ADRIAN BROWN CONSULTANTS, INC.
155 South Madison Street, Suite 302
Denver, Colorado 80209-3014
(303) 399-9630 FAX (303) 399-9701

August 15, 1988

009/1.2/WWL.006
RS-NMS-85-009
Communication No. 274

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

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

Re: Subtask 1.2 Update Report: Data Inventory and Management Report

Dear Mr. Pohle:

Attached please find the Subtask 1.2 Update Report: Data Inventory and Management, prepared by Water, Waste and Land (WWL). The report presents the bibliographical information relevant to the all documents in the WWL library on NNWSI, now comprising 356 titles. Please note that this is the last scheduled, semi-annual update report for Subtask 1.2 under the current contract.

The WWL report has received a managerial review by M. Logsdon (NWC), and the report was prepared under WWL's QA procedures, consistent with the NWC QA manual.

Please note that because of the substantial length of the document, NWC is forwarding at this time only two complete copies of the database, one to you and one to HLTR. We will, of course, prepare the microfiche copies for document control (both HL-DCC and DMB). If others in the division (or elsewhere) need hard copies of the full database that cannot be produced by DCC, please contact me or Ms. Basse, and we will produce additional copies.

If you have any questions about this transmittal letter or about the Subtask 1.2 update report, please contact me immediately.

Respectfully submitted,
NUCLEAR WASTE CONSULTANTS, INC.

Mark J. Logsdon, Project Manager

Att: WWL Data Management Update Report #6, Subtask 1.2

cc: US NRC - Director, NMSS (ATTN PSB)
HLTR (ATTN Branch Chief)

bc: US NRC - HLWM(ATTN Division Director)
Edna Knox, Contract Administrator
D. Chery, HLTR

L. Davis, WWL

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

August 5, 1988

WWL #4001

Mr. Mark Logsdon
Nuclear Waste Consultants, Inc.
155 South Madison Street, Suite 302
Denver, Colorado 80209

Attention: Mr. Mark Logsdon, Project Manager

Re: Data Management Report, Subtask 1.2

Dear Mr. Logsdon:

This letter serves as our semi-annual update of the report for Subtask 1.2, Data Inventory and Management, as required by our subcontract with Nuclear Waste Consultants. The report has been divided into two sections, the NNWSI Bibliography and the NNWSI Document Summaries. These are given in the report as Attachments A and B. The Keyword Reference Table is listed at the beginning of Attachment B.

Informal reviews of the documents will continue. Diskettes containing the database in the DBASE III format will be sent independently. If you have questions or if we can in any way be of assistance to you during your review of this report, do not hesitate to contact us.

Sincerely,

WATER, WASTE & LAND, INC.

Tom Sniff

Thomas Lyle Sniff
Senior Engineer

Attachments

Creekside Two Building, 2629 Redwing Road, Suite 200, Fort Collins, Colorado 80526 (303) 226-3535

D Cherry

NUCLEAR WASTE CONSULTANTS INC.

U.S NUCLEAR REGULATORY COMMISSION
DIVISION OF WASTE MANAGEMENT

DATA MANAGEMENT REPORT UPDATE

Nevada Nuclear Waste Storage Isolation
Subtask 1.2
Data Inventory and Management

Prepared by

Water, Waste, and Land, Inc.

for

Nuclear Waste Consultants

TECHNICAL ASSISTANCE IN HYDROGEOLOGY
PROJECT B - ANALYSIS
RS-NMS-85-009

August, 1987

NUCLEAR WASTE CONSULTANTS INC.
8341 So. Sangre de Cristo Rd., Suite 14
Littleton, Colorado 80127
(303) 973-7495

August 11, 1987

009/1.2/WWL.004
RS-NMS-85-009
Communication No. 191

U.S. Nuclear Regulatory Commission
Division of Waste Management
Geotechnical Branch
MS 623-SS
Washington, DC 20555

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

Re: **Subtask 1.2 Data Management Semi-Annual Update Report**

Dear Mr. Pohle:

Attached please find the semi-annual update report for Subtask 1.2 Data Management, prepared by Water, Waste and Land, Inc. The report has received a technical and project management review by Mark Logsdon of Nuclear Waste Consultants, and the report was prepared under WWL's quality assurance program, in compliance with the NWC Quality Assurance Program for the NRC. The report includes three attachments:

A. NNWSI Bibliography, presenting the bibliographical information on 294 documents currently in the technical holdings of our NNWSI team.

B. NNWSI Document Summaries, comprising the informal working reviews of 206 documents that have received at least screening reviews by the NNWSI team.

C. NNWSI Data Base, presenting the summary and cross-refernces on geologic and hydrogeologic information available to the team on all borehole tests that have been reported by DOE.

Because this data management report is self-contained, it replaces all earlier versions of the Subtask 1.2 update reports.

Submission of this update report completes the contract deliverable for Subtask 1.2 of the current contract. If you have any questions about the data management report, please contact me immediately.

Respectfully submitted,
NUCLEAR WASTE CONSULTANTS, INC.

Mark J. Logsdon, Project Manager

Att: WWL Data Management Report Update, Subtask 1.2

cc: US NRC - D. Chery, HLTR

bc: US NRC - Director, NMSS (ATTN PSB)
HLWM(ATTN Division Director)
Mary Little, Contract Administrator
HLTR (ATTN Branch Chief)
M. Galloway, TTI
L. Davis, WWL
J. Minier, DBS

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

AUG 10 1987
Fed Ex

August 7, 1987

WWL #4001

Nuclear Waste Consultants, Inc.
8341 So. Sangre de Cristo Rd., Suite 14
Littleton, CO 80127

Attention: Mr. Mark Logsdon, Project Manager

Re: Data Management Report, Subtask 1.2

Dear Mr. Logsdon:

This letter serves as our semi-annual update of the report for Subtask 1.2, Data Inventory and Management, as required by our subcontract with Nuclear Waste Consultants. The report has been divided into three sections, the NNWSI Bibliography, the NNWSI Document Summaries, and the NNWSI Data Base. These are given in the report as Attachments A, B, and C, respectively.

DATA INVENTORY AND MANAGEMENT STATUS

NNWSI Bibliography

The Bibliographic information for 294 documents have currently been entered into the computerized data base.

NNWSI Document Summaries

Informal reviews of 206 documents have been performed and are shown in Attachment B of this report. Also included in the Document Summaries is a Reference Table which allows rapid retrieval of information when necessary. The Reference Table relates each key word to every document by the WWL Document Number. The Reference Table is provided at the beginning of Attachment B.

NNWSI Data Base

Additional data has been entered into the NNWSI Data Base. The units and their abbreviations used in the data base are:

TCw.....Tiva Canyon welded
PTn.....Paintbrush Tuff nonwelded
TSw.....Topopah Spring welded
CHnv.....Calico Hills nonwelded vitric
CHnz.....Calico Hills nonwelded zeolitic
PPw.....Prow Pass welded
CFn.....Crater Flat
BFw.....Bull Frog welded
Tram.....Tram
Older.....Older Tuff
LR.....Lithic Ridge

A plus (+) after an abbreviation indicates that a well test included one or more underlying units. A complete printout of the NRCDATA data base file is presented in Attachment C.

SUMMARY

The data management techniques which have been developed and implemented will allow the WWL team to continue to efficiently review data relative to the NNWSI Project. As new data becomes available during site characterization, the data base can quickly be updated and utilized for analysis purposes.

If you have questions or if we can in any way be of assistance to you during your review of this report, do not hesitate to contact us.

Sincerely,

WATER, WASTE & LAND, INC.

Tom Sniff

Thomas L. Sniff
Project Engineer

TLS:dml
Attachments

ATTACHMENT A

NEVADA NUCLEAR WASTE STORAGE INVESTIGATION

HYDROGEOLOGY BIBLIOGRAPHY

WATER, WASTE & LAND, INC.

DATA BASE

August 6, 1987

1. , Department of Energy, Nevada Nuclear Waste Storage Investigations Project Monthly Report, Aug, 1985, WWL#: 81

2. , Department of Energy, Nevada Nuclear Waste Storage Investigations Project Monthly Report, Sept, 1985, WWL#: 90

3. , U.S. Department of the Interior Geological Survey and University of Nevada System Desert Research Institute, Long-Range Hydrologic Program, 1973, WWL#: 167

4. , Department of Energy, Nevada Nuclear Waste Storage Investigations Project, Monthly Report, Jan, 1985, WWL#: 209

5. , Department of Energy, Nevada Nuclear Waste Storage Investigations Project, Monthly Report, Dec, 1985, WWL#: 210

6. , Department of Energy, Nevada Nuclear Waste Storage Investigations Project, Monthly Report, Oct, 1985, WWL#: 211

7. , Department of Energy, Nevada Nuclear Waste Storage Investigations Project, Monthly Report, Nov, 1985, WWL#: 212

8. , Department of Energy, Nevada Nuclear Waste Storage Investigations Peer Review, Aug, 1981, WWL#: 222

9. , Materials Testing Laboratory, Nevada Test Site Physical Properties of Core Samples from USW G-1 and USW G-2, Oct, 1983, WWL#: 225

10. , Montazer, Parviz, Weeks, E. P., Thamir, F., Yard, S. N., and Hofrichter, P. B., Monitoring the Vadose Zone in Fractured Tuff, Yucca Mountain, Nevada, Nov, 1985, WWL#: 243

11. , Thamir, F., and McBride, C. M., Measurements of Matric and Water Potentials in Unsaturated Tuff at Yucca Mountain, Nevada, Nov, 1985, WWL#: 244

12. , Palaz, I., Application of Geophysical Logs to Estimate Moisture-Content Profiles in Unsaturated Tuff, Yucca Mountain, Nevada, Nov, 1985, WWL#: 245

13. , Division of Waste Management, NRC Staff Comments on the DOE Final Environmental Assessments, Dec, 1986, WWL#: 248

14. , Warren, J.E., Root, P.J., The Behavior of Naturally Fractured Reservoirs, Oct, 1962, WWL#: 249

15. , Castelijns, J.H.P., Hagoort, J., Recovery of Retrograde Condensate from Naturally Fractured Gas-Condensate Reservoirs, Dec, 1984, WWL#: 250

16. , Russel, C.E., Hydrogeologic Investigations of Flow in Fractured Tuffs, Rainier Mesa, Nevada Test Site, May, 1987, WWL#: 257

17. , Rasmussen, T.C., Evans, D.D., Unsaturated Flow and Transport Through Fractured Rock-Related to High-Level Waste Repositories-Phase 2, April, 1986, WWL#: 266

18. , Quade, J., Quaternary Geology of the Corn Creek Springs Area Clark County, Nevada, 1983, WWL#: 288

19. , Mifflin, M.D., Delineation of Groundwater Flow Systems in Nevada, 1967, WWL#: 289

20. , Evans, D.D., Rasmussen, T.C., Fracture System Characterization for Unsaturated Rock, April, 1987, WWL#: 291

21. Ann Arbor Science Publishers, Scott, R. B., Spengler, R. W., Diehl, S., Lappin, A. R., and Chornack, M., Geologic Character of Tuffs in the Unsaturated Zone at Yucca Mountain, Southern Nevada, 1983, WWL#: 97

22. AT(29-1)789, Tyler, L. D., Evaluation of Tuff as a Waste Isolation Medium, ? , WWL#: 181

23. BMI/OTSP-01, Battelle Memorial Institute, Overweight Truck Shipments to the Nuclear Waste Repositories: Legal, Political, Administrative, and Operational Considerations, Mar, 1986, WWL#: 234

24. CGS/8116R028, Reade, M. T., and McKay, E. D., Geology and Hydrology of Yucca Mountain and Vicinity, Nevada Test Site, Mar, 1982, WWL#: 75

25. CONF-791016, Gardiner, D. A., and Truett, T., Proceedings of the 1979 DOE Statistical Symposium, Sept, 1980, WWL#: 77

26. DOE/NV/10295-1, Quade, J., and Tingley, J. V., A Mineral Inventory of the Nevada Test Site, and Portions of Nellis Bombing and Gunnery Range, Southern Nye County, Nevada, Sept, 1983, WWL#: 38

27. DOE/NV/10322-10, Fenix and Scisson, Inc., NNWSI Hole Histories, UE-25wt#'s 3-6, 12-18, USW wt 1, 2, 7, 10, 11, Nov, 1986, WWL#: 264

28. DOE/NV/10322-12, Fenix and Scisson, Inc., NNWSI Hole Histories, UE-29A1, 2, Nov, 1986, WWL#: 265

29. DOE/NV/10322-17, Fennix and Scisson, Inc., NNWSI Hole Histories USW VH-1,-2, Dec, 1986, WWL#: 261

30. DOE/RW-0012, DOE Office of Civilian Radioactive Waste Management, Draft Environmental Assessment Yucca Mountain Site, Nevada Research and Development Area, Nevada, Dec, 1984, WWL#: 76

31. DOE/RW-0073, U. S. Department of Energy, Environmental Assessment, May, 1986, WWL#: 240

32. DOE/RW-0073, U. S. Department of Energy, Environmental Assessment, May, 1986, WWL#: 241

33. DOE/RW-0073, U. S. Department of Energy, Environmental Assessment, May, 1986, WWL#: 242

34. DOE/RW-0101, Office of Civilian Radioactive Waste Management, Issues Hierarchy for a Mined Geologic Disposal System, Sept, 1986, WWL#: 256

35. DOE/RW-0128, U.S. Department of Energy, Draft Mission Plan Amendment, Jan, 1987, WWL#: 280

36. DOE/RW-0144, Office of Civilian Management, Annual Report to Congress, April 1987, WWL#: 267

37. EPRI-EA-5011, Rehm, B.W., Christel, B.J., Stolzenberg, T.R., Nichols, D.G., Field Evaluation of Instruments for the Measurement of Unsaturated Hydraulic Properties of Fly Ash, April 1987, WWL#: 283

38. ERDA-1551, Energy Research & Development Administration, Final Environmental Impact Statement Nevada Test Site Nye County, Nevada, Sept, 1977, WWL#: 39

39. GE79TMP-55, Campana, M.E., Monitoring in the Vadose Zone: A Review of Technical Elements and Methods, 1979, WWL#: 282

40. Golder Associates, Golder Associates, Resaturation by Vertical Porous Media Flow Through Unflawed Geology, , WWL#: 207

41. IAEA-SM-243/37, Erdal, B. R., Bayhurst, B. P., Crowe, B. M., Daniels, W. R., Hoffman, D.C.,Lawrence, F. O., Smyth, J. R., Thompson, J. L., and Wolfsberg, K., Underground Disposal of Radioactive Wastes Proceedings of a Symposium on the Underground Disposal of Radioactive Wastes Jointly Organized by the International Atomic Energy Agency and the OECD Nuclear Energy Agency and Held at Otaniemi,, 1980, WWL#: 117

42. LA-09174-PR, Blacic, J., Carter, J., Halleck, P., Johnson, P., Shankland, T., Andersen,R.,Spicochi, K., and Heller, A., Effects of Long-Term Exposure of Tuffs to High-Level Nuclear Waste Repository Conditions: Preliminary Report, ? , WWL#: 102

43. LA-09706-MS, Levy, S. S., Petrology of Samples From Drill Holes USW H-3, H-4, and H-5 Yucca Mountain, Nevada, ? , WWL#: 95

44. LA-10003-MS, Warren, R. G., Byers, F. M., Jr., and Caporuscio, F. A., Petrography and Mineral Chemistry of Units of the Topopah Spring, Calico Hills and Crater Flat Tuffs, and Older Volcanic Units, with Emphasis on Samples from Drill Hole USW G-1, Yucca Mountain, Nevada Test Site, June, 1984, WWL#: 54

45. LA-10154-PR, Crowe, B. M., and Vaniman, D. T., Research and Development Related to the Nevada Nuclear Waste Storage Investigations January 1 - March 31, 1984, Feb, 1985, WWL#: 46

46. LA-10177-M, Lane, L. J., Surface Water Management: A User's Guide to Calculate a Water Balance Using the CREAMS Model, Nov, 1984, WWL#: 144

47. LA-10188-MS, Ogard, A. E., and Kerrisk, J. F., Groundwater Chemistry Along Flow Paths Between a Proposed Repository Site and the Accessible Environment, Nov, 1984, WWL#: 48

48. LA-10242-MS, Lane, L. J. and Nyhan, J. W, Water and Contaminant Movement: Migration Barriers, Nov, 1984, WWL#: 145

49. LA-10263-MS, Perkins, B, Travis, B., and DePoorter, G., Validation of the TRACR3D Code for Soil Water Flow Under Saturated/Unsaturated Conditions in Three Experiments, Jan, 1985, WWL#: 161

50. LA-10297-PR, Rundberg, R. S., Ogard, A. E., and Vaniman, D. T., Research and Development Related to the Nevada Nuclear Waste Storage Investigations April 1 - June 30, 1984, May, 1985 WWL#: 52

51. LA-10299-PR, Ogard, A. E., and Vaniman, D. T., Research and Development Related to the Nevada Nuclear Waste Storage Investigations July 1 - September 30, 1984, May, 1985, WWL#: 53

52. LA-10414-MS, Kerrisk, J. F., An Assessment of the Important Radionuclides in Nuclear Waste, Oct, 1985, WWL#: 204

53. LA-10415-MS, Carlos, B. Arney, Minerals in Fractures of the Unsaturated Zone from Drill Core USW G-4,Yucca Mountain, Nye County, Nevada, May, 1985, WWL#: 47

54. LA-10730-MS, Springer, E.P., Fuentes, H.R., Modeling Study of Solute Transport in the Unsaturated Zone, Workshop Proceedings, Feb, 1987, WWL#: 269

55. LA-10927-MS, Carlos, B.A., Minerals in Fractures of the Saturated Zone form Drill Core USW G-4, Yucca Mountain, Nye County, Nevada, April 1987, WWL#: 275

56. LA-10929-MS, Kerrisk, J.F., Groundwater Chemistry at Yucca Mountain, Nevada, and Vicinity, Feb, 1987, WWL#: 276

57. LA-10962 MS, Polzer, W.L., Fuentes, H.R., Raymond, R., Bish, D.L., Gladney, E.S., Lopez, E.A., Characterization of Crushed Tuff for the Evaluation of the Fate of Tracers in Transport Studies in the Unsaturated Zone, Feb, 1987, WWL#: 270

58. La-10981-MS, Fuentes, H.R., Polzer, W.L., Springer, E.P., Effects from Influent Boundary Conditions on Tracer Migration and Spacial Variability Features in Intermediate-Scale Experiments, March 1987 WWL#: 271

59. LA-8110-MS, Vine, E. N., et al., Sorption-Desorption Studies on Tuff II. A Continuation of Studies with Samples from Jackass Flats, Nevada and Initial Studies with Samples from Yucca Mountain, Nevada, Jan, 1980, WWL#: 185

60. LA-8139-MS, Sykes, M. L., Heiker, G. H., and Smyth, J. R., Mineralogy and Petrology of Tuff Units from the UE25a-1 Drill Site,Yucca Mountain, Nevada, Nov, 1979, WWL#: 45

61. LA-8747-MS, Wolfsberg, K., et al., Sorption-Desorption Studies on Tuff III. A Continuation of Studies with Samples from Jackass Flats and Yucca Mountain, Nevada, May, 1981, WWL#: 190

62. LA-8840-MS, Carroll, P. R., and Waters, A. C., Preliminary Stratigraphic and Petrologic Characterization of Core Samples from USW-G1, Yucca Mountain, Nevada, Nov, 1981, WWL#: 44

63. LA-9000-MS, Carroll, P. I., Caporuscio, F. A., and Bish, D. L., Further Description of the Petrology of the Topopah Spring Member of the Paintbrush Tuff in Drill Holes UE25A-1 and USW-G1 and of the Lithic Rich Tuff in USW-G1, Yucca Mountain, Nevada, Nov, 1982, WWL#: 43

64. LA-9021-MS, Bish, D. L., Detailed Mineralogical Characterization of the Bullfrog and Tram Members in USW-G1, with Emphasis on Clay Mineralogy, Oct, 1981, WWL#: 42

65. LA-9192-PR, Daniels, W.R., Laboratory and Field Studies Related to the Radionuclide Migration Project, Feb, 1982, WWL#: 255

66. LA-9328-MS, Daniels, W. R., et al., Summary Report on the Geochemistry of Yucca Mountain and Environs, Dec, 1982, WWL#: 116

67. LA-9332-MS, Norris, A. E., et al., Geochemistry Studies Pertaining to the G-Tunnel Radionuclide Migration Field Experiment, Nov, 1982, WWL#: 158

68. 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

69. LA-9667-MS, Travis, B. J., TRACR3D: A Model of Flow and Transport in Porous/Fractured Media, May, 1984, WWL#: 88

70. LA-9912-MS, Kerrisk, J. F., Reaction-Path Calculations of Groundwater Chemistry and Mineral Formation at Rainier Mesa, Nevada, Dec, 1983, WWL#: 50

71. LA-9995-MS, Kerrisk, J. F., Solubility Limits on Radionuclide Dissolution at a Yucca Mountain Repository, May, 1984, WWL#: 51

72. LA-UR-81-3141, Erdal, B. R., Wolfsberg, K., Rundberg, R. S., Daniels, W. R., Fortney, D.L.,Erickson, K. L., Friedman, A. M., Fried, S., and Hines, J. J., Nuclide Migration Field Experiments in Tuff, G Tunnel, Nevada Test Site, Nov, 1981, WWL#: 118

73. LA-UR-84-332, Bish, D. L., Ogard, A. E., and Vaniman, D. T., Mineralogy-Petrology and Groundwater Geochemistry of Yucca Mountain Tuffs, 1984, WWL#: 101

74. 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

75. LA-UR-86-680, Fuentes, H. R., Polzer, W. L., and Essington, E. H., Effects of Sorption and Temperature on Solute Transport in Unsaturated Steady Flow, 1985, WWL#: 228

76. LASL, Rundberg, R. S., Thompson, J. L., and Maestas, S., Radionuclide Migration: Laboratory Experiments With Isolated Fractures, Nov, 1981, WWL#: 164

77. LBL-15010, Wollenberg, H.A., Yang, J.S.Y., Korbin, G., Ann Appraisal of Nuclear Waste Isolation in the Vadose Zone in Arid and Semi-Arid Regions, May 1983, WWL#: 274

78. 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

79. MRSSP-v.26, McVay, G. L., Scientific Basis for Nuclear Waste Management VII Symposium held November 1983 in Boston, Massachusetts, U.S.A., 1984, WWL#: 94

80. NNWA-1985, Montazer, P., and Wilson, W. E., Hydrogeology of the Unsaturated Zone, Yucca Mountain, Nevada, Nov, 1985, WWL#: 230

81. NNWSI STP-1.0, Division of Waste Management, Hydrology Issues for the Nevada Nuclear Waste Storage Investigations Project Aug, 1984 WWL#: 252

82. NNWSI/OCRWM/OGR, NVO/NNWSI, Presentation for the OGR: An Issues Hierarchy Approach to Site Characterization and Regulatory Compliance (Viewgraphs), May, 1985, WWL#: 203

83. NRC-04-81-224, Kilbury, R. K., Water Intake at the Atmosphere-Earth Interface in a Fractured Rock System Nov, 1984, WWL#: 84

84. NUREG-0868, Codell, R.B., Key, K.T., Whelan, G, A Collection of Mathematical Models for Dispersion in Surface Water and Groundwater, Aug, 1981, WWL#: 268

85. NUREG/CR-2782, Thomas, S. D., Ross, B., and Mercer, J. W., A Summary of Repository Siting Models, July, 1982, WWL#: 78

86. NUREG/CR-3680, Schrauf, T. W., and Evans, D. D., Relationship Between the Gas Conductivity and Geometry of a Natural Fracture, April, 1984, WWL#: 79

87. NUREG/CR-4912, Davis, S.N., Murphy, E., Dating Ground Water and the Evaluation of Repositories for Radioactive Waste April, 1987, WWL#: 262

88. NVO-1253-14, Overlander, P.L., Development of a Quasi Three-Dimensional Groundwater Model for a Portion the Nevada Test Site, Jan, 1979, WWL#: 277

89. NVO-196-22, United States Department of Energy, Geologic and Hydrologic Investigation of Yucca Mountain Peer Review Documentation, April, 1981, WWL#: 193

90. NVO-196-23, Department of Energy, Radionuclide Migration in Tuff and Granite Peer Review Documentation, Nov, 1985, WWL#: 213

91. NVO-196-24 (Rev. 5), NVO, Bibliography of the Published Reports, Papers, and Articles on the Nevada Nuclear Waste Storage Investigations, by Nevada Operations Office, (original, rev. 1 (81/11), rev. 2 (82/06), rev. 3 & 4 (84/05)), Jan, 1985, WWL#: 195

92. NVO-269, Bowen, J. L., and Egami, R. T., Atmospheric Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada, Nov, 1983, WWL#: 80

93. NVO-283, French, R. H., Elzeftawy, A., and Elliot, B., Hydrology and Water Resources Overview for the Nevada Nuclear, Waste Storage Investigations, Nevada Test Site, Nye County, Nevada: Annotated Bibliography, June, 1984, WWL#: 82

94. NVO-283, Department of Energy, Hydrology and Water Resources Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada: Annotated Bibliography, Jun, 1981, WWL#: 224

95. NVO-284, French, R. H., Elzeftawy, A., Bird, J., and Elliot, B., Hydrology and Water Resources Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada, June, 1984, WWL#: 74

96. NVO-284, Department of Energy, Hydrology and Water Resources Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada, Jun, 1981, WWL#: 223

97. NWC-1746, Division of Waste Management, Draft Generic Position on Groundwater Travel Time, June 1986 WWL#: 263

98. Proceedings of the NWWA Conf., Montazer, P., Weeks, E. P., Thamir, F., Yard, S. N., and Hofrichter, P. B., Monitoring the Vadose Zone in Fractured Tuff, Yucca Mountain, Nevada, Nov, 1985, WWL#: 219

99. SAIC, Science Applications International Corporation, Meteorological Monitoring Plan for the Nevada Nuclear Waste Storage Investigations Project Yucca Mountain Site, Nov, 1984, WWL#: 177

100. SAND79-1197C, Iman, R. L., Davenport, J. M., Waddell, R. K., Stephens, H. P., and Leap, D.I., Sensitivity Study of the Parameters of the Regional Hydrology Model for the Nevada Nuclear Waste Storage Investigations, ?, WWL#: 134

101. SAND80-0201, Hadley, G. R. and Turner, J. R., Jr., Evaporative Water Loss From Welded Tuff, Apr, 1980, WWL#: 130

102. SAND80-1464, Johnstone, J. K. and Wolfsberg, K., Evaluation of Tuff as a Medium for a Nuclear Waste Repository: Interim Status Report on the Properties of Tuff, July, 1980, WWL#: 135

103. SAND80-1625C, Tyler, L. D., Thermal/Mechanical Modeling for a Tuff Repository, ?, WWL#: 182

104. SAND80-2137, Lappin, A. R., Thomas, R. K., and McVey, D. F., Eleana Near-Surface Heater Experiment Final Report, April, 1981, WWL#: 143

105. SAND80-2639, Langkopf, B. S., Thermal Analysis of Nuclear Waste Emplacement in Welded Tuff, Aug, 1982, WWL#: 67

106. SAND81-1058, Waymire, D. R. and Duimstra, C. O., In Situ Tuff Water Migration/Heater Experiment: Instrumentation Design and Fielding, Apr, 1982, WWL#: 187

107. SAND81-1059, Waymire, D. R. and Duimstra, C. O., In Situ Tuff Water Migration/Heater Experiment: The Data Acquisition and Playback System, Oct, 1981, WWL#: 186

108. SAND81-1253, Erickson, K. L. and Fortney, D. R., Preliminary Transport Analysis for Design of the Tuff Radionuclide-Migration Field Experiment, 1981, WWL#: 119

109. SAND81-1768, Zimmerman, R. M., Conceptual Design of Field Experiments for Welded Tuff Rock-Mechanics Program, Oct, 1982, WWL#: 218

110. SAND81-1918, Johnstone, J. K., Hadley, G. R., and Waymire, D. R., In Situ Tuff Water Migration/Heater Experiment: Final Report, Mar, 1985, WWL#: 138

111. SAND81-1970, Connolly, J. R., Mansker, W. L., Hicks, R., Allen, C. C., Husler, J., Keil, K., Lappin, A. R., Petrology and Geochemistry of the Grouse Canyon Member of the Belted Range Tuff, Rock-Mechanics Drift, U12g Tunnel, Nevada Test Site, Apr, 1983, WWL#: 106

112. SAND81-2584, Rechard, R. P. and Schuler, K. W., Permeability Change Near Instrumentation Holes in Jointed Rock, June, 1982, WWL#: 163

113. SAND81-7210, Klasi, M. L., Russell, J. E., and McClain, W. C., Far-Field Thermal Analysis of a High Level Waste Repository in Tuff, July, 1982, WWL#: 63

114. SAND82-0170, Johnson, R. L., Thermal Analyses for a Nuclear Waste Repository in Tuff Using USW-G1 Bore hole Data, Oct, 1982, WWL#: 137

115. SAND82-1043, Hadley, G. R., Water Transport Through Welded Tuff, Aug, 1984, WWL#: 65

116. SAND82-1164, Moss, M., Koski, J. A., Haseman, G. M., and Tormey, T. V., The Effects of Composition, Porosity, Bedding-Plane Orientation, Water Content and a Joint on the Thermal Conductivity of Tuff, Nov, 1982, WWL#: 61

117. SAND82-1277, Hunter, R. L., Barr, G. E., and Bingham, F. W., Scenarios for Consequence Assessments of Radioactive-Waste Repositories at Yucca Mountain, Nevada Test Site, March, 1983, WWL#: 89

