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Docket No.: 50-508

Mr. R. L. Ferguson
Managing Director
Washington Public Power Supply System
Post Office Box 968
3000 George Washington Way
Richland, Washington 99352

Dear Mr. Ferguson:

Subject: Request for Additional Information on WNP-3 Safety Review

Enclosed is a second set of requests for additional information related to several areas of the WNP-3 Safety Review. The first set was transmitted to you on April 12, 1983. Your responses should be forwarded to the NRC not later than July 12, 1983. After your responses have been reviewed, a draft SER will be prepared to provide a basis for a series of meetings designed to close out open items.

If clarification of these requests for additional information is necessary, the WNP-3 Project Manager, Ms. Annette Vietti, is available to provide any additional information you need. Ms. Vietti's telephone number is (301)492-4449.

Sincerely,

Original signed by:
Thomas M. Novak

Thomas M. Novak, Assistant Director
for Licensing
Division of Licensing

Enclosure:
As stated

cc: See next page

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DATE	4/13/83	4/ /83	4/3/83				

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220.10 SRP 3.3.2, II FSAR 3.3.2 & 3.8.4.3	Tornado load combinations have not been provided as a breakdown of velocity pressure, pressure drop and tornado missiles. Provide the requested load combinations. The staff's position is outlined in NUREG 0800, Section 3.3.2, II, 3, d.
220.11 SRP 3.4.2, II FSAR 3.4.1.2.3	Are water-stop materials and caulking compounds properly designed so as to resist deterioration due to potential environmental effects such as time, heat, radiation, and chemicals? Provide details of the materials used, their expected service environment, and their expected resistance to same.
220.12 SRP 3.5.3, II FSAR 3.5.3.1.2	Provide details of your design and or analysis of gratings and their supports to resist missile impacts. Also, discuss what assumptions were used in the application of empirical missile penetration formulas to gratings. Provide sketches of the gratings and their supports and fastenings.
220.13 SRP 3.7.1, II, 1 and 2.7.2, II, 4 FSAR 3.7.1.2	The applicant has allowed a considerable reduction in the estimated accelerations at the basemat compared to the full free-field design response spectrum (over 35% at 10 HZ for horizontal SSE). In the FSAR the applicant is comparing his response spectrum at the basemat with a 60% design response spectrum. This is essentially a rock site. Shear wave velocities of 3000 to 4300 fps were recorded in the supporting medium. Therefore, it is considered that, regardless of the method used to establish response spectra, reductions in seismic response at the basemat level would not be expected. This was specifically confirmed by the applicant in paragraph 2.5.4.7 of the FSAR, the last sentence of which states, "Therefore, there will be no amplification in the sandstone, and the baserock acceleration at the site is equal to the acceleration at the plant foundation." The applicant must provide conclusive justification to show that the approach used is technically correct and also will be properly conservative for this rock site. The seismic analysis methods described in NUREG 0800, Rev. 1, Section 3.7.1 and 3.7.2 will be used by the staff as guidance in our evaluation of an acceptable design basis.
220.14 SRP 3.8.1, II, 4, e (for reference) FSAR 3.7.1, 3.7.2, 3.7.3, 3.8.3, 3.8.4, 3.8.5	Provide a tabulation of all computer programs used in these sections. Include descriptions and validation information. The staff position is described in NUREG-0800 (SRP) Section 3.8.1, II, 4, e.
220.15 SRP 3.7.2, II, 4 FSAR 3.7.2.9	In the referenced paragraph of the FSAR it is stated, "...the shear modulus and damping ratio of the foundation rock are practically independent of the shear strain in the range of interest.." Given this situation, provide justification for your "rock-structure interaction" analysis showing substantial reduction in seismic excitation at the basemat vs. the free field.

220.16
SRP 3.7.2, II, 4
FSAR 3.7.2.4

The staff's position with regard to soil-structure interaction analysis is contained in the referenced section of NUREG 0800 (SRP). This position is that if a finite boundary modeling approach is used by the applicant, the analysis should be compared with an elastic half space analysis. Provide details and results of an elastic half space analysis which show that your finite boundary approach is conservative. If the finite boundary analysis is not conservative then the results of the two analyses should be combined as indicated in the SRP.

220.17
SRP 3.7.2, II, 6, b
FSAR 3.7.2.6

In the analysis of the common mat for seismic excitation in 3 directions, neither the rationale for nor the design procedure itself were understood from the description given. Provide further details and justification for the method of combining earthquake inputs in the design of the common mat. How was the horizontal amplification factor of 1.2 arrived at? What does the statement that the mat responses are combined "linearly" mean?

220.18
SRP 3.7.2, II, 3, d
FSAR 3.7.2.3

The rationale for disregarding rotational and out-of-plane translational degrees of freedom, in the justification of use of two-dimensional seismic models, is considered to be incomplete. Provide the numerical bases to support your position that these degrees-of-freedom "are believed not significant."

220.19
SRP 3.7.3, II, 5
FSAR 3.7.4, II, 5 as it refers to Subsection 7.6.1.1.7

Provide details of a seismic instrumentation inservice surveillance program. The staff's position is outlined in the SRP, NUREG 0800, Section 3.7.4, II, 5.

220.20
SRP 3.7.2, II, 1
FSAR 3.7.2.1

What is the significance of the adjective "modal" in the description of the time-history method? Does the modal time-history method differ from the time-history method? Describe the differences and provide justification.

220.21
SRP 3.7.3, II, 2, b
FSAR 3.7.3.2

Rather than referring to CESSAR-F it is requested that the number of earthquake cycles considered in the NSSS and BOP analyses be specifically stated in this section of the FSAR. Provide justification if not in compliance with staff positions outlined in the SRP.

220.22
SRP 3.7.2, II, 3
FSAR 3.7.2.9 and Table 1.8-1

Allowing a peak broadening range of only ± 10% for the construction of floor response spectra based on the assessment of foundation material properties alone is not considered sufficient. The staff's position is that a specific study, as outlined in Regulatory Guide 1.122, is required in order to justify a response spectra peak broadening of less than + 15%. It is requested that results of such a study be provided along with some examples of floor response spectra diagrams at representative points in the structures.

220.23 SRP 3.7.3, II, 2, a FSAR 3.7.3.1.1, a, 3.7.2.5, and Table 1.8-1	With the exception of the issue noted in question 220.22, discuss in detail and justify all differences between the response spectra as described in the referenced section of the FSAR and the staff's position as described in Regulatory Guide 1.122.
220.24 SRP 3.7.3, II, 2, e and 3.7.2, II, 13 FSAR 3.7.3.15	The description of the analysis procedure for damping indicates compliance with subsection 3.7.2.15 of CESSAR-F which outlines damping relations only for NSSS and not in great detail. Discuss compliance with the staff's position as outlined in the above referenced sections of NUREG 0800 (SRP).
220.25 SRP 3.8.2, II, 1 (Description of the Containment) FSAR 3.8.2.1	Provide additional detailed sketches or production drawings of the following: 1. Area where the steel containment is embedded in the basemat and particularly where the steel shell meets the concrete. 2. Details of the personnel hatch and equipment hatch including attachment and welding to the containment shell. 3. Details of the crane girder including its attachment to the steel containment including welding. 4. Details and material descriptions (including radiation resistance and aging characteristics) of all seals.
220.26 SRP 3.8.2, II, 4, c (Refers to 3.8.1, II, 4, e) FSAR 3.8.2.4.5	In the description of computer programs used for the containment stress analysis no validation information is presented. Provide validation information for each program as outlined in the staff's position in the referenced section of NUREG 0800 (SRP).
220.27 SRP 3.8.2, II. 4, d. FSAR 3.8.2 (see Table 1.8-3)	Provide an analysis of containment ultimate capacity. The analysis should provide the information listed in the staff's position as outlined in the referenced section of NUREG 0800 (SRP).
220.28 SRP Section 3.8.2, II, 4, b FSAR 3.8.2.4 and Table 1.8-3	In Table 1.8-3 of the FSAR it is noted that the dynamic nature of the loads applied in the static analysis of buckling was said to have been accounted for. Provide a complete description of the analysis used which indicates how the dynamic nature of the loads was accounted for. Provide results of your analysis. (It is noted that there is no subsection 3.8.2.4.3 in the FSAR).

