



UNITED STATES
 NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

January 30, 1995

Mr. Stephen J. Brocoum
 Assistant Manager for Suitability and Licensing
 U.S. Department of Energy - YMPO
 P.O. Box 98606
 101 Convention Center Drive
 Las Vegas, NV 89101

SUBJECT: REQUEST FOR REFERENCES CITED IN THE DEPARTMENT OF ENERGY'S
 FORTHCOMING RESPONSES TO THE NUCLEAR REGULATORY COMMISSION'S
 EROSION TOPICAL REPORT COMMENTS

Dear Mr. Brocoum:

On January 9, 1995, the Department of Energy (DOE) provided to the Nuclear Regulatory Commission a predecisional preliminary draft of its proposed responses to the August 22, 1994, NRC staff comments on the Extreme Erosion Topical Report. Included with DOE's transmittal was a list of references to be cited in DOE's final responses to the NRC staff comments. DOE requested that the staff identify those references that it may need for its evaluation of the responses. In response to DOE's request, the staff has identified those references (Enclosure 1), either not readily available or not yet published, that are felt necessary for its evaluation of the comment responses.

In addition to the above-requested references, there are four others that will also be required for response evaluation. The staff was made aware of the near-term availability (within two months or so) of three of these documents (Enclosure 2) during the January 13, 1995, DOE/NRC teleconference relative to DOE's predecisional preliminary draft responses to NRC's Erosion Topical Report comments. The fourth requested reference, assumed to be presently available, is the technical procedure for dating using the cosmogenic isotope ¹⁰Beryllium. In its predecisional preliminary draft responses to NRC's Erosion Topical Report, Comments 4 and 5, this dating technique has been identified by DOE as on-going work to be completed this summer. The results of the ¹⁰Beryllium dating are expected by DOE to corroborate the results of the varnish cation ratio (VCR) dating technique. The potential for corroboration of the VCR dating is of considerable interest to the staff. In order to acquire additional insight into topics such as ¹⁰Beryllium sampling frequency and sampling locations prior to the submittal of the results of the dating, the staff requests that arrangements be made for a conference call with the Principal Investigator for this dating investigation, Dr. Charles Harrington of Los Alamos National Laboratory, as soon as possible.

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If you have any questions concerning either this letter or its enclosures, please contact Mr. Harold Lefevre of my staff at (301) 415-6678.

Sincerely,

Michael J. Bell, Chief
Engineering and Geosciences Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

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cation contents of varnish.

References

The reference list includes only sources cited in the responses; references cited by the staff in the comments may not have been included.

Bates, R.L. and Jackson, J.A., eds., 1987. "Glossary of geology, third edition" American Geological Institute, Alexandria, Virginia.

* Beaty, C.B., 1990. "Anatomy of a White Mountain Debris-Flow - The Making of an Alluvial Fan," Alluvial Fans: A Field Approach, (eds.) A.H. Rachocki and M. Church, John Wiley & Sons, New York, NY, pp. 69-89. (NNA.921125.0003)

* Buesch, D., in review. "Revised stratigraphic nomenclature and macroscopic identification of lithostratigraphic units of the Paintbrush Group exposed at Yucca Mountain, Nevada," U.S. Geological Survey open-file report 94-469.

Bierman, P.R. and A.R. Gillespie, 1994. "Evidence suggesting that methods of rock-varnish cation-ratio dating are neither comparable nor consistently reliable," Quaternary Research, v. 41, p. 82-90.

Bierman, P.R. and A.R. Gillespie, 1991. "Accuracy of Rock-Varnish Chemical Analyses: Implications for Cation-Ratio Dating", Geology, v. 19, n. 3, p. 196-199. (NNA.910923.0008)

Bierman, P.R., A.R. Gillespie, and S. Kuehner, 1991. "Precision of Rock-Varnish Chemical Analyses and Cation-Ratio Ages", Geology, v. 19, n. 2, p. 135-138. (NNA.921125.0004)

Bull, W.B., 1986. "Climate-Change Induced Sediment-Yield Variations from Arid and Humid Hillslopes--Implications for Episodes of Quaternary Aggradation", Geological Society of America, Abstracts with Programs, v. 18, p. 90. (NNA.930112.0024)

Bull, W.B., 1991. Landscape Change, Vol. 1: Geomorphic Responses to Climactic Change, Oxford University Press, New York, 304 p.

