Comments on Consequences of Igneous Activity

Steve Frishman
Technical Policy Coordinator
Nevada Agency for Nuclear Projects
Nuclear Waste Project Office
Carson City, Nevada

Nuclear Waste Technical Review Board
Las Vegas, Nevada

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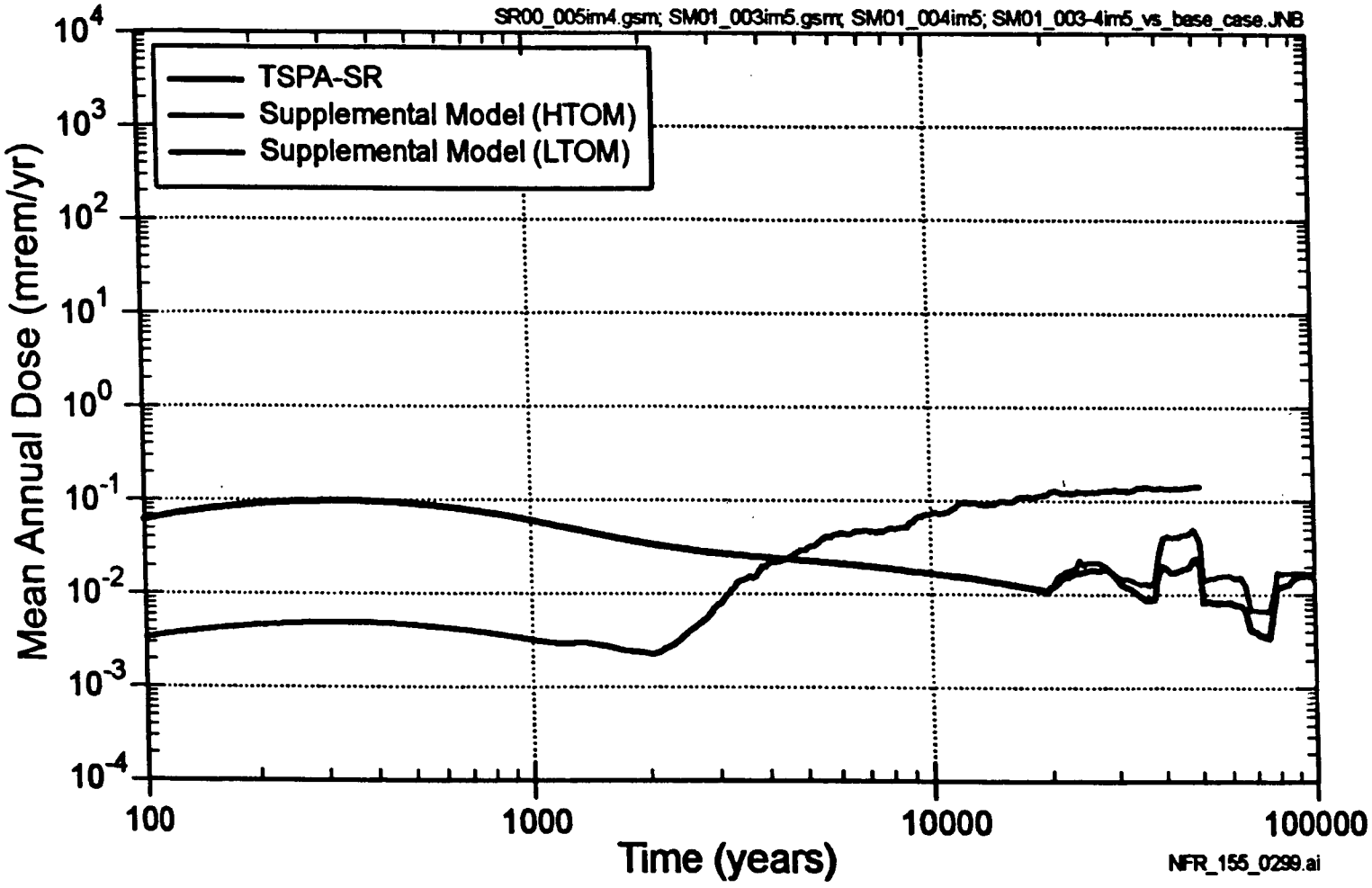