220.29
SRP 3.8.3, II, 1
FSAR 3.8.3.1

Provide additional detailed sketches or production drawings for the following:

1. Reactor base support including concrete reinforcement of primary shield wall.
2. Reinforcement of containment internal concrete fill.
3. Reinforcement of secondary shield walls.
4. Attachment of primary and secondary shield walls to fill concrete.
5. Attachment of internal concrete to containment vessel.

220.30
SRP 3.8.3, II, 1
FSAR 3.8.3-1

It was noted in Figure 3.8.3-1 of the FSAR that the applicant is installing a foam material behind the upper structural supports for the reactor vessel. The following information is requested for such materials.

1. A complete list of places where such plastic foam type material is to be used as fillers or separators in Category I structural applications where the material is left in place.
2. Description of material characteristics (including aging, potential thermal deterioration effects, potential radiation deterioration).
3. Purpose of these materials for each use.

220.31
SRP 3.8.3, II, 3, b
FSAR 3.8.3.3 and
Table 1.8-3

With regard to load combinations for concrete internal structures, the following remark was found in table 1.8-3 for the referenced SRP Section:

"(2) By combining these load combinations with the allowable limits presented in the Structural Acceptance Criteria (paragraph II.5 of this SRP) expressions defining structural acceptance criteria for every load combination can be generated. They are different from those presented in the FSAR. However, FSAR conditions are found to be conservative and SRP criteria here are amply satisfied."

The significance of this statement is not clear. Please expand the explanation and provide pertinent examples.

220.32
SRP 3.8.4, II, 1
and
3.8.5, II, 1
FSAR 3.8.4.1 and
3.8.5.1

Provide additional detail sketches or production drawings for the following.

1. Shield building reinforcement and attachment to the common mat including all shear reinforcement.

2. Auxiliary building main wall reinforcement and attachment to the common mat.

3. Interfaces between the shield building and auxiliary building walls and floors showing actual clearances.

4. Reinforcement of common mat.

5. Reinforcement and wall connections of tank enclosure mat foundation.

6. Reinforcement of dry cooling tower mat foundation and attachment to walls.

(NOTE: The sketches provided up to and including revision 2 of the FSAR are not considered sufficient to satisfy this request).

220.33
SRP 3.8.4, II, 1
FSAR 3.8.4.1.4

The last sentence in FSAR Subsection 3.8.4.1.4 refers to "masonry drawings of the Tank Enclosure Structure." Please confirm that the reference to "masonry" does not involve any reference to masonry block walls in this structure.

220.34
SRP 3.8.4, II, 6
FSAR 3.8.4.6

Describe in detail, materials, design procedures, installation procedures, and quality assurance requirements for all types of concrete anchors, both cast-in-place and drilled-in, which are used in seismic Category-1 structures and/or to support safety related equipment.

220.35
SRP 3.8.3, II
3.8.4, II
3.8.5, II
FSAR 3.8.3, 3.8.4
3.8.5

The applicant has used ACI 318-71 as the basis for design of Category I concrete structures. Currently, the staff's position as referenced in NUREG 0800 (SRP) is that ACI 349 as implemented by Regulatory Guide 1.142 is to be used as the basis for design of Category I concrete structures other than containment. The applicant should identify and justify all differences between his design procedures for concrete structures and those found in ACI 349/Reg. Guide 1.142.

220.36 SRP 3.7.4, 3.8.3, 3.8.4 FSAR 3.7.4, 3.8.3, 3.8.4, and Table 1.8-3	The following note appears in several places in FSAR Table 1.8-3 regarding various acceptance criteria of the referenced FSAR sections: "Where difference exist between the WNP-3 design criteria and the acceptance criteria identified in this SRP, the bases for concluding that the WNP-3 design criteria are in compliance with the Commission's regulations will be provided by January 1983," Provide the information.
220.37 SRP 3.8.4, II FSAR 9.12	Provide a description and sketches of arrangement and details of the spent fuel rack seismic restraints. Provide results of key calculations for the structural design of the spent fuel racks and seismic restraints for the racks.
220.38 SRP 3.8.4, II FSAR 3.8.4.1.2, a)	Provide a sketch or drawing showing the reinforcement of the spent fuel pool floor slab, including shear reinforcement. Show connection details of the floor slab to the walls. Provide results of key calculations relating allowable to actual shear and bending stresses in the floor slab of the spent fuel pool.

230.1 (SRP 2.5.2.2, 2.5.2.4, 2.5.2.6)

The work by Ruff and Kanamori (1980) and others appear to support the view that the subduction of the Juan de Fuca plate creates a potential for large magnitude earthquakes in the subduction zone beneath WNP-3. In addition:

a) Kanamori (1983) has published an equation relating the age of the subducting plate, convergence velocity, and the largest expected magnitude event. Does this equation apply to the Juan de Fuca plate and if not, why not? Alternatively are there other convincing models that allow the estimation of the magnitude of subduction zone earthquakes under the site to values lower than would be predicted by the Kanamori (1983) relationship?

b) Are there specific examples of aseismic subduction zones which share the following features with the Juan de Fuca subduction zone: young subducted lithosphere, low convergence rate, no back-arc basin, similar maximum depths of seismicity, shallow oceanic trench, low free-air gravity anomaly, small variation in surface topography of the subducted plate and, particularly, complete seismic quiescence down to the magnitude 5 level?

c) Crustal uplift rates of approximately 2mm/yr were observed in the region from 120 to 220 km inland of the Nankai Trough for the 50 years preceding the 1944, M=8.0 Tonankai and 1946, M=8.2 Nankaido earthquake. Why shouldn't the crustal uplift and NE-compressive strain reported by Savage (1981) for western Washington be considered consistent with a similar preseismic deformation? How is the Juan de Fuca subduction zone any different from the subduction zone in the Nankai Trough and the subduction zone associated with the Rivera plate?

d) What is the magnitude of the largest shock in the plate or along the plate interface that could occur beneath the site without exceeding the SSE acceleration? Specify the attenuation and distance used in the discussion. Assign a confidence level to your magnitude estimate, or estimate a range of magnitudes and corresponding confidence levels.

230.2 (SRP 2.5.2.2, 2.5.2.4)

a) What is the magnitude of the maximum credible earthquake that could occur on the subduction zone beneath the WNP-3 site? This magnitude may be described by a range of values with associated probabilities and a best-estimate value.

b) Estimate response spectra at the site assuming the occurrence of the maximum subduction zone earthquake beneath the site, for both vertical and horizontal components of motion. Specify all assumptions about hypocentral depth and attenuation. The spectra should be calculated on a deterministic basis. If, in addition, probabilistic response spectra are presented, describe the treatment of uncertainty in the magnitude of the maximum earthquake, the attenuation relation, and the hypocentral depth. Justify the SSE spectrum in light of your deterministic (and probabilistic) results, for both vertical and horizontal ground motion.

