50-397

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 26, 1997

LICENSEE: Washington Public Power Supply System (WPPSS)

FACILITY: Washington Nuclear Project No. 2 (WNP-2)

SUBJECT: MEETING SUMMARY

On August 27, 1997, Washington Public Power Supply System (WPPSS or the licensee) representatives met with members of the NRC staff to discuss the licensee's planned WNP-2 Final Safety Analysis Report (FSAR) upgrade program. Also, in attendance as an observer was a representative from Nebraska Public Power District representing Cooper Nuclear Station.

The licensee provided the staff with a discussion of the scope and progress of the WNP-2 FSAR upgrade. Details of the upgrade effort were presented to the staff and the licensee acknowledged that the program included the elimination of information the licensee felt was duplicative or contained unnecessary detail. The licensee believed the final product would comply with Regulatory Guide 1.70 with some exceptions. The licensee also provided examples of revised information. The licensee indicated its schedule to complete the effort and provide the NRC with a complete updated FSAR was approximately March 1998.

The staff stated from the outset that it would listen to the licensee's presentation but was not in a position at this time to approve or deny what the licensee was proposing. The staff has been tasked with providing a framework to the Commission for considering deletions of information from FSARs by December 1997. The staff informed the licensee that information taken out of FSARs prior to the issuance of Commission guidance would be done at the licensee's own risk. The licensee acknowledged the staff's position.

The licensee summarized its position with respect to its program and the meeting adjourned.

A copy of the licensee's slides is attached. Also attached is a list of attendees.

Original Signed By

Timothy G. Colburn, Senior Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-397

Attachments: 1. Meeting Slides
2. Attendance List

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DATE	9/26/97	9/18/97	9/26/97

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A copy of the licensee's slides is attached. Also attached is a list of attendees.

Timothy G. Colburn, Senior Project Manager
Project Directorate IV-2
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Attachment 1

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

FSAR UPGRADE PROGRAM

AUGUST 27, 1997

HANDOUT MATERIAL USED AT THE MEETING

NRC/WPPSS Meeting
August 27, 1997 0900-1100 (Proposed)
NRC Headquarters
on
WNP-2 FSAR Upgrade Program

Agenda

0900 Introduction

0905 WNP-2 FSAR Upgrade Program Scope and Progress

0910 Compliance with Regulatory Guide 1.70
- A. Elimination of Duplicate Information
- B. Deletions of Detail
- C. Archiving of Information
- D. Archiving by Regulatory Guide Exceptions

1000 Examples of Revised Information
Potential Impacts and Questions

1045 Schedule for WNP-2 Submittal

1050 Summary

WPPSS Attendees: D.W. Coleman - Manager, Regulatory Affairs (Acting)
P.J. Inserra - Manager, Licensing
J.C. Gearhart - FSAR Upgrade Project Manager

Progress

WNP-2 FSAR = Over 30 Volumes and over 8000 pages, divided into 176 sections.

58 sections have been evaluated, revised and issued for comment.

18 sections have been reviewed by all reviewers and either approved or approved with specific items requiring resolution.

Scheduled work is running about 4 weeks behind due to delays from the contractor or WNP-2 reviewers. This has no impact on the projected Upgraded FSAR submittal to the NRC (50.71(e) update in March of 1998).

FSAR Content Guidelines

1. Is the current content required? If yes, verify and correct as necessary.
   Commitment: RG 1.70, R2; SER; Specific Commitment in Correspondence.
   Recommended: RG 1.70, R3 or SRP (Current NUREG 0800).

2. If the current content is not required by Commitment or Management agreement on recommendation, consider archiving or deletion.

3. Archived material is deleted from the FSAR. It will no longer be referred to during future 10CFR50.59 change reviews. Candidate material for archiving should* meet the following:
   - a. The material is not required, by commitment or management decision, and
   - b1. The material is not subject to change by projected future plant, program or procedure changes, or
   - b2. The material is at a level of detail that projected changes to it over plant life could not impact the ability of required SSCs to perform their design function, and
   - c. The material must not contain the sole summary of information needed to establish the basis for plant design or operational parameters.

* The exception to the above is the case where the material is required by commitment, however it is historical in nature. In these cases we may elect to archive the material by taking specific exception to the commitment (e.g. RG 1.70, R2) and documenting the exception in the FSAR. This exception will be performed using 10CFR50.59 and will generally result in a safety evaluation.

4. Archived vs. Deleted: Archived material will be removed from the FSAR, however in its place the FSAR will have a brief description of what the material was and where it can be found. Deleted material will be removed without any remaining indication. In both cases the License Document Change Notice, Screening for Licensing Basis Impact and , if necessary, the Safety Evaluation will clearly indicate the basis for removal of the information from the FSAR.

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10.2.2 System Description

The main turbine is a tandem-compound unit, consisting of one double-flow high pressure turbine and three double-flow low pressure turbines (Figure 10.3-1), running at 1800 rpm with 47 in. eh last-stage blades. Exhaust steam from the high pressure turbine passes through two moisture separator/reheaters (two stage reheat) before entering the low pressure turbine inlets. The exhaust steam from the three low pressure turbines is condensed in the main condenser.

~~The generator has a hydrogen cooled rotor and a water cooled stator. It is a three phase, 60 cycle, 25,000 V, 1800 rpm unit rated at 1,230,000 kVA at 0.975 power factor.~~

The generator is a three phase, 60 cycle, 25,000 V, 1800 rpm unit rated at 1,230,000 kVA at 0.975 power factor. The stator is water cooled and the rotor is hydrogen cooled. The hydrogen system is designed and operated to minimize the hazard from fires or explosions as discussed in Appendix F.

~~The bulk hydrogen storage facility is located north of the turbine generator building. The storage facility consists of a three sided elevated building with the three walls provided with louvers to ensure proper ventilation. The hydrogen gas supply system is shown in Figure 10.2-5. The 1-in. hydrogen supply piping is installed inside a 4-in. culvert to ensure proper protection of the hydrogen line. The storage facility is furnished with an electrical feeder (480 V, No. BM2P-270), which is taken from motor control center MC-2P located in the turbine generator building. The feeder is routed through a duct bank via electrical manholes. All electrical work and equipment within the hydrogen storage facility is rated for installation in a hazardous area, Class I, Division II, Group B. The hydrogen storage facility has an elaborate grounding system which includes grounding of each end of each of the hydrogen bottle storage racks. These precautions minimize the occurrence of fires and explosions due to electrical failure. The design of the system, Figure 10.2-4, and the specified operating procedures are such that explosive mixtures are not possible under normal operating conditions.~~

~~The fundamental rule is that hydrogen and air should never be mixed. Carbon dioxide is used as an intermediate gas when changing either from air to hydrogen or from hydrogen to air. When changing from one gas to another, the generator is vented to the atmosphere. The valves, pressure gauges, regulators, and other equipment in the hydrogen gas supply system permit introducing hydrogen or prevent the flow of hydrogen into the generator and also provide means of controlling the gas pressure within the generator.~~

~~The hydrogen gas supply system includes a storage trailer and storage cylinders used as backup if the trailer supply runs low. Pressure regulators are mounted on both the storage trailer and the bottle manifold for control of the hydrogen gas, and a circuit for supplying and controlling the carbon dioxide used in purging the generator during filling and degasing operations. The primary hydrogen gas supply is from the trailer and the backup bottles are not normally attached to the supply manifold. To prevent hydrogen leakage by the generator shaft seals, a hydrogen~~

A1

which electrical load may be increased or decreased with and without reactor control rod motion or steam bypass); and design codes to be applied.