Figure 3-6. Projected Annual Doses for the Igneous Activity Disruptive Scenario
Probability-weighted mean annual dose histories are shown for the TSPA-SR model for the igneous activity scenario documented in the *Total System Performance Assessment for the Site Recommendation* (CRWMS M&O 2000c). These results are presented along with supplemental TSPA model results for both higher-temperature and lower-temperature operating modes; these results are documented in Volume 2 of *FY01 Supplemental Science and Performance Analyses* (BSC 2001c). HTOM = higher-temperature operating mode; LTOM = lower-temperature operating mode. Source: BSC 2001c, Figure 4.3-1.

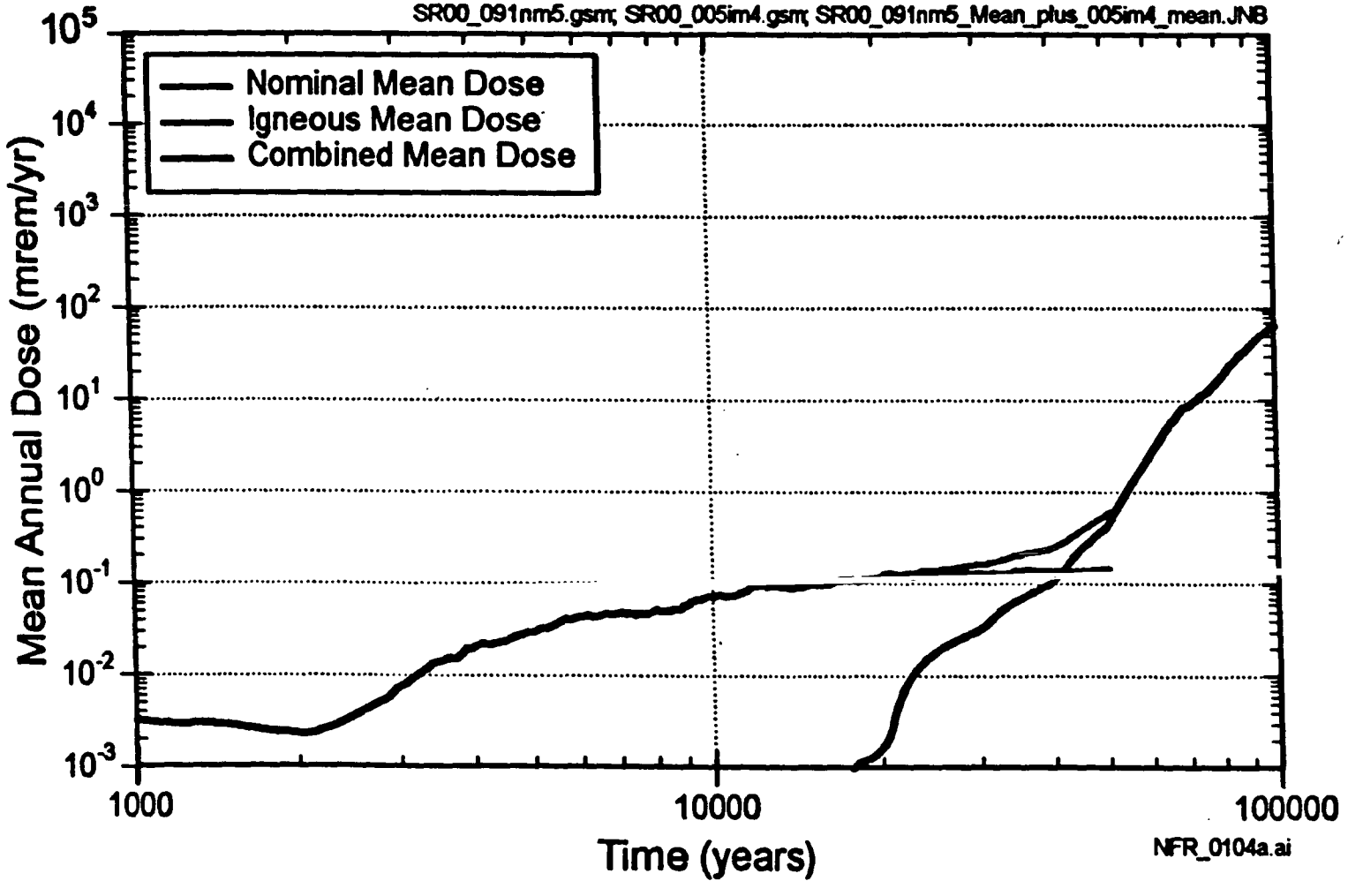


Figure 3-7. TSPA-SR Model Mean Annual Dose for Combined Nominal and Disruptive Scenario Results Used to Evaluate Compliance with Individual Protection Standards

Source: CRWMS M&O 2000c, Figure 4.3-3.

"Under the proposed 10 CFR Part 63 rule, the expected annual dose is used to determine compliance with the proposed performance objectives. Expected annual dose is the dose weighted by probability of event occurrence (i.e. risk), with the maximum annual risk during the post-closure period used to determine compliance."

U.S. Nuclear Regulatory Commission. Issue Resolution Status Report, Key Technical Issue: Igneous Activity, Revision 2, July 1999.

"The IRT suggests that even if probability-weighted dose is the main output required by the regulator, it would be desirable to present disaggregated information (doses and probabilities). This information would more clearly illustrate the nature of the potential impact, so as to better inform decision-makers and other interested audiences."

