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

FEB 24 1984

MEMORANDUM FOR: William V. Johnston, Assistant Director
Materials, Chemical & Environmental Technology, DE

FROM: Ronald L. Ballard, Chief
Environmental & Hydrologic Engineering Branch, DE

SUBJECT: MOUNT ST. HELENS/TROJAN PLANT ACTIVITIES IN THE
HYDROLOGIC ENGINEERING SECTION

The May 1980 eruption of Mount St. Helens increased the potential for sediment deposition and flooding on the Columbia River where the Trojan Nuclear Plant is located. This is due to blockage of the outlet of Spirit Lake, north of Mount St. Helens, by debris from the eruption. A failure of this blockage would result in a large flood with entrained mud on the Toutle and Cowlitz Rivers (see attached map). On Sunday, February 5, 1984, the U.S.G.S. and the University of Washington issued a volcano alert indicating that another eruption of Mount St. Helens was likely to occur within 48 hours. As a result of this alert, the Hydrologic Engineering Section is now monitoring the situation closely in an attempt to determine if a potential release from Spirit Lake could possibly affect the operation of the Trojan Plant.

Background

In early March 1983, NRC received a USGS report that concluded that the level of mudflow flooding at the confluence of the Cowlitz and Columbia Rivers due to a postulated Spirit Lake breakout would be of greater magnitude than the mudflow that followed the May 1980 eruption of Mount St. Helens (see attached map). The USGS did not assess the effects of the mudflow on the Columbia River but it appeared to the HES staff that the predicted mudflow level at the mouth of the Cowlitz which was at an elevation of about 40-50 feet could potentially result in some flooding of the Trojan plant depending on the magnitude of the discharge in the Columbia River. The Federal Emergency Management Agency (FEMA) also had some concern about the impact on the Columbia River so they requested that USGS extend their mudflow study to include effects on the Columbia River. This study was to take about a year to complete.

Since the NRC needed a basis for determining if a mudflow could affect the safety of the Trojan Plant, it was felt that a year, the time required by the USGS to complete their study, was too long to wait. Consequently, the HES contracted

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with the USGS to furnish in the shortest time possible, an estimate of the flows and elevations in the Columbia River at the Trojan Plant that would result from a Spirit Lake breakout.

The results of this study showed that the maximum flood elevations in the Columbia River near Trojan would result from either (1) the coincident occurrence of a mudflow and a Columbia River flood or (2) the occurrence of a mudflow depositing sediment in the Columbia River during a low flow period and then being followed by a Columbia River flood flow.

In the first of these scenarios, a hypothetical mudflow with a peak discharge of 1.1×10^6 cfs at the mouth of the Cowlitz River would occur coincident with a high flow in the Columbia River. For a flow of about 685,000 cfs in the Columbia River, the water level at the Trojan plant would rise as high as the plant grade elevation of 45 ft msl.

In the second scenario, it was assumed that the mudflow would occur coincident with a low flow in the Columbia River. The low flow would not transport the sediment downstream so it would deposit and aggrade the Columbia River channel. This event by itself would not impact on the operation of the Trojan Plant unless it was followed by a high flow in the Columbia River. It was determined that if the Columbia became blocked to the extent estimated by the USGS following a Spirit Lake breakout, during low flow conditions, a subsequent flow of about 430,000 cfs or greater would result in a flood level at Trojan at or above plant grade elevation of 45 ft msl.

Current Activities

The elevation to which the river water level would rise at the Trojan site in both of the scenarios described above is directly dependent on the condition of the Columbia River at the time each scenario is postulated to occur. Since the second scenario would only become important after a Spirit Lake breakout that resulted in most of entrained sediment depositing in the Columbia, the staff's immediate concern is the first scenario which shows that Columbia River flows in excess of 685,000 cfs coincident with a mudflow in the Cowlitz River, could result in flooding of the Trojan Plant. HES has been closely monitoring the flow in the Columbia River since Wednesday, February 8. During this time the flow has remained below about 370,000 cfs. The staff will continue to monitor river discharges and keep Operating Reactors Branch No. 3 informed on a daily basis or more frequently if necessary. The intention is to continue this as long as there is a volcano alert or as requested by the Division of Licensing.

William V. Johnston

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Future Activities by HES

Although HES's immediate concern is not with the second USGS scenario, we will contact other agencies involved in controlling Columbia River floods to find out what options would be available to reduce the potential for high flows to occur in the Columbia River following low flow periods. This is to establish a basis for decision making concerning the operation of the Trojan Plant should the potential for another eruption of Mount St. Helens develop again this fall.

Original signed by *[Signature]* Ronald L. Ballard

Ronald L. Ballard, Chief
Environmental & Hydrologic
Engineering Branch
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Attachments:
As stated

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