10.2.2 Description

A description of the turbine-generator equipment, including moisture separation, use of extraction steam for feedwater heating, and control functions that could influence operation of the reactor coolant system, should be provided as well as drawings. The turbine-generator-overspeed control system should be described in detail, including redundancy of controls, type of control utilized, overspeed setpoints, and valve actions required for each setpoint.

10.2.3 Turbine Disk Integrity

The failure of a turbine disk or rotor might produce a high-energy missile that could damage a safety-related component. This section should provide information to demonstrate the integrity of turbine disks and rotors.

10.2.3.1 Materials Selection. This section should include materials specifications, fabrication history, and chemical analysis of the disk and rotor forgings. Particular attention should be paid to items affecting fracture toughness and metallurgical stability. The mechanical properties of the disk material such as yield strength and fracture toughness should be listed. The methods of obtaining these properties should be described.

10.2.3.2 Fracture Toughness. The criteria used to ensure protection against brittle failure of low-pressure turbine disks should be described. Include detailed information on ductile-brittle transition temperature (NDT or FATT) and minimum operating temperature. If a fracture mechanics approach is used, the analytical method and the key assumptions made should be described.

10.2.3.3 High-Temperature Properties. Provide the stress-rupture properties of the high-pressure rotor material and describe the method for obtaining these properties.

10.2.3.4 Turbine Disk Design. Provide the following design information for low-pressure disks and high-pressure rotors:

1. The tangential stress due to centrifugal loads, interference fit, and thermal gradients at the bore region at normal speed and design overspeed.

2. The maximum tangential and radial stresses and their location.

10.2.3.5 Preservice Inspection. Describe the preservice inspection procedures and acceptance criteria to demonstrate the initial integrity of the disks and rotors.

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10.3.6 STEAM AND FEEDWATER SYSTEM MATERIALS

Materials used for the main steam supply system and feedwater, which are part of the reactor coolant pressure boundary, are found in Table 5.2-4. Materials used for portions of the main steam system described in this section are as follows:

a. Pipe — ASME/ASTM SA-106 Grade B and C
ASME/ASTM SA-155 CL1 KCF70

b. Valves — ASME/ASTM SA-105 Grade II, ASME/ASTM SA-216 Grade WCB, ASME/ASTM SA-217 Grade C 5

c. Fittings — ASME/ASTM SA-105 Grade II, ASME/ASTM SA-515 Grade 70B, ASME/ASTM SA-234 Grade WPBW

10.3.6.1 Fracture Toughness

Impact tests in accordance with the size limitations specified in ASME Code Section III, Class 1, are performed on all ASME Code Section III, Class 1, main steam and feedwater materials, as well as Class 2 main steam system materials for all pressure retaining ferritic steel parts. The tests are conducted at a temperature of 45°F or lower in accordance with NB or NC-2310 of the Summer 1972 or Winter 1973 Addendum of ASME Code Section III, as applicable.

10.3.6.2 Materials Selection and Fabrication

All materials used in the steam and feedwater systems are included in Appendix I to Section III of the ASME Boiler and Pressure Vessel (B&PV) Code. The requirements for welding the main steam piping from the reactor to the turbine generator are in accordance with ASME Section III, 1971 Fdition through the Winter 1973 Addenda. The welding requirements for other steam and feedwater piping are in accordance with ANSI B31.1, October 1973 (see Section 3.2).

For low alloy steel piping designed in accordance with ASME Section III or ANSI B31.1, ASME Section III Appendix D, or Table 131 of ANSI B31.1 covering nonmandatory preheat procedures are applicable to all classes of welds. The control of preheat temperature for welding of low alloy steel is in accordance with Regulatory Guide 1.50.

Procedure qualifications for welding of austenitic stainless steel components include the following requirements:

a. The welding procedure is designed to avoid sensitization of the weld joint area and is in accordance with Regulatory Guide 1.44.

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10.3.5 Water Chemistry (PWR)

The effect of the water chemistry chosen on the radioactive iodine partition coefficients in the steam generator and air ejector should be discussed.

Detailed information on the secondary-side water chemistry, including methods of treatment for corrosion control and proposed specification limits should be provided. Discuss methods for monitoring and controlling water chemistry.

10.3.6 Steam and Feedwater System Materials

This section should provide the information indicated below on the materials used for Class 2 and 3 components.

10.3.6.1 Fracture Toughness. Indicate the degree of compliance with the test methods and acceptance criteria of the ASME Code Section III in Articles NC-2300 and ND-2300 for fracture toughness for ferritic materials used in Class 2 and 3 components.

10.3.6.2 Materials Selection and Fabrication. Information on materials selection and fabrication methods used for Class 2 and 3 components should include the following:

1. For any material not included in Appendix I to Section III of the ASME Code, provide the data called for under Appendix IV for approval of new materials. The use of such materials should be justified.

2. For austenitic stainless steel components, the degree to which the recommendations of Regulatory Guide 1.44, "Control of the Use of Sensitized Stainless Steel;" Regulatory Guide 1.36, "Nonmetallic Thermal Insulation for Austenitic Stainless Steel;" and Regulatory Guide 1.31, "Control of Stainless Steel Welding," are followed should be indicated. Justification for any deviations from the procedures shown in these guides should be provided.

3. For all Class 2 and 3 components, information on the cleaning and handling of such components should be provided. The degree to which the recommendations of Regulatory Guide 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants," and ANSI N45.2.1-73, "Cleaning of Fluid Systems and Associated Components for Nuclear Plants," are followed should be indicated. Justification for any deviations from the position in these documents should be provided.

4. Indicate whether the preheat temperatures used for welding low-alloy steel are in accordance with Regulatory Guide 1.50, "Control of Preheat Temperature for Welding of Low-Alloy Steel." Justification for any deviations from the procedures shown in this guide should be provided.

Control switches for the electric motor driven operation of the air compressors on 1A and 1B diesel generators are on the local diesel engine control board. These control switches permit on-auto-off operation. A selector switch permits selection of either compressor function as the primary pressurization compressor.

Pressure switches in either air receiver bank automatically start the selected compressor when the receiver pressure ~~decays to 235 psig~~ drops below the setpoint. If the selected compressor fails to operate ~~or~~ cannot hold system pressure, a separate low pressure alarm switch is provided for each bank of air receivers and is set to alarm at ~~230 psig~~ Lower pressure on a local panel and in the main control room. When the receiver pressure decays to a lower pressure, the back-up air compressor starts.

