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

50-344

JUN 3 1980

Bill Bivins — What's your analysis of the situation?

George

6/3

NOTE TO: George Lear

FROM: Bob Jackson

SUBJECT: TROJAN SITE - FLOOD INFORMATION

I just received the attached notice from the USGS Hazard Information Center. Since the Cowlitz is downstream from the Trojan facility, I assume that this notice has no impact with respect to Trojan flooding. We would also like to point out the shoaling in the Columbia, both upstream and downstream Cowlitz junction which has occurred and the apparent potential for increasing that shoal significantly if Cowlitz River flooding or mudflow occurs. Harold Lefevre can provide you with more details on the extensive channel filling.

Robert E. Jackson
Bob Jackson

cc: J. Knight
H. Lefevre
W. Bivins

8006180249 XA
17pp

A/S

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

In Reply Refer To:
EGS-Mail Stop 415

MAY 29 1980

Mr. Edward Chow, Director
Department of Emergency Services
State of Washington
4220 East Martin Way
Olympia, Washington 98405

Dear Mr. Chow:

This letter is to update our hazard watch on Mount St. Helens. The enclosed statement summarizes information gathered by U.S. Geological Survey scientists since the explosive eruption of Mount St. Helens on May 18, 1980. The physical changes that have been documented in the Cowlitz River system since the May 18, 1980, flood from the Toutle River basin are the basis for the continuing concern about the increased flood hazard along the lower Cowlitz River.

As a result of sediment deposition in the reach of the Cowlitz River downstream from Castle Rock to its junction with the Columbia River at Longview during and following the flood of May 18-19, 1980, the carrying capacity of the channel has been greatly reduced. Prior to the flood, a flood stage of 23 feet in the lower Cowlitz River at Castle Rock was reached at a discharge of about 76,000 cfs (cubic feet per second). At the present time, this reach of channel is essentially at flood stage at a discharge of about 10,000 cfs.

Because upstream reservoirs in the upper Cowlitz River drainage are filled to near maximum storage capacity, it will take some time to provide storage necessary to contain significant inflows that may occur in the future. Releases from the reservoirs are being maintained at the maximum rates that can be safely passed downstream. Based on the average inflows for the period May through July, additional reservoir storage will occur at the rate of about 3,800 acre-feet per day. Any significant increase in runoff above the present discharge of about 10,000 cfs will increase the potential for flooding in the Castle Rock-Longview reach of the river. Whereas prior to the flood the channel below Castle Rock could safely carry an "8-year flood" today it can just carry the average flow of the river.

The mud and debris blocking the upper Toutle River channel pose an additional potential threat. Whether or not the material blocking the upper Toutle River channel fails catastrophically, erosion over time will move the material downstream, where it may add to the sediment "plug" in the lower Cowlitz River and in the Columbia River off the mouth of the Cowlitz River.

We will continue to keep you informed as new information becomes available from our monitoring activities.

Sincerely yours,

H William Menard

H. William Menard
Director

Enclosure

Copy to: Dr. Robert A. Clark, Associate Director (w/encl.)
National Weather Service (Hydrology)
504 Gramax Building
Silver Spring, Maryland 20910

Mr. Donald W. Kuehl
Hydrologist-in-Charge
Northwest River Forecast Center
National Weather Service, NOAA
121 Custom House
Portland, Oregon 97209

INCREASED FLOOD POTENTIAL IN THE LONGVIEW AND KELSO AREAS FROM THE MOUNT ST. HELENS' ERUPTION

U.S. Geological Survey
Reston, Virginia

Introduction

Sediment and debris produced by the Mount St. Helens' eruption have partially filled the lower 15 miles of the Cowlitz River causing a flood threat to the Longview and Kelso, Washington, areas. In addition, more than 1.5 million acre-feet of mud and debris produced by the eruption remain in the Toutle River channel. A major rainstorm runoff event will move part of this material into the Cowlitz River along with erosion from the denuded and ash-covered slopes, further increasing the flooding threat.

Changes in Hydrologic Conditions

The explosive eruption of Mount St. Helens on May 18, 1980, caused massive landslides and mudflows in the upper reaches of the Toutle River which drains the north and west slopes of the volcano. This resulted in runoff from the melted glaciers and snow (estimated water volume of about 140,000 acre-feet) on the north slope and possible outflow from Spirit Lake. This runoff caused unprecedented flooding in the Toutle River which empties into the Cowlitz River (2 miles upstream from Castle Rock, Washington).