118. SAND82-1434, Lappin, A. R., and Nimick, F. B., Bulk and Thermal Properties of the Functional Tuffaceous Beds in Holes USWG-1,UE-25a#1, and USW G-2, Yucca Mountain, Nevada, April, 1985, WWL#: 64

119. SAND82-2105, Guzowski, R.V., Nimick, F.B., Siegel, M.D., Finley, N.C., Repository Site Data Report for Tuff: Yucca Mountain, Nevada, Oct, 1983, WWL#: 287

120. SAND82-2203, Lappin, A. R. and Nimick, F. B., Thermal Properties of the Grouse Canyon Member of the Belted Range Tuff and of Tunnel Bed 5, G-Tunnel, Nevada Test Site, Aug, 1985, WWL#: 142

121. SAND82-2207, Sinnock, S., Geology of the Nevada Test Site and Nearby Areas, Southern Nevada, Oct, 1982, WWL#: 71

122. SAND82-2212, Connolly, J. R., Hicks, R. T., Emmanuel, K. M., Cappon, J. P., and Sinnock, S., Bibliography With Abstracts of Geological Literature Pertaining to Southern Nevada With Particular Reference to the Nevada Test Site, May, 1983, WWL#: 214

123. SAND82-2441, Sinnock, S., and Easterling, R. G., Empirically Determined Uncertainty in Potassium-Argon Ages For Plio-Pleistocene Basalts From Crater Flat, Nye County, Nevada, Apr, 1983, WWL#: 216

124. SAND82-2771, Eaton, R. R., Martinez, M. J., Wilson, R. K., and Nunziato, J. W., Code Development in Support of Nuclear Waste Storage Investigations for a Repository in Tuff, Mar, 1983, WWL#: 69

125. SAND82-2772, Eaton, R. R., Gartling, D. K., and Larson, D. E., SAGUARO - A Finite Element Computer Program for Partially Saturated Porous Flow Problems, June, 1983, WWL#: 68

126. SAND83-0280, Mondy, L. A., Hydrology of Sealing a Repository in Saturated Tuff, March, 1983, WWL#: 155

127. 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

128. SAND83-0757, Mondy, L. A., Wilson, R. K., and Bixler, N. E., Comparison of Waste Emplacement Configurations for a Nuclear Waste Repository in Tuff IV. Thermo-Hydrological Analysis, Aug, 1983, WWL#: 62

129. SAND83-1327, Schwartz, B. M., Grain Density Measurements of Ash Flow Tuffs: An Experimental Comparison of Water Immersion and Gas Intrusion Pycnometer Techniques, Aug, 1985, WWL#: 176

130. SAND83-1778, Fernandez, J. A., Freshley, M. D., Repository Sealing Concepts for the Nevada Nuclear Waste Storage Investigations Project, Aug, 1984, WWL#: 220

131. SAND83-1912, Church, H. W., Freeman, D. L., Boro, K., and Egami, R. T., Meteorological Tower Data for the Nevada Nuclear Waste Storage Investigations (NNWSI) Quarterly Report, July-September, 1982 Yucca Alluvial(YA) Site, Jan, 1984, WWL#: 105

132. 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

133. SAND83-2593, Nimick, F. B., and Williams, R. L., A Three-Dimensional Geologic Model of Yucca Mountain, Southern Nevada, Oct, 1984, WWL#: 70

134. SAND83-7132, The MITRE Corporation, Nevada Nuclear Waste Storage Investigations Environmental Area Characterization Report, July, 1984, WWL#: 151

135. SAND83-7466, Rice, W. A., Preliminary Two-Dimensional Regional Hydrologic Model of the Nevada Test Site and Vicinity, Aug, 1984, WWL#: 60

136. 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

137. SAND84-0175, Mansure, A. J. and Ortiz, T. S., Preliminary Evaluation of the Subsurface Area Available for a Potential Nuclear Waste Repository at Yucca Mountain, Dec, 1984, WWL#: 147

138. 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

139. 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

140. SAND84-0440/2, Eglinton, T. W., and Dreicer, R. J., Meteorological Design Parameters for the Candidate Site of a Radioactive-Waste Repository at Yucca Mountain, Nevada, Dec, 1984, WWL#: 72

141. SAND84-0637, Barr, G. E., Reduction of the Well Test Data for Test Well USW H-1, Adjacent to Nevada Test Site, Nye County, Nevada, May, 1985, WWL#: 66

142. SAND84-0747, Martinez, M. J., FEMTRAN - A Finite Element Computer Program for Simulating Radionuclide Transport Through Porous Media, Jan, 1985, WWL#: 146

143. SAND84-0878, Hadley, G. R., PETROS -- A Program for Calculating Transport of Heat, Water, Water Vapor and Air Through a Porous Material, May, 1985, WWL#: 131

144. SAND84-0996, Hayden, N. K., Benchmarking NNWSI Flow and Transport Codes: Cove 1 Results, June, 1985, WWL#: 58

145. 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 Test Site, Dec, 1985, WWL#: 208

146. 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

147. SAND84-1327, Church, H. W., Freeman, D. L., Boro, K., Egami, R. T., Meteorological Tower Data for the Nevada Nuclear Waste Storage Investigations (NNWSI) Tri-Quarterly Report, October 1982 - June 1983 Yucca Alluvial (YA)Site, Dec, 1984, WWL#: 109

148. SAND84-1471, Peters, R. R., Klavetter, E. A., Hall, I. J., Blair, S. C., Heller, P. R., and Gee, G. W., Fracture and Matrix Hydrologic Characteristics of Tuffaceous Materials from Yucca Mountain, Nye County, Nevada, Dec, 1984, WWL#: 56

149. SAND84-1492, Sinnock, S., Lin, Y.T. and Brannen, J. P., Preliminary Bounds on the Expected Postclosure Performance of the Yucca Mountain Repository Site, Southern Nevada, Dec. 84, WWL#: 2

150. SAND84-1643, Langkopf, B. S., Satter, B. J., and Welch, E. P., Version 1 of the Users Manual for the Tuff Data Base Interface, April, 1985, WWL#: 59

151. SAND84-2057, Bixler, N. E., NORIA - A Finite Element Computer Program for Analyzing Water, Vapor, Air, and Energy Transport in Porous Media, Aug, 1985, WWL#: 96

152. SAND84-2642, Klavetter, E. A., and Peters, R. R., Estimation of Hydrologic Properties of An Unsaturated, Fractured Rock Mass, July, 1986, WWL#: 231

153. SAND84-2668, Tien, P. L., Siegel, M. D., Updegraff, C. D.,Wahi, K. K., and Guzowski, R. V., Repository Site Data Report for Unsaturated Tuff, Yucca Mountain, Nevada, Nov, 1985, WWL#: 198

154. SAND84-7103, The Robbins Company, Small Diameter Horizontal Hole Drilling - State of Technology, Nov, 1984, WWL#: 165

155. SAND84-7202, Wang, J. S. Y., and Narasimhan, T. N., Hydrologic Mechanisms Governing Fluid Flow in Partially Saturated, Fractured, Porous Tuff at Yucca Mountain, April, 1985, WWL#: 73

156. 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

157. SAND85-0602, Lin, Y. T., SPARTAN-A Simple Performance Assessment Code for the Nevada Nuclear Waste Storage Investigations Project, Dec, 1985, WWL#: 233

158. 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

159. SAND85-0855, Klavetter, E. A. and Peters, R. R., Fluid Flow in a Fractured Rock Mass, 1985, WWL#: 226

160. Sand85-1774, Wilkinson, G.F., Runkle, G.E., Quality Assurance Plan for Computer Software Supporting the U.S.Nuclear Regulatory Commission's High-Level Waste Management Program, Dec, 1985, WWL#: 272

161. SAND85-2482, Reda, D. C., Liquid Permeability Measurements on Densely Welded Tuff over the Temperature Range 25 to 90 Degrees C., Dec, 1985, WWL#: 232

162. SAND85-2701, Sinnock, S. (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

163. Sand85-7114, Wang, J.S.Y., Narasmhan, T.N., Hydrologic Mechanisms Governing Partially Saturated fluid Flow in Fracture Welded Units and Porous Nonwelded Units at Yucca Mountain, Oct, 1986, WWL#: 284

164. 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

165. Sand86-0286, Klavetter, E.A., Peters, R.R., An Evaluation of the Use of Mercury Porosimetry in Calculation Hydrologic Properties of Tuffs From Yucca Mountain, Nevada, March 1987, WWL#: 285

166. SAND86-0369, Baker, B. L., and Eaton, R. R., Mass Balance Computation in SAGUARO, Dec, 1986, WWL#: 246

167. 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

168. SCP. 011-4.0, ? , Chapter 4: Geochemistry, Draft Site Characterization Plan for Yucca Mountain, Nevada, July 1986, WWL#: 253

169. State of Nevada, McNeely, J. G., Jr., Forecasts for the Future-Agriculture, 1974, WWL#: 191

170. TEI-838, Schoff, S. L. and Moore, J. E., Chemistry and Movement of Ground Water, Nevada Test Site, 1964, WWL#: 179

171. TEI-843, McKay, E. J. and Williams, W. P., Geology of Jackass Flats Quadrangle, Nevada Test Site, Nevada, Dec, 1963, WWL#: 150

172. 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

173. UCID-19081, Thomas, R. and Springer, J., Fracture Mapping for Radionuclide Migration Studies in the Climax Granite, May, 1981, WWL#: 183

174. UCID-19405, Raber, E., Lord, D., and Burklund, P., Hydrologic Test System for Fracture Flow Studies in Crystalline Rock, May, 1982, WWL#: 162

175. UCID-20289, Ramirez, A. L., and Daily, W. D., Preliminary Evaluation of Alterant Geophysical Tomography in Welded Tuff, Dec, 1984, WWL#: 40

176. UCRL-15620, Moore, D. E., Morrow, C. A., and Byerlee, J. D., Changes in Permeability and Fluid Chemistry of the Topopah Spring Member of the Paintbrush Tuff (Nevada Test Site) When Held in a Temperature Gradient:Summary of Results, June, 1984, WWL#: 153

177. UCRL-15667, Moore, D. E., Morrow, C. A., and Byerlee, J. D., Permeability and Fluid Chemistry Studies of the Topopah Spring Member of the Paintbrush Tuff, Nevada Test Site: Part II, March, 1985, WWL#: 152

178. UCRL-52073, Crow, N. B., First Observations of Tritium in Ground Water Outside Chimneys of Underground Nuclear Explosions, Yucca Flat, Nevada Test Site, May, 1976, WWL#: 235

179. UCRL-53130, Pawloski, G. A., Water Contents of Samples from the Nevada Test Site: Total, Free (Natural State to 105 C), and More Tightly Bonded (105-700 C), May, 1981, WWL#: 160

180. UCRL-53138, Murray, W. A., Geohydrology of the Climax Stock Granite and Surrounding Rock Formations, NTS, May, 1981, WWL#: 154

181. UCRL-53230, Corynen, G. C., \Stop\: A Fast Procedure for the Exact Computation of the Performance of Complex Probabilistic Systems, Jan, 1982, WWL#: 108

182. UCRL-53442, Oversby, V. M. and Knauss, K. G., Reaction of Bullfrog Tuff with J-13 Well Water at 90 C and 150 C, Sept, 1983, WWL#: 159

183. UCRL-53552, Oversby, V. M., Reaction of the Topopah Spring Tuff with J-13 Well Water at 90 C and 150 C, May, 1984, WWL#: 92

184. UCRL-53574, Oversby, V. M., Reaction of the Topopah Spring Tuff With J-13 Water at 120 C, July, 1984, WWL#: 199

185. UCRL-53576, Knauss, K. G. and Beiriger, W. B., Report on Static Hydrothermal Alteration Studies of Topopah Spring Tuff Wafers in J-13 Water at 150 C, Aug, 1984, WWL#: 136

186. UCRL-53602, Lin, W., and Daily, W., Transport Properties of Topopah Spring Tuff, Oct, 1984, WWL#: 41

187. UCRL-53726, Glassley, W.E., Reference Waste Package Environment Report, Oct, 1986, WWL#: 260

188. UCRL-85320, Coles, D.G., Ramspott, L.D., 106 Ru Migration in a Deep Tuffaceous Alluvium Aquifer, Nevada Test Site, Feb, 1981, WWL#: 254

189. UCRL-86722, Trimmer, D., Laboratory Measurements of Ultralow Permeability of Geologic Materials, Aug, 1982, WWL#: 184

190. UCRL-91464, Wilson, C. N. and Oversby, V. M., Radionuclide Release from PWR Fuels in a Reference Tuff Repository Groundwater March, 1985, WWL#: 189

191. UCRL-95568, Yow, J.L. Jr., Test Concept for Waste Package Environment at Yucca Mountain, June 1987, WWL#: 286

192. 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

193. USGS 84-4193, Weeks, E. P., and Wilson, W. E., Preliminary Evaluation of Hydrologic Properties of Cores of Unsaturated Tuff,Test Well USW H-1, Yucca Mountain, Nevada, 1984, WWL#: 16

194. USGS 84-4197, Robison, J. H., Ground-Water Level Data and Preliminary Potentiometric-Surface Maps, Yucca Mountain and Vicinity, Nye County, Nevada, 1984, WWL#: 12

195. USGS 84-4248, Craig, R. W., and Robison, J. H., Geohydrology of Rocks Penetrated by Test Well UE-25 p#1, Yucca Mountain Area, Nye County, Nevada, 1984, WWL#: 14

196. USGS 84-4253, Lahoud, R. G., Lobmeyer, D. H., and Whitfield, M. S., Jr., Geohydrology of Volcanic Tuff Penetrated by Test Well UE-25b#1, Yucca Mountain, Nye County, Nevada, 1984, WWL#: 13

197. USGS 84-4267, Waddell, R. K., Robison, J. H., and Blankennagel, R. K., Hydrology of Yucca Mountain and Vicinity, Nevada-California -- Investigative Results Through Mid-1983, 1984, WWL#: 11

198. USGS 84-4272, Thordarson, W., Rush, F. E., and Waddell, S. J., Geohydrology of Test Well USW H-3, Yucca Mountain, Nye County, Nevada, 1985, WWL#: 15

199. 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

200. 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

201. 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

202. USGS Letter, Wilson, W. E., Unsaturated-Zone Flux at Yucca Mountain, Nevada, Dec, 1985, WWL#: 247

203. USGS Letter, Wilson, W.E., Unsaturated-zone flux at Yucca Mountain, Nevada, Dec, 1985, WWL#: 259

204. USGS Report 54, Rush, F. E, Regional Ground-Water Systems in the Nevada Test Site Area, Nye, Lincoln, and Clark Counties, Nevada, 1971, WWL#: 83

205. USGS WRI 83-4067, Doty, G.C., Water Table in Rocks of Cenozoic and Paleozoic Age, 1980 Yucca Flat, Nevada Test Site, Nevada, 1983, WWL#: 221

206. USGS-OFR-83-0475, Byerlee, J., Morrow, C., and Moore, D., Permeability and Pore-Fluid Chemistry of the Bullfrog Tuff in a Temperature Gradient: Summary of Results, 1983, WWL#: 103

207. USGS-1543-1, Hodson, J. N. and Hoover, D. L., Geology and Lithologic Log for Drill Hole UE17a, Nevada Test Site, 1978, WWL#: 132

208. USGS-1543-2, Hodson, J. N. and Hoover, D. L., Geology of the UE17e Drill Hole, Area 17, Nevada Test Site, Mar, 1979, WWL#: 133

209. USGS-1543-3, Dinwiddie, G. A. and Weir, J. E., Jr., Summary of Hydraulic Tests and Hydrologic Data for Holes UE16d and UE16f, Syncline Ridge Area, Nevada Test Site, 1979, WWL#: 113

210. USGS-1543-4, Weir, J. E., Jr., and Hodson, J. N., Geohydrology of Hole UE-17a, Syncline Ridge Area, Nevada Test Site 1979, WWL#: 188

211. USGS-1543-6, Maldonado, F., Muller, D. C., and Morrison, J. N., Preliminary Geologic and Geophysical Data of the UE25a-3 Exploratory Drill Hole, Nevada Test Site, Nevada, ? , WWL#: 149

212. 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

213. USGS-83-4032, Rush, F. E., Thordarson, W., and Pyles, D. G., Geohydrology of Test Well USW H-1, Yucca Mountain, Nye County, Nevada, 1984, WWL#: 26

214. USGS-83-4171, Thordarson, W., Geohydrologic Data and Test Results From Well J-13, Nevada Test Site, Nye County, Nevada, 1983, WWL#: 87

215. USGS-84-4345, Montazer, P., and Wilson, W. E., Conceptual Hydrologic Model of Flow in the Unsaturated Zone, Yucca Mountain, Nevada, 1984, WWL#: 3

216. USGS-85-4066, Erickson, J. R., and Waddell, R. K., Identification and Characterization of Hydrologic Properties of Fractured Tuff Using Hydraulic and Tracer Tests--Test Well USW H-4, Yucca Mountain, Nye County, Nevada, 1985, WWL#: 86

217. USGS-Circ. 903, Roseboom, E.H. Jr., Disposal of High-Level Nuclear Waste Above the Water Table in Arid Regions, Oct, 1983, WWL#: 293

218. USGS-Circ. 904-a, Bedinger, M.S., Sargent, K.A,, Reed, J.E., Geologic and Hydrologic Characterization and Evaluation of the Basin and Range Province Relative to the Disposal of High-Level Radioactive Waste, , WWL#: 294

219. USGS-OFR-449, Whitfield, M. S., Jr., Thordarson, W., and Eshom, E. P., Geohydrologic and Drill-Hole Data for Test Well USW H-4, Yucca Mountain, Nye County, Nevada, 1984, WWL#: 29

220. USGS-OFR-74-176, Carr, W. J., Summary of Tectonic and Structural Evidence For Stress Orientation at the Nevada Test Site, 1974, WWL#: 107

221. USGS-OFR-76-313, Thordarson, W., Howells, L., Field Trip to the Nevada Test Site, 1976, WWL#: 279

222. USGS-OFR-79-1244, Spengler, R. W., Muller, D. C., Livermore, R. B., Preliminary Report on the Geology and Geophysics of Drill Hole UE25a-1, Yucca Mountain, Nevada Test Site, 1979, WWL#: 37

223. USGS-OFR-80-126, Daniels, J. J., and Scott, J. H., Borehole Geophysical Measurements for Hole UE25a-3, Nevada Test Site, Nuclear Waste Isolation Program, 1980, WWL#: 5

224. USGS-OFR-80-1263, Hagstrum, J. T., Daniels, J. J., and Scott, J. H., Analysis of the Magnetic Susceptibility Well Log in Drill Hole UE25a-5, Yucca Mountain, Nevada Test Site, 1980, WWL#: 128

225. USGS-OFR-80-466, Anderson, L. A., Bisdorf, R. J., and Schoenthaler, D. R., Resistivity Sounding Investigation by the Schlumberger Method in the Syncline Ridge Area, Nevada Test Site, Nevada, 1980, WWL#: 98

226. 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

227. USGS-OFR-80-817, Glanzman, V. M., Bibliography of Reports by U.S. Geological Survey Personnel Pertaining to Underground Nuclear Testing and Radioactive Waste Disposal at the Nevada Test Site, and Radioactive Waste Disposal at the Waste Isolation Pilot Plant Site, New Mexico, 1980, WWL#: 124

228. USGS-OFR-80-826, Sass, J. H., Lachenbruch, A. H., and Mase, C. W., Analysis of Thermal Data from Drill Holes UE25a-3 and UE25a-1, Calico Hills and Yucca Mountain, Nevada Test Site, 1980, WWL#: 172

229. USGS-OFR-80-929, Spengler, R. W. and Rosenbaum, J. G., Preliminary Interpretations of Geologic Results Obtained From Bore holes UE25a-4, -5, -6, and -7, Yucca Mountain, Nevada Test Site, 1980, WWL#: 174

230. USGS-OFR-80-941, Hagstrum, J. T., Daniels, J. J., and Scott, J. H., Interpretation of Geophysical Well-Log Measurements in Drill Hole UE25a-1, Nevada Test Site, Radioactive Waste Program, 1980, WWL#: 129

231. USGS-OFR-80-942, Hoover, D. L. and Morrison, J. N., Geology of the Syncline Ridge Area Related to Nuclear Waste Disposal, Nevada Test Site, Nye County, Nevada, 1980, WWL#: 127

232. USGS-OFR-80-963, Christensen, R. C. and Spahr, N. E., Flood Potential of Topopah Wash and Tributaries, Eastern Part of Jackass Flats, Nevada Test Site, Southern Nevada, 1980, WWL#: 112

233. USGS-OFR-81-1220, Lachenbruch, A. H., Temperature Effects of Varying Phase Composition During the Steady Vertical Flow of Moisture in Unsaturated Stratified Sediments, 1981, WWL#: 141

234. USGS-OFR-81-1336, Daniels, J. J. and Scott, J. H., Interpretation of Hole-to-Surface Resistivity Measurements at Yucca Mountain, Nevada Test Site, 1981, WWL#: 115

235. USGS-OFR-81-1337, Anderson, L. A., Rock Property Analysis of Core Samples from the Calico Hills UE25a-3 Borehole,Nevada Test Site, Nevada, 1981, WWL#: 100

236. USGS-OFR-81-1338, Anderson, L. A., Rock Property Analysis of Core Samples from the Yucca Mountain UE25a-1 Borehole, Nevada Test Site, Nevada, 1981, WWL#: 99

237. USGS-OFR-81-1349, Spengler, R. W., Byers, F. M., and Warner, J. B., Stratigraphy and Structure of Volcanic Rocks in Drill Hole USW-G1, Yucca Mountain, Nye County, Nevada, 1981, WWL#: 25

238. USGS-OFR-81-1350, Smith, C., Ross, H. P., and Edquist, R., Interpreted Resistivity and IP Section Line W1 Wahmonie Area, Nevada Test Site, Nevada, 1981, WWL#: 175

239. USGS-OFR-81-389, Daniels, J. J., Scott, J. H., and Hagstrum, J. T., Interpretation of Geophysical Well-Log Measurements in Drill Holes UE25a-4,-5,-6, and -7, 1981, WWL#: 114

240. USGS-OFR-81-615, Daniels, J. J., Scott, J. H., and Hagstrum, J. T., Interpretation of Geophysical Well-Log Measurements in Drill Holes UE25a-4,-5,-6, and -7, Yucca Mountain, Nevada Test Site, 1981, WWL#: 215

241. USGS-OFR-81-892, Glanzman, V. M., Bibliography of Reports by U.S. Geological Survey Personnel Pertaining to Underground Nuclear Testing and Radioactive Waste Disposal at the Nevada Test Site, and Radioactive Waste Disposal at the Waste Isolation Pilot Plant Site, New Mexico, 1981, WWL#: 123

242. USGS-OFR-81-980, Flanigan, V. J., A Slingram Survey at Yucca Mountain on the Nevada Test Site, 1981, WWL#: 122

243. USGS-OFR-82-1043, Senterfit, R. M., Hoover, D. B., and Chornack, M., Resistivity Sounding Investigation by the Schlumberger Method in the Yucca Mountain and Jackass Flats Area, Nevada Test Site, Nevada, 1982, WWL#: 173

244. USGS-OFR-82-1044, King, K. W., A Study of Surface and Subsurface Ground Motions at Calico Hills, Nevada Test Site, 1982, WWL#: 140

245. USGS-OFR-82-182, Smith, C. and Ross, H. P., Interpretation of Resistivity and Induced Polarization Profiles with Severe Topographic Effects, Yucca Mountain Area, Nevada Test Site, Nevada, 1982, WWL#: 170

246. USGS-OFR-82-409, Monfort, M. E. and Evans, J. R. Three-Dimensional Modeling of the Nevada Test Site and Vicinity From Teleseismic P-Wave Residuals, 1982, WWL#: 157

247. USGS-OFR-82-457, Carr, W. J., Volcano-Tectonic History of Crater Flat, Southwestern Nevada, As Suggested by New Evidence from Drill Hole USW-VH-1 and Vicinity, 1982, WWL#: 111

248. USGS-OFR-82-765, Jones, Blair F., Mineralogy of Fine Grained Alluvium From Borehole U11G, Expl. 1, Northern Frenchman Flat Area, Nevada Test Site, 1982, WWL#: 217

249. USGS-OFR-82-973, Sass, J. H., and Lachenbruch, A. H., Preliminary Interpretation of Thermal Data from the Nevada Test Site, 1982, WWL#: 35

250. USGS-OFR-83-141, Rush, F. E., Thordarson, W., and Bruckheimer, L., Geohydrologic Data For Test Well USW H-1 Yucca Mountain Area, Nye County, Nevada, 1983, WWL#: 33

251. USGS-OFR-83-321, Muller, D. C., Kibler, J. E., Commercial Geophysical Well Logs From The USW G-1 Drill Hole, Nevada Test Site, Nevada, 1983, WWL#: 4

252. USGS-OFR-83-401, Ellis, W. L. and Swolfs, H. S., Preliminary Assessment of In-Situ Geomechanical Characteristics in Drill Hole USW G-1, Yucca Mountain, Nevada, 1983, WWL#: 120

253. USGS-OFR-83-478, Glanzman, V. M., Bibliography of Reports by U.S. Geological Survey Personnel Pertaining to Underground Nuclear Testing and Radioactive Waste Disposal at the Nevada Test Site, and Radioactive Waste Disposal at the Waste Isolation Pilot Plant Site, New Mexico, 1983, WWL#: 125

254. USGS-OFR-83-535, Spaulding, W. G., Vegetation and Climates of the Last 45,000 Years in the Vicinity of the Nevada Test Site, South-Central Nevada, 1983, WWL#: 36

255. 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

256. USGS-OFR-83-732, Maldonado, F. and Koether, S. L., Stratigraphy, Structure, and Some Petrographic Features of Tertiary Volcanic Rocks at the USW G-2 Drill Hole, Yucca Mountain, Nye County, Nevada, 1983, WWL#: 148

257. USGS-OFR-83-768, Katzer, T., Moosburner, O., and Nichols, W. D., Investigations and Research in Nevada by the Water Resources Division, U.S.Geological Survey, 1982-83, 1984, WWL#: 139

258. USGS-OFR-83-853, Bentley, C. B., Robison, J. H., and Spengler, R. W., Geohydrologic Data For Test Well USW H-5 Yucca Mountain Area, Nye County, Nevada, 1983, WWL#: 34

259. USGS-OFR-83-854, Benson, L. V., Robison, J. H., Blankennagel, R. K., and Ogard, A. E., Chemical Composition of Ground Water and the Locations of Permeable Zones in the Yucca Mountain Area, Nevada, May, 1984, WWL#: 93

260. USGS-OFR-83-855, Lobmeyer, D. H., Whitfield, M. S., Jr., Lahoud, R. R., Bruckheimer, L., Geohydrologic Data for Test Well UE-25b#1 Nevada Test Site, Nye County, Nevada, 1983, WWL#: 28

261. USGS-OFR-83-856, Craig, R. W., Reed, R. L., and Spengler, R. W., Geohydrologic Data For Test Well USW H-6 Yucca Mountain Area, Nye County, Nevada, 1984, WWL#: 32

262. USGS-OFR-84-063, Bentley, C. B., Geohydrologic Data for Test Well USW G-4 Yucca Mountain Area, Nye County, Nevada, 1984, WWL#: 27

263. USGS-OFR-84-142, Waddell, R. K., Jr., Hydrologic and Drill-Hole Data For Test Wells UE-29a#1 and UE-29a#2, Forty mile Canyon, Nevada Test Site, 1984, WWL#: 18

264. USGS-OFR-84-149, Thordarson, W., Rush, F. E., Spengler, R. W., and Waddell, S. J., Geohydrologic and Drill-Hole Data for Test Well USW H-3, Yucca Mountain, Nye County, Nevada, 1984, WWL#: 17

265. USGS-OFR-84-273, Moore, D. E., Morrow, C. A., and Byerlee, J. D., Changes in Permeability and Fluid Chemistry of the Topopah Spring Member of the Paintbrush Tuff (Nevada Test Site) When Held in a Temperature Gradient: Summary of Results, 1984, WWL#: 200

266. USGS-OFR-84-356, Shaw, H. R. and Gartner, A. E., Empirical Laws of Order Among Rivers, Faults and Earthquakes, 1984, WWL#: 166

267. USGS-OFR-84-450, Craig, R. W., and Johnson, K. A., Geohydrologic Data for Test Well UE-25 p#1, Yucca Mountain Area, Nye County, Nevada, 1984, WWL#: 21

268. USGS-OFR-84-491, Scott, R. B., and Castellanos, M., Stratigraphic and Structural Relations of Volcanic Rocks in Drill Holes USW GU-3 and USW G-3, Yucca Mountain, Nye County, Nevada, 1984, WWL#: 20

269. USGS-OFR-84-494, Scott, R. B. and Bonk, J., Preliminary Geologic Map of Yucca Mountain Nye County, Nevada With Geologic Sections, 1984, WWL#: 178

270. USGS-OFR-84-552, Anderson, L. A., Rock Property Measurements on Large-Volume Core Samples From Yucca Mountain USW GU-3/G-3 and USW G-4 Boreholes, Nevada Test Site, Nevada, 1984, WWL#: 22

271. USGS-OFR-84-567, Scott, R. B., Bath, G. D., Flanigan, V. J., Hoover, D. B., Rosenbaum, J.G., and Spengler, R. W., Geological and Geophysical Evidence of Structures in Northwest-Trending Washes, Yucca Mountain, Southern Nevada, and Their Possible Significance to a Nuclear Waste Repository in the Unsaturated Zone, 1984, WWL#: 19

272. USGS-OFR-84-649, Muller, D. C., and Kibler, J. E., Preliminary Analysis of Geophysical Logs From Drill Hole UE-25 p#1, Yucca Mountain, Nye County, Nevada, 1984, WWL#: 31