The HPCS Starting Air system has two separate air supply trains. One supplied by a diesel driven compressor and the other by an electric motor driven compressor.

The compressor discharge piping is cross connected. Both air receivers charge if either compressor operates. A check valve on each receiver inlet isolates one train from the other.

The compressors are controlled automatically by pressure switches on their associated air receiver. The compressor's low pressure setpoint ensures that the compressor starts to maintain the air receiver pressure at a sufficient amount to start the engine the required number of times.

The diesel driven compressor shuts down prior to clearing the opposite train receiver low pressure alarm.

The air receivers are equipped with safety relief valves set at the receiver design pressure.

The major system components are located adjacent to the diesel generator skid.

For each diesel generators (1A and 1B), two separate air cooled compressors discharge through common piping to two banks of four 32 cu. ft. air receivers which are connected in parallel. Each bank of air receivers has the capability of a minimum of five engine starts. Each bank is connected through separate piping to a pair of air start motors on each engine.

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RG 1.70, R2

environmental design conditions, and the plans by which additional oil may be procured, if required.

9.5.5 Diesel Generator Cooling Water System

The design bases for the cooling water system should be provided and should include a discussion of the ability to meet the single-failure criterion. A description of the cooling water system, including drawings, should be provided.

9.5.6 Diesel Generator Starting System

The design bases for the starting system, including required system capacity, should be provided and should include a discussion of the ability to meet the single-failure criterion. A description of the starting system, including drawings, should be provided.

9.5.7 Diesel Generator Lubrication System

The design bases for the lubrication system should be provided and should include a discussion of the ability to meet the single-failure criterion. A description of the lubrication system, including drawings, should be provided.

9.5.8 Diesel Generator Combustion Air Intake and Exhaust System

9.5.8.1 Design Bases. This section should provide the design bases for the diesel generator combustion air intake and exhaust system, including the bases for protection from the effects of natural phenomena, missiles, and contaminating substances as related to the facility site, systems, and equipment and the capability of the system to meet minimum safety requirements assuming a single failure. Seismic and quality group classifications should be provided in Section 3.2 and referenced in this section.

9.5.8.2 System Description. A complete description of the system should be provided, including system drawings detailing component redundancy, where required, and showing the location of system equipment in the facility and the relationship to site systems or components that could affect the system.

9.5.8.3 Safety Evaluation. Analyses should be provided to demonstrate that the minimum quantity and oxygen content requirements for intake combustion air will be met considering such effects as recirculation of diesel combustion products, accidental release of gases stored in the vicinity of the diesel intakes, restriction of inlet airflow, intake of such particulates as airborne dust, and low barometric pressure. The results of failure mode and effects analyses to ensure minimum requirements should be provided. If system degradation could result from the consequences of missiles or failures of high- or moderate-energy

10.3 MAIN STEAM SUPPLY SYSTEM

10.3.1 DESIGN BASES

The main steam supply system is designed for the following conditions:

a. Deliver steam from the reactor to the turbine generator from warmup to 105% of rated load,

b. Provide steam for the second-stage reheaters and steam-jet air ejectors,

c. Bypass steam to the main condenser during startup and in the event steam requirements of the turbine generator are less than that produced by the reactor,

d. Provide steam to the gland seal steam evaporator during startup, low load operation, and shutdown,

e. Provide steam to drive reactor feedwater pumps during startup and low load operation, and

f. Provide steam to the offgas preheaters.

The design pressure and temperature of the main steam piping is 1250 psig and 575°F.

The main steam lines are designed to include accesses to permit inservice inspection and testing (refer to Sections 5.2.4 and 6.6).

~~Seismic category, safety class, and~~ Design ~~design~~ codes are given in Table 3.2-1, ~~3.2, Table 3,~~ item 2, Nuclear Boiler System, and item 43, Power Conversion System. The environmental design bases for the main steam supply system are contained in Section 3.11.

10.3.2 SYSTEM DESCRIPTION

The main steam supply system is shown in Figures 10.3-1 and 5.1-3~~piping drawings are shown in Figures 10.3-2 through 10.3-6~~. The main steam line piping consists of four 30-in. (26-in. in reactor building) I.D. lines extending from the reactor pressure vessel to the main steam header located upstream of the turbine stop and control valves. This header placement ensures ~~assures~~ a positive means of bypassing steam via the turbine bypass system during transient conditions and startup. ~~Drain lines are provided at the low points of each main steam line and are routed to the main condenser (see Figures 10.3-1, 10.3-6, and 10.5-7).~~ Branch lines from the main steam line provide the steam requirements for the

B2

10.2.3.6 Inservice Inspection. The inservice inspection program for the turbine assembly and the inspections and tests of the main steam stop and control valves and the reheat stop and intercept valves should be described.

10.2.4 Evaluation

An evaluation of the turbine-generator and related steam handling equipment should be provided. This evaluation should include a summary discussion of the anticipated operating concentrations of radioactive contaminants in the system, radiation levels associated with the turbine components and resulting shielding requirements, and the extent of access control necessary based on radiation levels and shielding provided. Details of the radiological evaluation should be provided in Chapters 11 and 12.

10.3 Main Steam Supply System

10.3.1 Design Bases

The design bases for the main steam line piping from the steam generator, in the case of an indirect cycle plant, or from the outboard isolation valve, in the case of a direct cycle plant, should be provided and should include performance requirements, environmental design bases, inservice inspection requirements, and design codes to be applied. Capability of the system to dump steam to the atmosphere, if required, should be discussed. Steam lines to and from feedwater turbines should be included in the descriptions.

10.3.2 Description

A description of the main steam line piping, including drawings showing interconnected piping, should be provided.

10.3.3 Evaluation

An evaluation of the design of the main steam line piping should be provided and should include an analysis of the ability to withstand limiting environmental and accident conditions and provisions for permitting inservice inspections to be performed. Appropriate references should be made to seismic classifications in Chapter 3 and to the analysis of postulated high-energy line failure in Section 3.6.

10.3.4 Inspection and Testing Requirements

The inspection and testing requirements of the main steam line piping should be described. Describe the proposed requirements for preoperational and inservice inspection of steam line isolation valves or reference other sections of the SAR where these are described.

2.4.6 PROBABLE MAXIMUM TSUNAMI FLOODING

The location of the WNP-2 site is in south-central Washington and it is not adjacent to any coastal area. It is not, therefore, vulnerable to tsunami flooding.