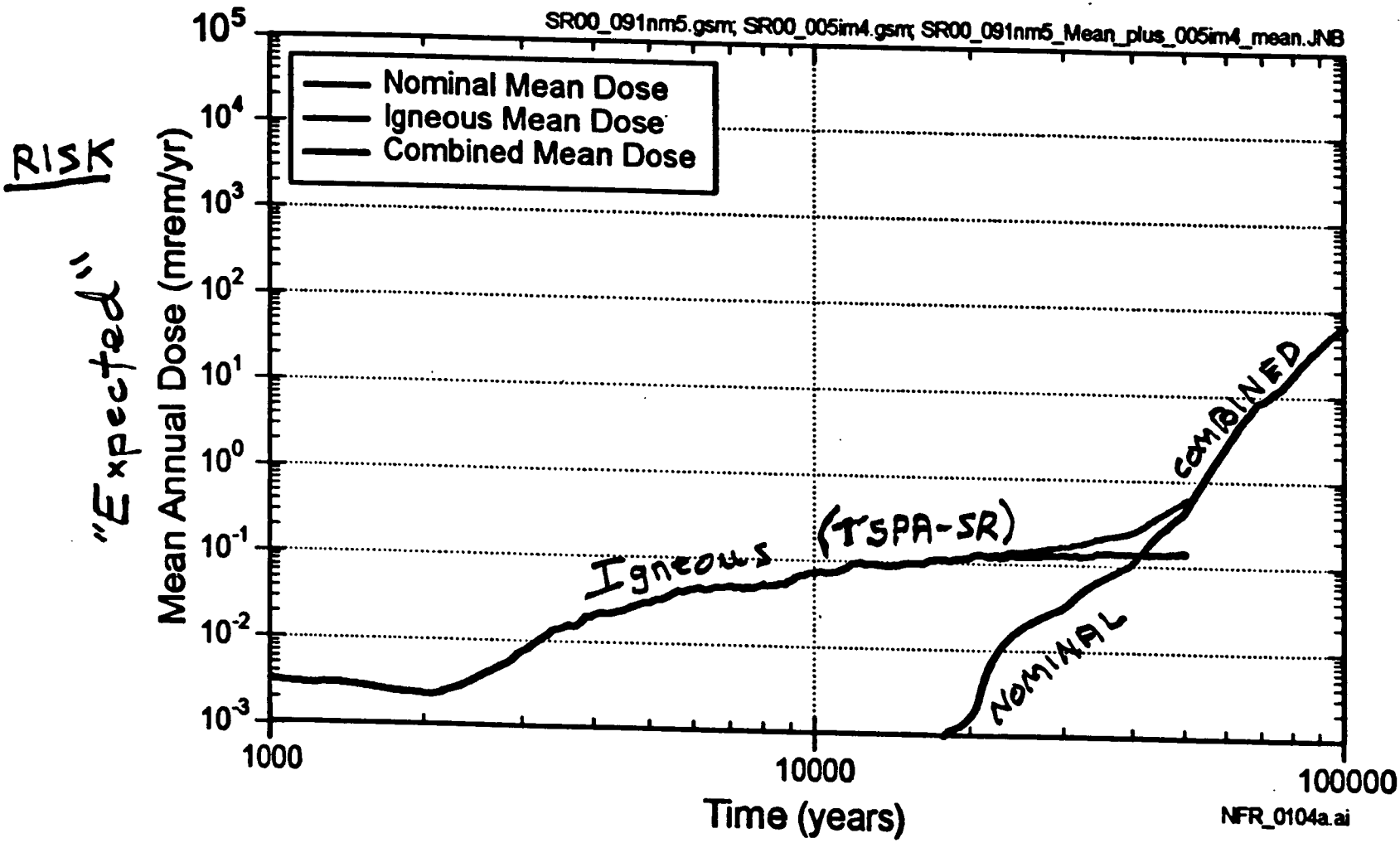
An International Peer Review of the Biosphere Modelling Programme of the US Department of Energy's Yucca Mountain Site Characterization Project. IAEA International Review Team, IAEA, Vienna, 2001.

"In addition, presenting only the probability-weighted igneous scenario is confusing. It would be much clearer if the conditional results of the igneous scenario were presented and discussed both with and without probability weighting."

Letter: Jared Cohon, Chairman, NWTRB, to Ivan Itkin, Director, OCRWM, September 20, 2000.

“ In the case of volcanic disruption of a Yucca Mountain nuclear waste repository, application of the risk-informed, performance-based approach, through manipulation of the meaning of dose and risk, results in the appearance that regulatory compliance is achieved, when, in fact, if the reference event were to take place, the compliance limit would be exceeded by a few orders of magnitude.”

Frishman, S., Hidden Risk Decisions in Waste Repository Regulation, *Proceedings*, VALDOR 2001, Stockholm, June 2001.