230.3 (SRP 2.5.2.1, 2.5.2.3)

The depth and configuration of the subducting Juan de Fuca plate is critical to the calculation of the effect of the Benioff zone earthquake at the site.

a) Attention is called to FSAR Figure 2.5-31. No location errors are specified for most of the earthquakes plotted thereon, especially for those occurring in a region which projects to the southwest of Olympia on section AA' and particularly for depth of focus. Referring to Crosson (1972), Figure 6, the site and most of the area in which these earthquakes occur is off-scale and the location errors are likely to be large. Several factors influence the accuracy in depth of focus, most important of which is station coverage which changed greatly during the time interval covered. The applicant is therefore asked to provide a number of diagrams similar to Crosson's Figure 6 for periods which reflect significant changes in network coverage and showing error bars that indicate the accuracy of hypocentral locations.

b) Figure 2.5-36C shows seismicity (for example in the vicinity of Mt. St. Helens) that does not appear to have been plotted in the sections shown in Figure 2.5-31. Yet Figure 2.5-31 states that earthquakes within 150 km of a line striking N60°E through the site have been included on the section. Two questions arise: (1) what earthquakes (if any) have been omitted from the section (Figure 2.5-31), and (2) why is the aperture for the section so wide since a width of 300 km results in earthquakes in the Willamette depression being projected to points west of the site into what may be an entirely different tectonic province?

c) Expand your explanation of the decrease in seismicity on the sections through the site west of point B in Figure 2.5-31.

d) The geometry and location of the flexure in the subducting plate is assumed to be the western boundary to down-dip tension earthquakes. Therefore, its position is critical. Clarify your reasoning for locating the position of the flexure.

e) The Puget Sound earthquake of February 15, 1946, is a large earthquake with uncertain depth (Rasmussen, Millard, and Smith, 1974). If this event was relocated at a shallower depth or farther to the west, it may significantly alter the applicant's conclusions about the earthquake potential of the subduction interface or the overriding plate. The International Seismological Summary for 1946 (1954) lists over 40 observations for this earthquake. The observations range in distance from as close as Seattle to as far as Lome in the Ivory Coast. Despite the existance of these data, the applicant chose not to do a computer relocation (FSAR p. 2.5-120). We request that the applicant relocate this earthquake using the published I.S.C. data and establish the relationship of this earthquake to the Juan de Fuca-North American plate interface.

230.5 (SRP 2.5.2.3, 2.5.2.4)

a) Estimate the maximum magnitude possible for a "random earthquake" in the shallow crust within a 32-km radius around the site.

b) Inasmuch as the 17 March 1904 earthquake has not been associated with a structure at any of its various hypothetical locations (pp. 2.5-127, 128, FSAR), show why the size of this earthquake should not be considered the size of the "random earthquake."

c) With respect to the 17 March 1904 earthquake, provide all references not in the public sector for the intensities shown in Figure 2.5-90, as well as for any other locations for which information is available which could be used to assess intensity. Provide the documentation for the relocation of the earthquake to "south of Port Townsend" and the assignment of a smaller size (both attributed to the Pacific Science Center, Victoria, B.C., as "Milne, 1981, private communication: and "Rogers 1981, private communication").

d) Identify the maximum historical earthquake, not associated with known geologic structure, in the tectonic province of the site. Following Appendix A to 10CFR100, assume this earthquake can occur in the vicinity of the site, estimate the resulting ground motion, and assess the adequacy of the SSE spectrum for this occurrence.

230.6 (SRP 2.5.2.4, 2.5.2.6)

Estimate the annual exceedance probability for the SSE, using as sources random earthquakes, subduction zone earthquakes, as well as earthquakes on significant, capable linears. Show the relative contribution of these sources to the annual exceedance probability. If an integrated assessment of exceedance probabilities is performed, assigning subjective weights to different tectonic models, the exceedance probabilities for each model should be presented separately.

230.5 (SRP 2.5.2.4, 2.5.2.6)

Estimate site-specific spectra for a range of percentiles for the maximum earthquake on the Olympia Lineament, using strong-motion data in the appropriate magnitude and distance range. Justify the SSE spectra in light of the site-specific spectra.

References

Crosson, R.W., (1972). Small earthquakes, structure and tectonics of the Puget Sound region, Bull. Seism. Soc. Am., vol. 62, no. 5, pp. 1133-1171.

International Seismology Summary for 1946 January to March (1954), Kew Observatory, Richmond, Surray.

Kanamori, H., (1983). Global Seismicity Preprint, California Institute of Technology.

Rasmussen, N.H., Millard, R.C., and Smith, S.W., 1974, Earthquake hazard evaluation of the Puget Sound region, Washington State: Seattle, Washington Univ. Press, 99 p.

Ruff, L., and Kanamori, H., (1980). Seismicity and the subduction process, Physics of the Earth and Planetary Interiors, vol. 23, pp. 240-252.

Savage, J. C., Lisowski, M., and Prescott, W. H., 1981, Geodetic strain measurements in Washington, J. Geoph. Res., vol. 86, pp. 4929-4940.

231.1 Standard Review Plan (SRP) Sections 2.5.1.1, 2.5.3.1, 2.5.3.2 and 2.5.3.5

A major northwest-trending fault in the Humptulips River area (Tabor and Cady, 1978) projects northwestward under Quaternary deposits to an outcrop of steeply dipping Pleistocene deposits (op. cit) on the west Fork of the Humptulips River. The capability of this fault may be important to the site in light of the following. Offshore studies by Silver (1972) and Snavely and Wagner (1982) indicate a subduction tectonic style characterized by eastward (landward) dipping thrust faults that generally steepen westward (upwards) and that have offset sediments as young as Quaternary. Considering this structural framework, evaluate the possibility that the Humptulips fault, if capable, extends southeastward as a continuous fault or fault zone along the steepened west limb of the Wynoochee anticline (Rau, 1967) and on into the less well-defined Melbourne anticline (Gower and Pease, 1965) or alternatively to the southeast of these structures. Is the Humptulips fault throughgoing and capable? If so, evaluate the effects on the site. Vibroseis records along the Chehalis River might help evaluate the thrust fault hypothesis and reportedly have been obtained by AMOCO.

231.2 SRP Sections 2.5.1.1, 2.5.3.2 and 2.5.3.5

Assuming that a "....subduction tectonic style characterized by eastward dipping thrust faults that generally steepen westward (upwards)....", described in question 231.1 is correct for the site vicinity, would your conclusion regarding the non-capability of the "reverse" and "normal" faults remain the same? Would a thrust fault model allow the presence of undiscovered faults in the site vicinity? If thrust faults exist in the site vicinity what would be their effect on the site? Document and provide supporting bases for your responses.

231.3 SRP Sections 2.5.1-I and 2.5.1.2

Update the FSAR to include recent seismic reflection, remote sensing, and geophysical data that encompass the site area within a radius of about 25 miles. If any new suspect tectonic structures or lineaments of such size or proximity to the site are identified which would exceed the impact of the Olympia lineament on the site earthquake design basis, determine whether or not those features represent capable faults. Evaluate the impact on the site. Document and provide the bases for your responses.

231.4 SRP Sections 2.5.1-I and 2.5.1.2

Many of the natural drainage features in the site vicinity occur along projections of mapped faults although the faults are shown to terminate away from the stream valleys but along their trends. Also many drainages are oriented in a pattern that is parallel to to the NNW and NE striking fault pattern, yet the streams are not considered to be fault controlled by the applicant. Present the evidence that supports the conclusion that the drainage features are not fault controlled.

231.5 SRP Sections 2.5.1.1, 2.5.2.2, 2.5.3.1, 2.5.3.2 and 2.5.3.5

The applicant has dismissed offset magnetic anomalies KK and HH on the Juan de Fuca plate as probably due to episodic jumping of short transform faults connecting offset segments of the spreading ridge a la Hey 91977) (FSAR 2.5-44). Provided that successive jumps are in the same direction and occur after equal increments of spreading, the jumps should produce a V-shaped wake consisting of a pair of lineaments intersecting at the ridge. Although KK seems to form such a wake, mirrored in the Pacific plate, HH is less convincingly matched (c.f. Barr, 1974 and Elvers and others, 1973). Considering the difficulty of identifying the mirror image of HH, evaluate the hypothesis that HH is a fault as suggested by Pavoni (1966), and that the on-shore subcrustal extension of HH could be the source of deep-seated major earthquakes in the Puget Sound region (Fox, 1983). Evaluate the response at the site of a major earthquake on fault HH.

231.6 SRP Sections 2.5.1.1 & 2.5.1-IV

Provide the bases for reducing the assumed maximum downwind thickness of volcanic ash at the site from 6 inches to 1.75 inches as stated on FSAR page 2.5-81. What maximum thickness of tephra landfall, and what maximum rate of ashfall was used as the design basis for the WNP-3 plant.

231.7 SRP Sections 2.5.3.1, 2.5.3.5 and 2.5.2.2

Summarize the field geological, remote sensing, and geophysical data that have a bearing on the overall length and capability or non-capability of the Olympia lineament (including recent analyses by the U. S. Corps of Engineers Districts in Seattle and Portland).