~~2.4.6.1 Probable Maximum Tsunami~~

~~Not applicable.~~

~~2.4.6.2 Historical Tsunami Record~~

~~Not applicable.~~

~~2.4.6.3 Source Tsunami Wave Height~~

~~Not applicable.~~

~~2.4.6.4 Tsunami Height Offshore~~

~~Not applicable.~~

~~2.4.6.5 Hydrography and Harbor or Breakwater Influence on Tsunami~~

~~Not applicable.~~

~~2.4.6.6 Effects on Safety Related Facilities~~

~~Not applicable.~~

'02,04-10

2.4.7 ICE EFFECTS

Historically, the Columbia River has never experienced complete flow stoppage or significant flooding due to ice blockage. Periodic ice blocking has caused reduced flows and limited flooding for only relatively short periods of time. ~~The most significant icing in recent recorded history occurred during the winter of 1936-37 prior to the construction of the upstream regulating dams. A relatively thick sheet of ice formed across the river. The minimum flow recorded near the Priest Rapids Dam site during this winter was 20,000 cfs. However, the ice forming on the river was caused primarily by the low flow rather than the reverse. The deltaic mouths of many of the tributaries to the Columbia River are frequently blocked by ice causing backup of flood waters. No instance of complete stoppage is known to have occurred.~~

'02,04-11

Ice blockage is most likely to occur when water temperatures are already low, when flows are small, and when a significant cold spell occurs. With the completion of Grand Coulee and other dams on the Columbia River main stream, the seasonal temperature and flow cycles have drastically changed. These changes will further aid to reduce the intensity and timing of the conditions which may contribute to potential ice blockage and flooding situations. Also average river flow rates, during the winter months, have been increased significantly. The water temperatures have shown a shift in time such that the peak temperatures occur 30-45 days later than formerly. In addition, the low extreme temperatures measured have risen over the years.

The long term trends of temperatures in the Columbia River been studied (Reference 2.4-19) using a 37-year record of measured temperatures. The trends for the maximum, average and minimum temperatures are shown in Figure 2.4-15. The erection of dams on the upper Columbia River has caused the extreme high and low river temperatures measured at Rock Island Dam (Columbia RM 453, 101 miles above the WNP-2 site) to converge toward the average. Winter water temperatures are considerably warmer and summer temperatures cooler with a slightly lowered average of less than 1°F occurring during the 37 years. 02.04-11

On the basis of these studies and the recorded observation of 25 years of operation of the Hanford plutonium production plants, it is concluded that tThe potential for ice blockage or the combination of blockage and flooding behind ice dams is so low as to be considered insignificant. The erection of Mica, Arrow and Libby Dams in the Columbia River Basin headwaters is expected to further raise winter water flows and also to increase winter water temperatures somewhat.

In any event, ice flooding will not effect the capability to shut down the reactor in a safe and orderly manner. Also, the daily fluctuating stage of the river at the intake location will discourage formation of sheet ice as well as ice jams. Ice flows, should they occur, will normally pass over intake structure due to relatively high winter discharge in the river. Additional historical discussion on ice formation and effects was provided in the FSAR (through Amendment 52).

2.4.8 COOLING WATER CANALS AND RESERVOIRS

There are no cooling water canals or reservoirs. The tTwo spray ponds located southeast of the reactor building (see Figure 2.1-4), designed as Seismic Category I structures, have reinforced concrete side walls, and reinforced concrete base mats at elevation 420 ft. MSL. The finished grade at the spray ponds is approximately at elevation 434 ft. MSL and have top of wall elevations of 435 ft. MSL. The spray ponds are the ultimate heat sink for normal reactor cooldown and are the ultimate heat sink for emergency cooling. 02.04-12

The spray ponds are a part of the standby service water system which is discussed in Sections 2.4.11.6, 9.2.5, and 9.2.7. As stated in Section 2.4.2.2, the spray ponds are safe from flood. See also Section 2.4.11.6.

RG 1.70, R2

(C1)

2.4.6.3 Source Tsunami Wave Height. Provide estimates of the maximum tsunami wave height possible at each major local generating source considered and the maximum offshore deepwater tsunami height from distant generators. Discuss the controlling generators for both locally and distantly generated tsunami.

2.4.6.4 Tsunami Height Offshore. Provide estimates of the tsunami height in deep water adjacent to the site, before bottom effects appreciably alter wave configuration, for each major generator.

2.4.6.5 Hydrography and Harbor or Breakwater Influences on Tsunami. Present the routing of the controlling tsunami, including breaking wave formation, bore formation, and any resonance effects (natural frequencies and successive wave effects) that result in the estimate of the maximum tsunami runup on each pertinent safety-related facility. This should include a discussion both of the analysis used to translate tsunami waves from offshore generator locations, or in deep water, to the site and of antecedent conditions. Provide, where possible, verification of the techniques and coefficients used by reconstituting tsunami of record.

2.4.6.6 Effects on Safety-Related Facilities. Discuss the effects of the controlling tsunami on safety-related facilities and discuss the design criteria for the tsunami protection to be provided.

2.4.7 Ice Effects

Describe potential icing effects and design criteria for protecting safety-related facilities from the most severe ice jam flood, wind-driven ice ridges, or other ice-produced effects and forces that are reasonably possible and could affect safety-related facilities with respect to adjacent streams, lakes, etc., for both high and low water levels. Include the location and proximity of such facilities to the ice-generating mechanisms: Describe the regional ice and ice jam formation history with respect to water bodies.

2.4.8 Cooling Water Canals and Reservoirs

Present the design bases for the capacity and the operating plan for safety-related cooling water canals and reservoirs (reference Section 2.4.11). Discuss and provide bases for protecting the canals and reservoirs against wind waves, flow velocities (including allowance for freeboard), and blockage and (where applicable) describe the ability to withstand a probable maximum flood, surge, etc.

Discuss the emergency storage evacuation of reservoirs (low-level outlet and emergency spillway). Describe verified runoff models (e.g., unit hydrographs), flood routing, spillway design, and outlet protection.

2.4.9 Channel Diversions

Discuss the potential for upstream diversion or rerouting of the source of cooling water (resulting from, for example, river cutoffs, ice

5.2.4.1 System Boundary Subject to Inspection (continued)

~~of shell circumferential and 90%~~ of the vessel ~~longitudinal~~ welds ~~are~~ volume is accessible) and has allowed the piping examination to be upgraded to conform to the requirements of the Summer 1975 Addenda to Section XI as far as practical. The owner has developed an inservice inspection program coordinated with plant design, which complies with the intent of 10 CFR 50.55a to the maximum extent possible.

The preservice examination was performed on Class 1 components and piping pursuant to the requirements of the 1974 Edition of the ASME B&PV Code, Section XI, including the Summer 1975 Addenda for both the RPV and associated piping, pumps, and valves. It is described~~detailed~~ in the WNP-2 Preservice Inspection Program Plan (Reference 5.2-6). Preservice Inspection Program Plan submittal dates are listed in the FSAR through Amendment 52 for ease of reference.