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* Requested by NRC; 3 copies of those references consisting of multi-colored maps or other non-reproducible figures (e.g., photographs); 2 copies of all others

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- * Coe, J., P. Glancy, and J.W. Whitney, in press. "Volumetric analysis of debris eroded off a hillslope near Yucca Mountain, Nevada during a convective rainstorm."

Coe, J.A., J.W. Whitney, P.A. Glancy, 1992. "Photogrammetric Analysis of Modern Hillslope Erosion at Yucca Mountain, Nevada", Geological Society of America, Abstracts with Programs, 1992 Annual Meeting, Cincinnati, OH, October 26-29, 1992, v. 24, n. 7, p. A296. (NNA.921029.0041)

- * Crowe, B., F. Perry, J. Geissman, L. McFadden, S. Wells, M. Murrell, J. Poths, G.A. Valentine, L. Bowker, and K. Finnegan, in press. "Status of volcanism studies for the Yucca Mountain Site Characterization Project," Los Alamos National Laboratory LAMS Report.

Crowe, B., R. Morley, S. Wells, J. Geissman, E. McDonald, L. McFadden, F. Perry, M. Murrell, J. Poths, S. Forman, 1992. "The Lathrop Wells Volcanic Center: Status of Field and Geochronology Studies", High Level Radioactive Waste Management - Proceedings of the Third International Conference, Las Vegas, NV, April 12-16, 1992, p. 1997-2013. (NNA.920831.0001)

- * Dethier, D.P. and W.D. McCoy, 1993. "Aminostratigraphic Relations and Age of Quaternary Deposits, Northern Española Basin, New Mexico," Quaternary Research, v. 39, p. 222-230.

Dethier, D.P., C.D. Harrington, M.J. Aldrich, 1988. "Late Cenozoic Rates of Erosion in the Western Española Basin, New Mexico - Evidence from Geologic Dating of Erosion Surfaces," Geological Society of America Bulletin, v. 100, p. 928-937, June, 1988. (NNA.921125.0007)

DOE (U.S. Department of Energy), 1994. Letter (Barrett, L. to Youngblood, B.J) on the three general concerns with Topical Report YMP-92-41-TPR, identified by the NRC staff. January 26, 1994, 5 pages.

DOE (U.S. Department of Energy), 1993. Letter (Shelor, D. to Holonich, J.J.) on the scope and purpose of topical reports. February 19, 1993, 3 pages. (HQV.930611.0042)

DOE (U.S. Department of Energy), 1993. "Topical Report YMP/92-41-TPR, Evaluation of the potentially adverse condition 'Evidence of extreme erosion during the Quaternary Period' at Yucca Mountain, Nevada," March, 1993. (NNA.930326.0068)

DOE (U.S. Department of Energy), 1992. "Erosion Rates at Yucca Mountain - Technical

PREDECISIONAL PRELIMINARY DRAFT

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* Requested by NRC

PREDECISIONAL PRELIMINARY DRAFT

Assessment Qualification of Data", prepared by TRW Environmental Safety Systems, Inc. for the Yucca Mountain Site Characterization Project Office, Las Vegas, NV, August 31, 1992. (NNA.921007.0095)

DOE (U.S. Department of Energy), 1988. "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada", Office of Civilian Radioactive Waste Management, Washington, D.C., DOE/RW-0199, December 1988. (HQO.881201.0002)

Gerson, R., 1982. "Talus Relicts in Deserts: A Key to Major Climatic Fluctuations", Israel Journal of Earth Sciences, v. 31, p. 123-132. (NNA.930212.0016)

Glancy, P.A., 1994 "Evidence of Prehistoric Flooding and the Potential for Future Flooding at Coyote Wash, Yucca Mountain, Nevada," U.S. Geological Survey Open File Report 92-458. (NNA 940606.0001).