273. USGS-OFR-84-672, Healey, D. L., Clutsom, F. G., and Glover, D. A., Borehole Gravity Meter Surveys in Drill Holes USW G-3, UE-25 p#1 and UE-25 c#1, Yucca Mountain Area, Nevada, 1984, WWL#: 30

274. USGS-OFR-84-788, Swadley, W. C., Hoover, D. L., and Rosholt, J. N., Preliminary Report on Late Cenozoic Faulting and Stratigraphy in the Vicinity of Yucca Mountain, Nye County, Nevada, 1984, WWL#: 168

275. USGS-OFR-84-789, Spengler, R. W. and Chornack, M. P., Stratigraphic and Structural Characteristics of Volcanic Rocks in Core Hole USWG-4, Yucca Mountain, Nye County, Nevada, 1984, WWL#: 169

276. USGS-OFR-84-792, USGS, A Summary of Geologic Studies Through January 1, 1983, of a Potential High-Level Radioactive Waste Repository Site at Yucca Mountain, Southern Nye County, Nevada, 1984, WWL#: 192

277. USGS-OFR-84-848, Moore, D. E., Morrow, C. A., and Byerlee, J.D., Permeability and Fluid Chemistry Studies of the Topopah Spring Member of the Paintbrush Tuff, Nevada Test Site: Part II, 1984, WWL#: 201

278. USGS-OFR-85-363, Glanzman, V. M., Bibliography of Reports by U.S. Geological Survey Personnel Pertaining to Underground Nuclear Testing and Radioactive Waste Disposal at the Nevada Test, Site, and Radioactive Waste Disposal at the Waste Isolation Pilot Plant Site, New Mexico, 1985, WWL#: 126

279. USGS-OFR-85-475, Carr, W. J. and Parrish, L. D., Geology of Drill Hole USW VH-2, and Structure of Crater Flat, Southwestern Nevada, 1985, WWL#: 104

280. USGS-OFR-85-484, Benson, L. V. and McKinley, P. W., Chemical Composition of Ground Water in the Yucca Mountain Area, Nevada, 1971-84, 1985, WWL#: 196

281. USGS-OFR-85-540, Rosholt, J. N., Bush, C. A., Carr, W. J., Hoover, D. L., Swadley, W. C.,and Dooley, J. R., Jr., Uranium-Trend Dating of Quaternary Deposits in the Nevada Test Site Area,Nevada and California, 1985, WWL#: 205

282. USGS-OFR-86-175, Carr, M.D., Waddell, S.J., Vick, G.S., Stock, J.M., Monsen, S.A., Harris, A.G., Cork, B.W., Byers, F.M. Jr., Geology of Drill Hole UE25p-1, A test Hole Into Pre-Tertiary Rocks Near Yucca Mountain, Southern Nevada, 1986, WWL#: 281

283. USGS-OFR-86-46, Muller, D. C., and Kibler, J. E., Preliminary Analysis of Geophysical Logs From the WT Series of Drill Holes, Yucca Mountain, Nye County, Nevada, 1985, WWL#: 239

284. USGS-OFR-86-558, Glanzman, V.M. , Bibliography of Reports by U.S. Geological Survey Personnel on Studies at the Nevada test Site and the Waste Isolation Pilot Plant Site, New Mexico, Jan, 1987, WWL#: 292

285. USGS-PP-712-C, Winograd, I. J., and Thordarson, W., Hydrogeologic and Hydrochemical Framework, South-Central Great Basin,Nevada-California, With Special Reference to the Nevada Test Site, 1975, WWL#: 23

286. 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

287. USGS-PP-927, Dudley, W. W.,Jr., and Larson, J. D., Effect of Irrigation Pumping on Desert Pupfish Habitats in Ash Meadows, Nye County, Nevada, 1976, WWL#: 10

288. USGS-WRI-85-4030, Whitfield, M. S., Jr., Eshom, E. P., Thordarson, W., and Schaefer, D. H., Geohydrology of Rocks Penetrated by Test Well USW H-4, Yucca Mountain, Nye County, Nevada, 1985, WWL#: 197

289. USGS-WRI-86-4359, Thordarson, W., Howells, L., Hydraulic Tests and Chemical Quality of Water at Well USW VH-1, Crater Flat, Nye County, Nevada, 1987, WWL#: 278

290. USGS/WRI 87-4009, Dinwiddie, G.A. and Trask, N.J., U.S. Geological Survey Research in Radioactive Waste Disposal- Fiscal Years 1983, 1984, and 1985, 1986, WWL#: 206

291. WRC-41065, Fordham, J.W., Cochran, G.F., Friesen, H.N., Pidcoe, W.W., Bamberg, S.A., Basin Development and Water Allocation, March 1987, WWL#: 290

292. WRR vol. 12, no. 3, Mualem, Y., A New Model for Predicting the Hydraulic Conductivity of Unsaturated Porous Media, June 1976, WWL#: 251

293. WRR Vol. 20, No. 7, Moench, A. F., Double-Porosity Models for a Fissured Groundwater Reservoir With Fracture Skin, June, 1985, WWL#: 202

294. WWR, Vol. 22, No. 9, Klemes, V., Dilettantism in Hydrology: Transition or Destiny?, Aug, 1986, WWL#: 238

ATTACHMENT B

NEVADA NUCLEAR WASTE STORAGE INVESTIGATION

HYDROGEOLOGY DOCUMENT SUMMARY SHEETS

WATER, WASTE & LAND, INC.

DATA BASE

August 6, 1987

REFERENCE TABLE FOR NRC DOCUMENT DATA BASE

KEY WORDS	WWL NUMBER OF DOCUMENT CONTAINING KEY WORD:
Aquifers	11, 23, 60
Aquitards	10, 11, 23
Atmosphere	72, 151
Bibliography	59, 82, 123, 124, 125, 126, 214, 223, 224
Boundary Conditions	6, 9, 60, 68, 79
Capillary Barrier	3, 73, 230, 231
Capillary	65, 68, 130, 226, 231, 251
Climate	8, 10, 36, 39, 60, 72, 74, 76, 80, 83, 144, 151, 236, 241,
Computer Code	58, 66, 68, 69, 78, 85, 96, 131, 144, 161, 233, 229
Conceptual Model	1, 2, 3, 6, 7, 9, 26, 49, 50, 51, 57, 58, 60, 62, 63, 73, 131, 179, 226, 229, 230, 231, 236, 240, 241, 243,
Core	20, 25, 26, 33, 37, 133, 153, 161, 169
Core Analysis	16, 22, 41, 49, 56, 61, 65, 99, 100, 148, 130, 136, 176, 184, 201, 232
Erosion	76, 89, 241
Evaporation Front	46, 65, 130
Exploratory Shaft	76, 240
Faults	19, 20, 70, 71, 91, 168, 173, 230, 236
Flux	2, 6, 9, 11, 16, 35, 55, 180, 208, 219, 226, 227, 229, 230, 231, 233, 237, 243
Fracture Analysis	13, 20, 25, 40, 56, 84, 86, 120, 132, 133, 149, 162, 231, 266
Fracture Flow	1, 3, 73, 79, 84, 85, 118, 135, 158, 164, 226, 227, 229, 230, 231, 233, 250, 255, 258, 266
Fractures	20, 46, 47, 49, 52, 55, 95, 133, 169, 184, 239, 249, 250, 260, 266
Geochemistry	46, 50, 52, 55, 60, 76, 94, 95, 106, 135, 136, 158, 179, 190, 196, 199, 200, 201, 232, 236, 241, 252, 253, 258, 260, 266

REFERENCE TABLE FOR NHRC DOCUMENT DATA BASE

KEY WORDS	WWL NUMBER OF DOCUMENT CONTAINING KEY WORD:
Geohydrologic Data	11, 28, 53, 64, 197
Geology	9, 23, 37, 39, 44, 71, 75, 83, 87, 111, 115, 120, 129, 132, 133, 140, 143, 147, 149, 178, 179, 181, 184, 185, 188, 197, 198, 205, 215, 216, 230, 231, 236, 240, 252, 258
Geophysical Logs	4, 5, 13, 17, 26, 28, 29, 30, 31, 33, 37, 40, 98, 99, 100, 114, 129, 133, 140, 149, 160, 169, 197, 215, 239, 245, 264, 265
Ground Water Basin	9, 10, 11, 23, 39, 83, 236
Ground Water Level	12, 13, 18, 24, 26, 27, 28, 29, 33, 47, 91, 217
Ground Water Movement	10, 23, 57, 60, 77, 179, 219, 223, 229, 230, 231, 254
Ground Water	50, 74, 117, 136, 180, 185, 188, 196, 197, 198, 200, 201, 208, 223, 224, 253, 254, 258
Heat Load Effect	61, 62, 63, 68, 69, 85, 89, 133, 138, 143, 153, 172, 199, 200, 201, 218, 260
Hydraulic Conductivity	16, 26, 60, 66, 99, 144, 145, 194, 197, 219, 226, 227, 229, 231, 251, 266
Hydraulic Head	6, 9, 26, 100, 188, 219
Hysteresis	3, 68, 73, 230
Imbibition	65
Lithology	13, 18, 20, 27, 28, 29, 33, 34, 44, 70, 87, 95, 104, 129, 132, 133, 147, 149, 160, 176, 188, 197, 215, 230, 239
Mesh Design	6, 60, 131, 143
Mineralogy	38, 42, 43, 44, 45, 47, 52, 53, 54, 55, 64, 94, 95, 198, 106, 114, 117, 129, 135, 216, 217, 223, 253, 255, 266
Moisture	
Characteristic Curves	16, 226, 231, 237,
Moisture Tension	16, 244
Monthly Report	81, 90

Numerical Model	1, 6, 7, 9, 49, 57, 58, 60, 68, 69, 70, 77, 78, 79, 84, 91, 96, 131, 143, 144, 146, 161, 194, 218, 226, 227, 229, 231, 233, 246, 249, 251, 266
Perched Water	3, 26, 230, 231
Permeability	28, 41, 55, 85, 138, 143, 152, 153, 158, 184, 200, 201, 219, 226, 232, 237, 250, 258, 260, 266
Petrology	20, 43, 45, 52, 53, 54, 94, 95, 198, 106, 114, 129, 135, 253, 260
Pluvial	10, 11, 24, 36, 46, 236
Pore Saturation	26, 28, 40, 65, 229, 245
Porosity	26, 28, 41, 91, 99, 100, 231, 232, 237, 245, 106, 135, 144, 149, 158, 194, 219, 227, 249, 251, 258, 266
Potentiometric Surface Map	10, 12, 39, 60, 147
Precipitation	8, 10, 11, 23, 36, 39, 52, 53, 72, 80, 230, 236, 171
Radionuclide Transport	2, 46, 49, 53, 85, 116, 164, 229, 233, 235, 237, 117, 118, 135, 145, 158, 180, 185, 190, 204, 208, 228, 253, 254, 255, 258, 266
Recharge	7, 10, 11, 23, 60, 180, 230, 231, 236, 258
Recommendations for Future Work	11, 19, 41, 89, 237, 241, 242, 252, 256, 267
Regional Hydrology	75, 76, 171, 179, 241, 252
Retardation	2, 46, 49, 135, 145, 146, 158, 185, 190, 204, 228, 233, 235, 241, 255
Saturated Flow	2, 3, 6, 7, 68, 89, 131, 161, 180, 194, 208, 252
Storativity	13, 66
Stratigraphy	10, 11, 20, 25, 30, 37, 42, 44, 45, 70, 71, 91, 95, 104, 106, 111, 114, 129, 132, 133, 148, 169, 198, 168, 188, 197, 205, 240
Tectonics	53, 71, 76, 89, 111, 140, 168, 240, 241
Thermomechanical Properties	35, 41, 55, 61, 62, 63, 64, 135, 138, 143, 172, 198, 232, 237, 218, 260
Transmissivity	6, 9, 10, 26, 60, 77, 194, 197

REFERENCE TABLE FOR NHRC DOCUMENT DATA BASE

KEY WORDS	WWL NUMBER OF DOCUMENT CONTAINING KEY WORD:
Transportation	76, 131, 234, 240, 241
Traveltime	6, 194, 204, 227, 229, 241, 252
Unsaturated Flow	1, 2, 3, 55, 68, 69, 73, 131, 161, 172, 180, 194, 219, 226, 227, 228, 229, 230, 233, 237, 243, 244, 251, 252, 258, 266
Vapor Transport	3, 35, 55, 65, 73, 131, 138, 172, 237
Vegetation	8, 36, 236
Waste Dissolution	2, 53, 94, 229, 233, 237, 241, 252
Water Chemistry	10, 11, 13, 14, 18, 21, 23, 26, 27, 29, 32, 33, 46, 48, 50, 51, 52, 53, 87, 92, 93, 94, 95, 110, 116, 152, 159, 236, 106, 136, 138, 153, 179, 188, 196, 199, 200, 201, 208, 223, 255, 258
Water Supplies	10, 151, 171, 179, 223, 224, 240
Well Data	11, 14, 15, 17, 18, 20, 21, 25, 29, 32, 33, 70, 100, 104, 129, 148, 169, 239, 243, 244, 245, 264, 265
Well Tests	10, 14, 15, 21, 26, 27, 28, 29, 32, 33, 34, 66, 86, 87, 93, 120, 138, 197, 243, 244

NRC DOCUMENT DATA BASE

WWL Document Number: 1 Document Summary

TITLE: Hydrologic Mechanisms Governing Fluid Flow in Partially Saturated, Fractured, Porous Tuff at Yucca Mountain

AUTHOR: Wang, J.S.Y. and Narasimhan T.N.

Document Number: LBL-18473 Publication Date: Oct, 1984
Requested From: NRC Request Date: Oct, 1985
Received From: NRC Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS,LAD,DBM

KEY WORDS: Fracture Flow, Unsaturated Flow, Conceptual Model, Numerical Model

KEY DATA: Fracture Inclination

COMMENTS: The paper has received a formal review.

SUMMARY:
A general statistical theory is proposed to describe flow along and across fractures that separate partially saturated matrix blocks. This theory incorporates a model for estimating fracture aperture distributions and yields expressions for fracture saturation, fracture permeability, and effective areas of matrix-fracture flow as functions of pressure. With these expressions, drainage of a fractured tuff column was simulated using the TRUST numerical model. The values for parameters in the expressions are deduced from observations of fracture spacings and orientations in samples from Yucca Mountain, measurements of pressure-saturation relationships of matrix core samples and indirectly derived fracture-surface characteristics. In the simulations of the draining column, discrete vertical and horizontal fractures and intervening matrix blocks were explicitly taken into account.

NRC DOCUMENT DATA BASE

WWL Document Number: 2 Document Summary

TITLE: Preliminary Bounds on the Expected Postclosure Performance of the Yucca Mountain Repository Site, Southern Nevada

AUTHOR: Sinnock, Scott, Lin, Y.T. and Brannen Joseph P.

Document Number: SAND84-1492 Publication Date: Dec, 1984
Requested From: NRC Request Date: Oct, 1985
Received From: NRC Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Flux, Unsaturated Flow, Saturated Flow, Retardation, Waste Dissolution, Radionuclide Transport

KEY DATA: Matrix Properties, Fracture Properties, Solubilities, Radionuclide Inventory, Water Composition, Sorption Values

COMMENTS: The report gives a first order approximation to the performance characteristics of the repository.

SUMMARY:
A conceptual model is developed for the flow through the unsaturated zone. Low flux results in groundwater travel times to the water table that probably exceed 10000 years and may exceed 100000 years. The low flux will also limit releases of waste from the waste packages; the corresponding releases of curies would be well within the allowable releases set by the NRC. Geochemical retardation by sorption and diffusion will slow radionuclide movement relative to groundwater flow by factors of hundreds to thousands for many waste species. In combination, these site conditions provide a high degree of confidence that no releases to the accessible environment will occur during the first 10,000 years after repository closure. Even if rapid fracture flow were to occur, release of wastes to the accessible environment would probably remain low with respect to the EPA's limits.

NRC DOCUMENT DATA BASE

WWL Document Number: 3

Document Summary

TITLE: Conceptual Hydrologic Model of Flow in the Unsaturated Zone, Yucca Mountain, Nevada

AUTHOR: Montazer, P., and Wilson, W. E.

Document Number: USGS-84-4345
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): general
Document Read By (Initials): TLS,LAD,DBM

KEY WORDS: Conceptual Model, Fracture Flow, Unsaturated Flow, Capillary Barrier, Hysteresis, Vapor Transport, Saturated Flow, Perched Water

KEY DATA: Hydrologic properties

COMMENTS: The conceptual flow model presented is based on many assumptions which the data may or may not support. Generally a good paper to read. Formal reviews by WWL and W&A.

SUMMARY:
A conceptual model describing the flow of fluids through the unsaturated zone at Yucca Mountain is proposed. The proposed model considers the following flow phenomena in the unsaturated region: flow through fractured rock, capillary barriers, infiltration into fractured rock, lateral movement, and capillary fringe. The proposed model gives a representation of the flow in the hydrogeologic units and structural pathways at Yucca Mountain. Areas needing further investigation are identified.

NRC DOCUMENT DATA BASE

WWL Document Number: 4 Document Summary

TITLE: Commercial Geophysical Well Logs From The USW G-1 Drill Hole, Nevada Test Site, Nevada

AUTHOR: Muller, D. C., Kibler, J. E.

Document Number: USGS-OFR-83-321 Publication Date: 1983
Requested From: NRC Request Date: Oct, 1983
Received From: NRC Receipt Date: Nov, 1984

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs

KEY DATA: Summary of drill hole USW G-1 logging operations.

COMMENTS: Referenced plates #1 and #2 are not contained with the report.

SUMMARY:
The logs usefulness as lithologic indicators is limited primarily to correlations with welding in the tuff. The major conclusion that can be drawn is that the physical properties of the tuffs above the Tram Unit are quite variable, while Tram and tuff of Lithic Ridge are more uniform and predictable. Future work should include borehole gravimetry for surface gravity modeling, IP logs to determine sulfide mineral content, magnetometer logs for stratigraphic correlation and for paleomagnetic models, and magnetic susceptibility logs.

NRC DOCUMENT DATA BASE

WWL Document Number: 5 Document Summary

TITLE: Borehole Geophysical Measurements for Hole UE25a-3, Nevada Test Site, Nuclear Waste Isolation Program

AUTHOR: Daniels, J. J., and Scott, J. H.

Document Number: USGS-OFR-80-126 Publication Date: 1980
Requested From: NRC Request Date: Oct, 1985
Received From: NRC Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs

KEY DATA: None

COMMENTS:

SUMMARY:
Borehole geophysical measurements made in drill hole UE25a#3 with a USGS survey truck are presented. Well logs are presented in this paper for dual-detector density, normal resistivity, gamma ray, neutron-neutron, induced polarization, and magnetic susceptibility measurements. These data are analyzed for correlations with the core lithology. Hole-to-surface measurements made from the drill hole indicate the presence of two resistive bodies at depth. The deeper resistive anomaly may be related to a granitic intrusion.

NRC DOCUMENT DATA BASE

WWL Document Number: 6 Document Summary

TITLE: Finite-Element Simulation of Ground-Water Flow in the Vicinity of Yucca Mountain, Nevada-California

AUTHOR: Czarnecki, J. B., and Waddell, R. K.

Document Number: USGS 84-4349 Publication Date: 1984
Requested From: NRC Request Date: Oct, 1984
Received From: NRC Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Mesh Design, Boundary Conditions, Traveltime, Hydraulic Head, Transmissivity, Flux, Numerical Model, Saturated Flow

KEY DATA: Transmissivity, Flux, Sensitivity Analysis, Hydraulic Head

COMMENTS: Has received a formal review by W&A.

SUMMARY:
A finite element model was developed using parameter estimation techniques to simulate steady-state ground water flow in the vicinity of Yucca Mountain. Model residuals for simulated wersus measured hydraulic heads range from -28.6 to 21.4 meters; most are less than (+,-) 7 meters. The overall agreement between measured and simulated heads is good. Exceptions occur in areas where vertical flow components and/or steep hydraulic gradients occur. The model results also indicate areas where additional studies are needed. The presence of barriers in the model greatly affects the orientation of ground-water flow vectors. Few data are available regarding the shape , orientation, and extent of the barrier north of Yucca Mountain. The traveltime estimation procedure used to determine a possible range in traveltimes provides a means of comparing traveltimes resulting from different values of porosity and thickness. Although changing the anisotropy ratio in western Jackass Flats to achieve greater y-transmissivity versus x-transmissivity did produce faster traveltimes, it also led to larger error variance.

NRC DOCUMENT DATA BASE

WWL Document Number: 7 Document Summary

TITLE: Simulated Effects of Increased Recharge on the Ground-Water Flow System of Yucca Mountain and Vicinity, Nevada-California

AUTHOR: Czarnecki, J. B.

Document Number: USGS 84-4344 Publication Date: 1984
Requested From: NRC Request Date: Oct, 1985
Received From: NRC Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Saturated Flow, Recharge, Numerical Model

KEY DATA: Hydraulic Head Map, Precipitation

COMMENTS: Has received a formal review by W&A.

SUMMARY:
The report assesses the potential effects of changes in future climatic conditions on the ground-water system in the vicinity of Yucca Mountain. The study was performed by simulating the ground water system using a 2-D, finite element ground water flow model. The simulated position of the water table rose as much as 130 meters near the primary repository area at Yucca Mountain for a simulation involving a 100-percent increase in precipitation compared to modern-day conditions. Despite the water table rise, no flooding of the potential repository would occur at its current proposed location. Simulated directions of ground water flow paths near the potential repository area generally would be the same for the baseline (modern day climate) and the increased recharge simulations, but the magnitude of flow would increase by 2 to 4 times that of the baseline simulation flux

NRC DOCUMENT DATA BASE

WWL Document Number: 8 Document Summary

TITLE: Preliminary Assessment of Climatic Change During Late Wisconsin Time, Southern Great Basin and Vicinity, Arizona, California, and Nevada

AUTHOR: Spaulding, W. G., Robinson, S. W., and Paillet, F. L.

Document Number: USGS 84-4328
Requested From: NRC
Received From: NRC

Publication Date: 1984
Request Date: Oct, 1985
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Climate, Precipitation, Vegetation

KEY DATA: Paleoclimatic Data

COMMENTS:

SUMMARY:
A period of wetter conditions in the southern Great Basin during the latest Wisconsin may have incorporated increased precipitation during both the summer and winter, and lower temperatures during the winter, relative to the present. Resurgence of closed lakes in the southern Great Basin between 12000 and 10000 radiocarbon years before present and the persistance of exophytic vegetation where desert now exists are explicable phenomena in accordance with a proposed latest Wisconsin pluvial event. The climate of this pluvial event was much different from that of the preceding full glacial episode. Its general nature is consistent with what would be expected from current models of astronomically induced climatic changes.

NRC DOCUMENT DATA BASE

WWL Document Number: 9

Document Summary

TITLE: Two-Dimensional, Steady-State Model of Ground-Water Flow, Nevada Test Site and Vicinity, Nevada-California

AUTHOR: Waddell, R. K.

Document Number: USGS 82-4085
Publication Date: 1982
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Geology, Ground Water Basin, Numerical Model, Transmissivity, Boundary Conditions, Flux, Hydraulic Head

KEY DATA: Hydrologic Units, Transmissivity, Gradient, Flux

COMMENTS:

SUMMARY:
A 2-D, steady-state, finite-element model of the ground water flow system of the Nevada Test Site and vicinity was developed using parameter-estimation techniques. The model simulates flow in an area underlain by clastic, carbonate and volcanic rocks. Sensitivities of fluxes derived from simulated heads and head sensitivities were used to determine the parameters that would most affect predictions of radionuclide transport from a hypothetical nuclear repository in the southwest quadrant of the NTS. The important parameters for determining flux through western Jackass Flats and Yucca Mountain are recharge to and underflow beneath Pahute Mesa; and transmissivities of the Eleana Formation, clastic rocks underlying the Groom Range, tuffs underlying Fortymile Canyon, and tuffs beneath Yucca Mountain. In the eastern part of Jackass Flats, the important parameters are transmissivities of the Eleana Formation and recharge or discharge terms for Pahute Mesa, Ash Meadows, and the Sheep Range.

NRC DOCUMENT DATA BASE

WWL Document Number: 10 Document Summary

TITLE: Effect of Irrigation Pumping on Desert Pupfish Habitats in Ash Meadows, Nye County, Nevada

AUTHOR: Dudley, W. W.,Jr., and Larson, J. D.

Document Number: USGS-PP-927
Publication Date: 1976
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Aquitards, Climate, Ground Water Basin, Ground Water Movement, Pluvial, Potentiometric Surface Map, Precipitation, Recharge, Stratigraphy, Transmissivity, Water Chemistry, Water Supplies, Well Tests

KEY DATA: Precipitation, Pan Evaporation, Spring Flow Rates, Water Table Altitudes, Water Chemistry

COMMENTS:

SUMMARY:
The Ash Meadows area discharges ground water collected over several thousand square miles of a regional flow system developed in Paleozoic carbonate rocks. The Devils Hole pupfish is the most endangered of the surviving species that have evolved since the post-pluvial isolation of their ancestors. This population feeds and reproduces on a slightly submerged rock ledge. Recent irrigation pumping has nearly exposed this ledge. Hydraulic testing, long-term water-level monitoring, water quality, and geologic evidence aid in defining the principal flow paths and hydraulic interconnections in the Ash Meadows area.

NRC DOCUMENT DATA BASE

WWL Document Number: 11

Document Summary

TITLE: Hydrology of Yucca Mountain and Vicinity, Nevada-California--Investigative Results Through Mid-1983

AUTHOR: Waddell, R. K., Robison, J. H., and Blankennagel, R. K.

Document Number: USGS 84-4267
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Aquifer, Aquitard, Flux, Geohydrologic Data, Ground Water Basin, Meteorology, Pluvial, Precipitation, Recharge, Recommendations for Future Work, Stratigraphy, Water Chemistry, Well Data

KEY DATA: Flood Records, Hydrogeologic Column, Spring Data, Water Chemistry, Well Data Summary, Potentiometric Surface

COMMENTS: Has had a formal review by Williams and Assoc.

SUMMARY:
Conceptual models for flow in the saturated zone are presented and are modified after the original models presented by Winograd and Thordarson. Conceptual models for flow in the unsaturated zone are not presented in detail because investigations up to mid-1983 were concerned primarily with potential high level waste disposal in the saturated zone.

NRC DOCUMENT DATA BASE

WWL Document Number: 12 Document Summary

TITLE: Ground-Water Level Data and Preliminary Potentiometric-Surface Maps, Yucca Mountain and Vicinity, Nye County, Nevada

AUTHOR: Robison, J. H.

Document Number: USGS 84-4197
Requested From: NRC
Received From: NRC

Publication Date: 1984
Request Date: Oct, 1985
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Ground Water Level, Potentiometric Surface

KEY DATA: Well Depths, Well Altitudes, Water Levels

COMMENTS:

SUMMARY:
The report contains data on ground water levels and preliminary maps of the potentiometric surface beneath Yucca Mountain and adjacent areas. The water level surface shown on the maps generally represents unconfined conditions. West of the crest of Yucca Mountain, water level altitudes are about 775 meters above sea level. Along the eastern edge and southern end of Yucca Mountain, the potentiometric surface generally is nearly flat, is about 728 to 730 meters above sea level, and has a southeastward slope.

NRC DOCUMENT DATA BASE

WWL Document Number: 13

Document Summary

TITLE: Geohydrology of Volcanic Tuff Penetrated by Test Well UE-25b#1, Yucca Mountain, Nye County, Nevada

AUTHOR: Lahoud, R. G., Lobmeyer, D. H., and Whitfield, M. S., Jr.

Document Number: USGS 84-4253
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Lithology, Fracture Analysis, Geophysical Logs, Ground Water Level, Water Chemistry

KEY DATA: Well Construction, Lithologic Log, Porosity, Permeability, Fracture Distribution, Well Tests, Water Chemistry

COMMENTS:

SUMMARY:
Test well UE-25b#1 located on the east side of Yucca Mountain was drilled to a total of 1220 meters and hydraulically tested. The composite hydraulic head for aquifers penetrated by the well was 728.0 meters above sea level, with a slight decrease in hydraulic head with depth. Average hydraulic conductivities for stratigraphic units determined from pumping tests, borehole flow surveys, and packer injection tests ranged from less than 0.001 meter per day for the Tram Member of the Crater Flat Tuff to 1.1 meters per day for the overlying Bullfrog Member of the Crater Flat Tuff. Chemical analysis indicated that the water is a soft sodium bicarbonate type, slightly alkaline, with large concentrations of dissolved silica and sulfate. Uncorrected carbon-14 age dates of the water were 14,100 and 13,400 years.

NRC DOCUMENT DATA BASE

WWL Document Number: 14 Document Summary

TITLE: Geohydrology of Rocks Penetrated by Test Well UE-25p#1, Yucca Mountain Area, Nye County, Nevada

AUTHOR: Craig, R. W., and Robison, J. H.

Document Number: USGS 84-4248
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Well Tests, Water Chemistry

KEY DATA: Well Construction, Well Tests, Transmissivity

COMMENTS:

SUMMARY:
Test well UE-25p#1 was drilled to a total depth of 1805 meters. The composite static water level was approximately 381 meters below land surface for the Tertiary section and 361 meters for the Paleozoic section. ^AThe likely confining layer is a conglomerate near the bottom of the Tertiary section in the depth interval from 1138 to 1172 meters. In the Tertiary section, an interval of less than 30 meters in the upper part of the Prow Pass Member has an apparent transmissivity of 14 meters squared per day. Composition of water from the Tertiary section was similar to water from other wells in the Yucca Mountain area.

