systems for Nuclear Power Generating Stations (IEEE-308) and ASME Code, Section III, Class 3, Quality Group C. Miscellaneous equipment shall conform to applicable standards of NEMA, DEMA, ASTM, IEEE, ANSI, API, NFPA. ANSI Standard N195 " Fuel oil systems for Standby Diesel. Generators" shall be used.

(4) The Diesel-Generator Fuel Oil Storage and Transfer shall be of Seismic Category I design. In addition, the system shall be protected from damage by flying debris carried

QUESTION 430.66
(9.5.4)

The Division 3 diesel-generator fuel system includes an electrically driven, backup booster pump. Discuss the purpose and operation of this pump. State why an electrically driven backup booster pump is provided for the Divisions 1 and 2 diesel-generators. Indicate the source of power for the Division 3 backup pump.

RESPONSE

Division 3 (HPCS) DG fuel system backup booster pump is to prime the fuel line and act as an additional backup to the engine driven fuel pump. The booster pump may be operated manually by depressing the fuel prime pushbutton on the DG control panel (Local), and it will also operate automatically on any start signal, and will run continuously for as long as engine is running. The pump will stop ten seconds after the engine speed has decreased below 50 RPM. Division 3 (HPCS) backup pump is powered from Bus G Division 3 (HPCS) 125V dc.

△1

430.66 Response (Continued)

The purpose of the electrically driven, backup booster pump for the Division 3 diesel-generator fuel system is to augment fuel oil delivery to the engine in the event of a mulfunction of the engine driven fuel oil booster pump while the engine is in service. An elertrically driven backup booster pump is not provided for the Divisions 1 and 2 diesel-generators because the engine driven fuel oil booster pump is driven by the same drive assembly that drives the engine's overspeed trip. The drive assembly was purposely designed this way so that if there was a failure of the overspeed trip drive, the engine would automatically shutdown due to lack of fuel. Therefore, two potential problems present themselves, should an automatically operated motor driven fuel oil booster pump be added to the system: (1) If the overspeed trip drive fails, the motor driven fuel booster pump will start on falling fuel oil pressure and the engine will continue to operate but without the protection of the overspeed trip, which is one of the two shutdown protections required during a LOCA. (2) If the failure of the overspeed trip drive is not investigated and corrected it could lead to the failure of the entire timing gear train. In addition, the redundancy of adding a motor driven

430.66 (cont'd)

fuel oil booster pump to the engine driven pump is not a requirement of either NRC's "Standard Review Plan Section 9.5.4 - Emergency Diesel Engine Fuel Oil Storage and Transfer System" or ANS - 59.51 "Fuel Oil Systems for Standby Diesel - Generators".

The source of power for the Division 3 backup pump is 125 volts DC from the Div 3 engine control panel.

Note 16 will be added in GESSAR Figure 9.5-10 - "an electric motor driven fuel oil booster pump could be added for non - DeLaval engines", as shown in the attached p. 9.5-73/9.5-74.

430.66 ATTACHMENT

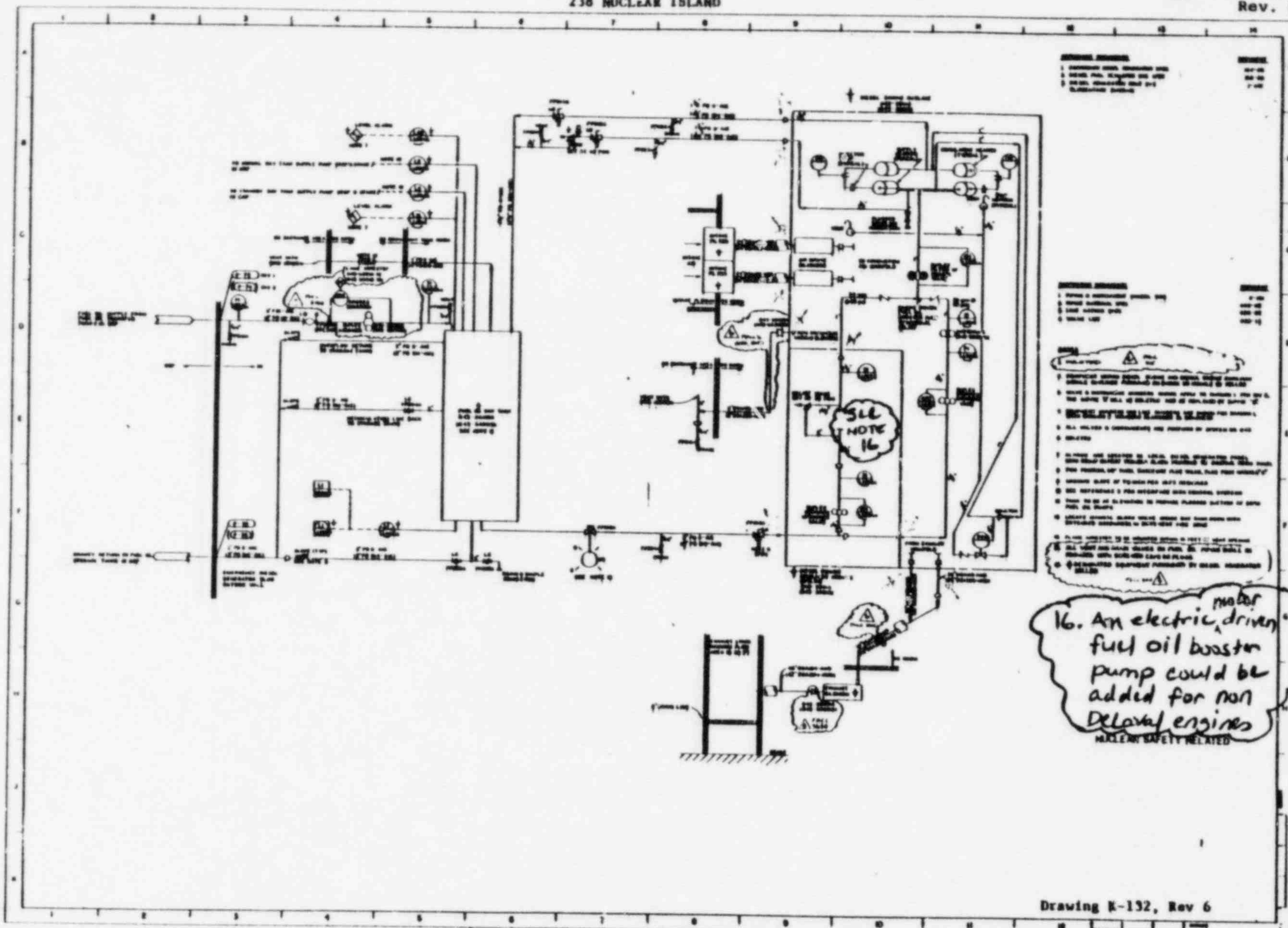


Figure 9.5-10. Division 1 and 2 Diesel Fuel Transfer, Intake and Exhaust System P&I Diagram

430.67
(9.5.4)

Add a section to your FSAR which describes the instruments, controls, sensors, and alarms provided for monitoring the diesel engine storage and transfer system and discuss their function. Discuss the testing necessary to maintain and assure highly reliable instruments, controls, sensors and alarms. Indicate where the alarms are annunicated. Identify the temperature, pressure, and level sensors which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer. Describe what operator actions are required during alarm conditions to prevent harmful effects to the diesel engine. Discuss the system interlocks provided in your proposed design.

2

430.67 Response

The following will be added to section 9.5.4.5: A differential indicating pressure switch indicat[es] the pressure differential across the duplex strainer in the fuel oil supply from fuel oil transfer pumps in BOP to fuel oil day tank. Additionally, a local pressure indicator and a local temperature indicator indicate the oil pressure and temperature, respectively. The close and open positions of manual block valve in the fuel oil supply line from the fuel oil day tank to the diesel. engine are sensed and indicated in the control room. A differential pressure switc[h] across the duplex strainer in the fuel oil booster pump suction line is provided. A local pressure indicator is provided both on the fuel oil booster pump and discharge line. An indicating pressure differential is provid[ed] across the duplex filter in the fuel oil booster pump discharge line. Other instruments, controls, sensors, and alarms provided are by the applicant.

The testing necessary to maintain and assure high reliable instruments, controls, sensors and alarms is by the Applica[nt]. Requirement for periodic testing of instrum[ents], controls, sensors & alarms will be added on page 9.5-26 of FSAR, as attached in 430.63.

430.67 (cont'd)

The temperature, pressure, and level sensors which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer are shown in GESSAR Section 8.3.1.1.8.1.5, page 8.3-24. See response to 430.09.

The description of operator actions that are required during alarm conditions to prevent harmful effects to the diesel engine is by the Applicant's Operation Procedure Manual.

The system interlocks provided in the design are the fuel oil day tank level switch to start & stop the BOP supply pump. Diesel engine interlocks are provided by the ~~Seller~~ Applicant

9.5.4.3 Safety Evaluation (Continued)

Day tank fuel oil feed to the booster pump is by gravity. There are no powered components to fail. A suction strainer prevents foreign matter from entering the pump and causing malfunction. A component failure analysis of the Diesel-Generator Fuel Oil Storage and Transfer System is given in Table 9.5-2. The system is safety related and is designed and constructed in accordance with the ASME Code Section III, Class 3, and Seismic Category I requirements.

The Diesel-Generator Fuel Oil Storage and Transfer System is designed to withstand the adverse loadings imposed by earthquakes, tornadoes and winds. Earthquake protection is provided by the Seismic Category I construction. Tornado and wind protection is provided by locating system components either underground or within the Diesel-Generator Buildings. All underground piping is covered with protective coating and wrapping to guard against corrosion.

All storage and day tanks are located at a sufficient distance away from the plant control room to preclude any danger to control room personnel or equipment resulting from an oil tank explosion and/or fire. The fuel oil day tank is located in a separate room with 3-hour fire rating concrete walls.

9.5.4.4 Tests and Inspection

Diesel Generator Fuel Oil Storage and Transfer System operability is demonstrated during the regularly scheduled operational tests of the diesel generators. ~~Test frequency is given in Chapter 16.~~ Periodic testing of instruments, controls, sensors and alarms is necessary to assure reliable operation. ~~ASTM standard fuel sample tests are~~ conducted at regular intervals to ensure compliance with fuel composition limits recommended by the diesel engine manufacturer. The "Standard Specification for Diesel Fuel Oils ANSI/ASTM D975" is the governing specification. Fuel oil may normally be stored by a minimum of six months without deterioration.

430.68 (9.5.4)

Provide the following balance of plant (BOP) interface data:

a. The piping requirements for the BOP section of the fuel oil storage and transfer system, including pipe sizes, materials, quality group classifications and the location of the interface.

b. The source of power for the BOP fuel oil transfer pumps including the bus, voltage, number of phases and MCC location.

c. The BOP fuel oil transfer pump minimum capacity in gallons per minute (gpm) and the discharge head requirements for those portions of the system associated with the nuclear island.

d. The minimum quantity of fuel to be stored for each diesel-generator and your basis for calculating the minimum quantity.

e. The diesel fuel oil quality standards which must be met in accordance with the standards of the diesel engine manufacturer and to comply with Item C.2 of Regulatory Guide 1.137.

<u>Response</u>

430.68

a. The piping requirements for the BOP section of the fuel oil storage and transfer system are as follows: Fuel oil supply from fuel oil transfer pumps in BOP to fuel oil day tank, 2 inch pipe size, SA 106-B carbon steel material, quality group C and the location of the interface is at the emergency diesel generator building outside wall. Overflow gravity return and recirculation line from fuel oil day tank to fuel oil storage tank, 3-inch pipe size, SA 106-B carbon steel material, quality group C and the location of the interface is at the DG Bldg. outside wall. The above information is shown in FSAR Figure 1.9-1 page 76 + 74 at coordinate D-5, page 66 + 67 at coordinate F-6 and page 75 and 73 at coordinate G-11.

~~Re: Electrical Input on Question~~ 430.68b.

The power sources for the BOP fuel oil transfer pumps are as follows:

LOAD DESCRIPTION	BUS # & MPL	CABLE INTERFACE	RACEWAY INTERFACE	MCC LOCATION	DIV.
FUEL OIL TRANSFER PUMP IFD-MPMP-7A FOR DG-1	E1-2 R24-SS112	E-17	R-17	DIESEL BLDG. 1 EL. -6'-10"	1
BACK UP FUEL OIL TRANSFER PUMP IFD-MPMP-8A FOR DG-1	E1-2 R24-SS112	E-18	~~E~~R-18	DIESEL BLDG. 1 EL. -6'-10"	1
FUEL OIL TRANSFER PUMP IFD-MPMP-9B FOR DG-2	F1-2 R24-SS212	E-20	R-20	DIESEL BLDG. 2 EL -6'-10"	2
BACK UP FUEL OIL TRANSFER PUMP IFD-MPMP-10B FOR DG-2	F1-2 R24-SS212	E-21	R-2~~0~~1	DIESEL BLDG. 2 EL. -6'-10"	2
FUEL OIL TRANSFER PUMP IFD-MPMP-11C FOR DG-3	G1-2 R24-SS350	E-23	R-23	DIESEL BLDG. 3 EL -6'-10"	3
BACK UP FUEL OIL TRANSFER PUMP IFD-MPMP-12C FOR DG-3	G1-2 R24-SS350	E-24	R-2~~3~~4	DIESEL BLDG. 3 EL -6'-10"	3

NOTE: ALL VOLTAGES ARE 3Φ, 480 VOLTS.
Power for each transfer pump is from its respective division.

Refer to FSAR Table 8.3-10 interface # E-17, E-18, E-20, E-21, E-23 + E-24 and for raceways at R-23 (DIV 3) at coordinate C-5 of Figure 1.9-5a, R-20 + 21 (DIV 2) at coordinate C-3 of Fig. 1.9-5b, and R-17 + 18 (DIV 1) at coordinate C-8 of Fig. 1.9-5b.

430.68 (cont'd)

c. The BOP fuel oil transfer pump minimum capacity in gallons per minute & is by the Applicant. The minimum discharge head requirements ~~for those portions of the system associated with the nuclear island is 16 psig for Div 1 + 2 and 25 psig for Div 3~~.

d. The minimum quantity of fuel to be stored for each diesel-generator shall be by the applicant. Minimum + maximum fuel oil day tank capacity & specific fuel consumption are given in 430.57. 1-day supply per 9.5.4-1.1(2)

e. The diesel fuel oil quality standards which must be met is the ASTM specification D975 for Diesel-fuel oils, #2 diesel fuel, with not less than 35 cetane number. The above meet the requirement of Reg Guide 1.137.

430.69 (9.5.5) In Section 9.5.5 of your FSAR, you indicate that the function of the diesel-generator cooling water system is to dissipate the heat transferred through: (1) the engine water jacket, (2) the lube oil cooler; (3) the engine air water coolers; and (4) the governor lube oil cooler. Provide information on the individual component heat removal rates (btu/hr), flow (lbs/hr) and temperature differential (°F) and the total heat removal rate required. Provide the design margin (i.e., the excess heat removal capacity) provided in the design of major components and subsystems. The design margin should be stated either as a percentage or as btu per hour.

Response

The ESW system for diesel-engine jacket water cooling system heat removal rates are shown in section 9.5.5.2 of FSAR, 23.23×10^6 Btu/hr for Divisions 1 and 2, and 8.55×10^6 Btu/hr for Div 3. Prudent margin is included in the above heat rate, Since these rates are engine manufacturer unique, the Applicant has to verify these heat rates. A margin of 10% will be recommended in section 9.5.5.2, Compliance is by the Applicant. The individual component heat removal rates are engine manufacturer unique and the information is to be provided by the Applicant.

Page 9.5-28 of the FSAR will be revised to incorporate the above, as shown in the attached marked-up page 9.5-28.

9.5.5.2 System Description (Continued)

The jacket cooling water passes through a three-way temperature control valve which modulates the flow of water through and/or around the jacket water heat exchangers, as necessary, to maintain required water temperature. Jacket water cools the turbocharger, the governor, the air intercooler, the exhaust manifold and the lube oil heat exchanger. The three-way valve, whose service is crucial, is designed and qualified as stated in Subsection 9.5.5.1.

An electric heater is installed in each system for the purpose of keeping the engine jacket water at a temperature near the normal operating level during plant normal operation. The heated water is circulated through the engine to assure temperature uniformity in the engine. Two jacket water circulating pumps are provided to circulate the cooling water through the system during diesel-generator operation. During the standby mode, the jacket water temperature is maintained at 120°F based on 60°F normal ambient temperature.

To prevent long-term deterioration of the system internal surfaces, the system is filled with high quality treated water from the Demineralized Water System. (See Subsection 9.2.3 for water quality details.) The ESW side of the system (see Subsection 9.2.1 for water quality details) is designed with the appropriate corrosion allowances on piping, and a fouling factor of 0.002 for heat exchanger tubes. A long interval periodic cleaning of the heat exchanger tubes may be necessary to restore the heat transfer capacity of the system in case of excessive fouling rates. (Treatment of ESW to minimize organic fouling is described in the Applicant's portion of Subsection 9.2.1.)

The ESW system for the jacket cooling water system is designed for a total heat removal rate of 23.23×10^6 Btu/hr for Divisions 1 and 2, and 8.55×10^6 Btu/hr for Division 3, based on the maximum permissible overload output of each diesel generator. Prudent margins are incorporated into the design to assure reliable system operation. 10% margin is recommended. The Applicant has to verify the total & individual heat removal rates & the recommended margin.

430.70
(9.5.5)

Indicate the measures you have taken to preclude long-term corrosion and organic fouling in the diesel engine cooling water system since these would degrade the system cooling performance and affect the compatability of the system. State whether the water chemistry is in conformance with the engine manufacturer's recommendations.

Response

Demineralized water is provided for system fill, and chemical addition will be provided. Manufacturer's [redacted] standard has to be followed for water quality.

430.71 (9.5.5) Recent licensee event reports (LER's) have shown that tube leaks are occurring in the heat exchangers of diesel engine jacket cooling water systems resulting in failures of the engines to start on demand. Provide a discussion of the measures you propose to detect tube leakage and the corrective measures that will be taken. Include a consideration of jacket water leakage into the lube oil system (standby mode), lube oil leakage into the jacket water (operating mode) and jacket water leakage into the engine air intake and governor systems (operating or standby mode). Provide the permissable inleakage or outleakage in each of the above conditions which can be tolerated without degrading engine performance or causing engine jacket water/service water systems leakage.

Response

430.71

Detections of inleakage to the diesel-engine jacket cooling water and lube oil system are done by sampling and analyzing jacket water and lube oil at regular intervals. Jacket water is treated, as necessary, to maintain the desired quality. Lube oil is replenished, as necessary. Jacket water outleakage to the air cooler and governor system detection is by the applicant. Permissable inleakage and outleakage is by applicant.

Large amount of leakages are detected by a level gage in the jacket water system standpipe for Div 1 + 2 + level alarm + level gage in the Div 3 jacket water expansion tank. For the lube oil system, Div 1 & 2 L.O. sump tank is provided by level transmitter + Div 3 is provided with level alarm.

The following will be added in FSAR section 9.5.7.4, Periodic sampling and testing is required to insure good quality of oil in the system. Marked-up page 9.5-35 is attached.

9.5.7.4 Tests and Inspection

The operating ability of the Diesel-Generator Lubrication System is tested and inspected during scheduled testing of the overall engine. Instrumentation is provided to monitor the lube oil temperature, pressure and sump level, ensuring proper operation of the system. During standby periods, the keep-warm feature of the system is checked at scheduled intervals to ensure that the oil is warm. Warm oil assists quick starting of the engine. Periodic sampling and analyzing of the lube oil is required to insure good quality of oil in the system. Local gauge board-mounted alarms signal low oil pressure, high oil temperature and low oil level. A remote combined alarm, one for each division, located in the main control room, annunciates on signal of diesel generator trouble from any alarm source on the local panel.

Administrative Controls - The lubrication systems are located in locked, controlled Diesel-Generator Buildings, thus precluding unauthorized personnel from interfering with system operation. Also, any contamination of the lubricating oil by deleterious material is thereby prevented.

9.5.8 Diesel-Generator Combustion Air Intake and Exhaust System

9.5.8.1 Design Bases

All components of the Diesel-Generator Combustion Air Intake and Exhaust System shall be designed and qualified to Seismic Category I requirements. Failure of the intake and exhaust system in any one diesel generator shall not compromise the readiness or operability of any other diesel generator. The system shall be housed in a Seismic Category I and tornado missile-protective structure. The system shall also be protected from flooding and the effects of pipe breaks.

430.72
(9.5.5)

Describe the provisions you have made in the design of the diesel engine cooling water system to assure that all components and piping are filled with water.

Response

A high point standpipe with atmospheric vent is provided to assure that all components and piping are filled with jacket water for DIV 1 and 2 diesel-engine cooling water system. For DIV 3 refer to 430.73.

QUESTION 430.73
(9.5.5)

For the Division 1 and 2 diesel-generators, you show an atmospheric vent at the top of the standpipe in Figures 9.5-12 and 9.5-13 of your FSAR. This indicates that the top of the standpipe is the highest point in the diesel engine cooling water system. For the Division 3 diesel-generator, however, no atmospheric vent is shown in any part of the system. This indicates that the jacket water expansion tank is not the high point in the cooling water system as shown on Figure 9.5-13. Clarify this matter. If the expansion tank is not the highest point in the system, then: (1) revise Figure 9.5-13 to show the proper elevation of the tank relative to other piping and components in the cooling water system; and (2) refer to Question 430.72 and show how air is vented from the system. Demonstrate that air in the piping at the system high point will not be forced to another part of the system such as the jacket water cooler where it could cause a partial or total blockage. Describe how air is purged from the system piping once the diesel engine is running. Indicate the time required to accomplish this purging following startup.

RESPONSE

Figure 9.5-13 is a schematic representation of the jacket water system piping and instrumentation and is not intended to show the relative elevations of various components. Therefore there is no need to revise the Figure 9.5-13. The specific system configuration description with regards to the air vents and air purging will be supplied by the applicant once the specific design has been selected.

QUESTION 430.74
(9.5.5)

If the Division 3 diesel generator expansion tank is not at the cooling water system high point, then provide a discussion of how you will prevent corrosion in the piping which is exposed to air when the engine is not operating (standby) and in the remainder of the system due to entrapped air in the system cooling water.

RESPONSE

Cooling water used for Division 3 diesel generator is treated for corrosion protection as per manufacturer's recommendation. The entrapped air will be purged from the system piping by means of proper design. The details of the air purge configuration to be provided by the applicant once the specific design has been selected.

430.75
(9.5.5)

The diesel-generators are required to start automatically on loss of all offsite power and in the event of a LOCA. The diesel-generator sets should be capable of operation at less than full load for extended periods without degradation of performance or reliability. Should a LOCA occur and offsite power is available, discuss the design provisions and other parameters which you have considered in the selection of the diesel-generators to enable them to run unloaded (on standby) for extended periods without degradation of engine performance or reliability. Explicitly define the capability of your design with regard to this required characteristic.

Describe the make and type of engine and the design features which enables the engine to operate at no load and full speed for seven days without degradation of performance and reliability. Provide the manufacturer's test results which verify the above cited capability.

430.75 Response

By the Applicant. The cooling water system primary loop (essential service water) sizing was based on a continuous supply of water based on the manufacturer's input. Refer to ESW section 9.2.1.

Each diesel generator set was specified to be capable of unattended operation at 100% load for 7 days. The jacket cooling water system is expected to operate for 7days without makeup This will be added in section 9.5.5.1 of FSAR. A seven day no load capability will be added to GESSAR section 8.3.1.1.8.5 (6) as shown in the attached marked-up page 8.3-27.

The diesel engines are De Laval model DSRV16-4.

Description of design features that enables the engine to operate at no load and full speed for seven days without degradation of performance and reliability and the manufacturer's test result should be provided by the ~~Vendor or~~ Applicant.

9.5.4.5 Instrumentation Application

Fuel supply level in the day tanks is indicated both locally and in the main control room. Also, alarms on the local diesel-generator panel annunciate low level and high level in the day tanks. A group repeat trouble alarm is also provided in the main control room. Level switches in the day tank signal automatic start and stop of the fuel oil transfer pump.

9.5.5 Diesel-Generator Cooling Water System

9.5.5.1 Design Bases

All essential components of the Diesel-Generator Cooling Water System shall be qualified to Seismic Category I requirements and to 10CFR50, Appendix B. With the exception of the engine-driven jacket water pumps, all pumps, valves, tanks, piping and heat exchangers shall be designed in accordance with ASME Code, Section III, Class 3, Quality Group C. Failure of the cooling system in any one engine shall not affect the readiness or operability of any other engine. The cooling system shall derive from a reliable source, one not affected by a LOPP, the plant Essential Service Water (ESW) System. Divisions 1, 2 and 3 diesel-generators are located in Seismic Category I structures, protected from tornado-generated missiles and flood waters.

The jacket water cooling system shall be able to operate at full load for 7 days without any make-up.

9.5.5.2 System Description

Each diesel-generator unit is supplied with a complete closed loop cooling system mounted integrally with the engine generator package. See Figures 9.5-12 (K-136) and 9.5-13 (K-137) for pertinent flow diagrams. Included in each cooling package are an expansion tank, temperature-regulating valve, lube oil cooler, immersion heater, jacketed manifold and a heat exchanger which is furnished with ESW from the essential portion of the system. ESW supply is from the same division as that of the diesel generator served.

430.76 (9.5.5) The Divisions 1 and 2 and the Division 3 diesel-generator cooling water system standpipes and expansion tank, respectively, provide for expansion of the cooling systems inventory when the diesel-generators are operating. In addition, the standpipes and the expansion tank provide makeup to the systems inventory to compensate for minor leaks at pump shaft seals, valve stems, and other components. Provide the size (i.e., the capacity) of the standpipes and the expansion tank for the Divisions 1 and 2 and the Division 3 diesel-generators, respectively. Demonstrate by analysis that the standpipe and expansion tank sizes will be adequate to provide makeup water for seven days of continuous diesel-generator operation at full rated load without requiring any makeup water supply to the standpipes and to the expansion tank. (Refer to Item (a) of Question 430.110.)

The Divisions 1 and 2 diesel-generator standpipes are mounted vertically on the floors of their rooms. When determining the adequacy of the standpipe inventory with respect to the required seven days of makeup, you should consider only that volume of coolant which can be lost from the standpipe and yet still maintain a net positive suction head (NPSH) to both the engine-driven and motor-driven cooling system circulating pumps.

430.76 Response

The standpipes and expansion tank for the DIV 1, 2 and 3 diesel-generator cooling water system were provided by the ~~Vendor~~ Applicant, including the sizes and their respective capacities.

It was specified that each diesel-generator set shall be capable of unattended operation at 100 percent rated load, voltage and frequency, during the emergency condition for at least 7 days. It is expected that all the diesel-engine auxiliaries should be able to meet the same requirement. Compliance is by the ~~Vendor~~ Applicant. A requirement for the jacket water cooling system to be able to operate at full load for 7 days without any make-up is added in 430.75 in section 9.5.5.1 of the FSAR, page 9.5-27. Additionally, during normal operation the make-up water is provided from the demineralized water system thru a manual operated valve.

QUESTION 430.77
(9.5.5)

For the Division 3 diesel-generator, demonstrate that the expansion tank does, in fact, provide a NPSH for the jacket water pumps at both the normal and the lowest permissible operating water level in the expansion tank.

RESPONSE

Division 3 diesel-generator cooling water system ~~has been designed~~ is specified to provide adequate NPSH for the jacket water pumps at both normal and operating water levels in the expansion tank. Specific details of the design to be furnished by the applicant based on the specific engine selected.

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QUESTION 430.78
(9.5.5)

Provide a detailed discussion of how the diesel-generator cooling water systems functions in the standby mode to maintain jacket water temperatures above ambient temperatures to enhance the diesel engine start capability. Your discussion should address how the jacket water is heated, how heated water is circulated through the diesel engines and the design jacket water temperature at the anticipated ambient temperatures of the diesel-generator rooms. Identify any excess capacity in the jacket water heating system.

