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JUN 27 1975

R.-C. DeYoung, Assistant Director for Light Water Reactors, Group 1

HYDROLOGIC ENGINEERING SUMMARY

PLANT NAME: WPPSS NUCLEAR PROJECTS NO. 3 & 5
LICENSING STAGE: CP
DOCKET NUMBER: 50-508, 509
MILESTONE 24-32
RESPONSIBLE BRANCH: LWR 1-3
REQUESTED COMPLETION DATE: June 16, 1975
REVIEW STATUS: Hydrologic Engineering Section, SAB - Awaiting Resolution

Enclosed is a hydrologic engineering summary, prepared by T. L. Johnson and W. S. Bivins, for your use in preparing the Safety Evaluation Report. At this time, several issues concerning the groundwater drainage system, accidental liquid radwaste spill, and monitoring remain unresolved.

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H. R. Denton

Harold R. Denton, Assistant Director
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As stated

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WPPSS 3 & 5
HYDROLOGIC ENGINEERING SUMMARY
DOCKET NOS. 50-508, 509

2.4 Hydrologic Engineering

2.4.1 Hydrologic Description

The site is located about 26 miles southwest of Olympia, Washington, approximately one mile south of the Chehalis River at the confluence with the Satsop River. The Chehalis River has a drainage area of about 1765 square miles at the site. In the vicinity of the site, the Chehalis River flows through a winding channel in a fairly uniform flood plain whose width is about 2 miles. The river is a tidal estuary in the site vicinity.

Normal cooling will be accomplished by cooling towers.

The applicant proposes to obtain makeup water from the alluvial aquifer which exists in the Chehalis River Valley using a well field. The applicant has indicated that there are approximately 43 groundwater users within a five-mile radius of the site and that there are approximately seven downstream users of surface waters within 5 miles of the site. In the immediate site area, groundwater is present in limited quantities in the relatively impermeable Astoria Sandstone.

Emergency cooling will use dry cooling towers, which reject heat to the atmosphere. Therefore, the plant is not dependent on a water supply to provide emergency cooling.

2.4.2 Floods

The maximum recorded flood on the Chehalis River occurred in January, 1972 with a corresponding water level at the site of approximately elevation 30 ft. msl. All safety-related plant facilities, systems, and components are located above elevation 300 ft. msl, and are not susceptible to flooding from any major streams in the site area.

The applicant has proposed that site drainage facilities will be designed for the 100-year rainfall and that the runoff from local intense precipitation up to and including the Probable Maximum Precipitation (PMP) will be conveyed overland away from safety-related building. We conclude the applicant's design bases are acceptable.

2.4.3 Probable Maximum Floods

The applicant has estimated that an occurrence of the Probable Maximum Flood (PMF) on the Chehalis results in a water level of 76.2 ft. MSL (including waves) near the site. However, since safety-related structures are located more than 200 ft. above this applicant's estimated PMF level, we conclude that there is no potential danger to safety-related structures due to the PMF with coincident waves.

2.4.4 Potential Dam Failures

The only dam upstream of the site is Bloody Run Dam located on the Skookumchuck River about 66 miles upstream of the site. The dam is

approximately 175 feet high. The applicant analyzed the potential flood effects at the site from a dam failure and has concluded that no flooding would occur at the site. We concur with the applicant that the proposed plant grade precludes any flooding due to dam failures.

2.4.5 Surges and Tsunamis

The site is not subject to flooding by a probable maximum surge or tsunami.

2.4.6 Ice Flooding

The applicant has considered flooding due to ice blockage and has concluded that site flooding is precluded by the nature of the prevailing climate and the site elevation. We concur with the applicant.

2.4.7 Flooding Protection Requirements

No flood protection is required for safety-related structures as these structures are located above the PMF level in the Chehalis River. We have concluded (see 2.4.2) that the applicant's design bases for local intense precipitation are acceptable.

