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U.S. Nuclear Regulatory Commission
ATTN: Ms. Deborah A. DeMarco
Office of Nuclear Material Safety and Safeguards
Two White Flint North
Mail Stop 8 A23
Washington, DC 20555

Subject: Submittal of Abstract: Quantifying Hazards from Basaltic Tephra-Fall Eruptions (AI 1402.461.060)

Dear Ms. DeMarco:

Enclosed is an abstract for presentation at the February 2001 Cities on Volcanoes meeting, which is an international meeting devoted to evaluating volcanic hazards in populated areas. This abstract is based on work conducted as part of the Igneous Activity KTI project and demonstrates how modeling approaches used in the NRC total system performance assessment can be used to assess volcanic hazards in other areas. Presenting the results of these investigations at an international scientific conference directly supports several NRC goals. Recent investigations on airborne particle concentrations will be presented to the scientific community for the first time, providing an opportunity for meaningful peer review of these data. This presentation also will demonstrate that the modeling approach used by the NRC for licensing decisions is based on realistic models and data, which have been reviewed and discussed by international experts in volcanology. Finally, this presentation can support public confidence that the NRC independently develops a wide range of techniques to evaluate safety issues. Following programmatic acceptance by the NRC, this abstract will be submitted to the organizing committee for presentation at the February meeting in Auckland, New Zealand. If you have any questions please contact Dr. Brittain Hill at (210) 522-6087 or me at (210) 522-5252.

Sincerely,

Budhi Sagar
Technical Director

BS/re
Enclosure
cc: B. Meehan, J. Greeves, J. Holonich, S. Wastler, D. Brooks, T. Essig, W. Reamer, J. Linehan, E. Whitt, P. Justus, J. Trapp, W. Patrick, CNWRA Directors, CNWRA Element Managers, T. Nagy (SwRI Contracts), B. Hill, C. Connor, J. Weldy, N. Franklin

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Quantifying hazards from basaltic tephra-fall eruptions

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Basaltic cinder cone fields located in populated areas (e.g., Auckland, Mexico City) can adversely impact public health and safety by depositing centimeters or more of basaltic tephra. Some critical facilities such as nuclear power plants or waste repositories are located where future eruptions may directly disrupt facility operations. Few tephra deposits are preserved at most cinder cones older than 1,000 yr, making hazards difficult to discern. Hazards from future eruptions can be evaluated quantitatively, however, using models that sample a range of eruption parameters stochastically (e.g., Hill et al., 1998, *Geo. Soc. Am. Bull.*). For example, Quaternary volcanoes near Yucca Mountain, Nevada, likely produced eruption columns 2–6 km high with tephra volumes of $4x10^6$–$5x10^7$ m^3, similar to ranges observed at many historically active cinder cones. Using a stratified wind-field and average particle diameters of 1 mm, future tephra-fall deposits have 50th & 95th percentile thicknesses of 25 & 175 cm at 5 km; 15 & 50 cm at 10 km; and 4 & 30 cm at 20 km. Tephra particles <100 μm in diameter can be resuspended and cause abrasion, electrical conduction, and filtration problems in facilities. Very fine ash also can cause adverse health effects. Basaltic tephra falls about 5 km from the vent generally contain <5% particles <100 μm, which increases to around 30% at 20 km. Airborne particle concentrations were measured 1.5 m above basaltic tephra deposits about 5 km from Cerro Negro, Nicaragua, 4 yr after the 1995 eruption. Concentrations above undisturbed deposits were $\approx 10^{-4}$ g/m^3 in 4±2 m/s winds, which increased to $\approx 10^{-3}$ g/m^3 while walking on the deposits. Driving over deposits produced airborne particle concentrations of $\approx 10^{-2}$ g/m^3. About 60% of the airborne particles were 10–100 μm, however, $\leq$10% are $\leq$4 μm in diameter and thus can affect deep respiration processes.

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