

**From:** Fred Lyon  
**Sent:** Monday, June 01, 2009 2:59 PM  
**To:** Tom Lakosh  
**Cc:** Tanya Mensah; Michael Markley; Tom Blount  
**Subject:** G20090007 2.206 Petition (Reactors Near Yellowstone)

Mr. Lakosh, you were informed of the Petition Review Board's (PRB's) initial recommendation to reject your petition in an earlier phone call today with me, Mr. Markley, and Ms. Mensah. The PRB recommended to reject your petition because the impact of volcanic activity on U.S. operating reactors has already been the subject of NRC staff review and evaluation for which a resolution has been achieved, the issues have been resolved, and the resolution is applicable to U.S. nuclear power plants.

The Atomic Energy Commission (the predecessor of the NRC) considered the need for investigations of possible volcanism required for sites located in areas of volcanic activity during its consideration of amendments to its regulations, 10 CFR Part 100, "Reactor Site Criteria," which added an Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants." In its final rule (38 FR 31279, dated November 13, 1973), the Commission stated in Appendix A, Section II, that "These criteria do not address investigations of volcanic phenomena required for sites located in areas of volcanic activity. Investigations of the volcanic aspects of such sites will be determined on a case-by-case basis."

Of the current operating reactors, potential volcanic activity, specifically ash fall, is addressed in the final safety analysis report for only Columbia Generating Station. The licensee concluded that the only aspect of volcanic activity that would affect the plant is ash fall. Considering the maximum expected ash fall rate concurrent with a 2-hour loss of offsite power, the licensee concluded that the procedures and equipment available will provide adequate assurance of safe plant operation and shutdown. In its Safety Evaluation Report (SER) for the operating license for WNP-2 (NUREG-0892, Supplement 3, "Safety Evaluation Report Related to the Operation of WPPSS [Washington Public Power Supply System] Nuclear Project No. 2," dated May 1983; ADAMS Accession No. ML091310458, non-publicly available), the NRC staff concurred with the licensee's assessment.

However, in NRC Generic Letter (GL) 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," dated June 28, 1991 (available at <http://www.nrc.gov/reading-rm/doc-collections/gen-comm/gen-letters/1988/gl88020.html>), licensees were requested to perform an IPEEE for plant-specific severe accident vulnerabilities initiated by external events and to submit the results to the NRC. As regulatory guidance for responses to GL 88-20, the staff referred licensees to NUREG-1407, "Procedural and Submittal Guidance for the [IPEEE] for Severe Accident Vulnerabilities," dated June 1991 (ADAMS Accession No. ML063550238). GL 88-20, Supplement 4, paragraph 3, "Identification of External Hazards," states that

However, licensees should confirm that no plant-unique external events known to the licensee with the potential to initiate severe accidents are excluded from the IPEEE. For example, *volcanic activities should be assessed as part of the IPEEE process at plant sites in the vicinity of active volcanoes....* [emphasis added].

NUREG-1407, Chapter 2, "Events Evaluated for Inclusion in the IPEEE," states that

In supporting the implementation of the [NRC's] Severe Accident Policy, a study of the risk of core damage to nuclear power plants in the United States due to externally initiated events was performed. ... "other external events" are investigated in NUREG/CR-5042, Suppl. 2. The "other external events" covered are nearby industrial/military facility accidents, on-site hazardous material storage accidents, severe temperature transients, severe weather storms, lightning strikes, external fires, extraterrestrial activity, *volcanic activity*, earth movement, and abrasive windstorms [emphasis added].

NUREG-1407, Section 2.11, "Volcanic Activity," states that

Most nuclear power plant sites are too far away from active volcanoes to expect any effect at the plant, so most licensees need not consider the volcanic effects. However, those sites in the vicinity of active volcanoes should assess volcanic activities (NUREG/CR-5042, Suppl. 2) as part of the IPEEE process.

NUREG-1407, Appendix D, "NRC Response to Comments and Questions," addressed the question of the inclusion of volcanic activities, among other events, in the IPEEE as follows.

Licensees need to confirm that lightning or volcanic activity is not a dominant contributor to severe-accident risk at their nuclear power plant sites. The determination should be based on plant-specific experience.... In regard to volcanic activity, only two sites [Trojan and WNP-2] would be affected. In either case, a simple discussion will be sufficient for those plants not affected by these events.