On May 18, 1980, about noon, a flash flood occurred on the South Fork Toutle River as a result of water from melted glaciers and mudflows. The peak flow of 47,000 cubic feet per second (cfs) measured at the Geological Survey streamflow gage near Silver Lake was derived from a few square miles of drainage area. A few hours later, a silt-laden flood came down the North Fork Toutle River and destroyed

the Silver Lake stream gage. High-water marks recovered at the site, together with information recovered at the Castle Rock gage on the Cowlitz River, indicated that the flood from the North Fork reached a stage of more than 53 feet. This exceeded the previous maximum stage of a record (beginning in 1909), which had occurred only hours before, by about 30 feet with an accompanying discharge of about 150,000 cfs.

The flood of May 18, 1980, in its passage from Castle Rock past Longview to the Columbia, seriously impaired the flow capacity of the lower Cowlitz River. The flood deposited sediment to depths of as much as 15 feet in this reach. The volume of deposition in the Cowlitz River is estimated to be more than 25,000 acre-feet.

A shoal was formed in the Columbia River, blocking the shipping channel, and has an estimated volume of about 10,000 acre-feet of sediment. Prior to May 18, 1980, the below-flood-stage carrying capacity of the Cowlitz River below Castle Rock was about 76,000 cfs, an 8-year flood. Assuming the present channel conditions do not improve, the risk of a floodflow exceeding the designated flood stage of 23 feet, in any year, increases from a probability of .12 to virtually 1. In short, any significant uncontrolled runoff upstream from Castle Rock will exceed flood stages in the lower Cowlitz River.

Geological Survey hydrologists have worked with local officials in a continuing concerted effort to release water from the Mossyrock and Mayfield reservoirs at the maximum rate that can be passed safely to the Columbia River. The available storage in the two reservoirs was depleted earlier when outflows were stopped because of concern over the threat of an outbreak from Spirit Lake. Consequently, the outlook for creating significant storage capacity in the upstream reservoirs in the immediate future is not good.

The present inflow to the reservoirs is less than normal. With a maximum safe release of 7,800 cfs, additional storage in the resevoirs will be accrued at a rate of about 3,800 acre-feet per day for normal inflow conditions (about 5,900 cfs) through July.

In 3 days of sustained flow of 8,000 to 10,000 cfs at Castle Rock there is no indication of change in channel capacity of the Cowlitz River from Castle Rock to its mouth, which indicates that during this period the river has not been significantly aggrading or degrading.

Conclusions

1. In the wake of the Sunday (May 18, 1980) eruption of Mount St. Helens, the flood potential along the lower Cowlitz River has increased significantly. The vulnerability of communities from Castle Rock downstream to Kelso and Longview has increased accordingly.

2. Ash and sediment washed into the Cowlitz River has deposited as much as 15 feet of sediment in the river channel. It is estimated that the maximum below-flood-stage capacity of the river has been reduced about 85 percent, from 76,000 cfs to about 10,000 cfs. Because of the decreased capacity of the river channel, the risk of a floodflow exceeding the designated flood stage of 23 feet in any year is increased from about .12 to virtually 1.

3. Unless and until significant amounts of the sediment deposited in the lower Cowlitz River channel are removed, naturally or otherwise, a flow in excess of the current flood threshold of 10,000 cfs could occur anytime as a result of excess precipitation and/or increased snowmelt.

4. Two hydropower reservoirs upstream on the Cowlitz River, the Mossyrock and Mayfield reservoirs, are at near-full capacity and will not be able to hold a significant above normal inflow. Outflow from these reservoirs was stopped during the Sunday (May 18, 1980) eruption. Outflow from these reservoirs has now been resumed to the maximum safe level to avoid downstream flooding, but the rate of flow into the reservoirs is only slightly less than outflow. For a constant outflow of 7,800 cfs and normal inflow of about 5,900 cfs for the period May through July, additional storage will be gained at the rate of 3,800 acre-feet per day.

DRAFT
6-12-80

REQUESTS FOR ADDITIONAL INFORMATION
TROJAN NUCLEAR PLANT
PORTLAND GENERAL ELECTRIC COMPANY
DOCKET NO. 50-344

1. Ash has been emitted many times from Mount St. Helens since resumption of volcanic activity in March, 1980. Major widespread ashfalls occurred as a result of the eruptions of May 18, 1980 and May 25, 1980. Describe the effects, if any, of each of the above events (or any intermediate ashfalls) on the Trojan plant.