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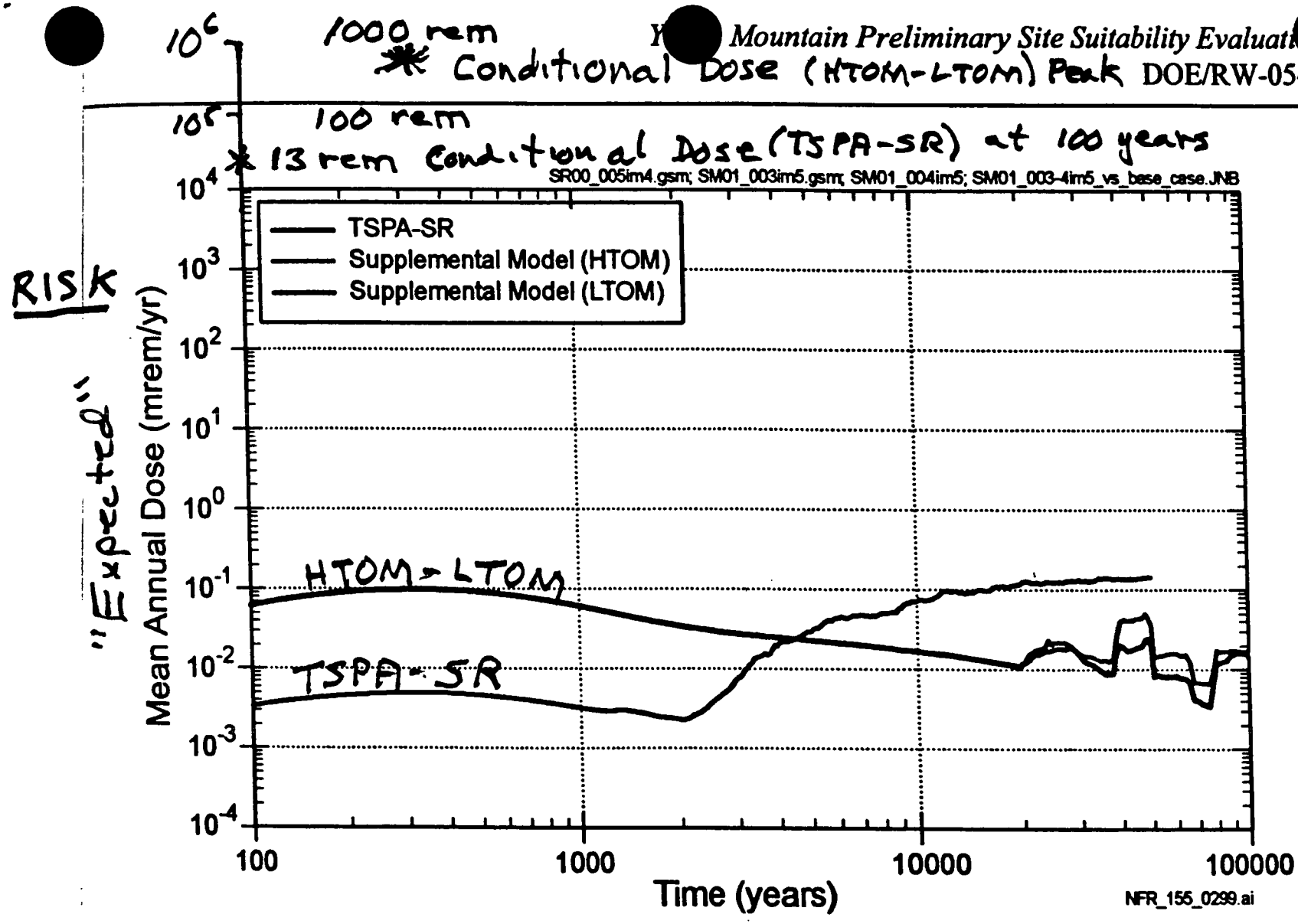

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"Peak conditional annual doses associated with volcanic eruption are significantly higher than those associated with igneous intrusion. This is a reversal of the relative importance of the two pathways in the probability-weighted igneous annual dose results...Probability-weighting therefore has the effect of emphasizing the more likely groundwater doses from a prior intrusive event, while de-emphasizing the eruptive doses that require the less likely occurrence of an eruption in a short time interval."

FY01 Supplemental Science and Performance Analyses, Vol. 2: Section 3 - TSPA Sensitivity Analyses: Evaluations of Uncertainty and New Information: Section 3.3.1.2.4, Conditional Igneous Events.

"The approach recommended by the NRC's report [1] rests on two pillars: complete openness with the public, and external scientific peer review."

[1] *Disposition of High-Level Waste and Spent Nuclear Fuel: The Continuing Societal and Technical Challenges, National Research Council, 2001.*

Decision Time at Yucca Mountain, Nature, Vol. 412, No. 6850, August 30, 2001, page 841.