The operation of the Division 3 diesel-generator cooling water system during standby requires additional discussion since there is an apparent lack of heated jacket water under forced circulation in this mode.

RESPONSE

Division 3 diesel-generator cooling water system is ~~designed~~ specified to maintain the engine in a warm standby condition in accordance with the quick start reliability requirements. The specific details of the system functions to achieve this will be provided by the applicant depending on the type of the keepwarm system furnished for a particular engine.

MP:csc/I10146-30
11/4/82

430.79 (9.5.5) Describe the instrumentation, controls, sensors and alarms provided for monitoring the diesel engine cooling water system and describe their functions. Discuss the testing necessary to maintain and assure highly reliable instruments, controls, sensors and alarms. Indicate where the alarms are annunciated. Identify the temperature, pressure, level and flow sensors, where applicable, which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer. Describe what operator actions are required during alarm conditions to prevent harmful effects to the diesel engine. Discuss the systems interlocks you will provide.

430.79 Response

One set of all necessary temperature switches, for initiating alarm, and for initiating a shut down in the event of any abnormality during test running only is provided. Local thermometers, as required, to permit manual check of operating conditions are provided. The control panel includes jacket water temperature gauge. The annunciator includes jacket water temperature high and low, jacket water level low in expansion tank. The rest of the instruments, controls, sensors and alarms are by the applicant. Refer to FSAR section 8.3.1.1.8.1.5 and the response for 430.09. FSAR section 9.5.5.5 will be revised to include reference to section 8.3.1.1.8.1.5 as shown on the attached marked-up page 9.5-29.

The testing + calibration necessary to maintain and assure highly reliable instruments, controls, sensors and alarms shall be performed periodically, see FSAR section 9.5.5.4. Testing program is by the Applicant.

9.5.5.3 Safety Evaluation

Each Diesel-Generator Cooling Water System is independent. Failure of a Diesel-Generator Cooling Water System does not affect the other diesel-generator cooling systems or their diesel-generators. The engine jacket cooling water heat exchanger is furnished in accordance with ASME Boiler and Pressure Vessel Code, Section III, Class 3. Components of the Diesel-Generator Cooling Water Systems are designed to Seismic Category I requirements. Procurement of components is governed by the requirements of 10CFR50, Appendix B, to ensure quality assurance in all places of manufacture and installation.

9.5.5.4 Tests and Inspection

To ensure the availability of the Diesel-Generator Cooling Water System, scheduled inspection and testing of the equipment is performed as part of the overall engine performance checks. Instrumentation is provided to monitor cooling water temperatures, pressure and head tank level. Instruments receive periodic calibration and inspection to verify their accuracy. During standby periods, the keep-warm feature of the engine water jacket cooling closed-loop system is checked at scheduled intervals to ensure that the water jackets are warm. This system facilitates quick starting of the engine. The cooling water in the engine water jacket cooling closed-loop system is analyzed at regular intervals and is treated, as necessary, to maintain the desired quality.

9.5.5.5 Instrument Application

Pressure, temperature and level instrumentation is provided for monitoring of important system operating parameters. Alarms provide warning in case of system low or high water temperature, low pressure, or low water inventory. Except for post-LOCA operation, the diesel-generators will trip on high-high cooling water temperature. (See section 8.3.1.1.8.1.5 for complete alarms.)

430.80 (9.5.6) Describe the instrumentation, controls, sensors and alarms provided for monitoring the diesel engine air starting system. Describe their function. Describe the testing necessary to maintain highly reliable instruments, controls, sensors and alarms. Indicate where the alarms are annunciated. Identify the temperature, pressure and level sensors which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer. Describe any operator actions required during alarm conditions to preclude degradation of diesel-generator starting capability. Provide the setpoints at which these alarms function. Discuss system interlocks you will provide.

Response

The gauge panel includes compressed air pressure gauge. The annunciator includes starting air pressure low + start failure annunciation. The rest of the instruments, controls, sensors and alarms are by the Applicant. Refer to the response in question 430.09 and FSAR section 8.3.1.1. 8.1.5. FSAR section 9.5.6.5 will be revised to add reference to section 8.3.1.1, 8.1.5 as shown on the attached page 9.5-33 marked-up.

Testing to maintain highly reliable instruments, controls, sensors and alarms is done periodically, see FSAR section 9.5.6.4. The Applicant shall provide a program for periodic testing and calibration of the instruments, controls, sensors and alarms. Interlocks, if any are provided by the Applicant, 9.5.6.4 Tests and Inspection (Continued)

(5) air receivers to clear accumulated moisture using the blowdown connection.

9.5.6.5 Instrument Application

An air receiver low pressure alarm is provided to alert the control room operator in case of loss of starting air pressure. See section 8.3.1.1.8.1.5 for complete alarms.

9.5.7 Diesel-Generator Lubrication System

9.5.7.1 Design Bases

The Diesel-Generator Lubrication System is a self-contained system designed to supply clean, filtered oil to the engine bearing surfaces at controlled pressure and temperature. Built-in capacity ensures adequate lubrication of wearing surfaces, and cooling as necessary. An electric heater in the sump and a keep-warm circulating pump maintain sufficient circulation of warm oil to help keep the engine in standby readiness.

The system is located in a Seismic Category I structure providing protection from tornado-generated missiles and flood waters, as well as the effects of pipe whip and jet impingement from high and moderate energy pipe failures.

9.5.7.2 System Description

See Figure 9.5-16 (K-134) for the Divisions 1 and 2 lube oil systems flow diagram and Figure 9.5-17 (K-135) for the Division 3 flow diagram. All components herein described are supplied as part of the diesel-generator package by the diesel-generator supplier. All three systems are nuclear safety-related except for the keep-warm heaters and pumps. In the event of LOPP or other emergency

430.81 (9.5.6) Provide a detailed description of the diesel engine starting system which is shown on Figures 9.5-14 and 9.5-15 of your FSAR. Additionally, describe: (1) the components and their function; (2) the instrumentation, controls, sensors and alarms; and (3) a diesel engine starting sequence. In describing the diesel engine starting sequence, include the number of air start valves used and whether one or both air start systems are used.

Response

Detailed description of the diesel engine air starting system is by the Applicant. General description is shown in FSAR section 9.5.6.2.

QUESTION 438.82
(9.5.6)

For the Divisions 1 and 2 diesel-generators, provide a discussion of the air starting system downstream of the left and right bank air distributors. Revise Figure 9.5-14 of your FSAR to show the additional system components.

Response

The description of the air starting system downstream of the left and right bank air distributors for the Divisions 1 and 2 diesel-generators is by the applicant. Figure 9.5-14 will not show detailed system components supplied by the applicant, and therefore, Figure 9.5-14 will not be revised.

QUESTION 430.83
(9.5.6)

Expand your discussions of the air starting systems for the Divisions 1 and 2, and the Division 3 diesel-generators. Identify the differences between the two types of systems. Your description of these differences should cover both the systems components and the instrumentation and controls. (Refer to Item (b) of Question 430.110.)

RESPONSE

The main differences between the Division 1 and 2 and Division 3 air starting system are:

a) Division 1 and 2 diesel-generators, each have two redundant electric motor driven air compressors while Division 3 has one electric motor driven and one diesel engine driven air compressor.

b) Division 1 and 2 air start systems are provided with redundant air dryers while Division 3 air start system will be provided with adequate supply of dry air. The detail components and description will be provided by the applicant.

QUESTION 430.84
(9.5.6)

In Section 9.5.6.1 of your FSAR, you state that the storage tanks, valves, and piping up to the air start motors are designed to seismic Category I requirements and ASME Section III, Class 3 standards. Review your design and indicate if there are any non-ASME items or sections in the system. If so, identify these and indicate their locations on Figures 9.5-14 and 9.5-15 of your FSAR. In any case, revise Figures 9.5-14 and 9.5-15 to reflect their seismic and quality group classifications of system piping and components. Indicate where changes in classification occur.

Response

The Div 1 & 2 air dryers, air start module and diesel-engine module are non-ASME section III items. Changes in quality group classification are indicated by means of heavy arrow signs.

Div 3 starting air skid and diesel-engine module are non-ASME section III items. Division 3 air receiver tanks are designed to ASME Section III, Class 3 Standard while other piping and components of the air start system are designed to ANSI B31.1 standard.* All components are classified for quality group "C" and therefore no specific group changes will be shown on the Figure 9.5-15.

*- and other manufacturer's applicable standards e.g. DEMA, TEMA.

The above classification will be added in FSAR section 9.5.6.1, as attached on the marked-up page 9-5-30.

The non-ASME section III piping is per ANSI B31.1 piping code, quality group D.

Figures 9.5-14 and 9.5-15 are complete and will not be revised.

9.5.6 Diesel-Generator Starting Air System

9.5.6.1 Design Bases

The Diesel-Generator Starting Air System provides a supply of compressed air for starting the emergency generator diesel engines without external power. In order to meet the single-failure criterion, each diesel-generator set is provided with two complete, redundant, and independent starting air systems. Each starting air system has enough air storage capacity for five consecutive starts of the engine, and performs its starting function in such a way that the time interval between signal to start and "ready to load" status will not exceed 10 sec. The air storage tanks, valves and piping between tank and air starting motors are designed to Seismic Category I requirements, and in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Class 3. The system is located in a Seismic Category I structure, protected against tornado, external missiles and flood waters. The air compressor skid + air dryer are non Section III.

9.5.6.2 System Description

See Figure 9.5-14 for a flow diagram of the Divisions 1 and 2 Diesel-Generator Starting System and Figure 9.5-15 for a flow diagram of the Division 3 system.

The Diesel-Generator Starting Air System provides a separate and independent starting facility for each of the diesel-generating units. Each facility includes two 100% capacity sections, each section consisting of an air compressor and an air receiver. Two redundant starting air admission valves in each of two engine starting air manifolds are provided for each engine. Failure of any one starting system in no way affects the ability of any other system to perform its required safety related function. Normally, the compressors are fully automatic in operation, controlled by pressure switches located on their respective air receivers. The

430.85 (9.5.6) In Section 9.5.6.3 of your FSAR, you briefly discuss the air dryers in the Divisions 1 and 2 diesel-generators air start system. However, there is no mention of an air dryer for the Division 3 diesel-generator nor is one shown on Figure 9.5-15 of your FSAR. Provide a discussion of why air dryers are used with the Divisions 1 and 2 diesel-generator air start system but not with the Division 3 diesel-generator air start system.

Response

Air dryers were specified to be provided in the Div 1 & 2 diesel-generators to improve the reliability of the air start system. The air dryers were accepted by the diesel generator manufacturer and were provided by them.

Division 3 air start system will be ~~provided~~ specified with a provision for adequate dry air supply to the engine starting system. The specific details of the air drying system will be supplied by the applicant.

430.86 (9.5.6) In Section 9.5.6.2 of your FSAR, you describe the compressed air and air start systems. However, this description appears to cover only the Divisions 1 and 2 diesel-generators. Revise this section to include a detailed description of the Division 3 diesel-generator compressed air and air start systems. State whether all four air start motors are used in every engine start. For the diesel engine driven compressor, describe how this unit cycles on and off, what inputs are used to stop and start the engine and/or compressor, whether the diesel engine operates continuously and any other pertinent information. Show now the Division 3 diesel-generator air start system is, operationally, completely redundant. (Refer to Item (b) of Question 430.110.)

Response

Detailed description of the Division 1 and 2 air start systems is provided by the Applicant.

Section 9.5.6.2 will be revised to add Division 3 air start system description.

All four air start motors are used in every engine start even though only two are sufficient to crank the engine. (Refer to revised text.) The diesel engine driven compressor unit automatically starts and stops based on the preset pressure values. The engine compressor unit starts at 200 psi following pressure and stops when pressure reaches 250 psi rising.

Division 3 air start system consists of two independent and redundant trains each consisting of:

a) air compressor, (air dryer - optional)
b) air receiver
c) control valves and accessories
d) air start solenoid valve
e) two air start motors

Each train is independently capable of supplying enough air for a minimum of five normal engine starts.

For added reliability of the adequate air supply in the event of consecutive engine starts, both the electrically driven as well as diesel-engine driven air compressors are set to operate at 200 psi ~~following~~ falling pressure.

430.87 (9.5.6) In Section 9.5.6.2 of the FSAR, you state that each redundant air start system has sufficient capacity for five automatic or manual starts without recharging the air receivers. There are two different types of systems for the Divisions 1 and 2, and Division 3 diesel generators, respectively. For both types of systems, provide the following information:

a. Describe what constitutes a completed "start cycle."

b. Indicate the design working pressure for the air start motors for Division 3 and the direct cylinder injection for Divisions 1 and 2.

c. Indicate how much air, measured as either a pressure drop or standard cubic feet per minute (SCFM), is consumed for each starting cycle. Indicate the resulting air receiver pressures; i.e., at the beginning of the start cycle and on its completion for each of the other five starts. Provide the time required for the diesel-generator to reach full speed, voltage, and frequency and be ready to accept load for each of the five starts.

d. State the pressure at which the five start capacity is determined; i.e., compressor cut-in, compressor cut-out or mid-point.

e. Indicate the capacity of the air receivers.

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430.87 (cont'd)

The time required for the diesel-generator to reach full speed, voltage and frequency and be ready to accept load for each of the five starts is less than 10 [redacted] Seconds. See FSAR section 9.5.6.1 and 8.3.1.1.8.1.2 (3). The exact time for each of the five starts is by the Applicant.

d. The initial normal working pressure is 250 to 350 PSIG, The compressor cut-in and cut-out pressure varies from one diesel engine to the other. Therefore, specific compressor cut-in and cut-out pressures are by the Applicant.

e. The capacity of the air receiver is based on the air consumption for five consecutive starts of the diesel engine, per FSAR section 9.5.6.1. The air consumed per start varies with the engine type and therefore, the air receiver size is by the Applicant.

QUESTION 430.87
(9.5.6)

In Section 9.5.6.2 of the FSAR, you state that each redundant air start system has sufficient capacity for five automatic or manual starts without recharging the air receivers. There are two different types of systems for the Divisions 1 and 2, and Division 3 diesel generators, respectively. For both types of systems, provide the following information:

a. Describe what constitutes a completed "start cycle".

b. Indicate the design working pressure for the air start motors for Division 3 and the direct cylinder injection for Divisions 1 and 2.

c. Indicate how much air, measured as either a pressure drop or standard cubic feet per minute (SCFM), is consumed for each starting cycle. Indicate the resulting air receiver pressures; i.e., at the beginning of the start cycle and on its completion for each of the other five starts. Provide the time required for the diesel-generator to reach full speed, voltage, and frequency and be ready to accept load for each of the five starts.

d. State the pressure at which the five start capacity is determined; i.e., compressor cut-in, compressor cut-out or mid-point.

e. Indicate the capacity of the air receivers.

RESPONSE

a. DIV 3 Diesel engine start cycle is completed when the engine has attained a speed of 150 RPM, at which point the air start solenoids are deenergized causing the air flow to the air motors to stop and the pinion gears to disengage.

b. The design working pressure for air start motors for Division 3 will be provided by the applicant.

c. The division 3 diesel generator air start system will provide sufficient air to five consecutive starts without recharging the fully charged air receivers. The diesel generator has successfully been tested to start each of the five successive starts and attain the rated speed, voltage and frequency within 10 seconds following the receipt of the start signal. The specific data requested will be provided by the applicant.

d. Five start air supply adequacy is determined at ~~our~~ the compressor cut-out pressure, ~~i.e., the air tanks are at ____________~~. The specific data requested will be provided by the applicant.

e. The air receivers will have the adequate capacity to provide sufficient air supply for five consecutive starts without recharging the fully charged receivers.

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430.87

a. A "start cycle" begins when a signal to start is initiated, air being injected to the cylinder heads, engine reaching full speed and rated voltage and ready to accept loads. The time to complete a start cycle is within 10 seconds as shown in GESSAR section 9.5.6.1 and 8.3.1.1.8.1.2 (4). Exact "start cycle" time is by the Applicant.

b) The capacity of the air receiver shall be adequate for five consecutive starts without a recharge. The requirement for the design working pressure shall meet DEMA standards. Compliance ~~of~~ to the requirements ~~should~~ shall be by the applicant.

c. Each starting cycle consumes 1/5 of the total capacity of the air receiver. The exact air consumption rate is dependent on the type of diesel engine selected. The initial normal working pressure at the air receiver is from 250 to 350 PSIG. The resulting air receiver pressures at the beginning of each start cycles will depend on the rate of consumption for each start which varies from one diesel engine to the other.

430.88 (9.5.6) Indicate the source of power to the solenoid valves in the diesel-generators air start systems.

Response

The sources of power to the solenoid valves in the diesel-generators air start systems are 125 VDC Inst Bus E for Division 1 diesel-generator, 125 VDC Inst Bus F for Division 2 diesel-generator, and 125 VDC Inst. Bus G for Division 3 diesel-generator. The power for each solenoid is from its respective division.

The above will be added in FSAR section 9.5.6.2 as shown in the attached marked-up page 9.5-31.

9.5.6.2 System Description (Continued)

pressure switches signal the start and stop of the compressors, as necessary, to maintain the required system pressure. System pressure is shown on Figures 9.5-14 and 9.5-15. Manual override of the automatic sequence is provided for emergency situations.

Each independent air starting system section has sufficient capacity for cranking the engine for five automatic or manual starts without recharging the tanks. Each motor-driven compressor has sufficient capacity to recharge the storage system in 30 min, after five starts of the diesel engine. The Divisions 1 and 2 compressors are electric motor-driven; in Division 3 one compressor is electric motor-driven, the other has its own diesel engine drive.

In Divisions 1 and 2, an air dryer is provided upstream of the air receiver, for the purpose of minimizing moisture in the shroud starting air. A connection at the receiver bottom will be used to blow down any water accumulated in the tank. The Division 3 air receiver is also provided with a blowdown connection. The starting air admission valves are operated by solenoids supplied with uninterruptible DC power from 125VDC Inst. Bus E for Div1, 125VDC Inst. Bus F for DIV2 and 125VDC Inst. Bus G for DIV. 3. ~~Solenoids and power~~ ~~supply~~ are in the same division.

9.5.6.3 Safety Evaluation

The Standby Diesel-Generator Starting Air System is designed in accordance with the requirements of Section III of the ASME Boiler and Pressure Vessel Code. The system is classified Safety Class 3 and Seismic Category I. Starting air facilities for each of the diesel engines are completely redundant, with each redundant section capable of supplying enough air for a minimum of five normal engine starts. Because of the independence and redundancy incorporated in the system design, the Diesel-Generator Starting System provides its minimum required safety function under the following conditions.

430.89 (9.5.6) You incorporate in Figures 9.5-14 and 9.5-15 of your FSAR, symbols and abbreviations for which no explanation is included on Figure 1.7-4 or any other drawing showing symbols or legends. Accordingly, revise these drawings, as required, to ensure there is an explanation for all symbols and abbreviations. Explain the purpose of the heavy black arrows shown at various locations on Figures 9.5-14 and 9.5-15.

Response

All standard and common component symbols are covered in Figure 1.7-4, components not shown are labeled with proper names. The heavy black arrows are indication for piping specification change as shown in Figure 1.7-4, in coordinate H-13.

430.90 (9.5.6) In NUREG/CR-0660, air dryers in diesel generator air start systems are described as being safety significant. In Section 9.5.6.2 of your FSAR, you briefly discuss air dryers in the Division 1 and 2 diesel-generator air start systems. Provide details of these air dryers, including the type (desiccant or refrigerant), manufacturer and model number, capacity, special features, principal of operation and other pertinent details. Show that the dew point in the air system will be maintained below the recommended minimum value in accordance with our position on this matter in Section 9.5.6 of the SRP. Since the air dryers are safety significant, provide details of the system operation and/or system maintenance procedures which, when implemented, will ensure proper functioning of the air dryers at all times.

Provide a comparable discussion for the air dryer to be installed in the Division 3 system, if you do not provide justification for the lack of an air dryer.

Response

Details of the air dryers, i.e. type, manufacturer, model number, capacity, special features, principal of operation and other pertinent details are by the Applicant.

Maintaining the dew point below the recommended minimum value is by the Applicant.

Details of system operation and/or maintenance procedures are by the Applicant. Periodic test and inspection are shown in FSAR section 9.5.6.4.

(See response to question 430.85.) Air dryer is an upgrade item for Div 3. Description of the air dryer for Division 3 will be furnished based on the type of the dryer selected for division 3. Applicant to provide this data.

430.91 (9.5.6) In Figure 9.5-14 of your FSAR, you show the air dryers for the Divisions 1 and 2 diesel-generator starting air system mounted on the air receivers. Since the air receivers are safety-related, provide the seismic qualification for the air dryers. Alternatively, show that failure of the air dryers as a consequence of a design basis event will not impair operation of the diesel-generator air start systems.

Response

The seismic qualification for the air dryers for the Divisions 1 and 2 diesel-generator starting air system is seismic category I.

430.92
(9.5.6)

Provide the pertinent characteristics of the air compressors for the diesel-generator air start systems; i.e., the rated air flow in cfm at design pressure, rated duty, motor HP and duty, motor voltage and number of operating phases and the source of power to the motor-driven compressor.

Response

The pertinent characteristics of the air compressors for the diesel-generator air start systems is by the applicant.

The source of power to the motor-driven air compressors are 480V Bus # E2-1 for Div 1, 480V Bus # F2-1 for Div 2, ~~and 480V Bus # G1-1 for Div 3~~.

GESSAR section 9.5.6.2, page 9.5-31 indicated that each independent air starting system section has sufficient capacity for cranking the engine for five automatic or manual starts without recharging the tanks. Each motor-driven compressor has sufficient capacity to recharge the storage system in 30 min, after five starts of the diesel engine.

These buses are fed from the safety buses but are non-class 1E and shed on LOCA.

QUESTION/RESPONSE 430.93 (9.5.6)

QUESTION 430.93

Provide enlarged and more detailed plan and elevation views of the Division 3 Diesel Generator Air Start System Air Compressors. Show the intake, the exhaust, the cooling system and the fuel supply for the diesel engine-driven compressor. Incorporate these enlarged views into the appropriate drawings in Section 1.2 of your FSAR.

RESPONSE 430.93

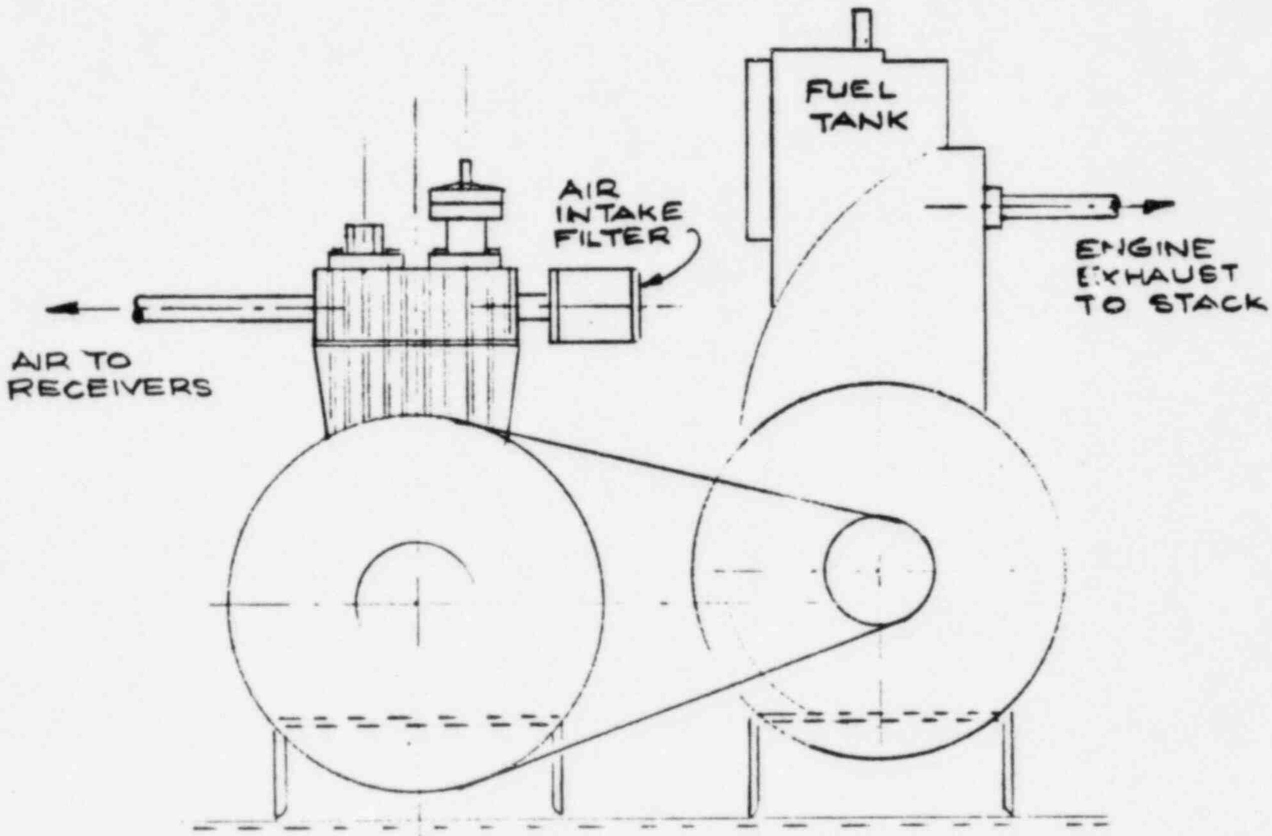
The diesel engine driven air compressor is an air-cooled type and requires no cooling water. The fuel supply is provided by a tank locally mounted on the air compressor base. The air intake is through a filter mounted on the compressor head. The diesel engine exhaust is piped to the Diesel Generator Building stack.

C F BRAUN & CO

R W Christiansen

General Electric	GESSAR ROUND 1 QUESTIONS	Project 6382-P September 29, 1982
San Jose		

QUESTION 430.93
Addition to Section 1.2



DETAIL 1

STARTING AIR COMPRESSOR E22-S001-9
AIR-COOLED DIESEL ENGINE-DRIVEN

430.94 (9.5.7) The seismic and quality group classification of the diesel-generator's lubrication system piping and components are not clearly identified in Section 9.5.7, in Table 3.2.1 or Figures 9.5-16 and 9.5-17 of your FSAR. This is not acceptable. The lubrication system should conform to the positions we present in Regulatory Guide 1.26; i.e., all the diesel-generator auxiliary systems should be designed to ASME Section III, Class 3 or Quality Group C standards. Provide the industry standards you will follow for the design, manufacture, and inspection of the lubrication system piping and components, including engine-mounted piping and components. Show this information on Figures 9.5-16 and 9.5-17. Indicate where the Quality Group Classification changes from Quality Group C, as applicable. (Refer to Section 9.5.4 of your FSAR.)

Response

It was specified that all tanks, pumps (except the motor driven LO pump), piping, valves and heat exchangers in the lubricating oil system shall be designed in accordance with ASME Section III, class 3, quality group C. Also, it was specified that the emergency diesel generator sets, together with all accessories, shall be designed to Seismic category I.

The industry standards that will be followed in the design manufacturing and inspection of the lubrication system piping and components, including the engine mounted piping and components are the ASME, API, ANSI, ASTM, DEMA, HEI, IEEE, ISA, NEMA, TEMA applicable standards.

9.5.7.2 System Description (Continued)

requiring diesel generator operation, the lube oil keep-warm system is shut down.

The Diesel-Generator Lubrication System consists of an oil sump in the engine frame, an engine-driven positive displacement pump, an oil cooler, an oil strainer and a filter. The main engine-driven lube oil pump takes oil from the sump, passes it through the lube oil cooler and lube oil filter, through a strainer, through the engine and back to the sump. Constant oil pressure to the engine bearings is maintained by a pressure-regulating valve, which bypasses excess oil back to the sump.

The lube oil cooler is a shell and tube type, built to TEMA Class R, and conforms in all respects to ASME Code, Section III, Class 3. Cooling water for the cooler comes from the jacket cooling water (Subsection 9.5.5).