References

Barr, S. M. 1974, Sea Mount formed near the crest of Juan de Fuca Ridge, NE Pacific Ocean; Marine Geology, vol. 17, p1-19.

Elvers, Douglas, Srivastava, S, P., Potter, Kenneth, Moorley, Joseph, Sdidel, Dean, 1973. A symetric spreading across the Juan de Fuca and Gorda rises as obtained from a detailed magnetic survey; Earth and Planetary Sciences Letters, vol. 20 p. 211-219.

Fox, Kenneth F., Jr., 1983, Northeast-trending subcrustal fault transects western Washington: U.S. Geological Survey Open-File Report 83-39d.

Gower, H. P., and Pease, H., Jr., 1965, Geology of the Monteseno Quadrangle, Washington: U.S. Geological Survey GQ Map 374.

Hey, Richard, 1977, A new class of "pseudofaults" and their bearing on plate tectonics: a propagating rift model: Earth and Planetary Sciences Letters, v. 37, p. 321-325.

Pavoni, N., 1966, Tectonic interpretation of the magnetic anomalies southwest of Vancouver Island: Pure and applied geophysics, v. 63, p. 172-178.

Rau, W. W., 1967, Geology of the Wynoochee Valley Quadrangle, Washington: Washington State Division of Mines and Geology Bulletin no. 46, 51 p.

Silver, E. A., 1972, Pleistocene Tectonic Accretion of the Continental Slope off Washington: Marine Geology, v. 13, p. 239-249.

Snavely, P. D., Jr., and Wagner, H., 1982, Geologic cross section across the continental margin off Greys Harbor, southwestern Washington: U.S. Geological Survey Open-File Report 82-459, 11 p.

Tabor, R. W., and Cady, W. M., 1978, Geologic map of the Olympic Peninsula, Washington: U.S. Geological Survey Miscellaneous Field Investigations Map I-993.

260.0 Quality Assurance Branch

Section 17.1.2.2 of the standard format (Regulatory Guide 1.70) requires the identification of safety-related structures, systems, and components controlled by the QA program. You are requested to supplement and clarify the WNP-3 FSAR in accordance with the following:

a. The following items do not appear on FSAR Table 3.2-1. Add the appropriate items to the table or justify not doing so.

1. Containment water level monitor

2. Containment pressure monitor

3. Containment hydrogen monitor

4. Onsite Power Systems (Class 1E)

° Diesel generator packages including auxiliaries (e.g., lube system, jacket cooling, air start systems, governor, voltage regulator and excitation system).
° Instrumentation, control and power cables (including underground cable system, cable splices, connectors, and terminal blocks).
° Conduit and cable trays and their supports containing Class 1E cables and other raceway installations whose failure may damage other safety-related items.
° Transformers
° Valve operators
° Protective relays and control panels
° Pump motors
° Load sequencer
° AC control power inverters
° Electrical penetrations of containment - vital and non-vital including primary and backup fault current protective devices.
° Emergency lighting battery packs
° AC vital bus distribution equipment

5. DC Power Systems (Class 1E)

   - Cables
   - Conduit and cable trays and their supports containing 1E cables and other raceway installations whose failure may damage other safety-related items.
   - Battery racks
   - Protective relays and control panels

6. Radioactivity monitoring (fixed and portable)

7. Radiactivity sampling (air, surfaces, liquids)

8. Radioactive contamination measurement and analysis

9. Personnel monitoring internal (e.g., whole body counter) and external (e.g., TLD system)

10. Instrument storage, calibration, and maintenance

11. Decontamination (facilities, personnel and equipment)

12. Respiratory protection, including testing

13. Contamination control

14. Radiation shielding

15. Accident monitoring instrumentation

16. In-plant iodine radioactivity monitoring

17. Post-accident sampling systems

18. Permanent groundwater drainage system

19. Accepted local surface drainage contours (grading) and structures (i.e., watershed alterations)

20. Vertical manholes for reactor auxiliary dewatering system

21. Class 1E electrical duct banks

22. Buried essential service water pipeline

b. Clarify Table 3.2-1 as noted below or justify not doing so.

1. Item F, "Containment Cooling System," shows Supply System Quality Class II in the table. This system should be subject to the pertinent requirements of the FSAR Appendix B QA program.

2. Regarding item T.1, "Control Room Ventilation System," clarify that the following components will be subject to the pertinent requirements of the FSAR Appendix B QA program:

   - Cooling coils
   - Fans
   - Motors
   - HEPA filters
   - Charcoal adsorber beds
   - Ductwork
   - Intake monitors
   - Toxic gas monitors
   - Piping
   - Dampers/valves

3. Regarding item E, "Containment Spray," clarify that the following components will be subject to the pertinent requirements of the FSAR Appendix B QA program:

   - Containment isolation piping
   - Containment penetration piping supports/hangers
   - Spray chemical storage tank
   - Containment spray pump motors

4. Provide a commitment that all safety-related I&C described in FSAR Section 7.1 through 7.6 and other safety-related I&C for safety-related fluid systems will be subject to the pertinent requirements of the FSAR Appendix B QA program. This can be done by a footnote to FSAR Table 3.2-1.

c. Enclosure 2 of NUREG-0737, "Clarification of TMI Action Plan Requirements" (November 1980) identifies numerous items that are safety-related and appropriate for OL application and therefore should be on Table 3.2-1. These items are listed below. Add the appropriate items to Table 3.2-1 and provide a commitment that the remaining items are (or will be) subject to the pertinent requirements of the FSAR operational QA program or justify not doing so.

	NUREG-0737 Enclosure 2 Clarification Item
1. Plant-safety-parameter display console.	I.D.2
2. Reactor coolant system vents.	II.B.1
3. Plant shielding.	II.B.2
4. Post accident sampling capabilities.	II.B.3
5. Valve position indication.	II.D.3
6. Auxiliary feedwater system.	II.E.1.1
7. Auxiliary feedwater system initiation and flow.	II.E.1.2
8. Emergency power for pressurizer heaters.	II.E.3.1
9. Dedicated hydrogen penetrations.	II.E.4.1
10. Containment isolation dependability.	II.E.4.2
11. Accident monitoring instrumentation.	II.F.1
12. Instrumentation for detection of inadequate core-cooling.	II.F.2
13. Power supply for pressurizer level indicators.	II.G.1
14. Automatic trip of reactor coolant pumps.	II.K.3(5)
15. Power on pump seals.	II.K.3(25)
16. Emergency plans (and related equipment).	III.A.1.a/III.A.2
17. Equipment and other items associated with the emergency support facilities.	III.A.1.2
18. Inplant I_2 radiation monitoring.	III.D.3.3
19. Control-room habitability.	III.D.3.4

430.3
SRP (9.5.3) Identify the vital areas and hazardous areas where emergency lighting is needed for safe shutdown of the reactor and the evacuation of personnel in the event of an accident. Tabulate the lighting system provided in your design to accommodate those areas so identified.

430.4
SRP (9.5.3) For the areas identified in the above request, 430.1, provide a tabulation of the illumination levels that will be maintained during emergency conditions. Demonstrate that illumination levels in the control room will conform to the requirements of NUREG/CR-0700, assuming a single active failure of a diesel generator. Show that illumination levels in other vital areas meet the recommendations of the Illumination Engineering Society (IES) handbook.

430.5
SRP (9.5.3) In Section 9.5.3 of the FSAR, you describe the Normal/Emergency (N/E) lighting transformers as being "seismically supported," and "meets the requirements of Class 1E." These descriptions are unclear. Provide a clarification.

430.6
SRP (9.5.3) In Section 9.5.3 of the FSAR you state that the lighting fixtures in safety related areas for both the normal and normal/emergency lighting systems are not seismically supported. This is not acceptable. We require lighting system components and fixtures in safety related areas to be seismically supported, or provide the results of an analysis that shows that failure of these components and/or fixutures will not impair the safety function of equipment.

430.7
SRP (9.5.3) Your FSAR does not cover lighting panels for the normal/emergency ac and emergency dc lighting systems. Expand your FSAR to include a discussion of these panels, including location and classification (seismic, quality group, etc). Show that adequate lighting will be maintained in all safety related areas, as well as in access routes, following a design basis seismic event.

