

W. Bivins

FEB 6 1981

MEMORANDUM FOR: Charles Trammell  
Operating Reactors Branch No. 3  
Division of Licensing

THRU: James P. Knight, Assistant Director  
for Components and Structures Engineering  
Division of Engineering

FROM: George Lear, Chief  
Hydrologic and Geotechnical Engineering Branch  
Division of Engineering

We have completed our review of a report by Thomas Dunne and Luna B. Leopold "Flood and Sedimentation Hazards in the Toutle and Cowlitz River System as a Result of the Mt. St. Helens Eruption, 1980". Our comments, prepared by W. Bivins and R. Codell are enclosed.

Original signed by George Lear

George Lear, Chief  
Hydrologic and Geotechnical  
Engineering Branch  
Division of Engineering

Enclosure:  
As stated

cc: R. Vollmer  
J. P. Knight  
G. Lear  
R. Codell  
M. Fliegel  
W. Bivins

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## Hydrologic Engineering Section Comments

"Flood and Sedimentation Hazards in the Toutle and Cowlitz River Systems  
As a Result of the Mt. St. Helens Eruption, 1980"

By Thomas Dunne and Luna B. Leopold, Federal Emergency Management Agency

We have reviewed the subject report with regard to Hydrologic Engineering aspects. Our principal concern is, of course, any potential adverse impacts upon the Trojan Nuclear Power Plant located downstream of the report area. The report provides an excellent compilation of available information with regard to source material, the mechanism by which pyroclastic flows are initiated and their potential impact on subsequent mud flows, the amounts of debris which may be available for mud flows and the mechanisms by which such flows can be initiated, an assessment of the potential hazard of the failure of the debris dam within the water shed, and the assessment of potential impact upon the hydrosphere as it would affect flood and sediment production.

With one exception we have made no effort to provide specific comments on the report; treating it principally as an information source rather than a report to be editorially reviewed for comment. The exception involves the methods used to predict the failure of a feature referred to as Coldwater Lake.

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On May 18, an avalanche flowing down the north fork of the Toutle Valley was partially diverted into the Coldwater Creek drainage area. A ridge on the avalanche now encloses a basin with a storage capacity of approximately 100,000 acre feet. It is this ridge that is now referred to as a Coldwater Dam. There are empirical methods which may be used to predict the rate of

erosional failure of embankment type dams. The authors assume a vertical erosion of a one foot per minute with an associated width/depth ratio for the failed section. We know of no basis for these assumptions and suggest that methods developed variously by the Bureau of Reclamation, Tennessee Valley Authority, and the Corps of Engineers might be used to predict discharge and erosion rates. Essentially the procedure relates discharge rates and angle of repose of the embankment material to a volume removal function. Alternately, one might use the "pull the plug" method in which the embankment is simply assumed to fail catastrophically and instantaneously. This at least has the advantages of being demonstrably conservative and does not rely upon the arbitrarily assumed erosion rates.

The effect on Trojan with regard to the failure is moot with regard to the techniques. The failure will not create a safety problem at Trojan. We have, on numerous occasions, documented the design bases for Trojan Nuclear Power Plant. The flooding which would occur on the Columbia River due to a failure of Coldwater Creek Dam would not approach the severity, at the Trojan Site, of the domino failure of the upstream reservoirs on the Lewis River or the instantaneous failures of large dams upstream on the Columbia River.

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The estimates made by the authors with regard to the production of sediment in the Toutle and Cowlitz River, which would presumably find its way to the Columbia, may produce operational constraints on the plants, although it is not clear that it will do so. Regardless, the plant has adequate engineered

features which would allow it to obtain water from alternate sources without the use of river intake structure. Thus, we conclude that while the subject report provides information of general interest to the technical community, it does not raise issues which would question the safety of the Trojan Nuclear Power Plant.