REVIEW OF ANALYSIS AND MODEL REPORTS (AMRs)

- Characterize Eruptive Processes at Yucca Mountain -- ANL-MGR-GS-000002

OVERVIEW

Included in the packet are each of the original AMRs, a copy of each with my brief annotations and a summary sheet for each that reveals the purpose and principal conclusions, as excerpted from the original, as well as my comments.

The AMRs were reviewed during October 2000. Each of the AMRs relies principally upon geologic data, much of which is derived from field studies. In view of the lack of 1) extensive, three-dimensional rock exposures and 2) full geochemical, chronologic, petrologic and other information necessary to completely characterize the geologic evolution of this region, the analyses and models are heavily dependent upon well constrained interpretations. In general, thorough and fully considered analyses are contained in this group of AMRs. My comments generally reflect a difference of opinion leading to an alternative interpretation rather than an error or omission in the AMR.

CHARACTERIZE ERUPTIVE PROCESSES AT YUCCA MOUNTAIN
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INTRODUCTION

This AMR presents information about natural volcanic systems and the parameters that may be used to model their behavior. The report begins with (1) considerations of the geometry of volcanic feeder systems, which are of primary importance in predicting how much of a potential repository would be affected by an eruption. This discussion is followed by one of (2) the physical and chemical properties of the magmas, which influence both eruptive styles and mechanisms for interaction with radioactive waste packages. (3) Eruptive processes including the ascent velocity of magma at depth, the onset of bubble nucleation and growth in the rising magmas, magma fragmentation, and velocity of the resulting gas-particle mixture are discussed. (4) The duration of eruptions, their power output, and mass discharge rates are also described as is (5) the interaction between magma and waste packages. Finally, (6) the bulk grain size produced by relevant explosive eruptions and grain shapes are characterized. Information and parameters described herein are used in two other AMRs (from 1. Purpose, p. 11 & 12)

COMMENT

This AMR utilizes data and parameters (Tables 1a and 1b) derived principally from appropriate analogs, described in published literature. The analysis is based upon the assumption that a plausible future eruption during the postclosure performance would be of the same character as Quaternary basaltic eruptions in the Yucca Mountain region. Therefore, the eruptive style and magmatic composition recorded at Lathrop Wells volcano are emphasized. Studies of other analogous volcanoes provide information useful to characterize the event that could affect the repository. If direct data on some aspect of the plumbing of the Lathrop Wells volcano is absent, theoretical estimates are utilized. A thorough consideration of possible and probable eruption processes at Yucca Mountain.