



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

MAY 4 1983

R. Gonzales

Docket No. 50-344

MEMORANDUM FOR: Robert A. Clark, Chief
Operating Reactors Branch No. 3, DL

THRU: William V. Johnston, Assistant Director
Materials, Chemical & Environmental Technology, DE *WVJ*

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

SUBJECT: HYDROLOGIC ENGINEERING QUESTIONS CONCERNING THE EFFECTS
OF A SPIRIT LAKE BREAKOUT ON THE TROJAN PLANT

Plant Name: Trojan Nuclear Plant
Licensing Stage: Operating
Responsible Branch: Operating Reactors Branch No. 3; C. Trammell, PM
Status: Continuing Review

In a letter to you dated April 12, 1983, the Trojan Plant licensee, Portland General Electric Company, provided a discussion of a recently published USGS report titled "Mudflow Hazards Along the Toutle and Cowlitz Rivers From the Hypothetical Failure of Spirit Lake Blockage." In its discussion, the licensee states that the mudflow peak postulated by the USGS is substantially less than the design basis flood for the Trojan Plant. The licensee, however, does not address the differences between the design basis Columbia River flood and that discussed in the USGS report including the potential for sediment deposition in the Columbia River and the resultant reduction in channel cross-sectional area which could cause flood levels to rise above the design basis flood level of 45 feet MSL.

To address these concerns, we have prepared the attached questions for your transmittal to the licensee.

These questions are also a followup to our Spirit Lake-Mount St. Helens-Trojan Status which is being submitted to you under a separate memo.

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Robert A. Clark

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These questions were prepared by R. Gonzales who can be reached at extension 28018.

Original signed by Ronald L. Ballard

Ronald L. Ballard, Chief
Environmental & Hydrologic
Engineering Branch
Division of Engineering

Attachments: As stated

cc: w/o attachment

R. Vollmer
D. Eisenhut

w/attachment

W. Johnston
G. Laines
O. Parr
R. Jackson
G. Lear
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DATE	5/4/83	5/4/83	5/4/83	5/4/83		

Hydrologic Engineering Questions
Concerning a Postulated Breakout of
Spirit Lake and the Effects on the
Trojan Nuclear Plant

In referring to USGS Report 82-4125, you state that the Trojan Plant is protected against conditions that might be expected from a failure of the Spirit Lake debris blockage. You apparently base this statement on the fact that the design basis flood for Trojan, 4,400,000 cfs, is substantially more than the 1,090,000 cfs postulated by the USGS in their report. We would agree with this reasoning if the Spirit Lake breakout flood was a clear-water flood. However, since it would be a mudflow, the forces considered in analyzing fluid flow, particularly pressure, inertia and viscosity would be significantly different. We would expect that the more viscous mudflow would result in reduced channel efficiency and higher flood levels for a given flow. In addition, the mudflow would be capable of depositing a tremendous amount of sediment in the Columbia River thus resulting in even higher flood levels.

The staff position is that you have not provided sufficient information to show that a breakout of Spirit Lake and the ensuing mudflow would not affect the safety of the Trojan Plant. You should therefore provide the following information for staff review.

1. Taking the scenario in the USGS report as a "given", discuss the potential for sediment deposition in the Columbia River, i.e., how much of the 2.4×10^9 cubic yards of sediment that would be entrained in the Spirit Lake breakout flood would be deposited in the Columbia River?

2. The Corps of Engineers estimates in their report, "Mount St. Helens, The Challenge to Restore and Protect," that about 45,000,000 cubic yards of mudflow infill were deposited in the Columbia River following the May 1980 eruption of Mount St. Helens; the major portion being deposited from about 5 miles downstream of the mouth of the Cowlitz River (River Mile 63) to about the vicinity of the Trojan Plant (River Mile 72). Of this amount, about 14,000,000 cubic yards were removed by the Corps of Engineers and about 31,000,000 cubic yards were left in the river outside the 600 foot wide navigation channel. Discuss the impact of this new condition on the flood carrying capacity of the Columbia River and the effect on the design basis water level of 45 ft at Trojan.
3. Assume that the sediment amount determined in your response to question 1 would be deposited between River Miles 63 and 72, as was the case following the 1980 mudflow, and analyse the impact on flood levels in the Columbia River at the Trojan Plant.
4. The USGS study necessarily required many assumptions concerning items such as the amount of sediment that would be entrained, dam failure mode, downstream routing methods, flood peak attenuation, etc. The USGS assumptions were reasonable and not necessarily upper bound conditions such as are usually assumed in siting of nuclear power plants. You should therefore assume other debris blockage failures and mudflow hydrographs more severe than the USGS's, and discuss the likelihood of water levels exceeding plant grade elevation of 45 feet msl at Trojan.