NRC DOCUMENT DATA BASE

WWL Document Number: 15

Document Summary

TITLE: Geohydrology of Test Well USW H-3, Yucca Mountain, Nye County, Nevada

AUTHOR: Thordarson, W., Rush, F. E., and Waddell, S. J.

Document Number: USGS 84-4272
Requested From: NRC
Received From: NRC

Publication Date: 1985
Request Date: Oct, 1985
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Well Tests

KEY DATA: Well Construction, Fracture Distribution, Well Tests

COMMENTS: Well test data was not analyzed in this report

SUMMARY:
The report presents data collected to determine the hydraulic characteristics of rocks penetrated in test well USW H-3. Data on drilling operations, lithology, borehole geophysics, hydrologic monitoring, pumping, swabbing, and injection tests for the well are contained in the report.

NRC DOCUMENT DATA BASE

WWL Document Number: 16

Document Summary

TITLE: Preliminary Evaluation of Hydrologic Properties of Cores of Unsaturated Tuff, Test Well USW H-1, Yucca Mountain, Nevada

AUTHOR: Weeks, E. P., and Wilson, W. E.

Document Number: USGS 84-4193
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Moisture Tension, Hydraulic Conductivity, Moisture Characteristic Curves, Flux, Core Analysis

KEY DATA: Density, Porosity, Volumetric Moisture Content, Moisture Tension, Hydraulic Conductivity, Moisture Characteristic Curves, Saturation-Tension Curves

COMMENTS:

SUMMARY:
Analyses were made on 19 core samples of unsaturated tuff from test well USW H-1. No direct measurements were made of moisture tension and hydraulic conductivity at ambient moisture content. Moisture char. curves relating saturation and moisture tension were developed from results of mercury injection tests. Ambient moisture tension estimated from these curves generally was 100 to 200 kPa. Values of relative permeability ranging from about 0.002 to 0.1 were determined by fitting an analytical expression to eight of the moisture char. curves, and then integrating to solve for relative permeability. These values of relative permeability were applied to values of saturated hydraulic conductivity of core from a nearby test well to obtain effective hydraulic conductivities of about 8E-12 to 7E-10 cm/sec. If a unit hydraulic head gradient is assumed, these values convert to a vertical flux through the tuff matrix of 0.003 to 0.2 mm/yr.

NRC DOCUMENT DATA BASE

WWL Document Number: 17

Document Summary

TITLE: Geohydrologic and Drill-Hole Data for Test Well USW H-3, Yucca Mountain, Nye County, Nevada

AUTHOR: Thordarson, W., Rush, F. E., Spengler, R. W., and Waddell, S. J.

Document Number: USGS-OFR-84-149
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs, Well Data

KEY DATA: Water Levels, Hydraulic Tests, Fracture Distribution, Lithologic Log, Geophysical Well Logs, Injection Test, Pumping Test, Radioactive Tracer Flow Survey

COMMENTS:

SUMMARY:
The following data is presented for test well USW H-3: Bit and casing data, Lithologic log, Geophysical Well Logs, Lineations, Distribution of out of gage hole, Fracture distribution, Water Levels, Drilling Fluid Use, Pumping test data, injection test data, Recovery data, Radioactive tracer flow survey

NRC DOCUMENT DATA BASE

WWL Document Number: 18 Document Summary

TITLE: Hydrologic and Drill-Hole Data For Test Wells UE-29a#1 and UE-29a#2, Fortymile Canyon, Nevada Test Site

AUTHOR: Waddell, R. K., Jr.

Document Number: USGS-OFR-84-142
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Well Tests

KEY DATA: Lithologic Log, Water Chemistry, Well Test Data, Water Levels

COMMENTS: Well test data was not analyzed in the report.

SUMMARY:
Both wells were drilled in Fortymile Canyon. Drilling difficulties caused the abandonment of UE-29a#1; drilling problems and a rig accident caused cessation of drilling of UE-29a#2 before the desired total depth was reached. Six pumping tests were performed, and water samples were collected during two series of tests in UE-29a#1. Two short term, slow pumping rate tests were performed in UE-29a#1; a water sample was collected in a subsequent period of pumping for which no drawdown data were collected.

NRC DOCUMENT DATA BASE

WWL Document Number: 19

Document Summary

TITLE: Geological and Geophysical Evidence of Structures in Northwest-Trending Washes, Yucca Mountain, Southern Nevada, and Their Possible Significance to a Nuclear Waste Repository in the Unsaturated Zone

AUTHOR: Scott, R. B., Bath, G. D., Flanigan, V. J., Hoover, D. B., Rosenbaum, J. G., and Spengler, R. W.

Document Number: USGS-OFR-84-567
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Faults, Recommendations for Future Work

KEY DATA: Generalized Geologic Map

COMMENTS:

SUMMARY:
Geological and geophysical evidence suggests that five prominent linear northwest-trending washes in the northeastern part of Yucca Mountain are underlain by zones of right-lateral strike-slip faults. Strike-slip faults in the northeastern part of Yucca Mountain will affect the stability of mined openings where brecciated or highly fractured zones are encountered.

NRC DOCUMENT DATA BASE

WWL Document Number: 20

Document Summary

TITLE: Stratigraphic and Structural Relations of Volcanic Rocks in Drill Holes USW GU-3 and USW G-3, Yucca Mountain, Nye County, Nevada

AUTHOR: Scott, R. B., and Castellanos, M.

Document Number: USGS-OFR-84-491
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Core, Faults, Fracture Analysis, Fractures, Lithology, Petrology, Stratigraphy, Well Data

KEY DATA: Well Data, Geologic Data, Drill Hole Deviation, Fracture Frequency, Rose Diagram of Fracture Azimuth

COMMENTS:

SUMMARY:
This report concerns the stratigraphic and structural character of two drill holes, USW GU-3 and USW G-3, drilled 30 m apart as a two-stage coordinated drilling and geophysical logging program. Continuous core was obtained between Jan and June, 1982 from these two drill holes to a depth of 1533 meters. Emphasis in the report is placed upon the lithologic, stratigraphic, and structural character of the core recovered at the two drill holes, stratigraphic correlation between preexisting drill holes and structural correlation with surface mapping on Yucca Mountain are also presented.

NRC DOCUMENT DATA BASE

WWL Document Number: 21

Document Summary

TITLE: Geohydrologic Data for Test Well UE-25p#1, Yucca Mountain Area, Nye County, Nevada

AUTHOR: Craig, R. W., and Johnson, K. A.

Document Number: USGS-OFR-84-450
Requested From: NRC
Received From: NRC

Publication Date: 1984
Request Date: Oct, 1985
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Well Tests, Water Chemistry

KEY DATA: Lithologic Log, Well Construction, Water Levels, Well Tests, Water Analysis

COMMENTS: The well test data was not analyzed.

SUMMARY:
Test well UE-25p#1 was drilled to a total depth of 1,805 meters. From 1,244 to 1,805 meters the rock is dolomite of Paleozoic age. The report presents the following data for the test well: drilling operations, lithology, availability of borehole geophysical logs, water levels, water chemistry, pumping tests, borehole flow survey, and packer injection tests.

NRC DOCUMENT DATA BASE

WWL Document Number: 22

Document Summary

TITLE: Rock Property Measurements on Large-Volume Core Samples From Yucca Mountain USW GU-3/G-3 and USW G-4 Boreholes, Nevada Test Site, Nevada

AUTHOR: Anderson, L. A.

Document Number: USGS-OFR-84-552
Publication Date: 1984
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Core Analysis

KEY DATA: Density, Porosity

COMMENTS:

SUMMARY:
Core samples from USW GU-3/G-3 and USW G-4 boreholes were analyzed for the following; electrical resistivity, induced polarization, porosity, bulk and grain density, and compressional sonic velocity.

NRC DOCUMENT DATA BASE

WWL Document Number: 23

Document Summary

TITLE: Hydrogeologic and Hydrochemical Framework, South-Central Great Basin, Nevada-California, With Special Reference to the Nevada Test Site

AUTHOR: Winograd, I. J., and Thordarson, W.

Document Number: USGS-PP-712-C
Publication Date: 1975
Requested From: NRC
Request Date: Oct, 1985
Received From: NRC
Receipt Date: Nov, 1985

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): General
Document Read By (Initials): TLS

KEY WORDS: Geology, Aquifers, Aquitards, Ground Water Movement, Ground Water Basin, Recharge, Precipitation, Water Chemistry

KEY DATA: Hydrogeologic Map, Well Test, Permeability, Fracture Transmissibility, Porosity, Hydraulic Gradients, Water Analysis

COMMENTS: A good overview of the regional ground water systems.

SUMMARY:
Strata in the Nevada Test Site are divided into 10 hydrogeologic units. Three of these-the lower clastic aquitard, the lower carbonate aquifer, and the tuff aquitard- control the regional movement of ground water. Synthesis of hydrogeologic, hydrochemical, and isotopic data suggests that an area of at least 4500 square miles is hydraulically integrated into one ground water basin, the Ash Meadows basin, by interbasin movement of ground water through the widespread carbonate aquifer. Discharge from this basin-a minimum of about 17000 acre-feet annually-occurs along a fault-controlled spring line at Ash Meadows in east-central Amargosa Desert. Within the Nevada Test Site, ground water moves southward and southwestward toward Ash Meadows.

NRC DOCUMENT DATA BASE

WWL Document Number: 24

Document Summary

TITLE: Paleohydrology of the Southern Great Basin, With Special Reference to Water Table Fluctuations Beneath the Nevada Test Site During the Late(?) Pleistocene

AUTHOR: Winograd, I. J., and Doty, G. C.

Document Number: USGS-OFR-80-569
Publication Date: 1980
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Ground Water Level, Pluvial

KEY DATA: Water Level Change

COMMENTS:

SUMMARY:
The distribution of calcitic veins in alluvium and lakebeds, and of tufa deposits, between the Ash Meadows spring discharge area and the NTS suggests that discharge from the regional Paleozoic carbonate aquifer during the Late(?) Pleistocene occurred at distances as much as 14 kilometers northeast of Ash Meadows and at altitudes up to 50 meters higher than at present.

NRC DOCUMENT DATA BASE

WWL Document Number: 25 Document Summary

TITLE: Stratigraphy and Structure of Volcanic Rocks in Drill Hole USW-G1, Yucca Mountain, Nye County, Nevada

AUTHOR: Spengler, R. W., Byers, F. M., and Warner, J. B.

Document Number: USGS-OFR-81-1349 Publication Date: 1981
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Stratigraphy, Core, Fracture Analysis

KEY DATA: Fracture Frequency, Well Completion Data, Lithologic Log

COMMENTS:

SUMMARY:
Drill hole USW-G1 was cored from 292 to 6000 feet. Examination of core for structural features revealed the presence of 61 shear fractures, 528 joints, and 4 conspicuous fault zones. Shear fractures mainly occurred in the TSw, flow breccia, and near fault zones. Conspicuous fault zones, arbitrarily defined by their disruption of more than 5 feet of core, were recognized by the concentration of shears coupled with the presence of fault breccia, clay gouge, and granulated core. A coincidence occurs between joint development and the degree of welding. Nearly 88 percent of shear and joint surfaces show evidence of coatings. Approximately 40 percent of the fractures were categorized as completely healed.

NRC DOCUMENT DATA BASE

WWL Document Number: 26 Document Summary

TITLE: Geohydrology of Test Well USW H-1, Yucca Mountain, Nye County, Nevada

AUTHOR: Rush, F. E., Thordarson, W., and Pyles, D. G.

Document Number: USGS-83-4032 Publication Date: 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Hydraulic Head, Transmissivity, Hydraulic Conductivity, Core, Pore Saturation, Geophysical Logs, Well Tests, Conceptual Model, Ground Water Level, Perched Water, Water Chemistry, Porosity

KEY DATA: Density, Matrix Porosity, Pore Saturation, Hydraulic Conductivity, Water Levels, Pump Test Data, Transmissivity, Hydraulic Conductivity, Storage, Chemical Analysis

COMMENTS: A very good report.

SUMMARY:
Based on the results of 3 pump tests, 6 injection tests, radioactive tracer surveys, hydrological monitoring, core analysis, and geophysical log interpretations; (1) Stratigraphic units from the surface through the Topopah Spring Member generally are intensively fractured, relatively porous, and unsaturated; (2) The water table is at a depth of 572 m, in the upper part of the Prow Pass Member. In the interval from 448 to 572 m, the rock is nearly saturated, probably with a perched saturated zone from 448 to 458 m. Water seeps were observed at many depths with a TV camera log; (3) For the Bullfrog Member, the avg. horiz. matrix hydraulic conductivity is about twice the magnitude of the avg. vertical matrix hydraulic conductivity; (4) Four zones showed temperature gradient reversals and four zones showed large increases in the temperature gradient. Hydrological conditions which may be related to the geothermal conditions have not been identified for this report. All eight zones are above the water table; (5) During drawdown and recovery tests, a slight drawdown occurred in well USW G-1, 430 m northwest; (6) Hydraulic head

in the zone 688 to 741 m below surface was 730 m above sea level. Deeper zones had hydraulic heads of 781 meters above sea level or higher, indicating an upward component of groundwater flow at the site; (7) Based on results of the pumping tests, nearly all the permeable rock penetrated by this well is in the Prow Pass Member above a depth of 688 m.

NRC DOCUMENT DATA BASE

WWL Document Number: 27

Document Summary

TITLE: Geohydrologic Data for Test Well USW G-4 Yucca Mountain Area, Nye County, Nevada

AUTHOR: Bentley, C. B.

Document Number: USGS-OFR-84-063
Publication Date: 1984
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Lithology, Well Tests, Ground Water Level, Water Chemistry

KEY DATA: Well Construction, Water Levels, Pumping Test, Borehole Flow Survey, Injection Test, Water Chemistry

COMMENTS: Pumping and Injection Test Data is graphically plotted as drawdown vs. time, recovery vs. time, and head above static level vs. time. The data has not been analyzed.

SUMMARY:
This report presents data on drilling operations, lithology, borehole geophysics, hydrologic monitoring, core analysis, water chemistry, pumping tests, and packer-injection tests for test well USW G-4. Test well USW G-4 was drilled to a total depth of 915 meters. Depth of water in the well during drilling and testing ranged from 538 to 544 meters below land surface. Drawdown in the well was about 3 meters after test pumping more than 5,000 minutes at a rate of 16 liters per second. A borehole flow survey indicated that almost all water withdrawn from the well was contributed by a zone between a depth of about 865 and 915 meters below land surface. A composite water sample collected after well completion contained 216 mg/liter of dissolved solids, with relatively large concentrations of silica, sodium and bicarbonate.

NRC DOCUMENT DATA BASE

WWL Document Number: 28 Document Summary

TITLE: Geohydrologic Data for Test Well UE-25b#1 Nevada Test Site, Nye County, Nevada

AUTHOR: Lobmeyer, D. H., Whitfield, M. S., Jr., Lahoud, R. R., Bruckheimer, L.

Document Number: USGS-OFR-83-855
Publication Date: 1983
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Core, Well Tests

KEY DATA: Lithologic Log, Geophysical Logs, Water Levels, Well Tests, Porosity, Density, Saturation, Permeability, Water Analysis

COMMENTS:

SUMMARY:
Data on drilling operations, lithology, core analyses, borehole geophysics, hydrologic monitoring, hydraulic testing, and ground water chemistry for test well UE-25b#1 are contained in this report

NRC DOCUMENT DATA BASE

WWL Document Number: 29 Document Summary

TITLE: Geohydrologic and Drill-Hole Data for Test Well USW H-4, Yucca Mountain, Nye County, Nevada

AUTHOR: Whitfield, M. S., Jr., Thordarson, W., and Eshom, E. P.

Document Number: USGS-OFR-449 Publication Date: 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs, Ground Water Level, Lithology, Water Chemistry, Well Data, Well Tests

KEY DATA: Well Data, Water Levels, Drilling Fluid Use, Pump Test, Injection Test, Water Chemistry

COMMENTS:

SUMMARY:
Test well USW H-4 was drilled in ash-flow tuff to a total depth of 1219 meters. Depth to water below land surface was 519 meters, or at an altitude of 730 meters above sea level. After test pumping at a rate of 17.4 liters per second for approximately 9 days, the drawdown was 4.85 meters. A radioactive borehole-flow survey indicated that the Bullfrog Member of the Crater Flat Tuff was the most productive geologic unit, producing 36.5 percent of the water in the well. The second most productive geologic unit was the Tram Member of the Crater Flat Tuff, which produced 32 percent of the water. The water in test well USW H-4 is predominantly a soft, sodium bicarbonate type of water typical of water produced in tuffaceous rocks in southern Nevada.

NRC DOCUMENT DATA BASE

WWL Document Number: 30

Document Summary

TITLE: Borehole Gravity Meter Surveys in Drill Holes USW G-3, UE-25p#1 and UE-25c#1, Yucca Mountain Area, Nevada

AUTHOR: Healey, D. L., Clutsom, F. G., and Glover, D. A.

Document Number: USGS-OFR-84-672
Publication Date: 1984
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs, Stratigraphy

KEY DATA: Density

COMMENTS: Has received a formal review by W&A.

SUMMARY:
The borehole gravity meter (BHGM) measures a larger volume of rock than conventional logging tools and provides an independent measurement of the in situ bulk density. Drill holes USW G-3, UE-25p#1, and UE-25c#1 were logged with the BHGM and free-air gradient (FAG) measurements were made at UE-25p#1 and UE-25c#1. The interval densities calculated from the three BHGM surveys are presented herein.

NRC DOCUMENT DATA BASE

WWL Document Number: 31

Document Summary

TITLE: Preliminary Analysis of Geophysical Logs From Drill Hole UE-25p#1, Yucca Mountain, Nye County, Nevada

AUTHOR: Muller, D. C., and Kibler, J. E.

Document Number: USGS-OFR-84-649
Publication Date: 1984
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs

KEY DATA: Geophysical Logs

COMMENTS:

SUMMARY:
This report presents a preliminary analysis of the geophysical log data, and documents the data for Quality Assurance required by the Nuclear Regulatory Commission (NRC) and for use by other investigators. Detailed analysis of the data is not contained in this report.

NRC DOCUMENT DATA BASE

WWL Document Number: 32 Document Summary

TITLE: Geohydrologic Data For Test Well USW H-6 Yucca Mountain Area, Nye County, Nevada

AUTHOR: Craig, R. W., Reed, R. L., and Spengler, R. W.

Document Number: USGS-OFR-83-856
Publication Date: 1984
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Well Tests, Water Chemistry

KEY DATA: Water Level, Well Test Data, Water Analysis

COMMENTS: The well test data was not analyzed.

SUMMARY:
Test well USW H-6 was drilled to a total depth of 1220 meters. Rocks penetrated are predominantly ash flow tuffs. Lava was encountered from 877 to 1126 meters. The composite static water level is approximately 526 meters below land surface. The well was pumped during two periods. Maximum drawdown was about 18 meters after pumping for 4822 minutes at 28 liters per second, and 12 meters after pumping for 2,226 minutes at 27 liters per second. A borehole flow survey showed that 91 percent of the water withdrawn from the well came from the depth intervals from 616 to 631 meters, and from 777 to 788 meters.

NRC DOCUMENT DATA BASE

WWL Document Number: 33

Document Summary

TITLE: Geohydrologic Data For Test Well USW H-1 Yucca Mountain Area, Nye County, Nevada

AUTHOR: Rush, F. E., Thordarson, W., and Bruckheimer, L.

Document Number: USGS-OFR-83-141
Publication Date: 1983
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): general
Document Read By (Initials): TLS

KEY WORDS: Well Data, Lithology, core, Geophysical Logs, Well Tests, Ground Water Level, Water Chemistry

KEY DATA: Casing Data, Lithologic Log, Core Analysis, Water Levels, Drawdown Data, Recovery Data, Injection Test Data

COMMENTS:

SUMMARY:
This report presents data collected to determine the hydraulic characteristics of rocks penetrated in test well USW H-1. Data on drilling operations, lithology, borehole geophysics, hydrologic monitoring, core analysis, ground water chemistry and pumping and injection tests are contained. All data tables presented were compiled by the authors except where otherwise noted.

NRC DOCUMENT DATA BASE

WWL Document Number: 34 Document Summary

TITLE: Geohydrologic Data For Test Well USW H-5 Yucca Mountain Area, Nye County, Nevada

AUTHOR: Bentley, C. B., Robison, J. H., and Spengler, R. W.

Document Number: USGS-OFR-83-853 Publication Date: 1983
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Lithology, Well Tests

KEY DATA: Well Construction, Lithologic Log, Water Levels, Drawdown Test, Recovery Test, Borehole Flow Survey, Injection Test

COMMENTS: Buildup, Drawdown, and Injection Test Data has not been analyzed.

SUMMARY:
The report presents data on drilling operations, lithology, borehole geophysics, water-level monitoring, core analysis, ground water chemistry, pumping tests, and packer injection tests for test well USW H-5. The well was drilled to a total depth of 1219 meters through volcanic rock consisting mostly of ash-flow tuff. Depth to water in the well ranged between 703.8 and 707.2 meters below land surface, at an approximate altitude of 774 meters above sea level. Draw-down in the well exceeded 6 meters after test pumping more than 3000 minutes at a rate of 120 liters per second. Borehole-flow surveys showed that about 90 percent of the water in the well is contributed by the zone between 707 and about 820 meters below land surface. Two composite water samples collected after well completion contained 206 and 220 milligrams per liter of dissolved solids. Sodium and bicarbonate were the predominate dissolved anion and cation. The concentration of dissolved silica was 48 milligrams per liter in both samples, which is a relatively large concentration for most natural water.

NRC DOCUMENT DATA BASE

WWL Document Number: 35

Document Summary

TITLE: Preliminary Interpretation of Thermal Data from the Nevada Test Site

AUTHOR: Sass, J. H., and Lachenbruch, A. H.

Document Number: USGS-OFR-82-973
Publication Date: 1982
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Flux, Thermomechanical Properties, Vapor Transport

KEY DATA: Temperature Profiles, Heat Flow Determination, Thermal Conductivity, Density, Apparent Porosity

COMMENTS:

SUMMARY:
Analysis of data from 60 wells in and around the Nevada Test Site, including 16 in the Yucca Mountain area, indicates a thermal regime characterized by large vertical and lateral gradients in heat flow. Estimates of heat flow indicate considerable variation on both regional and local scales. The variations are attributable primarily to hydrologic processes involving interbasin flow with a vertical component of (seepage) velocity (volume flux) of a few mm/yr.

NRC DOCUMENT DATA BASE

WWL Document Number: 36

Document Summary

TITLE: Vegetation and Climates of the Last 45,000 Years in the Vicinity of the Nevada Test Site, South-Central Nevada

AUTHOR: Spaulding, W. G.

Document Number: USGS-OFR-83-535
Publication Date: 1983
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Climate, Pluvial, Precipitation, Vegetation

KEY DATA: Precipitation Data, Vegetation

COMMENTS:

SUMMARY:
The objective of this study is to characterize long-term climatic variability inherent to the Nevada Test Site. Specifically, paleoenvironmental and paleoclimatic reconstructions spanning the last 45,000 years are offered to facilitate calculations of potential variations in water-table levels and ground-water recharge. Radiocarbon-dated plant macrofossil assemblages from ancient packrat middens in the Nevada Test Site and vicinity provide data for these paleoclimatic reconstructions. The uniformitarian assumption is made that climates of the last 45,000 years approximate the climates that will occur in the next 100,000 years.

NRC DOCUMENT DATA BASE

WWL Document Number: 37

Document Summary

TITLE: Preliminary Report on the Geology and Geophysics of Drill Hole UE25a-1, Yucca Mountain, Nevada Test Site

AUTHOR: Spengler, R. W., Muller, D. C., Livermore, R. B.

Document Number: USGS-OFR-79-1244
Publication Date: 1979
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geology, Stratigraphy, Core, Geophysical Logs

KEY DATA: Joint Inclination, Shear Fracture Inclination, Porosity, Saturation

COMMENTS:

SUMMARY:
Structural analysis of the core indicated densely welded zones to be highly fractured. Many fractures show near-vertical inclinations and are commonly coated with secondary silica, manganese and iron oxides, and calcite. Five fault zones were recognized, most of which occurred in the Topopah Spring Member. Shear fractures commonly show oblique slip movement and some suggest a sizable component of lateral compression. Graphic logs are included that show the correlation of lithology, structural properties, and geophysical logs. Many rock units have characteristic log responses but highly fractured zones, occurring principally in the Tiva Canyon and Topopah Spring Members, Restricted log coverage to the lower half of the drill hole.

NRC DOCUMENT DATA BASE

WWL Document Number: 38 Document Summary

TITLE: A Mineral Inventory of the Nevada Test Site, and Portions of Nellis Bombing and Gunnery Range, Southern Nye County, Nevada

AUTHOR: Quade, J., and Tingley, J. V.

Document Number: DOE/NV/10295-1
Requested From: NRC
Received From: NRC

Publication Date: Sept, 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Mineralogy

KEY DATA: None

COMMENTS:

SUMMARY:
The Nevada Test Site Mineral Inventory was completed in two stages. First, a search of the literature was made, and data on mineral occurrences within the project area were compiled. Mining activity in the area was plotted on maps for field use. During the field phase of the project, every accessible mining district within the study area was examined. Information generated included summary reports, mining district folios, and maps. No attempt was made to compile detailed geologic information on the districts. The efforts were confined to acquiring geological and geochemical data on individual mines and prospects.

NRC DOCUMENT DATA BASE

WWL Document Number: 39 Document Summary

TITLE: Final Environmental Impact Statement Nevada Test Site Nye County, Nevada

AUTHOR: Energy Research & Development Administration

Document Number: ERDA-1551
Requested From: NRC
Received From: NRC

Publication Date: Sept, 1977
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Climate, Geology, Ground Water Basin, Potentiometric Surface Map, Precipitation

KEY DATA: Potentiometric Surface Map

COMMENTS:

SUMMARY:
This environmental statement considers underground nuclear detonations with yields of one megaton or less, along with the preparations necessary for such detonations. The testing activities considered also include other continuing and intermittent activities, both nuclear and nonnuclear, which can best be conducted in the remote and controlled area of the Nevada Test Site

NRC DOCUMENT DATA BASE

WWL Document Number: 40

Document Summary

TITLE: Preliminary Evaluation of Alterant Geophysical Tomography in Welded Tuff

AUTHOR: Ramirez, A. L., and Daily, W. D.

Document Number: UCID-20289
Requested From: NRC
Received From: NRC

Publication Date: Dec, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Fracture Analysis, Geophysical Logs, Pore Saturation

KEY DATA:

COMMENTS:

SUMMARY:
In-situ electromagnetic measurements have been performed at 300 MHz to evaluate the applicability of alterant geophysical tomography to delineate flow paths in a welded tuff rock mass. The measurements were made before, during and after a water-based tracer flowed through the rock mass. Alterant geophysical tomographs are compared with independent evidence--borescope logs, neutron logs and dyed rock samples. Anomalies imaged in the tomograph match fractures mapped with the borescope. The location of tracer-stained fractures coincides with the location of some image anomalies; other geophysical anomalies exist where tracer-stained fractures were not observed, perhaps due to poor core recovery. Consequently, a conclusive evaluation of the technique's effectiveness is not possible at present. Additional work is planned to conclusively evaluate the capabilities of alterant geophysical tomography in an environment similar to the Waste Package Environment Tests expected in Yucca Mountain.

NRC DOCUMENT DATA BASE

WWL Document Number: 41

Document Summary

TITLE: Transport Properties of Topopah Spring Tuff

AUTHOR: Lin, W., and Daily, W.

Document Number: UCRL-53602
Requested From: NRC
Received From: NRC

Publication Date: Oct, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Permeability, Porosity, Recommendations for Future Work, Thermomechanical Properties

KEY DATA: Permeability

COMMENTS:

SUMMARY:
Electrical resistivity, ultrasonic P-wave velocity, and water permeability were measured simultaneously on both intact and fractured Topopah Spring tuff samples at a confining pressure of 5.0 MPa, pore pressures to 2.5 MPa, and temperatures to 140 deg C. The tested samples were subjected to three dehydration and rehydration cycles. The dehydrations were accomplished at a temperature of 140 deg C, and the rehydrations were accomplished at various combinations of temperature and pore pressures so that the wetting fluid was either liquid water steam, or both. The permeability of the intact sample was independent of temperature, dehydration and rehydration cycles, and time. The permeability of the fractured sample, initially dominated by the fracture, decreased by about one order of magnitude after each dehydration and rehydration cycle.

NRC DOCUMENT DATA BASE

WWL Document Number: 42

Document Summary

TITLE: Detailed Mineralogical Characterization of the Bullfrog and Tram Members in USW-G1, with Emphasis on Clay Mineralogy

AUTHOR: Bish, D. L.

Document Number: LA-9021-MS
Requested From: NRC
Received From: NRC

Publication Date: Oct, 1981
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Mineralogy, Stratigraphy

KEY DATA:

COMMENTS:

SUMMARY:
The detailed mineralogy of the Bullfrog and Tram Members of the Crater Flat Tuff from drill hole USW-G1 has been examined, primarily to characterize fully the amounts and types of clay minerals in the tuffs and the possible effects clay minerals have on rock properties. Results of bulk sample x-ray diffraction analyses agree closely with previous determinations, although slightly higher clay mineral contents were found in this study.

NRC DOCUMENT DATA BASE

WWL Document Number: 43

Document Summary

TITLE: Further Description of the Petrology of the Topopah Spring Member of the Paintbrush Tuff in Drill Holes UE25A-1 and USW-G1 and of the Lithic Rich Tuff in USW-G1, Yucca Mountain, Nevada

AUTHOR: Carroll, P. I., Caporuscio, F. A., and Bish, D. L.