2. Since Mount St. Helens volcanism may continue for an indefinite (and unpredictable) time period, describe, based upon the post-March, 1980 volcanic activity the volcano-related phenomena that have affected or may possibly affect the Trojan Nuclear Plant. Describe and assess the effect or possible effect of each of these phenomena on the Trojan nuclear ~~plant~~. Address as a minimum in your response the following phenomena: (1) ashfall (possible thickness and accummulation rates), (2) volcanic-induced seismicity (probable location and depth of events, size of events, and effect of these events on the plant), and (3) mudflows, debris flows, ~~and associated flooding~~. With respect to (3) above provide volume estimates based on recent events in the Toutle River area.

3. It is our understanding that the ash falls resulting from the May 18, 1980 and May 25, 1980 ~~eruptions produced at least two distinct types of~~ ash with the May 18 event distributing ash predominantly to the east-northeast and the ash from the May 25 event falling mostly to the west and northwest. Since ash similar to that produced during these events either has or may fall at the Trojan Nuclear Plant site, provide all available physical, chemical, and mineralogical data relative to the above two events. Do not exclude information obtained from ashfalls other than the May 18 and May 25 events.

A57

4. Describe hazards, risks, adverse conditions or situations or problems to the Trojan Nuclear Plant that you have experienced or anticipate as a result of the recent volcanic activity (including ash fall) at Mount St. Helens. Include (1) conditions or situations that might affect the operation of a plant, (2) the functioning of plant operators, (3) ability to enter or leave the plant or to evacuate its vicinity and (4) any other hazard, risk, adverse condition situation or problem that is appropriate to discuss.

5. Please discuss lessons learned from the Mount St. Helens event or events leading up to it or subsequent to it that might impact on the Trojan Nuclear Plant.

6. Please make recommendations that will minimize or lead to the mitigation of volcanic hazards to the Trojan Nuclear Plant.

7. What information do you need to know or know better in order to make such recommendations that will ensure the safety of the Trojan Nuclear Plant regarding the potential volcanic hazard?

8. A weekly magazine (Time - June 2, 1980) describes fatalities and burns presumably resulting from the volcano's May 18, 1980 hot air blast and hot ash. This occurrence was presumably near the Green River, some 30 miles from Mount St. Helens. Please verify this report. Include in your response a confirmed tally of the most distant fatalities and injuries attributable to air blast, gas, and hot ash or other ejecta.

9. Apparently even small amounts (fractions of an inch) of ash-laden air can cause considerable damage and breakdown to mechanical equipment requiring access to the atmosphere. Based upon an analysis of case histories of equipment failures and malfunctions resulting from the recent erruptions describe the conditions under which the Trojan Nuclear Plant would remain operative. Include in your response the amount of ashfall (including duration of fall) required before plant shutdown is initiated.

10. What is the expected time interval(s) between ash emission at Mount St. Helens and ash arrival (fall) at the Trojan plant site? Explain the assumptions made and presumed meteorological conditions used in the analyses. Such calculated travel times would dictate the amount of time plant operators would have to prepare for the ash fall.

11. Based upon information obtained or reported as a result of the current volcanic activity, provide a map showing the distribution and cumulative thickness of ash within a 40 mile radius of Mount St. Helens. Provide separate maps depicting the ash distribution and thickness of the May 18 and the May 25 events within the same radius.

Subject: Items of Interest - Hydrologic Engineering Section
Trojan

1. Will knowledgable applicant reps. be available for discussions?

2. Are the USGS reps geology? If so, can "water boys" attend?
Info.

3. - Are the "house water" pumps and UHS (service water) pumps the same?
- Are the pumps being adversely affected by ash/mud in the intake?

4. - What bathemetric surveys are done in the vicinity of the intake structure. When last?
- Is equipment at hand to remove blockages (mud & channel) as they develop? How? What?

5. Need quad-sheets of river for a few miles upstream and downstream.

6. Obtain (applicant) results of latest sediment surveys nearest plant. Whats suspended load; bed load?

7. - Whats ash fall total at plant site?
- Is it being removed from safety-related

#5

related buildings? How?

8. An eruption of Mt St Helens was considered as a design basis for Trojan. The design basis flood analysis included debris/mud flow induced failures of upstream dams. Seismic failures were also considered. Describe any effects since the eruption, or any that are anticipated, which would alter your conclusions with regard to the design basis flood at the plant.

9. Describe the entire Ultimate Heat Sink for Trojan.