5. Discuss the effect of water levels higher than elevation 45 feet msl on the safety of the Trojan Plant assuming various durations and levels of flooding.

RECORD OF TELEPHONE CONVERSATION

DATE: March 10, 1983 PROJECT: TROJAN-Portland
RECORDED BY: Raymond Gonzales General Electric Co.
TALKED WITH: Tom Davis OF the Corps of Engineers, North
Pacific Division
MAIN SUBJECT OF CALL: To inquire about the Corps involvement in the post
Mount St. Helens eruption effects on the Columbia River.

I spoke to Tom Davis who is in the Planning Division of the North Pacific Division of the Corps of Engineers. Tom suggested that we contact Mr. Pat Keough who is the Chief of the Planning Division of the Portland District. His number is 8-423-6413.

Tom told me that he believes that the Waterways Experiment Station (WES) has done some modeling of a Spirit Lake breakout and the results are considerably different from the USGS study. (Perhaps what we need has already been done). Tom tells me that the Spirit Lake in-house expert is Bill (Ed) Daugherty (8-423-6454) so we may want to talk to Bill. However, we should first talk to Keough and if he doesn't mention Daugherty, we may inquire about other on-going COE studies.

Daugherty works in the Engineering Division so he may have some information that Keough doesn't have.

P/S

RECORD OF TELEPHONE CONVERSATION

DATE: April 1, 1983 PROJECT: TROJAN-Portland
RECORDED BY: Raymond Gonzales General Electric Co.
TALKED WITH: Ed Daugherty OF the Corps of Engineers, Portland
MAIN SUBJECT OF CALL: To inquire about the status of a Corps' request that
USGS assess the impact of mudflows on the Columbia River.

The USGS is planning to conduct a study of the impacts of mudflows, on the Columbia River, that could result from a Spirit Lake breakout. This USGS study is expected to take about a year to complete. The Corps of Engineers would like to have some idea of the magnitude of flooding on the Columbia River in a shorter time span than a year and has requested the USGS perform a quick study to determine this. I called Ed Daugherty of the Corps (FTS 8-423-6454) to inquire whether the USGS had agreed to do such a study. Mr. Daugherty hasn't received a response from the USGS yet. However, Mr. Daugherty did say that the USGS is quite reluctant to do a short study so he does not know what will be done. He promised to find out and let us know. I requested that he send copies of the report "Mount St. Helens Eruption, The Challenge to Restore and Protect, October 1981, COE-Portland". He said that this report is just a historical account of COE activities after the May 1980 eruption and has nothing to do with future eruptions or mudflows. I told him to send us a copy anyway.

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RECORD OF TELEPHONE CONVERSATION

DATE: April 19, 1983 PROJECT: TROJAN-Portland
RECORDED BY: Myron Fliegel General Electric Co.
TALKED WITH: D. Kresch OF the United States Geological Survey

MAIN SUBJECT OF CALL: To inquire about the possibility of the USGS doing
a quick study of the impacts, of a potential spirit Lake breakout, on the
Trojan Plant.

I called David Kresch, USGS co-author of Spirit Lake Dam failure report (82-4125) at FTS 390-6510 in Tacoma. I discussed NRC's interest in flood effects of Spirit Lake (S. L.) dam failure in relation to the Trojan plant on the Columbia River. Kresch said that FEMA had been investigating feasibility of USGS doing a quick analysis of Columbia River effects of S.L. dam failure but he didn't know whether USGS had agreed to do the work. He promised to find out and get back to me. I told Kresch that NRC was interested in a more narrowly defined evaluation in that we were only interested in the effects at the Trojan site rather than a large stretch of the Columbia. I stated our request as:

Estimate flows and evaluations in the Columbia River at the Trojan site assuming a failure of the Spirit Lake dam and flows in the Toutle and Cowlitz Rivers as per Report 82-4125. Also estimate elevation of sediment deposited.