NUREG/CR-5042, Supplement 2, "Evaluation of External Hazards to Nuclear Power Plants in the United States - Other External Events," dated February 1989 (ADAMS Accession No. ML063470272, non-publicly available), specifically addresses volcanic activity in Section 2.2.8, "Volcanic Activity." The NRC staff concluded in Section 5.0, "Summary and Conclusions," that

Volcanic activity is a hazard which should be considered, but only at the Trojan and WNP-2 sites. All other nuclear plant sites are too far away from active U.S. volcanos to have to consider this threat.

In accordance with GL 88-20, Supplement 4, licensees performed IPEEEs to identify plant-specific vulnerabilities to severe accidents, and reported the results to the NRC together with any licensee-determined improvements and corrective actions.

The NRC staff performed a screening review, which examined the IPEEE results for their "completeness and reasonableness" considering the design and operation of the plant. On the basis of this review and further review by a senior review board (SRB), the NRC staff concluded that the aspects of seismic; fires; and high winds, floods, transportation and other external events were adequately addressed. The SRB was comprised of NRC staff from NRR, the Office of Nuclear Regulatory Research (RES), and an RES consultant (Sandia National Laboratories) with probabilistic risk assessment expertise for external events. The staff's review findings were summarized in individual plant SERs, which included appendices with the details of the contractor's and staff's findings.

In response to your concerns, responses to GL 88-20, and the subsequent staff SERs were reviewed for the following plants, which represent those surrounding the Yellowstone caldera:

Columbia Generating Station  
Wolf Creek Generating Station  
Fort Calhoun Station  
Cooper Nuclear Station  
Diablo Canyon Power Plant  
San Onofre Nuclear Generating Station  
Palo Verde Nuclear Generating Station

Volcanic activity was addressed in detail only by the licensee for Columbia Generating Station. The licensee concluded that the only aspect of volcanic activity that would affect the plant is ash fall. Considering the maximum expected ash fall rate concurrent with a 2-hour loss of offsite power, the licensee concluded that the procedures and equipment available will provide adequate assurance of safe plant operation and shutdown. In its SER for the plant's IPEEE (letter from J. Cushing (NRC) to J. Parrish (licensee) dated February 26, 2001; ADAMS Accession No. ML010570035, non-publicly available), the NRC staff referred to its SER for the operating license and concurred with the licensee's assessment.

The licensees for Palo Verde, San Onofre, Diablo Canyon, Cooper, Fort Calhoun, and Wolf Creek eliminated volcanic activity for review in the IPEEEs for those plants using the screening methodology outlined in NUREG-1407. The NRC staff review of the IPEEEs for those plants concluded that the licensees' processes were capable of identifying the most likely severe accidents and severe accident vulnerabilities for the plants and that the IPEEEs met the intent of GL 88-20, Supplement 4.

In addition, the latest Yellowstone Volcano Observatory (YVO; a partnership of the U.S. Geological Survey (USGS), Yellowstone National Park, and the University of Utah) monthly update for May 2009 reports a volcano alert level of normal and an aviation color code of green, which are unchanged since at least 2006. The Yellowstone National Park website (<http://www.nps.gov/yell/naturescience/volcanoqa.htm>) states that,

There is no evidence that a catastrophic eruption at Yellowstone National Park is imminent. Current geologic activity at Yellowstone has remained relatively constant since earth scientists first started monitoring some 30 years ago. Though another caldera-forming eruption is theoretically possible, it is very unlikely to occur in the next thousand or even 10,000 years. Scientists have also found no indication of an imminent smaller eruption of lava.

Regarding the earthquake swarm at Yellowstone in late December 2008, the YVO states in its article, "Yellowstone Lake Earthquake Swarm Summary as of 8 January 2009" (available at <http://volcanoes.usgs/yvo/publications/2009/09swarm.php>), that,

At this time, there is no reason to believe that magma has risen to a shallow level within the crust or that a volcanic eruption is likely.

The USGS states in its Open-File Report 2007-1071, "Preliminary Assessment of Volcanic and Hydrothermal Hazards in Yellowstone National Park and Vicinity" (available at <http://pubs.usgs.gov/of/2007/1071/>), that,

Of all the possible hazards from a future volcanic eruption in the Yellowstone region, by far the least likely would be another explosive caldera-forming eruption of great volumes of rhyolitic ash.... The probability of another major caldera-forming Yellowstone eruption, in the absence of strong premonitory indications of major magmatic intrusion and degassing beneath a large area of the caldera, can be considered to be below the threshold of useful calculation.

Please inform me by June 8 if you would like to address the PRB again.

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