Document Number: LA-9000-MS
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1982
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Mineralogy, Petrology

KEY DATA:

COMMENTS:

SUMMARY:
The Topopah Spring Member (TSw) has two compound cooling units. The upper, thinner unit is densely welded to vitrophyric. The lower unit ranges from nonwelded to vitrophyric, and its nonwelded base is extensively zeolitized to clinoptilolite and mordenite. Heulandite occurs as fracture fill in the overlying vitrophyric part, but zeolites are absent above that vitrophyre. Here primary devitrification plus vapor-phase crystallization dominate the mineralogy. Vapor-phase effects are especially prominent between the two vitrophyres in both cores and include numerous large lithophysal cavities throughout most of this moderately to densely welded tuff. The lithic-rich tuff is nonwelded to partly welded but is well indurated due to pervasive intergrowths of authigenic minerals.

NRC DOCUMENT DATA BASE

WWL Document Number: 44

Document Summary

TITLE: Preliminary Stratigraphic and Petrologic Characterization of Core Samples from USW-G1, Yucca Mountain, Nevada

AUTHOR: Carroll, P. R., and Waters, A. C.

Document Number: LA-8840-MS
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1981
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geology, Lithology, Mineralogy, Stratigraphy

KEY DATA:

COMMENTS:

SUMMARY:
The tuffs are partly recrystallized to a variety of secondary minerals. The important alteration products are zeolites, smectite clays, and various forms of silica. Zeolites are first observed at about the 1300 ft depth, and the high-temperature boundary of zeolite stability in this core occurs at about 4350 ft. Analcime persists, either metastably or as a retrograde mineral, deeper in the core.

NRC DOCUMENT DATA BASE

WWL Document Number: 45 Document Summary

TITLE: Mineralogy and Petrology of Tuff Units from the UE25a-1 Drill Site, Yucca Mountain, Nevada

AUTHOR: Sykes, M. L., Heiker, G. H., and Smyth, J. R.

Document Number: LA-8139-MS
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1979
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Mineralogy, Petrology, Stratigraphy

KEY DATA:

COMMENTS:

SUMMARY:
Two major zeolitized horizons occur at depths below 380 m. These horizons are restricted to low density, high porosity nonwelded tuffs below the basal vitrophyre of the Topopah Springs Member, and interfinger with more densely welded devitrified tuffs of granophyric mineralogy. Zeolites occur as glass pyroclast replacement, vug linings, and fracture fillings. Nonwelded units above the welded portion of the TSw are essentially unaltered, indicating that they have never been ground water-saturated for any significant length of time.

NRC DOCUMENT DATA BASE

WWL Document Number: 46

Document Summary

TITLE: Research and Development Related to the Nevada Nuclear Waste Storage Investigations January 1 - March 31,1984

AUTHOR: Crowe, B. M., and Vaniman, D. T.

Document Number: LA-10154-PR
Requested From: NRC
Received From: NRC

Publication Date: Feb, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Summary
Document Read By (Initials): TLS

KEY WORDS: Exploratory Shaft, Fractures, Geochemistry, Pluvial, Radionuclide Transport, Retardation, Water Chemistry

KEY DATA: Solubility, Water Chemistry, Retardation

COMMENTS:

SUMMARY:
The document provides a summary of the research and development related to the NNWSI project from Jan. 1 to Mar. 31, 1984. The summary includes sections on Geochemistry of Tuff, Groundwater Chemistry, Solubility Determinations, Plutonium Chemistry, Sorption and Precipitation, Applied Diffusion, Natural Isotope Chemistry, Dynamic Transport, Fracture Fillings by Zone, and Exploratory Shaft design.

NRC DOCUMENT DATA BASE

WWL Document Number: 47

Document Summary

TITLE: Minerals in Fractures of the Unsaturated Zone from Drill Core USW G-4, Yucca Mountain, Nye County, Nevada

AUTHOR: Carlos, B. Arney

Document Number: LA-10415-MS
Requested From: NRC
Received From: NRC

Publication Date: May, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Mineralogy, Fractures, Ground Water Level

KEY DATA: Mineral Analysis

COMMENTS: Has received a formal review by W&A.

SUMMARY:
The mineralogy of fractures in drill core USW G-4, from a depth of nearly 800 feet to the static water level (SWL) at 1770 feet, was examined to determine the sequence of deposition and the identity of minerals that might be natural barriers to radionuclide migration from a nuclear waste repository. The unsaturated zone below 244 meters was divided into three rock types: devitrified, glossy, and zeolitized host rock. Fracture-lining zeolites for each of these three rock types differ in mineralogy and morphology. Similarities between fracture mineralogy and host-rock alteration in the nonwelded zeolitic units of the Topopah Spring Member suggest that this zone was once below the water table. Nonwelded glass shards present in the host rock above the zeolite-mineral transition in the fractures indicated that the water table was never higher than the lithic-rich base of the Topopah Spring Member in the vicinity of USW G-4.

NRC DOCUMENT DATA BASE

WWL Document Number: 48 Document Summary

TITLE: Groundwater Chemistry Along Flow Paths Between a Proposed Repository Site and the Accessible Environment

AUTHOR: Ogard, A. E., and Kerrisk, J. F.

Document Number: LA-10188-MS
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Water Chemistry

KEY DATA: Water Analysis, Radionuclide Solubility

COMMENTS: Has received a formal review by W&A.

SUMMARY:
The groundwater from all pumped wells in and near the site has been sampled and analyzed; the results are reported in this document. The speciation and solubility of nuclear waste elements in these groundwaters have been calculated using the EQ3/6 computer code. Estimates have also been made of the pH and Eh buffering capacity of the water/rock system of Yucca Mountain. ^A

NRC DOCUMENT DATA BASE

WWL Document Number: 49

Document Summary

TITLE: Theoretical and Experimental Determination of Matrix Diffusion and Related Solute Transport Properties of Fractured Tuffs From the Nevada Test Site

AUTHOR: Walter, G. R.

Document Number: LA-9471-MS
Requested From: NRC
Received From: NRC

Publication Date: Oct, 1982
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Core Analysis, Fractures, Numerical Model, Radionuclide Transport, Retardation

KEY DATA: Porosity versus Pore Diameter, Tortuosities, Porosity

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Theoretical and experimental studies of the chemical and physical factors which affect molecular diffusion of dissolved substances from fractures into a tuffaceous rock matrix were made on rocks from G-tunnel and Yucca Mountain at the NTS. A variety of groundwater tracers have been developed and tested. Although a number of physical/chemical processes may cause nonconvective transport of dissolved species from fractures into the tuff matrix, molecular diffusion seems to be the most important process. The diffusion paths in tuff are more tortuous than in granular media.

NRC DOCUMENT DATA BASE

WWL Document Number: 50 Document Summary

TITLE: Reaction-Path Calculations of Groundwater Chemistry and Mineral Formation at Rainier Mesa, Nevada

AUTHOR: Kerrisk, J. F.

Document Number: LA-9912-MS
Requested From: NRC
Received From: NRC

Publication Date: Dec, 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Geochemistry, Groundwater, Water Chemistry

KEY DATA: Dissolution Rate, Reaction Progress

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Reaction-path calculations of groundwater chemistry and mineral formation at Rainier Mesa have been done using a model of volcanic-glass dissolution by water that is initially saturated with carbon dioxide. Predicted aqueous-phase compositions and precipitates agree with observations at Rainier Mesa and other NTS areas. Further mineral evolution, to quartz, clay, analcime, and albite mixtures, was also modeled. Decreasing aqueous silica activity from the first stage, where cristobalite percipitates, to later stages, where quartz is present, was the controlling variable in the mineral evolution.

NRC DOCUMENT DATA BASE

WWL Document Number: 51

Document Summary

TITLE: Solubility Limits on Radionuclide Dissolution at a Yucca Mountain Repository

AUTHOR: Kerrisk, J. F.

Document Number: LA-9995-MS
Requested From: NRC
Received From: NRC

Publication Date: May, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Water Chemistry, Conceptual Model

KEY DATA: Water Analysis, Radionuclide Solubility, Repository Inventory

COMMENTS:

SUMMARY:
This report examines the effects of solubility in limiting dissolution rates of a number of important radionuclides from spent fuel and high level waste. Two simple dissolution models were used for calculations that are characteristic of a Yucca Mountain repository. A saturation limited dissolution model, in which the water flowing through the repository is assumed to be saturated with each waste element, is very conservative in that it over estimates dissolution rates. A diffusion limited dissolution model, in which element dissolution rates are limited by diffusion of waste elements into water flowing past the waste, is more realistic, but it is subject to some uncertainty at this time.

NRC DOCUMENT DATA BASE

WWL Document Number: 52

Document Summary

TITLE: Research and Development Related to the Nevada Nuclear Waste Storage Investigations April 1 - June 30, 1984

AUTHOR: Rundberg, R. S., Ogard, A. E., and Vaniman, D. T.

Document Number: LA-10297-PR
Requested From: NRC
Received From: NRC

Publication Date: May, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Fractures, Geochemistry, Mineralogy, Petrology, Precipitation, Tectonics, Water Chemistry

KEY DATA: Water Chemistry, Solubilities, Sorption Ratios

COMMENTS:

SUMMARY:
This report summarizes the contribution of the Los Alamos National Laboratory to the Nevada Nuclear Waste Storage Investigations for the third quarter of FY 1984.

NRC DOCUMENT DATA BASE

WWL Document Number: 53 Document Summary

TITLE: Research and Development Related to the Nevada Nuclear Waste Storage Investigations July 1 - September 30,1984

AUTHOR: Ogard, A. E., and Vaniman, D. T.

Document Number: LA-10299-PR
Requested From: NRC
Received From: NRC

Publication Date: May, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Mineralogy, Petrology, Precipitation, Radionuclide Transport, Tectonics, Waste Dissolution, Water Chemistry

KEY DATA: Water Chemistry, Chloride 36 Concentrations, Solubility, Sorption Ratios

COMMENTS:

SUMMARY:
This report summarizes some of the technical contributions from the Los Alamos National Laboratory to the Nevada Nuclear Waste Storage Investigations project during the period July 1 through September 30, 1984.

NRC DOCUMENT DATA BASE

WWL Document Number: 54

Document Summary

TITLE: Petrography and Mineral Chemistry of Units of the Topopah Spring, Calico Hills and Crater Flat Tuffs, and Older Volcanic Units, with Emphasis on Samples from Drill Hole USW G-1, Yucca Mountain, Nevada Test Site

AUTHOR: Warren, R. G., Byers, F. M., Jr., and Caporuscio, F. A.

Document Number: LA-10003-MS
Requested From: NRC
Received From: NRC

Publication Date: June, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Mineralogy, Petrology

KEY DATA:

COMMENTS:

SUMMARY:
This report contains a comprehensive set of petrographic and mineral chemical data for phenocrysts in volcanic units of Yucca Mountain drill hole USW G-1. This study provides a basis for petrographic comparison of units. Phenocryst modes provide a most effective means for subsurface correlation of volcanic units, but use of these data alone sometimes results in miscorrelations because substantial petrographic variation occur within some units.

NRC DOCUMENT DATA BASE

WWL Document Number: 55

Document Summary

TITLE: Effect of Host-Rock Dissolution and Precipitation on Permeability in a Nuclear Waste Repository in Tuff

AUTHOR: Braithwaite, J. W., and Nimick, F. B.

Document Number: SAND84-0192
Requested From: NRC
Received From: NRC

Publication Date: Sept, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Flux, Fractures, Geochemistry, Mineralogy, Permeability, Thermomechanical Properties, Unsaturated Flow, Vapor Transport

KEY DATA: Temperature Distribution, Thermomechanical Properties

COMMENTS:

SUMMARY:
In the tuff beneath Yucca Mountain (YM), the dissolution and precipitation of minerals due to their interaction with heating and cooling groundwaters can be conservatively described by assuming that the groundwater is always in equilibrium with amorphous silica. If fracture flow dominates (for water fluxes in excess of 0.5 mm/yr), fracture permeabilities may show large changes, but even with these changes, the bulk permeability due to fractures is much greater than the amount of water which the fractures will be required to transmit. Thus, changes in fracture permeability will have no significant effect on the total hydrologic flow patterns through the mountain.

NRC DOCUMENT DATA BASE

WWL Document Number: 56

Document Summary

TITLE: Fracture and Matrix Hydrologic Characteristics of Tuffaceous Materials from Yucca Mountain, Nye County, Nevada

AUTHOR: Peters, R. R., Klavetter, E. A., Hall, I. J., Blair, S. C., Heller, P. R., and Gee, G. W.

Document Number: SAND84-1471
Requested From: NRC
Received From: NRC

Publication Date: Dec, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Fracture Analysis,

KEY DATA: Matrix Permeability, Fracture Permeability

COMMENTS:

SUMMARY:
The primary purpose of this document is to provide a compilation of the testing procedures used and the hydrologic data obtained. The results of testing indicate the following; (1) There are wide variations in water retention characteristics for the tuffaceous materials tested. (2) The measured saturated hydraulic conductivities for welded tuff samples were low, ranging from 10E-10 to 10E-14 m/s. The fracture saturated conductivity was significantly higher than the matrix conductivity on all samples tested and flow through all fractured and unfractured samples was reduced at elevated pressure.

NRC DOCUMENT DATA BASE

WWL Document Number: 57

Document Summary

TITLE: Unit Evaluation at Yucca Mountain, Nevada Test Site: Summary Report and Recommendation

AUTHOR: Johnstone, J. K., Peters, R. R., and Gnirk, P. F.

Document Number: SAND83-0372
Requested From: NRC
Received From: NRC

Publication Date: June, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Numerical Model, Ground Water Movement

KEY DATA: Stratigraphy, Hydraulic Head Distribution, Recharge

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Pacific Northwest Laboratory documented the data requirements, boundary conditions, and calibration of a two dimensional, finite difference, hydrologic model of the NTS and vicinity. Underflow from areas north and east of the model boundary contribute a significant flux to model input; however, water balances within the model boundary are in good agreement with published values. The major discharge flux from the model occurs along the Death Valley perimeter. If future hydraulic head data and aquifer tests were identified with hydrostratigraphic units, a two layer, three dimensional model could be constructed, which would more accurately simulate the physical system.

NRC DOCUMENT DATA BASE

WWL Document Number: 58 Document Summary

TITLE: Benchmarking NNWSI Flow and Transport Codes: Cove 1 Results

AUTHOR: Hayden, N. K.

Document Number: SAND84-0996
Requested From: NRC
Received From: NRC

Publication Date: June, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Computer Code, Conceptual Model, Numerical Model

KEY DATA: Porosity, Permeability, Saturation, Density

COMMENTS:

SUMMARY:
This report describes the work done for COVE 1, the first step in benchmarking some of the codes. Isothermal calculations for the COVE 1 benchmarking have been completed using the hydrologic flow codes SAGUARO, TRUST, and GWVIP; the radionuclide transport codes FEMTRAN and TRUMP; and the coupled flow and transport code TRACR3D. This report presents the results of three cases of the benchmarking problem solved for COVE 1, a comparison of the results, questions raised regarding sensitivities to modeling techniques, and conclusions drawn regarding the status and numerical sensitivities of the codes .

NRC DOCUMENT DATA BASE

WWL Document Number: 59

Document Summary

TITLE: Version 1 of the Users Manual for the Tuff Data Base Interface

AUTHOR: Langkopf, B. S., Satter, B. J., and Welch, E. P.

Document Number: SAND84-1643
Requested From: NRC
Received From: NRC

Publication Date: Apr, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): General
Document Read By (Initials): TLS

KEY WORDS: Bibliography

KEY DATA:

COMMENTS:

SUMMARY:
This report is an interim users manual for the Tuff Data Base Interface, as of August, 1984. It gives basic instructions on accessing the Sandia computing system and explains the Interface on a question-by-question basis.

NRC DOCUMENT DATA BASE

WWL Document Number: 60 Document Summary

TITLE: Preliminary Two-Dimensional Regional Hydrologic Model of the Nevada Test Site and Vicinity

AUTHOR: Rice, W. A.

Document Number: SAND83-7466
Requested From: NRC
Received From: NRC

Publication Date: Aug, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Regional
Document Read By (Initials): TLS

KEY WORDS: Aquifers, Boundary Conditions, Climate, Conceptual Model, Geochemistry, Ground Water Movement, Hydraulic Head, Mesh Design, Numerical Model, Potentiometric Surface Map, Recharge, Transmissivity

KEY DATA: Hydrologic Units, Potentiometric Surface Map, Precipitation, Evapotranspiration, Vegetation

COMMENTS:

SUMMARY:
Pacific Northwest Laboratory documented the data requirements, boundary conditions, and calibration of a two-dimensional, finite difference, hydrologic model of the NTS and vicinity. Underflow from areas north and east of the model boundary contribute a significant flux to model input; however, water balances within the model boundary are in good agreement with published values. The major discharge flux from the model occurs along the Death Valley perimeter. If future hydraulic head data and aquifer tests were identified with hydrostratigraphic units, a two-layer, three-dimensional model could be constructed, which would more accurately simulate the physical system.

NRC DOCUMENT DATA BASE

WWL Document Number: 61

Document Summary

TITLE: The Effects of Composition, Porosity, Bedding-Plane Orientation, Water Content and a Joint on the Thermal Conductivity of Tuff

AUTHOR: Moss, M., Koski, J. A., Haseman, G. M., and Tormey, T. V.

Document Number: SAND82-1164
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1982
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Heat Load Effect, Thermomechanical Properties

KEY DATA: Thermal Conductivity, Porosity, Density, Saturation

COMMENTS:

SUMMARY:
The effects of composition, porosity, bedding-plane orientation, water content, and a joint on the thermal conductivity of several tuffs from the NTS have been examined. In the range 310-423 K, the conductivity of dehydrated Grouse Canyon Member, G-tunnel, welded, devitrified, tuff increased 5% and was insensitive to bedding-plane orientation. This 20% porous tuff also displayed small differences in temperature dependence of conductivity between samples with heat flux parallel and perpendicular to the bedding plane. The zeolitic tuffs were less conductive than the devitrified tuffs at a given porosity, and conductivity declined with porosity. Complete water saturation produced a 45% increase in conductivity in the devitrified tuff and a 54 to 80% increase in the zeolitic.

NRC DOCUMENT DATA BASE

WWL Document Number: 62

Document Summary

TITLE: Comparison of Waste Emplacement Configurations for a Nuclear Waste Repository in Tuff IV. Thermo-Hydrological Analysis

AUTHOR: Mondy, L. A., Wilson, R. K., and Bixler, N. E.

Document Number: SAND83-0757
Requested From: NRC
Received From: NRC

Publication Date: Aug, 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Heat Load Effect, Thermomechanical Properties

KEY DATA: Thermal Conductivity, Porosity, Density, Saturation, Heat Capacity, Permeability

COMMENTS:

SUMMARY:
This report summarizes the results of a hydrological analysis of two emplacement schemes being considered for the storage of commercial high level nuclear waste at the NTS. The analysis is two-dimensional, considers the flow of water in partially saturated tuff and includes the effects of the heat source on that flow. The results include measures of the heat flux entering the access and emplacement drifts, measures of the flow rates near the canisters and a comparison of the temperature fields.

NRC DOCUMENT DATA BASE

WWL Document Number: 63

Document Summary

TITLE: Far-Field Thermal Analysis of a High Level Waste Repository in Tuff

AUTHOR: Klasi, M. L., Russell, J. E., and McClain, W. C.

Document Number: SAND81-7210
Requested From: NRC
Received From: NRC

Publication Date: July, 1982
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Heat Load Effect, Thermomechanical Properties

KEY DATA: Thermal Conductivity, Density, Porosity, Heat Capacity

COMMENTS:

SUMMARY:
Thermal loadings of 25 to 150 kW/acre were used for thermal analyses of a high level waste repository at a depth of 800 m in tuff. Three methods of handling the presence of pore water were considered; the first assumed that pore water did not boil, the second that pore water boiled in the interval 90 to 110deg C, and the third that pore water boiled at a temperature governed by hydrostatic pressure. It was found that hydrostatic boiling did not occur for any thermal load considered.

NRC DOCUMENT DATA BASE

WWL Document Number: 64

Document Summary

TITLE: Bulk and Thermal Properties of the Functional Tuffaceous Beds in Holes USW G-1, UE-25a#1, and USW G-2, Yucca Mountain, Nevada

AUTHOR: Lappin, A. R., and Nimick, F. B.

Document Number: SAND82-1434
Requested From: NRC
Received From: NRC

Publication Date: Apr, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): specific
Document Read By (Initials): TLS

KEY WORDS: Geohydrologic Data, Mineralogy, Thermomechanical Properties

KEY DATA: Grain Density, Porosity, Thermal Conductivity, Thermal Expansion

COMMENTS:

SUMMARY:
The objective of this report is to document bulk and thermal property data used in evaluating the Tuffaceous Beds of Calico Hills. Only data received as of March 15, 1982 are included. A Functional Unit is defined using zeolitization as a prime characteristic. The Functional Unit includes portions of the overlying and underlying tuffs. Thermal conductivity measurements on zeolitized ashflow tuffs are relatively consistent, indicating a zero porosity conductivity of 1.95 W/m*K. Internal complexity of the functional Tuffaceous Beds is apparent in thermal expansion behavior. On cooling, the expansion behavior of these strongly zeolitized tuffs depends on the availability of water. If the tuffs are not rehydrated, they will contract continuously to ambient temperature, resulting in net contraction if they are dewatered on heating.

NRC DOCUMENT DATA BASE

WWL Document Number: 65

Document Summary

TITLE: Water Transport Through Welded Tuff

AUTHOR: Hadley, G. R.

Document Number: SAND82-1043
Requested From: NRC
Received From: NRC

Publication Date: Aug, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): specific
Document Read By (Initials): TLS

KEY WORDS: Imbibition, Evaporation Front, Capillary, Vapor Transport, Core Analysis, Pore Saturation

KEY DATA: Porosity, Saturation Profiles

COMMENTS: The report presents an interesting method for determining the saturation profile in a rock sample by the use of gamma ray attenuation.

SUMMARY:
The direct measurement of saturation profiles in tuff cores during drying and imbibition is discussed. Much information on the experimental procedures and apparatus is given. The results of the experiments showed that the shapes of the saturation profiles in the 0.15 meter long core of welded tuff depend on the presence and direction of the sample temperature gradient. The profiles indicate that drying takes place simultaneously throughout the sample, and not from an isolated region, such as an evaporation front.

NRC DOCUMENT DATA BASE

WWL Document Number: 66

Document Summary

TITLE: Reduction of the Well Test Data for Test Well USW H-1, Adjacent to Nevada Test Site, Nye County, Nevada

AUTHOR: Barr, G. E.

Document Number: SAND84-0637
Requested From: NRC
Received From: NRC

Publication Date: May, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Tests, Hydraulic Conductivity, Storativity, Computer Code

KEY DATA: Test Intervals, Pumping Rate, Injection Rate, Hydraulic Conductivity, Storativity

COMMENTS: Contains computer code used for data reduction

SUMMARY:
The data from 3 pump tests, 3 recovery tests, and 6 injection tests are reduced by a computer program to determine hydraulic conductivity, storativity, and any source/ boundary conditions. The computer code PUMP, allows investigations of the sensitivity of the results due to changes in K and S and of the subsurface location of possible water sources or barriers. The model assumes no vertical infiltration occurs and that the medium is vertically homogeneous. It is necessary to assume starting values for K and S. By trial and error, values of K and S can be found which give and approx. fit between the calculated and the observed data. The integrated total hydraulic conductivity of the penetrated portion of the saturated zone is essentially the same as determined in WWLNUM 26 by Rush et.al, using graphical methods. However, some individual tests differ by a factor of 10 for K. The upper zone is characterized by relatively high hydraulic conductivities, in the range of 1E-4 to 1E-5 m/sec, with some indication of fracture connectivity. Below this zone, the volcanic rocks appear to be less

conductive by several orders of magnitude.

NRC DOCUMENT DATA BASE

WWL Document Number: 68

Document Summary

TITLE: SAGUARO - A Finite Element Computer Program for Partially Saturated Porous Flow Problems

AUTHOR: Eaton, R. R., Gartling, D. K., and Larson, D. E.

Document Number: SAND82-2772
Requested From: NRC
Received From: NRC

Publication Date: June, 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Boundary Conditions, Capillary, Computer Code, Heat Load Effect, Hysteresis, Numerical Model, Saturated Flow, Unsaturated Flow

KEY DATA:

COMMENTS: Has received a formal review by W&A.

SUMMARY:
SAGUARO is a finite element computer program designed to calculate two-dimensional flow of mass and energy through porous media. The media may be saturated or partially saturated. SAGUARO solves the parabolic time-dependent mass transport equation which accounts for the presence of partially saturated zones through the use of highly non-linear material characteristic curves. The energy equation accounts for the possibility of partially-saturated regions by adjusting the thermal capacitances and thermal conductivities according to the volume fraction of water present in the local pores. Program capabilities, user instructions, and a sample problem are presented in this report.

NRC DOCUMENT DATA BASE

WWL Document Number: 69

Document Summary

TITLE: Code Development in Support of Nuclear Waste Storage Investigations for a Repository in Tuff

AUTHOR: Eaton, R. R., Martinez, M. J., Wilson, R. K., and Nunziato, J. W.

Document Number: SAND82-2771
Requested From: NRC
Received From: NRC

Publication Date: Mar, 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Computer Code, Heat Load Effect, Numerical Model, Unsaturated Flow

KEY DATA:

COMMENTS: Has received a formal review by W&A.

SUMMARY:
A summary of the code development in support of the design and performance evaluation of a nuclear waste repository in tuff is documented. Various aspects of equation derivation, code development, code verification and scoping calculations for flow through partially saturated media are presented.

NRC DOCUMENT DATA BASE

WWL Document Number: 70

Document Summary

TITLE: A Three-Dimensional Geologic Model of Yucca Mountain, Southern Nevada

AUTHOR: Nimick, F. B., and Williams, R. L.

Document Number: SAND83-2593
Requested From: NRC
Received From: NRC

Publication Date: Oct, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Faults, Lithology, Numerical Model, Stratigraphy, Well Data

KEY DATA: Well Data, Cross Sections

COMMENTS:

SUMMARY:
The model that is described is an initial version of a three-dimensional geometrical representation of the surfaces for the base of each stratigraphic zone. The primary method of surface definition is an analytical interpretation technique called Trend Modulation by Multikernel summation. Comparison of predicted and actual elevations of geologic contacts in drill holes not used as input data indicates that the method predicted the elevations at those drill holes to within 71 feet or less with 95 percent confidence. Four representative geologic cross sections are presented, with a brief discussion. Regional trends suggested by other researchers are seen in some of the cross sections.

NRC DOCUMENT DATA BASE

WWL Document Number: 71 Document Summary

TITLE: Geology of the Nevada Test Site and Nearby Areas, Southern Nevada

AUTHOR: Sinnock, S.

Document Number: SAND82-2207 Publication Date: Oct, 1982
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Faults, Geology, Stratigraphy, Tectonics

KEY DATA: Cross Sections

COMMENTS:

SUMMARY:
The report gives an overview of the geology for the NTS. The report discusses physiography, rock types, rock structures, tectonics, and joints and fractures.

NRC DOCUMENT DATA BASE

WWL Document Number: 72

Document Summary

TITLE: Meteorological Design Parameters for the Candidate Site of a Radioactive-Waste Repository at Yucca Mountain, Nevada

AUTHOR: Eglinton, T. W., and Dreicer, R. J.

Document Number: SAND84-0440/2
Requested From: NRC
Received From: NRC

Publication Date: Dec, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Atmosphere, Climate, Precipitation

KEY DATA: Precipitation, Relative Humidity, Temperature, Wind, General Weather

COMMENTS:

SUMMARY:
This study presents a collection of meteorological information and data for the design and construction of installations at the candidate location of a repository for radioactive waste at Yucca Mountain. Climate and weather data provided in this summary include: precipitation, lightning, temperature, relative humidity, solar radiation, cloud coverage, wind, and air pressure.

NRC DOCUMENT DATA BASE

WWL Document Number: 73

Document Summary

TITLE: Hydrologic Mechanisms Governing Fluid Flow in Partially Saturated, Fractured, Porous Tuff at Yucca Mountain

AUTHOR: Wang, J. S. Y., and Narasimhan, T. N.

Document Number: SAND84-7202
Requested From: NRC
Received From: NRC

Publication Date: Apr, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): General
Document Read By (Initials): TLS,LAD,DBM

KEY WORDS: Conceptual Model, Fracture Flow, Unsaturated Flow, Capillary Barrier, Hysteresis, Vapor Transport

KEY DATA: Hydrologic properties of Hydrogeologic Units

COMMENTS: Formal review by WWL and W&A.

SUMMARY:
A conceptual model describing the flow of fluids through the unsaturated zone at Yucca Mountain is proposed. The proposed model considers the following flow phenomena in the unsaturated region; flow through fractured rock, capillary barriers, infiltration into fractured rock, lateral movement, and capillary fringe. The proposed model gives a representation of the flow in the hydrogeologic units and structural pathways at Yucca Mountain. Areas needing further investigation are identified.

NRC DOCUMENT DATA BASE

WWL Document Number: 74

Document Summary

TITLE: Hydrology and Water Resources Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada

AUTHOR: French, R. H., Elzeftawy, A., Bird, J., and Elliot, B.

Document Number: NVO-284
Requested From: NRC
Received From: NRC

Publication Date: June, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Groundwater, Climate, Meteorology

KEY DATA: Water Analysis, Water Usage, Precipitation

COMMENTS:

SUMMARY:
This report summarizes the literature and available unpublished data regarding hydrology and water resources utilization in the NTS area.

NRC DOCUMENT DATA BASE

WWL Document Number: 75 Document Summary

TITLE: Geology and Hydrology of Yucca Mountain and Vicinity, Nevada Test Site

AUTHOR: Reade, M. T., and McKay, E. D.