430.8
SRP (9.5.4) Refer to FSAR Fig. 9.5.4-1 and Fig. 1.2-13a. On Fig. 9.5.4-1, the level of fuel oil in a full storage tank is shown to be around elevation 420'-0. On Fig. 1.2-13a, the elevation of the day tank is shown to be around 409'-0. Consequently, when the storage tanks are full, there is a positive head differential between the storage and day tanks of 8'-10'. Under these conditions, a failure of a transfer pump discharge solenoid valve would result in fuel oil overflowing the day tank (Table 9.5.4-3) and entering oil sump 8A

or 9A. The FSAR does not provide sufficient information on adequately evaluating the consequences of this event. Therefore, provide the following information:

(1) A detailed description of the fuel oil overflow sump system, including but not limited to, seismic and quality group classifications of oil sumps is discharged, and

(2) Results of your analysis that show that overflow of the day tank will not create a fire hazard in the diesel generator room or at any other safety related area, or revise your design such that an overflow of the day tank(s) is not a credible event.

430.9 SRP (9.5.4) In the remarks column of Table 9.5.4-3, you state that a failed (open) transfer pump solenoid valve can be isolated using a manual bypass valve. It is not clear from the piping arrangement shown on Fig. 9.5.4-1 just how this isolation can be accomplished. Revise your FSAR to provide clarification of how a failed solenoid valve can be isolated, and what operator action is required to ensure the isolation.

430.10 SRP (9.5.4) In the FSAR, you classify the Fuel Oil Gravity Drain Tank(s) as Non-Nuclear Safety. This is not acceptable. The gravity drain tanks and associated pumps, piping, and controls must remain functional during prolonged diesel generator operation (7 days) in order to prevent overflowing of fuel oil and creation of a fire hazard. Revise your FSAR to show the gravity drain tanks, pumps, piping, and components as Seismic Category I, ASME Section III, Class 3, or demonstrate that your design will not result in unacceptable discharge of fuel oil and fire hazard during diesel generator operation following the design basis seismic event.

430.11 SRP (9.5.4) The FSAR does not adequately address piping classification in the fuel oil storage and transfer system. Revise the FSAR (Section 9.5.4.2.4) to state what piping conforms to ASME Section III, and what piping conforms to ANSI B31.1. Indicate piping classifications on Fig. 9.5.4-1, and identify all interfaces where there is a change of classification.

430.12 SRP (9.5.4) Expand your FSAR to include a discussion of the tornado missile protection provided for the fuel oil storage tanks fill, vent, and return lines, and for the day tank and gravity drain tank vent lines. In your discussion, include details of where these lines are located on the storage tank building and reactor auxiliary builing, respectively.

430.13
SRP (9.5.4)

Refer to FSAR Fig. 9.5.4-1. What is the purpose of the valve 3 EG-VE002SB and line 6EG10-084 on storage tank B-SB, as well as similar lines on storage tank A-SA? Also, provide a table explaining the legends and note references on Fig. 9.5.4-1.

430.14
SRP (9.5.4)

In FSAR Section 9.5.4.3, you state that the temperature of the stored fuel oil will be maintained at temperatures between 40°F and 104°F. Explain how this will be accomplished. If electric heaters are to be used, describe the type of heater and its operation, and control including seismic classification and source of power.

430.15
SRP (9.5.4)

Regulatory Guide 1.137 (by reference to ANSI N195) requires that duplex fuel oil strainers and filters be fitted with differential pressure indicators and alarms. This instrumentation is not discussed in the FSAR, nor is it shown on Fig. 9.5.4-1. Revise your FSAR to include this instrumentation, or provide justification for not having same. Show instrumentation and controls on Fig. 9.5.4-1.

430.16
SRP (9.5.4)

Describe the instruments, controls, sensors and alarms provided for monitoring the diesel engine fuel oil storage and transfer system and describe their function. Discuss the testing necessary to maintain and assure a highly reliable instrumentation, controls, sensors and alarm system and 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 and describe what operator actions are required during alarm conditions to prevent harmful effects to the diesel engine. Discuss the system interlocks provided.

430.17
SRP (9.5.4)

Discuss the means for detecting or preventing growth of algae in the diesel fuel storage tank. If it were detected, describe the methods to be provided for cleaning the affected storage tank.

430.18
SRP (9.5.4)

In the FSAR, you do not include a section covering corrosion protection for buried piping. Expand the FSAR to include a description of proposed protection of underground piping. Where corrosion protective coatings are being considered (piping and tanks) include the industry standards which will be used in their application. Also discuss what provisions will be made in the design of the fuel oil storage and transfer system in the use of a impressed current type cathodic protection system, in addition to waterproof protective coatings, to minimize corrosion of buried piping or equipment. If cathodic protection is not being considered, provide your justification.

430.19 SRP (9.5.4) Identify all high and moderate energy lines and systems that will be installed in the diesel generator room. Discuss the measures that will be taken in the design of the diesel generator facility to protect the safety related systems, piping and components from the effects of high and moderate energy line failure to assure availability of the diesel generators when needed.

430.20 SRP (9.5.4) Section 9.5.4.1 Diesel Generator Fuel Oil Storage and Transfer System (DFGOSTS) does 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 DGFOSTS; otherwise provide justification for noncompliance.

430.21 SRP (9.5.4) Discuss the precautionary measures that will be taken to assure the quality and reliability of the fuel oil supply for emergency diesel generator operation. Include the type of fuel oil, impurity and quality limitations as well as diesel index number or its equivalent, cloud point, entrained moisture, sulfur, particulates and other deliterious insoluble substances; procedure for testing newly delivered fuel, periodic sampling and testing of onsite fuel oil (including interval between tests), interval of time between periodic removal of condensate from fuel tanks and periodic system inspection. In your discussion include reference to industry (or other) standard which will be followed to assure a reliable fuel oil supply to the emergency generators.

430.22 SRP (9.5.4) In FSAR Section 9.5.4.2.1, you state that additional fuel can be delivered to the site by tanker truck within six hours. Expand this section of the FSAR to include a discussion of unfavorable environmental conditions which may occur in the vicinity of the plant site and how fuel will be delivered under these conditions.

430.23 SRP (9.5.4) In FSAR Section 9.5.4.3, you state than an automatic fire protection system is installed in the fuel oil tank structures. The fuel oil transfer pumps are also located in these structures. Consider the design basis seismic event with resulting inadvertent operation of the nonseismic fire protection systems in both storage tank structures. Show that operation of the fire protection systems will not impair the safety functions of the fuel oil transfer pumps and associated controls and alarms.

430.24 SRP (9.5.4) Expand your FSAR to include a discussion of the corrosion protection you will use to protect the interior surface of the fuel oil storage tanks.

430.25 SRP (9.5.5) Describe the instrumentation, controls, sensors and alarms provided for monitoring of the diesel engine cooling water system and describe their function. Discuss the testing necessary to maintain and assure a highly reliable instrumentation, controls, sensors, and alarm system, and where the alarms are annunciated. Identify the temperature, pressure, level, and flow (where applicable) sensors which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer and describe what operator actions are required during alarm conditions to prevent harmful effects to the diesel engines. Discuss the systems interlocks provided.

430.26
SRP (9.5.5)

You state in Section 9.5.5.2 the diesel engine cooling water is treated as appropriate to minimize corrosion. Provide additional details of your proposed diesel engine cooling water system chemical treatment, and discuss how your proposed treatment complies with the engine manufacturer's recommendations. Also, provide a discussion of the testing program you will implement to ensure proper cooling water chemistry and how you will maintain a clean cooling water system free of chemical sludge deposits.

430.27
SRP (9.5.5)

Expand FSAR Table 9.5.5-1 to include the design margin excess heat removal capacity included in the design of the heat exchangers listed therein.

430.28
SRP (9.5.5)

In FSAR Section 9.5.5.2.2, you state "the location of the expansion tank ensures that the pump suction piping and most of the remaining system is initially filled with water. Expand your FSAR to provide clarification in this area. Is the expansion tank located higher than its associated diesel engine piping? Once trapped air has been displaced by the pump discharge, is there a possibility for air to enter the system again, or will the expansion tank positive head prevent air entering the system?