~~The WNP-2 Preservice Inspection Program Plan and Amendments 1 through 4 were submitted to the NRC on the following dates:~~

~~Preservice Inspection Program Plan~~

~~March 28, 1979, Supply System Letter G02-79-54, D.L. Renberger to S.A. Varga~~

~~Amendment 1~~

~~May 9, 1979, Supply System Letter G02-79-89, D.L. Renberger to R.H. Engelken~~

~~Amendment 2~~

~~December 31, 1980, Supply System Letter G02-80-311, G.D. Bouchey to B.J. Youngblood~~

~~Amendment 3~~

~~December 30, 1981, Supply System Letter G02-81-565, G.D. Bouchet to A. Schwencer~~

~~Amendment 4~~

~~February 28, 1985, Supply System Letter G02-85-110, G.C. Sorensen to A. Schwencer~~

~~The PSI Summary Report was submitted to the NRC on May 3, 1983 (SS Letter G02-83-401, G.D. Bouchey to A. Schwencer). Supplement 1 and the NIS-1 Owners Data Report were submitted on February 28, 1985 (Supply System Letter G02-85-110, G.C. Sorenson to A. Schwencer). The Summary Report contained requests for relief from examinations the Supply System found not feasible.~~

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2. Control of welding. Provide the following information relative to the control of welding of austenitic stainless steels for components of the RCPB:

a. Sufficient information about the avoidance of hot cracking (fissuring) during weld fabrication and assembly of austenitic stainless steel components of the RCPB to indicate whether the degree of weld integrity and quality will be comparable to that obtainable by following the recommendations of Regulatory Guide 1.31, "Control of Stainless Steel Welding." Describe the requirements regarding welding procedures and the amount of and method of determining delta ferrite in weld filler metals and in production welds.

b. Sufficient information about electroslag welds in austenitic stainless steel components of the RCPB to indicate whether the degree of weld integrity and quality will be comparable to that obtainable by following the recommendations of Regulatory Guide 1.34, "Control of Electroslag Weld Properties." Provide details on the control of welding variables and the metallurgical tests required during procedure qualification and production welding.

c. In regard to welding and weld repair during fabrication and assembly of austenitic stainless steel components of the RCPB, provide sufficient details about welder qualification for areas of limited accessibility, requalification, and monitoring of production welding for adherence to welding qualification requirements to indicate whether the degree of weld integrity and quality will be comparable to that obtainable by following the recommendations of Regulatory Guide 1.71, "Welder Qualification for Areas of Limited Accessibility."

3. Nondestructive examination. Provide sufficient information about the program for nondestructive examination of austenitic stainless steel tubular products (pipe, tubing, flanges, and fittings) for components of the RCPB to indicate whether detection of unacceptable defects (regardless of defect shape, orientation, or location in the product) will be comparable to that obtainable by following the recommendations of Regulatory Guide 1.66, "Nondestructive Examination of Tubular Products."

5.2.4 Inservice Inspection and Testing of Reactor Coolant Pressure Boundary

This section should discuss the inservice inspection and testing program for the NRC Quality Group A components (ASME Boiler and Pressure Vessel Code, Section III, Class 1 components). Provide sufficient detail to show that the inservice inspection program meets the requirements of Section XI of the ASME Code. Areas to be discussed should include:

1. System boundary subject to inspection, including associated component supports, structures, and bolting,

(C2)

2. Arrangement of systems and components to provide accessibility,

3. Examination techniques and procedures, including any special techniques and procedures that might be used to meet the Code requirement,

4. Inspection intervals,

5. Inservice inspection program categories and requirements,

6. Evaluation of examination results,

7. System leakage and hydrostatic pressure tests.

In the FSAR, a detailed inservice inspection program including information on areas subject to examination, method of examination, and extent and frequency of examination should be provided in Chapter 16, "Technical Specifications."

5.2.5 Detection of Leakage Through Reactor Coolant Pressure Boundary

The program should be described and sufficient leak detection system information should be furnished to indicate the extent to which the recommendations of Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," have been followed.

Specifically, provide information that will permit comparison with the regulatory positions of the guide, giving a detailed description of the systems employed, their sensitivity and response time, and the reliance placed on their proper functioning. Also, the limiting leakage conditions that will be included in the Technical Specifications should be provided.

Identify the leakage detection systems which are designed to meet the sensitivity and response guidelines of Regulatory Guide 1.45. Describe these systems as discussed in Section 7.5, "Safety-Related Display Instrumentation." Also, identify those systems that are used for alarm as an indirect indication of leakage and provide the design criteria.

Describe how signals from the various leakage detection systems are correlated to provide information to the plant operators on conditions of quantitative leakage flow rate.

Discuss the provisions for testing and calibration of the leak detection systems.

2.4.13 GROUNDWATER

2.4.13.1 Description and Onsite Use

Site groundwater conditions are presented in Section 2.5.4.6 and a historical discussion of regional and local groundwater characteristics (aquifers, formations, sources, sinks) and site use was provided in the FSAR (through Amendment 52). The WNP-2 design-basis groundwater level of 420 ft msl is based on the proposed construction of the Ben Franklin Dam at RM 348. The project was canceled. Water table elevation at WNP-2 is 385 ft msl with seasonal variations less than 1 ft.

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~~Subsurface soil conditions, across the site, have been classified as follows:~~

~~a. Loose to medium dense, fine to coarse sand with scattered gravel (glaciofluvial sediments).~~

~~b. Very dense, sandy gravel with interbedded sandy and silty layers (Ringold Formation, Middle Member).~~

~~c. Very dense, interbedded layers of sandy gravel silt and soft sandstone (Ringold Formation, Lower Member).~~

~~d. Basalt bedrock which forms the bedrock beneath the area.~~

~~The lithologic character and water bearing properties of the geologic units occurring in the Hanford region are summarized in Table 2.4-8. In general, groundwater in the surficial sediments occurs unconfined, although locally confined zones exist. Water in the basalt bedrock occurs mainly under confined conditions. Occasionally, the lower zone of the Ringold Formation occurs as a confined aquifer, separated from the overlying unconfined aquifer by thick clay beds which possess a distinct hydraulic potential.~~

~~The unconfined aquifer consists of both glaciofluvial sand and gravel deposits and the Ringold silts, clays, and gravels. Since these materials are very heterogeneous, often greater lithologic differences occur within a given bed than between beds. In the vicinity of WNP-2 the water table is below the top of the Ringold Formation (see Figures 2.5-64 and 2.5-65). The unconfined aquifer bottom is the basalt bedrock in some areas and silt/clay zones of the Ringold Formation in other areas. Clearly the bottom of the unconfined aquifer is not a continuous lithologic surface.~~

~~The Hanford Reservation contains over 2200 wells constructed from pre-Hanford work days to the present (Reference 2.4-30). Approximately 600 of these wells are used for groundwater monitoring (Reference 2.4-30). Figure 2.4-24 identifies the well locations in the Hanford~~

Reservation as of September 1975. Figure 2.4-25 shows the December 1975 groundwater contour map. In general, the groundwater gradient resulting from groundwater flowing under the Reservation is the highest in the southwestern area toward Rattlesnake Mountain, and slopes toward the Hanford 200 Areas near the center of the reservation. From the 200 Areas the general slope in the gradient is toward northeast and southeast.

