

NUCLEAR WASTE CONSULTANTS INC.

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December 12, 1988

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RS-NMS-85-009
Communication No. 296

U.S. Nuclear Regulatory Commission
Division of High-Level Waste Management
Technical Review Branch
OWFN - 4H3
Washington, DC 20555

Attention: Mr. Jeff Pohle, Project Officer
Technical Assistance in Hydrogeology - Project B (RS-NMS-85-009)

Re: Task 5 - Compilation of Reports on Performance Assessment

Dear Mr. Pohle:

Pursuant to the direction of the NRC Project Officer, attached please find a letter report from Water, Waste, and Land (WWL) to Nuclear Waste Consultants (NWC) compiling the citations to performance assessment reports that are contained in the NNWSI bibliographic data base. The list includes 52 citations from DOE, NRC, the USGS and the open literature, plus 4 additional citations from WWL technical reports prepared under this contract. The compilation has been reviewed by Mark Logsdon of NWC, and it was prepared under WWL's quality assurance procedures as controlled by the NWC QA Manual.

If you have questions about this letter or about WWL's compilation, please contact me.

Respectfully submitted,
NUCLEAR WASTE CONSULTANTS, INC.



Mark J. Logsdon, Project Manager

cc: US NRC - Director, NMSS (ATTN PSB)
HLWM (ATTN Division Director)
Edna Knox, Contract Administrator
HLGP (ATTN Branch Chief)
D. Chery, HLGP
W. Ford, HLGP

L. Davis, WWL

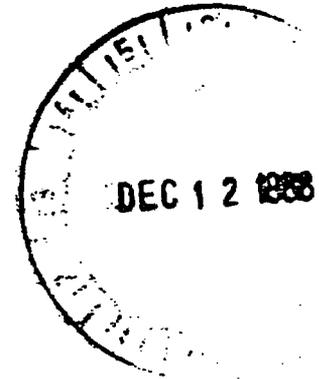
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Water, Waste & Land, Inc.
CONSULTING ENGINEERS & SCIENTISTS

December 6, 1988



Nuclear Waste Consultants, Inc.
ATTN: Mark Logsdon
155 South Madison Street, Suite 306
Denver, CO 80209-3014

Dear Mr. Logsdon:

Mr. Jeff Pohle, the Project Officer for Contract NRC-02-85-009 (WWL# 4001), has requested that Water, Waste & Land, Inc., (WWL) compile a list of any previous performance assessments (no matter how simplistic) contained in the document database and submit that list to him by mid-December. Any analyses performed under this contract are to be included along with those performed by the U.S. Nuclear Regulatory Commission (NRC), the U.S. Department of Energy (DOE) or any other agency or organization. Performance assessment has been defined as follows in Consultation Draft Site Characterization Plan prepared by the DOE:

Any analysis that predicts the behavior of a system or system component under a given set of constant and/or transient conditions. Performance assessments will include estimates of the effects of uncertainties in data and modeling.

The following reports which relate to performance assessment were submitted by WWL under project NRC-02-85-009:

- WWL, 1986a. "Theoretical Description of Steady, Downward Flow in Layered, Fractured Unsaturated Porous Media"
- WWL, 1986b. "Travel Time Calculations Yucca Mountain, Nevada"
- WWL, 1986c. "Estimates of Cumulative Radioactive Flux at Yucca Mountain, Nevada"
- WWL, 1986d. "Penetration and Resistance of Water in a Single Planar Fracture Affected by Air Flow in the Matrix"

The following reports which relate to performance assessment are contained in the document database maintained by WWL:

1. Desert Research Institute, Water Resources Center, Publication #45058, "Review of Soil Moisture Flux Studies at the Nevada Test Site Nye County, Nevada", April, 1987, WWL#: 354
2. Journal of Geophysical Research, Vol. 92, No. B8, pages 7820-7842, Sinnock, S., Lin, Y. T., and Brannen, J. P., "Preliminary Bounds on the Expected Postclosure Performance of the Yucca Mountain Repository Site, Southern Nevada", July 10, 1987, WWL#: 298