2.4.8 Low Water Considerations

The major source of recharge to the Chehalis River Valley aquifer, from which makeup water will be drawn, is surface water from the Chehalis and Satsop rivers. Based on pumping tests, the applicant has concluded that induced infiltration of surface water into the groundwater aquifer will be achieved. Therefore, the extraction of required makeup water from the aquifer will result in a decrease

in surface water flow downstream of the groundwater collection system, essentially equal to the withdrawal of groundwater. The required normal cooling water flow rate is approximately 71 cfs. The minimum historical flow of record on the Satsop River at the Satsop gaging station is 166 cfs based on 43 years of records. The minimum historical flow for the 20 years of record on the Chehalis River at the Porter gaging station is 164 cfs. The applicant has estimated that the 7-day, 10-year low flow at the confluence of these streams to be approximately 440 cfs. We have concluded that the makeup water supply to the plant is adequate, based on the low-flow yields of the Chehalis River, the induced infiltration capability of the aquifer, and the amount of groundwater storage in the aquifer. No makeup water is required for safety-related cooling.

2.4.9 Groundwater

Groundwater at the site region occurs predominantly in the alluvial aquifer underlying the Chehalis River Valley. The aquifer is fully saturated from about 10 feet below ground level downward. Recharge to the aquifer is from infiltration of precipitation and infiltration from the Chehalis River. The unconfined aquifer is about 2 miles wide and is horizontally limited by relatively impermeable sandstones on both sides of the river. Based on pumping test data, we conclude that an adequate supply of makeup water can be extracted from the aquifer, using the applicant's proposed groundwater collection system. (See also Section 2.4.8).

In the immediate site vicinity groundwater occurs in the relatively impermeable sandstones of the Astoria formation. Recharge is derived from rainfall and snowmelt along the topographic ridge south of the site above Workman Creek. The very low permeability of the Astoria formation permits only small amounts of recharge and groundwater movement.

The applicant proposes to permanently lower the groundwater levels in the vicinity of safety-related structures, using a system of horizontal and vertical collector drains. The proposed system consists of vertical 6-inch half-round drain pipes, spaced on 8.5' centers around the reactor auxiliary buildings which collect and convey the groundwater to 8" horizontal drains located at mat level. The horizontal collector pipes discharge to a common (to both units) drainage tunnel which then conveys the flow into Workman Creek, south of the plant. The system will not be Category I except for the manholes, located at the corners of the auxiliary buildings, which are to be designed to allow repair and maintenance in the event the system is clogged or damaged. In the event of system failure, the applicant has estimated that there will be approximately 2 1/2 to 5 1/2 months to repair the system before the groundwater level recovers to the design groundwater level of Elev. 350 msl (about 20 feet above the mat level). However, due to lack of substantiated information we are unable to concur with these estimates. We will require the applicant to substantiate the time available to initiate alternate dewatering action and we will report the results of

our analyses in a supplement to this report.

Further, we have been unable to conclude that the dewatering system will not be overwhelmed in the event that the circulating water pipe directly under or in the turbine building ruptures. If the pipe ruptures under or in the non-Seismic Category I turbine building, the water may enter the turbine building and flow directly into the drainage system's vertical pipes, subsequently exceed the capacity of the system, overwhelm the drainage system, and cause the groundwater levels to rise rapidly in excess of design hydrostatic levels. As of this time, this issue remains unresolved. The applicant has not provided an analysis of a pipe rupture at the turbine building; we have no basis to conclude that the water will not enter and overwhelm the groundwater drainage system thus causing subsurface groundwater levels to exceed the design basis elevation.

In the event of a spill, the effluent will be collected in the proposed groundwater drainage system and will discharge into Workman Creek. There is a surface water user (irrigation) near the mouth of Workman Creek. The staff has conservatively estimated a travel time of one hour and dilution factor of 2 at this location. The concentrations exceed 10 CFR 20. To resolve this issue, the applicant has committed to document in a subsequent amendment to the PSAR that the cracks in the walls of the buildings will limit the amount of effluent that will be discharged into Workman Creek. The staff's review and conclusions of this analysis will be provided in a supplement to this report. The applicant has committed to monitoring

groundwater levels and to radiological monitoring of discharges through the ground water drainage system. However, the details of the monitoring program have not been provided at this time. The applicant has stated that additional details will be provided in a subsequent amendment. Until these details are provided, along with additional documentation, we conclude that the applicant's proposed design is unacceptable. Also, we will require that the monitoring program reflect any changes to the proposed groundwater drainage system.

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