

KK/2/1191 QUAT MEMO

FEB 13 1991

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MEMORANDUM FOR: All HLWM Section Leaders

James R. Wolf
Office of the General Counsel

John Randall
Office of Nuclear Regulatory Research

FROM: Kenneth Kalman
Project Manager
Special Projects Section
Division of High-Level Waste Management

SUBJECT: REQUEST FOR REVIEW OF DRAFT STAFF POSITION; "MEANING AND USE OF THE PHRASE, 'QUATERNARY PERIOD' WITHIN 10 CFR PART 60"

Enclosed for your review and comment is a copy of a draft Staff Position (SP) entitled, "Meaning and Use of the Phrase, 'Quaternary Period' Within 10 CFR Part 60". Although work on this SP is not budgeted for this fiscal year, there have been some requests from DOE pertaining to the meaning of the subject phrase. I therefore request that you review this document and provide comments to me as time permits.

If you determine that this SP is of no consequence to the work performed by your section and have no comments, please write "no comment" on your copy of this SP and return it to me by Friday, March 15, 1991. Any comments that you have should also be provided to me, in writing, by that same date.

Work performed on this review should be coded to L60177, 411142, "Prepare Geologic Setting Staff Position." Please call me on extension 20428 if you have any questions concerning the review of this SP.

ORIGINAL SIGNED BY

Kenneth Kalman
Project Manager
Special Projects Section
Division of High-Level Waste Management

Enclosure: As stated

cc: JBunting, HLEN
RBallard, HLGP
MSilberberg, RES

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STAFF POSITION 60 - XXXX

MEANING AND USE OF THE PHRASE "QUATERNARY PERIOD" WITHIN 10 CFR PART 60

Division of High-Level Waste Management
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission

FULL TEXT ASCII SCAN

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SUBJECT: THE MEANING AND USE OF THE PHRASE "QUATERNARY PERIOD" WITHIN 10 CFR PART 60

THE QUESTION: Do the references to the Quaternary Period (a geologic time interval) within 10 CFR Part 60 require that DOE concentrate its investigations and analyses on a specified time interval within the geologic past?

RESPONSE: No. The references to the Quaternary Period within 10 CFR Part 60 were intended to imply a concept related to the sufficiency of the geologic record to be used for extrapolation rather than a specified time interval. While the staff assumes for regulatory purposes that the onset of the Quaternary Period began approximately 2 million years before the present (MYBP) the staff does not require that DOE use this date as long as the date used is specified and justified. The NRC will consider the date used in the context of the ability of the program to gain sufficient and necessary information such that regulatory decisions can be made.

¹DISCUSSION: In 10 CFR Part 60 (see Ref. 1), the term Quaternary Period is used in two sections; in 60.2 in the definition of anticipated processes and events, and in 60.122, Siting Criteria. In the definition of anticipated processes and events the rule states:

"To the extent reasonable in the light of the geologic record, it shall be assumed that those processes operating in the geologic setting during the Quaternary Period (emphasis added) continue to operate....."

The phrase during the Quaternary is used in all references to the Quaternary Period within 60.122, except 60.122(c)(15), where the phrase since the start of the Quaternary Period is used. The staff considers this an equivalent usage.²

The staff considers that the reference to the Quaternary Period within the rule is intended to require that DOE demonstrate an understanding of the

¹During the promulgation of the final rule the NRC staff had stated that they were assuming that the start of the Quaternary Period was approximately 2 MYBP. (see Ref. 5, p 373) It was recognized at that time that various dates could be used, and with the various scientific studies which have been undertaken since that time various other dates and rationals for the dates have been proposed. The staff was asked to revisit this decision to determine if they still considered 2 MYBP as correct.

²In the staff response to Comment No. 525, (see Ref 5, p. 373) the staff stated "However, in recognition of the lack of precision concerning the start of the Quaternary Period, staff has used the language 'during the Quaternary Period' rather than 'since the start of the Quaternary Period' in revised 60.122." The failure to change the wording in 60.122(c)(15) is considered to be an unintended error of omission.

FULL TEXT

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processes and events which have occurred within the recent geologic past³ within the geologic setting, and to use this understanding to make reasonable and conservative projections about the potential processes and events which could affect a geologic repository.