I also told Kresch that if the above could not be accomplished NRC would settle for an estimate of the likelihood and duration of Columbia River elevations exceeding 45' msl (plant grade) at Trojan assuming dam failure and Cowlitz hydrograph as in Report 82-4125. We discussed the meaning of "likelihood". I stated that we were starting from the assumptions used in Report 82-4125 and were not asking for probabilities of those assumptions occurring. Also, that we said "likelihood" rather than "probability" to convey the qualitative nature of the assessment.

I asked that the USGS also qualitatively discuss the effects of other dam failure scenarios and mudflow hydrographs, more severe than those in Report 82-4125, on the likelihood of elevations above 45' msl at Trojan.

I told Kresch that the time from we needed was about the end of June because Trojan was to restart in July or August.

Kresch said that he would discuss the request with appropriate USGS management and that he or somebody else would get back to me soon today or within a couple of days.

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RECORD OF TELEPHONE CONVERSATION

DATE: April 19, 1983PROJECT: Trojan PortlandRECORDED BY: Raymond GonzalesGeneral Electric Co.TALKED WITH: Al RamirezOF the Corps of Engineers, Portland

MAIN SUBJECT OF CALL: Since it doesn't appear that USGS can do a quick study of mudflow impacts on Trojan I wanted to know if the Corps might be capable of doing this.

I called Mr. Al Ramirez (8-423-6478) of the Corps of Engineers-Portland to inquire about the possibility of the COE doing a study of the Columbia River-Trojan mudflow impacts. Mr. Ramirez is the Study Manager for the Comprehensive Study of the Toutle-Cowlitz Rivers. This study was authorized as a result of the President's emergency declaration (August 19, 1982) concerning the potential for catastrophic flooding from Spirit Lake. This study is to be completed and on the President's desk by the 15th of November 1983. Mr. Ramirez informed me that "WES" has done some modeling for this study and that he expects that by July or August a portion of the report dealing with a long term solution to flooding on the Cowlitz will be completed and available.

As far as the COE doing some work for NRC, it doesn't look too promising. Mr. Ramirez says they are swamped just trying to meet the November 1983 deadline for their study report. He mentioned that the Hydrology Section which would do this type of study does not have the resources to do any extra work but he suggested that we call the Chief of Engineering, Mr. Bob Flanagan (8-423-6919) just to make sure. I am trying to get hold of Mr. Flanagan but he is not in today. I will call back tomorrow April 20, 1983.

P/S

RECORD OF TELEPHONE CONVERSATION

DATE: April 19, 1983PROJECT: Trojan PortlandRECORDED BY: Raymond GonzalesGeneral Electric Co.TALKED WITH: Ed DaughertyOF the Corps of Engineers, PortlandMAIN SUBJECT OF CALL: To follow up on telecon of April 1, 1983 betweenR. Gonzales-NRC and Daugherty COE.

I spoke with Ed Daugherty (COE) to get an update on the Corp's request that USGS do a quick study of Columbia River impacts. The USGS will not do a quick study. FEMA and the USGS are now negotiating about who is to fund the year long study. If FEMA funds it, it will take a year. If USGS funds it, it will take two or three years. Mr. Daugherty suggested that we contact FEMA in Bothell, Washington to express our interest and let them know that NRC also has an interest in a quick completion of the study. He suggested we call Mr. Bill Mayer FTS 8-396-0284.

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RECORD OF TELEPHONE CONVERSATION

DATE: April 20, 1983 PROJECT: Trojan Portland
RECORDED BY: Myron Fliegel General Electric Co.
TALKED WITH: Leslie Laird OF the USGS, Tacoma, Washington
MAIN SUBJECT OF CALL: Follow up on telecon of April 19, 1983 between
M. Fliegel-NRC and Kresch-USGS

I returned call from Leslie Laird, District Chief, USGS, Tacoma, Washington (FTS 390-6510) at 1:45 p.m. Mr. Laird told me that USGS is working on a model to be used to evaluate effects in Columbia River, of a breakout of Spirit Lake blockage but that won't be completed for at least a year. He said that some of the items I discussed on April 19, 1983 with D. Kresch cannot be answered until that study is complete but that others could. Specifically, Laird stated that estimations of sediment deposition levels in the Columbia River cannot be done. However, the technical ability to determine water (actually water and entrained sediment) levels in the Columbia River near Trojan exists now.

