UNITED STATES
NUCLEAR REGULATORY COMMISSION
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MAY 10 1988

MEMORANDUM FOR: Ronald L. Ballard, Chief
Technical Review Branch
Division of High Level Waste Management, NMSS

FROM: James R. Wolf, Attorney
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Office of the General Counsel

SUBJECT: DRAFT TECHNICAL POSITION ON GROUNDWATER TRAVEL TIME

This responds to your April 25, 1988 memorandum inviting comments on the draft technical position on groundwater travel time prepared by the Hydrology Section.

The draft needs to be reconsidered to ensure that adequate guidance is provided on three issues: (1) what is a "path?"; (2) which path is the "fastest?"; and (3) what is the groundwater travel time along the path?

What is a Path?

The draft technical position defines "paths" as "macroscopic groundwater flow paths discernable [sic] within the hydrologic system." In so doing, it rejects a possible alternative position which would relate the term "paths" to the many "non-uniform pathways ... reflecting spatially non-uniform potentiometric and transmissivity fields and possible short-circuit pathways through conductive fractures" cited in Comment No. 435 on the proposed technical criteria (NUREG-0804, p. 334). Had the latter view been intended, it would have been appropriate to express it more clearly in the rule, as the commenter suggested. ("If NRC intends to apply its 1,000 year criterion to that filament of water which arrives first at the environment after contacting the waste, it should so state.") On the contrary, it seems that the Commission had in mind the macroscopic path referred to in the draft technical position, for the only response to the comment was a reference to the rationale document, which contemplated that flow determinations (in fractured media) could be made using "an effective porosity and an effective permeability ... based on average fracture size and length and the porosity and permeability of the unfractured rock." (NUREG-0804, p. 482). If I understand the passage correctly, it signifies that calculations of groundwater flow time would be made on the basis of macroscopic units and presumably the fracture flow and matrix flow within such units would not be treated as separate paths. This matter was raised in public comments on the 1986 draft GTP, and the staff's position needs to be spelled out.

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Identifying the Fastest Path

The technical position does not explain how the fastest path is to be identified. Presumably -- though this is not made explicit -- there would be a travel time distribution function for each pathway, one which would account for the variability in transport as well as the uncertainties of data and conceptualization. The curves could, but need not, display normal distributions. Moreover, the variance of the postulated travel times may be much greater for some pathways than for others. The 1986 draft GTP explained how a comparison could be made under these circumstances and provided a rationale for selecting a particular percentile as the point for comparison. If the staff now proposes a different approach, it should explain just as clearly the methodology that is to be employed and it should support that methodology by reference to the Commission's stated objectives. It would be highly desirable for the approach to be fully consistent with the discussion of groundwater travel time that appears in the rationale document that accompanied the issuance of technical criteria in 10 CFR Part 60. (NUREG-0804, pp. 447ff.)

The staff's reasons for departing from the 1986 proposal should be articulated; and, in this regard, there needs to be something more convincing than the desire to avoid overprescriptivenes. For unless the technical position is prescriptive, the issue cannot be resolved. (Prescriptiveness may be undesirable when it has the effect of limiting an applicant's choice of methods for satisfying a regulatory requirement; but prescriptiveness is the goal when it comes to explaining what the staff regards as the meaning of the regulation.)

Calculating the Travel Time

The technical position needs to explain how the travel time for the fastest pathway is to be calculated. In particular, the staff should state how it expects the treatment of uncertainty to affect the calculation of groundwater travel time. One possibility is for the uncertainties to be taken into account in developing the distribution functions referred to above; the travel time, for purposes of the regulation, would then have the same value as was used in determining which pathway was the fastest. If that is what is intended, it should be so stated explicitly. If something else is meant, it too would require explication.

I believe there may be merit in retaining the 1986 technical position as the basic working document. It would need to be revised, of course, in light of the public comments -- but the general approach seems to make a good deal

of sense. If you decide to go this route, you should consider reissuance not as a final GTP, but rather as a proposed rule (since disputes regarding the meaning of the existing requirement cannot be put to rest with a GTP alone).

/s/

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