430.29
SRP (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 with availability of offsite power, discuss the design provisions and other parameters that have been 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. Expand your FSAR to include and explicitly define the capability of your design with regard to this requirement.

430.30
SRP (9.5.5)

Refer to FSAR Fig's. 9.5.5-1 and 9.5.5-2. On 9.5.5-1, you show the expansion tank piping from the engine jacket water system to the engine skid boundary as non-ASME Section III. On the same figure, you also show the engine keep warm piping, between the normally open plug valves, as non-ASME Section III. This is not acceptable. We require all cooling water system piping, from the diesel engine interface out, to be ASME Section III, Class 3. REvise your design accordingly, or provide justification for noncomformance.

On both 9.5.5-1 and 9.5.5-2, you do not provide a classification for piping between the diesel engine skid and the expansion tank. We require that this piping also be ASME Section III, Class 3. Confirm that this piping meets this requirement, and revise FSAR Fig's. 9.5.5.-1 and 9.5.5-2 to show the piping classification. Also, provide a legend for the piping, valves, indication and instrumentation associated with the expansion tanks.

430.31
SRP (9.5.5)
SRP (9.5.6)
SRP (9.5.7)
SRP (9.5.8)

Recent licensee event reports have shown that tube leaks are being experienced in the heat exchangers of diesel engine jacket cooling water systems with resultant engine failure to start on demand. Provide a discussion of the means used to detect tube leakage and the corrective measures that will be taken. Include jacket water leakage into the lube oil system (standby mode), lube oil leakage into the jacket water (operating mode), 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 failure. The discussion should also include the effects of jacket water/service water systems leakage.

430.32
SRP (9.5.5)

Provide a description of how the diesel engine jacket water keep warm system operates. Include such things as operating temperature range, source of power for pump and heater, controls, and instrumentation.

430.33
SRP (9.5.5)

Operating experience indicates that diesel engines have failed to start on demand due to water spraying on locally mounted electronic/electrical components in the diesel engine starting system. Describe what measures have been incorporated in the diesel engine electrical starting system to protect such electronic/electrical components from such potential environment.

430.34
SRP (9.5.6)

Expand your description of the diesel engine starting system. The FSAR text should provide a detail system description of what is shown on Figures 9.5.6-1 amd 9.5.6-2. The FSAR text should also describe: 1) components and their function, 2) operating pressures and relief valve settings, 3) instrumentation, controls, sensors and alarms, and 4) 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.

430.35
SRP (9.5.6)

Describe the instrumentation, controls, sensors and alarms provided for monitoring the diesel engine air starting system, and describe their function. Describe the testing necessary to maintain a highly reliable instrumentation, control, sensors and alarm system and 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 and describe any operator actions required during alarm conditions to prevent harmful effects to the diesel engine. Discuss system interlocks provided. Revise your FSAR accordingly.

430.36
SRP (9.5.6)

Provide the design dew point temperature (°F) for the compressed air as it leaves the refrigerant air dryers. Show that the design dew point will be at least 10°F lower than the lowest possible ambient temperature in the diesel generator room. Discuss the procedures that will be implemented to ensure that compressed air dew point design is maintained and that moisture does not collect in the air receivers.

430.37
SRP (9.5.6)

Describe the provisions in the design of your compressed air system which prevent accumulation of dirt and oil in the receiver and/or other parts of the system.

430.38
SRP (9.5.6)

Diesel generators in many cases utilize air pressure or air flow devices to control diesel generator operation and/or emergency trip functions such as air operated overspeed trips. The air for these controls is normally supplied from the emergency diesel generator air starting system. Provide the following:

a) Expand your FSAR to discuss any diesel engine control functions supplied by the air starting system or any air systems. The discusstion should include the mode of operation for the control function (air pressure and/or flow), a failure modes and effects analysis, and the necessary P&ID's to evaluate the system.

b) Since air systems are not completely air tight, there is a potential for slight leakage from the system. The air starting system uses a non-seismic air compressor to maintain air pressure in the seismic Category I air receivers during the standby condition. In case of an accident, a seismic event, and/or loop, the air in the air receivers is used to start the diesel engine. After the engine is started, the air starting system becomes non-essential to diesel generator operation unless the air system supplies air to the engine controls. In this case the controls must relay on the air stored in the air receivers, since the air compressor may not be available to maintain system pressure and/or flow. If your air starting system is used to control engine operation, with the compressor not available, show that a sufficient quantity of air will remain in the air receivers, following a diesel engine start, to control engine operations for a minimum of seven days assuming a reasonable leakage rate. If the air starting system is not used for engine control describe the air control system provided and provide assurance that it can perform for a period of seven days or longer.

430.39 SRP(9.5.6) Refer to Fig. 9.5.6-1. Not all of the compressed air piping within the engine skid outline is shown as ASME Section III Class 3. This is not acceptable. We require all compressed air piping from the diesel engine interface out to be ASME Section III Class 3. Revise your design accordingly, or provide justification for nonconformance.

430.40 SRP(9.5.6) The air starting system for your plant is defined as a high energy system. A high energy line pipe break in the air starting system of one diesel generator, plus any single active failure in any auxiliary system of the other diesel generator could result in loss of all onsite AC power. This is unacceptable. Provide the following information:

a) Assuming a pipe break at any location in the safety related portion of the air start system, demonstrate that no damage from the resulting pipe whip, jet implingement, or missiles (air receivers, or engine mounted air tanks) will cause failure of the redundant diesen generators or its auxiliary systems.

b) Demonstrate that a pipe break in the non-safety portion of the air start systems (compressor and piping up to ASME Section III check valves) will not cause damage to the corresponding safety portions of the systems or to its diesel generator and its auxiliary systems.

430.41 SRP(9.5.7) Describe the instrumentation, controls, sensors and alarms provided for monitoring the diesel engine lubrication oil system and describe their function. Describe the testing necessary to maintain a highly reliable instrumentation, control, sensors and alarm system and 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 and describe any operation action required during alarm conditions to prevent harmful effects to the diesel engine. Discuss systems interlocks provided. Revise your FSAR accordingly.

430.42 SRP (9.5.7) Several fires have occurred at some operating plants in the area of the diesel engine exhaust manifold and inside the turbocharger housing which have resulted in equipment unavailability. The fires were started from lube oil leaking and accumulating on the engine exhaust manifold and accumulating and igniting inside the turbocharger housing. Accumulation of lube oil in these areas, on some engines, is apparently the result of continuous, or long periods of prelubrication prior to operating the diesel engine. Since the design of your diesel generator lubrication system calls for continuous prelubrication, expand your FSAR to show that oil will not accumulate in the exhaust manifolds and/or turbocharger housing, and will not create a fire hazard which would impair the diesel generator safety function.

430.43 SRP (9.5.7) Provide the source of power for the main prelube pump, the rocker prelube pump, and the lube oil heater. Expand your FSAR to include a detailed description of these components and their operation for 1) standby mode, 2) a diesel generator start sequence, and 3) during operation of the diesel generator.

430.44 SRP (9.5.7) In the FSAR, you state that the valve rocker are lubricated by a separate rocker lube system to "protect the crankcase oil from contamination by possible cooling water and fuel leaks at the cylinder head upper deck level." Expand your FSAR to include a more detailed description of the rocker lube system. Explain how contamination from cooling water and fuel leaks does not degrade rocker lube oil quality to the extent it can no longer perform its function, thereby causing excessive wear and possible premature failure of the valve rockers. Describe how the presence of water and/or diesel fuel is detected in the rocker lube system.

430.45 SRP (9.5.7) In FSAR Table 9.5.7-1, you list the lube oil makeup tank as having 375 gallon capacity. Expand your FSAR to describe the minimum lube oil inventory (gals) that will be maintained for each diesel generator at all times. Show by analysis that this amount is adequate for seven days operation of the diesel generator(s) while powering the maximum post LOCA electrical loads. State how lube oil level in the storage tank is checked, and how frequently a level check is made.