The Divisions 1 and 2 diesel-generator sets have lube oil heating systems to keep the oil warm during standby. An electric oil heater in the engine oil sump heats the oil, which is then circulated through the engine by a keep-warm oil circulating pump. A separate filter and a separate strainer in the keep-warm circuit ensure oil cleanliness.

All tanks, pumps, piping, and valves are built to ASME Section III, class 3, Quality Group C and Seismic Category I

insert

9.5.7.3 Safety Evaluation

Each diesel-generator lubrication system is an integral part of the diesel generator. The system is not required to meet the single-failure criterion because a failure does not prevent the other two divisions of the emergency power system from providing adequate power to safely shut down the plant or to mitigate the consequences of any of the postulated accidents.

Quality group classification change is already shown on Figures 9.5-16 by heavy arrow symbol. GE should define the quality group classification change on Figure 9.5-17 for Div 3 diesel-generator lube oil system.

The first paragraph will be added to GESSAR section 9.5.7.2, Exception for motor driven L.O. pump will be deleted, as shown on the attached marked-up page 9.5-34.

430.95 (9.5.7) For the diesel engine lubrication systems described in Section 9.5.7 of your FSAR, provide the following information: (1) define the temperature differentials, flow rate, and heat removal rate of the interface cooling system external to the engine and verify that these are in accordance with the recommendations of the engine manufacturer; (2) discuss the measures that will be taken to maintain the required quality of the oil, including its inspection and replacement when oil quality is degraded; (3) describe the protective features such as blowout panels provided to prevent an unacceptable crankcase explosion and to mitigate the consequences of such an event; and (4) describe the capability to detect and control system leakage. In your response, consider the different types of diesel engines in the design of your nuclear island and any special requirements for lube oil and lube oil analysis which may exist.

Response

(1) The temperature differentials, flow rate, and heat removal rate of the interface cooling system for the diesel-engine lubrication systems are provided by the ~~vendor~~ Applicant and definitions of the above are by the applicant. GESSAR section 9.5.5.2 indicate the heat loads for jacket water cooling system.

~~(2) By the applicant~~.

(3) It was specified that a crankcase breathing system is provided by the ~~Seller~~ Applicant. This will be added to GESSAR Sec. 8.3.1.1.8.1 P. 8.3-20 AS SHOWN IN 435-42.

(4) Detection and control of lube oil system leakage is by means of a local level transmitter in the lube oil sump tank.

(2) To maintain the required quality of oil, periodic sampling and testing of oil is necessary. The Applicant should include this in the plant maintenance and operating manual. See attached FSAR SECTION 9.5.7.d

9.5.7.4 Tests and Inspection

The operating ability of the Diesel-Generator Lubrication System is tested and inspected during scheduled testing of the overall engine. Instrumentation is provided to monitor the lube oil temperature, pressure and sump level, ensuring proper operation of the system. During standby periods, the keep-warm feature of the system is checked at scheduled intervals to ensure that the oil is warm. Warm oil assists quick starting of the engine.

Local gauge board-mounted alarms signal low oil pressure, high oil temperature and low oil level. A remote combined alarm, one for each division, located in the main control room, annunciates on signal of diesel generator trouble from any alarm source on the local panel.

Periodic sampling and testing of the lube oil is required to maintain a good quality of oil.

~~Administrative Controls~~ - The lubrication ~~systems are located~~ in locked, controlled Diesel-Generator Buildings, thus precluding unauthorized personnel from interfering with system operation. Also, any contamination of the lubricating oil by deleterious material is thereby prevented.

9.5.8 Diesel-Generator Combustion Air Intake and Exhaust System

9.5.8.1 Design Bases

All components of the Diesel-Generator Combustion Air Intake and Exhaust System shall be designed and qualified to Seismic Category I requirements. Failure of the intake and exhaust system in any one diesel generator shall not compromise the readiness or operability of any other diesel generator. The system shall be housed in a Seismic Category I and tornado missile-protective structure. The system shall also be protected from flooding and the effects of pipe breaks.

430.96 (9.5.7) Indicate what measures you have taken to prevent entry of deliterious materials into the engine lubrication oil system due to operator error during recharging of lubricating oil or normal operation.

Response

The crankcase openings are covered and properly sealed. Procedure for recharging of lube oil is included in the mainte-nance and operating manual by the Applicant.

430.97 (9.5.7) Under certain emergency conditions, the diesel-generators may be required to operate continuously for an extended period (i.e., 7 days or more). During this time, the diesel engines will consume lube oil. In your FSAR, you do not discuss: (1) provisions for checking or monitoring the lube oil level during engine operation; or (2) the capability to add lube oil to the sump during engine operation. Provide a discussion of these items. If extra lube oil is stored in the diesel-generator buildings, describe the oil storage containers and the area in which they are stored. Show the storage locations on appropriate plan and elevation views in Chapter 1 of your FSAR and show any piping on Figures 9.5-16 and 9.5-17. Provide seismic and quality group classifications. Alternatively, show that there is sufficient inventory in the diesel engine sumps at all times to allow for oil consumption during seven days of continuous engine operation at full load while still maintaining enough lube oil for lubrication, cooling, and adequate suction head to the lube oil pressure pump(s).

Response

A local low level lube oil transmitter is specified per FSAR section 8.3.1.1.8.1.5. A self contained 7 day lube oil supply is also specified, see FSAR section 9.5.7.2 as attached.

Descriptions of lube oil to the sump during engine operation, extra lube oil storage and lube oil inventory are by the applicant. The requirement that lube oil could be added to the sump tank during engine operation will be added to GESSAR section 9.5.7.2 as shown in the attached markedup page 9.5-34 in 430.94.

~~Since a self contained 7 day lube oil supply~~ is provided. ~~The~~ extra lube oil may be stored outside the D.G. Bldg. in 55 gallons drums.

9.5.7.2 System Description (Continued)

requiring diesel generator operation, the lube oil keep-warm system is shut down.

The Diesel-Generator Lubrication System consists of an oil sump in the engine frame, an engine-driven positive displacement pump, an oil cooler, an oil strainer and a filter. The main engine-driven lube oil pump takes oil from the sump, passes it through the lube oil cooler and lube oil filter, through a strainer, through the engine and back to the sump. Constant oil pressure to the engine bearings is maintained by a pressure-regulating valve, which bypasses excess oil back to the sump.

The lube oil cooler is a shell and tube type, built to TEMA Class R, and conforms in all respects to ASME Code, Section III, Class 3. Cooling water for the cooler comes from the jacket cooling water (Subsection 9.5.5).

The Divisions 1 and 2 diesel-generator sets have lube oil heating systems to keep the oil warm during standby. An electric oil heater in the engine oil sump heats the oil, which is then circulated through the engine by a keep-warm oil circulating pump. A separate filter and a separate strainer in the keep-warm circuit ensure oil cleanliness.

All tanks, pumps, piping, and valves are built to ASME SECTION III, class 3, Quality Group C and Seismic Category I.

9.5.7.3 Safety Evaluation

Each diesel-generator lubrication system is an integral part of the diesel generator. The system is not required to meet the single-failure criterion because a failure does not prevent the other two divisions of the emergency power system from providing adequate power to safely shut down the plant or to mitigate the consequences of any of the postulated accidents.

insert — Lube oil could be added to the sump tank during engine operation

Lube oil system could operate for 7 days at full load

430.98 (9.5.7) Describe the instrumentation, controls, sensors and alarms provided for monitoring the diesel engine lubrication oil systems and their function. Indicate where the alarms are annunciated. Identify the temperature, pressure and level sensors which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer. Describe any operator action required during alarm conditions to prevent harmful effects to the diesel engine. If any of the systems, controls and/or alarms are associated with an automatic engine shutdown, discuss the interlocks provided for bypassing the shutdown function under emergency conditions.

Response

It was specified that sufficient indication and alarms to monitor the performance of the lube oil system both during the running of the diesel generator set and during the standby mode, shall be provided. The gauge panel includes lube oil pressure and lube oil temperature gauges. Also, the annunciator includes lube oil pressure low, and lube oil high differential pressure annunciation. The rest of the instrumentation, controls, sensors and alarms provided are by the applicant. See response to 430.09 for alarms.

430.99 (9.5.7) Describe your program for periodic testing and calibration of sensors, controls, and instrumentation which will be implemented to ensure a highly reliable lubrication system.

Response

The program for periodic testing and calibration of sensors, controls, and instrumentation to insure a highly reliable lubrication system is by the applicant.

The requirement for periodic testing & calibration will be added to FSAR section 9.5.7.4 as shown in the attached marked-up page 9.5-35.

9.5.7.4 Tests and Inspection

The operating ability of the Diesel-Generator Lubrication System is tested and inspected during scheduled testing of the overall engine. Instrumentation is provided to monitor the lube oil temperature, pressure and sump level, ensuring proper operation of the system. During standby periods, the keep-warm feature of the system is checked at scheduled intervals to ensure that the oil is warm. Warm oil assists quick starting of the engine. Instruments receive periodic calibration + test to verify their accuracy. Local gauge board-mounted alarms signal low oil pressure, high oil temperature and low oil level. A remote combined alarm, one for each division, located in the main control room, annunciates on signal of diesel generator trouble from any alarm source on the local panel.

Administrative Controls - The lubrication systems are located in locked, controlled Diesel-Generator Buildings, thus precluding unauthorized personnel from interfering with system operation. Also, any contamination of the lubricating oil by deleterious material is thereby prevented.

9.5.8 Diesel-Generator Combustion Air Intake and Exhaust System

9.5.8.1 Design Bases

All components of the Diesel-Generator Combustion Air Intake and Exhaust System shall be designed and qualified to Seismic Category I requirements. Failure of the intake and exhaust system in any one diesel generator shall not compromise the readiness or operability of any other diesel generator. The system shall be housed in a Seismic Category I and tornado missile-protective structure. The system shall also be protected from flooding and the effects of pipe breaks.

430.100 (9.5.7) Expand your description of the diesel engine lube oil system to include a detailed system description of what is shown on Figures 9.5-16 and 9.5-17 of your FSAR. In your response, describe: (1) the components and their function; and (2) a diesel-generator starting sequence for a normal start and an emergency start.

Response

Detailed system description of diesel engine lube oil is by the applicant. General system description is shown in section 9.5.7.2 of the FSAR.

430.101 (9.5.7) In Section 9.5.7.4 of your FSAR, you refer to alarms for low oil pressure, high oil temperature and low oil level. However, none of these alarms are shown on Figure 9.5-16. Further, you show these alarms on Figure 9.5-17 in addition to a low oil temperature alarm, a lube oil high temperature and a high pressure alarm associated with a relief valve and an extra lube oil low pressure alarm. None of these alarms are described in the text of your FSAR. Revise Figures 9.5-16 and 9.5-17 to agree with the text and/or revise the text to agree with Figures 9.5-16 and 9.5-17.

Response

It was specified for the Div 1 and 2 diesel-generator lube oil system that the annunciator shall include annunciation of the lube oil pressure low and lube oil high differential pressure. All the rest of the alarms necessary shall be by the Vendor. ~~Figure 9.5-16 is an exact replica of Delaval's drawing 07-720-115?? and Brown SPF-520086-00-039. Therefore, the Vendor should provide their drawing showing complete alarm system in order that Figure 9.5-16 could be revised to show complete alarm system. Afterward, GESSAR 9.5.7.4 could also be revised to comply with Figure 9.5-16.~~

Our drawings are not intended to show all instrumentation within the ~~Vendor~~ Applicant's scope of supply. See response to 430.07 and revised FSAR section 8.3.1.1.8.1.5 for alarms.

430.102 (9.5.7) On Figure 9.5-16, you show a 12 inch "engine L.O. drain," and a 2 inch "drain." Explain the function of each of these drains.

Response

The function of 12 inch engine lube oil drain as shown on figure 9.5-16 is to return lube oil from the diesel-engine to the lube oil sump tank. The function of the 2 inch drain is to empty the lube oil sump tank, as necessary, to reflenish the dirty lube oil with clean lube oil, and during maintenance or plant shutdown where repairs are needed to be done on the lube oil sump tank and components located inside the sump Tank, Figure 9.5-16 will be revised to change 12 inch engine lube oil "drain" to "return", as shown on the attached marked up Figure 9.5-16.

430.102 ATTACHMENT

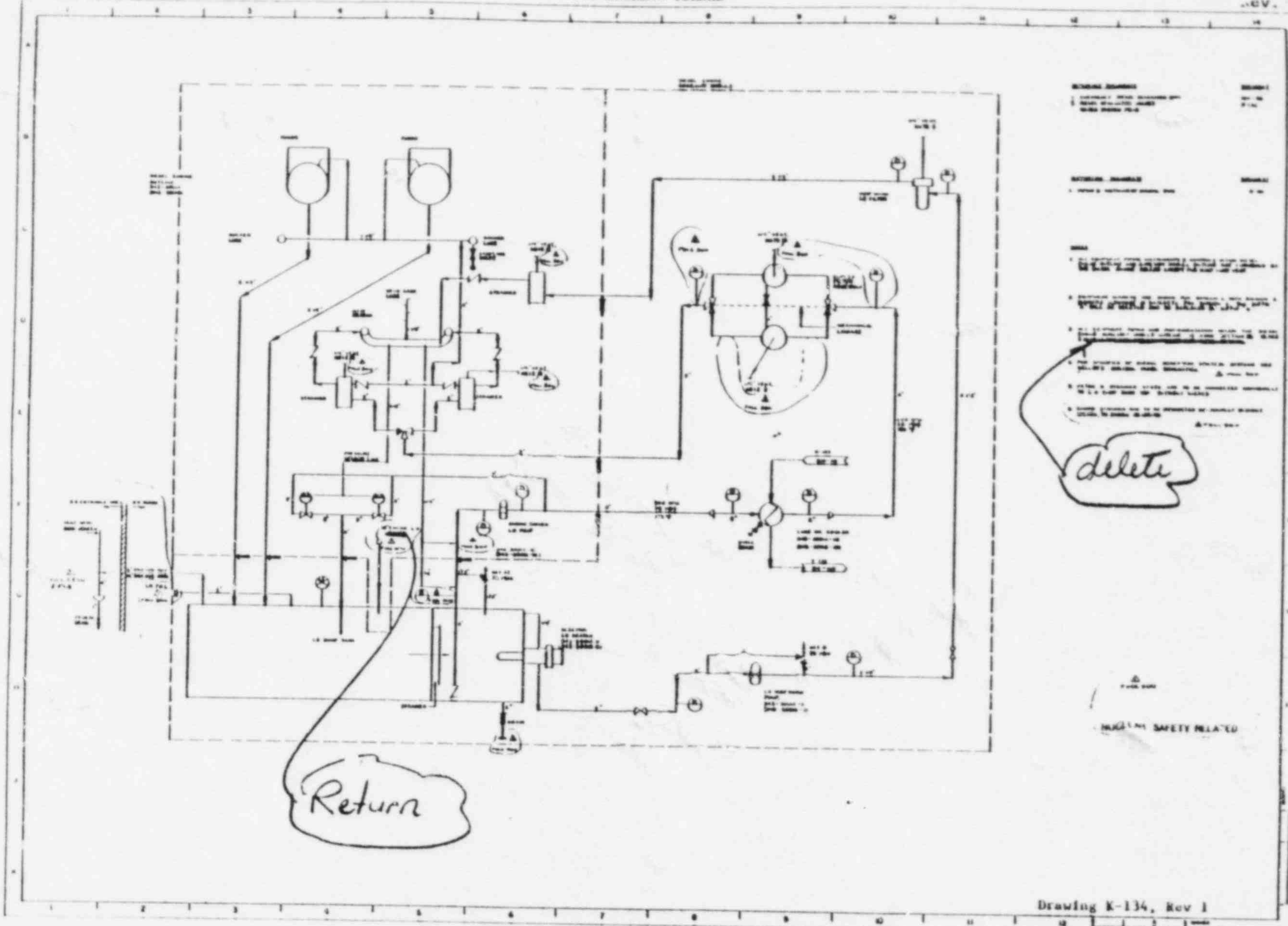


Figure 9.5-16. Division 1 and 2 Diesel-Generator Lube Oil System P&I Diagram

430.103 (9.5.7) Expand your description of the lube oil keepwarm circuit for the Divisions 1 and 2 diesel-generators to include such specific items as the keepwarm pump capacity, L.O. heater capacity, design L.O. temperature during standby operation, minimum design ambient temperature in the diesel-generator room, and instrumentation and controls for the keepwarm system.

Response.

The lube oil keepwarm pump capacity, L.O. heater capacity, design L.O. temperature during standby operation, and the instrumentation and controls for the keepwarm circuit are by the Applicant.

The minimum design ambient temperature in the diesel-generator room, as specified, is 60°F, See FSAR section 9.4.7.5.1.

430.104 (9.5.7) Provide the seismic and quality group classifications for the keepwarm pump, heater, and associated piping and components, and for the L.O. sump vent.

Response

The seismic qualification for the lube oil keepwarm pump, heater and associated piping and components is seismic category I, and for the lube oil sump vent is category II. Refer to note 3 on 9.5-16. Quality group C infers seismic category I unless otherwise noted - Table 3.2-2. The quality group classification for the sump tank vent is quality group D and for the lube oil keepwarm pump, heater, lube oil piping, and components is by the Vendor or by the Applicant since all of these are furnished by the diesel-engine seller, see note 1 in Figure 9.5.16.

For new and future plants, Figure 9.5.16 note 3 will be modify so that exception for LO keepwarm pump and sump tank vent shall be taken out, see markedup Figure 9.5-16 attached in question 430.102.

QUESTION 430.105
(9.5.7)

One of the recommendations in NUREG/CR-0660 is for prelubrication of the diesel engines prior to starting, thereby minimizing wear due to a lack of adequate lubrication at the time of starting. The keepwarm circuit shown on Figure 9.5-16 provides continuous prelubrication to the Divisions 1 and 2 diesel engines, except for the turbochargers and the upper part of the diesel engine. Show that this lack of prelubrication does not impair diesel engine operation or reliability.

If the Divisions 1 and 2 diesel engines will be manufactured by DeLaval, revise your lubrication system P&I diagrams to show vendor modifications to provide drip lubrication to the turbocharger thrust bearings. State whether vendor modifications to the governor lube oil circuits have been, or will be, incorporated. If the Division 3 diesel generator is manufactured by EMD, show that the recommendations of MI-9644 have been incorporated. (Refer to Item (c) of Question 430.110.)

RESPONSE

The implementation of MI-9644 recommendation to be answered by the applicant.

Division 3 diesel generator has a continuously operating soakback pump which provides lubrication to the turbo-charger parts in the standby condition.

MP:csc/I10146-39
11/4/82

QUESTION 430.106
(9.5.7)

Describe the function of the pressure pump, piston cooling pump, scavenging pump, and soak back pump for the Division 3 diesel-generator. (Refer to Figure 9.5-17 of your FSAR.) Describe how these pumps are driven; i.e., common shaft or separate shafts.

RESPONSE

The pressure pump (main oil pump) and the piston cooling pump tube oil from the diesel engine oil sump via the lube oil strainer. The pressure pump supplies the lube oil to the diesel engine bearings, gears, and the turbo-charger; the piston cooling pump supplies oil to the diesel engine pistons.

The soak back pump supplies oil from the engine sump to the turbo-charger bearings (in order to carry away the heat from the bearings after the engine is shut down) as well as circulate oil through the lube oil cooler to pick up heat during the standby condition. The soak back pump (motor driven) operates all the time. During standby condition the soak back pump circulates the oil through the lube oil filter and the lube oil cooler where the oil picks up heat from the preheated cooling water, and thus keeps the engine enhance the engine start capability.

The scavenging pumps take oil from the engine oil pan sump or resevoir and pumps through the filters, oil cooler, and returns to supply the main lube or pump and piston cooling pump with cool and filtered oil.

The main oil pump (pressure pump) and the piston cooling pumps are driven by a common driven shaft (engine driven).

The scavening oil pump is driven by the gears mounted on the main drive shaft which also drives the fuel pump.

MP:csc/I10146-40
11/4/82

QUESTION 430.107
(9.5.7)

The lube oil filter shown on Figure 9.5-17 of your FSAR has a single inlet line from the scavenging pump discharge and two outlet lines, both of which terminate at the lube oil strainer. Describe the operation of the lube oil filter and the function of each of the outlet lines. Describe the operation of the lube oil filter internal relief valve. Indicate how this relief valve interfaces with the system temperature and pressure alarms.

RESPONSE

Lube oil filter entraps the foreign particles of dirt, debris and other solids and allows clean oil to flow through the filter media. The main outlet line feeds oil to the lube oil cooler.~~while~~ the secondary outlet line ~~relieves the excessive flow to the cooler and let's it to flow~~ directly to the lube oil strainer. Lube oil filter relief valve allows the lube oil to bypass the filter when the filter is clogged and the differential pressure across the filter rises above the preset limit.

QUESTION 430.108
(9.5.7)

inlet ?

You show on Figure 9.5-17 of your FSAR, a line between the soak back pump discharge and the turbocharger lube oil filter outlet. State the purpose of this line. If the soak back pump operates continuously during standby, describe how a buildup of lubricating oil in the diesel engine exhaust system is prevented. (NUREG/CR-0660 indicates that excess oil in the exhaust system could be a fire hazard.) Describe the function and operation of the spring check valve and the connecting line between the soak back pump discharge and the lube oil filter inlet shown on Figure 9.5-17.

RESPONSE

The line between inlet the soak back pump discharge and the turbo charger lube oil filter ~~outlet~~ is to provide lube oil flow to the engine keepwarm loop during the standby condition.

The soak back pump operates continuously during the standby condition.

The fire hazard potential in the engine's exhaust system is partially due to incomplete combustion of fuel resulting in formation of gum and varnish deposits on cylinder walls, pistons, piston rings, turbochargers and exhaust system. This may occur because of diesel light load operation for extended periods of time.

The lubrication supplied to the turbo-charger is not the prime suspect for the fire hazard in the exhaust system. The turbocharger bearings are sealed inorder to prevent lube oil leakage into the exhaust system. The spring check valve and the lube oil line connecting the soak back pump discharge to the lube oil filter are part of the keep warm loop. The springcheck valve opens in one direction to allow lube oil flow to the lube oil cooler via lube oil filter when, in standby condition the lube oil pressure in soakback pump discharge line exceeds 30 PSI. This is approximately equal to 2-3 GPM oil flow to the keepwarm loop.

MP:csc/I10146-43
11/4/82

QUESTION 430.109
(9.5.7)

Using Figure 9.5-17 of your FSAR as an aid, describe how diesel engine prelubrication is accomplished. State whether the prelube system operates continuously during periods of diesel-generator standby. Describe how the lube oil temperature is maintained during standby. If any parts of the diesel engine do not receive prelubrication, identify the affected parts and explain how engine reliability is not degraded as a consequence. Revise Figure 9.5-17 as required.

RESPONSE

Prelubrication to the turbocharger bearings is achieved by the soakback pump which operates continuously. Prelubrication to the other parts is achieved by regular manual lubrication, as per manufacturer's recommended procedures.

The lube oil is kept warm by circulating the oil from the oil sump through the lube oil filter and lube oil cooler, where it picks up heat from the warm water, and returning to the lube oil strainer and to the oil sump by flowing over the alarm. This circulation is maintained during standby condition by means of continuously operating the soakback pump. This pump has a capacity of 5-6 gpm out of which 2 gpm flows to the turbo charger bearing while the balance flows through the lube oil filter and cooler via 30 psi spring check valve.

QUESTION 430.110
(9.5.5, 9.5.6, 9.5.7)

Category of most significant corrective action. This is based on data which show that lack of knowledge of diesel-generators and systems has contributed significantly to diesel-generator failures and an overall lack of reliability. In response to these data, we now review personnel training and training programs as an integral part of our licensing procedure.

Considering the significance of personnel training, provide justification for proposing:

a. Cooling water systems for the diesel engines of Divisions 1 and 2 which have significant design differences from that of Division 3. (Refer to Question 430.76)

b. Compressed air starting systems for the Divisions 1 and 2 diesel generators which have significant design differences from that of Division 3. (Refer to Question 430.86)

c. Diesel-generator lubrication systems for Divisions 1 and 2 which have significant design differences from that of Division 3. (Refer to Question 430.105.)

RESPONSE

The Division 3 (HPCS) DG is specified and designed for a specific application to start and carry a single large motor load (HPCS pump) while the Divisions 1 and 2 diesel generators were purchased for the specific purpose of handling distributed loads rater than one large load. The division 3 load requirements (one large inductive load - HPCS pump motor) dictates the type of the diesel generator set as presently designed and purchased. This is a standard design package to match the HPCS pump motor load requirements. The design and manufacture of the division 3 (HPCS) DG has been standardized and historically approved for the application. It might be purely a coincidence if Division 1 and 2 DG sets will match with the Division 3 DG sets. Thus, the various auxiliary systems furnished with each diesel generator set may be different.

NOTE TO AE:

Supplement above responds with your justification of Divisions 1 and 2 DG sets. Also verify the statements applicable to Divisions 1 and 2 DG sets.

MP:csc/I10146-41
11/4/82

430.111 (9.5.7) Revise Figure 9.5-10 of your FSAR, to show the complete combustion air intake and exhaust systems. Alternatively, provide a new P&I diagram showing these systems, including all three divisions. Show all instrumentation and controls associated with the systems.

Response

The combustion air intake and exhaust systems shown in Figure 9.5-10 is complete. All instrumentation and controls associated with the systems but are not shown are by applicant.

430.112 (9.5.8) Describe the instrumentation, controls, sensors and alarms provided in the design of the diesel engine combustion air intake and exhaust system which alert the operator when parameters exceed ranges recommended by the engine manufacturer and describe any operator action required during alarm conditions to prevent harmful effects to the diesel engine. Discuss systems interlocks provided.

Response

The Div 1 and 2 air intake filters are provided with a differential pressure gauge across each filter. Additional instrumentation, controls, sensors, and alarms provided in the design of the diesel engine combustion air intake and exhaust system are by Vendor's requirement applicable to a particular situation and environment.

430.113 (9.5.8) In Section 9.5.8.3 of your FSAR, you state that all intake and exhaust ducting will be seismic Category I and conform to ANSI B31.1 piping code requirements. This is not acceptable. We require the air intake and exhaust system, up to the diesel engine interface, be designed to seismic Category I requirements and be built to ASME Section III, Class 3 or Quality Group C standards. Revise your design accordingly. Identify the engine interface for both intake and exhaust systems.

Response

section 9.5.8.3 will be revised to show that the air intake and exhaust ducting will be designed and built to seismic category I and ASME section III, class 3, quality group C requirements.

The interface quality group classification within the diesel-engine outline or module will be by the Vendor.

9.5.8.3 Safety Evaluation (Continued)

monitor this condition, a differential pressure gauge is installed across each filter.

The effects of a local decrease in barometric pressure (e.g., due to a tornado or hurricane) are largely negated by the engine turbochargers.

All intake and exhaust ducting, as well as the ducting hangers, are designed and qualified to Seismic Category I requirements. Further, the ducting conforms to ~~the ANSI B31.1 piping code.~~ ASME Section III, Class 3, Quality Group C requirements.

9.5.8.4 Inspection and Testing Requirements

Visual inspection of the Diesel-Generator Combustion Air Intake and Exhaust System may be carried out concurrently with regularly scheduled diesel-generator testing and inspection. Integrity of the ducting and joints, filter condition, intake and exhaust silencer condition and exhaust stack inspection are included in the diesel-generator inspection procedure.

9.5.9 Suppression Pool Cleanup System

The Suppression Pool Cleanup (SPCU) System serves no safety function. System analysis has shown that failure of the system to operate does not compromise any safety-related system nor prevent a safe shutdown.

9.5.9.1 Design Bases

9.5.9.1.1 Safety Design Bases

(1) Containment penetrations, isolation valves and piping up to those valves are designed to Seismic Category I, ASME

430.114 (9.5.8) In Section 9.5.8.3 of your FSAR, you state that the air intakes for the Divisions 1 and 2 diesel-generators are located 7 feet, 9 inches above grade. This is not acceptable. In NUREG/CR-0660, it is recommended that air intakes be located a minimum of 20 feet above ground to minimize ingestion of dust and debris stirred up at grade level or by the velocity of the air entering the intakes. Revise your design accordingly.