The staff considers that the recent geologic past is a better indicator of possible future activity than the distant geologic past, and that in performing an evaluation of potential future activity and the effect such activity can have on a repository, a sufficient data base must be established to make the various projections. It has been documented in many geologic studies that the Quaternary record is one of the best indicators of potential future activity, especially for tectonic processes and events. For example, Allen (see Ref. 2, p. 1046) states ... the distribution of faults with Quaternary displacements seems to be a valid general guide to modern seismicity...and understanding the Quaternary Period is much more important than understanding earlier periods.... Hays (see Ref. 3, p. 10) indicates that ...stratigraphic offset of Quaternary deposits by faulting is indicative of an active fault... The staff is in agreement with the general philosophy expressed by these authors, and has interpreted the wording of 10 CFR Part 60 as intending that the applicant demonstrate a knowledge of the processes and events which have occurred within the geologic setting during the recent geologic past and has used the geologic term Quaternary Period to express this thought. This interpretation is consistent with the rulemaking record.

In discussion of the then proposed rule, the NRC had specified that the geologic setting was to have exhibited stability since the start of the Quaternary Period. This requirement was removed from the final rule, and in making this change the staff stated, "Thus, its interest in specifying that the geologic setting shall have exhibited "stability" since the start of the Quaternary Period was to assure only that processes be such as to enable the recent history to be interpreted and to permit near-term geologic changes to be projected over the relevant time period with relatively high confidence." (see Ref. 4, p. 28201)

The staff also has considered the wording and intent of such portions of the rule as 60.122(a)(2). This section of the rule requires adequacy and conservatism in investigations and analysis. This requirement, in turn, would necessitate an interpretation as to the onset of the Quaternary Period, if a difference in assumed date of onset of the Quaternary Period could make a difference (e.g., in calculating fault slip rates). In addition, the different potential dates for the start of the Quaternary were recognized during promulgation of the final rule, and at that time the staff stated that for regulatory purposes 2 MYBP was appropriate. (see Ref. 5, p. 373) Therefore, while many various references to the onset of the Quaternary can be found which generally provide a range from about 1.6 to 2 million years before the present, the staff has considered, and still

³The concept "recent geologic past" refers to an interval within the latest portion of the geologic time-scale that may extend beyond the Quaternary period.

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considers, that 2 MYBP better reflects the intent of the rule, as well as providing a stable, although arbitrary, baseline date for discussion.

The staff recognizes that there may be cases in which examination of only the Quaternary record may not be sufficient in providing the analysis required to demonstrate compliance with the performance objectives. In the statement of considerations (see Ref. 4, p. 28200) this was recognized in such places as the discussion of unanticipated processes and events. This discussion indicates that unanticipated processes and events must consider not only processes and events which occurred within the Quaternary and are not likely to occur within the relevant time frame, but also processes and events which were not evidenced during the Quaternary Period.

The staff therefore considers that the exact date of the onset of the Quaternary Period is immaterial. The staff will require that DOE demonstrate an understanding of the processes and events which have occurred within the recent geologic past within the geologic setting, and to use this understanding to make reasonable and conservative projections about the potential processes and events which could affect a geologic repository. In making a judgement as to sufficiency, the staff will consider such portions of the rule as 60.122(a)(2) to assure that they have not been violated. In addition, unless otherwise stated, the staff accepts 2 MYBP as the onset of the Quaternary Period. The staff does not require DOE to use this date, but will require a clear statement of, and justification for, the date used.

REFERENCES

1. U.S. Code of Federal Regulations, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," Chapter 10, Part 60, January 1990
2. Allen, C.R., "Geologic Criteria for Evaluating Seismicity," Geologic Society of America Bulletin, Vol. 86, pp. 1041-1057 (1975)
3. Hayes, W.W., "Procedures for Estimating Earthquake Ground Motion," U.S. Geologic Survey Professional Paper 1114, 77 pp. (1980)
4. U. S. Nuclear Regulatory Commission, "Disposal of High-Level Radioactive Wastes in Geologic Repositories, Technical Criteria," Federal Register, Vol. 48, No. 120, June 21, 1983, pp. 28194-28229
5. U.S. Nuclear Regulatory Commission, "Staff Analysis of Public Comments on the Proposed Rule 10 CFR 60, 'Disposal of High-Level Radioactive Wastes in Geologic Repositories,'" NUREG-0804, December 1983
6. U.S. Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development area, Nevada," December 1988

FULL TEXT AVAILABLE