WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECTS NOS. 3 & 5
GROUNDWATER DRAINAGE SYSTEM

ANALYSIS OF SYSTEM PERFORAMANCE AND DATA TO DATE

(SUPPLEMENT NO. 3)

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EBASCO SERVICES INCORPORATED
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I. SYNOPSIS

The WNP 3 and 5 projects have a permanent groundwater drainage system (GWDS), which performs solely by gravity drainage, placed around the reactor auxiliary buildings. This system consists of vertical half-round drain pipes that drain the rock and discharge to a horizontal header on the periphery of the mat. The horizontal header collects water and conducts it to a tunnel which then drains to a small creek south of the plant island. Calculations have been made, and tests made to develop the parameters for these calculations, in determining the expected performance of the groundwater drainage system by predicting the groundwater drawdown curve surrounding the buildings.

Installed piezometers are being monitored to determine the actual performance of the groundwater drainage system. Analysis to date supports the original design parameters used in the drawdown calculations. Additional piezometers in the northwest and eastern areas of the WNP-3 excavation continue to indicate the presence of perched water tables in these areas. The installation of additional piezometers around the WNP-5 excavation should provide further information regarding the presence of perched water tables there.

II. DESIGN PARAMETERS

All design parameters for the groundwater drainage system were those identified in PSAR Section 3.4.5. Applicable portions of the PSAR and the expected results of the effect of the groundwater drawdown in the area of the reactor auxiliary buildings are presented in the report dated March 3, 1978.

III. INSTRUMENTATION IN PLACE

Figure 1 shows the location of existing open hole piezometers around the WNP-3 excavation. Of these, sixteen are the original continuously slotted inclinometer casings which were installed 20 and 50 feet away from the excavation in accordance with Ebasco Specification WPPS-3240.406. Following the discovery of several areas of high ground water, twenty-one additional open hole piezometers with varying slot depth locations were installed approximately 9 feet from the excavation.

Figure 2 shows the location of the original sixteen continuously slotted inclinometer casings installed 20 and 50 feet away from the WNP-5 excavation.

IV. ADDITIONAL PIEZOMETER INSTALLATIONS

Sixteen additional piezometers will be located nine feet from the west, north and east faces of the WNP-5 excavation. These piezometers will be sealed at various specified elevations. This will permit monitoring of local zones of perched water believed to exist around the WNP-5 excavation. Information obtained from these additional piezometers may be available for the next report.

V. DATA COLLECTED TO DATE

Figures 1 and 2 show the groundwater data collected to date for WNP-3 and -5 respectively. In addition, the corresponding depth of excavation and precipitation data are included. Figure 1 also includes groundwater information for the twenty-one additional piezometers installed

around the WNP-3 excavation.

Groundwater data is collected weekly and submitted periodically by formal report. Unusual occurrences are verbally reported to responsible personnel at the site by the instrumentation subcontractor and appropriate action is taken.

VI. GROUNDWATER FLOW MEASUREMENTS

Until the WNP-3 and -5 excavation walls are sealed by concrete placements and all groundwater infiltration is routed through the GWDS, accurate measurement of total flow is not possible. Based on observations during the report period, the total groundwater flows are estimated at 3 - 7 gpm and 7 - 12 gpm from the WNP-3 and -5 excavations, respectively.

VII. COMMENTARY

Excavation for the site grading has brought the plant grade down to a planned final elevation of 390 feet. This has eliminated the effect of groundwater stored in the high areas that had existed to the east and west of the Reactor Auxiliary Building excavations. Reactor Auxiliary Building excavations to elevation 325 feet were completed on March 19 and September 6, 1978 for Units 3 and 5, respectively.

In areas of least drawdown, local perched water conditions are indicated by water level measurements on the additional piezometers adjacent to WNP-3 and by observation of wall seepage for WNP-5. The sixteen additional piezometers to be installed around the WNP-5 excavation will permit water level measurements there.

Recorded values from approximately seven of the originally installed 16 piezometers around WNP-3 excavation fluctuated considerably with rainfall during the report period. Efforts are being made to extend casings and provide improved seals to reduce direct surface inflow.

The 21 additional piezometers placed adjacent to WNP-3 were installed with grout seals which prevent inflow of surface water. Groundwater levels obtained in these installations remained essentially stable or declined slightly over the report period. The lack of effect on these piezometer levels and the existence of relatively impermeable layers in these areas of the excavation continue to indicate perched water tables in the northwest and eastern areas. The water perched on these relatively impermeable layers effects the piezometer readings by causing the piezometer to read the perched water table and not the underlying water table. Continued monitoring through the winter wet season should define any recharge effect in these areas.

Groundwater levels surrounding the WNP-5 excavation indicate the existence of perched water in the west, north and east areas. Installation of 16 additional piezometers should provide further definition of the perched water conditions in these areas.

VIII. CONCLUSION TO DATE

The validity of the GWDS design is apparent, recognizing that the piezometers located in the northwest and eastern areas of the WNP-3 excavation are measuring the highest of several localized perched water

tables and not the single underlying water table. The piezometers located in areas without apparent perched water zones are in close agreement with the predicted drawdown. Data obtained from all piezometers during the winter wet season should provide further definition of the perched water zones and allow a comparison of actual with predicted drawdown in each zone.

As indicated in Section VII, groundwater levels surrounding WNP-5 excavation will be more closely examined in the next report.

Observation of piezometer recordings, rainfall data, wall seepage, and GWDS discharges indicates that the system will function as required.

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