A groundwater contour map based on the potential construction of the Ben Franklin Dam at approximately RM 348 is illustrated by Figure 2.4-26. The WNP-2 design basis groundwater level is based on the possible construction of the Ben Franklin Dam and is taken to be 420 ft MSL, whereas the most recent study indicates that the water table would be about 405 ft MSL (Reference 2.4-32). The feasibility of constructing Ben Franklin Hydroelectric Dam has been extensively studied. Its proposal was strongly contested by local groups and individuals concerned with environmental protection and preservation. Additionally, the matter of the impact such a facility would have on the DOE Hanford Reservation was believed by some to preclude its construction. Finally, the cost/benefit ratio was believed by many to be too low to make the project viable. The combination of the unresolved impediments to the project has effectively, though not conclusively, relegated it to a very low priority status. Planning studies for the project by the Corps of Engineers were suspended in 1969 and reinitiated in October 1979 as part of the development of a management plan for the Hanford reach. The most recent studies were terminated in November 1981.

Impermeable groundwater boundaries are the Rattlesnake Hills, Yakima Ridge, and Umtanum Ridge on the west and southwest sides of the Hanford Reservation. Gable Mountain and Gable Butte also impede the groundwater flow, as well as other small areas of basalt outcrop above the water table. The Yakima River recharges the unconfined aquifer along its reach from horn Rapids to Richland. The Columbia River forms a hydraulic potential boundary which is a discharge boundary for the aquifer. The major source of natural recharge is precipitation on Rattlesnake Hills, Yakima Ridge and Umtanum Ridge.

Minor changes would be expected in the groundwater elevations during the summer months because of the charging stage of the Columbia River, which historically reaches peak flood stage in June. Because WNP-2 is located about three miles from the river and because of the permeability characteristics and enormous volume of the Ringold Formation, there is a substantial time lag in changing water levels. For the same reasons, the range in water table fluctuations is very small.

Natural recharge due to precipitation over the lowlands of the Hanford Reservation is not measurable as the evaporation potential during the summer months greatly exceeds total precipitation. Data on migration of moisture from natural precipitation in deep soils (below 30 ft) show movement rates less than 1/2 in./yr at one measurement site (References 2.4-29, 2.4-37 and 2.4-38). The major artificial recharge of ground water to the unconfined aquifer occurs near the Hanford 200 East and 200 West Areas. The large volume of process water (1.35x1011 gallons) discharged to ground during 1944-1973 has caused the formation of significant groundwater mounds in the water table (Figures 2.4-27 and 2.4-28). Other local groundwater mounds formerly existed along the Columbia River. The present Hanford 100 N Area mound is the only one of these remaining. A minor recharge mound also exists at the Hanford 300 Area.

The unconfined aquifer is characterized by its hydraulic conductivity, the storage coefficient, and the effective porosity. The hydraulic conductivity relates the water flow quantity to the hydraulic potential gradient, while the effective porosity gives the fraction of porous media volume that is available to transmit ground water flow. The storage coefficient relates a change in the water table elevation to a change in the volume of water contained in the aquifer per unit horizontal area. In the limit of no delayed yield, the storage coefficient is equal to the effective porosity of the soil through which the water table moves. These parameters vary widely over the Hanford Reservation.

Qualitatively the hydraulic conductivity, storage coefficient, and effective porosity distributions are a function of the different geologic formations in the unconfined aquifer. Ancestral Columbia River channels which incised in the Ringold Formation are now filled with more permeable glaciofluvial sediments. These channels have been identified extending eastward along the northern and southern flanks of Gable Mountain and extending southeastward from the 200 East Area to the Columbia River (see Figure 2.4-35). These permeable channels are reflected in the groundwater flow pattern of the region.

Quantitative measurements of the hydraulic conductivity of the unconfined aquifer have been made on the Hanford Reservation using a variety of techniques: pumping tests, specific capacity tests, and tracer tests. The most common method has been the pumping tests. Values obtained for the Ringold Formation range between 10 to 650 ft/day with a median of about 130 ft/day. In sharp contrast are the very large hydraulic conductivities of glaciofluvial sediments, ranging from 1,200 to 12,000 ft/day (Reference 2.4-39).

The storage coefficient is much more difficult to measure in the field and estimates are, therefore, less common. For the unconfined aquifer, estimates of the storage coefficient have ranged from 0.01 to 0.1 (Reference 2.4-39). An aerial estimate of 0.11 has been provided for the 200 West Area based on the growth of groundwater mounds (References 2.4-39 and 2.4-46). The median specific yield (effective porosity) has been estimated by various researchers at Hanford to range from 4.8% to 11%; most commonly it is assumed to be 10% (Reference 2.4-54).

The unconfined groundwater aquifer is characterized by the contour map of the hydraulic potential or water table. The map for December 1975 appears in Figure 2.4-25. The depth to the water table varies greatly from place to place, depending chiefly on local topography which ranges from less than 1 to more than 300 ft below the land surface. Beneath most of the Hanford 200 Area disposal sites the depth of the water table averages about 250 ft. The current estimate of the maximum saturated thickness of the unconfined aquifer is approximately 230 ft.

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The chemical quality of the groundwater in the unconfined aquifer is measured at seven locations. Sodium, calcium, and sulfate ions are measured as well as pH. Chromium and fluoride ions associated with fuel manufacturing operations are analyzed from Hanford 300 Area wells. Nitrate ion, which is a waste product from the manufacturing and chemical separation operations, is monitored over the entire Hanford Reservation. Annual maps of the nitrate ion concentration near the surface of the unconfined aquifer are published (Reference 2.4-40). The map showing nitrate concentration for December 1975 appears in Figure 2.4-29.

The radiological status of the groundwater near the surface of the unconfined aquifer is monitored regularly (Reference 2.4-41) and reported annually. Plots of gross beta (ruthenium) plumes and the tritium plumes are shown in Figures 2.4-30 and 2.4-31 for December 1975 (Reference 2.4-40). Since the nitrate ion is not adsorbed in the soil it can be used as a tracer for groundwater movement. The extent of movement of waste water containing radionuclides can thus be plotted. Respective tritium and nitrate ion concentrations under the WNP-2 site are currently ranging from 30 to 300 pci/ml and 4.5 to 45 mg/l depending on the sampling location. Concentration guide for drinking water is 3,000 pci/ml for tritium and the recommended drinking water standard is 10 mg/l for nitrate ions. Gross beta concentrations do not extend to the WNP-2 site.

From the research that has been done to date, it appears that there are a number of confined aquifers underlying the Hanford Reservation. Relatively impermeable confining beds commonly include the individual basalt flows and the silts and clays of the lower part of the Ringold Formation.

Within the basalt sequence, groundwater is transmitted primarily in the interflow zones, either in sedimentary beds or in the scoria and breccia zones forming the tops and bottoms of the flows (References 2.4-42 and 2.4-43). Basalt flows in the Pasco Basin have been eroded particularly in the anticlinal ridges. In some locations the basalts are highly jointed and contain breccia, pillow and plagonite complexes through which groundwater can move. Consequently, hydraulic potential differences between water bearing zones in the upper part of the basalt sequence are small over hundreds of ft of depth. The lowermost Ringold Formation silts and clays are of variable thickness. Distinct hydraulic potential differences have been observed between aquifers below the silts and clays and the unconfined aquifer.