Document Number: CGS/8116R028 Publication Date: Mar, 1982
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Geology, Regional Hydrology

KEY DATA: Porosity, Permeability, Fracture Properties

COMMENTS:

SUMMARY:
This report provides a summary of the geology and hydrology from available studies of the NTS region for the purpose of allowing application of the Sandia risk assessment methodology to a realistic geologic system in which volcanic tuffs are the candidate disposal medium. The probability and consequences of the occurrence of several scenarios are considered.

NRC DOCUMENT DATA BASE

WWL Document Number: 76

Document Summary

TITLE: Draft Environmental Assessment Yucca Mountain Site, Nevada Research and Development Area, Nevada

AUTHOR: DOE Office of Civilian Radioactive Waste Management

Document Number: DOE/RW-0012
Requested From: NRC
Received From: NRC

Publication Date: Dec, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Regional Hydrology, Geochemistry, Erosion, Tectonics, Meteorology, Exploratory Shaft, Transportation

KEY DATA: Ground water travel time, Sorption Ratios, Water Chemistry, Cross Sections, Maps, Bibliography

COMMENTS: The Department of Energy's Evaluation of the Yucca Mountain Site

SUMMARY:
A great deal of assumptions have been made by the DOE to justify the suitability of Yucca Mountain for site characterization and for development as a repository. The crux of the evaluation and subsequent recommendations are given in Chapter 6. Since the characterization of the site is not complete, much of the current description draws heavily from previous studies of the NTS and of the southern Nevada region. Potential geohydrological impacts which have been pointed out by the DOE include the following: cyclic pluvial conditions may lead to an increase in the level of the water table; sufficient data on stratigraphic, structural, and hydrological features are not yet available to model the site with reasonable certainty; it has not been determined if the geohydraulic unit above the host rock will divert the downward flow of water beyond the limits of the emplaced wastes. The major areas which still need to be investigated are: the amount of recharge, the related ground water flux through the unsaturated zone, the mechanisms by which water moves in densely welded, fractured tuffs (unsaturated);

representative values for hydraulic conductivities and moisture contents of various rocks transversed by ground water, and effective porosities.

NRC DOCUMENT DATA BASE

WWL Document Number: 77

Document Summary

TITLE: Proceedings of the 1979 DOE Statistical Symposium

AUTHOR: Gardiner, D. A., and Truett, T.

Document Number: CONF-791016
Requested From: NRC
Received From: NRC

Publication Date: Sept, 1980
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 5
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Ground Water Movement, Numerical Model, Transmissivity

KEY DATA:

COMMENTS:

SUMMARY:
Statistical techniques, including Latin hypercube sampling, were used to perform a sensitivity analysis on a two-dimensional finite element model of the regional flow system encompassing the NTS. Results of the sensitivity analysis agree with the conceptual model of the hydrologic system, and have led to its refinement.

NRC DOCUMENT DATA BASE

WWL Document Number: 78 Document Summary

TITLE: A Summary of Repository Siting Models

AUTHOR: Thomas, S. D., Ross, B., and Mercer, J. W.

Document Number: NUREG/CR-2782 Publication Date: July, 1982
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Computer Code, Numerical Model

KEY DATA:

COMMENTS:

SUMMARY:
This report provides critical reviews and summaries of computer programs that can be used to analyze the potential performance of a high-level radioactive waste repository. The computer programs identified address the following phenomena: saturated and unsaturated subsurface flow, heat transport, solute transport, surface water runoff, geomechanical interactions, and geochemical interactions. The report identifies 183 computer programs that can be used to analyze a repository site and provides a summary description of 31 computer programs.

NRC DOCUMENT DATA BASE

WWL Document Number: 79

Document Summary

TITLE: Relationship Between the Gas Conductivity and Geometry of a Natural Fracture

AUTHOR: Schrauf, T. W., and Evans, D. D.

Document Number: NUREG/CR-3680
Requested From: NRC
Received From: NRC

Publication Date: Apr, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Boundary Conditions, Fracture Flow, Numerical Model

KEY DATA: Flow Regime Chart

COMMENTS:

SUMMARY:
Theoretical analysis of parallel plate gas flow revealed that the gas conductivity of a fracture is the same as for incompressible fluids and can be expected to follow a cubic law relationship. Application of the cubic law to practical field test situations, however, was found to be limited by uncertainties in flow boundary conditions, nonlinearity of flow behavior, and effects of fracture surface roughness. Quantitative assessment of uncertainties in flow boundary conditions including elliptical injection boundaries, secondary intersecting fractures, and estimation of effective radius was performed.

NRC DOCUMENT DATA BASE

WWL Document Number: 80

Document Summary

TITLE: Atmospheric Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada

AUTHOR: Bowen, J. L., and Egami, R. T.

Document Number: NVO-269
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Climate, Precipitation

KEY DATA: Climatological Summaries

COMMENTS:

SUMMARY:
The report presents the findings of an atmospheric overview for a nuclear waste repository on the NTS. These findings show that the climate within the last one million years has changed between glacial and interglacial periods. Current data show that wind, temperature, and precipitation depend on station altitude and local terrain. Future climatic changes will probably be similar to those of the past, although planned and inadvertent changes caused by man are uncertain at the present. Various predictive schemes are not well enough developed to determine the effects of complicated interactions among natural and manmade forces.

NRC DOCUMENT DATA BASE

WWL Document Number: 81

Document Summary

TITLE: Nevada Nuclear Waste Storage Investigations Project Monthly Report August 1985

AUTHOR: Department of Energy

Document Number:
Requested From: NRC
Received From: NRC

Publication Date: Aug, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Update
Document Read By (Initials): TLS

KEY WORDS: Monthly Report

KEY DATA:

COMMENTS:

SUMMARY:
The report provides a general review for the many projects which are underway.

NRC DOCUMENT DATA BASE

WWL Document Number: 82

Document Summary

TITLE: Hydrology and Water Resources Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada: Annotated Bibliography

AUTHOR: French, R. H., Elzeftawy, A., and Elliot, B.

Document Number: NVO-283
Requested From: NRC
Received From: NRC

Publication Date: June, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Bibliography

KEY DATA: Bibliography

COMMENTS: The report lists 344 references which pertain to the NNWSI.

SUMMARY:
The bibliography is organized in alphabetical order and the citation format is that recommended by the American Society of Civil Engineers. ^AIt should be noted that, in isolated cases, annotations were extracted from other annotated bibliographies and the actual publication was not examined by the authors.

NRC DOCUMENT DATA BASE

WWL Document Number: 83

Document Summary

TITLE: Regional Ground-Water Systems in the Nevada Test Site Area, Nye, Lincoln, and Clark Counties, Nevada

AUTHOR: Rush, F. E

Document Number: USGS Report 54
Publication Date: 1971
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Geology, Climate, Ground Water Basin

KEY DATA: Precipitation, Recharge

COMMENTS:

SUMMARY:
Three regional interbasin ground water flow systems have been identified: The Ash Meadows system in the eastern two-thirds of the area, the Pahute Mesa system in the western third, and the Sarcobatus Flat system west of the study area and including Cactus Flat.

NRC DOCUMENT DATA BASE

WWL Document Number: 84

Document Summary

TITLE: Water Intake at the Atmosphere-Earth Interface in a Fractured Rock System

AUTHOR: Kilbury, R. K.

Document Number: NRC-04-81-224
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Fracture Analysis, Fracture Flow, Numerical Model

KEY DATA:

COMMENTS:

SUMMARY:
Measurement of intake into numerous single fractures made possible the characterization of the atmosphere-earth boundary conditions for a large areal extent. It is suggested that the cubic law provides a reasonable estimate of surface water intake characteristic of the Patagonia study area. Intake into the fractured rock system (2.1 mm annually) is found to be less than 1 percent of annual precipitation, and more dependent on storm duration than intensity.

NRC DOCUMENT DATA BASE

WWL Document Number: 85 Document Summary

TITLE: Preliminary Estimates of Water Flow and Radionuclide Transport in Yucca Mountain

AUTHOR: Travis, B. J., Hodson, S. W., Nuttall, H. E., Cook, T. L., and Rundberg, R. S.

Document Number: LA-UR-84-40 Publication Date: 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Computer Code, Fracture Flow, Radionuclide Transport, Permeability, Heat Load Effect

KEY DATA: Radionuclide Retardation Factors, Radionuclide Diffusivity, Relative Permeability

COMMENTS:

SUMMARY:
The report looks at the effect of lithology and the presence of fractures on water flow and radionuclide transport in Yucca Mountain. Two computer codes were used in the analysis: (1) TRACR3D, which computes saturated and unsaturated two phase flow in fractured porous media, and (2) WAFE, which computes water, air, vapor, and energy movement in porous media. Plots of crack width vs. depth reached by a water slug for various matrix saturations and diffusion coefficients were generated. Migration histories for ten radionuclides through four stratigraphic units (Topopah Spring, Bedded Tuff, Calico Hills, Prow Pass) are presented. Some of the conclusions stated: (1) Significant fracture flow can occur above the water table, but only through high-saturation, low permeability tuff (2) Diffusion into the matrix and adsorption have a profound effect on transport. None of the radionuclides considered reaches the accessible environment in less than 10,000 years. (3) Heat load in partially saturated tuff can result in a dry, steam-filled region extending several meters above and below a repository with recharge during

cooldown phase.

NRC DOCUMENT DATA BASE

WWL Document Number: 86 Document Summary

TITLE: Identification and Characterization of Hydrologic Properties of Fractured Tuff Using Hydraulic and Tracer Tests--Test Well USW H-4, Yucca Mountain, Nye County, Nevada

AUTHOR: Erickson, J. R., and Waddell, R. K.

Document Number: USGS-85-4066 Publication Date: 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Tests, Fracture Analysis

KEY DATA: Fracture Intervals, Flow Intervals, Temperature Survey, Fracture Porosity

COMMENTS:

SUMMARY:
Intrawell bore flow velocities were measured at & locations using a short duration radioactive tracer. Other fractures were identified using temperature and borehole flow surveys. The fractures were correlated with an acoustic televiewer log, which showed that 86.2% of the identified fractures in the saturated zone have strikes ranging from N10W to N55E, with dips ranging from 50 to 86. A TV camera log showed some fractures with strikes from N15W to N55W. Radioactive tracer flow surveys indicate that less than 21% of the total saturated section contributed measurable quantities of water to the well bore. The flow points identified from the temperature log during pumping correlated with the location of fractures. However, the majority of the fractures had no detectable flow. The results of the fracture analysis indicate that water was produced predominately from northeast trending fractures. In general, good correlation exists between zones determined to be permeable by different techniques, however, no single technique was capable of producing sufficient information to characterize distribution of permeability

and direction of movement within the borehole. The results presented indicate that in detail, the ground water flow characteristics of the fractured tuff at Yucca Mountain are complex.

NRC DOCUMENT DATA BASE

WWL Document Number: 87

Document Summary

TITLE: Geohydrologic Data and Test Results From Well J-13, Nevada Test Site, Nye County, Nevada

AUTHOR: Thordarson, W

Document Number: USGS-83-4171
Requested From: NRC
Received From: NRC

Publication Date: 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geology, Lithology, Well Tests, Water Chemistry

KEY DATA: Well Construction, Lithologic Log, Porosity, Saturation, Water Level, Well Test Data, Water Analysis

COMMENTS:

SUMMARY:
Well J-13 was drilled to a depth of 1063.1 meters by using air hydraulic rotary drilling equipment. The Topopah Spring unit was found to be the principal aquifer. Below the TSw unit, tuff units are confining beds; transmissivities range from 0.1 to 4.5 meters squared per day. A static water level of approximately 282.2 meters was measured for the various water bearing tuff units above a depth of 645.6 meters. Below a depth of 772.7 meters, the static water level was slightly deeper. The apparent age of the ground water, derived from carbon-14 age dating, is 9,900 years.

NRC DOCUMENT DATA BASE

WWL Document Number: 89

Document Summary

TITLE: Scenarios for Consequence Assessments of Radioactive-Waste Repositories at Yucca Mountain, Nevada Test Site

AUTHOR: Hunter, R. L., Barr, G. E., and Bingham, F. W.

Document Number: SAND82-1277
Requested From: NRC
Received From: NRC

Publication Date: Mar, 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): General
Document Read By (Initials): TLS

KEY WORDS: Erosion, Heat Load Effect, Recommendations for Future Work, Saturated Flow, Tectonics

KEY DATA: Rayleigh Numbers

COMMENTS:

SUMMARY:
This report describes the construction and preliminary analysis of nearly 4000 scenarios for the release of radioactive waste from a hypothetical repository at Yucca Mountain. Preliminary analysis were carried out for four rock units: the Topopah Spring Member, the bedded tuffs of the Calico Hills, and the Bullfrog and Tram Members of the Crater Flat Formation. Only a few of the scenarios were found to have appreciable probabilities of occurrence. Preliminary modeling of certain possible release mechanisms shows that convective cells can form in saturated tuff. The scenarios can be used to guide future consequence analyses and exploratory programs.

NRC DOCUMENT DATA BASE

WWL Document Number: 90

Document Summary

TITLE: Nevada Nuclear Waste Storage Investigations Project Monthly Report September, 1985

AUTHOR: Department of Energy

Document Number:
Requested From: NRC
Received From: NRC

Publication Date: Sept, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): General
Document Read By (Initials): TLS

KEY WORDS: Monthly Report

KEY DATA:

COMMENTS: Presents the current status for the various projects relating to NNWSI.

SUMMARY:

NRC DOCUMENT DATA BASE

WWL Document Number: 91

Document Summary

TITLE: A Three-Dimensional Model of Reference Thermal/Mechanical and Hydrological Stratigraphy at Yucca Mountain, Southern Nevada

AUTHOR: Ortiz, T. S., Williams, R. L., Nimick, F. B., Whittet, B. C., and South, D. L.

Document Number: SAND84-1076
Requested From: NRC
Received From: NRC

Publication Date: Oct, 1985
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): general
Document Read By (Initials): TLS

KEY WORDS: Numerical Model, Faults, Stratigraphy, Porosity, Groundwater Level

KEY DATA: Cross Sections, Isopach Maps, Water Table Surface, Fault Angles, Dip

COMMENTS:

SUMMARY:
A 3-D model of the thermal/mechanical and hydrological reference stratigraphy at Yucca Mountain has been developed for use in performance assessment and repository design studies involving material properties data. The reference stratigraphy defines units with distinct thermal, physical, mechanical, and hydrological properties. The model is a collection of surface representations, each surface representing the base of a particular unit. The reliability of the model was evaluated by comparing the generated surfaces, existing geologic maps and cross sections, drill hole data, and geologic interpretation. Interpolation of surfaces between drill holes by the model closely matches the existing information.

NRC DOCUMENT DATA BASE

WWL Document Number: 92

Document Summary

TITLE: Reaction of the Topopah Spring Tuff with J-13 Well Water at 90 C and 150 C

AUTHOR: Oversby, V. M.

Document Number: UCRL-53552
Requested From: NRC
Received From: NRC

Publication Date: May, 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): specific
Document Read By (Initials): TLS

KEY WORDS: Water Chemistry

KEY DATA: Water analysis for J-13 well water and reaction water, Steady state estimate of water chemistry

COMMENTS:

SUMMARY:
The reaction of Topopah Springs Tuff (Tpt) with J-13 well water was conducted using Tpt collected from Fran Ridge, which is several miles east of Yucca Mountain. The Tpt samples were crushed and combined with J-13 well water in Teflon lined reaction vessels, in four rock to water weight ratios. The experiments were run at 90 C and 150 C for reaction times up to 72 days. None of the experiments reached steady state solution concentration. Long term experiments were in progress to determine the steady state chemistry. However, an estimated water chemistry at steady state for 90 C and 150 C is given in Table 54.

NRC DOCUMENT DATA BASE

WWL Document Number: 93 Document Summary

TITLE: Chemical Composition of Ground Water and the Locations of Permeable Zones in the Yucca Mountain Area, Nevada

AUTHOR: Benson, L. V., Robison, J. H., Blankennagel, R. K., and Ogard, A. E.

Document Number: USGS-OFR-83-854 Publication Date: May, 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 5
Document Description (general, specific, etc.): specific
Document Read By (Initials): TLS

KEY WORDS: Water Chemistry, Well Tests

KEY DATA: Well construction, flow surveys, water level, water chemistry

COMMENTS: Poorly written paper.

SUMMARY:
Ten wells on or near Yucca Mountain were sampled for chemical analysis including carbon-14 dating. Significant differences were found in uncorrected carbon-14 age and in inorganic and stable isotope composition. A lithium tracer was used with the drilling fluids to measure the extent of infiltration. The majority of the water samples contained less than about 0.4 percent drilling fluid. The source for drilling water on all but one well was J-13. Borehole surveys were conducted using an injector type tool with 131 I as the tracer. Pump rates while the surveys were being performed are not given. The only wells listed where the Tpt lies below the water table are J-12 and J-13. On these wells, water injection tests using packers indicated most of the production comes from the Tpt.

NRC DOCUMENT DATA BASE

WWL Document Number: 94

Document Summary

TITLE: Scientific Basis for Nuclear Waste Management VII Symposium held November 1983 in Boston, Massachusetts, U.S.A.

AUTHOR: McVay, G. L.

Document Number: MRSSP-v.26
Requested From: NRC
Received From: NRC

Publication Date: 1984
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Mineralogy, Petrology, Waste Dissolution, Water Chemistry

KEY DATA: Cross Sections, Water Chemistry

COMMENTS:

SUMMARY:
The report presents some of the data available on the mineralogy in Yucca Mountain as a function of depth. A brief section on water chemistry is also given.

NRC DOCUMENT DATA BASE

WWL Document Number: 95

Document Summary

TITLE: Petrology of Samples From Drill Holes USW H-3, H-4, and H-5 Yucca Mountain, Nevada

AUTHOR: Levy, S. S.

Document Number: LA-09706-MS
Requested From: NRC
Received From: NRC

Publication Date:
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Fractures, Geochemistry, Lithology, Mineralogy, Petrology, Stratigraphy, Water Chemistry

KEY DATA: Drill Hole Stratigraphy, Drill Hole Lithology

COMMENTS:

SUMMARY:
Rocks penetrated by the hydrology drill holes and other drill holes may record several distinct episodes of zeolitization. In the earliest identified episode, heulandite-clinoptilolite zeolitization affected the Prow Pass Member and possible the tuff of Calico Hills. A second episode of zeolitization was localized in the lower Topopah Spring vitrophyre. Heulandite and smectite may have crystallized as late stage devitrification products. The third episode of zeolitization may have been in part contemporaneous with the second.

NRC DOCUMENT DATA BASE

WWL Document Number: 96 Document Summary

TITLE: NORIA - A Finite Element Computer Program for Analyzing Water, Vapor, Air, and Energy Transport in Porous Media

AUTHOR: Bixler, N. E.

Document Number: SAND84-2057 Publication Date: Aug, 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 10
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Computer Code, Numerical Model

KEY DATA:

COMMENTS:

SUMMARY:
NORIA is a finite element computer program that solves four nonlinear, parabolic, partial differential equations simultaneously. The four equations describe the transport of water, water vapor, air, and energy through partially saturated media. The numerical procedure uses the standard Galerkin finite element method to handle spatial discretization of two-dimensional domains with either planar symmetry or axisymmetry. Time integration is performed by a third-order predictor corrector scheme that uses error estimates to automatically adjust time-step size so as to maintain uniform local time truncation error throughout the calculation. Thus, the user is not required to select time-step size except at the first time step. This report is intended primarily as a user's manual but also includes discussions of the theory of two-phase transport in porous media and the numerical procedure used in NORIA.

NRC DOCUMENT DATA BASE

WWL Document Number: 98

Document Summary

TITLE: Resistivity Sounding Investigation by the Schlumberger Method in the Syncline Ridge Area, Nevada Test Site, Nevada

AUTHOR: Anderson, L. A., Bisdorf, R. J., and Schoenthaler, D. R.

Document Number: USGS-OFR-80-466
Requested From: NRC
Received From: NRC

Publication Date: 1980
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geophysical logs

KEY DATA:

COMMENTS:

SUMMARY:
This report summarizes the results of the resistivity sounding surveys made in the general vicinity of Syncline Ridge and its northern extensions. Based on a lack of structural integrity of the Eleana Formation and the limited extent of rock which can be identified as primarily argillaceous argillite, no suitable site can be clearly identified as having the necessary attributes for containing nuclear waste products.

NRC DOCUMENT DATA BASE

WWL Document Number: 99 Document Summary

TITLE: Rock Property Analysis of Core Samples from the Yucca Mountain UE25a-1 Borehole, Nevada Test Site, Nevada

AUTHOR: Anderson, L. A.

Document Number: USGS-OFR-81-1338 Publication Date: 1981
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Geophysical Logs, Hydraulic Conductivity, Porosity

KEY DATA: Porosity, Density, Hydraulic Conductivity

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Core samples from the Yucca Mountain UE25a-1 borehole were measured for bulk density, porosity, resistivity, induced polarization, compressional sonic velocity, permeability, magnetic susceptibility, and remanent magnetization as part of a large scale site evaluation program. There is no direct correlation between porosity and permeability; the latter varying widely and often decreasing with time as unconsolidated particles within the pore network are repositioned so as to impede the continued flow of water through the rock.

NRC DOCUMENT DATA BASE

WWL Document Number: 100

Document Summary

TITLE: Rock Property Analysis of Core Samples from the Calico Hills UE25a-3 Borehole, Nevada Test Site, Nevada

AUTHOR: Anderson, L. A.

Document Number: USGS-OFR-81-1337
Requested From: NRC
Received From: NRC

Publication Date: 1981
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Geophysical Logs, Hydraulic Head, Porosity, Well Data

KEY DATA: Porosity, Density

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Core samples from the Calico Hills UE25a-3 borehole were measured for density, porosity, resistivity, induced polarization, compressional sonic velocity, and magnetic properties as part of the radioactive waste disposal site identification studies. The samples were representative of three distinct subunits of argillite underlain by a marble section, all believed to be in the Mississippian part of the Elena Formation.

NRC DOCUMENT DATA BASE

WWL Document Number: 104 Document Summary

TITLE: Geology of Drill Hole USW VH-2, and Structure of Crater Flat, Southwestern Nevada

AUTHOR: Carr, W. J. and Parrish, L. D.

Document Number: USGS-OFR-85-475 Publication Date: 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Stratigraphy, Lithology

KEY DATA: Lithologic Log

COMMENTS: Has received a formal review by W&A.

SUMMARY:
A 1219 meter drill hole in Crater Flat shows the absence of buried Pliocene or Quaternary volcanic rocks, and penetrates a section of Timber Mountain, Paintbrush, and the upper part of the Crater Flat Tuffs, similar to that exposed adjacent to Crater Flat.

NRC DOCUMENT DATA BASE

WWL Document Number: 106

Document Summary

TITLE: Petrology and Geochemistry of the Grouse Canyon Member of the Belted Range Tuff, Rock-Mechanics Drift, U12g Tunnel, Nevada Test Site

AUTHOR: Connolly, J. R., Mansker, W. L., Hicks, R., Allen, C. C., Husler, J., Keil, K., Lappin, A. R.

Document Number: SAND81-1970
Requested From: NRC
Received From: NRC

Publication Date: Apr, 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Mineralogy, Petrology, Porosity, Stratigraphy

KEY DATA: Tuff Chemical Analysis

COMMENTS:

SUMMARY:
G-Tunnel at Nevada Test Site (NTS) is the site of thermal and thermomechanical experiments examining the feasibility of emplacing heat-producing nuclear wastes in silicic tuffs. This report describes the general stratigraphy, mineralogy, and bulk chemistry of welded portions of the Grouse Canyon Member of the Belted Range Tuff, the unit in which most of these experiments will be performed. The geologic characteristics of the Grouse Canyon Member are compared with those of the Topopah Spring Member of the Paintbrush Tuff, presently the preferred horizon for an actual waste repository at Yucca Mountain, near the southwest boundary of Nevada Test Site. This comparison suggests that test results obtained in welded tuff form G-Tunnel are applicable, with limitations, to evaluation of the Topopah Spring Member at Yucca Mountain.

NRC DOCUMENT DATA BASE

WWL Document Number: 110

Document Summary

TITLE: Sources and Mechanisms of Recharge for Ground Water in the West-Central Amargosa Desert, Nevada--A Geochemical Interpretation

AUTHOR: Claassen, H. C.

Document Number: USGS-OFR-83-542
Publication Date: 1983
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): General
Document Read By (Initials): TLS

KEY WORDS: Water Chemistry

KEY DATA: Water Analysis

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Ground water in the west-central Amargosa Desert, Nevada, was recharged primarily by overland flow of snowmelt in or near the present day stream channels, rather than by subsurface flow from highland recharge areas to the north. Geochemical arguments, including reaction mechanisms, are used to support these findings. Carbon-, hydrogen-, and oxygen-isotope data show that much of the recharge in the area occurred during late Wisconsin time. Absence of ground water recharged prior to late Pleistocene is considered to indicate that either climatic conditions were unfavorable for recharge or that ground-water velocities were such that they transported this earlier recharge away from the study area.

NRC DOCUMENT DATA BASE

WWL Document Number: 111

Document Summary

TITLE: Volcano-Tectonic History of Crater Flat, Southwestern Nevada, As Suggested by New Evidence from Drill Hole USW-VH-1 and Vicinity

AUTHOR: Carr, W. J.

Document Number: USGS-OFR-82-457
Requested From: NRC
Received From: NRC

Publication Date: 1982
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology, Stratigraphy, Tectonics

KEY DATA: Lithologic Log, Well Data

COMMENTS:

SUMMARY:
New evidence for a possible resurgent dome in the caldera related to eruption of the Bullfrog Member of the Crate Flat Tuff has been provided by recent drilling of a 762-meter (2501-foot) hole in central Crater Flat. Although no new volcanic units were penetrated by the drill hole (USW-VH-1), the positive aeromagnetic anomaly in the vicinity of the drill hole appears to result in part from the unusually thick, densely welded tuff of the Bullfrog. Major units penetrated include alluvium, basalt of Crater Flat, Tiva Canyon and Topopah Spring members of the Paintbrush Tuff, and Prow Pass and Bullfrog Members of the Crater Flat Tuff. In addition, the drill hole provided the first subsurface hydrologic information for the area. The water table in the hole is at about 180 meters (600 feet), and the temperature gradient appears slightly higher than normal for the region.

NRC DOCUMENT DATA BASE

WWL Document Number: 114

Document Summary

TITLE: Interpretation of Geophysical Well-Log Measurements in Drill Holes UE25a-4, -5, -6, and -7

AUTHOR: Daniels, J. J., Scott, J. H., and Hagstrum, J. T.

Document Number: USGS-OFR-81-389
Publication Date: 1981
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Mineralogy, Petrology, Stratigraphy, Geophysical Logs

KEY DATA: Resistivity Log, Density Log, Caliper Log

COMMENTS:

SUMMARY:
Exploratory holes UE25a-4, -5, -6, and -7 were drilled at the Nevada Test Site (NTS) to determine the suitability of pyroclastic deposits as storage sites for radioactive waste. Studies have been conducted to investigate the stratigraphy, structure, mineralogy, petrology, and physical properties of the tuff units encountered in the drill hole. Ash-flow and bedded tuff sequences at NTS comprise complex lithologies of variously welded tuffs with superimposed crystallization and altered zones. Resistivity, density, neutron, gamma-ray, induced-polarization, and magnetic-susceptibility geophysical well-log measurements were made to determine the physical properties of these units. The interpretation of the well-log measurements was facilitated by using a computer program designed to interpret well logs. The broad features of the welded tuff units are readily distinguished by the geophysical well-log measurements. Some mineralogic features in drill holes can be identified on the gamma ray, induced polarization and magnetic susceptibility well logs.

NRC DOCUMENT DATA BASE

WWL Document Number: 115

Document Summary

TITLE: Interpretation of Hole-to-Surface Resistivity Measurements at Yucca Mountain, Nevada Test Site

AUTHOR: Daniels, J. J. and Scott, J. H.

Document Number: USGS-OFR-81-1336
Requested From: NRC
Received From: NRC

Publication Date: 1981
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology

KEY DATA: Total electric field, Apparent Resistivity

COMMENTS:

SUMMARY:
Hole-to-surface measurements from drill holes UE25a-1, -4, -5, and -6 illustrate procedures for gathering, reducing, and interpreting hole-to-surface resistivity data. the magnitude and direction of the total surface electric field resulting from a buried current source is calculated from orthogonal potential difference measurements for a grid of closely-spaced stations. A contour map of these data provides a detailed map of the distribution of the electric field away from the drill hole. Resistivity anomalies can be enhanced by calculating the difference between apparent resistivities calculated from the total surface electric field, and apparent resistivities for a layered earth model. Lateral discontinuities in geoelectric section are verified by repeating the surface field measurements for current sources in different drill holes. A qualitative interpretation of the anomalous bodies within a layered earth can be made by using a three dimensional resistivity model in a homogeneous half-space. The general nature of resistive and conductive bodies causing anomalies away from the source drill holes is determined with the aid of data from several source holes, layered models, and three dimensional models.

NRC DOCUMENT DATA BASE

WWL Document Number: 116

Document Summary

TITLE: Summary Report on the Geochemistry of Yucca Mountain and Environs

AUTHOR: Daniels, W. R., et al.

Document Number: LA-9328-MS
Requested From: NRC
Received From: NRC

Publication Date: Dec, 1982
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Water Chemistry, Radionuclide Transport

KEY DATA: Water Analysis, Sorption Ratios, Petrology, Cation Exchange Capacity, Permeability, Porosity, Fracture Flow Properties, Thermodynamic Data, Solubility

COMMENTS: An extensive report. Has received a formal review by W&A.

