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Title: Emeritus Professor
Comments: Comments on the Spirit Lake Outflow Safety Improvement Project

Dear Dr Kovarik,
My name is Colin Thorne, and I am an Emeritus Professor of Physical Geography at the University of Nottingham, England, currently residing in Vancouver, WA. I am an internationally recognized expert in river science and flood risk management, having advised governments and river authorities around the world, with my research cited more than 22,000 times .
I began studying the Toutle River and its tributaries draining Mount St. Helens in 1983 when I monitored the Corps' emergency pumping project, while an Associate Professor in Civil Engineering at Colorado State University. Since then, my research at MSH has focused on the river's post-eruption evolution and sediment dynamics, primarily in collaboration with the U.S. Geological Survey's Cascades Volcano Observatory. In 2009 and 2013, I was contracted by the Portland District, U.S. Army Corps of Engineers to provide guidance on sediment management in the Toutle-Cowlitz river system.
Currently, I am working with WDFW and the Lower Columbia Fish Enhancement Group to restore salmon habitat in both the North and South Forks of the Toutle. I am also collaborating with the U.S. Army Corps 'Engineer Research and Development Center' (ERDC) on a four-year, Corps-funded research project evaluating future engineering and management alternatives for the Toutle-Cowlitz system. In addition, I serve as an expert witness appointed by the Corps in two on-going cases before the U.S. Court of Federal Claims concerning management of sediment in the lower Mississippi River.
In this letter, I express my honest, expert opinion. For brevity, the detailed arguments supporting my opinion are appended in the Annex.
In my professional opinion, the USFS currently has a rare opportunity to shape a better future for Spirit Lake, the Toutle River, the Mount St. Helens National Volcanic Monument, and the people of Cowlitz County by choosing Alternative 7 -- replacing the existing tunnel with a pressure tunnel and applying Engineering with Nature (EwN®) principles to safely create a controlled breach of the 1980 debris avalanche dam.
Alternative 7 is the clear choice because it:

A.Eliminates the risks to people, property, infrastructure, and ecology posed by a break-out flood.
B.Generates multiple economic, societal, and environmental benefits that extend throughout the Toutle and lower Cowlitz valleys, are continuous, and will accrue in value for the foreseeable future.

Alternative 7 is the best option because it removes the threat of a catastrophic break-out flood by lowering Spirit Lake's elevation. It also facilitates reconnection of Spirit Lake with the North Fork Toutle River, restoring flow to six and a half miles of the headwaters and reopening passage for resident and migratory fish -- including listed salmon -- which helps revitalize Cowlitz County's eco-tourism economy.
There is an equally compelling, Policy-based case for Alternative 7, supported by three irrefutable facts:
1.Congress created the Mount St. Helens National Volcanic Monument on August 27th, 1982, in order to, "preserve the geologic, ecologic, and cultural resources of the area, allowing geological forces and ecological succession to continue substantially unimpeded."
2.Spirit Lake, the Debris Avalanche, and headwaters of the NF Toutle River are located within the Monument.
3.Notwithstanding the previous two facts, the U.S. Forest Service has impeded geological forces and ecological succession for four decades.

There is no doubt that left unimpeded, hydro-geological forces would have naturally breached the debris avalanche dam and partially drained Spirit Lake. This is precisely what happened to previous debris dams following past eruptions , and it would have happened again, soon after the 1980 event. But the impact would

have been catastrophic. Thus, the emergency pumping project that stabilized the elevation of Spirit Lake between 1982 and 1985, and the decision to drill a tunnel to provide a longer-term outlet for Spirit Lake, were entirely justified.

Given that context, I do not criticize the prudent decisions that were made to protect lives, property, and key infrastructure. At that time, management alternatives were constrained by both limited knowledge of the geologic and hydrologic systems that posed the threat, and the technologies available to manage those systems. While those decisions were justified, it is regrettable that the time gained by operating the existing tunnel has not, until now, been used to develop a long-term solution-one that works with, rather than against, natural hydro-geological forces and enables rather than impedes ecological succession.

In summary, this is the singular opportunity to align management of Spirit Lake and the NF Toutle River with both the intent of Congress and the realities of Nature. Alternative 7 offers a forward-looking, science-based solution that ensures public safety while promoting natural processes, ecological succession, and economic prosperity.

Yours Sincerely,

Colin R Thorne
Professor and Emeritus Chair of Physical Geography, University of Nottingham, UK