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MEMORANDUM FOR: Martha W. Pendleton, Geologist
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Division of Waste Management, NMSS

FROM: Ernst G. Zurflueh, Geophysicist
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SUBJECT: REVIEW OF USGS OPEN-FILE REPORT 82-973 ON NTS THERMAL DATA

The report presents an analysis of heat flow measurements in sixty wells at or near the Nevada Test Site. The regional heat flow picture shows a high in the general area of northern Nevada and southern Idaho with a local low (Eureka low) in southern Nevada.

Conclusions of the report are that vertical water flow influences the measurements, producing lower heat flow values, and that the flow extends to depths of 2-2.5 km. I have the following comments on the report:

1. Only one of the boreholes was grouted to prevent movement of water in the annulus. It is stated (p. 11) that it is usually possible to distinguish between water movement in the borehole and water movement in the formation. However, the summary admits that uncertainties remain. These uncertainties have a bearing on some of the conclusions reached.
2. Vertical water movement in the formation is assumed, although 2- or 3-dimensional flow is also postulated. Lateral movement may play a greater role than is assumed. For instance, temperature reversals that occur in several of the wells indicate lateral circulation.
3. In fig. 10 it appears that boreholes G1 and H1 below about 1200m would give reliable regional heat flow values at Yucca Mountain. Above that depth, the values are distorted by water movement. The value of about 52 mW/m² obtained from these wells is relatively low and conforms with the Eureka low. However, in my opinion, this low value is not conditioned by vertical water flow but indicates that there is no deep seated volcanic activity of Yucca Mountain.
4. A nearby well, Ue25a3 in fig. 3, shows a very high value of 130mW/m² which would indicate some local magmatic body. However, the well is only 600m deep and may be influenced by water circulation.

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5. The reasoning behind the formulas employed (p. 20 ff.), in my opinion cannot be used to determine the depth below which water circulation is unimportant. From the graphs shown it is possible that this depth is near 1200m at Yucca Mountain and not between 2000 and 2500 m as derived from the formulas.

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