SUMMARY:
This report gives a detailed description of work at Los Alamos that will help resolve geochemical issues pertinent to siting a high-level nuclear waste repository in tuff at Yucca Mountain. It is necessary to understand the properties and setting of the host tuff because this rock provides the first natural barrier to migration of waste elements from a repository. The geochemistry of tuff is being investigated with particular emphasis on retardation processes. This report addresses the various aspects of sorption by tuff, physical and chemical makeup of tuff, diffusion processes, tuff/groundwater chemistry, waste element chemistry under expected repository conditions, transport processes involved in porous and fracture flow, and geochemical and transport modeling.

NRC DOCUMENT DATA BASE

WWL Document Number: 117 Document Summary

TITLE: Underground Disposal of Radioactive Wastes Proceedings of a Symposium on the Underground Disposal of Radioactive Wastes Jointly Organized by the International Atomic Energy Agency and the OECD Nuclear Energy Agency and Held at Otaniemi,

AUTHOR: Erdal, B. R., Bayhurst, B. P., Crowe, B. M., Daniels, W. R., Hoffman, D. C., Lawrence, F. O., Smyth, J. R., Thompson, J. L., and Wolfsberg, K.

Document Number: IAEA-SM-243/37 Publication Date: 1980
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Groundwater, Mineralogy, Radionuclide Transport

KEY DATA: Cation Exchange Capacity, Groundwater Composition, Sorption Ratios

COMMENTS:

SUMMARY:
A systematic study of some of the parameters that may affect sorption of radionuclides in geologic media is reported. All studies were made on three media, a quartz monzonite, and argillite, and several lithologic varieties of tuff. The nuclides studied were Sr-85, Te-95m, Cs-137, Ce-141, Eu-152, Pu-237239, and Am-241. The parameters studied were time, temperature, exchange capacity, available surface area, particle size, element concentration, groundwater composition, and of course, mineralogy. Sorption tends to increase somewhat with time. Particle size and available surface area are important for granite-type materials. The dependence of the amount of sorption on temperature depends on the system studied. sorption of Technetium(VII) and uranium(VI) is generally low except when fine sieve fractions are used. A proper method for making batch measurements was developed, in which the solid and aqueous phases are assayed for radioactivity. ^Adetailed studies of the behavior of plutonium and americium in aqueous solutions at pH=8 were made.

NRC DOCUMENT DATA BASE

WWL Document Number: 118 Document Summary

TITLE: Nuclide Migration Field Experiments in Tuff, G Tunnel, Nevada Test Site

AUTHOR: Erdal, B. R., Wolfsberg, K., Rundberg, R. S., Daniels, W. R., Fortney, D. L., Erickson, K. L., Friedman, A. M., Fried, S., and Hines, J. J.

Document Number: LA-UR-81-3141 Publication Date: Nov, 1981
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fracture Flow, Radionuclide Transport

KEY DATA:

COMMENTS:

SUMMARY:
The work has three objectives: 1) to develop the experimental, instrumental, and safety techniques necessary to conduct controlled, small-scaled, radionuclide migration, field experiments; 2) to use these techniques to define radionuclide migration through rock by performing generic, at-depth experiments under closely controlled conditions in a single fracture in porous rock; and 3) to determine whether available lithologic, geochemical, and hydraulic properties together with existing or developed transport models are sufficient and appropriate to describe real field conditions (i.e., to scale from small-scale laboratory studies to bench-size studies to field studies). the detailed scope of this project is described.

NRC DOCUMENT DATA BASE

WWL Document Number: 120

Document Summary

TITLE: Preliminary Assessment of In-Situ Geomechanical Characteristics in Drill Hole USW G-1, Yucca Mountain, Nevada

AUTHOR: Ellis, W. L. and Swolfs, H. S.

Document Number: USGS-OFR-83-401
Requested From: NRC
Received From: NRC

Publication Date: 1983
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geology, Well Tests, Fracture Analysis

KEY DATA: Drilling Fluid Loss, Fracture Frequency,

COMMENTS:

SUMMARY:
Substantial drilling fluid losses, and the occurrence of drilling induced fracturing, are understandable in terms of the low, minimum horizontal stress magnitudes interpreted from six hydraulic-fracturing stress measurements conducted between hole depths of 640 and 1300 meters. Although not confirmed directly by the hydraulic fracturing data, other observations suggest that the minimum stress magnitudes in the more densely welded and brittle tuff layers may be even smaller than in the less welded and more ductile rocks.

NRC DOCUMENT DATA BASE

WWL Document Number: 123 Document Summary

TITLE: Bibliography of Reports by U.S. Geological Survey Personnel Pertaining to Underground Nuclear Testing and Radioactive Waste Disposal at the Nevada Test Site, and Radioactive Waste Disposal at the Waste Isolation Pilot Plant Site, New Mexico

AUTHOR: Glanzman, V. M.

Document Number: USGS-OFR-81-892 Publication Date: 1981
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Bibliography

KEY DATA: Bibliography

COMMENTS:

SUMMARY:
The bibliography lists reports released to the public between January 1, 1980, and December 31, 1980, by personnel of the USGS. Reports include information on underground nuclear testing and waste management projects at the NTS and radioactive waste projects at the WIPP site, New Mexico.

NRC DOCUMENT DATA BASE

WWL Document Number: 124

Document Summary

TITLE: Bibliography of Reports by U.S. Geological Survey Personnel Pertaining to Underground Nuclear Testing and Radioactive Waste Disposal at the Nevada Test Site, and Radioactive Waste Disposal at the Waste Isolation Pilot Plant Site, New Mex

AUTHOR: Glanzman, V. M.

Document Number: USGS-OFR-80-817
Publication Date: 1980
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Bibliography

KEY DATA: Bibliography

COMMENTS:

SUMMARY:
This bibliography presents reports released to the public between January 1, 1979, and December 31, 1979, by personnel of the USGS. Reports include information on underground nuclear testing and waste management projects at the NTS and radioactive waste projects at the WIPP site, New Mexico.

NRC DOCUMENT DATA BASE

WWL Document Number: 125

Document Summary

TITLE: Bibliography of Reports by U.S. Geological Survey Personnel Pertaining to Underground Nuclear Testing and Radioactive Waste Disposal at the Nevada Test Site, and Radioactive Waste Disposal at the Waste Isolation Pilot Plant Site, New Mexico.

AUTHOR: Glanzman, V. M.

Document Number: USGS-OFR-83-478
Publication Date: 1983
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Bibliography

KEY DATA: Bibliography

COMMENTS:

SUMMARY:
This bibliography lists reports by personnel of the USGS released to the public between January 1, 1981, and December 31, 1981. Reports include information on underground nuclear testing and waste management projects at the NTS and radioactive waste projects at the WIPP site, New Mexico.

NRC DOCUMENT DATA BASE

WWL Document Number: 126

Document Summary

TITLE: Bibliography of Reports by U.S. Geological Survey Personnel Pertaining to Underground Nuclear Testing and Radioactive Waste Disposal at the Nevada Test Site, and Radioactive Waste Disposal at the Waste Isolation Pilot Plant Site, New Mexico.

AUTHOR: Glanzman, V. M.

Document Number: USGS-OFR-85-363
Publication Date: 1985
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Bibliography

KEY DATA: Bibliography

COMMENTS:

SUMMARY:
The bibliography lists reports by personnel of the USGS released to the public between January 1, 1983, and December 31, 1984. Reports include information on underground nuclear testing and waste management projects at the NTS and radioactive waste projects at the WIPP site, New Mexico.

NRC DOCUMENT DATA BASE

WWL Document Number: 129

Document Summary

TITLE: Interpretation of Geophysical Well-Log Measurements in Drill Hole UE25a-1, Nevada Test Site, Radioactive Waste Program

AUTHOR: Hagstrum, J. T., Daniels, J. J., and Scott, J. H.

Document Number: USGS-OFR-80-941
Publication Date: 1980
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 0
Document Description (general, specific, etc.):
Document Read By (Initials):

KEY WORDS: Geology, Geophysical Logs, Lithology, Mineralogy, Petrology, Stratigraphy, Well Data

KEY DATA: Density Log, Resistivity Log, Magnetic Susceptibility

COMMENTS: Has received a formal review by W&A.

SUMMARY:
An exploratory hole (UE25a-1) was drilled at Nevada Test Site (NTS) to determine the suitability of pyroclastic deposits as storage sites for radioactive waste. Studies have been conducted to investigate the stratigraphy, structure, mineralogy, petrology, and physical properties of the tuff units encountered in the drill hole. This report deals with the interpretation of physical properties for the tuff units from geophysical well-log measurements. The ash-flow and bedded tuff sequences at NTS comprise complex lithologies of variously welded tuffs with superimposed crystallization and altered zones. To characterize these units, resistivity, density, neutron, gamma-ray, induced polarization, and magnetic susceptibility geophysical well-log measurements were made. Although inherently subjective, a consistent interpretation of the well-log measurements was facilitated by a computer program designed to interpret well logs either individually or simultaneously. The broad features of the welded tuff units are readily

distinguished by the geophysical well-log measurements. However, many details revealed by the logs indicate that more work is necessary to clarify the causal elements of well-log response in welded tuffs.

NRC DOCUMENT DATA BASE

WWL Document Number: 130

Document Summary

TITLE: Evaporative Water Loss From Welded Tuff

AUTHOR: Hadley, G. R. and Turner, J. R., Jr.

Document Number: SAND80-0201
Requested From: NRC
Received From: NRC

Publication Date: Apr, 1980
Request Date: Oct. 85
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Capillary, Core Analysis, Evaporation Front

KEY DATA: Water Loss

COMMENTS:

SUMMARY:
This paper reports the measurement of water loss rate for welded tuff at various temperatures due to the action of evaporative drying. The samples are sections of 4.8 cm diameter core cut to lengths of approximately 6 cm. The initial saturation was unknown, but the average initial water content was found to be ~7% by weight. The samples were weighed and then inserted in a sealed chamber through which dry nitrogen gas was passed at various flow rates. The chamber could also be heated to any desired temperature. Upon passing through the chamber, the nitrogen gas was forced to flow through four desiccant canisters in series which were periodically weighed to determine the water loss rate. the resulting data show that the water loss rate declined monotonically with time at a given temperature and increases with increasing temperature as expected. Somewhat surprising, however, is the fact that over 90% of the water from a sample was lost by evaporation at room temperature within 72 hours. All the water loss data, including that taken at temperatures as high as 150 c, are explained to within a factor of two by a

simple evaporation front model. The later assumes the water is lost by the molecular diffusion of water vapor from a receding evaporation front. The motion of the evaporation front seems to depend on mass balance rather that energy balance. capillary forced\s and the resulting liquid diffusion are evidently not strong enough to wash out the evaporation front, since the front model seems to fit the data well.

NRC DOCUMENT DATA BASE

WWL Document Number: 131 Document Summary

TITLE: PETROS -- A Program for Calculating Transport of Heat, Water, Water Vapor and Air Through a Porous Material

AUTHOR: Hadley, G. R.

Document Number: SAND84-0878 Publication Date: May, 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Computer Code, Conceptual Model, Mesh Design, Numerical Model, Saturated Flow, Transportation, Unsaturated Flow, Vapor Transport

KEY DATA: Saturation Profiles

COMMENTS: Has received a formal review by W&A.

SUMMARY:
The one-dimensional code PETROS computes the transport of water, water vapor, and inert gas, and heat through a partially saturated porous medium. The mass flux of liquid water is driven by gradients in saturation, temperature, and gas pressure as well as the force of gravity. Gas transport included effects due to Knudsen diffusion and binary gaseous diffusion of each gas component, plus Darcy flow of the gas mixture. Evaporation and condensation are accounted for, both in the fluid mass balance and the heat equation. This report includes a description of the model assumptions and the resulting equations, together with the numerical techniques use to obtain problem solutions. Included also are instructions for running the code, and a sample problem.

NRC DOCUMENT DATA BASE

WWL Document Number: 132

Document Summary

TITLE: Geology and Lithologic Log for Drill Hole UE17a, Nevada Test Site

AUTHOR: Hodson, J. N. and Hoover, D. L.

Document Number: USGS-1543-1
Requested From: NRC
Received From: NRC

Publication Date: 1978
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fracture Analysis, Geology, Lithology, Stratigraphy

KEY DATA: Core Index, Fracture Analysis, Lithologic Log

COMMENTS: Has received a formal review by W&A.

SUMMARY:
The UE17a vertical exploratory drill hole is located at Nevada State Coordinates N. 257,902.89 m and E. 196,897.91 m (N. 846,897.12; E. 645,990.55 ft) at an altitude of 1431.48 m (4,696.48 ft). It is one of a series of holes drilled to evaluate the suitability of unit J of the Eleana Formation as a medium for nuclear waste storage. Total depth of the drill hole is 370 m (1214 ft). The hole penetrated 22.3 m (73 ft) of alluvium of Quaternary age, 144.2 m (473 ft) of Tippipah Limestone of Early Pennsylvanian to Early Permian(?) age, and 203.6 m (668 ft) of argillite with interbedded quartzite of unit J of the Eleana Formation of Mississippian age.

NRC DOCUMENT DATA BASE

WWL Document Number: 133 Document Summary

TITLE: Geology of the UE17e Drill Hole, Area 17, Nevada Test Site

AUTHOR: Hodson, J. N. and Hoover, D. L.

Document Number: USGS-1543-2 Publication Date: Mar, 1979
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Core, Fracture Analysis, Fractures, Geology, Geophysical Logs, Lithology, Stratigraphy

KEY DATA: Fracture Frequency

COMMENTS: Has received a formal review by W&A.

SUMMARY:
The UE17e drill hole, located at the northwest corner of Syncline Ridge, was cored from 3.05 m (10 ft) to a total depth of 914.4 m (3000 ft) in unit J (mississippian) of the Eleana (Devonian and Mississippian) to obtain samples for mineral, chemical, and physical-property analyses. UE17e penetrated 73.5 M (241 ft) of the quartzite subunit and 840.9 m (2759 ft) of the argillite subunit of unit J. Less than 0.4 percent quartzite is present in the argillite subunit. Dips Range from 12 to 18. Twenty-three faults were observed in the core or on geophysical logs. Most of these Faults affect only a few meters of the core and probably have displacements of a few meters. The majority of fractures are parallel to bedding planes. Fracture frequency ranges from 3.4 to 9.4 fractures per meter in the upper part of the cored interval and 1.4 to 5.9 fractures per meter in lower part of the cored interval. The core index indicates that the lower part of the hole is more

competent than the upper part. Lower competency in the upper part of the hole may be caused by weathering and (or) near-surface stress relief. Physical, mechanical, and thermal property measurements indicate that bedding and fracturing are the major factors in variation of properties between samples.

NRC DOCUMENT DATA BASE

WWL Document Number: 135 Document Summary

TITLE: Evaluation of Tuff as a Medium for a Nuclear Waste Repository: Interim Status Report on the Properties of Tuff

AUTHOR: Johnstone, J. K. and Wolfsberg, K.

Document Number: SAND80-1464
Requested From: NRC
Received From: NRC

Publication Date: July, 1980
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials):

KEY WORDS: Fracture Flow, Geochemistry, Heat Load Effect, Mineralogy, Petrology, Porosity, Radionuclide Transport, Retardation, Thermomechanical Properties

KEY DATA: Water Loss Rate, Load Axial Displacement Rate, Porosity/Stiffness Ratio, Porosity, Sorption Ratio

COMMENTS: Has received a formal review by W&A.

SUMMARY:
This report is the second in series of summary briefings t the National Academy of Science's (NAS) Committee on Radioactive Waste Management dealing with the feasibility of disposal of heat-producing radioactive waste in silicic tuff. We discuss the interim status of studies of tuff properties determined on samples obtained form Yucca Mountain and Rainier Mesa (G-tunnel) located on the Nevada Test Site (NTS). In particular, we describe progress on resolving issues identified during the first briefing to the NAS which include behavior of water in tuff when heated, the effect of the presence or absence of water and joints on the thermal/physical properties of tuff and the detailed/complex sorptive properties of highly altered and unaltered tuff. Initial correlations of thermal/physical and sorptive properties with the highly variable porosity and mineralogy are described. Three in-situ, at-depth field experiments, one nearly completed and two just getting underway are described. In particular, the current status of mineralogy and petrology, geochemistry, thermal and mechanical, radiation effects and water behavior

studies are described. The goals and initial results of Mine Design Working Group are discussed. Regional factors such as seismicity, volcanism and hydrology are not discussed.

NRC DOCUMENT DATA BASE

WWL Document Number: 136

Document Summary

TITLE: Report on Static Hydrothermal Alteration Studies of Topopah Spring Tuff Wafers in J-13 Water at 150 C

AUTHOR: Knauss, K. G. and Beiriger, W. B.

Document Number: UCRL-53576
Requested From: NRC
Received From: NRC

Publication Date: Aug, 1984
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Geochemistry, Groundwater, Water Chemistry

KEY DATA:

COMMENTS:

SUMMARY:
Static hydrothermal alteration experiments were run for 4 months using polished wafers either fully submerged in a appropriated natural ground water or exposed to water-saturated air with enough excess water to allow refluxing. The aqueous results agreed favorably with similar experiments run using crushed tuff, and the use of solid polished wafers allowed us to directly evaluate the effects of reaction on the tuff. The results are preliminary in the sense that these experiments were run in Teflon-lined, static autoclaves, whereas subsequent experiments have been run in Dickson-type gold-cell rocking autoclaves. The results predict relatively minor changes in water chemistry, very minor alteration of the host rock, and the production of slight amounts of secondary minerals, when liquid water could return to the rock pores following the temperature maximum during the thermal period.

NRC DOCUMENT DATA BASE

WWL Document Number: 138

Document Summary

TITLE: In Situ Tuff Water Migration/Heater Experiment: Final Report

AUTHOR: Johnstone, J. K., Hadley, G. R., and Waymire, D. R.

Document Number: SAND81-1918
Requested From: NRC
Received From: NRC

Publication Date: Mar, 1985
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Dehydration, Heat Load Effect, Permeability, Thermomechanical Properties, Vapor Transport, Water Chemistry, Well Tests

KEY DATA: Permeabilities

COMMENTS:

SUMMARY:
This report summarizes the results of the In Situ Tuff Water Migration/Heater Experiment operated in the welded portion of the Grouse Canyon Member of the Belted Range Tuff in U12g-tunnel (G-Tunnel) on the Nevada Test Site (NTS). The experiment was located approximately 400 m below the surface and 200 m above the water table in nearly saturated rock. The experiment was designed to provide and initial assessment of the thermally induced behavior of the potentially large volumes of water (~25 vol% in this case) available in saturated or nearly saturated tuffaceous rocks. Instruments in the water collection cavities, including water depth gages, pH probes, humidity gages, and pressure transducer measured some properties of the collected water. Other holes in the array were instrumented to measure temperature profiles, thermally induced stress, and on provided a test bed for a continuously operating laser interferometer for measuring thermally induced rock displacements. Initial analysis of the water generation rate data in the heater hole, assuming an one-dimensional evaporation front/vapor diffusion

model, provided good qualitative agreement. The results of chemical analyses of water samples supports the notion of mass transport by vapor diffusion in the heater hole but not int the water migration holes. Rock temperatures it the heater hole exceeded 240 C.

NRC DOCUMENT DATA BASE

WWL Document Number: 140

Document Summary

TITLE: A Study of Surface and Subsurface Ground Motions at Calico Hills, Nevada Test Site

AUTHOR: King, K. W.

Document Number: USGS-OFR-82-1044
Requested From: NRC
Received From: NRC

Publication Date: 1982
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology, Geophysical Logs, Tectonics

KEY DATA: Seismic Refraction Profiles

COMMENTS:

SUMMARY:
A study of earthquake ground motions recorded at depth in drill hole and at the ground surface has derived the surface to subsurface transfer functions such as might be expected at a potential nuclear waste repository in a similar setting. The site under investigation has small seismic velocity contrasts in layers of rock between the surface and the subsurface seismometer location. The subsurface seismic motions were similar in spectral characteristics to the surface motions and were lower in amplitude across the recorded band-width by a factor of 1.5.

NRC DOCUMENT DATA BASE

WWL Document Number: 143

Document Summary

TITLE: Eleana Near-Surface Heater Experiment Final Report

AUTHOR: Lappin, A. R., Thomas, R. K., and McVey, D. F.

Document Number: SAND80-2137
Requested From: NRC
Received From: NRC

Publication Date: Apr, 1981
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Dehydration, Geology, Heat Load Effect, Mesh Design, Numerical Model, Permeability, Thermomechanical Properties

KEY DATA: Argillaceous Rock Bulk Chemical Analysis, Gas Transmissivity

COMMENTS:

SUMMARY:
This report summarizes the results of a near-surface heater experiment operated at a depth of 23 m in argillite within the Eleana Formation on the Nevada Test Site (NTS). The test geometrically simulated emplacement of a single canister of High-Level Waste (HLW) and was operated at a power level of 2.5 kW for 21 days, followed by 3.8 kW to 250 days, when the power was turned off. Below 85 to 100 C, there was good agreement between modeled and measured thermal results in the rock and in the emplacement hole, except for transient transport of water in the heater hole. Above 100 C, modeled and measured thermal results increasingly diverged, indicating that the in-situ rock-mass thermal conductivity decreased as a result of dehydration more than expected on the basis of matrix properties. correlation of thermomechanical modeling and field results suggests that this decrease was caused by strong coupling of thermal and mechanical behavior of the argillite at elevated temperatures.

NRC DOCUMENT DATA BASE

WWL Document Number: 144

Document Summary

TITLE: Surface Water Management: A User's Guide to Calculate a Water Balance Using the CREAMS Model

AUTHOR: Lane, L. J.

Document Number: LA-10177-M
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1984
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Climate, Computer Code, Hydraulic Conductivity, Numerical Model, Porosity

KEY DATA: Hydraulic Conductivity, Porosity, Evaporation Parameter

COMMENTS:

SUMMARY:
The hydrologic component of the CREAMS model is described and discussed in terms of calculating a surface water balance for shallow land burial systems used for waste disposal. Parameter estimates and estimation procedures are presented in detail in the form of a user's guide. Use of the model is illustrated with three examples based on analysis of data from Los Alamos, New Mexico and Rock Valley, Nevada. Use of the model in design of trench caps for shallow land burial systems is illustrated with the example applications at Los Alamos.

NRC DOCUMENT DATA BASE

WWL Document Number: 145

Document Summary

TITLE: Water and Contaminant Movement: Migration Barriers

AUTHOR: Lane, L. J. and Nyhan, J. W

Document Number: LA-10242-MS
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1984
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Hydraulic Conductivity, Radionuclide Transport, Retardation,

KEY DATA: Hydraulic Conductivity, Porosity

COMMENTS:

SUMMARY:
Migration barriers are used in shallow land burial facilities to slow or stop the movement of water and contaminants and are discussed here as a single component embedded in a complex environmental system. Analytical solutions to solute transport equations are use to approximate the behavior of migration barriers and to derive design criteria for control of subsurface water and contaminant migration. Various types of migration barriers are compared and design recommendations are made for shallow land burial trench caps and liners. Needed improvements and suggested field experiments for future designs of migration barriers are then discussed relative to the management of low-level radioactive wastes.

NRC DOCUMENT DATA BASE

WWL Document Number: 146

Document Summary

TITLE: FEMTRAN - A Finite Element Computer Program for Simulating Radionuclide Transport Through Porous Media

AUTHOR: Martinez, M. J.

Document Number: SAND84-0747
Requested From: NRC
Received From: NRC

Publication Date: Jan, 1985
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Numerical Model, Radionuclide Transport

KEY DATA: Radionuclide Properties

COMMENTS:

SUMMARY:
FEMTRAN is a finite element computer program for numerical simulation of the two-dimensional transport of radionuclide decay chains through saturated/unsaturated sorbing porous media. Transport mechanisms include advection, hydrodynamic dispersion, diffusion, equilibrium adsorption, and radioactive decay and evolution. The mathematical formulation and numerical implementation are presented in some detail. User instructions and example problems are described to illustrate the use and capabilities of the program.

NRC DOCUMENT DATA BASE

WWL Document Number: 147 Document Summary

TITLE: Preliminary Evaluation of the Subsurface Area Available for a Potential Nuclear Waste Repository at Yucca Mountain

AUTHOR: Mansure, A. J. and Ortiz, T. S.

Document Number: SAND84-0175 Publication Date: Dec, 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology, Lithology, Potentiometric Surface Map

KEY DATA:

COMMENTS:

SUMMARY:
One purpose of this study was to determine whether adequate area for the underground facility exists within the portion of the devitrified,densely welded Topopah Spring Member that contains less than 15-20% lithophysae. Areas were considered where the underground facility would be above the water table and at least 200 m below the surface. the thickness required for the repository zone was assumed to be 45 m. An area significantly larger than the area estimated to be required to accommodate the underground facility appears to be potentially usable from this study. However, because the primary area of exploration has been the central portion of north Yucca Mountain, adjacent areas are less well characterized. Portions of the areas identified in this study may not meet all of the above criteria. Additional exploration is required to determine the acreage of the usable area. Another purpose of this study was to identify a preliminary location within the primary area of exploration, where conditions are favorable for the proposed underground facility. Using available information, this study has identified a slab that

meets the above criteria. The slab dips 5 degrees 6 min. NE from a strike direction of N11 deg. 18 min.W. The area of the slab is about 1850 acres (7.49 km^2).

NRC DOCUMENT DATA BASE

WWL Document Number: 148 Document Summary

TITLE: Stratigraphy, Structure, and Some Petrographic Features of Tertiary Volcanic Rocks at the USW G-2 Drill Hole, Yucca Mountain, Nye County, Nevada

AUTHOR: Maldonado, F. and Koether, S. L.

Document Number: USGS-OFR-83-732 Publication Date: 1983
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Stratigraphy, Core Analysis, Well Data

KEY DATA: Well Completion, Stratigraphy, Fracture Analysis, Lithologic Log

COMMENTS:

SUMMARY:
A fracture analysis of the core resulted in tabulation of 7848 fractures, predominately open and high angle. The fractures were filled or coated with material in various combinations. Numerous fault zones were penetrated by the drill hole, predominately in the lithophysal zone to the Topopah Spring Member and below the tuffaceous beds of Calico Hills.

NRC DOCUMENT DATA BASE

WWL Document Number: 149 Document Summary

TITLE: Preliminary Geologic and Geophysical Data of the UE25a-3 Exploratory Drill Hole, Nevada Test Site, Nevada

AUTHOR: Maldonado, F., Muller, D. C., and Morrison, J. N.

Document Number: USGS-1543-6 Publication Date: ?
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fracture Analysis, Geology, Geophysical Logs, Lithology, Porosity

KEY DATA: Material Properties, Lithologic Log

COMMENTS:

SUMMARY:
The UE25a-3 drill hole, located in the Calico Hills area, southwestern part of the Nevada Test Site, was drilled as part of an effort to evaluate the Calico Hills area as a possible nuclear waste repository site. The purpose of the drill hole was to verify the existence of an intrusive crystalline body in the subsurface and to determine the stratigraphy, structure, and nature of fractures of the cored rocks. Cored samples were obtained for mineral, chemical, and material property analyses. Numerous high-angle faults and brecciated zones ware intersected by the drill hole. The units cored were intensely fractured with fracture analysis of the core consisting of frequency of fractures, dips of fractures, open and closed (sealed) fractures and types of fracture sealing or coating material. Twenty-four hundred and thirty fractures, representing approximately 30 percent of the fractures present, indicate an average fracture frequency of 13.2 fractures per meter, predominantly high-angle dips with 66 percent of the fractures closed. Borehole geophysical logs were run for geologic correlations and lithologic

characterizations. The logs include: caliper, density, resistivity, spontaneous potential, Vibroseis, 3-D velocity, neutron, and gamma-ray logs. Lithologic boundaries and structures correlates to responses in the logs.

NRC DOCUMENT DATA BASE

WWL Document Number: 151 Document Summary

TITLE: Nevada Nuclear Waste Storage Investigations Environmental Area Characterization Report

AUTHOR: The MITRE Corporation

Document Number: SAND83-7132 Publication Date: July, 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Atmosphere, Climate, Water Supplies

KEY DATA: Precipitation, Hydrologic Units, Water Use,

COMMENTS:

SUMMARY:
The report describes the southwestern corner of the Nevada Test Site, Nye County, Nevada, a potential location for a geologic repository for a high-level radioactive waste. The characterization summarizes reports supplied by Sandia National Laboratories, which cover the following topics: atmosphere, radiation background, hydrosphere, biosphere, energy and mineral resources, socioeconomics, and cultural resources.

NRC DOCUMENT DATA BASE

WWL Document Number: 152 Document Summary

TITLE: Permeability and Fluid Chemistry Studies of the Topopah Spring Member of the Paintbrush Tuff, Nevada Test Site: Part II

AUTHOR: Moore, D. E., Morrow, C. A., and Byerlee, J. D.

Document Number: UCRL-15667 Publication Date: Mar, 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Water Chemistry, Permeability

KEY DATA: Water Analysis, Reaction States

COMMENTS:

SUMMARY:
A series of permeability experiments has been conducted to model the flow of groundwater away from canisters heated by radioactive decay at a nuclear waste disposal site in tuffaceous rock. The purpose of the study was to determine the effects of localized heating around the canisters on the repository rock and associated groundwater. Studies concentrated on two tuff units from the NTS : the Bullfrog Member of the Crater Flat Tuff, and the Topopah Spring Member of the Paintbrush Tuff. This paper reports the permeability and groundwater chemistry results for the Topopah Spring Member and compares those results with the previous work on Bullfrog.

NRC DOCUMENT DATA BASE

WWL Document Number: 153

Document Summary

TITLE: Changes in Permeability and Fluid Chemistry of the Topopah Spring Member of the Paintbrush Tuff (Nevada Test Site) When Held in a Temperature Gradient: Summary of Results

AUTHOR: Moore, D. E., Morrow, C. A., and Byerlee, J. D.