Response

Actually, the Div 1 and 2 air intake are located at El. +7'-8 3/8" and the grade level is at El. -9'-0". Therefore, the air intake is 16'-8 3/8" above the grade. FSAR Section 9.5.8.3 will be revised as ~~The Div 3 air intake is located at Floor El. +13'-0" and the grade level is at El. -9'-0". Therefore, the Div 3 air intake is 22'-0" above the grade.~~ shown on the marked-up page 9.5-37.

9.5.8.2.2 Division 3 (Continued)

Engine exhaust gases are ducted clear of the building, through an exhaust silencer, into an exhaust stack and ultimately out to the atmosphere. A drain penetration in the bottom of the exhaust stack prevents buildup of condensate. Intake air and exhaust gases are completely isolated from the Diesel Generator Building air.

9.5.8.3 Safety Evaluation

Both the intake and exhaust system components of all three engines are completely separate and independent. Failure in any one system has no effect on the readiness and/or operability of either of the others.

For all systems, the air intake is approximately ~~7~~ 16 ft 9 in. above grade, while the exhaust gases are released to the atmosphere at El. 65 ft 0 in. above grade. Therefore, the possibility of products of combustion diluting the oxygen content of the intake air is essentially nil. Also, other gases will not be stored close enough to the diesel air intake that their release to atmosphere would dilute the intake air and affect the performance of the diesel generators.

See the Diesel-Generator Building arrangement drawings in Section 1.2 for intake and exhaust locations, Subsection 3.8.4 for design of the Diesel-Generator Building, Section 3.4 for flood protection and Section 3.6 for pipe failure protection. See Table 9.5-3 for the system failure analysis.

The Division 1 and 2 combustion air intakes are protected by grills through which the air passes vertically upward. This minimizes plugging of the filters by gross debris picked up by events such as a tornado or a hurricane. Particulate matter small enough to pass through the grill can cause plugging of the inlet filters. To

430.115 (9.5.8) In Section 9.5.8.3 of your FSAR, you briefly discuss the effects of decreases in barometric pressure on diesel engine performance. Expand this discussion to be more specific as to the effect of decreasing barometric pressure. State the maximum tornado-induced pressure change in units of psi per second, the diesel engines can withstand without significantly affecting performance. State the minimum barometric pressures (in. of Hg regulating from a hurricane) at which the diesel engines can operate for: (1) up to one hour; and (2) for extended periods without degrading output or causing engine problems. In your response, discuss the three diesel-generators.

Response

It was specified that the diesel-engine should be able to stand a maximum outdoor tornado-induced pressure change of 2 psi per second for Div 1 and 2 diesel-generator. & (–) 3 PSI. See FSAR section 3.3.2. The minimum barometric pressure (in. of Hg) ~~regulating~~ resulting from a hurricane) at which the diesel engine can operate without degrading output or causing problems should be ~~provided~~ by the equipment manufacturer.

430.116 (9.5.8) Experience at some operating plants has shown that diesel engines have failed to start due to an accumulation of dust and other deliterious material on electrical equipment associated with starting of the diesel-generators (e.g., auxiliary relay contacts and control switches).

Describe the provisions you have made in your diesel-generator building design, electrical starting system, and ventilation air intake design(s) to preclude this condition, thereby assuring the availability of the diesel-generator on demand.

Describe what procedures will be used during normal plant operation to minimize accumulation of dust in the diesel-generator room. Specifically address the control of concrete dust. In your response, consider the condition of one unit in operation with one or more additional units under construction at the same site.

Response

The diesel generator starting system is a pneumatic system with electrical interlocks such as solenoid valves. The diesel engine purchase specification requires the control panels to be NEMA Type 12. ~~The NEMA Type 12 will provide some dust protection.~~ The specification also requires all relays to have covers for dust protection. The interiors of the DG rooms are painted.

430.117 (9.5.8) Show by analysis that a potential fire in the Division 2 and Division 3 diesel-generator building occurring with a coincident single failure of the fire protection system, will not degrade the quality of the diesel combustion air, thereby permitting the remaining diesel-generator to provide its full rated power.

Response

Potential fire in the Division 2 and 3 diesel-generator building will not degrade the quality of the diesel combustion air, thereby permitting the remaining diesel-generator to provide its full rated power for the following reasons: Each Division 2 and 3 DG buildings are independent from each other and will be totally isolated from each other in case of occurence of fire in either building. The location of each air intake are far away as possible so that in case of fire in one building the remaining air intake will not be affected,

ATTACHMENT NO. 6A

DRAFT RESPONSES TO

RADIOLOGICAL ASSESSMENT BRANCH

QUESTIONS

Responses to all Radiological Assessment Branch questions will be provided in December 1982.

ATTACHMENT NO. 6B

DRAFT RESPONSES TO

EFFLUENT TREATMENT SYSTEMS BRANCH

QUESTIONS

460.09 (1.8) (11.2) (11.3) (11.4) Provide a table in Section 1.8 of your FSAR comparing the design features of the liquid, gaseous and solid radwaste systems with each position of Regulatory Guide 1.143, Revision 1 (October 1979). Justify each position for which an exception is taken. If information is provided in other sections of the FSAR for the individual items, cross-references to these sections is acceptable. We consider compliance with Section C.5 of Regulatory Guide 1.143 to be essential. Verify whether you satisfy our acceptance criteria for concentrations of radioactive constituents in accordance with Item II of section 15.7.3 of the Standard Review Plan (SRP). Our position is that limiting doses to 0.5 rems, as stated in Section 11.3.2.20 of your FSAR, is not an acceptable alternative.

GENERAL ELECTRIC CO.

Nuclear Energy Business Operations

ENGINEERING CALCULATION SHEET

NUMBER ______ DATE ______

SUBJECT ______ BY ______ SHEET 1 OF ______

Response (GAS)

460.09

a) The Offgas system is designed and ~~fabricated~~ tested to the requirements of RG 1.143 Rev 1 table 2

b) The materials of the pressure retaining components of the Off gas system conform to the ~~the~~ requirements of ~~the~~ Section II of the ASME B&PV code. There is no portion of the offgas system that, in normal operation contains a combustible mixture of H2 and oxygen. H2 analysers are provided in ~~all~~ the places were it is ~~probable that~~ remotely possible for Hydrogen to exist in combustible amounts. The system is designed to eliminate all possible sources of ignition in case H2 should so exist. In addition all ~~part~~ pressure retaining components of the off gas systems are designed to contain without damage the worst possible detonation of a hydrogen mixture within the system. The design method is that of Appendix C of ANSI 55.4.

GENERAL ELECTRIC CO.
Nuclear Energy Business Operations
ENGINEERING CALCULATION SHEET

NUMBER ______ DATE ______
SUBJECT ______ BY ______ SHEET 2 OF ______

The charcoal delay tanks of the off gas system are installed on the basemat of the turbine bldg. The tanks and their supports are designed to sustain the OBE without damage and without exceeding the allowable stresses in the supports.

a) The tanks as structures ~~are~~ have a natural frequency above 33 hertz and b. the stress is analysed with a horizontal static ~~a~~ coefficient equivalent to the OBE c) The tanks are mounted on the basemat of the building containing them. d) The stress level in the supports does not exceed 1.33 times the allowable level ~~as~~ permitted in AISC "Manual of Steel Construction" 7th Ed 1970. ~~[illegible]~~

These criteria have been accepted in NuReg 0124 (Supp 1 to NuReg-75/110)

GENERAL ELECTRIC CO.
Nuclear Energy Business Operations
ENGINEERING CALCULATION SHEET

NUMBER ______ DATE ______
SUBJECT ______ BY ______ SHEET 3 OF ______

It is to be noted that the normal operating pressure of the offgas system is below 3 psig and the minimum design pressure of a process containing component is 350 psig. ~~The~~ All pressure retaining butt welds are 100% radiographed. and the system is 100% helium leak checked.

~~The~~ In addition the system is designed so that no single failure of an active mechanical component could allow the bypass of the ~~th~~ primary charcoal adsorbers.

GENERAL ELECTRIC CO.
Nuclear Energy Business Operations
ENGINEERING CALCULATION SHEET

NUMBER ______ DATE ______
SUBJECT ______ BY ______ SHEET 4 OF ______

Assuming ~~the failure of~~ 2 active component failures (both bypass valves) allowing gas to bypass the main charcoal adsorbers and using either (7+1) times the expected offgas release rate of 25,000 µci/sec (measured at 30 min) or 100 µci/sec x Rated Thermal power of the plant in Megawatts) as specified in SRP 11-5 and the physically unrealizable semi infinite cloud model of RG 1.109 and the ~~accident~~ ~~of~~ a $\frac{\chi}{Q}$ designed to cover accidents not the "normal operating event" as this is defined in the SRP. The dose is less than 375 mrem

LIQUID & SOLID

Draft responses will be provided in December 1982.

C F BRAUN & CO

EJW
11-1-82
JOB NOTES

CUSTOMER	PAGES 3	PAGE 1
APPARATUS	JOB 6382-P	
DATE	BY	ITEM

QUESTION 460.10

Add sections for effluent radiation monitors and engineered safety feature (ESF) filters in Table 3.2-1 of your FSAR. Also add to this table, under appropriate sections, the recombiners in the off-gas system and the process radiation monitors themselves.

RESPONSE 460.10

Effluent radiation monitoring is included in Group X, Process Radiation Monitor System, of Table 3.2-1. ESF filters are in Group XXXI, Standby Gas Treatment System, of Table 3.2-1. The recombiners in the off-gas system are included with the pressure vessels in Group XXX, Offgas System, of Table 3.2-1. The process radiation monitors themselves are included with the electrical modules in Group X, Process Radiation Monitor System, of Table 3.2-1.

~~ok with h.b.l for SGTS~~

Table 3.2-1

EQUIPMENT CLASSIFICATION (Continued)

Principal Component[a]	Safety Class[b]	Location[c]	Quality Group Classification[d]	Quality Assurance Requirement[e]	Seismic Category[f]	Comments
X Process Radiation Monitor System (includes gaseous and liquid effluent monitoring)						
1. Electrical modules ~~main~~ with safety ~~steamline and reactor building ventilation monitors~~ functions (includes monitors)	2	A,C,T,X (R3)	N/A	B	I	
2. Cable ~~main steamline and~~ with ~~containment ventilation~~ safety ~~monitors~~ functions	2	A,C,T,X (R3)	N/A	B	I	
XI RHR System						
1. Heat exchangers - primary side	2	A	B	B	I	
2. Heat exchangers - secondary side	3	A	C	B	I	
3. Piping within outermost isolation valves	1,2	C	A/B	B	I	(g)
4. Piping beyond outermost isolation valves	2	A	B	B	I	(g)
5. Pumps	2	A	B	B	I	
6. Pump motors	2	A	N/A	B	I	
7. Valves - isolation, LPCI line	1	D,A	A/B	B	I	(g)
8. Valves - isolation, other	2	D,A	B	B	I	(g)

460.11 (6.5.1) Provide additional information on the following items for the ESF filters of the standby gas treatment system (SGTS) and the control building:

a. State whether instrumentation for measuring flow rates through the ESF filter systems will be provided in accordance with Regulatory Guide 1.52, Revision 2 (March 1978).

<u>Response</u>

The instrumentation for measuring flow rates through the ESF filter systems for the SGTS is furnished by the applicant as part of the Gaseous Effluent Monitoring System (GEMS).

The instrumentation for measuring flow rates through the ESF filter systems for the Control Building Outdoor Air Cleanup (CB OAC) System is provided in accordance with Regulatory Guide 1.52, Revision 2 (March 1978) except for the record suggestion as discussed in the following part b.2).

b. Indicate the type of recording device which will be provided for recording pertinent pressure drops and flow rates in the control rooms.

<u>Response</u>

1) The type of recording device which ~~will be~~ is provided for recording the flow rates through the ESF filter systems for the SGTS is furnished by the applicant as part of the GEMS.
No recording device ~~will be~~ is provided for recording the pertinent pressure drops in the control room for the SGTS. A recording device is not needed since the standby unit will automatically start if either of the operating unit's pertinent pressure drops reaches its limiting condition.

2) No recording device ~~will be~~ is provided for recording the pertinent pressure drops and flow rates in the control room for the CB OAC System. A recording device is not needed since the standby unit will automatically start if the operating unit's flow rate reaches its lower limiting condition.

c. Since the explanations given in Table 6.5-1 of your FSAR indicating how you satisfy positions C.2.j and C.4.b of the regulatory guide cited in Item (a) above are unclear, explain how replacements of either all or part of the filter train will be accomplished when this is required. Also explain how the filter train components will be maintained by service personnel located outside the housing. Indicate whether the ESF atmosphere cleanup system will be totally enclosed.

Response

The charcoal, filters, demister, electric heating coil and controls for the SGTS and the CBOACS are replaced by removing them from the units. The housings for the SGTS and the CBOACS are all welded stainless steel housings and are not removal as and intact unit or in section. This position was explained in GESSAR I, as follows:

c-2-j Both the standby gas treatment units and the emergency air makeup cleaning units are not removable as intact unit. High activity accumulating elements can decay safely in place prior to removal as safe radwaste. Removal of the charcoal will be done pneumatically into standard solid radwaste containers with minimum exposure to operating personnel.

A change in the position stated in GESSAR I will have a major effect upon the design.

RESPONSE TO QUESTION 460.11 CONT.

The CBOACS unit is a front loading type of unit. The unit is manufactured by CTI and meets the requirements of RG 1.52.
The unit is designed such that the prefilters and the HEPA filters are installed into the unit from the front of the unit. The filter are bolted into holding frames from the front of the unit. The filters openings in the front of the unit are covered by access plates. The access plates are removed from the unit to remove the filters. This operation is done from the front of the unit without entering into the unit.

The ESF atmosphere cleanup system will be totally enclosed

d. State whether duct and housing leak tests will be performed in accordance with the provisions of Section 6 of ANSI N 510-1975 and in accordance with position C.2.1 of the regulatory guide cited in Item (a) above.

Response

The ESF atmosphere cleanup systems housing leakage test is specified to be performed in accordance with provisions of Section 6 of ANSI N 510-1975 and in accordance with C.2.1 of RG 1.52. The purchase specification for the ESF atmosphere cleanup systems require the manufacturer to perform the required factory

[illegible]

test specification for these systems will require the field test to be performed to verify the systems meets the requirements of ANSI N 510-1975.

Compliance with the test requirements is the responsibility of the applicant

e. With regard to the position C.3.b of this regulatory guide, state whether the manual overtemperature cutoff switches for the air heaters will be accessible following a postulated loss-of-coolant accident (LOCA). Note that the temperature set point should not exceed 225 F per ANSI N 510-1975.

Response

With regard to the position C.3.b of the NRC Regulatory Guide 1.52, Revision 2 (March 1978), and ANSI N 509-1976, automatic overtemperature cutoff switches are furnished for the air heaters in lieu of the manual overtemperature cutoff switches. These automatic overtemperature cutoff switches will not be accessible following a postulated LOCA. This is acceptable since they reset automatically and do not require manual action of any kind. The temperature set point should not exceed 225°F per ANSI N 509-1976. The applicant will be required to comply.

460.12 (11.1) Provide information on source terms for the following items:

a. Provide the appropriate data for the items listed in Chapter 4 of NUREG-0016, Revision 1 (January 1979). For those items for which information has already been provided elsewhere, cross-references to the applicable sections are acceptable.

<u>Response</u>

4.1

1) Maximum Power = 3730 Mwt
2) H^3 production = 56 Ci/yr gas
56 Ci/yr liquid

4.2

1) Total Steam Flow
2) Total RPV inventory
{will be provided in December 1982}

4.6

1) Holdup Time from Main Condenser to offgas system = 0.0012 hrs.

2) See GESSAR II Section 11.3 for description of Offgas System performance
- Reduces H_2 from 45#/hr to 0.01#/hr
- Reduces Xe & Kr from 1.2 Ci/sec to 5.1×10^{-5} Ci/sec

I^- at Main Turbine Condenser = 6.3 Ci/yr

3) Mass of charcoal = 24.5 tons
Temperature of charcoal = -3°F, Dewpt = -65°F
K_{bxe} at above conditions = 2032 cc/gm,
K_{bkr} = 93 cc/gm

4) No cryogenic offgas system
5 & 6) H_2O used for turbine gland seal has no appreciable activity
7) See GESSAR II Section 11.3

b. Release data for tritium from operating BWR's does not support your conclusions regarding release via: (1) the gaseous pathway as compared to the liquid pathway; or (2) the total release. In fact, for a number of operating BWR's, tritium releases are significantly higher than your estimate. Accordingly, verify your estimates for tritum release via the gaseous and liquid pathways using actual release data.

c. Verify and correct the N-16 concentration given in Table 11.1-4 of your FSAR. Additionally, verify and correct, as appropriate, the reactor water concentrations for Na-24, P-32, Cr-51, Mn-54 and Zn-65 since these are significantly lower than the corresponding concentrations given in NUREG-0016, Revision 1.

d. Add Fe-55 to Table 11.1-5 of your FSAR.

Response

Draft responses to be provided in December 1982.

460.13 (11.2) Provide additional information on the following items applicable to the liquid waste management system:

a. Provide the liquid waste inputs in gallons per day (GPD), averaged on a yearly basis, of waste generation for low conductivity and high conductivity wastes to be used for evaluating liquid effluent releases and related off-site doses. In addition to the waste streams you have identified as design basis inputs in Table 11.2-4, you should also include the resin rinse and cleanup phase separator decant inputs. State the primary coolant activity fractions for each of the individual streams for these two waste subsystems.

b. Your inputs for chemical laboratory waste, laboratory wash water and laundry drains are low in comparison with the corresponding values given in NUREG-0016, Revision 1, on a per reactor basis. Verify and correct, as appropriate, these inputs.

c. Since you have considered only the deep bed regenerant system for condensate cleanup and you have also stated that the condensate cleanup system is within the applicant's scope, indicate whether usage of the deep bed regenerant system for condensate cleanup is an interface requirement. Additionally, indicate whether ultrasonic resin cleaning is also an interface requirement.

d. Since the filtered detergent wastes may be directly discharged into the circulating water discharge canal, state the fraction of detergent wastes that you expect to be discharged in a year to the circulating water discharge canal.

e. Indicate what you mean by a "waste collector subsystem" to which you refer in Section 11.2.2.2 of your FSAR; we do not find it discussed anywhere.

f. Since the excess water tank collects excess water from both the low and high conductivity subsystems, explain how you can selectively prevent discharge of excess water from the low conductivity subsystem during the time when excess water from the high conductivity subsystem is discharged to the environment. If you cannot prevent discharge of low conductivity wastes to the environment at all times, then include the appropriate fraction of waste discharge from this subsystem to the environment.

g. Since your P&I diagrams for the waste subsystems are for a dual unit radwaste system, indicate whether the equipment that you have listed on page 11.2-30 of your FSAR is for both units or whether it is on a per unit basis.

h. Describe the provisions for preventing uncontrolled releases of radioactive materials due to spillage in buildings or from outdoor tanks if the latter is within your scope. If these provisions will be described in your response to Question 460.09, a cross-reference to the relevant portion of Section 11.2 is acceptable.

i. Provide the concentrations of radionuclides in the excess water storage tank. Verify and correct, as appropriate, the amount of radioactivity, in curies, for I-131 and the total curies in the concentrated waste tank given in Table 12.2-13 of your FSAR.

j. Indicate whether your estimated releases and corresponding doses due to liquid effluents are based on design basis reactor coolant source terms provided in Tables 11.1-2 and 11.1-3 of your FSAR. If not, use reactor coolant source terms consistent with the bases in NUREG-0016.

In responding to the ten items above, revise the appropriate tables throughout your FSAR in a consistent manner and so indicate in your response.

Response

Draft responses will be provided in December 1982.

460.14 (11.3) Provide additional information on the following items applicable to the gaseous waste management systems:

a. Since your system description, tables and figures in Chapter 9 of your FSAR do not clearly indicate whether there are provisions for both HEPA and charcoal adsorbers for the reactor building pressure control mode and purge exhaust, provide the appropriate information relating to filter units for the reactor building.

Response

The filter unit, marked future, on Figure 9.4.7 is to filter the containment exhaust if operational measurement of radioactive emission indicate that filtration is needed to meet Appendix I limits.

This exception to the GESSAR PDA requirement for the filter unit was negotiated between TVA and the NRC for the Hartsville and Phipps Bend STRIDE units. (GE to provide exact reference).

The Nuclear Island design provides space and provisions for the addition of the filter units.

b. Total airborne effluent releases of noble gases, including Ar-41, tritium and C-14 and some of the particulates given in Table 11.3-8 of your FSAR, are not consistent with NUREG-0016, Revision 1, and are lower than corresponding releases for radionuclides cited in this document. We assume that you have not taken any credit for particulate removal by HEPA filters in the building exhaust systems since you state in Section 1.8 of your FSAR that the need for HEPA's and charcoal absorbers will have to be decided on a site specific basis. Accordingly, verify that your estimated releases are conservative. You should note that using an off-gas release rate of 25,000 Ci/sec for noble gases after a 30 minute delay is not consistent with the basis provided in NUREG-0016, Revision 1. A release rate of about 53,000 Ci/sec is appropriate according to this document. You should also note that the caption for Table 12.2-22 is misleading since the annual airborne releases from the various sources for evaluating the environmental impact should be used for total plant release and corresponding off-site gaseous effluent doses. Either correct the caption for Table 12.2-22 or revise the contents of the table so as to reflect expected releases rather than design basis releases. Revisions to Table 11.3-8 should be coordinated with corresponding revisions to gaseous effluent dose estimates given on page 11.3-25.

Response (b)

Draft response to be provided in December 1982.

c. Add flow rate measuring devices for the monitors and samplers for all the airborne effluent release pathways.

Response

The following effluent pathways are currently designed with flowrate measuring devices in the sampling system or duct:

(1) offgas pretreatment (see Fig 7.6-10a)
(2) offgas posttreatment (see Fig. 7.6-10b)
(3) offgas vent pipe (see Fig. 7.6-10b)
(4) containment ventilation discharge monitoring (Fig. 7.6-10d)
(5) shield annulus HVAC (Figs. 9.4-9, 6.5-1)

The following pathways do not have flow measuring devices dedicated distinctly for Process Radiation Monitoring but have the maximum rated flows associated with the duct shown on their respective ventilation drawing. Additional flow measuring devices for these ducts are within the applicants scope.

(1) Fuel Building HVAC
(2) Containment space - Refuel mode
(3) Auxiliary Building HVAC
(4) Control Building HVAC

The Standby Gas Treatment system and the Radwaste Building HVAC system are noted (per DWG on 7.6-11a) as having flow measuring devices to be installed by the customer.

Since the off-gas system is located in the turbine building which is not within the scope of your design, state whether the design of the off-gas system lies within your scope. If not, state whether the off-gas system you have described is an interface requirement for the balance of plant.

e. State whether the source terms you have used to evaluate off-site doses due to a postulated failure of the off-gas system are consistent with Branch Technical Position ETSP 11-5 (July 1981).

f. State whether the seismic criteria for the proposed off-gas system will conform to Section C.5 of Regulatory Guide 1.143. In responding to this question, a cross-reference to another section of your FSAR is acceptable.

Response

Draft responses to parts d, e and f will be provided in December 1982.

460.15
a

460.15 (11.4) Provide additional information on the following items applicable to the solid radwaste system:

a. Provide the isotopic breakdown of the total curie content of "wet" solid wastes that are expected to be shipped annually to a licensed burial site, accounting for the minimum decay available during storage prior to shipment. The total should include contributions from: (1) evaporator bottoms associated with high conductivity and detergent wastes; (2) spent resins associated with reactor water cleanup, radwaste, regenerant condensate deep bed, fuel pool and suppression pool cleanup demineralizers; and (3) filter sludges. Provide an estimate of the number of containers which will be shipped annually.

RESPONSE: 460.15 a

Wet solid waste is described in paragraph 11.4.2.3.1. Isotopic breakdown is shown in TABLE 11.4-3 and estimated number of containers is shown in Figure 11.2-16

[signature]

460.15
b

b. Experience with operating BWR's indicates that a deep bed condensate polishing system can generate a significantly higher volume of solidified "wet" solid wastes (i.e. about 41,000 cubic feet for a 3400 MWt plant) than that presented in Table 11.4-2 of your FSAR. Accordingly, verify that your inputs to Table 11.4-2 of your FSAR are correct.

RESPONSE: 460.15 b

Our information for operating BWR's in the 1700 to 2300 MW_T plant size indicates good agreement with the data presented in TABLE 11.4-2.

Domestic operating plants in the power range of 3300 MW_T are Brown Ferry and Peach Bottom. Neither have deep bed condensate polishing systems.

[signature]

46015
C

c. Add the suppression pool cleanup wastes in Section 11.4.1 of your FSAR
Added to text as shown below:

11.4.1 Design Bases

11.4.1.1 Power Generation Design Bases

The solid waste management system provides the capability for solidifying and packaging wastes from the reactor water cleanup system, the fuel pool cooling and cleanup system, suppression pool cleanup systems, the liquid radwaste system, resins, and particulate wastes from the condensate cleanup system. Wastes from these systems will consist of spent resin, evaporator bottoms, diatomaceous earth, and other filtering media.

The solid waste management system also provides a means of compacting and packaging miscellaneous dry radioactive materials, such as paper, rags, contaminated clothing, gloves, and shoe coverings and for packaging contaminated metallic materials and incompressible solid objectives such as small tools and equipment parts.

The solid waste management system is designed so that failure or maintenance of any frequently used component shall not impair system or plant operation. Storage is provided ahead of process units to allow hold-up in case of delay for maintenance.

Drum capping and sample retrieval are performed locally. The operating philosophy of the solid radwaste control system is manual start and automatic stop with all functions interlocked to provide a fail-safe mode of operation.

460.15
d

d. Describe your provisions for complying with Branch Technical Position ETSB 11-3, Revision 2 (July 1981). Your description should include: (1) the curbs and drainage provisions for containing radioactive spills; (2) a reference to the process control program as an interface requirement; (3) heat tracing for evaporator concentrate piping and tanks that are likely to solidify at ambient temperatures; (4) flushing connections, wherever appropriate; (5) the direct venting of equipment which uses compressed gases for the transport of resins or filters sludges; (6) the appropriate waste storage capacities for tanks accumulating spent resins from the reactor water cleanup system and other sources and filters sludges in accordance with our position in the branch technical position cited above; and (7) the volume of the available waste storage area for both the high and low-level wastes.

RESPONSE: 460.15 d

Sub-Question (1) radioactive spills
~~Chapter~~ Paragraph 11.4.2.3.3 discusses spills in the mix/fill STATION

" " (2) Process Control interface

" " (3) heat tracing for evaporator concentrate
heat tracing for concentrate piping and Tanks is shown on Figures 11.2-2j and 11.2-2h

" " (4) flushing connection
provisions for pipe and equipment flushing are described in chapter 11 and shown on specific P&ID for system

" " (5) direct venting of compressed gases

" " (6) Spent resin (OR Filter sludge) Rx Water Cleanup STORAGE CAPACITY.
STORAGE CAPACITY OF CLEANUP PHASE SEPARATORS and expected input is given in FIGURE 11.2-1b

" " (7) AVAILABLE WASTE STORAGE.
STORAGE CAPACITY FOR SOLID WASTE IS DISCUSSED IN PARAGRAPH 11.4.1.2

460.15
e

e. Add an interface requirement to control the release of airborne dusts generated during the compaction process for "dry" solid wastes.

RESPONSE: 460.15 e

~~The equipment used to process dry solid waste system is the responsibility of the applicant.~~

The response to this requirement will be supplied by the applicant. Reference: Subsection 11.4.2.3.2.

[signature] 10/20/82

2. The grab sampling provisions for the component cooling water system and the laboratory and sample system waste systems will be in the applicants scope. The fuel pool filter-demineralizer has the capability to include both the spent fuel and refueling pools.

