

UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D.C. 20555-0001

September 11, 2009

Mr. Tom Lakosh 2429 Forget Me Not Lane Anchorage, AK 99508

Dear Mr. Lakosh:

In your emails to the U.S. Nuclear Regulatory Commission (NRC), dated December 30 and 31, 2008, you requested that the NRC devise a plan for immediate systematic shutdown and cooling of all reactors that may be downwind of a major Yellowstone caldera eruption. You also requested that the NRC issue an Order to all U.S. operating reactors detailing the threat and requiring immediate acquisition of sufficient temporary water storage, water filtration systems and pumps with spare parts to accommodate the loss of direct access to surface water for a period of no less than 3 months. The NRC staff evaluated your requests pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 2.206, "Requests for action under this subpart."

On March 12, 2009, you addressed a petition review board (PRB) from the Office of Nuclear Reactor Regulation (NRR) regarding your petition (Agencywide Documents Access and Management System (ADAMS) Accession No. ML090930078). In your subsequent emails dated April 29, April 30, and May 13, 2009 (ADAMS Accession Nos. ML091310203, ML091210231, and ML091330630, respectively), you modified your request to include mitigation of volcanic ash impacts to reactors nationwide, not just those in the vicinity of Yellowstone, and to require a comprehensive assessment of potentially adverse impacts from ash to reactor mechanical and electrical systems to determine whether the historically eruptive volcanoes of the Cascade Range could produce either hazardous airborne or waterborne ash concentrations that require mandatory mitigation protocols.

You did not specify particular nuclear power plants in your request that could potentially be affected by volcanic activity. However, the NRC staff estimated that plant sites that may be affected by a major Yellowstone caldera eruption include Columbia Generating Station (formerly Washington Nuclear Project No. 2, or WNP-2), Wolf Creek Generating Station, Fort Calhoun Station, Cooper Nuclear Station, Diablo Canyon Power Plant, San Onofre Nuclear Generating Station is located approximately 450 miles west of Yellowstone. The other plants are located from about 760 miles to 870 miles south or east of Yellowstone.

The PRB considered your petition requests on May 26, 2009. The PRB's initial recommendation was that your petition requests not be accepted for review pursuant to 10 CFR 2.206. The NRC staff informed you of this determination on June 1, 2009. On June 15, 2009, you indicated that you wanted to discuss this matter with the PRB. On September 3, 2009, you addressed the PRB regarding your petition. The PRB's final recommendation is that your requests not be accepted for review pursuant to 10 CFR 2.206, as explained below.

Your requests are not accepted for review pursuant to 10 CFR 2.206 because the potential hazards of volcanic activity to U.S. operating reactors have 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," and added 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 safety analysis report for the operating license 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," May 1983; ADAMS Accession No. ML091310458, non-publicly available), the NRC staff concurred with the licensee's assessment. Of reactors formerly licensed to operate, the potential volcanic hazards to Trojan Nuclear Plant were addressed in section 2.5.6, "Volcanology," of the safety analysis report dated July 20, 1982 (ADAMS Accession No. 8207270456). Trojan was permanently shutdown in January 1993 and is decommissioned.

The NRC staff re-visited the issue of the potential hazards of volcanic activity to operating reactors 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). In GL 88-20, 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," June 1991 (ADAMS Accession No. ML063550238). GL 88-20, Supplement 4, section 3, "Identification of External Hazards," states, in part, 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, in part, 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," February 1989 (ADAMS Accession No. ML063470272, non-publicly available), specifically addresses volcanic activity in Section 2.2.8, "Volcanic Activity." It states, in part, that

A volcano is considered active if there is some record of its having erupted within historic time. A volcano that has not erupted within historic time and is believed to be incapable of further activity is regarded as extinct.

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 plantspecific 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 ash fall is the only hazard from future eruptions of active volcances that would affect the plant. 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.

Therefore, the potential hazards from active volcanoes to U.S. operating reactors have 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.

If you believe that NRC regulations regarding your issue are deficient, a different process that may satisfy you is the rulemaking process, which is described on the NRC public website at - <u>http://www.nrc.gov/about-nrc/regulatory/rulemaking/public-involvement.html</u>.

You may request the NRC documents referenced above under the Freedom of Information Act (FOIA). Instructions on how to file a FOIA request with the NRC are at http://www.nrc.gov/reading-rm/foia/foia-privacy.html.

The PRB noted that the only new issue raised in your petition is the potential for the imminent eruption of the Yellowstone caldera. The NRC staff therefore considered if the information provided in your petition indicated that the likelihood of a major eruption of the Yellowstone caldera was comparable to the likelihood of an eruption of an active Cascade volcano. However, the latest Yellowstone Volcano Observatory (YVO) monthly update for September 2009 reports a volcano alert level of normal and an aviation color code of green, which are unchanged since at least 2006. The YVO is a partnership of the U.S. Geological Survey (USGS), Yellowstone National Park, and the University of Utah to strengthen the long-term monitoring of volcanic and earthquake unrest in the Yellowstone National Park region. The Yellowstone National Park website (<u>http://www.nps.gov/yell/naturescience/volcanoga.htm</u>) 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 <u>http://volcanoes.usgs.gov/yvo/publications/2009/09swarm.php</u>), 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.

The PRB concluded that you have provided no new evidence of an imminent eruption of the Yellowstone caldera beyond that already considered by the YVO. Therefore, there are insufficient facts at this time to warrant further inquiry by the NRC staff into the matter.

Since the potential hazards of volcanic activity to U.S. operating reactors have 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, your petition under 10 CFR 2.206 is rejected.

During your telephone calls with members of the PRB on March 12 and June 1, 2009, you alleged misconduct by the NRC staff. Your concerns have been referred to the NRC Office of the Inspector General (OIG), which is charged with investigating misconduct by NRC employees. You may forward your concerns directly to the OIG through the NRC public website - <u>http://www.nrc.gov/insp-gen/oighotline.html</u> - or the OIG Hotline (1-800-233-3497) at anytime.

Thank you for your interest in these matters.

Sincerely,

Homas / Blount

Thomas B. Blount, Deputy Director Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

Docket Nos. 50-397, 50-482, 50-285, 50-298, 50-275, 50-323, 50-361, 50-362, 50-528, 50-529, and 50-530

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/RA/

Thomas B. Blount, Deputy Director Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

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