430.46 SRP (9.5.7) The rocker lube system for the diesel generator is separate from the main lube system, but does not have its own lube oil cooler. Expand your FSAR to include a discussion of how acceptable operating temperatures are maintained in the rocker lube system.

430.47
SRP (9.5.7)

Refer to FSAR Fig. 9.5.7-1. Some lube oil piping within the outline of the diesel generator is shown as non-ASME Section III. Provide the industry standard that was followed in the design, inspection, and fabrication of this lube oil piping. Also, revise the FSAR and Fig. 9.5.7-1 to show the lube oil makeup tank piping, including fill, vent, drain, and make up lines as Seismic Category I ASME Section III, Class 3.

430.48
SRP (9.5.7)

In the FSAR, you briefly discuss a crankcase evacuation system. Expand your FSAR to provide a diagram and additional descriptive information on this system as follows: 1) what components make up the evacuation system, 2) what is the source of power for the evacuation system, 3) where are crankcase gases discharged, and 4) does the evacuation system operate on the rocker lube system reservoir..

430.49
SRP (9.5.7)

Provide a discussion of the measures that will be taken to maintain the required quality of the lube oil, including the inspection and replacement when oil quality is degraded.

430.50
SRP (9.5.7)

Provide the design margin included in the lube oil heat exchanger heat removal capability as listed in FSAR Table 9.5.7-1.

430.51
SRP (9.5.8)

In FSAR Section 9.5.8.1, you state that the combustion air intake filter and combustion air silencer are "non-safety equipment." This is not acceptable. We require these components to be Seismic Category I and conform to ASME Section III, Class 3 requirements, or provide justification for nonconformance and include the industry standards used for the design, construction, and inspection of the combustion air intake filter and silencer.

430.52
SRP (9.5.8)

The design for the diesel generator exhaust systems is not acceptable. We require the entire exhaust system to be seismic Category I, to conform to ASME Section III Class 3 requirements, and have tornado missile protection. Revise your design, or show that the following requirements can be met:

1. The complete alternate exhaust system, including the portion outside the RAB, is ASME Section III, Class 3.

2. Tornado missile protection is provided for the alternate exhaust exposed piping.

3. Provisions are made to preclude short circulating of exhaust gases from the alternate exhaust back to the combustion air intakes and degrading diesel engine performance.

4. It can be demonstrated that "exhaust surges" (FSAR Table 9.5.8-2, Item 5, Remarks) will not result in diesel generator voltage or frequency instability such that tripping of powered safety related equipment and/or the diesel generator could occur.

5. The valve separating the normal and alternate exhaust paths is tested for free movement and proper operation each time the diesel generators are tested, and this valve testing is included in the plant Technical Specifications.

Revise your FSAR accordingly.

430.53
SRP(9.5.8)
In FSAR Section 9.5.8.3, you state that no atmospheric conditions such as ice or snow are "expected to clog the combustion air intakes. This inadequate justification and therefore not acceptable. The meterology for the WNP 3 site, as described in FSAR Section 2.3, include both significant snowfall and winds. Provide justification for your statement that ice and snow are not "expected" to clog the air intakes. In your justification, show that wind driven snow and/or debris will not pile up at the air intakes or be blown inside and accumulate in the air intake room to the extent that combustion air supply is impaired. Revise your FSAR accordingly.

430.54
SRP(9.5.8)
Show by analysis that potential fire in the diesel generator building together with a single failure of the fire protection system will not degrade the quality of the diesel combustion air so that the remaining diesel will be able to provide full rated power.

430.55
SRP(9.5.8)
Experience at some operating plants has shown that diesel engines have failed to start due to accumulation of dust and other deliterious material on electrical equipment associated with starting of the diesel generators (e.g., auxiliary relay contacts, control switches - etc.). Describe the provisions that have been made in your diesel generator building design, electrical starting system, and combustion air and ventilation air intake design(s) to preclude this condition to assure availability of the diesel generator on demand.

Also describe under normal plant operation what procedure(s) will be used to minimize accumulation of dust in the diesel generator room; specifically address concrete dust control.

430.56
SRP(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 system interlocks provided. Revise your FSAR accordingly.

430.57 SRP (9.5.8) Provide the results of an analysis that demonstrates that the function of your diesel engine air intake and exhaust system design will not be degraded to an extent which prevents developing full engine rated power or cause engine shutdown as a consequence of any meteorological or accident condition. Include in your discussion the potential and effect of fire extinguishing (gaseous) medium.

430.58 SRP (9.5.8) Expand your FSAR discussion of the diesel generator combustion air intake filter with regard to the design basis volcanic ash fallout. Show that the filter can adequately retain all volcanic ash of a particulate size that would be harmful to the diesel engines for the duration of the fallout event without incurring an unacceptable pressure drop across the filter or impairing diesel engine performance. Provide the diesel generator loading used in the design of your filter system and include the diesel engine manufacturer's recommendations regarding maximum allowable volcanic ash volume and particulate size that can be entrained in the combustion air for his diesel engine without significantly affecting equipment reliability and performance.

430.59 SRP (9.5.8) The staff has been advised that diesel engines of the type used at WNP 3 may foul out and stall if operated at no load with combustion air (ambient) temperatures below 50°F. Considering that temperatures at the WNP 3 site will regularly be below 50°F, and that the diesel generators may be required to operate for extended periods of time at no load, provide a detailed discussion of the capability of your diesel generators to operate under the above conditions. If no load operation at low ambient temperatures is a problem, discuss the provisions you have made in your design to eliminate this problem.

430.60 SRP (10.2) Expand your FSAR to include a description of the motor operated steam extraction valves in the lines from the steam turbines to the first, second, third, and fourth stage heaters. Discuss the sequence of operation of these valves in the event of a turbine trip and/or load rejection, including the valve closure times, and show that the turbine stabilizes.

430.61 SRP (10.2) Discuss your inservice testing and inspection program for the motor operated steam extraction valves such as provided for the turbine governor, control, interceptor, and reheat stop valves.

430.62 SRP (10.3) As explained in issue No. 1 of NUREG-0138, credit is taken for all valves downstream of the Main Steam Isolation Valve (MSIV) to limit blowdown of a second steam generator in the event of a steam line break upstream of the MSIV. In order to conform satisfactory performance following such a steam line break provide a tabulation and descriptive text (as appropriate) in the PSAR of all flow paths that branch off the main steam lines between the MSIV's and the turbine stop valves. For each flow path originating at the main steam lines, provide the following information:

a) system identification
b) maximum steam flow in pounds per hour
c) type of shut-off valve(s)
d) size of valve(s)
e) quality of the valve(s)
f) design code of the valve(s)
g) closure time of the valve(s)
h) actuation mechanism of the valve(s) (i.e., solenoid operated, motor operated diaphragm valve, etc.)
i) motive or power source for the valve actuating mechanism

In the event of the postulated accident, termination of steam flow from all systems identified above, except those that can be used for mitigation of the accident, is required to bring the reactor to a safe cold shutdown. For these systems describe that design features have been incorporated to assure closure of the steam shutoff valve(s). Describe what operator actions (if any) are required.

430.63
SRP (10.4.1) Provide the permissible cooling water inleakage and time of operation with inleakage to assure that condensate/feedwater quality can be maintained within safe limits.

430.64
SRP (10.4.1) In Section 10.4.1.4 you have discussed tests and initial field inspection but not the frequency and extent of inservice inspection of the main condenser. Provide this information in the FSAR.

430.65
SRP (10.4.1) Indicate that design provisions have been made to preclude failures of condenser tubes or components from turbine bypass blowdown or other high temperature drains into the condenser shell.

430.66
SRP (10.4.1) Discuss the effect of loss of main condenser vacuum on the operation of the main steam isolationvalves.

430.67
SRP (10.4.1) Discuss the effect of main condenser degradation (leakage, vacuum, loss) on reactor operation.

430.68
SRP (10.4.1) If the systems that can be used for mitigation of the accident are not available or decision is made to use other means to shut down the reactor, describe how these systems are secured to assure positive steam shutoff. Describe that operator actions (if any) are required.