3. Grab sampling and the associated analyses for radiological concentrations are within the applicants scope.

4. The entries for waste sample tanks and the floor drain sample tank, in Table 11.5-6, will be deleted.

5. Specific isotopic analyses are within the applicants scope. However, Regulatory Guide 1.21 Rev. 1 section C.10. notes that for certain radionuclides, for example Fe 55, it may be more appropriate to calculate its release concentrations based on previously calculated ratios and ones that are updated periodically to insure an accurate ratio.

469.16 (11.5) Provide additional information on the following items applicable to the process and effluent and radiological monitoring and sampling systems:

a. Provide in tabular columns, the sampling frequency, the minimum analysis frequency and the sensitivity in Ci/cc for the following airborne effluents and process streams:

1. Grab sampling for the principal gamma emitters and tritium for the plant vent, turbine building vent and radwaste building ventilation system effluents.

2. Grab sampling for the principal noble gas gamma emitters for the off-gas system, the drywell purge system and the fuel building ventilation system effluents.

3. Grab sampling for iodine in process streams for the off-gas treatment system; the drywell purge system; the auxiliary, fuel, radwaste and turbine buildings vent systems; the evaporator vent systems; and the pre-treatment liquid radwaste tank vent gas systems.

4. Continuous sampling of the effluents for iodines, particulates and gross alpha emitters for the plant vent, turbine building vent and radwaste building vents.

Your sampling and analysis frequencies and sensitivities for Items (1) through (4) above should be consistent with the appropriate frequencies and sensitivities in NUREG-0473, Revision 2 (February 1980). State whether the turbine building monitoring and sampling provisions are within the applicant's scope.

Response

The technical specifications for radiological effluents for grab sampling frequency, minimum analysis frequency and the sensitivity should be provided by the applicant during his submittal of the waste sampling and analysis program in conformance with R.G. 1.21. The consistency of these items with NUREG - 0473 Rev. 2 will need to be ascertained by the applicant at that time. The tables presented in GESSAR II, ie 11.5.4, 5, 6 and 7, are intended as a basic guide but not as a complete substitute for an approved sampling program.

The turbine building monitoring and sampling provisions are within the applicants scope.

b. For liquid effluents and process streams:

1. Add your proposed grab sampling provisions for the service water and the detergent drain tank effluents to Table 11.5-6 of your FSAR.

2. Add your grab sampling provisions in the process liquid streams for the component cooling water system and the laboratory and sample system waste systems in Table 11.5-4 of your FSAR. Clearly indicate whether the fuel pool filter-demineralizer includes both spent fuel and refueling pools.

3. It is our position that your grab sampling and the associated analysis should identify the isotopic composition and determine the concentrations of the principal radionuclides and determine the concentration of the alpha emitters in addition to determining the gross radioactivity for all liquid effluents and process streams.

4. Explain what you mean by the waste sample tanks and the floor drain sample tank to which you refer in Table 11.5-6 of your FSAR. We find these references to be unclear since the discharge to the environment from the liquid radwaste system can only be from either the excess water tank or the detergent drain tank according to your system description.

5. Add the radionuclide Fe-55 to the isotopic analyses of effluent and process streams.

Response

1. The grab sampling provisions for the detergent drain tank are listed in table 11.5.6. The grab sampling provisions for service water will be within the applicants scope.

c. State whether the design criteria for the radiological effluent monitors will conform with the manufacturer's standard per ANSI N13.10 (1974) and the staff's position on quality assurance in Sections C.4 and C.6 of Regulatory Guide 1.143, Revision 1. If not, provide justification for any deviations.

Response

It is unknown at this time whether all effluent monitors will conform with ANSI N13.10 (1974) since the scope of supply for process radiation monitors will be determined by the applicant. The majority of GE designed Process Radiation Monitors was completed prior to the issuance of ANSI N13.10 (1974) and although it is anticipated that they could meet most, if not all, of ANSI N13.10 (1974), the parameters and units used in the design specifications may be expressed in different terms than the ANSI document

460.17 Since the radiological consequences resulting from the release of contaminated liquid to the environs due to a postulated failure of the liquid tank are dependent upon site specific geological and hydrological parameters, provide justification for not leaving the evaluation of the off-site radiological consequences within the applicant's scope. Our understanding of your proposed nuclear island is that your scope of work should be only to supply the source terms. In this regard, your assumption that iodine is the critical isotope which will determine whether radionuclide concentrations at the nearest surface water supply in an unrestricted area will be within the limits of 10 CFR Part 20, is not valid. (In general, the long-lived isotope Cs-137 is the critical isotope.)

Response

Draft response will be provided in December 1982.

460.18 Provide additional information on the following items applicable to Item III.D.1.1 of NUREG-0737:

a. Add the containment and primary coolant sampling and containment spray recirculation systems to those systems requiring periodic leak tests.

b. State whether high pressure injection recirculation is part of the leak test programs.

c. Describe the leak reduction measures which will be incorporated into your design.

Response

Draft response will be provided in December 1982.

ATTACHMENT NO. 7

DRAFT RESPONSES TO

PROCEDURES AND TEST REVIEW BRANCH

QUESTIONS

640.01 (14.1) Modify Table 14.1-3 and Figure 14.1-1 of your FSAR to either delete the reference to Test Condition 7 or to state why it has been included since no tests are indicated as being conducted at these conditions. Additionally, operation in excess of your rated thermal power is not permitted.

Response

Figure 14.1-1 was revised accordingly. Table 14.1-3 will be formally revised in January 1983. (The revised table will reflect the recently completed Clinton STS -- provided in Attachment No. 8)

640.02 (14.1) Modify Figure 14.1-1 of your FSAR to show the location of A through F and Test Condition 6 on this figure. In addition, provide a description for those lines and cross-hatched areas which are not described. Alternatively, remove these lines and cross-hatched areas.

Response

The response to this question is provided in revised Figure 14.1-1.

640.03 (14.2.7) Most of the exceptions to Regulatory Guide 1.68 listed in Section 14.2.7.2 of your FSAR were presented to us in your letters dated March 18, 1974, and December 17, 1974, as comments to a proposed Revision 1 to this guide. Many of these comments were incorporated into Revision 2 of Regulatory Guide 1.68 and are no longer applicable. Accordingly, modify Section 14.2.7.2 to address those exceptions still applicable to Revision 2 of this regulatory guide.

Response

Section 14.2.7.2 has been revised to address exceptions to Reg Guide 1.68, Rev. 2.

NUCLEAR ENERGY
BUSINESS OPERATIONS

GENERAL ELECTRIC

Figure revision for 640.01 and 640.02

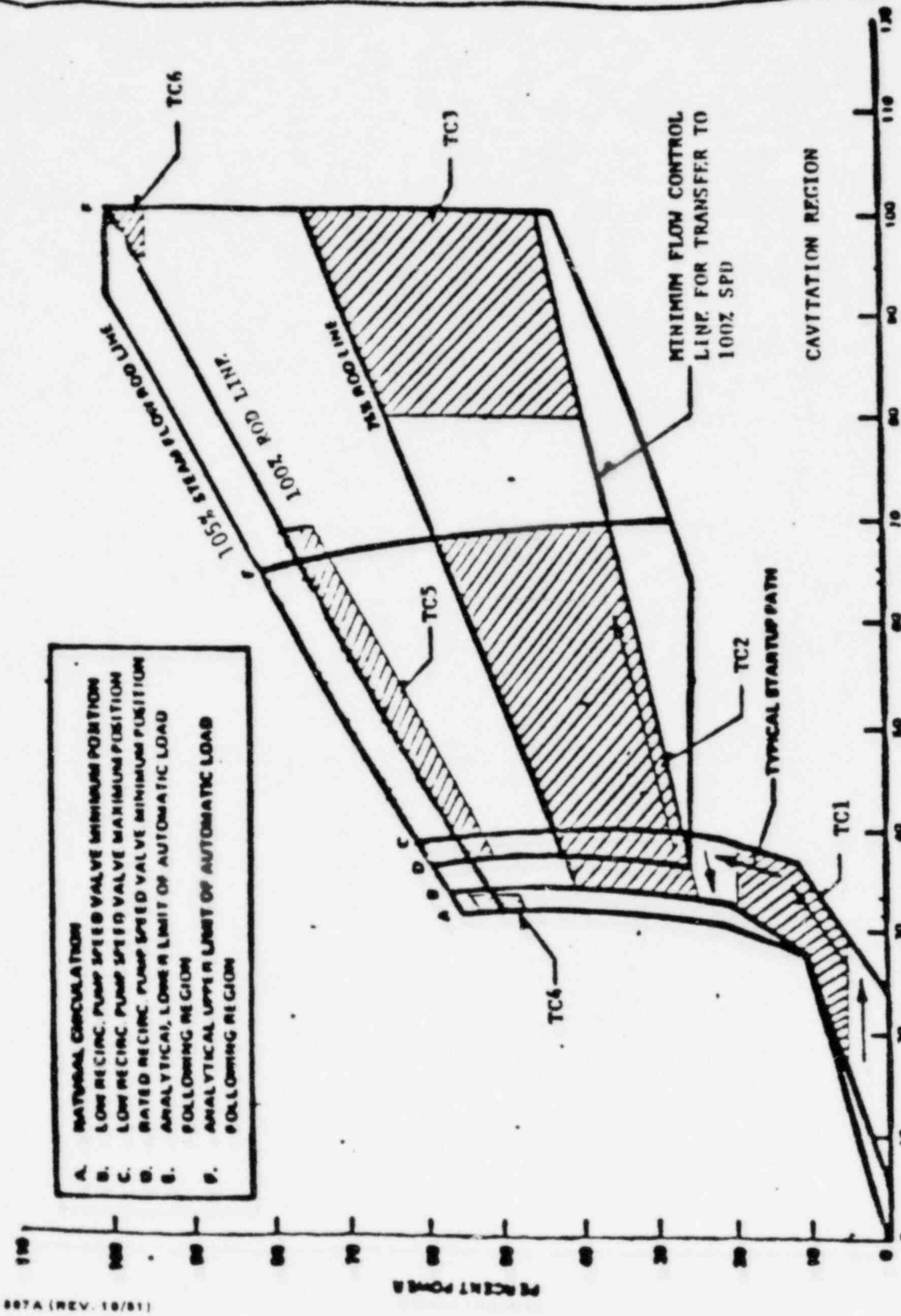


Figure 14.1-1 **Power-Flow Operating Map**

(Revised)

Figure 14.1-1 (Continued)

Test Condition (TC)	Power Flow Map Region and Notes
1	Before or after main generator synchronization from 5 to 20 percent thermal power and operating on recirculation pump low frequency power supply
2	After main generator synchronization from 50 to 75 percent control rod lines, at or below the analytical lower limit of Master Flow Control mode and with the lower power corner within bypass valve capacity.
3	From 50 to 75 percent control rod lines above 80 percent core flow, and within maximum allowed recirculation control valve position.
4	On the natural circulation core flow line within ± 5 percent of the intersection with the 100 percent power rod line.
5	From the 100 percent loadline to 5 percent below the 100 percent loadline and between minimum flow at rated recirculation pump speed (minimum valve position) to 5 percent above the analytical lower limit of the automatic flow control range.
6	Within 0 to -5 percent of rated 100 percent thermal power, and within 0 to -5 percent of rated 100 percent core flow rate.

Text revision for 640.03

14.2.7 Conformance of Test Programs to Regulatory Guides (Applicant will Confirm)

14.2.7.1 Conformance with Regulatory Guide 1.68

The test and startup program shall conform to the requirements of Regulatory Guide 1.68, Preoperational and Initial Startup Test Programs for Water-Cooled Power Reactors, except where specifically noted below. This regulatory guide will be reviewed by the Applicant for applicability of individual items in the guide to the specific facility and its systems. The applicability to this plant determines the nature and scope of testing to be performed. Actual exceptions to the testing required by this guide have been specifically addressed and are discussed in Subsection 14.2.7.2. Areas where the guide does not apply are not considered to be exceptions.

14.2.7.2 Exceptions to Regulatory Guide 1.68

The exceptions to Regulatory Guide 1.68 follow with an explanation of the justification for the exception:

(1) Core flow calibration is only performed at near rated flow in a mid-power rod line (50-75% power) and the rated rod line (100+0, -1% power). Core flow calibration at lower than near rated flow is of little or no value.

(2) Appendix A, Section 5.l.l. and 5.n.n.: Turbine Turbine trip and generator trip have essentially the same effect on the reactor and safety-related system actuation. Only a generator trip (5.n.n. will be performed near rated power. A turbine trip will be performed at near rated flow and at an intermediate power (60-80%).

(3) Appendix A, Section 5.r.: a verification that the process computer is receiving correct inputs from process variables is performed during the preoperational test program and once during power ascension. A validation that the performance calculations performed by the computer are correct is performed once during power ascension. A review of printouts and/or displays are made throughout the test program.

(4) Appendix C, Section 2.a.(4): Poison curtins are not applicable.

(5) Appendix C, Section 2.b.(1): Poison curtins are not applicable.

640.04 (14.2.7) Modify Section 14.2.7.3 of your FSAR to indicate the level of conformance of your intitial test program with the following regulatory guides: (1) Regulatory Guide 1.68.1; (2) Regulatory Guide 1.68.2; (3) Regulatory Guide 1.95, Position C.5; (4) Regulatory Guide 1.108, Position C.2.a; (5) Regulatory Guide 1.128, Position C.4; (6) Regulatory Guide 1.140, Position C.5.

Response

Initial test program conformance to the indicated regulatory guides will be provided in conjunction with the revision to Section 1.8 scheduled for formal submittal in February 1983.

640.05 (14.1.3) State in Section 14.1.3.3 of your FSAR whether the completion of the preoperational testing which is required prior to fuel loading includes the review and approval of the test results. If portions of any preoperational tests are intended to be conducted, or their results approved, after fuel loading, provide the following information: (1) list each test; (2) state which portions of each test will be delayed until after fuel loading; (3) provide technical justification for delaying these portions; and (4) state when each test will be completed (key to test conditions defined in Chapter 14). Adding this type of information into your FSAR will permit facilities built per the GESSAR II FDA to conduct a "phased initial test program" similar to that approved for Unit 1 of the Grand Gulf facility.

Response

Response to this question will be provided by the Applicant. Refer to Section 1.9 for interface.

640.06 (14.2.12) Describe how acceptance criteria for your proposed tests will be developed. We are concerned about a number of instances in which tests failed to meet established acceptance criteria but upon further review of the test results by the applicant or licensee, the acceptance criteria were changed and the test results then accepted. Identify in the appropriate sections of Chapter 14, the bases for the acceptance criteria for all tests. Examples of such "bases" might include: (1) regulatory guides; (2) Technical Specifications; (3) assumptions used in Chapter 15 analyses; (4) topical reports; (5) references to other GESSAR sections; and (6) codes and standards.

Response

To insure that the tests are conducted in accordance with established acceptance criteria, a paragraph has been added to Section 14.2.12 requiring the Applicant to make the plant startup test specification available to the NRC site inspector.

Test addition for 640-06

14.2.11 Test Program Schedule

Applicant will supply.

14.2.12 Individual Test Descriptions

To insure that the tests are conducted in accordance with established acceptance criteria, the Applicant will make the plant startup test specification available to the NRC site inspector.

14.2.12.1 Preoperational Test Procedures

The following general descriptions are the specific objectives of each preoperational test. During the final construction phase, it may be necessary to modify the preoperational test methods as operating and preoperational test procedures are developed. Consequently, methods in the following descriptions are general, not specific.

Specific acceptance criteria for each preoperational test are in accordance with the detailed system and equipment specifications for equipment in those systems. The tests demonstrate that the installed equipment and systems perform within the limits of these specifications.

Table 14.1-1 lists the preoperational tests anticipated for this facility.

Applicant will supply balance-of-plant tests listed in Table 14.1-1.

14.2.12.1.1 Feedwater Control System Preoperational Test

(1) Purpose

Verify proper operation of the feedwater level control system.

640.07 (14.2.12) You list in Section 14.2.12.1 of your FSAR, 15 preoperational test descriptions which the applicant will supply. However, there are a number of additional tests specified in Regulatory Guide 1.68 which you do not list. State whether the applicant's FSAR will describe the tests listed below or provide descriptions of these tests in the appropriate sections of your FSAR. If complete test descriptions are provided elsewhere in your FSAR, insert a cross-reference in Section 14.2. The additional tests to be added, if necessary, are:

a. Closed cooling water (CCW) system tests. (Refer to Section 9.2.2 of your FSAR.)

Response

A preoperational test procedure for the Closed Cooling Water System has been added as Subsection 14.2.12.1.66.

b. Combustible gas control system tests, including hydrogen monitors and analyzer. (Refer to Section 6.2.5.4 of your FSAR.)

Response

A preoperational test procedure for the Combustible Gas Control System has been added as Subsection 14.2.12.1.67.

c. Fuel storage system tests, including:

1. Spent fuel pit cooling system tests, including the testing and antisiphon devices and low water level alarms.

2. Operability and leak tests of sectionalizing devices and drains and leak tests of gaskets or bellows in the refueling canal and fuel storage pool.

Reponse

Subsection 14.2.12.1.15 has been modified to include the requested fuel storage system tests.

d. Containment isolation valve function and closure timing tests.

Response

This test has been specified revised in Subsections 6.2.4.4 and 6.2.1.6.1.2.

e. Containment penetration leakage tests.

Response

A preoperational test procedure for containment penetration leakage referencing subsection 6.2.1.6 has been added as Subsection 14.2.12.1.69.

f. Containment airlock leak rate tests.

Response

A preoperational test procedure for containment airlock leakage referencing Subsection 6.2.1.6 has been added as Subsection 14.2.12.1.70.

g. Integrated containment leakage tests.

Response

A preoperational test procedure for integrated containment leakage referencing subsection 6.2.6.1 has been added as Subsection 14.2.12.1.71.

6.2.1.6.1.2 Post-Construction Component Test Phase

After installation and immediately preceding the initial ILRT, local component leakage tests will be conducted to ensure that any leakage is detected, measured and minimized. The leak tests, in general, follow the criteria established for Type B and C tests of 10CFR50, Appendix J and include the testing of:

(1) mechanical and electrical containment vessel penetration sleeve welds;

(2) all resilient seals in personnel air locks, equipment hatches and fuel transfer tubes;

(3) all isolation valves - operability AND CLOSING TIMES of valves (prior to leak test) must be demonstrated by closure utilizing the normal mode of operation. CLOSING TIMES ARE SHOWN ON TABLE 6.2-25.

(4) air locks, by pressurization between the doors;

(5) equipment hatch, by pressurization of the space between the seals; and

(6) guard pipe and fuel transfer pipe bellows.

All tests will be performed by local pneumatic pressurization of the above containment components, either individually or in groups at pressure P_a. Leak detection will be by pressure decay, flow rate measurement or equivalent means.

The acceptance criteria for the combined leakage rate of all components cannot exceed 60% of La. The specifics of the acceptance criteria are defined in 10CFR50 Appendix J for type "C" testing.

~~640.07d~~ Text change for 640.07d

6.2.4.3.3 Evaluation of Single Failure (Continued)

In single-failure analysis of electrical systems, no distinction is made between mechanically active or passive components. All fluid system components such as valves are considered electrically active, whether or not mechanical action is required.

Electrical as well as mechanical systems are designed to meet the single-failure criterion, regardless of whether the component is required to perform a safety action in the Nuclear Safety Operational Analysis outlined in Appendix 15A. Even though a component, such as an electrically-operated valve, is not designed to receive a signal to change state (open or closed) in a safety scheme, it is assumed as a single failure if the system component changes state or fails. Electrically-operated valves include valves that are electrically piloted but air operated, as well as valves that are directly operated by an electrical device. In addition, all electrically-operated valves that are automatically actuated can also be manually actuated from the main control room. Therefore, a single failure in any electrical system is analyzed, regardless of whether the loss of a safety function is caused by a component failing to perform a requisite mechanical motion or a component performing an unnecessary mechanical motion.

6.2.4.4 Tests and Inspections

The Containment Isolation System is scheduled to undergo periodic testing during reactor operation. The functional capabilities of power-operated isolation valves are tested remote-manually from the control room. By observing position indicators and changes in the affected system operation, the closing ability AND CLOSING TIME of a particular isolation valve is demonstrated. CLOSING TIMES ARE SHOWN ON TABLE 6.2-25.

Air-testable check valves are provided on influent emergency core cooling lines of the LPCS, HPCS and RHR Systems whose operability is relied upon to perform a safety function.

h. Isolation initiation (CRVICS) logic tests. (See Section 7.3.2.3.3 of your FSAR.)

Response

These tests are covered by paragraph (3)(a) of Subsection 14.2.12.1.6.

i. Containment air purification and cleanup system tests. (Refer to Section 6.5.1.4.1 of your FSAR.)

Response

A preoperational test procedure for the Standby Gas Treatment System and the Control Building Outdoor Air Cleanup System referencing Subsection 6.5.1.4 has been added as Subsection 14.2.12.1.72.

j. Bypass leakage tests.

Response

A preoperational test procedure for bypass leakage referencing Section 6.2 has been added as Subsection 14.2.12.1.73.

k. Autodepressurization system tests. Testing should include items such as sensor and logic train operability, accumulator capacity, relief valves and operability using all alternate power and pneumatic supplies.

Response

These tests are covered by paragraphs (3)(f) through (3)(h) of Subsection 14.2.12.1.6

1. Emergency response information system (ERIS) tests.

Response

Draft response will be provided in December 1982.

m. Reactor water sampling system tests. Verify that the test will be adequate to verify flow paths, holdup times and procedures.

Response

These tests are covered by Subsection 14.2.12.3.1.

n. Preoperational testing to determine expansion, vibration, and dynamics effects for: (1) ASME Code Class 1, 2, and 3 systems; (2) other high-energy piping systems inside seismic Category I structures; (3) high-energy portions of systems whose failure could reduce the functioning of any seismic Category I plant feature to an unacceptable level; and (4) seismic Category I portions of moderate-energy piping systems located outside containment.

Response

A preoperational test procedure for expansion, vibration and dynamic effects has been added as Subsection 14.2.12.1.75.

Text addition for §40.07a

14.2.12.1.66 Closed Cooling Water System Preoperational Test

(1) Purpose

Verify the capability of the Closed Cooling Water (CCW) System to remove specified amounts of heat from various non-essential systems. Adequacy of circulating pumps, piping, heat exchangers, and instruments shall be determined.

(2) Prerequisites

(a) All construction tests shall have been performed. All instruments and controls shall be completely installed, calibrated and checked out so that the system is ready for operation.

The SCG has reviewed and approved the test procedure, schedule, staffing, and plant condition.

(b) The following systems must be available

1. Instrument air
2. Normal and DRW drains
3. Demineralized water
4. Electrical power

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as required.

(b) Check out system components.

(c) Purge air from CCW Expansion Tank with nitrogen.

(d) Slowly fill system with demineralized water.

(e) Establish 12 psig nitrogen pressure above water in CCW Expansion Tank.

(f) Start one CCW circulating pump. Establish design water flow in each cooler in a logical sequence, readjusting flows as required for balance. Check pump flow rate frequently, to avoid exceeding design flow.

(g) Check automatic start of standby pump by stopping operating pump. Check pressure recovery time.

(h) CHECK CLOSING TIME OF ISOLATION VALVES.

(i) CONDUCT VIBRATION TESTS PER REGULATORY GUIDE 1.68.

(j) THE SYSTEM IS ACCEPTABLE IF FLOWS AND PRESSURE DROPS MEET DESIGN VALUES, AND EQUIPMENT AND INSTRUMENTS FUNCTION AS SPECIFIED

Text addition for 640.07b

14.2.12.1.67 Combustible Gas Control Preoperational Test

a. Test Objective

To verify the ability of the Combustible Gas Control System to perform within design specifications.

b. Prerequisites

1. Individual component tests have been completed.
2. Instrument calibration and loop checks are completed.
3. Test instruments are available and calibrated.
4. Electrical power is available.
5. ~~Emergency Closed Cooling~~ Essential Service Water System is operational.
6. Shield Annulus Exhaust and Return, and Standby Gas Treatment Systems are operational. ~~Gas Treatment System is operational.~~

c. Test Procedure

1. Verify ~~compressor~~ mixing fan, recombiner, analyzer and control functions.
2. Verify operation time for isolation valves.
3. Verify system response to manual isolation.
4. Verify post-LOCA hydrogen monitor operability.

d. Acceptance Criteria

~~Compressor~~ Mixing fan, recombiner, analyzer, controls, and post-LOCA monitors function within design specification.

Text change for 640.07c

14.2.12.1.14 High Pressure Core Spray System Preoperational Test (Continued)

(h) photographs to prove acceptability of HPCS spray pattern.

14.2.12.1.15 Fuel Pool Cooling and Cleanup System Preoperational Test

(1) Purpose

Verify the operation of the fuel pool cooling and cleanup system including the pumps, heat exchangers, controls, valves, and instrumentation.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. The instrument air, service air, fuel pool emergency makeup, service water, and RHR Systems must be available.

(3) General Test Methods and Acceptance Criteria

Fuel pool system capability is verified by the integrated operation of the following:

(a) logic and interlocks;
(b) interconnection to RHR system;
(c) pump and related controls;
(d) cleanup subsystem; ~~and~~
(e) annunciators;
(f) antisiphon devices; and
(g) leak tests of sectionalizing devices, drains, gaskets and/or bellows.

Test addition for 640.07d

14.2.12.1.68 Isolation Valve Function and Closure Time

Refer to Subsections 6.2.4.4 and 6.2.1.6.1.2.

Text addition for 640.07e

14.2.12.1.69 Containment Penetration Leakage

Criteria for preoperational tests of containment penetrations are given in Subsection 6.2.1.6. A list of penetration and isolation valve leakage tests is given as Table 6.2-29.

Text addition for 640.07f

14.2.12.1.70 Containment Airlock Leakage

Criteria for AIRLOCKS preoperational tests of containment ~~penetrations~~ are given in Subsection 6.2.1.6. A list of penetration and isolation valve leakage tests is given as Table 6.2-29.

Text addition for 640.07g

14.2.12.1.71 Integrated Containment Leakage

Criteria for integrated containment leakage tests are given in Subsection 6.2.6.1.

Text addition for 640.07i

14.2.12.1.72 Containment Air Purification and Cleanup System

~~GE GESSAR~~
~~ROUND 1 QUESTION~~

~~Response to Question 640.07i (14.2.12)~~

The preoperational test procedures for the Standby Gas Treatment System (STGS) and the Control Building Outdoor Air Cleanup Systems (CBOACS) are described in ~~section~~ Subsection 6.5.1.4 ~~of GESSAR II~~. The SGTS and the CBOACS are included in Section 14.2.12 ~~of GESSAR II~~ but the requirements for the preoperational test procedures ~~should be referenced to Section 6.5.1.4.~~ are provided in Subsection 6.5.1.4.

Text addition for 640.07j

14.2.12.1.73 Bypass Leakage

Table 6.2-24 ~~of GESSAR II~~ lists potential bypass leakage paths, and describes mode of leakage protection where applicable. Test procedures are identical to those used for other penetrations under isolation conditions.

Text addition for 640.07l

14.2.12.1.74 Emergency Response Information System

Will be provided in December 1982.

Text addition for 640.07n

14.2.12.1.75 Expansion, Vibration and Dynamic Effects

~~Test Objective~~
14.2.12.1.75.1 Expansion Test Objective

The purpose of this test is to verify that the non-NSSS safety-related piping, designated as ASME Class 1, 2, or 3, is free to expand thermally as designed. ~~and that transient induced pipe motion and steady-state vibrations are within acceptable limits~~.

14.2.12.1.75.1.1 Prerequisites

The system piping to be tested is supported and restrained in conformance with the design drawings. Instrumentation has been installed and calibrated.

14.2.12.1.75.1.2 EXPANSION TEST PROCEDURE

~~Test Procedure~~

~~During preoperational testing, the system piping will be visually inspected for vibration. If visual inspection detects questionable vibration, the system will be checked using a vibration monitor.~~ During initial system heatup, piping thermal movements at selected points will be instrumented, monitored, and recorded. Accessible pipe hangers and snubbers not instrumented will be visually inspected.