3. LA-10414-MS, Kerrisk, J. F., "An Assessment of the Important Radionuclides in Nuclear Waste", Oct., 1985, WWL#: 204
4. LA-10929-MS, Kerrisk, J.F., "Groundwater Chemistry at Yucca Mountain, Nevada, and Vicinity", Feb., 1987, WWL#: 276
5. LA-9471-MS, Walter, G. R., "Theoretical and Experimental Determination of Matrix Diffusion and Related Solute Transport Properties of Fractured Tuffs From the Nevada Test Site", Oct., 1982, WWL#: 49
6. LA-9995-MS, Kerrisk, J. F., "Solubility Limits on Radionuclide Dissolution at a Yucca Mountain Repository", May, 1984, WWL#: 51
7. LA-UR-84-40, Travis, B. J., Hodson, S. W., Nuttall, H. E., Cook, T. L., and Rundberg, R. S., "Preliminary Estimates of Water Flow and Radionuclide Transport in Yucca Mountain", 1984, WWL#: 85
8. LBL-18473, Wang, J.S.Y. and Narasimhan T.N., "Hydrologic Mechanisms Governing Fluid Flow in Partially Saturated, Fractured, Porous Tuff at Yucca Mountain", Oct. 1984, WWL#: 1
9. LBL-20553, Rulon, J., Bodvarsson, G.D., and Montazer, P., "Preliminary Numerical Simulations of Groundwater Flow in the Unsaturated Zone, Yucca Mountain, Nevada", March, 1986, WWL #: 328
10. LB1-23195, Tsang, Y.W., Tsang, C.F., Hale, F.V., Moreno, L., and Neretnieks, I., "Channeling Characteristics of Flow and Solute Transport Through a Rough-Surfaced Fracture", June, 1987, WWL #: 350
11. NNWA-1985, Montazer, Parviz and Wilson, William E., "Hydrogeology of the Unsaturated Zone, Yucca Mountain, Nevada", Nov., 1985, WWL#: 230
12. SAND82-0170, Johnson, R. L., "Thermal Analyses for a Nuclear Waste Repository in Tuff Using USW-G1 Bore hole Data", Oct., 1982, WWL#: 137
13. SAND83-0372, Johnstone, J. K., Peters, R. R., and Gnirk, P. F., "Unit Evaluation at Yucca Mountain, Nevada Test Site: Summary Report and Recommendation," June, 1984, WWL#: 57
14. SAND83-1778, Fernandez, J. A., Freshley, M. D., "Repository Sealing Concepts for the Nevada Nuclear Waste Storage Investigations Project", Aug., 1984, WWL#: 220
15. SAND83-2465, Freshley, M. D., Dove, F. H., and Fernandez, J. A., "Hydrologic Calculations to Evaluate Backfilling Shafts and Drifts for a Prospective Nuclear Waste Repository in Unsaturated Tuff", June, 1985, WWL#: 121
16. SAND83-2593, Nimick, F. B., and Williams, R. L., "A Three-Dimensional Geologic Model of Yucca Mountain, Southern Nevada", Oct., 1984, WWL#: 70

17. SAND83-7466, Rice, W. A., "Preliminary Two-Dimensional Regional Hydrologic Model of the Nevada Test Site and Vicinity", Aug., 1984, WWL#: 60
18. SAND83-7475, Thompson, F. L., Dove, F. H., and Krupka, K. M., "Preliminary Upper-Bound Consequence Analysis for a Waste Repository at Yucca Mountain, Nevada", Aug., 1984, WWL#: 180
19. SAND84-0192, Braithwaite, J. W., and Nimick, F. B., "Effect of Host-Rock Dissolution and Precipitation on Permeability in a Nuclear Waste Repository in Tuff", Sept., 1984, WWL#: 55
20. SAND84-0369, Mondy, L. A., Baker, B. L., and Eaton, R. R., "Vadose Water Flow Around a Backfilled Drift Located in Tuff", July, 1985, WWL#: 156
21. SAND84-1007, Sandia National Laboratories, "The Potential Effect of Water Influx on the Dissolution Rate of UO₂ in Spent Fuel at the Yucca Mountain, Nevada Site", Dec., 1985, WWL#: 208
22. SAND84-1076, Ortiz, T. S., Williams, R. L., Nimick, F. B., Whittet, B. C., and South, D. L., "A Three-Dimensional Model of Reference Thermal/Mechanical and Hydrological Stratigraphy at Yucca Mountain, Southern Nevada", Oct., 1985, WWL#: 91
23. SAND84-1492, Sinnock, Scott, Lin, Y.T. and Brannen Joseph P., "Preliminary Bounds on the Expected Postclosure Performance of the Yucca Mountain Repository Site, Southern Nevada", Dec. 84, WWL#: 2
24. SAND84-2642, Klavetter, E. A., and Peters, R. R., "Estimation of Hydrologic Properties of An Unsaturated, Fractured Rock Mass", July, 1986, WWL#: 231
25. SAND84-1895, Fernandez, J.A., Kelsall, P.C., Case, J.B., and Meyer, D., "Technical Basis for Performance Goals, Design Requirements, and Material Recommendations for the NNWSI Repository Sealing Program", Sept., 1987, WWL #: 321
26. SAND84-7212, Jacobson, E. A., Freshley, M. D., and Dove, F. H., "Investigations of Sensitivity and Uncertainty in Some Hydrologic Models of Yucca Mountain and Vicinity", Oct., 1985, WWL#: 194
27. SAND85-0602, Lin, Y. T., "SPARTAN-A Simple Performance Assessment Code for the Nevada Nuclear Waste Storage Investigations Project", Dec., 1985, WWL#: 233
28. SAND85-0854C, Peters, R. R., Gauthier, J. H., and Dudley, A. L., "The Effect of Percolation Rate on Water-Travel Time in Deep, Partially Saturated Zones", 1985, WWL#: 227
29. SAND85-0855, Klavetter, E. A. and Peters, R. R., "Fluid Flow in a Fractured Rock Mass", 1985, WWL#: 226
30. SAND85-2701, Sinnock, Scott (Editor), Lin, Y. T., Tierney, M. S., and others, "Preliminary Estimates of Groundwater Travel Time and

