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Volcanic Hazards Studies Tailored to Future Populations and Facilities: Yucca Mountain, Nevada, USA

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The evaluation of impacts of potential volcanic eruptions on populations and facilities far in the future may involve detailed volcanological studies that differ from traditional hazards analyses. The proximity of Quaternary volcanoes to a proposed repository for disposal of the USA's high-level radioactive waste at Yucca Mountain, Nevada, has required in-depth study of probability and consequences of basaltic igneous activity. Because of the underground nature of the repository, evaluation of the potential effects of dike intrusion and interaction with the waste packages stored in underground tunnels (drifts) as well as effects of eruption and ash dispersal have been important. These studies include analyses of dike propagation, dike-drift intersection, flow of magma into drifts, heat and volcanic gas migration, atmospheric dispersal of tephra, and redistribution of waste-contaminated tephra by surficial processes. Unlike traditional volcanic hazards studies that focus on impacts on housing, transportation, communications, etc. (to name a small subset), the igneous consequences studies at Yucca Mountain have focused on evaluation of igneous impacts on nuclear waste packages and implications for enhanced radioactive dose on a hypothetical future (≤ 10000 yrs) local population. Potential exposure pathways include groundwater (affected by in-situ degradation of waste packages by igneous heat and corrosion) and inhalation, ingestion, and external exposure due to deposition and redistribution of waste-contaminated tephra. This presentation highlights aspects of these models and analyses that have been tailored to address potential igneous consequences for a repository at Yucca Mountain, Nevada.

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