If any of the requested information is presently included in the FSAR text, provide only the reference where the information may be found.

480.7: (6.2.1) Provide the following information in accordance with Table 6-1 of Regulatory Guide 1.70: containment design temperature and service water temperature used in containment analysis.

480.8: (6.2.1) Provide the curve of energy removed by the containment spray system as a function of time along with the other energy removal mechanisms shown in Figure 6.2.11 for the DBA LOCA.

480.9: (6.2.1) Provide additional information and/or analysis to resolve the concerns of IE Bulletin No. 80-04 regarding main steam line breaks with continued feedwater addition. Discuss whether the MSLB analysis included the impact of runout flow from the auxiliary feedwater system, or the impact of other energy sources, such as a continuation of feedwater or condensate flow. Discuss the ability to identify and isolate the damaged steam generator and the capability of the pumps to remain operable after extended operation at runout flow.

480.10: Provide additional information on the net positive
(6.2.2) suction head (NPSH) analysis of the spray pumps, for both the injection and recirculation phases, in sufficient detail to justify the adequacy and conservatism of the analysis. Include the bases for obtaining the elevation pressure head (Pe) of 37.5 ft, the friction pressure loss (Pi) of 4 ft and the required NPSH of 12.5 ft.

480.11: Provide an analysis of the heat removal capability of
(6.2.2) the containment spray system. The analysis should include the degree of thermal equilibrium attained by the spray water.

480.12: Provide the missing information in Table 6.2.2-4
(6.2.2) identified as "Later."

480.13: In Appendix 6.2A, it is stated that the WATEMPT code
(6.2.3) is an extension of the CONTEMPT code. Identify the modifications that have been made to the CONTEMPT code to assure a conservative calculation of the shield building annulus pressure response.

480.14: Appendix 6.2A describes the computer code WATEMPT,
(6.2.3) used for calculating the shield building annulus transient. Provide additional information to clarify the following description in this Appendix:

a. Provide a more detailed discussion on how radiation heat is accounted for in the analysis. Provide the gray body radiation heat transfer equations used in the code and justify their use.

b. The fan curve in Figure 6.2-35 shows that for a static pressure greater than 28 inches W.G., there exist two possible CFM values. Explain how the code input table was developed to obtain a proper CFM value.

c. The dependency of the annulus volume on the containment wall temperature and differential pressure across the containment vessel is considered in the code. Describe how the containment vessel expansion and corresponding annulus volume change are accounted for in the analysis, and provide the equations describing this effect.

d. SRP 6.2.3 states that adiabatic boundary conditions should be assumed for the surface of the secondary containment structure exposed to the outside environment. Verify that this assumption has been used in the analysis.

e. SRP 6.2.3 states that no credit should be taken for secondary containment outleakage. Verify that the analysis complies with this guidance.

480.15: (6.2.4) Provide additional information to describe the conditions requiring containment isolation. This information is required in accordance with Section 6.2.4.1 of Regulatory Guide 1.70 (design bases for containment isolation system).

480.16: (6.2.4) Provide the following information regarding the fluid system isolation provisions described in Table 6.2.4-1:

For Penetration Nos. 84, 86, and 87, provide the additional information identified in the table as "Later."

480.17: (6.2.4) Identify all valves in FSAR Table 6.2.4-1 that are greater than 10 feet from the containment wall. Provide the rationale for their locations and justify that they have been placed as close to the containment as practical, as required by GDC 55, 56, and 57.

480.18: (6.2.4) Provide a tabulation of those containment isolation valves for which provision has been made to allow them to be individually leak tested, in the correct direction.

480.19: (6.2) Sections 6.2.1.6, 6.2.2.4, 6.2.3.4, 6.2.4.4, 6.2.5.4, 6.2.6, 9.4.6.6.4, describe various (i.e., preoperational, startup and surveillance) tests for containment systems. Discuss and justify the acceptance criteria proposed for these tests.

480.20: (6.2.5) a. The analysis of hydrogen production should be based on the parameters listed in Table 1 of Regulatory Guide 1.7 for the purpose of establishing the design basis for the combustible gas control system. Verify that your analysis in Section 6.2.5.3 conforms to the above Regulatory Guide.

b. Discuss and justify the fission product decay energy model used in the calculation of hydrogen production from radiolysis of the emergency core cooling water and sump water, and provide a comparison of the model to that in Branch Technical Position ASB 9-2 of SRP Section 9.2.5.

480.21: (6.2.5) Section 6.2.5.2.1 states that manual operator action from the control room is required to actuate the containment hydrogen analyzers. Discuss and justify the emergency procedures that will alert an operator of the need to actutae the hydrogen analyzers.

480.22 (6.2.5) The combustible gas control system should be designed to facilitate periodic inservice inspections, operability testing and leak rate testing of the system components. Discuss the design provisions which will permit the above actions.

480.23: (6.2.5) Provide a qualitative discussion of the effectiveness of convective mixing and/or spray system operation to mix combustible gases that may be generated within the containment. In so doing, describe the design features of containment internal structures which promote the free circulation of the atmosphere. Identify the interior compartments when it may be difficult to achieve good mixing of combustible gases. Provide elevation drawings of the containment showing expected circulation patterns caused by sprays or thermal convection.

480.24: (6.2.6) Containment leakage fractions, described in Table 6.5.3-1 are divided into three parts: to the annulus (0.4), to controlled ventilation areas (0.52), and bypass leakage (0.08). Discuss and justify the bases for obtaining these fractions.

480.25 (6.2.4) An interface requirement in CESSAR-F, Section 5.1.4, specifies that the containment spray system shall provide 4000 gpm per train at a head which can be set between 250-300 feet. Provide evidence which shows this interface requirement has been met.

480.26: Item No. 7.Q.2 of Table 1.9-1 states that WNP-3 complies with CESSAR-F, Section 6.2.1.5, regarding the minimum containment pressure analysis. However, the response to Q. 480.3 states that the analysis in CESSAR-F is not applicable to WNP-3 and that a plant specific analysis will be performed. Therefore, Table 1.9-1 should be updated accordingly.

490.2 (4.2.) The applicant should provide for NRC review and approval the applicant - specific information requested in Section 4.2.5 of the CESSAR SER (NUREG-0852). The items applicable to the WNP-3 application are numbers 1 (CEA surveillance), 3 (fuel assembly shoulder gap), 4 (seismic-and-LOCA loads), 5 (fuel surveillance), and 6 (miscellaneous fuel calculations).

492.1 According to SRP 4.4 (Section II.7) the design description and proposed procedures for use of the loose parts monitoring system (LPMS) should be consistent with the requirements of Regulatory Guide 1.133. You have provided much of the information in section 4.4.6.1 of the FSAR. Indicate your compliance to the requirements of Regulatory Guide 1.333, including item C4J, on the training program for plant personnel that addresses operation of the system hardware and the purpose and implementation of the loose-part detection program.

492.2 According to SRP 4.4 (Section II.9) the instrumentation for detection of the inadequate core cooling should meet the requirements described in item II.F.2 of NUREG-0737. Therefore submit the nine items of documentation required by item II.F.2, of NUREG-0737, page II.F.2-3 and 4.

492.3 The Core Protection Calculators (CPCs) and statistical combination of uncertainties (SCU) reviews in CESSAR are still under review. CE is required to identify plant specific SCU items and describe their plant-specific interface. Applicants are required to submit plant-specific information on the CPC and SCU. According to SRP 4.4 (Section II.1) uncertainties in the values of process parameters, core design parameters, and calculational methods used in the assessment of thermal margin should be treated with at least a 95% probability at a 95% confidence level. Therefore, upon completion of the staff review of CESSAR you should provide the following plant-specific information on CPCs and SCU:

(a) For the application of statistical combination of uncertainties (SCU) to WNP-3 provide the required plant-specific information, including the instrument measurement uncertainties.

(b) Supply the plant-specific information for the digital core protection calculator (CPC) including the Reactor Power Cutback System (RPCS). This information should include the plant-specific data base constants, software implementation testing, and the effects of SCU on the DNBR limit.