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Honorable B. John Garrick  
Chairman  
Nuclear Waste Technical Review Board  
2300 Clarendon Boulevard  
Suite 1300  
Arlington, VA 22201

Dear Dr. Garrick:

I have communicated in writing with the Board several times in the past nine years; first as a Nevada Deputy Attorney General and in recent years as a private attorney associated with a group of concerned scientists. I have urged the Board to take an active role in the review of what we consider the most serious safety issue in the development of a proposed repository at Yucca Mountain in southern Nevada. The issue, still unresolved, involves the potential for episodic upwelling of plumes of hydrothermal water through faults and fractures beneath Yucca Mountain during the lifetime of the proposed repository. In 1998 the Board performed a limited review and issued a report on July 28, 1998 which accepted conclusions from a previous National Academy of Science/National Research Council study but recommended that the DOE and the State of Nevada resolve their differences with respect to the issue. I have compiled a history of the upwelling issue with technical input, review and comment by my scientist friends. I have attached a copy as a resource to the extent it may be used to refresh the institutional memory of the prolonged and checkered life of this issue.


The announced purpose of the Board's Winter meeting is to "review DOE efforts to develop a fundamental understanding of phenomena that would affect radionuclide releases from a proposed repository for permanent disposal of the waste at Yucca Mountain in Nevada." Our interest is to draw the Board's attention to recent technical developments that may demonstrate DOE's misunderstanding of a fundamental aspect of the Yucca Mountain paleo-hydrogeology. This pertains to the issue of whether or not significant hydrothermal activity suggested by the upwelling hypothesis affected the Yucca Mountain vadose zone in the geologically recent past. Deposition of secondary minerals at Yucca Mountain from waters with "hydrothermal" temperatures (up to 80-90°C) has been established unequivocally by a thorough verification study (UNLV Thermochronology project), which was arranged at the recommendation of the NWTRB. The DOE developed a safety case following the UNLV project based on the inference that the elevated temperatures were accounted for by a conceptual model proposed by

USGS researchers, which interpreted such temperatures as being caused by the conductive heating of the Yucca Mountain vadose zone by a magma body emplaced some 7 km to the north of Yucca Mountain. The DOE accepted the USGS "hot mountain" model as a viable explanation for the elevated temperatures at Yucca Mountain and used it as the key argument for excluding the FEP "Hydrothermal Activity" from consideration in the TSPA analysis.

In 2001, the USGS researchers attempted to verify their conceptual model by means of thermal modeling. They reported that verification was successful in that they were able to reproduce in their numeric simulations, the temperatures and "cooling times" determined from the Yucca Mountain minerals (see, e.g., transcript of presentation of Joseph Whelan before the Board on May 9, 2001). Only recently, technical information on the USGS thermal modeling has become available in a report by the DOE contractor, Bechtel SAIC (2004). Analysis of this information shows that, contrary to the USGS claims, the thermal modeling failed to reproduce the empirical temperature and age data by a wide margin. Dr. Yuri Dublyansky's technical analysis of the thermal modeling performed by USGS researchers is attached. The failure of the thermal modeling clearly demonstrates that the USGS conceptual model explaining past elevated temperatures at Yucca Mountain is invalid. Presently, however, this is the only model explaining these temperatures as "benign" for repository safety without the involvement of upwelling thermal waters. In view of the absence of technical information on the USGS modeling until recently, the DOE decision to exclude the FEP "hydrothermal activity" from consideration in the TSPA for the anticipated license application appears to be ill-founded and needs to be revisited and set aside.

We believe that the subject, which is the focus of Dr. Dublyansky's analysis, is within the purview of the Board's charter and within the scope of the Boards' Winter meeting. We urge the NWTRB to give serious consideration to the issues raised in this letter and the attached documents and request that this letter as well as the documents transmitted with it, be included as a part of the record of the meeting of the NWTRB scheduled for February 1, 2006 in Las Vegas, Nevada.

If you have any questions or if I may be of any assistance with respect to this matter please do not hesitate to contact me at the address, e-mail address or telephone number on the above letterhead.

  
Harry W. Swainston

cc with attachments:  
Karen Severson, NWTRB External Affairs