14.2.12.1.75.1.3 Acceptance Criteria

1. There shall be no evidence of blocking of thermal expansion of the piping systems or components other than by design.

2. The measured thermal movement shall be within ±25 percent of the analytical value or ±0.25 inch, whichever is greater.

3. Spring hanger movement shall remain within the hot and cold set points, and snubbers shall not become fully extended or retracted.

14.2.12.1.75.2 VIBRATION TEST OBJECTIVE

NRC Regulatory Guide 1.70, Item 3.9.2.1 "Preoperational Vibration and Dynamic Effects Testing on Piping" says the preoperational piping vibration and dynamic effects testing during startup functional testing will be conducted on safety-related ASME Class 1, 2, and 3 piping systems including their supports and restraints. The following test program is intended to comply with that requirement.

14.2.12.1.75.2.1

PREREQUISITES Vibration tests shall not be made before all piping and supports have been inspected and determined to be properly installed and hydrotested.

14.2.12.1.75.2.2 VIBRATION TEST PROCEDURE

~~DESCRIPTION OF THE TEST PROGRAM~~ The vibration test is designed to be run with the reactor and associated system in either the hot or cold condition. The test program is divided into two phases.

(CONTINUED NEXT PAGE)

14.2.12.1.7 5.2.2 VIBRATION TEST PROCEDURE (CONTINUED)

Phase I - The dynamic response of the system is noted by observation and visual instrument measurement. Piping with less than allowable deflections requires no further evaluation and can be approved to have met the requirements of Section 3.9.2 of Regulatory Guide 1.70. Allowable deflections should be developed after completion of stress analysis. Piping exceeding Phase I acceptance limits will be treated as described in Phase II.

Phase II - Take remedial action (add or relocate supports, etc) or proceed with time history analysis.

Apply time history analysis to determine whether additional corrections are required.

1. PHASE I All safety-related piping shall be subjected to preliminary vibration measurements. These measurements shall be taken during pre-operational tests, with machinery and fluid systems operating under test conditions. Any indication of persistent vibration shall be followed by recorded measurements for subsequent analysis.

~~A.5.1~~ 2. TEST CONDITIONS Special attention shall be given to piping attached to pumps, compressors, and other rotating or reciprocating equipment. Measurements shall be taken near isolation valves, pressure-control valves, and other locations where shock or high turbulence may be present.

~~A.5.2~~ 3. TEST INSTRUMENTATION Test instruments will be provided by General Electric as a service to the applicant. ~~Table A.5.1 gives a list of recommended test instruments.~~ Preliminary measurements may be made with a light-weight portable vibration meter. ~~eg B&K Model 2511~~. From these measurements, the number and location of recorded measurement points shall be determined.

~~A.5.3~~ 4. RECORDED MEASUREMENTS Every measurement record shall be accompanied by a sketch showing the location of the measurement point, plus a description of the system operating conditions at the time of measurement. Measured data shall include actual deflections and frequencies. Time duration of measurement shall be sufficient to indicate whether the vibration is continuous or transient.

~~A.5.5~~ 5. PHASE II ACTION If the allowables are exceeded, two options are available, whichever is deemed appropriate.

a Take remedial action (add or relocate supports, etc).

b Perform time-history test of the piping system.

(CONTINUED)

14.2.12.1.7.2.2 Vibration Test Procedure (continued)

6. TIME-HISTORY TEST

a. Establish the time-history of the piping system.

b. Perform stress analysis based on time-history and compare with code allowables.

c. If the allowables are exceeded, take remedial action.

7. REMEDIAL ACTIONS Two basic methods of solving the problems are suggested, one or both of which may be used in a given case.

A Change in the piping arrangement. This includes a number of possible changes, as -

- a Adding and/or relocation of piping supports.
- b Rerouting of piping layout to eliminate fluid resonance characteristics.

B. Change in the flow modes of the system by -

- a Increasing opening or closing time of valves.
- b Addition of a device eg a grid, strainer or damper, which minimizes the forcing function of the vibration source.

These solutions require partial or full reanalysis of the affected piping system.

640.08 (14.2.12) Modify your acceptance criteria in Section 14.2.12.1.4 of your FSAR for the preoperational test of the reactor water cleanup system to ensure that the system meets the required head and flow values.

Response
Section 14.2.12.1.4 has been modified accordingly.

640.09 (14.2.12) Modify in Section 14.2.12.1.5 of your FSAR, the general test methods and acceptance criteria for the Standby Liquid Control System Preoperational Test to include:

a. Testing to verify proper mixing of the neutron absorber solution.

Response
Paragraph (3) of subsection 14.2.12.1.5 has been modified accordingly.

b. Test firings of the explosive-actuated injection valves.

Response
Paragraph (3) of subsection 14.2.12.1.5 has been modified accordingly.

c. Demonstration of the design injection rate capability in accordance with Section 9.3.5.3 of your FSAR.

Response
Paragraph (3) of subsection 14.2.12.1.5 has been modified accordingly.

d. Flow testing for all modes listed in Section 9.3 and Table 9.3-8 of your FSAR.

Response
Paragraph (3) of subsection 14.2.1.5 has been modified accordingly.

Text revision for 640.08

14.2.12.1.3 Reactor Feedwater Pump Driver Control System Preoperational Test

Applicant will supply - agreement with Subsection 14.2.12.1.1.

14.2.12.1.4 Reactor Water Cleanup System Preoperational Test

(1) Purpose

Verify the operation of the reactor water cleanup system (RWCS), including pumps, valves, and filter/demineralizer equipment.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Filter aid and both anion and cation resin should be available. Reactor Building Closed Cooling Water (RBCCW) System and Instrument Air System must have readiness verification.

(3) General Test Methods and Acceptance Criteria

RWCS capability is verified by the integrated operation of the following:

(a) drain flow regulator flow interlocks;

(b) system isolation and logic;

(c) valve-operating sequence;

(d) pump operation (including required head and flow verification) and related control and logic;

Text additions for 640.09 a,b,c&d

14.2.12.1.4 Reactor Water Cleanup System Preoperational Test (Continued)

(e) annunciators; and

(f) filter/demineralizer system operation.

14.2.12.1.5 Standby Liquid Control System Preoperational Test

(1) Purpose

Verify the operation of the Standby Liquid Control (SLC) System including pumps, tanks, control, logic, and instrumentation.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Valves should be previously bench tested and other precautions relative to positive displacement pumps taken. The reactor vessel should be available for injecting demineralized water.

(3) General Test Methods and Acceptance Criteria

SLC System capability is verified by the integrated operation of the following:

(a) SLC System tank level instrumentation;
(b) heaters;
(c) alarms and logic;
(d) relief valves;
(e) pumps and related controls and logic; ~~and~~
640.09 c&d → (f) flow testing in all modes listed in Table 9.3-8; ~~with different flow paths.~~
640.09 a → (g) verification of proper mixing of the neutron absorber solution; and
640.09 b → (h) test firings of the explosive-actuated injection valves

e. Verification that the manual system initiation, both local and remote, operate properly.

Response
This verification is already covered in paragraph (e) of Subsection 14.2.12.1.5.

640.10 (14.2.12) Expand the following test descriptions to include, either directly or by reference, the applicable features included in Section 5.4.7.4 and 6.3.4.1 of your FSAR. These tests are the Residual Heat Removal System Preoperational Test (Section 14.2.12.1.7); the Low Pressure Core Spray System Preoperational Test (Section 14.2.12.1.12); and the High Pressure Core Spray System Preoperational Test (Section 14.2.12.1.14).

Response
Cross references were added to Subsections 14.2.12.1.7, 14.2.12.1.12 and 14.2.12.1.14.

640.11 (14.2.12) Describe in Section 14.2.12.1.12(3) of your FSAR, how the proper operation of the fuel handling and the vessel servicing equipment will be tested prior to handling fuel.

Response
Paragraph (3)(f) of Subsection 14.2.12.1.12 has been modified accordingly.

640.12 (14.2.12) Expand the test description of the Liquid and Solid Radwaste Systems Preoperational Tests in Section 14.2.12.1.17 of your FSAR to specify those subsystems and components which will be tested and the particular test to be performed.

Response
Response to this question is provided in Subsections 14.2.12.1.17.1 (3)(d) and Subsection 14.2.12.1.17.2(3)(g).

Text addition for 640.10

14.2.12.1.7 Residual Heat Removal System Preoperational Test (Continued)

(3) General Test Methods and Acceptance Criteria

RHR system capability is verified demonstrated by the integrated operation of the following:

(a) system isolation valve control and logic tests;

(b) RHR and RHR service water pump and motor operation, controls, and related logic features;

(c) automatic LPCI initiation logic;

(d) verification of all flow paths (the time from initiation signal to full flow should be similarly verified); and

(e) alarms and annunciators.

¶ Refer to section 5.4.7.4 for additional information

14.2.12.1.8 Reactor Core Isolation Cooling System Preoperational Test

(1) Purpose

Verify the operation of the Reactor Core Isolation Cooling (RCIC) System including turbine, pump, valves, instrumentation, and control.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. The turbine, disconnected from the pump, shall be tested. The turbine instruction

Text addition (continued) for 640.10

14.2.12.1.13 Low Pressure Core Spray System Preoperational Test (Continued)

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. The reactor vessel must be available and ready to receive water.

(3) General Test Methods and Acceptance Criteria

Low pressure core spray system capability is verified by the integrated operation of the following:

(a) logic and interlocks;

(b) low pressure core spray system pumps including auto initiation;

(c) flow path verification;

(d) annunciators;

(e) verification of the time for initiation signal to full flow; and

~~(f) photographs to prove acceptability of core spray patterns.~~

¶ See Subsection 6.3.4.1 for additional information.

14.2.12.1.14 High Pressure Core Spray System Preoperational Test

(1) Purpose

Verify the operation of the high pressure core spray (HPCS) system including diesel generator and related

Text addition (continued) for 640.10

14.2.12.1.14 High Pressure Core Spray System Preoperational Test (Continued)

(h) photographs to prove acceptability of HPCS spray pattern.

14.2.12.1.15 Fuel Pool Cooling and Cleanup System Preoperational Test

(1) Purpose

Verify the operation of the fuel pool cooling and cleanup system including the pumps, heat exchangers, controls, valves, and instrumentation.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. The instrument air, service air, fuel pool emergency makeup, service water, and RHR Systems must be available.

(3) General Test Methods and Acceptance Criteria

Fuel pool system capability is verified by the integrated operation of the following:

(a) logic and interlocks;
(b) interconnection to RHR system;
(c) pump and related controls;
(d) cleanup subsystem; and
(e) annunciators.

¶ See section 6.3.4.1 for additional information.

Text addition for 640.11

14.2.12.1.12 Fuel-Handling and Vessel Servicing Equipment Preoperational Test (Continued)

(3) General Test Methods and Acceptance Criteria

The fuel-handling and vessel servicing equipment capability is verified by dry operation of the following equipment:

(a) cell disassembly tools;

(b) channel replacement tools;

(c) instrument handling tools;

(d) vacuum cleaning equipment;

(e) verification of interlocks and logic associated with the refueling and service platform; and

(f) verification of proper operation of refueling and service platforms. Dummy fuel bundle moves will be performed prior to actual fuel loading.

14.2.12.1.13 Low Pressure Core Spray System Preoperational Test

(1) Purpose

Verify the operation of the low pressure core spray system including spray pumps, sparger ring, spray nozzles, controls, valves, and instrumentation.

Text changes for 640.12

14.2.12.1.17.1 Liquid Radwaste System (Continued)

5. electrical power; and

6. laboratory facilities for water analysis.

The following safety precautions should be observed:

(a) Verify that all safety and construction tags have been removed from each portion of the system to be tested.

(b) Do not exceed maximum allowable flow rates through filters and demineralizers.

(c) Verify visually that system components, piping, and pipe hangers do not suffer excessive vibration or movements.

(d) Monitor tank levels to ensure that no tanks will overflow and that intended flow paths are correctly lined up.

(3) General Test Methods and Acceptance Criteria

(a) The system demonstration will verify flow capabilities, control and interlock operations, and overall system operation using demineralized water.

(b) System flow rates shall be within design tolerances.

(c) All interlocks and automatic operations shall function in accordance with design.

(d) All subsystem and/or component operations shall have been successfully demonstrated.

(d) The following subsystems and components shall be tested:

1. Valve tests including pneumatic controls, remote controls, position indication and leakage.
2. Pump Performance
3. Instruments and Controllers
4. Radwaste Filters
5. Radwaste Demineralizer
6. Phase Separators
7. Spent Resin Tank
8. High Conductivity Tank
9. Waste Evaporator

14.2.12.1.17.2 Solid Radwaste System (Continued)

(e) System flow rates and throughputs shall be within design tolerances.

(f) All interlocks and automatic operations functions shall be in accordance with design requirements.

(g) The proper performance of each system component listed in Subsection 11.4.2.2 will be verified. ~~All system components and operations shall be successfully demonstrated.~~

(h) Crane location shall be accurate within the prescribed tolerance.

14.2.12.1.18 Reactor Protection System Preoperational Test

(1) Purpose

Verify the proper operation of the reactor protection system (RPS) including sensor logic and respective scram relays, scram reset time delay and the annunciators.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Additionally, the CRD hydraulic system test should have been completed.

(3) General Test Methods and Acceptance Criteria

RPS capability is verified by the integrated operation of the following.

640.13 (14.2.12) Explain in Section 14.2.12.1.19 of your FSAR how the Reactor Protection System Preoperational Test will:

a. Account for process-to-sensor hardware (e.g., instrument lines; hydraulic snubbers) delay times.

b. Provide assurance that the response time of each primary sensor is acceptable.

c. Provide assurance that the total reactor protection system response time is consistent with your accident analysis assumptions.

Item (b) above can be accomplished by: (1) measuring the response time of each sensor during the preoperational test; or (2) stating that the response time of each sensor will be measured by the manfacturer's certification process in sufficent detail for us to conclude that the sensor response times are in accordance with the design.

Response

Paragraph (3)(g) has been added to subsection 14.2.12.1.18 to insure that response times will be verified.

640.14 (14.2.12) The Process Computer Interface System Preoperational Test should not be considered within the scope of the GESSAR II FDA unless the system description is also covered in your FSAR. Accordingly, either delete this test from Section 14.2.12.1.23 of your FSAR or describe the interfaces in Chapter 7.

Response

The name of this system is now the Performance Monitoring System. Subsection 14.2.12.1.23 has been modified accordingly.

Text addition for 640.13

14.2.12.1.18 Reactor Protection System Preoperational Test (Continued)

(a) sensor logic and scram relay logic;

(b) scram reset time delay;

(c) sensors relay-to-scram trip actuator response time;

(d) annunciators;

(e) mode switch tests; and

(f) auxiliary sensor operation.

(g) Response times for applicable logic channels from the process variable (with the exception of neutron sensors) to the de-energization of the Pilot Scram Valve Solenoids will be verified.

The ability of the system to scram the reactor within a specified time must be demonstrated in conjunction with the CRD hydraulic system preoperational test (Subsection 14.2.12.1.11).

14.2.12.1.19 Neutron Monitoring System Preoperational Test

(1) Purpose

Verify the operation of the Neutron Monitoring System (NMS) including startup, intermediate and power range detectors, and related equipment.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Additionally, all source range monitors (SRM) and pulse preamplifiers, intermediate

Text revision for 640.14

14.2.12.1.22 Area Radiation Monitoring System Preoperational Test (Continued)

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Additionally, indicator and trip units, power supplies, and sensor/converters are calibrated according to the vendor instruction manual.

(3) General Test Methods and Acceptance Criteria

ARM system capability is verified by the integrated operation of the following:

(a) sensor/converter and associated channels;
(b) channel trip points;
(c) alarm annunciators and lights; and
(d) recorder.

14.2.12.1.23 Performance Monitoring System ~~Process Computer Interface System~~ Preoperational Test

(1) Purpose

Verify the operation of the Performance Monitoring ~~process computer interface (PCI)~~ System (PMS) including computer inputs and printout.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Additionally, computer diagnostic checks and programming are completed.

Text version (cont) for 640.14

14.2.12.1.23 ~~Process/Computer Interface~~ Performance Monitoring System Preoperational Test (Continued)

(3) General Test Methods and Acceptance Criteria

~~PCI system~~ PMS capability is verified by operation of the following:

(a) analog input signals;
(b) computer printout;
(c) digital input signals; and
(d) digital output signals.

14.2.12.1.24 Rod Pattern Control System (RPCS) Preoperational Test

(1) Purpose

Verify the operation of the RPCS under its various modes of operation.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Additionally, the self-test feature of the RPCS is verified.

(3) General Test Methods and Acceptance Criteria

RPCS capability is verified by the proper computer initiation of the following:

(a) low-power setpoint and low-power alarm point tests;
(b) RPCS status displays and annunciators;
(c) reactor mode switch test;

640.15 (14.2.12) Add in Section 14.2.12.1.26 of your FSAR, verification of alarms and recorders in the Offgas System Preoperational Test.

Response

Paragraph (3)(i) has been added to Subsection 14.2.12.1.26 for this verification.

640.16 (14.2.12) Modify in Section 14.2.12.1.27 of your FSAR, the general test method and acceptance criteria for the Environs Radiation Monitoring System Preoperational Test to include the filter equipment.

Response

Paragraph (3)(f) has been added to Subsection 14.2.12.1.27 to include the filter equipment.

640.17 (14.2.12) Modify in Section 14.2.12.1.35 of your FSAR, the test abstract for the Demineralized Water and Condensate Distribution System Preoperational Tests to include testing of the isolation valves and the ability of the system to satisfy the appropriate interface requirements (Section 9.2.3.2).

Response

~~Section~~ Subsection 14.2.12.1.35 HAS BEEN MODIFIED TO COVER THE ABILITY OF THE SYSTEM TO SATISFY THE APPROPRIATE INTERFACE REQUIREMENTS, AND ALSO TESTING OF THE ISOLATION VALVES.

Text addition for 640.15

14.2.12.1.26 Offgas System Preoperational Test

(1) Purpose
Verify the operation of the offgas system including valves, recombiner, condensers, coolers, filters, and hydrogen analyzers.

(2) Prerequisites
The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Additionally, the instrument air system, electrical power, and cooling water should be operational.

(3) General Test Methods and Acceptance Criteria
Offgas system operability is verified by performing the following tests:

(a) valve operation including failsafe and isolation features;

(b) pump operation;

(c) level and temperature control and indication;

(d) recombiner and preheater;

(e) condenser, cooler, and moisture separator;

(f) gas dryer and cooler;

(g) filter efficiency; ~~and~~

(h) hydrogen analyzer performance; and

(i) indication and annunciation.

Text addition for 640.16

14.2.12.1.27 Environs Radiation Monitoring System Preoperational Test

(1) Purpose
Verify the operation of the environs radiation monitoring system including sensors and channels, sampling pump, and filter equipment.

(2) Prerequisites
The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. Additionally, indicator and trip units, power supplies, and sensor/converters are calibrated according to the vendor instruction manual.

(3) General Test Method and Acceptance Criteria
The environs radiation monitoring system capability is verified by the integrated operation of the following:

(a) trip point check;

(b) annunciation;

(c) recorder;

(d) channel calibration; ~~and~~

(e) sample equipment; and
(f) filter equipment.

14.2.12.1.28 Inclined Fuel Transfer System Preoperational Test

(1) Purpose

Verify the operation of inclined fuel transfer system, including the actual transfer of a dummy fuel assembly configuration.

Text modifications for 640.17

14.2.12.1.35 Demineralized Water and Condensate Distribution System Preoperational Test (Continued)

(c) It would be desirable to have other user systems available; however, they are not required because the design flow rate is set by the systems listed in Para (b).

(3) Test Methods and Acceptance Criteria

(a) Temporary instruments and devices shall be installed.

(b) Hydraulic tests, flushing, and cleaning shall be done.

(c) Be sure that backwash receiving tank G46-A003 is empty. Line out piping and start the condensate transfer pump. Measure the time to fill tank A003 (about 5 minutes). When the high-level alarm sounds, stop the pump.

(d) Test other parts of the system in a similar manner [Para (c)].

(e) Test fire hose connections for flow rate and pressure. The most remote connection of each branch shall be tested.

INSERT (f) THROUGH (i) ATTACHED.

(j) The system is acceptable when design flow rates and pressures are attained.

Insert after (e) on page 14.2-73

f. Line out demineralized water piping to Expansion Tanks P39-AA001, P44-AA001A&B and P42-AA001. Check total flow rate at BOP supply flow meter. Check pressure at supply line inlet to Auxiliary Building. The supply pressure should be 85 psig minimum at 160 gpm.

g. Line demineralized water piping to Radwaste Building general service outlets to give at least 124 gpm at the BOP supply meter. Check pressure at supply line inlet to Radwaste Building. The supply pressure should be 55 psig minimum at 124 gpm

h. Line condensate piping through HPCS Pump E22-C001 and Bypass line 10" HPCS 6-EAB back to Condensate Storage Tank. Start HPCS pump. Check flow at BOP supply meter. Check pressure at HPCS Pump suction. The supply pressure should be 7 psig minimum at 7800 gpm. Shut off HPCS pump.

(i) Check all isolation valves by closing and opening using normal control instrumentation. During closing tests, check all closing times. See Table 6.2-25 for maximum closing times.

640.18 (14.2.12) **Modify in Section 14.2.12.1.36 of your FSAR, the acceptance criteria for the Clean and Dirty Radwaste Drains Preoperational Tests to ensure that drain flow to proper sumps.**

Response

~~Section~~ Subsection 14.2.12.1.36 HAS BEEN MODIFIED TO INCLUDE CHECKING THAT ALL DRAINS DISCHARGE TO THE CORRECT SUMPS.

640.19 (14.2.12) **Revise the test description of the Heated Water Distribution System Preoperational Test (Section 14.2.12.1.40) to specify testing at design temperatures or justify how testing at lower temperatures will verify the operation and safety of the system at the rated temperatures.**

Response

The design inlet temperature of the Heated Water System is 195F. As the temperature is reduced at constant mass flow rate, the principal changes are the pressure drop and the pump differential. For example, if the ~~Assume the~~ temperature is 100F instead of 195F, at normal flow rates the pressure drop will increase about 2.5 percent. At the same time, the pump differential will increase about 2.3 percent, virtually offsetting the increase in friction loss. Since this ~~This~~ temperature difference is greater than should actually exist, ~~hence,~~ the overall effect will be even less. Hence, testing ~~the heated water distribution system~~ at lower temperature will adequately verify the operation and safety of the heated water system at the rated temperatures.

~~640.18~~

Text revision for 640.18

14.2.12.1.36 Clean and Dirty Radwaste Drains Preoperational Tests

(1) Purpose

Verify the ability of the CRW and DRW drains to collect and dispatch waste streams to appropriate processing facilities.

(2) Prerequisites

(a) The construction tests have been completed and the SCG has reviewed and approved the test procedure, schedule, staffing, and plant condition.

(b) The following systems must be available:

1. radwaste;
2. condensate;
3. electrical power; and
4. instrument air.

(3) Test Methods and Acceptance Criteria

(a) Temporary instruments needed for safe and adequate testing shall be installed.

(b) System components such as pumps and valves shall be checked out.

(c) Each sump is to be individually tested as follows:

1. Apply design flow to each drain, one at a ~~time,~~ to verify that the water drains properly. VERIFY THAT EACH DRAIN FLOWS TO THE CORRECT SUMP, AS SHOWN ON FIGURES 11.2-3 through ~~a,c~~ AND 11.2-4 through ~~a,c~~.

640.20 (14.2.12) Expand the Polar Crane Preoperational Test in Section 14.2.12.1.53 of your FSAR to include a static load test ot 125 percent of the maximum critical load.

Response

SUBSECTION 14.2.12.1.53 HAS BEEN REVISED TO INCLUDE A STATIC LOAD TEST OF 125 PERCENT OF THE MAXIMUM CRITICAL LOAD.

640.21 (14.2.12) Provide test descriptions of the following tests which will ensure that the systems under test meet the design and construction requirements described in Chapter 8 and 9 of your FSAR. Our position is that the scope of Chapter 14 testing requirements should parallel the requirements for design and construction and the balance of plant (BOP) interfaces specified in other sections of your FSAR. These tests are the Heating, Ventilating, and Air Conditioning (HVAC) Systems Preoperational Test (Section 14.2.12.1.54); the Electric Systems Preoperational Test (Section 14.2.12.1.55); and the RHR Complex Heating and Ventilation System Preoperational Test (Section 14.2.12.1.57).

Response

Subsections 14.2.12.1.54 and 14.2.12.1.55 have been added. Subsection 14.2.12.1.57 has been deleted since ~~the~~ it is included as part of Subsection 14.2.12.1.54.2.

TEXT Change for 640.20

14.2.12.1.53 Polar Crane Preoperational Test (Continued)

(h) Check the load sensing instrumentation of the main hoist. Applying known loads, verify that both digital readouts display accurate weights. Verify hoist and alarm operation on high loads.

(i) APPLY A STATIC LOAD OF AT LEAST 125 PERCENT OF THE MAXIMUM OPERATING LOAD, AND HOLD FOR AT LEAST ONE HOUR.

(j) The system is acceptable when all controls, switches, and alarms function according to design specifications.

14.2.12.1.54 Heating, Ventilation, and Air Conditioning (HVAC) Systems Preoperational Test

Applicant will supply.

14.2.12.1.55 Electrical Systems Preoperational Tests

Applicant will supply.]

14.2.12.1.56 Seismic Monitoring System Preoperational Test

Applicant will supply.

14.2.12.1.57 RHR Complex Heating and Ventilation System Preoperational Test

Applicant will supply.]

14.2.12.1.58 RHR Service Water System Preoperational Test

Applicant will supply.

14.2.12.1.59 Condensate Makeup Demineralizer System Preoperational Test

Applicant will supply.

Text addition for 640.21

14.2.12.1.54 Heating, Ventilation, and Air Conditioning (HVAC) System Preoperational Test.

14.2.12.1.54.1 ~~[illegible]~~ Control Building Heating, Ventilating and Air Conditioning Systems Preoperational Test.

(1) Purpose

To verify the ability of the Control Building Heating, Ventilating and Air Conditioning (HVAC) Systems to perform within design specifications

(2) Prerequisites

(a) The construction tests and the balancing tests have been completed and the SCG has reviewed and approved the test procedures, schedule, staffing and plant conditions.

(b) The following systems must be available:

1. Instrument air.
2. Control building chilled water systems.
3. Preferred electric power source from the division 1 and 2 power distribution system.
4. Normal electric power.
5. Normal drains.

6. Performance monitoring system Computer.

7. Main control room annunciator system

8. Process radiation monitoring system.

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as needed

(b) check out system components

(c) All dampers and valves shall be checked for operability from fully open to fully closed and left in their normal operating position. Verify the operation of dampers and valves by means of remote manual operators and position indicating lights in the main control room.

(d) All fans shall be checked for correct rotation.

(e) All filters shall be in a clean condition.

(f) All components of HVAC equipment controls and instruments shall be checked for completion of piping and wiring

(g) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure.

Instruments shall be adjusted and calibrated as required.

(h) The test requirements for the control building outdoor air cleanup system are detailed in section 6.5.1.4

(i) Start air conditioning unit X93-ACU01A. Verify fan X93-CC001A starts and inlet dampers X93-FF001A&B automatically open. The unit startup will automatically start both the control room exhaust/return fan X93-CC002A and control equipment room exhaust/return fan X93-CC004A. Verify inlet dampers X93-FF011A and FF012A automatically open. Assume the normal return dampers X93-FF007A and FF009A have automatically opened.

(j) Allow the system to stabilize then verify the following occurs to control air flow.

1. Electric heater X93-BB002A modulates air leaving air conditioning unit X93-ACU01A
2. Differential pressure indicating control switch dPICS-RR601A controls air leaving the control equipment room.
3. Differential pressure indicating control switch dPICS-RR602A controls air leaving the control room.