Laird will not consider doing any work for NRC, however, because work performed last year for NRC was not paid for. (Note: This work was not done for NRR). The work involved the BWIP sites at Hanford. The USGS reviewed Rockwell's work in groundwater modeling. Evidently, NRC forget to include it in the budget and had already committed all available FY 82 monies when the oversight was discovered. An attempt to have USGS paid by DOE in FY 83 failed. In any event, Laird was adamant about not performing any more work for NRC until he gets paid for the BWIP work - about \$30 K.

Because he will not consider working for NRC at this time, Laird will not investigate whether he has the manpower available to actually perform the analysis of Columbia River water levels within the time period I discussed with Kresch by the end of June, 1983.

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RECORD OF TELEPHONE CONVERSATION

DATE: April 25, 1983 PROJECT: TROJAN-Portland
RECORDED BY: Raymond Gonzales General Electric Co.
TALKED WITH: B. Mayer, D. Donovan and B. Brown OF FEMA-Bothell, Washington
MAIN SUBJECT OF CALL: To discuss status of FEMA-USGS study to determine potential impacts of a Spirit Lake breakout on the Columbia River.

FEMA has requested the USGS to do a study of the potential impacts of a Spirit Lake breakout on the Columbia River. I wanted to let FEMA know that NRC is also interested in such a study as it relates to Trojan.

Mr. Mayer who is the FEMA regional director in Bothell, Washington, referred me to Mr. Dick Donovan and Mr. Bill Brown. Mr. Brown is the one most knowledgeable about the FEMA-USGS study. Mr. Brown generally reiterated the information that we've obtain from the USGS and COE in past telephone conversations. Mr. Brown, however, did shed some light on the negotiations currently underway concerning who will fund the study (See tele-con dated April 4, 1983 between Gonzales-NRC and Daugherty-COE). The resources for funding the study of the Columbi River are not in the USGS's budget at the present time so it would probably take about three years to obtain the funds and do the study. FEMA, however, want an answer as quickly as possible so funds may come from FEMA. If funds are available now, study will take about a year to complete. Mr. Brown stated that a quick study like NRC would like to have done is not a new idea; USGS has considered this all along. However, since this is not the usual way of doing business at USGS, trying to overcome inertia within the agency is a major problem.

FEMA is aware that some consideration has been given to having the state(s) of Washington and/or Oregon together with consultants, knowledgeable with sediment-transport processes, do a quick study. USGS would not be an active participant and would draw no conclusions but would sit in on the discussions. This could be the answer NRC is looking for.

Mr. Brown suggested that NRC write a letter to the regional director of FEMA, Mr. Bill Mayer, stating that NRC also has an urgent need to know what the consequences of a Spirit Lake breakout will be in relation to the Trojan Plant. This letter would improve FEMA's position in their negotiations with USGS as far as getting answers as quickly as possible is concerned.

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RECORD OF TELEPHONE CONVERSATION

DATE: April 26, 1983 PROJECT: TROJAN-Portland
RECORDED BY: Raymond Gonzales General Electric Co.
TALKED WITH: Bill Flanagan OF the Corps of Engineers

MAIN SUBJECT OF CALL: To discuss possibility of the COE performing a quick study for NRC on the impacts of a Spirit Lake breakout on the Columbia River and the Trojan Plant

ITEMS DISCUSSED: In a conversation with Mr. Al Ramirez of the COE, (See tele-con record dated April 19, 1983 between Gonzales-NRC and Al Ramirez- COE) Mr. Ramirez had suggested that we contact Mr. Flanagan to inquire as to the possibility of the COE performing a quick study for NRC. Mr. Flanagan stated that the COE would not be able to do this at the present time because of the lack of manpower resources and because the USGS and FEMA are already engaged in such a study.