* Harrington, C.D. and J.W. Whitney, in press. "Comment on 'Evidence suggesting that methods of rock-varnish cation ratio dating are neither comparable nor consistently reliable,'" by P.R. Bierman and A.R. Gillespie, Quaternary Research.

Harrington, C.D., D.J. Krier, R. Raymond, Jr., and S.L. Reneau, 1991. "Barium Concentration in Rock Varnish: Implications for Calibrated Rock-Varnish Dating Curves", Scanning Microscopy, v. 5, n. 1, p. 55-62. (NNA.920131.0275)

Harrington, C.D. Dethier, D.P., and Whitney, J.W., 1988. "Comment and Reply on 'Scanning electron microscope method for rock-varnish dating,'" Geology, v. 16, p. 1051-1052. (NNA.900110.0149)

Hawley, J.W., P.W. Birkeland, T.M. Oberlander, 1989. "Peer Review Report on Rock-Varnish Studies Within the Yucca Mountain Project," New Mexico Bureau of Mines and Mineral Resources, Socorro, NM, September 6, 1989. (NNA.921125.0009)

Hillhouse, J.W., 1987. "Late Tertiary and Quaternary Geology of the Tecopa Basin, Southeastern California", U.S. Geological Survey Miscellaneous Investigations Series Map 1-1728, 16 pp. (NNA.930106.0046)

Hoover, D.L., 1989. "Preliminary Description of Quaternary and Late Pliocene Surficial Deposits at Yucca Mountain and Vicinity, Nye County, Nevada, " U.S. Geological Survey Open-File Report 89-359, USGS-OFR-89-359, U.S. Geological Survey, Denver, CO. (NNA.900403.0406)

PREDECISIONAL PRELIMINARY DRAFT

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* Requested by NRC

PREDECISIONAL PRELIMINARY DRAFT

- * Hubert, J.F., and A.J. Filipov, 1989. "Debris-Flow Deposits in Alluvial Fans on the West Flank of the White Mountains, Owens Valley, California, USA," Sedimentary Geology, v. 61, pp 177-205. (NNA.921125.0010)
- * Ku, T-L., 1988. "Radiometric dating with U- and Th-series isotopes in the Nevada Test Site region - a review." (NNA.910412.0011)
- * Lundstrom, S.C., J.R. Wesling, E.M. Taylor, and J.B. Paces, in review. "Preliminary surficial deposits map of the northeast 1/4 of the Busted Butte 7.5' quadrangle, Nye County, Nevada: U.S. Geological Survey open-file report 94-341.

Lundstrom, S.C. and R.G. Warren, 1994. "Late Cenozoic evolution of Fortymile Wash: major change in drainage pattern in the Yucca Mountain, Nevada region during late Miocene volcanism," *in* Proceedings of the Fifth Annual International Conference on High Level Radioactive Waste Management, v. 4, p. 2121-2130.

- * Lundstrom S.C. and R.G. Warren, 1994. "Late Cenozoic evolution of Fortymile Wash, southern Nevada: drainage reversal in the east moat of the Timber Mountain caldera during late Miocene volcanism," poster described *in* EOS, v. 75, no. 44 (supplement) p. 275.
- * Maldonado, F., 1985. "Geologic map of the Jackass Flats area, Nye County, Nevada," U.S. Geological Survey miscellaneous investigations series map I-1519, 1:48,000.

Mish, R.C., ed., 1993, Merriam Webster's Collegiate Dictionary, Tenth Edition, Meriam-Webster, Inc., Springfield, Massachusetts, p. 360.

Morrison, R.B., 1991. "Introduction", Quaternary Nonglacial Geology: Conterminous U.S., R.B. Morrison ed., Geological Society of America, The Geology of North America, Boulder, Colorado, v. K-2, p. 1-12. (NNA.921125.0011)

NRC (U.S. Nuclear Regulatory Commission), 1994. "Staff review of the U.S. Department of Energy topical report on extreme erosion," letter (Holonich, J.J. to Milner, R.A., dated August 22, 1994) with enclosure, 24 p.