Groundwater flow in the uppermost confined aquifer is also to the southeast with possible discharge into the Columbia River somewhere below Lake Wallula. However, the flow rates are regarded as quite small due to the low transmissivity range of this water bearing zone. Groundwater in the lower confined aquifers does not appear to cross the major anticlinal divides that define the Pasco Basin.

The piezometric or hydraulic potential map for the confined zones above the basalt (Figure 2.4-32) was based on measurements made in 1970. In general, the hydraulic potential observed

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~~in the confined aquifer zones above the basalt is greater than in the overlying unconfined aquifer. The main exception is in the vicinity of the Hanford 200 Area recharge mounds which have raised the potential in the unconfined aquifer.~~

~~One recharge area that has been identified is from the Yakima River at Horn Rapids. The piezometric map in Figure 2.4-32 also suggests recharge from the upper Cold Creek Valley with flow toward a potential trough under the Columbia River. The Columbia Basin Irrigation Project to the northeast and east, and the Columbia River behind Priest Rapids and Wanapum Dams to the northwest are other probable recharge sites in both these areas the basalt is exposed and is covered by perennially saturated unconsolidated deposits. A site of possible minor recharge exists adjacent to Gable Butte and Gable Mountain anticline near the center of the Reservation.~~

~~Only 90 wells on the Hanford Reservation have been drilled to basalt. Thus data on the confined aquifers in the basalt flows are limited and more would have to be gathered to fully characterize the confined aquifers.~~

~~The plant is located on glaciofluvial outwash sands and gravels which are about 50 ft thick. Below this layer occurs very dense gravel. Sandy gravel occurs in a sequence approximately 200 ft thick which is assumed to be the middle member of the Ringold Formation. The lower member of the Ringold Formation consists of a very compact, interbedded gravel, sand, silt, and clay and extends down to a depth of about 500-525 ft. Basaltic bedrock underlies the lower Ringold member, at approximately 550 ft depth.~~

~~The water table is about 60 ft below the ground surface level at WNP-2. The water table elevation is about 378 ± 4 ft MSL and appears to be stable. The effective bottom of the unconfined aquifer is assumed to be at about 220-260 ft MSL at the top of the lower Ringold Formation. Groundwater potentials from the lower Ringold and from the basalt water bearing zones are about 25 ft higher than that of the unconfined aquifer. Test borings down to 925 ft reveal there are water bearing zones in the lower basalt flows and sedimentary interbeds at WNP-2. Piezometric level in basalt is 10 ft above unconfined water table and hence artesian.~~

~~Under the WNP-2 site the unconfined groundwater is moving easterly toward the Columbia River, the nearest discharge boundary. Studies of the uppermost confined aquifer indicate that the potential gradients at the proposed site are oriented in the same general direct ion as those of the unconfined aquifer.~~

Three water supply wells are located on the WNP-2 site~~ (see Section 2.4.13.2)~~. Two onsite wells draw from the unconfined aquifer in the Ringold Formation and a third well penetrates the confined aquifer in the underlying basalt flows. Normal water supply is from the river, and the deep well is maintained in the standby mode to provide supplemental makeup water for the potable and demineralized water system as needed. The design is for a peak requirement of 250 gpm although average usgage should be less than 20 gpm. The two shallow wells were used during construction.

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as related to existing or potential future water users. Discuss the bases used to determine dilution factors, dispersion coefficients, flow velocities, travel times, sorption and pathways of liquid contaminants. The locations and users of surface waters should be included in Section 2.4.1.2, and the release points should be identified in Section 11.2.3.

2.4.13 Groundwater

All groundwater data should be presented in this section, in Section 2.5.4, or in both and should be appropriately cross-referenced. If the information is placed in both sections, the information in the two sections should be consistent.

2.4.13.1 Description and Onsite Use. Describe the regional and local groundwater aquifers, formations, sources, and sinks. Describe the type of groundwater use, wells, pumps, storage facilities, and flow requirements of the plant. If groundwater is to be used as a safety-related source of water, the design basis protection from natural and accident phenomena should be compared with Regulatory Guide 1.27 guidelines and an indication should be given as to whether, and if so how, the guidelines have been followed; if not followed, the specific alternative approaches used should be described. Bases and sources of data should be adequately described.

2.4.13.2 Sources. Describe present regional use and projected future use. Tabulate existing users (amounts, water levels and elevations, locations, and drawdown). Tabulate or illustrate the history of groundwater or piezometric level fluctuations beneath and in the vicinity of the site. Provide groundwater or piezometric contour maps of aquifers beneath and in the vicinity of the site to indicate flow directions and gradients; discuss the seasonal and long-term variations of these aquifers. Indicate the range of values and the method of determination for vertical and horizontal permeability and total and effective porosity (specific yield) for each relevant geologic formation beneath the site. Discuss the potential for reversibility of groundwater flow resulting from local areas of pumping for both plant and nonplant use. Describe the effects of present and projected groundwater use (wells) on gradients and groundwater or piezometric levels beneath the site. Note any potential groundwater recharge area such as lakes or outcrops within the influence of the plant.

2.4.13.3 Accident Effects. Provide a conservative analysis of a postulated accidental release of liquid radioactive material at the site. Evaluate (where applicable) the dispersion, ion-exchange, and dilution capability of the groundwater environment with respect to present and projected users. Identify potential pathways of contamination to nearby groundwater users and to springs, lakes, streams, etc. Determine groundwater and radionuclide (if necessary) travel time to the nearest downgradient groundwater user or surface body of water. Include all methods of calculation, data sources, models, and parameters or coefficients used such as dispersion coefficients, dispersivity, distribution (sorption) coefficients, hydraulic gradients, and values of permeability, total and effective porosity, and bulk density along contaminant pathways.

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Exceptions to RG 1.70, R2

WNP-2 complies with the guidance for Regulatory Guide 1.70, R2 except as indicated below.

General: Certain information required by RG 1.70 becomes historical in nature after the granting of an Operating License. This information may include descriptions necessary to evaluate site acceptability, validate data analysis or conclusions, provide summaries or details which led to the selection of a parametric values which were then modified by application of engineering margins to establish design bases values, or summaries of submittal dates for various answers to questions for additional information during the pre-license review phase of the project. Such information is historical in nature and does not contribute to the WNP-2 staff's ability to assess the impact of proposed changes to plant design, configuration or operational practices. Maintenance of this information in the FSAR is an unnecessary burden and detracts from the analysis necessary to properly evaluate proposed change to the plant or its operation.

This information has been evaluated and removed from the current FSAR through an archival process. Archived information will not be evaluated during future change analysis. A summary of the information is provided in the FSAR section where it existed and a reference to its current location is also provided. The following, identified by RG section number, lists the specific FSAR content requirements in RG 1.70, R2, which have been removed under this exception.

2.4.13.1 This section requires a description of regional and local groundwater aquifers formations, sources and sinks. It also indicates that bases and sources for the data should be adequately described. WNP-2 provided detailed descriptions and data through amendment 52 to the FSAR. Detailed information on this subject has been removed from the FSAR in amendment 53, as it is serves only historical purposes. A summary of the pertinent conclusions of the details is all that will be retained in this section of the FSAR.