(k) Start the chiller room exhaust fan X93-CC007, area exhaust fan X93-CC005 and the control building chilled water unit P45-ZZ001. Verify exhaust dampers X93-FF014A&B are open.

(l) Upon completion of preoperational testing, all temporary equipment (piping supports, instruments, etc) shall be removed, and all systems returned to normal operating condition, or placed in lay-up condition, as appropriate.

14.2.12.1.54.2 Auxiliary Building ECCS Area Heating, Ventilating, and Air Conditioning Systems Preoperational Test.

(1) Purpose

To verify the ability of the the ECCS Area Heating, Ventilating and Air Conditioning system to perform within design specifications.

(2) Prerequisites

(a) The construction tests and the balancing test have been completed and the SCG has reviewed and approved the test procedures, schedule, staffing, and plant conditions.

(b) The following systems must be available:

1. Division 1, Division 2, and Division 3 electric power

2. Normal electric power.

3. Essential service water

4. HPCS service water

5. Drywell chilled water

6. Reactor Island chilled water

7. Heated water system

8. Process radiation monitoring system

9. Instrument air system

10. Drain systems

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as required

(b) Check out system components

(c) All dampers and valves shall be checked for operability from fully open to fully closed ~~and left~~ in their normal operating position. Verify the operation of dampers and valves by means of remote manual operators and position indicating lights in the main control room.

(d) All fans shall be checked for correct rotation.

(e) All filters shall be in a clean condition.

(f) All components of HVAC equipment controls and instruments shall be checked for completion of piping and wiring

(g) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure. Instruments shall be adjusted and calibrated as required.

(h) Verify that pressure control system maintains the ECCS area at the design negative pressure and temperature.

(i) Verify that the ECCS and the RWCU pump room coolers respond to automatic initation signal and maintain area temperatures.

(j) Verify that the SGTS initation signal shuts down the pressure control system, starts the SGTS and changes the dampers and valve positions as required, and that the design negative pressure requirements are met.

(k) Upon completion of preoperational testing, all temporary equipment (piping supports, instruments, etc) shall be removed, and all systems returned to normal operating condition, or placed in lay-up condition, as appropriate.

14.2.12.1.54.3
Auxiliary Building Electrical Areas Heating, Ventilating and Air Conditioning Systems Preoperational Test.

(1) Purpose
To verify the ability of the Auxiliary Building Electrical Areas Heating, Ventilating and Air Conditioning Systems to perform within design specifications.

(2) Prerequisites
(a) The construction tests and the balancing tests have been completed and the SCG has reviewed and approved the test procedures, schedule, staffing and plant conditions.

(b) The following systems must be available:

1. Instrument air
2. Reactor island chilled water.
3. Reactor island heated water.
4. Essential service water.
5. Division 1 and 2 electrical power
6. Normal electrical power
7. Control building chilled water.
8. Drain systems

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as required

(b) Check out system components

(c) All dampers and valves shall be checked for operability from fully open to fully closed and left in their normal operating position Verify the operation of dampers and valves by means of remote manual operators and position indicating lights [redacted] in the main control room. [redacted]

(d) All fans shall be checked for correct rotation.

(e) All filters shall be in a clean condition.

(f) All components of HVAC equipment controls and instruments shall checked for completion of piping and wiring

(g) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure. Instruments shall be adjusted and calibrated as required.

(h) Verify that the systems interlocks, trips and controls function within design requirements

(i) Verify that the standby Electric Switchgear Room Coolers start when the operating coolers are taken off the line.

(j) Verify that the standby battery rooms exhaust starts when the operating fans are taken off the line

(k) Verify that the standby steam tunnel cooling unit starts on area high temperature

(l) Verify that the non-safety grade corridor and elevator tower air conditioning units operate, and that the areas are maintained at a positive pressure

(m) Upon completion of preoperational testing, all temporary equipment (piping supports, instruments, etc) shall be removed, and all systems returned to normal operating condition, or placed in lay-up condition, as appropriate.

14.2.12.1.5404 Containment Heating, Ventilating, Air Conditioning and Pressure Control System Preoperational Test

(1) Purpose
to verify the ability of the Contain Heating, Ventilating, Air Conditioning and Pressure Control System to perform within the design specifications.

(2) Prerequisite
(a) The construction Tests and the balancing tests have been completed and the SCG has reviewed and approved the test procedures, schedule, staffing, and plant conditions.

(b) The following systems must be available

1. Instrument air.
2. Reactor island chilled water system.
3. Heated water system
4. Normal electric power
5. Normal drains
6. Process radiation monitoring system

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipments as needed

(b) check out system components

(c) All dampers and valves shall be checked for operability from fully open to fully closed and left in their normal operating position. Verify the operation of dampers and valves by means of remote manual operators and position indicating lights ~~have been previously checked~~ in the main control room. ~~(See [illegible])~~.

(d) All fans shall be checked for correct rotation.

(e) All filters shall be in a clean condition.

(f) All components of HVAC equipment controls and instruments shall be checked for completion of piping and wiring

(g) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure. Instruments shall be adjusted and calibrated as required.

(h) Verify that the systems interlocks, trips and controls function within design requirements

(i) Verify that the air conditioning system maintains the temperature within design requirements.

(j) Verify the the pressure control system maintains the containment pressure within design requirements.

(k) Upon completion of preoperational testing, all temporary equipment (piping supports, instruments, etc) shall be removed, and all systems returned to normal operating condition, or placed in lay-up condition, as appropriate.

14.2.12.1.54.5 Drywell Cooling System Preoperational Test.

(1) Purpose
to verify the ability of the drywell cooling system to perform within design specifications

(2) Prequisite

(a) The construction tests and the balancing tests have been complete and the SCG has reviewed and approved the test procedures, schedule, staffing, and plant conditions

(b) The following systems must be available

1. leak detection system.

2. Drywell chilled water system.

3 Division 1 and 2 electric power.

4 Normal electric power.

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as required.

(b) Check out system components.

(c) All dampers and valves shall be checked for operability from fully open to fully closed and left in their normal operating positic Verify the operation of dampers and valves by means of remote manual operators and position indicating lights in the main control room.

(d) All fans shall be checked for correct rotation.

(e) All components of HVAC equipment controls and instruments shal be checked for completion of piping and wiring.

(f) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure. Instruments shall be adjusted and calibrated as required.

(g) Verify that systems interlocks, trips and controls function within design requirement

(h) Verify that any four air handling units operating will maintain the drywell temperature within design requirements

(i) verify operation of units on application of N_1 and N_2 electric power to cooling system

(j) verify operation of controls to change drywell temperature

(k) Upon completion of preoperational testing all temporary equipment (piping, supports, instruments, etc) shall be removed, and all systems returned to normal operating conditions, or placed in lay-up condition, as appropriate.

14.2.12.1.54.6

Fuel Building Heating, Ventilating and Air Conditioning Systems Preoperational Test.

(1) Purpose

To verify the ability of the Fuel Building Heating, Ventilating and Air Conditioning Systems to perform within design specifications.

(2) Prerequisites

(a) The construction tests and the balancing tests have been completed and the SCG has reviewed and approved the test procedures, schedule, staffing, and plant conditions.

(b) The following systems must be available:

1. Normal electric power.

2. Division 1 and Division 2 electric power.

3. Instrument air.

4. Process radiation monitoring system.

5. Essential service water

6. Reactor island non-essential chilled water

7. Heated water system

8. Standby gas treatment system

9. Shield annulus plant vent

10. Drain systems

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as required.

(b) Check out system components.

(c) All dampers and valves shall be checked for operability from fully open to fully closed and left in their normal operating position. Verify the operation of dampers and valves by means of remote manual operators and position indicating lights in the main control room.

(d) All fans shall be checked for correct rotation.

(e) All filters shall be in a clean condition.

(f) All components of HVAC equipment controls and instruments shall be checked for completion of piping and wiring.

(g) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure. Instruments shall be adjusted and calibrated as required.

(h) Verify that each pressure control exhaust fan, operating fan X63-CC002A and standby fan X63-CC002B, maintains the design negative pressures within the fuel building.

(i) Verify that the main air conditioning units, X63-ACU01 and X63-ACU02, maintain the area temperatures at the design temperatures specified.

(j) Verify that each of the following individual room coolers maintains the room at the design temperature specified: MG set cooling unit

X63-ECU04A, MG set cooling unit X63-ECU04B, Division 1 Shield Annulus fan room cooling unit X63-ECU03A, Division 2 Shield Annulus fan room cooling unit X63-ECU03B, SGTS room cooling unit X63-ECU01A, SGTS room cooling unit X63-ECU01B, Division 1 FPCCU Pump area cooling unit X63-ECU02A Division 2 FPCCU Pump area cooling unit X63-ECU02B, and Air Positive Seal Compressor cooling unit X63-ECU05.

(k) Verify that SGTS initiation signal shuts down the pressure control exhaust system and the main air conditioning units, starts the SGTS system, and changes the dampers and valves positions as required. Verify that the design negative pressure requirements for the Fuel building are met for these conditions.

(l) Upon completion of preoperational testing, all temporary equipment (piping supports, instruments, etc) shall be removed, and all systems returned to normal operating condition, or placed in lay-up condition, as appropriate.

14.2.12.1.54.7

Diesel Generator Buildings Heating and Ventilating Systems Preoperational Test.

(1) Purpose

To verify the ability of the Diesel Generator Buildings Heating and Ventilating Systems to perform within design specifications.

(2) Frerequisites

(a) The construction tests and the balancing tests have been completed and the SCG has reviewed and approved the test procedures, schedule, staffing, and plant conditions.

(b) The following systems must be available:

1. Normal electric power.

2. Division 1, Division 2, and Division 3 electric power.

3. Carbon Dioxide Fire Protection system.

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as required.

(b) Check out system components.

(c) All dampers and valves shall be checked for operability from fully open to fully closed and left in their normal operating position Verify the operation of dampers and valves by means of remote manual operators and position indicating lights in the main control room.

(d) All fans shall be checked for correct rotation.

(e) All filters shall be in a clean condition.

(f) All components of HVAC equipment controls and instruments shall be checked for completion of piping and wiring.

(g) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure. Instruments shall be adjusted and calibrated as required.

(h) Verify that all the supply, exhaust, recirculation, and fume control fans for the Division 1, 2, and 3 Diesel Generator Rooms are interlocked with the CO_2 Fire Protection system to shut down when their divisional CO_2 system is initiated.

(g) Verify the operation of the divisional supply and recirculating fans under the control of their respective temperature switches.
Verify the interlock of each of the two divisional supply fans with a respective exhaust fan for simultaneous operation.
Verify the interlock of the recirculation fan with its divisional diesel generator.

(h) Verify that the heating and ventilating system, supply, recirculation, exhaust and fume control fans, for the Division 1, 2, and 3 Diesel Generator Rooms maintains the room temperature within the design range specified.

(i) Verify that the summer/winter and summer ventilation fans serving the switchgear room and the exhaust fans for the battery room operate when CO_2 system for Division 3 DG Room is initiated.
Verify that the weighted backdraft damper, releasing air from the switchgear room to the generator room, maintains the switchgear room at the design positive pressure when the battery room exhaust fan operates in conjunction with both ventilation fans, and also in conjunction with only the summer/winter ventilation fan.

(j) Verify the operation of the summer ventilation fan under the control of its temperature switch.

(k) Upon completion of preoperational testing, all temporary equipment (piping supports, instruments, etc) shall be removed, and all systems returned to normal operating condition, or placed in lay-up condition, as appropriate.

14.2.12.1.54.8
Shield Annulus Return/Exhaust System Preoperational Test.

(1) Purpose
To verify the ability of the Shield Annulus Return/Exhaust System to perform within design specifications.

(2) Prerequisites

(a) The construction tests and the balancing tests have been completed and the SCG has reviewed and approved the test procedures, schedule, staffing, and plant conditions.

(b) The following systems must be available:

1. Normal electric power.

2. Division 1 and Division 2 electric power.

3. Standby gas treatment system.

4. Process radiation monitoring system.

5. Instrument air

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as required.

(b) Check out system components.

(c) All dampers and valves shall be checked for operability from fully open to fully closed and left in their normal operating positic: Verify the operation of dampers and valves by means of remote manual operators and position indicating lights in the main control room.

(d) All fans shall be checked for correct rotation.

(e) All filters shall be in a clean condition.

(f) All components of HVAC equipment controls and instruments shal be checked for completion of piping and wiring.

(g) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure. Instruments shall be adjusted and calibrated as required.

(h) Verify that the operating fan, T41-CC004A, and the standby fan, T41-CC004B, can each maintain the annulus between the shield building and the containment at the design negative pressure specified. Verify the modulation of the recirculating and exhaust dampers by the divisional pressure differential controllers to maintain the negative pressure setting. Verify the alarm operation for low differential pressure (high annulus pressure).

(i) Verify the operation of the system on normal electric power and also on each divisional ESF electric power.

(j) Verify that an annulus high radiation signal, and also a LOCA signal, shuts the discharge dampers to the plant vent, opens fully the return/recirculating dampers to the annulus, starts the Standby Gas Treatment System, and opens the annulus shutoff valves to the SGTS.

Verify in addition to the above actions, that, when high radioactivity is detected from the shield annulus only, the pressure control of the SGTS is transferred from the controller set at (-) 2 inches WG to the controller set at (-) 6 inches WG.

(k) Verify that the operation of the flow switch in the discharge duct for each fan will automatically start the other (standby) fan upon indication of operating fan failure to provide the minimum required flow.

(l) Upon completion of preoperational testing, all temporary equipment (piping supports, instruments, etc) shall be removed, and all systems returned to normal operating condition, or placed in lay-up condition, as appropriate.

14.2.12.1.54.9

Radwaste Building Heating, Ventilating, and Air Conditioning Systems Preoperational Test.

(1) Purpose

To verify the ability of the Radwaste Building Heating, Ventilating, and Air Conditioning Systems to perform within design specifications.

(2) Prerequisites

(a) The construction tests and the balancing tests have been completed and the SCG has reviewed and approved the test procedures, schedule, staffing, and plant conditions.

(b) The following systems must be available:

1. Normal electric power.
2. Instrument air.
3. Process radiation monitoring system.
4. Essential service water.
5. Reactor island non-essential chilled water
6. Heated water system.
7. Drain systems.

(3) Test Methods and Acceptance Criteria

(a) Install temporary instruments and equipment as required.

(b) Check out system components.

(C) All dampers and valves shall be checked for operability from fully open to fully closed and left in their normal operating positic Verify the operation of dampers and valves by means of remote manual operators and position indicating lights in the main control room.

(d) All fans shall be checked for correct rotation.

(e) All filters shall be in a clean condition.

(f) All components of HVAC equipment controls and instruments shal be checked for completion of piping and wiring.

(g) As each HVAC system is checked for compliance with design criteria, the associated instrumentation and control functions shall be tested. Although most testing of control operations and alarm monitoring are carried out in the main control room, all instrumentation including local indicating instruments, sensing elements and final control elements shall be functionally inspected at some time during the test procedure. Instruments shall be adjusted and calibrated as required.

(h) Verify that the air conditioning unit, V41-ACU02, and system serving the Radwaste control room and substation room, maintains the rooms at the design temperatures specified for the normal and off-normal modes of operation. Verify that the A/C unit and the system control dampers maintain the control room at the design positive pressure specified, with respect to the atmosphere, while in each mode of operation.

(i) Verify that the main air conditioning unit serving the remainder of the Radwaste Building, with operating supply fan V41-CC001A and standby supply fan V41-CC001B, maintains the zone temperatures within the design temperature ranges specified.

Verify the interlock and operation of the exhaust fans with the supply fans, operating exhaust fan V41-CC002A and standby exhaust fan V41-CC002B.

(j) Verify that the zone differential pressure controllers modulate their respective control component, supply fan inlet vanes or supply duct modulating control damper, and that they maintain the design negative pressures as specified.

(k) Verify the operation of the filtration unit, with charcoal and HEPA filters and exhaust fan V41-CC005, for the silo, waste filter rooms, oil separator room and the mixing & filling station exhaust air.

(l) Verify that the radiation monitoring system closes the branch isolating dampers as required.

(m) Upon completion of preoperational testing, all temporary equipment (piping supports, instruments, etc) shall be removed, and all systems returned to normal operating condition, or placed in lay-up condition, as appropriate.

Text addition for 640.21

14.2.12.1.55 Electrical Systems Preoperational Tests

14.2.12.1.55.1 Class 1E 125 Volt D-C System Preoperational Test

(1) Purpose

To verify the capability of each divisional and non-divisional battery to supply its load demand without support of the chargers for a specified time without dropping below minimum battery and cell voltage. To verify the capability of both the normal and alternate battery chargers to restore the batte from the duty cycle discharge state to its fully charged state within an 8 hour period while supplying normal steady state loads. To verify that each Class 1E division's d-c bus can be energized independently of the other division's d-c bus. To verify that the undervoltage, overvoltage, and ground relays and associated alarms operate within the design specification. To verify dc to ac inverted operation and transfer to emergency dc lighting.

(2) Prerequisites

(a) The component testing procedures as required for this test are completed and the data has been reviewed.

(b) All the necessary permanently installed instrumentation properly calibrated and operable.

(c) All the necessary test instrumentation available and properly calibrated.

(d) Appropriate a-c and d-c power sources available.

(e) Fire Protection System is available.

(f) Switchgear and battery room ventilation available.

(g) DC to ac inverters available.

(h) All dc emergency lighting available.

(3) Methods and Acceptance Criteria

(a) Perform a service test by loading each battery with its battery duty cycle and without support of the battery charger, verify that the battery will deliver the design requirements of the d-c system for a specified time without dropping below minimum battery and cell voltage, and verify that the undervoltage relay and the associated alarm operate within the design specification.

(b) With the battery at the duty cycle discharge state, verify that the normal battery charger will fully charge the battery within an 8 hour period while supplying normal steady state load. Verify the tests in (a) and (b) for the alternate battery charger.

(c) Verify that the d-c system load is consistent with battery sizing assumptions.

(d) Demonstrate that each Class 1E division's d-c bus can be energized independently of the other division's d-c bus.

(e) Verify that the ground detection and its associated alarm operate within the design specification.

(f) Deomonstrate that the overvoltage relay and its associated alarm operate with the design specification without actually subjecting the bus to an overvoltage condition.

(g) Demonstrate inverter static transfer switch operation and the ability of the dc to ac inverter to supply normal load within design specification.

(h) Demonstrate that the 125VDC lighting and the self-contained dc lighting will be automatically switched on upon loss of ac power. Demonstrate that the dc self-contained lighting batteries have a minimum 8 hour capacity. Demonstrate the adequacy of lighting level for all emergency lighting.

14.2.12.1.55.2 Emergency AC Power Distribution System

(1) Purpose

To demonstrate electrical independence of the 3 divisional buses, correct power availability, feed isolation, regulation of regulating transformers, to test local and control room controls, bus transfer, load shedding and sequencing on class 1E buses, and standby lighting.

(2) Prerequisities

(a) Individual component tests and complete and have been approved.

(b) Instrument calibration is complete.

(c) The Fire Protection System is operable.

(d) Appropriate d-c sources available.

(e) The class 1E buses are energized.

(f) Switchgear and battery room ventilation available.

(g) Standby diesel generators and associated systems available.

(h) Diesel generator rooms ventilation system available.

(i) Essential service water available.

(3) Test Procedure

(a) Verify all divisional buses preenergized at correct voltages.

(b) Open one Division 1,6.9kv bus feed breaker, verify only associated bus is affected, alarms are correct, alternate feeder will energize bus (as appropriate), and feeders can not be tied (Repeat for Division 2).

(c) Verify trip and close paralleling interlocks.

(d) Verify system redundancy and electrical independence.

(e) Verify all load shedding and sequencing events for Division 1 and 2 buses as described in Section 8.3.1.1.7.

(f) Vary feed voltage to regulating transformers and verify load voltage is within limits for entire load range.

(g) Verify Motor Control Center Voltage.

(h) Test all local and control room controls associated with the tests above.

(i) Verify adequacy of standby lighting systems.

14.2.12.1.55.3 Standby Diesel Generator Preoperational Test

(1) Purpose

(a) To demonstrate the capability of the standby diesel generator power sources

(b) To provide assurance that the system is capable of providing emergency electrical power during normal and simulated accident conditions.

(c) To demonstrate the system's ability to pickup emergency loads during simulated accident conditions.

(d) To demonstrate the operability of the diesel generator auxiliary systems, e.g., diesel fuel oil transfer, diesel-generator starting air supply, jacket water, and lube oil.

(2) Prerequisites

(a) Individual component tests are complete and have been approved.

(b) Instrumentation available and properly calibrated.

(c) The following system and/or components are available:

1. Pneumatic sources.

2. Essential service water.

3. Electrical power, to motors, fans, etc.

4. Fire protection system in diesel generator building.

5. Diesel generator building ventilation.

6. D-c power source.

(d) Sufficient diesel fuel on site to perform test.

(3) Test methods and Acceptence Criteria.

(a) Demonstrate proper manual and automatic operation of the diesel generators and that they can start automatically upon simulated loss of a-c voltage and attain the required frequency and voltage within the specified limits.

(b) Demonstrate proper response and operation for design-basis accident loading sequence to design-basis load requirements, and verify that voltage and frequency are maintained within specified limits.

(c) Demonstrate proper operation of the diesel generator during load shedding, load sequencing, and load rejection. Include a test of the loss of the largest single load while maintaining voltage and frequency within design limits, and a test of the complete loss of load in which overspeed limits are not exceeded.

(d) Demonstrate that a LOCA or LOPP signal will block generator breaker or field tripping by all protective relays except for the generator differential and engine overspeed relays.

(e) Demonstrate that a LOCA signal will initiate termination of parallel operations (test or manual tranfer) and the diesel generator will continue to run unloaded and available.

(f) Demonstrate that the engine speed governor and the generator voltage regulator automatically return to an isochronous (constant speed) mode of operation upon initiation of a LOCA signal.

(g) Demonstrate full-load carrying capability of the diesel generators for a period of not less than 24 hours, of which 22 hours are at a load equivalent to the continuous rating of the diesel generator and 2 hours are at the DEMA STANDARD 2-hour load rating (110 percent of nameplate rating). Verify that the diesel cooling systems function within design limits, and the diesel generator HVAC system maintains the diesel generator room within design limits.

(h) Demonstrate functional capability at operating temperature conditions by reperforming "the automatic response" tests for 1 and 2 above immediately (within 5 minutes) after completion of the 24-hour load test per 4 above.

(i) Demonstrate the ability to:

1 Synchronize the diesel generators with offsite power while connected to the emergency load.

2 Transfer the load from the diesel generators to the offsite power.

3 Isolate the diesel generators and restore them to standby status.

(j) Demonstrate that the rate of fuel consumption while operating at the design-basis accident load is such that the requirements for 7-day storage inventory are met for each diesel generator.

(k) Verify all interlocks, controls, and alarms operate in accordance with design specifications.

(l) Demonstrate starting reliability by means of any 69/n consecutive valid starting test without failure (per plant), where n is equal to the number of diesel generator units of the same design and size.

(m) Auxiliary system instrumentation and equipment will be tested using actural or simulated conditions to verify performance within design specification.

(n) Test all Diesel Generator Local and Control Room controls.

14.2.12.1.55.4 ECCS Integrated Initiation With Preferred Source of Offsite Power Available and During a Loss of Offsite Powe Preoperational Test

(1) Purpose

To demonstrate the ability to initiate ECCS load sequencing/shedding when the Class 1E 6.9 kV buses are powered by the preferred offsite source, and during a loss of offsite power (LOPP).

(2) Prerequisites

a. Preoperational/acceptance testing of systems as required for this test is complete and the data has been reviewed.

b. Permanently installed instrumentation properly calibrated and operab

c. Necessary test instrumentation available and properly calibrated.

d. Appropiate a-c and d-c power sources available.

e. The Class 1E buses are energized from the preferred source of offsite power.

f. Class 1E switchgear and battery room ventlation systems available.

g. Class 1E buses are loaded with their normal plant demands.

h. Standby diesel generators and associated systems available.

i. Diesel generator rooms ventilation system available.

j. Emergency pump rooms ventilation systems available.

k. Emergency service water systems available.

l. RHR system available.

m. HPCS system (including HPCS diesel generator) available.

n. LPCS system available.

o. Condensate storage tank and suppression pool water available for ECC operation.

p. Fire protection system is operable.

(3) Test Procedure

a. Intitiate a Class 1E, Division 1, 6.9 kV bus undervoltage and verify the following.

1. Automatic starting of the diesel generator with its associated d- system energized and its automatic connection to a properly cleared bus when the diesel generator reaches rated speed and voltage.

2. Proper operation of all relaying and interlocks involved with thi undervoltage condition including shedding/sequencing of sources and loads.

3. Abilty to manually operate and restore normal loads to the 6.9 kV Class 1E buses.

Repeat the above procedure for Divisions 2 and 3 Class 1E, 6.9 kV buses. Verify the diesel generators start and the load shedding/ sequencing occur within design specification.

b. Initiate a total LOPP and initiate the items in 14.2.12.1.55.4(3)(a) (Items 1 through 3) above for the entire Class 1E system. on total loss of offsite power, diesel generators simultaneously start, load shedding takes place, preferred and/or alternate preferr source breakers are tripped, diesel generators accept the sequenced loads.

c. With normal power available simulate a LOCA signal and test ECCS integrated response by injecting rated flow into the vessel beginnin from a normal system lineup. Integrated ECCS response must show the ability to initiate RHR/LPCI, LPCS,HPCS, and inject rated flow to the vessel within the described period of time following LOCA signal.

d. With Division 1 and 3 electrical systems out-of-service, normal power available to Division 2 and the ECCS manual pressure vessel isolation valves closed, simulate a LOPP followed immediately by a LOCA and verify the following.

1. Automatic starting of the diesel generator with its associated d-c system energized and its automatic connection to a properly cleared bus when the diesel generators reach rated speed and voltage.

2. Proper operation of all relaying and interlocks involved with the undervoltage/LOCA condition, including shedding/sequencing of sources and loads.

3. The Division 2 equipment operating conditions can be stabilized that no adverse conditions develop to Division 2 equipment such as overheating, etc., that there is sufficient instrumentation operable to properly monitor and control Division 2 safety related equipment.

4. Verify that isolated buses remain de-energized.

   Repeat the above procedure for Divisons 1 and 3 Class 1E, 6.9 kV buses.

   Verify integrated ECCS response in conjunction with simulated LOCA LOPP signals demonstrates the ability of the diesel generators to start simultaneously and maintain ECCS loads while they provide rated flow to the vessel within the prescribed time.

e. Verify that the dc system load is consistent with battery sizing assignments.

14.2.12.1.55.5 Non-divisional AC Power Distribution System

(1) Purpose

To demonstrate the correct power availability, to demonstrate regulation of regulating transformers, to demonstrate adequacy of normal AC lighting, and isolation devices.

(2) Prerequisites

(a) Individual component tests are complete and have been approved.

(b) Instrument calibration is complete.

(c) The Fire Protection System is operable.

(d) Appropriate d-c sources available.

(e) Switchgear and battery room ventilation available.

(f) Normal AC lighting system available.

(3) Test Methods and Acceptance Criteria

(a) Verify buses pre-energized at correct voltage.

(b) Vary feed voltage to regulating transformers and verify load voltage is within limits for entire load range.

(c) Verify Motor Control Center Voltage.

(d) Verify adequacy of normal AC lighting.

(f) Verify that the series isolation breakers feeding the ECCS Sump Pump MCC buses A1-3 and B1-3 are tripped by their associated Division 1 and 2 control signals upon initiation of a LOCA.

Text change for 640.21

14.2.12.1.53 Polar Crane Preoperational Test (Continued)

(h) Check the load sensing instrumentation of the main hoist. Applying known loads, verify that both digital readouts display accurate weights. Verify hoist and alarm operation on high loads.

(i) The system is acceptable when all controls, switches, and alarms function according to design specifications.

14.2.12.1.54 Heating, Ventilation, and Air Conditioning (HVAC) Systems Preoperational Test

Applicant will supply.]