NRC (U.S. Nuclear Regulatory Commission), 1993. "Status of review of topical report on extreme erosion," letter (Youngblood, B.J. to Shelor, D., dated December 30, 1993, 5 p.

NRC (U.S. Nuclear Regulatory Commission), 1984. "Preliminary decision related to U.S. Department of Energy's general guidelines for the recommendation of sites for nuclear waste repositories," Federal Register, v. 49, p. 9650 and following, March 14, 1984.

PREDECISIONAL PRELIMINARY DRAFT

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PREDECISIONAL PRELIMINARY DRAFT

NRC (U.S. Nuclear Regulatory Commission), 1983a. "Staff analysis of public comments on proposed rule 10 CFR Part 60, Disposal of High-Level Radioactive Wastes in Geologic Repositories," NUREG-0804, p. 382, December 1983.

NRC (U.S. Nuclear Regulatory Commission), 1983b. "10 CFR Part 60: Disposal of high-level radioactive wastes in geologic repositories, technical criteria," Final Rule. Federal Register, v. 48, no. 120, p. 28,194-28,229, June 21, 1983.

Reneau, S.L. and R. Raymond, Jr., 1991. "Cation-Ratio Dating of Rock Varnish: Why Does It Work?", Geology, v. 19, n. 9, p. 937-940. (NNA.930212.0012)

* Rosholt, J.N., C.A. Bush, W.J. Carr, D.L. Hoover, WC Swadley, and J.R. Dooley, Jr., 1985. "Uranium-trend dating of Quaternary deposits in the Nevada Test Site area, Nevada and California," U.S. Geological Survey open-file report OFR-85-540. (HQS.880517.2848)

* Sawyer, D.A., R.J. Fleck, M.A. Lanphere, R.G. Warren, D.E. Broxton, and M.R. Hudson, in press. "Episodic caldera volcanism in the Miocene Southwestern Nevada Volcanic Field: revised stratigraphic framework 40 Ar/39Ar geochronology, and implications for magmatism and extension," Geological Society of America.

Smith, G.I., V.J. Barczak, G.F. Moulton, and J.C. Liddicoat, 1983. "Core KM-3, A Surface-to-Bedrock Record of Late Cenozoic Sedimentation in Searles Lake, California", U.S. Geological Survey Professional Paper 1256, 24 p. (NNA.900227.0061)

Swadley, WC, 1983. "Map showing surficial geology of the Lathrop Wells Quadrangle, Nye County, Nevada," U.S. Geological Survey Miscellaneous Investigations Series Map I-1361, scale 1:48,000. (NNA.890832.0099)

Swadley, WC, and W.J. Carr, 1987. "Geologic map of the Quaternary and Tertiary deposits of the Big Dune Quadrangle, Nye County, Nevada, and Inyo County, California," U.S. Geological Survey Miscellaneous Investigations Series Map I-1767, scale 1:48,000. (NNA.900618.0080)

Swadley, WC, and L.D. Parrish, 1988. "Surficial geologic map of the Bare Mountain Quadrangle, Nye County, Nevada," U.S. Geological Survey Miscellaneous Investigations Series Map I-1826, scale 1:62,500. (NNA.900618.0081)

Swadley, WC, D.L. Hoover, J.N. Rosholt, 1984. "Preliminary Report on Late Cenozoic Faulting and Stratigraphy in the Vicinity of Yucca Mountain, Nye County, Nevada", U.S. Geological Survey Open-File Report 84-788, Plate 1, 42 p., 1984. (HQS.880517.1515)

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REQUEST FOR ADDITIONAL INFORMATION
FOR EVALUATION OF DOE's RESPONSES TO NRC's
EROSION TOPICAL REPORT COMMENTS

Preliminary Surficial Deposits Maps*

1. Southeast 1/4 of the Topopah Spring NW Quadrangle, Nye County, NV
2. Southwest 1/4 of the Topopah Spring NW Quadrangle, Nye County, NV
3. Northwest 1/4 of the Busted Butte 7.5' Quadrangle, Nye County, NV

* It is assumed that these map reports are to be published as USGS Open-File Reports.