- Radionuclide Transport At the Yucca Mountain Repository Site", 1985, WWL#: 229
31. SAND85-7114, Wang, J.S.Y., Narasimhan, T.N., "Hydrologic Mechanisms Governing Partially Saturated fluid Flow in Fracture Welded Units and Porous Nonwelded Units at Yucca Mountain", Oct. 1986, WWL#: 284
 32. SAND86-0121, Hunter, R.L., Cranwell, R.M., Chu, M.S.Y., "Assessing Compliance With the EPA High-Level Waste Standard: An Overview", Oct. 1986, WWL#: 273
 33. SAND86-1264, Prindle, R. W., "Specification of a Test Problem for HYDROCOIN Level 3 Case 2: Sensitivity Analysis for Deep Disposal in Partially Saturated, Fractured Tuff", 1987, WWL#: 303
 34. SAND86-1571, Hopkins, P. L., Eaton, R. R., and Sinnock, S., 1987. "Effect of Drift Ventilation on Repository Hydrology and Resulting Solute Transport Implications", 1987, WWL#:299
 35. SAND86-1598, Smith, D. M., Updegraff, C. D., Bonano, E. J., and Randall, J. D., "Assessment of Radionuclide Vapor-Phase Transport in Unsaturated Tuff", Nov, 1986, WWL#: 237
 36. SAND86-1955, Langkopf, B.S., "Proposed Preliminary Definition of the Disturbed-Zone Boundary Appropriate for a Repository at Yucca Mountain", December, 1987, WWL #: 323
 37. SAND86-7001, Case, J. B. and Kelsall, P. C., "Modification of Rock Mass Permeability in the Zone Surrounding a Shaft in Fractured, Welded Tuff", 1987, WWL#: 295
 38. SAND87-0112, Barr, G. E. and Miller, W. B., "Simple Models of the Saturated Zone at Yucca Mountain", 1987, WWL#: 312
 39. UCID vol. 2, Binnall, E.P., Wollenberg, H.A., Benson, S.M., Tsao, L., "Critical Parameters for a High-Level Waste Repository Volume 2: Tuff", Feb. 1986, WWL#: 258
 40. USGS 82-4085, Waddell, R. K., "Two-Dimensional, Steady-State Model of Ground-Water Flow, Nevada Test Site and Vicinity, Nevada-California", 1982, WWL#: 9
 41. USGS 84-4328, Spaulding, W. G., Robinson, S. W., and Paillet, F. L., "Preliminary Assessment of Climatic Change During Late Wisconsin Time, Southern Great Basin and Vicinity, Arizona, California, and Nevada", 1984, WWL#: 8
 42. USGS 84-4344, Czarnecki, J. B., "Simulated Effects of Increased Recharge on the Ground-Water Flow System of Yucca Mountain and Vicinity, Nevada-California", 1984, WWL#: 7

43. USGS 84-4349, Czarnecki, J. B., and Waddell, R. K., "Finite-Element Simulation of Ground-Water Flow in the Vicinity of Yucca Mountain, Nevada-California", 1984, WWL#: 6
44. USGS Letter, Wilson, W. E., "Unsaturated-Zone Flux at Yucca Mountain, Nevada", Dec. 1985, WWL#: 247
45. USGS Letter, Wilson, W.E., "Unsaturated-zone flux at Yucca Mountain, Nevada", Dec. 1985, WWL#: 259
46. USGS-83-4001, Squires, R. R. and Young, R. L., "Flood Potential of Forty Mile Wash and its Principal Southwestern Tributaries, Nevada Test Site, Southern Nevada", 1984, WWL#: 171
47. USGS-84-4345, Montazer, P., and Wilson, W. E., "Conceptual Hydrologic Model of Flow in the Unsaturated Zone, Yucca Mountain, Nevada", 1984, WWL#: 3
48. USGS-OFR-80-569, Winograd, I. J., and Doty, G. C., "Paleohydrology of the Southern Great Basin, With Special Reference to Water Table Fluctuations Beneath the Nevada Test Site During the Late(?) Pleistocene", 1980, WWL#: 24
49. USGS-OFR-82-973, Sass, J. H., and Lachenbruch, A. H., "Preliminary Interpretation of Thermal Data from the Nevada Test Site", 1982, WWL#: 35
50. USGS-OFR-83-542, Claassen, H. C., "Sources and Mechanisms of Recharge for Ground Water in the West-Central Amargosa Desert, Nevada--A Geochemical Interpretation", 1983, WWL#: 110
51. USGS-PP-712-F, Claassen, H. C., "Sources and Mechanisms of Recharge for Ground Water in the West-Central Amargosa Desert, Nevada- A Geochemical Interpretation", 1985, WWL#: 236
52. Water Resources Research, Vol. 24, No. 3, Peters, R.R. and Klavetter, E.A., "A Continuum Model for Water Movement in an Unsaturated Fractured Rock Mass," March, 1988, WWL #: 333

I trust that the above list of references meet the Staff's needs at this time. If you have any questions or comments, please feel free to contact us.

Sincerely

WATER, WASTE & LAND, INC.



Lyle A. Davis, P.E.
Project Manager

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