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2.5.1.1.2 Provinces

The Pacific Northwest physiographic provinces are shown on Figure 2.5-1. The source of the province boundaries and descriptions are taken from McKee (1972), Washington Public Power Supply System (1977b), and Rockwell (1979). No distinction is made between geologic and physiographic provinces due to their coincidence throughout the Pacific Northwest.

From the Pacific Ocean eastward, the first major physiographic feature is the Coast Range of Washington and Oregon. These mountains extend northward from the Klamath Mountains of southern Oregon to the Strait of Juan de Fuca. East of these mountains lies the Puget-Willamette Trough, a series of topographic lowlands that extend parallel to the Coast Range from the Willamette River valley on the south to the Strait of Georgia on the north. East of the the Puget-Willamette Trough are the Cascade Mountains. The Cascade Mountains extend from northern California to southern British Columbia where they merge with the Coast Mountains. East of the Cascades, the north-south grain of the regional physiography gives way to an east-west grain. From north to south, the principal elements are the Okanogan Highlands, the Columbia Plateau, the Blue Mountains, and the High Lava Plains and Snake River Plain. To the east and north in Idaho, western Montana, and British Columbia, the north to northwest regional grain returns in the form of the Northern Rocky Mountains. A discussion of the tectonics of these provinces is contained in Section 2.5.2.2.1.

The WNP 1-2-4 site (Figure 2.5-1) lies in southeastern central Washington within the Columbia Plateau province. The site is situated near a north-south stretch of the Columbia River, the major watercourse in the region. The Pasco Basin contains the site and comprises approximately 4,144 square km of undulating semiarid plain with low-lying hills, dunes, and intermittent streams. The northern and southern boundaries of the Pasco Basin (Figures 2.5-4, 2.5-6a, 2.5-6b, and 2.5-6c) are defined by the Saddle Mountains and Rattlesnake Mountain, respectively. The easterly ends of Umtanum and Yakima Ridges mark the western boundary of the basin. To the east the basin merges into a vast expanse of dunes, dissected flatlands, and coulees northwest of the Snake River. A detailed discussion of the Columbia Plateau province is contained in Section 2.5.1.2. A detailed discussion of the Pasco Basin is contained in Section 2.5.1.2.4.

2.5.1.1.2.1 Columbia Plateau

The Columbia Plateau (a physiographic and geologic province) is bounded by the Blue Mountains and High Lava Plains on the south, the northern Rocky Mountains-Idaho batholith on the east, the Okanogan Highlands on the north, and the Cascade Mountains Province on the west.

The Columbia Plateau is drained by the Columbia River which flows westward toward the Pacific Ocean. The Snake River joins the Columbia River after draining the eastern Columbia Plateau and parts of the adjoining provinces to the east and south. Most of the Plateau (see Figure 2.5-7) has gentle topographic relief. Exceptions to this gentle relief are the deep gorge of the Columbia River, the many steep-walled coulees north and east of the Columbia River, and the series of linear, generally west to northwest-trending, anticlinal ridges in the vicinity of Yakima.

The Channeled Scabland of Washington covers the Columbia Plateau from Spokane on the northeast to the Snake River on the south and to the Columbia River on the west. The scabland topography was formed in Pleistocene time by the action of glacial meltwaters and catastrophic floods due to breaching of ice-dammed lakes in western Montana.

The Columbia Plateau formed between 16.5 and 6 m.y.b.p. (Watkins and Baski, 1974; McKee and others, 1977) when large volumes of basalts were erupted from north-northwest trending linear vent systems in northeastern Oregon and southeastern Washington (see Figure 2.5N-2) (Waters, 1961; Taubeneck, 1970; Swanson and others, 1975; Fruchter and Baldwin, 1975; Price, 1977; Swanson and others, 1977).

The lavas of the Columbia Plateau cover an area of approximately 202,018 square km and have an estimated volume of 170,894 cubic km (Figures 2.5-3 and 2.5N-2) (Swanson and Wright, 1978). The Columbia Plateau is surrounded by topographically higher areas. The character of the pre-Tertiary rocks covered by basalt is visible only within highlands surrounding the plateau.

Individual basalt flows are voluminous, generally 8 to 25 cubic km, with a maximum known volume of 604 cubic km. Flows range in thickness from a few inches to more than 300 ft, with an average thickness of 90 to 120 ft (Swanson and others, 1979a). The thickest flows are interpreted as showing ponding in pre-basalt valleys, in structurally

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Exceptions to RG 1.70, R2

2.5.1.1 This section on regional geology was addressed by WNP-2, through Amendment 52 to the FSAR, in specific discussions of geologic features which contain a mix of general and specific information describing and differentiating the various regional features. Included in these discussions were tables of data reflecting investigative techniques, such as borehole analysis, trenching analysis and compilations of scientific research in this area. This information is historical in nature and has been removed from the FSAR by amendment 53. Sections archived from the FSAR via this exception include: 2.5.1.1.2 (all sections).

2.5.1.2 This section on site geology was addressed by WNP-2, through amendment 52 to the FSAR, with specific discussions of geologic features near and coincident with the WNP-2 site. Supporting these discussions were tables and maps of data used to characterize the features. These specific discussions and data are historical in nature and have been removed from the FSAR by amendment 53. Sections 2.5.1.2.3.1 through 2.5.1.2.5 have been archived.

FSAR Content Revision Issues

1. Historical Information - What do we need to update per 50.71(e)?

Chapter 2 - Site Characteristics
- Geography and Demography
- Meteorology
- Hydrologic Engineering
- Geology, Seismology and Geotechnical Engineering
- Nearby Industrial, Transportation and Military Facilities

Chapter 11 - Radioactive Waste Management
- Source Terms
- Liquid Waste Management
- Solid Waste Management

Chapter 14 - Initial Test Program

2. Drawings and Figures - For plants which incorporated P& ID into their FSARs, how can we remove drawing details which are non-safety significant from SAR space for 50.59 and 50.71(e) considerations?

3. Operating Plant Safety Analysis Report - What is really needed to ensure effective reviews and approvals of changes, including NRC approvals?

4. State of the Art Applications - When to incorporate in SAR and at what detail?

Substituted EPRI Chemistry Guidelines for GE BWR Chemistry Guidelines
Substituted Condensate Suction Ion Chromatography sampling and Sodium Hexaflouride Injection for Condensate Hotwell Conductivity Sampling

Attachment 2

MEETING WITH WASHINGTON PUBLIC POWER SUPPLY SYSTEM

FSAR UPGRADE PROGRAM

ATTENDEES

August 27, 1997

<u>NRC</u>

T. Colburn
W. Bateman
F. Akstulewicz
E. McKenna
S. Magruder

<u>Washington Public Power Supply System</u>

D. Coleman
P. Inserra
J. Gearhart

<u>Nebraska Public Power District</u>

R. Wenzl

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