14.2.12.1.55 Electrical Systems Preoperational Tests

Applicant will supply.]

14.2.12.1.56 Seismic Monitoring System Preoperational Test

Applicant will supply.

14.2.12.1.57 (Deleted) RHR Complex Heating and Ventilation System Preoperational Test

Applicant will supply.]

14.2.12.1.58 RHR Service Water System Preoperational Test

Applicant will supply.

14.2.12.1.59 Condensate Makeup Demineralizer System Preoperational Test

Applicant will supply.

640.22 (14.2.12) Identify any of the post-fuel loading tests described in Section 14.2.12.3 of your FSAR which are not essential to the demonstration of conformance with design requirements for structures, systems, components, and design features which meet any of the following criteria:

a. Will be relied upon for the safe shutdown and cooldown of the reactor under normal plant conditions and for maintaining the reactor in a safe condition for an extended shutdown period.

b. Will be relied upon for the safe shutdown and cooldown of the reactor under transient (i.e., infrequent or moderately frequent events) conditions and postulated accident conditions and for maintaining the reactor in a safe condition for an extended shutdown period following such conditions.

c. Will be relied upon for establishing conformance with safety limits or limiting conditions for operation that will be included in the facility Technical Specifications.

e. Are assumed to function, or for which credit is taken, in the accident analysis of the facility as described in your FSAR.

f. Will be used to process, store, control, or limit the release of radioactive materials.

These tests will be exempt from operating license conditions requiring NRC prior approval for major test changes.

Response

The corresponding tests have been identified in Subsection 14.2.12.3.

640.23 (14.2.12) Add a test description in Section 14.2.12.3 of your FSAR for a high temperature containment penetration area concrete temperature survey as described in previous applications for an operating license.

Response

A startup test for concrete temperature survey was added as Subsection 14.2.12.3.38.

Text modification for 640.22

14.2.12.2 General Discussion of Startup Tests (Continued)

In describing the purpose of a test, an attempt is made to identify those operating and safety-oriented characteristics of the plant which are being explored.

Where applicable, a definition of the relevant acceptance criteria for the test is given and is designated either Level 1 or Level 2. A Level 1 criterion normally relates to the value of a process variable assigned in the design of the plant, component systems, or associated equipment. If a Level 1 criterion is not satisfied, the plant will be placed in a suitable hold-condition until resolution is obtained. Tests compatible with this hold-condition may be continued. Following resolution, applicable tests must be repeated to verify that the requirements of the Level 1 criterion are now satisfied.

A Level 2 criterion is associated with expectations relating to the performance of systems. If a Level 2 criterion is not satisfied, operating and testing plans would not necessarily be altered.

Investigations of the measurements and of the analytical techniques used for the predictions would be started.

For transients involving oscillatory response, the criteria are specified in terms of decay ratio (defined as the ratio of successive maximum amplitudes of the same polarity). The decay ratio must be less than unity to meet a Level 1 criterion and less than 0.25 to meet Level 2.

14.2.12.3 Startup Test Procedures

The following post-fuel loading tests are exempt from operating license conditions requiring NRC prior approval for major test changes:

Text modification (cont) for 640.22

Startup Test Number 17 - Core Power-Void Mode Response (14.2.12.3.17)

Startup Test Number 19 - Feedwater System (14.2.12.3.19) - Sections on level control and feedpump trip only.

Startup Test Number 25 - Recirculation Flow Control (14.2.12.3.25) - All sections except that dealing with maximum flow control valve speed.

Startup Test Number 26 - Recirculation System (14.2.12.3.26) - section on system runback only.

Startup Test Number 31 - Reactor Water Cleanup System (14.2.12.3.31)

Text addition for 640.23

14.2.12.3.38 Startup Test Number 38 - Concrete Temperature Survey

14.2.12.3.38.1 Purpose

The purpose of this test is to demonstrate the ability of natural convection to cool the concrete surrounding selected pipe penetrations in the containment wall.

14.2.12.3.38.2 Prerequisites

The preoperational tests have been completed, the SCG has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

14.2.12.3.38.3 Description

The penetration concrete temperature survey test consists of measuring concrete temperatures surrounding selected main steam and reactor water cleanup discharge piping penetrations in the containment and auxiliary buildings. Measurements from temperature sensors on the concrete will be recorded at various steady-state operating power levels. The measured temperatures will be compared, and proven to be acceptable with respect to the design criteria.

Temperatures will be recorded during initial heatup and at each major power level during the power ascension test phase.

14.2.12.3.38.4 Criteria

Level 1

The concrete temperature adjacent to the selected containment penetrations shall not exceed 200° F.

640.24 (14.2.12) You do not establish prerequisites in Section 14.2.1.5 of your FSAR for the following test abstracts even though this particular section is referenced in the test abstracts. These test abstracts are the Fuel Loading Test (Section 14.2.12.3.3) and Full Core Shutdown Margin (Section 14.2.12.3.4). Accordingly, modify Sections 14.2.12.3.3 and 14.2.12.3.4, as necessary, to remove this discrepancy.

Response

Subsection 14.2.12.3.3.2 was modified to remove the discrepancy.

640.25 (14.2.12) Modify the test abstract for the Control Rod Drive System Test (Section 14.2.12.3.5) to include the following test requirements:

a. Perform full-flow and no-flow scrams to bound the conditions under which the control rods might be required to function to achieve plant shutdown or provide a detailed technical justification which will ensure that your test conditions have, in fact, bracketed the expected operating envelope.

b. Perform tests on the control rod decelerating devices.

c. Modify the table contained in Section 14.2.12.3.5.3 of your FSAR as follows:

   1. In the first control rod drive test, change "Indication" to "Position Indication" and add "all" in the "Preop Test" and "0 (psig)" column.

   2. In the last control rod test, add "normal" to the "Accumulator Pressure" column and delete "normal" from the Preop Test Column.

d. Include in the acceptance criteria, a scram time versus the RPV pressure envelope for individual control rod drive scram measurements.

Response

The above modifications will be provided formally in January 1983. (Item a: Table II of Clinton STS already requires scram testing of all rods at zero and rated pressure, as well as scrams of selected rods in conjunction with planned startup testing scrams that will occur at various power and flow conditions. Item b: GESSAR II will be modified to reflect Clinton STS test no. 5. The level 2(e) criterion will be verified in conjunction with the required individual rod scram testing at zero and rated pressure. Item c: The table of subsection 14.2.12.3.5.3 will be changed to agree with sheet 9 of the Clinton STS. Item d: The required testing will be included by adding the level 2(d) criterion for test 5 of the Clinton STS along with the figure on sheet 30).

Text change for 640.24

14.2.12.3.3.2 Prerequisites

Prerequisites to fuel loading are established in Subsection 14.2.1.5 and the tests required thereby are implied in those prerequisites. [redacted], The following prerequisites will be met prior to commencing fuel loading to assure that this operation is performed in a safe manner.

(1) The status of all systems required for fuel loading will be specified and will be in the status required.

(2) Fuel and control rod inspections will be complete. Control rods will be installed and tested.

(3) At least three movable neutron detectors will be calibrated and operable. At least three neutron detectors will be connected to the high flux scram trips. They will be located to provide acceptable signals during fuel loading.

(4) Nuclear instruments will be source checked with a neutron source prior to loading or resumption if sufficient delays are incurred.

(5) The status of secondary containment will be specified and established.

(6) Reactor vessel status will be specified relative to internal component placement and this placement established to make the vessel ready to receive fuel.

640.26 Provide a description of how the first reactor heatup will be accomplished (i.e., pump heat, nuclear or auxiliary steam). If non-nuclear, indicate what tests will be performed. Also indicate if non-nuclear heatups will be performed before or after fuel loading or both.

Response

The first plant heatup will be performed in conjunction with the Reactor Vessel Flow-Induced Vibration Preperational Test (14.2.12.1.31). If necessary, additions will be made to this test description. This will be a non-nuclear heatup accomplished using pump heat (RHR and/or recirc. pumps). The Recirculation System and Control Preoperational Test (14.2.12.1.9) will be performed in conjunction with this test. Unless a prototype flow-induced vibration program is required, the only non-nuclear heatup will be the one done in conjunction with the ~~preop test~~ preoperational test.

640.27 (14.2.12) Modify the test abstract for the Reactor Core Isolation Coolant (RCIC) System Test (Section 14.2.12.3.12) to address the following concerns:

a. Our review of licensee events reports (LER's) has disclosed several instances of RCIC pump failure to start on demand and of inadvertent trips. It appears that many of these deficiencies could have been avoided through better testing during the plant's initial test programs. To demonstrate the reliability of the RCIC system, state your plans to demonstrate cold, quick pump starts over a wide range of pressures during your initial test program. Include starts initiated by both manual means and by injection of simulated low water level signals.

Response

Plans to demonstrate cold, quick pump starts during the initial test program will be provided formally in January 1983. (Note: inclusion of Test No. 14 of the Clinton STS into GESSAR II will provide the required testing)

b. IE Information Notice No. 82-13, dated May 28, 1982, "HPIC/RCIC High Steam Flow Setpoints," discussed problems pertaining to incorrect setpoint values for the RCIC steam supply line high flow isolation trip. Accordingly, modify the Level 2 criteria to:

1. Ensure that the differential pressure switch setting is accomplished in accordance with the guidance provided in the IE notice cited above.

2. Describe whether there are any time delay devices (e.g., orifice snubbers or electronic timers) used to preclude spurious isolation trips. Include the testing of these time delay devices.

Response

The statement of the steam flow setpoint criterion ~~in the FSAR~~ is correct as stated. An electronic timer to preclude spurious isolations during system startup will be tested during the preop program, but does not need to be included in the Level 2 criterion.

640.28 (14.2.12) Modify Section 14.2.12.3.16.2 of your FSAR to include determination of the minimum critical power ratio in the Core Performance Test (Section 14.2.12.3.16.3) and any other thermal-hydraulic or power distribution limits.

Response

Response to this question will be provided formally in January 1983. (Wording of Subsection 14.2.12.3.16.3 will be revised per Test 19 of the Clinton STS).

640.29 (14.2.12) Include tests to determine the runout capability and the loss of maximum credible feedwater heating capability in the Feedwater System Test (Section 14.2.12.3.19).

Response

Response to this question will be provided formally in January 1983. (Tests 23B and 23D of the Clinton STS will accomplish this)

640.30 (14.2.12) Provide a description of how the startup test data will be recorded. Indicate the parameters to be recorded (i.e., the signal list), the equipment to be used (i.e., Startrec, ERIS), and how the portable instrumentation will be isolated from the permanently installed instrumentation. Alternatively, indicate that the information cited above will be included in the OL applicant's FSAR.

Response

The startup test data will be recorded utilizing ERIS described in Appendix 18B.

640.31 (14.2.12) You state in Section 5.4.5.2 of your FSAR that the valve poppet of the main steam isolation valves (MSIV) is closed at about 90 percent of the valve stem travel and that the last 10 percent of travel closes the pilot valve only. Accordingly, provide technical justification in the description of the Main Steam Isolation Valves Test (Section 14.2.12.3.21) for your linear extrapolation from 90 percent to 100 percent closed.

Response

Response to this question will be provided formally in January 1983. (The description and Level 1 criterion section on sheet 67 (Test 25A) of the Clinton STS will be reflected in Subsection 14.2.12.3.21)

640.?? (14.?.12) State in the Relief Valves Test description (Section 14.2.12.3.22) whether the temperature return to within 10 F of the initial temperature is a Level 1 or a Level 2 acceptance criterion. Our position is that it should be a Level 2 criterion and not both a Level 1 and a Level 2.

Response

Subsection 14.2.12.3.22 has been modified to show criteria as Level 2 only.

640.33 (14.2.12) Verify in the Turbine Trip and Generator Load Rejection Test description (Section 14.2.12.3.23) that both turbine trips (stop valve closure) and generator trips (fast control valve closure) will be conducted at full rated power (test condition 6), in both the manual and automatic flow control modes. Alternatively, provide technical justification which shows how proper protective actions for the turbine and the reactor can be demonstrated with a reduced number of trips.

Response

Only one Generator Load Reject will be conducted from Test Condition 6. Reactor response to a Load Reject or Turbine Trip is essentially identical. Turbine overspeed protection can be checked doing a load reject. Plant response to a turbine trip will be checked at T.C.3. Manual or auto flow control does not affect transient response since recirc. pump trip to the low frequency motor generators occurs automatically (and will be evaluated) following either a turbine trip or load reject. Table 14.1-3 will show only a T.C.6 Load Reject required.

Text change for 640.32

14.2.12.3.22.2 Description (Continued)

less than 55% of inlet pressure. The GE design specification requires the back pressure to be less than 40% of the inlet pressure, and present designs have back pressures on the order of 30% of the inlet pressures. Methods of calculating line losses and pressure drops are reliable enough to assure that the 15% to 25% conservatism in the design more than offsets any slight inaccuracies in the calculation. A major blockage of the line would not necessarily be offset and it should be determined that none exists through the BPV response signatures.

Vendor bench test data of the SRV opening responses will be available onsite. The response times of relief valves to reactor steam will be measured on the three valves of any type or model not previously installed and tested on a reactor. This procedure is to ensure the validity of the bench testing.

14.2.12.3.22.3 Criteria

Level 1

There should be a positive indication of steam discharge during the manual actuation of each valve.

(1) Pressure control system-related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response must be less than or equal to 0.25.

(2) The temperature measured by thermocouples on the discharge side of the valves shall return to within 10°F of the temperature recorded before the valve was opened.

Text change (cont) for 640.32

14.2.12.3.22.3 Criteria (Continued)

If pressure sensors are available, they shall return to their initial state upon valve closure.

(2) During the 250 psig functional test, the steam flow through each relief valve, as measured by the initial and final bypass valve position, shall not be less than 10% under the average of all valve responses.

(3) During the rated pressure test, the steam flow through each relief valve, as measured by MWe shall not be less than 5% of rated MWe under the average of all the valve responses.

(4) If the SRVs have not been previously tested on a reactor, three valves shall be monitored and the total of the delay and stroke times shall be compatible with the design specification.

The sum of capacity measurements from all relief valves will be equal to or greater than rated, corrected for inlet pressure of 103% of the spring setpoint.

Level 2

(1) Relief valve leakage will be low enough that the temperature measured by the thermocouples in the discharge side of the valves returns to within 10°F (5.6°C) of the temperature recorded before the valve was opened. The thermocouples are expected to be operating properly.

(2) The pressure regulator must satisfactorily control the reactor transient and close the control valves or bypass

640.34 (14.2.12) Modify the test description for the Shutdown From Outside the Main Control Room Test (Section 14.2.12.3.24) to address the following:

a. State that all personnel actions including scram and MSIV closure will be accomplished from outside the control room.

b. Demonstrate that the plant can be maintained at stable hot, standby conditions for a least 30 minutes.

c. Demonstrate operation of the RHR system in the suppression pool cooling mode with change over to shutdown cooling mode. State that the cooldown in the shutdown cooling mode will lower coolant temperature at least 50 F.

Response

Response to this question will be provided formally in January 1983. (Item a: Subsection 14.2.12.3.24 will be revised to have wording of Test 28 of Clinton STS. Item b: item a requires cooldown to put RHR SDC on (has to be less than 135 psi) means far in excess of 30 minutes will be required. Item c: Additional sentences at end of Clinton STS will be added "The RHR system operation from outside the control room will be demonstrated by operating the system in the suppression pool cooling mode and then shifting to the shutdown cooling mode. The system will be operated in the shutdown cooling mode to lower coolant temperature at least 50°F").

640.35 (14.2.12) Modify the test description of the Recirculation System Test (Section 14.2.12.3.26) to include two-pump trips as indicated in Table 14.1-3 and to determine the drive flow coastdown curve. Modify Table 14.1-3 of your FSAR to indicate the correct test condition for the non-cavitation test.

Response

Response to this question will be provided in January 1983. (Subsection 14.2.12.3.26 will be reworded per Test 30 of the Clinton STS).

640.36 (14.2.12) Except for the test title, the test description for the Loss of Turbine-Generator and Offsite Power Test (Section 14.2.12.3.27) is essentially identical to the Turbine Trip and Generator Load Rejection Test (Section 14.2.12.3.23). Accordingly, revise this test description to describe the Loss of Turbine-Generator and Offsite Power Test. This test should be initiated from a sufficient power level and, as discussed below, should be maintained for a period of time sufficient to demonstrate that the necessary equipment, controls, and instrumentation are available following a simulated loss of offsite power to remove decay heat from the core using the onsite power systems. It is our position that you should initiate this test from a generator output of at least 10 percent and maintain the simulated loss of offsite power for at least 30 minutes in order to demonstrate this capability.

Response

Response to this question will be provided formally in January 1983. (Subsection 14.2.12.3.27 will be reworded per Test 31 of the Clinton STS. Additional wording in the description that the generator will be at > 10% load and the plant will be maintained isolated from the grid for > 30 minutes will be added).

640.37 (14.2.12) Provide either a test description or a suitable reference for a "confirming test" of the RPV Internals Vibration Test (Section 14.2.12.3.29).

Response

Subsection 14.2.12.1.31 describes the confirmatory test. A corresponding reference was added to Subsection 14.2.12.1.29.

640.38 (14.2.12) Revise the Suppression Pool Makeup System Test description (Section 14.2.12.3.36) so as not to describe "periodic" (i.e., surveillance) testing but, instead, describe the testing to be conducted during the initial startup. Clarify the test condition since Table 14.1-3 of your FSAR specifies heatup while Section 14.2.12.3.36.3 specifies shutdown. Indicate in Section 14.2.12.1.45 of your FSAR, the satisfactory completion of the preoperational test as a prerequisite. This test is for an ESF system and should also verify redundancy and divisional separation.

Response

Subsection 14.2.12.3.36 has been deleted. All of this system testing is done in conjunction with 14.2.12.1.45.

640.39 Compare all test descriptions in Section 14.2.12.3 of your FSAR with recent General Electric Startup Test Specifications provided to BWR-6 licensees and OL applicants. Describe and explain any differences not due to plant-unique features.

Response

Response to this question will be provided formally in January 1983. (The test descriptions in Subsection 14.2.12.3 will be replaced by those given in the Clinton STS. Any differences will be described).

Text change for 640.37

14.2.12.1.29 Upper Pool Storage System Preoperational Test (Continued)

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing.

(3) General Test Methods and Acceptance Criteria

Verification of the capability to transfer upper pool fluid to the lower pool at the flow desired.

¶ The confirmatory internal vibration test is conducted in accordance with subsection 14.2.12.1.31.

14.2.12.1.30 Plant Process Sampling System (Radwaste) Preoperational Test

Applicant will supply.

14.2.12.1.31 Reactor Vessel Flow-Induced Vibration Preoperational Test

(1) Purpose

The reactor vessel flow-induced vibration test contains the engineering requirements for the preoperational vibration inspection and flow excitation of reactor internals. These requirements are intended to fulfill provisions of NRC Regulatory Guide 1.20 with respect to the vibration assessment of reactor intervals.

(2) Prerequisites

(a) Recirculation system preoperational testing shall be completed sufficiently to allow safe operation of the recirculation pumps at rated volumetric flow for extended operation.

Table change for S40.38

Table 14.1-3

START-UP TEST PROGRAM (continued)

STI No.	Test Title	Cold Test or Open RPV	Heatup	Test Conditions 1	2	3	4	5	6	7	Warranty
28	Drywell piping vibration		X	X		X			X		
• 29	RPV internals vibration		X	X	X	X	X	X	X		
30	Recirc. System flow calibration	X			X[4]	X		X, X[5]	X		
31	Reactor Water Cleanup System		X								
32	Residual Heat Removal System		X	X							
• 33	Drywell atmosphere cooling		X		X				X		
• 34	Cooling Water System		X						X		
35	Offgas System		X		X	X		X	X		
• 36	~~Suppression Pool Makeup System~~ Deleted		~~X~~ Del								
• 37	Inclined fuel transfer		X								

1. See Figure 14.1-1 for test conditions region map.
2. Perform Test 5, timing of 4 slowest control rods in conjunction with these scrams.
3. Between test conditions 1 and 3.
4. Between test conditions 2 and 3.
5. Between test conditions 5 and 6.
6. Before 100% turbine trip.
7. Future maximum power test point.
8. Determine maximum power without scram.
9. Perform at 100% core flow, 50% ± 2.5% power
10. Anywhere > 75% power.
11. 70 - 80% power.
12. 80 - 90% power.
13. Do STI 28 in conjunction with this test.
14. Demonstrate recirculation system runback feature.

L = Local Flow Control Mode
M = Master Manual Flow Control Mode
X = Local or Master Manual Flow Control Mode
A = Automatic Flow Control Mode
SP = Scram Possibility
SD = Scram Definite
BP = Bypass Valve Response
• * = Do either Stop Valve or Control Valve Trip

Text change for 640.38

14.2.12.3.35.4 Criteria (Continued)

Level 2

The system flow, pressure, temperature, and relative humidity shall comply with design specifications. The catalytic recombiner, the hydrogen analyzer, the activated carbon beds, and the filters shall be performing their required function.

14.2.12.36 Startup Test Number 36 - Deleted

14.2.12.3.36 Startup Test Number 36 - Suppression Pool Makeup System

14.2.12.3.36.1 Purpose

Verify the capability of the suppression pool makeup system under simulated accident conditions to transfer the required fluid quantity from the upper containment pool to the suppression pool within a time period prescribed to ensure equal to or greater than two feet of fluid above the upper suppression pool vents.

14.2.12.3.36.2 Prerequisites

Apply test procedures reviewed and approved by the Startup Coordinating Group (SCG) using instrumentation which has been checked and calibrated to accomplish the required preoperational tests. Periodic tests shall confirm the operational capability of the suppression pool makeup system.

14.2.12.3.36.3 Description

The periodic tests shall consist of the means to verify the operational status of all system components. During reactor shutdown, the HPCS pump shall be started after positioning valves of the HPCS System to pump water from the suppression pool to the condensate storage tank. The lowering of the water in the suppression

14.2.12.3.36.3 Description (Continued)

pool shall actuate the low-low suppression pool level alarm and not cause actuation of any dump valve. Observation of the suppression pool makeup system piping outlets over the suppression pool shall confirm there is no release of fluid from the upper containment pool. Next, these valves shall be opened manually one at a time to confirm there is no discharge of fluid. Follow this by opening the two-series Division 1 dump valves in less than 30 seconds from full closed to full open and continue to measure the time to release the required quantity of fluid from the upper containment pool to the suppression pool. Prior to this flow rate test, the upper containment pool gates must be in their proper positions for the test. The required water for transfer shall be contained in the upper containment pool above the top of the suppression pool makeup system inlets to preclude the need to rely on the reduced flow rate that occurs when air is introduced or when upper containment pool level is below the top of the inlets. The anti-vortex forming devices shall be in place for the test as well as during reactor operation. Following this portion of the test, water shall be pumped back up to the upper containment pool in order to repeat the timed transfer rate for the Division 2 two-in-series dump valves.

The allowable dump time shall be established for the test procedure and shall be less than the minimum full ECCS pump runout flow-start time and shall allow for the following: 30-second dump-valve-opening time, fluid-acceleration time to full gravity flow, reduced flow with reduction in head due to drop of upper containment pool water level, any cavitation effects in dump line, reduced flow caused by any vortex effects at inlets, and loss of inlet submergence. The quantity of fluid required to be transferred shall be equal to, or greater than, that established by the test procedure and shall include the following: required makeup volume inside the drywell below the weir wall, the added volume to fill the vessel above the normal level to the dome, volume in the steamlines to

14.2.12.3.36.3 Description (Continued)

the inboard isolation valves on three lines and to the outboard isolation valve on the fourth, and the allowance for containment spray hold up on equipment and structural surfaces. The draw-down volume of the ECCS system operating at runout flow shall also be considered. It shall be necessary to determine how low the suppression pool must be lowered to contain the test fluid volume without overflowing the weir wall and measuring the fluid transferred.

14.2.12.3.36.4 Criteria

The test results shall confirm that the suppression pool makeup system is capable of transferring the required fluid volume within the allowed time period prescribed in the test procedures.

14.2.12.3.37 Startup Test Number 37 - Inclined Fuel Transfer System

14.2.12.3.37.1 Purpose

Verify the operability of the inclined fuel transfer system.

14.2.12.3.37.2 Prerequisites

The operational tests have been completed and the SCG has reviewed and approved the test procedures and initiation of testing. Instrumentation and mechanical control devices have been checked or calibrated as appropriate.

14.2.12.3.37.3 Description

Transfer fuel assemblies into and out of containment in accordance with the requirements of the operation and maintenance manual.

640.40 Review the BWR Owners' Group response to Item I.G.1 of NUREG-0737 in their letter from D. B. Waters to D. G. Eisenhut, dated February 4, 1981. Revise Chapter 14 of your FSAR to include Appendix E (additional tests).

Response

Subsections 14.2.12.1.6 and 14.2.12.1.8 have been revised and a new Subsection 14.2.12.1.76 has been added to include these additional tests.

640.41 Rearrange the format of Chapter 14 of your FSAR to conform with the standard format recommended in Regulatory Guide 1.70 (November 1978). This will facilitate our review of the interfaces with the FSAR's of future operating license applicants.

Response

Response to this question will be provided formally in January 1983. (Section 14.1 PSAR-type information will be integrated with Section 14.2 FSAR-type information).

Text change for 640.40

14.2.12.1.6 Nuclear Boiler System Preoperational Test (Continued)

(e) isolation and leak detection systems;

(f) automatic depressurization system logic;

(g) SRV and MSIV actuators accumulator capacity test;

(h) safety/relief valves air piston ope..tion;

(i) reactor head seal leak detection; and

(j) alarms and annunciators.

(k) water level instrumentation and system operation will be tested and verified using simulated signals and by variations in actual vessel level.

14.2.12.1.7 Residual Heat Removal System Preoperational Test

(1) Purpose

Verify the operation of the residual heat removal (RHR) system under its various modes of operation: low pressure coolant injection (LPCI), shutdown cooling and vessel head spray, containment spray, suppression pool water cooling, and steam condensing.

(2) Prerequisites

The construction tests have been completed and the SCG has reviewed and approved the test procedure and the initiation of testing. The RHR service water system must have readiness verification. The reactor vessel and recirculation loops shall be intact and capable of receiving water.

14.2.12.1.8 Reactor Core Isolation Cooling System Preoperational Test (Continued)

manual shall be reviewed in detail in order that precautions relative to turbine operation are followed. Then the system shall be tested within the capability of a temporary steam supply with the pump coupled to the turbine.

(3) General Test Methods and Acceptance Criteria

RCIC system capability is verified by the integrated operation of the following:

(a) all valves and related controls, interlocks, and indicators;

(b) manual and automatic initiation;

(c) automatic isolation, including leak detection system logic;

(d) turbine speed control, trip, mode selection, and test mode;

(e) barometric condenser condensate pump and vacuum pump controls;

(f) flow path verification; ~~and~~

(g) annunciators.

(h) The ability of the RCIC system to start without the aid of AC power with the exception of the RCIC DC/AC inverters will be verified;

(i) Operation of RCIC beyond its design basis will be evaluated during system operation with extended loss of AC power to it and support systems with the exception of the RCIC DC/AC inverters; and

(j) Proper operation of RCIC DC components when the non-RCIC station batteries are disconnected will be verified.

14.2.12.1.76 Containment Pressure Instrumentation Preoperational Test

(1) Purpose

Verify the proper connection and tracking of containment pressure instruments, and that the tubing supplying these instruments is not blocked.

(2) Prerequisites

(a) All containment pressure instruments have been calibrated and are valved in service.

(b) Integrated containment leak rate testing is to be performed per Section 6.2.6.1.

(3) General Test Methods and Acceptance Criteria

As containment pressure is increased during the containment integrated leak rate test, all containment pressure instruments must track properly and all affected instrument lines will be verified clear of obstructions.

Text addition for 640.40

ATTACHMENT NO. 8

CONTENTS

(CONTENTS OF ATTACHMENT 8 PROVIDED TO DAVE LYNCH ON 11/12/83)