Document Number: UCRL-15620
Requested From: NRC
Received From: NRC

Publication Date: June, 1984
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Core, Heat Load Effect, Permeability, Water Chemistry

KEY DATA: Permeability, Water Chemical Analysis, Reaction States

COMMENTS:

SUMMARY:
A series of permeability experiments has been conducted to model the flow of groundwater away from canisters heated by radioactive decay at a nuclear waste disposal site in tuffaceous rock. The purpose of the study was to determine the effects of localized heating around the canisters on the repository rock and associated groundwaters. This work was performed as a support study for the Nevada Nuclear Waste Storage Investigations (NNWSI) project under a contract to Lawrence Livermore Laboratory which is conducting waste packaging studies. Studies concentrated on two tuff units from the Nevada Test Site which are being evaluated as possible disposal horizons: the Bullfrog Member of the Crater Flat Tuff, and Topopah spring Member of the Paintbrush Tuff. Results for the Bullfrog Member have been presented Morrow et al. (1983) and Byerlee et al. (1983). This paper reports the permeability and groundwater chemistry results for the Topopah Spring Member and compares those results with the previous work on Bullfrog.

NRC DOCUMENT DATA BASE

WWL Document Number: 155 Document Summary

TITLE: Hydrology of Sealing a Repository in Saturated Tuff

AUTHOR: Mondy, L. A.

Document Number: SAND83-0280 Publication Date: Mar, 1983
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 0
Document Description (general, specific, etc.):
Document Read By (Initials):

KEY WORDS:

KEY DATA:

COMMENTS:

SUMMARY:
This modeling study dealt only with repositories in saturated rock and investigated the effects on groundwater flow once drifts and shafts are filled with materials of various permeability. Temperature effects were not examined. Modeling was limited to two dimensions, necessitating simplifying assumptions in some cases. Groundwater flow for the drift model was assumed to be due primarily to a hydraulic head gradient caused by a dipping water table similar to that found in the Yucca Mountain region. In the shaft model a vertical pressure gradient was assumed so that comparisons of sealing designs could be made. Results indicated that observable deviations in the groundwater flow near a repository would occur unless the drifts and shafts were backfilled to a permeability approaching that of native rock.

NRC DOCUMENT DATA BASE

WWL Document Number: 156

Document Summary

TITLE: Vadose Water Flow Around a Backfilled Drift Located in Tuff

AUTHOR: Mondy, L. A., Baker, B. L., and Eaton, R. R.

Document Number: SAND84-0369
Requested From: NRC
Received From: NRC

Publication Date: July, 1985
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 0
Document Description (general, specific, etc.):
Document Read By (Initials):

KEY WORDS:

KEY DATA:

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Through the technique of computer simulation, the authors investigate the flow characteristics of groundwater from surface influx into a host medium of unsaturated tuff. The study is designed to assess the potential influence of backfilled drifts on the groundwater flow past vertically emplaced waste canisters in a prospective nuclear waste repository. Numerical modeling with the code SAGUARO is used to determine the magnitude and direction of flow in the vicinity of a waste package below a drift backfilled with various materials. Sand and clay represent potential backfill materials which are significantly different in hydrologic properties. Results indicate that clay in a drift reduces the flow immediately adjacent to the waste package to 91% to 96% of the natural flow. Sand in the same drift acts as an extremely effective barrier to flow; however, below the drift at the waste package level, the groundwater flow is 81% to 92% of the natural volumetric flow. Therefore, backfilling a drift does not provide a significant reduction of flow in the vicinity of vertically emplaced waste package. The effect of the

drift on flow extends only slightly over adrift length below and drift width to the side of the backfilled region.

NRC DOCUMENT DATA BASE

WWL Document Number: 158 Document Summary

TITLE: Geochemistry Studies Pertaining to the G-Tunnel Radionuclide Migration Field Experiment

AUTHOR: Norris, A. E., et al.

Document Number: LA-9332-MS
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1982
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fracture Flow, Geochemistry, Permeability, Porosity, Radionuclide Transport, Retardation

KEY DATA: Porosity, Permeability, Bulk Density, Diffusion Coefficients, Water Compositions, Sorption Ratios

COMMENTS:

SUMMARY:
This report presents the results of geochemical studies of Tunnel Bed tuff that were performed by Los Alamos National Laboratory or done at its direction as part of the Nevada Test Site G-Tunnel Radionuclide Migration Field Experiment. A tuff-treated water was prepared and used in laboratory-scale measurements of radionuclied sorption onto crushed Tunnel Bed tuff, pulverized fracture-fill material, tuff wafers, and a solid tuff core. Modelling studies were undertaken to determine the effects of matrix diffusion and unsaturated tuff on the proposed fracture-flow experiments. The initial results of those studies are presented in this report.

NRC DOCUMENT DATA BASE

WWL Document Number: 159

Document Summary

TITLE: Reaction of Bullfrog Tuff with J-13 Well Water at 90 C and 150 C

AUTHOR: Oversby, V. M. and Knauss, K. G.

Document Number: UCRL-53442
Requested From: NRC
Received From: NRC

Publication Date: Sept, 1983
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Water Chemistry

KEY DATA: Water Analysis

COMMENTS:

SUMMARY:
A series of experiments were conducted to determine the nature and extent of reaction between the Bullfrog Member of the Crater Flat tuff and natural groundwater from well J-13 at the NTS. The experiments were conducted on crushed tuff at 90 and 150 degrees C and on core wafer samples at 150 degrees C. The paper presents the data for a number of ions in solution and for the pH of solutions. Additionally, it outlines the various experimental conditions used to determine the effects of different sample weights relative to solution volume, length of reaction time, presence and nature of highly soluble components, filtration of samples, agitation of samples during reaction, and method of sample preparation.

NRC DOCUMENT DATA BASE

WWL Document Number: 160 Document Summary

TITLE: Water Contents of Samples from the Nevada Test Site: Total, Free (Natural State to 105 C), and More Tightly Bonded (105-700 C)

AUTHOR: Pawloski, G. A.

Document Number: UCRL-53130 Publication Date: May, 1981
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs, Lithology

KEY DATA: Distribution of Various Water Types, Water Content, Neutron Sonde

COMMENTS:

SUMMARY:
To help confirm correct functioning of a epithermal neutron sonde, tightly bonded water content of selected Nevada Test Site (NTS) drill holes was measured. Tuff and alluvium samples were dried overnight as 105 C. The samples were then heated for 45 min in a split tube furnace at 700 C. The water that came off due to this heating was collected and the amount recorded. The error in this procedure is +- 0.59%. Total water can be calculated from samples from analyses of free and tightly bonded water contents. The maximum error in this calculation is equivalent to the error in determining the more tightly bonded water. Average total water content values have been assigned to geologic units. These values, in weight fraction, are alluvium 0.14 +- .05 and tuff 0.19 +- .04. Further division of the tuff gives values of Rainier Mesa 0.15 +- .01, Paintbrush 0.18 +- .03, Tunnel Beds 0.20 +- .04, and Grouse Canyon 0.29 +- .02. Statistically significant differences also occur between Grouse Canyon, Rainier Mesa, and Paintbrush/Tunnel Beds. Paintbrush and Tunnel Beds cannot be distinguished by this method.

NRC DOCUMENT DATA BASE

WWL Document Number: 161 Document Summary

TITLE: Validation of the TRACR3D Code for Soil Water Flow Under Saturated/Unsaturated Conditions in Three Experiments

AUTHOR: Perkins, B, Travis, B., and DePoorter, G.

Document Number: LA-10263-MS
Requested From: NRC
Received From: NRC

Publication Date: Jan, 1985
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Computer Code, Core, Numerical Model, Saturated Flow, Unsaturated Flow

KEY DATA: Soil Moisture, % Moisture by Volume, Degree of Saturation, Water Content

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Validation of the TRACR3D code in one-dimensional form was obtained for flow of soil water in three experiments. In the first experiment, a pulse of water entered a crushed-tuff soil and initially moved under conditions of saturated flow, quickly followed by unsaturated flow. In the second experiment, steady-state unsaturated flow took place. In the final experiment, two slugs of water entered crushed tuff under field conditions. In all three experiments, experimentally measured data for volumetric water content agreed, within experimental errors, with the volumetric water content predicted by the code simulations. The experiments and simulations indicated the need for accurate knowledge of boundary and initial conditions, amount and duration of moisture input, and relevant material properties as input into the computer code. During the validation experiments, limitations on monitoring of water movement in waste burial sites were also noted.

NRC DOCUMENT DATA BASE

WWL Document Number: 162 Document Summary

TITLE: Hydrologic Test System for Fracture Flow Studies in Crystalline Rock

AUTHOR: Raber, E., Lord, D., and Burklund, P.

Document Number: UCID-19405 Publication Date: May, 1982
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Fracture Analysis

KEY DATA: None

COMMENTS:

SUMMARY:
A hydrologic test system has been designed to measure the intrinsic permeabilities of individual fractures in crystalline rock. This system is used to conduct constant pressure-declining flow rate and pressure pulse hydraulic tests. The system is composed of four distinct units: (1) The Packer System, (2) Injection System, (3) Collection System and (4) Electronic Data Acquisition System. The apparatus is built in modules so it can be easily transported and re-assembled. It is also designed to operate over a wide range of pressures (0-300 psig) and flow rates (0.2 - 1.0 gal/min).

NRC DOCUMENT DATA BASE

WWL Document Number: 164 Document Summary

TITLE: Radionuclide Migration: Laboratory Experiments With Isolated Fractures

AUTHOR: Rundberg, R. S., Thompson, J. L., and Maestas, S.

Document Number: LASL
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1981
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Fracture Flow, Radionuclide Transport

KEY DATA: Breakthrough Curves

COMMENTS:

SUMMARY:
Laboratory experiments have been run on fractures ranging in size from 1 to 20 cm in length. The hydraulic flow in these fractures was studied to provide the effective apertures. Traced solutions containing Strontium and Cesium were flowed through fractures in Climax Stock granite and welded tuff. The results of the elutions through granite agree with the matrix diffusion calculations based on independent measurements of Kd. The results of the elutions through tuff, however, agree only if the Kd values used in the calculations are lower than the Kd values measured using a batch technique. This trend has been previously observed in chromatographic column experiments with tuff.

NRC DOCUMENT DATA BASE

WWL Document Number: 165 Document Summary

TITLE: Small Diameter Horizontal Hole Drilling - State of Technology

AUTHOR: The Robbins Company

Document Number: SAND84-7103 Publication Date: Nov, 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS:

KEY DATA: Manufactures and Specifications of Various Drilling and Surveying Equipment, Case Histories of Horizontal Drilling

COMMENTS:

SUMMARY:
The purpose of this study is to determine the existing state of the art for small diameter, horizontal pilot hole drilling. The data were collected by contacting worldwide owners of raise or slant hole drill equipment, manufacturers of drills and bits, and manufacturers of survey tools. ^AThe study was limited to existing equipment and completed trials. Most attempts at directional pilot hole drilling, and most survey tools are designed for near vertical, downward drilling. Several types of control-label bits are available which depend upon in-hole motors and bent or wedged assemblies to bias the direction of drilling. Accurate horizontal drilling can be achieved in this way by alternately drilling and surveying at frequent intervals. This procedure in impractical, however, from both a production and a cost standpoint. A few attempts at directional drilling have been made using ordinary drilling tools, a rotary drill string and a tricone bit. Good equipment and a well trained drill crew appeared to be the most significant factor in practical, accurate drilling, whether horizontal or vertical.

Because of the cost, no one uses steerable bit drilling except for correction, and then only for short portions of an overall drill program. No satisfactory continuous readout surveying tool, coupled with a remotely controlled bit capable of direction correction, exists. An industry need exists for a high speed, directional drill bit, coupled with a continuously monitored survey tool.

NRC DOCUMENT DATA BASE

WWL Document Number: 168 Document Summary

TITLE: Preliminary Report on Late Cenozoic Faulting and Stratigraphy in the Vicinity of Yucca Mountain, Nye County, Nevada

AUTHOR: Swadley, W. C., Hoover, D. L., and Rosholt, J. N.

Document Number: USGS-OFR-84-788 Publication Date: 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 0
Document Description (general, specific, etc.):
Document Read By (Initials):

KEY WORDS: Faults, Stratigraphy, Tectonics

KEY DATA: Trenches across Faults, Radiometric Ages

COMMENTS:

SUMMARY:
Mapping of surficial deposits and examination of faults in natural and trenched exposures in a 1100 km^2 area around the site of a potential repository for radioactive waste at Yucca Mountain have identified 32 faults that offset or fracture Quaternary deposits. Where the amount of Quaternary offset can be estimated, dip-slip movement is on the order of 3 m or less on faults in and near Yucca Mountain. Maximum Quaternary offset within the study area may be as much as 30 m. No strike-slip movement was demonstrated nor can it be ruled out. Based on radiometric ages, correlations of stratigraphic units, and field observations, Quaternary faults are divided into three broad age groups: five faults moved between about 270,000 and 40,000 years ago; four faults moved about 1 m.y. ago; and 23 faults moved probably between 2 m.y. and more than 1.2 m.y. ago. Offset of Holocene deposits has not been demonstrated.

NRC DOCUMENT DATA BASE

WWL Document Number: 169 Document Summary

TITLE: Stratigraphic and Structural Characteristics of Volcanic Rocks in Core Hole USW G-4, Yucca Mountain, Nye County, Nevada

AUTHOR: Spengler, R. W. and Chornack, M. P.

Document Number: USGS-OFR-84-789 Publication Date: 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Well Data, Stratigraphy, Fractures, Core, Geophysical Logs

KEY DATA: Geologic Units, Fracture Inclination, Fracture Strike, Fracture Frequency

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Core hole USW G-4 was cored from 13m to 915m at a location approx. 91m southwest of the proposed site of the exploratory shaft. Welding characteristics of ash-flow tuff members and within the tuffaceous beds of Calico Hills vary in thickness from 0.8m to 17.0m. Zeolitic alteration of rock units occurs below a depth of 434.2m. Above this depth, densely welded units are dominantly devitrified, and non- to moderately welded tuff units are dominantly vitric. Three obvious lithophysae-bearing intervals occur in the densely welded zone of the Topopah Spring Member. The most conspicuous zone occurs between depths of 143m and 207m, and commonly contains from 11 to 29 percent voids. 81 percent of the fractures identified in core occur in the densely welded zones of the Tiva Canyon and Topopah Spring Members. Fracturing decreases significantly below the densely welded zone of the Topopah Spring. Strike directions of fractures identified from downhole television camera observations in the Tiva Canyon Member suggest an absence of any preferred orientation. In the densely welded zone of the Topopah Spring

Member and the upper part of the tuffaceous beds of Calico Hills most fractures strike between N30W and N60E.

NRC DOCUMENT DATA BASE

WWL Document Number: 171 Document Summary

TITLE: Flood Potential of Fortymile Wash and its Principal Southwestern Tributaries, Nevada Test Site, Southern Nevada

AUTHOR: Squires, R. R. and Young, R. L.

Document Number: USGS-83-4001 Publication Date: 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Precipitation, Regional Hydrology, Water Supplies

KEY DATA: Peak Flood Discharge

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Flood hazards for a 9-mile reach of Fortymile Wash and its principal southwestern tributaries--Busted Butte, Drill Hole, and Yucca Washes--were evaluated to aid in determining possible sites for the storage of high-level radioactive wastes on the Nevada Test Site. Among seven cross sections on fortymile Wash, the estimated maximum depths of the 100-year, 500-year, and regional maximum floods are 8, 11, and 29 feet, respectively. At these depths, flood water would remain within the deeply incised channel of the wash. Mean flow velocities would be as great as 9, 14, and 28 feet per second for the three respective flood magnitudes. The study shows that Busted Butte and Drill Hole Washes (9 and 11 cross sections, respectively) would have water depths of up to at least 4 feet and mean flow velocities of up to at least 8 feet per second during a 100-year flood. A 500-year flood would exceed stream-channel capacities at several places, with depths to 10 feet and mean flow velocities to 11 feet per second. The regional maximum flood would inundate

sizeable areas in central parts of the two watersheds. At Yucca Wash (5 cross sections), the 100-year, 500 year, and regional maximum floods would remain with the stream channel . Maximum flood depths would be about 5, 9, and 23 feet and mean velocities about 9, 12, and 22 feet per second, respectively, for the three floods.

NRC DOCUMENT DATA BASE

WWL Document Number: 172 Document Summary

TITLE: Analysis of Thermal Data from Drill Holes UE25a-3 and UE25a-1, Calico Hills and Yucca Mountain, Nevada Test Site

AUTHOR: Sass, J. H., Lachenbruch, A. H., and Mase, C. W.

Document Number: USGS-OFR-80-826 Publication Date: 1980
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Heat Load Effect, Thermomechanical Properties, Unsaturated Flow, Vapor Transport

KEY DATA: Thermal Conductivity, Temperature Gradient, Conductive Heat Flow, Temperature Profile

COMMENTS:

SUMMARY:
Thermal data from two sites about 20 km apart in the Nevada Test Site indicate that heat flow both within and below the upper 800 meters is affected significantly by hydrothermal convection. For hole UE25a-1, Yucca Mountain, the apparent heat flow above the water table (~470 m) is 54 mWm-2 (~1.3 HFU). Below the water table, the temperature profile indicates both upward and downward water movement within the hole and possibly within the formation. Hole UE25a-3, Calico Mountain, is characterized by conductive heat flux averaging 135 mWM-2 (~3.2 HFU) to a depth of about 700 meters below which water appears to be moving downward at the rate of nearly 1 ft/yr (255 mm/yr). Between 735 and 750 meters, the hole intersected a nearly vertical fault along which water seems to be moving vertically downward. The nearly threefold variation in conductive heat flow over a lateral distance of only 20 km suggests the presence of a more deeply seated hydrothermal convective system with a net upward flow beneath Calico Hills and a net downward flow beneath Yucca Mountain.

NRC DOCUMENT DATA BASE

WWL Document Number: 173 Document Summary

TITLE: Resistivity Sounding Investigation by the Schlumberger Method in the Yucca Mountain and Jackass Flats Area, Nevada Test Site, Nevada

AUTHOR: Senterfit, R. M., Hoover, D. B., and Chornack, M.

Document Number: USGS-OFR-82-1043 Publication Date: 1982
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Faults

KEY DATA: Resistivities, Geolelectric Fields

COMMENTS:

SUMMARY:
A Schlumberger resistivity survey was made in the west-central sector of the Nevada Test Site as part of an extensive program to assess and identify potential repositories for high-level nuclear waste. The survey area shown is located within the Topopah Spring 15-minute Quadrangle. The intent of the survey was to determine the geoelectric characteristics of the area and to relate them to the thickness and horizontal continuity of lithologic units in the Yucca Mountain and Jackass flats area, and to locate faulting within the survey area. A total of 29 soundings is included in this report. The field data were interpreted in terms of rock layer resistivity and thickness by computer method, and cross-sections were constructed to illustrate lateral resistivity variations within the near-surface rock.

NRC DOCUMENT DATA BASE

WWL Document Number: 176 Document Summary

TITLE: Grain Density Measurements of Ash Flow Tuffs: An Experimental Comparison of Water Immersion and Gas Intrusion Pycnometer Techniques

AUTHOR: Schwartz, B. M.

Document Number: SAND83-1327 Publication Date: Aug, 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials):

KEY WORDS: Core Analysis, Lithology

KEY DATA: Grain Density

COMMENTS:

SUMMARY:
This report compares two widely use techniques for measuring grain density: water immersion and gas intrusion. It also describes sample-handling and operating procedures necessary for repeatable grain density measurements of zeolitized and clay-bearing tuffaceous rocks. Laboratory tests included in this report show the importance of careful sample-handling on the acquisition of accurate and repeatable data. Without consistent thermal pretreatment of hygroscopic tuff samples, grain densities determined by either method can vary by as much as 10 percent due to the loss or gain of adsorbed water. Repeatable data are obtained only when pretest sample-handling procedures are both defined and rigorously followed. These data indicate that both techniques are probably sufficiently accurate and precise for most project needs. However, water pycnometer data have a higher level of precision for both zeolitized and non-zeolitized tuff samples than do gas pycnometer data.

NRC DOCUMENT DATA BASE

WWL Document Number: 178 Document Summary

TITLE: Preliminary Geologic Map of Yucca Mountain Nye County, Nevada With Geologic Sections

AUTHOR: Scott, R. B. and Bonk, J.

Document Number: USGS-OFR-84-494 Publication Date: 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): General
Document Read By (Initials): TLS

KEY WORDS: Geology

KEY DATA: Description of Map Units, Geologic Sections

COMMENTS:

SUMMARY:
The report consists of a description of map units and two large sheets: Sheet 1 is a preliminary geologic map of Yucca Mountain with geologic sections, Sheet 2 has geologic sections. The cross sections emphasize lithologic and stratigraphic features important to hydrology.

NRC DOCUMENT DATA BASE

WWL Document Number: 179 Document Summary

TITLE: Chemistry and Movement of Ground Water, Nevada Test Site

AUTHOR: Schoff, S. L. and Moore, J. E.

Document Number: TEI-838
Requested From: NRC
Received From: NRC

Publication Date: 1964
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Geochemistry, Geology, Ground Water Movement, Regional Hydrology, Water Chemistry, Water Supplies

KEY DATA: Water Chemistry

COMMENTS:

SUMMARY:
Three chemical types of ground water are distinguished at the Nevada Test Site and vicinity. A sodium-potassium water is related to tuff (in part zeolitized) and to alluvium containing detrital tuff. A calcium-magnesium water is related to limestone and dolomite, or to alluvium containing detritus of these rock types. A mixed chemical type, containing about as much sodium and potassium as calcium and magnesium, may result from the addition of one of the first two types of water to the other; to passage of water first through tuff and then through carbonate rock, or vice versa; and to ion-exchange during water travel. Consideration of the distribution of these water types, together with the distribution of sodium in the water and progressive changes in the dissolved solids, suggests that the ground water in the Nevada Test Site probably moves toward the Amargosa Desert, not into Indian Spring Valley and thence southeastward toward Las Vegas. The low dissolved solids content of ground-water reservoirs in alluvium and tuff of the enclosed basins indicates that recharge is local in origin.

NRC DOCUMENT DATA BASE

WWL Document Number: 180 Document Summary

TITLE: Preliminary Upper-Bound Consequence Analysis for a Waste Repository at Yucca Mountain, Nevada

AUTHOR: Thompson, F. L., Dove, F. H., and Krupka, K. M.

Document Number: SAND83-7475 Publication Date: Aug, 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Flux, Groundwater, Radionuclide Transport, Recharge, Saturated Flow, Unsaturated Flow

KEY DATA: Recharge, Radionuclide Inventories, Traveltime, Cross Section

COMMENTS: Has received a formal review by W&A.

SUMMARY:
This report presents results of a first attempt to estimate the long-term, cumulative release of radionuclides from a proposed nuclear waste repository at Yucca Mountain in Nevada. The approach taken is to quantify the releases that would be expected from the repository under undisturbed conditions, and to use these releases to obtain upper bounds on the cumulative release of radioactivity to the accessible environment (here defined as a boundary in the underlying aquifer 10 km downstream from the boundary of the repository). Using currently available data, it is shown that ground-water flux through the repository horizon is the most important parameter determining release to the accessible environment; however, the results of the analysis show that even for the highest credible flux, 17mm/yr, releases of radioactivity to the accessible environment in 10,000 years after closure are significantly less than the limits imposed in the draft standards (40 CFR 191) for environmental radiation protection.

NRC DOCUMENT DATA BASE

WWL Document Number: 181 Document Summary

TITLE: Evaluation of Tuff as a Waste Isolation Medium

AUTHOR: Tyler, L. D.

Document Number: AT(29-1)789 Publication Date: ?
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Geology

KEY DATA: Sorption Ratios, Physical Properties

COMMENTS:

SUMMARY:
The properties of the rock are discussed and compared with other isolation media. The favorable and unfavorable aspects are presented. Also, unresolved issues are discussed along with the investigative program for addressing these issues. Tuff is of interest for use as an isolation medium for high heat producing wastes because it provides highly sorptive minerals and suitable thermomechanical properties.

NRC DOCUMENT DATA BASE

WWL Document Number: 184

Document Summary

TITLE: Laboratory Measurements of Ultralow Permeability of Geologic Materials

AUTHOR: Trimmer, D.

Document Number: UCRL-86722
Requested From: NRC
Received From: NRC

Publication Date: Aug, 1982
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Fractures, Geology, Permeability

KEY DATA: Permeability, Fracture Width, Effective Pressure

COMMENTS:

SUMMARY:
An apparatus is described for determining permeability (water) in geologic material as a function of confining pressure (to 200 MPa), pore pressure (to 25 MPa), and deviatoric stress (500-800 MPa). The samples are relatively large (0.15 m diameter X 0.28 m long) and may be intact or contain a single through-going fracture. Permeabilities of 10 E-11-10E-24 m2(10-10^12 D) may be measured, simultaneously, with electrical conductivity and acoustic velocity and amplitude. Crack closure is also monitored for the fractured samples. All experimental control and data-acquisition functions are performed by a microcomputer. A discussion of data-analysis techniques and typical data are also presented.

NRC DOCUMENT DATA BASE

WWL Document Number: 185 Document Summary

TITLE: Sorption-Desorption Studies on Tuff II. A Continuation of Studies with Samples from Jackass Flats, Nevada and Initial Studies with Samples from Yucca Mountain, Nevada

AUTHOR: Vine, E. N., et al.

Document Number: LA-8110-MS
Requested From: NRC
Received From: NRC

Publication Date: Jan, 1980
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology, Groundwater, Radionuclide Transport, Retardation,

KEY DATA: Neutron Activation Analysis, Traced Water and Element Concentrations, Sorption Ratios, pH Values

COMMENTS:

SUMMARY:
Distribution coefficients were determined by a static (batch) technique for sorption-desorption of radionuclides between tuffs from drill holes UE25a#1 and J-13 at the Nevada Test Site and water from well J-13. Measurements were performed under atmospheric and controlled atmospheric conditions. Under atmospheric conditions tuffs high in zeolite minerals had sorption ratios of ~10^3 to 10^4 ml/g with Sr, Cs, Ba, Ce, Eu, Am, and Pu. For tuffs similar mineralogically to a microgranite the sorption ratios were ~10^2 to 10^3 ml/g. Values for U and Tc were obtained under controlled atmosphere (<0.2 ppm O2) conditions. Studies were also begun to measure distribution ratios by a dynamic (column) technique. The ratios obtained for the elements studied, Sr, Cs, and Ba, were similar to, although lower than, those obtained by batch methods.

NRC DOCUMENT DATA BASE

WWL Document Number: 188

Document Summary

TITLE: Geohydrology of Hole UE-17a, Syncline Ridge Area, Nevada Test Site

AUTHOR: Weir, J. E., Jr., and Hodson, J. N.

Document Number: USGS-1543-4
Requested From: NRC
Received From: NRC

Publication Date: 1979
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology, Groundwater, Hydraulic Head, Lithology, Stratigraphy, Water Chemistry

KEY DATA: Water Quality, Transmissivity

COMMENTS:

SUMMARY:
Hole UE-17a was drilled as part of a study to evaluate the suitability of Unit J of the Eleana Formation of Mississippian age as a medium for storage of nuclear wastes. The 1,214-foot (370-meter) hole penetrated alluvium of Quaternary age, a thrust plate of the Tippipah Limestone of Pennsylvanian and Permian Age, and 668 feet (204 meters) of the Eleana Formation. A small amount of ground water occurs in fractured quartzites and limestones of the Eleana Formation; jetting produced only 20 gallons per minute (1.3 liters per second) from the completed hole. Approximate transmissivity, calculated from jetting test results, is 1.2 feet squared day (0.11 meters squared per day). The hydraulic head has almost steadily declined in the hole since September 29, 1976, a few days after the hole was completed. Water from the Eleana Formation is a sodium bicarbonate and sodium sulfate type.

NRC DOCUMENT DATA BASE

WWL Document Number: 190 Document Summary

TITLE: Sorption-Desorption Studies on Tuff III. A Continuation of Studies with Samples from Jackass Flats and Yucca Mountain, Nevada

AUTHOR: Wolfsberg, K., et al.

Document Number: LA-8747-MS Publication Date: May, 1981
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Radionuclide Transport, Retardation,

KEY DATA: Sorption Ratios

COMMENTS:

SUMMARY:
This report is the third in a series of reports describing studies of sorption and migration of radionuclides in tuff. The investigations were extended to lithologies of tuff not previously studied. Continuing experiments with uranium, plutonium, and americium are described. The dependence of sorption on the concentration of the sorbing element and on the solution-to-solid ratio was investigated for a number of nuclides and two lithologies. A circulating system was designed for measuring sorption ratios. ^AValues obtained from this system, batch measurements, and column elutions are compared. Progress on measuring and controlling Eh is described.

NRC DOCUMENT DATA BASE

WWL Document Number: 194 Document Summary

TITLE: Investigations of Sensitivity and Uncertainty in Some Hydrologic Models of Yucca Mountain and Vicinity

AUTHOR: Jacobson, E. A., Freshley, M. D., and Dove, F. H.

Document Number: SAND84-7212 Publication Date: Oct, 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Hydraulic Conductivity, Numerical Model, Porosity, Saturated Flow, Transmissivity, Travel Time, Unsaturated Flow

KEY DATA: Percolation Flux, Saturated Hydraulic Conductivity, Travel Time, Sensitivity

COMMENTS: Has received a formal review by W&A.

SUMMARY:
The uncertainty in travel time for water through the unsaturated and saturated zones of Yucca Mountain and vicinity was determined by considering uncertainty associated with input parameters to the hydrologic models of these zones. A first-order analysis was use to investigate uncertainty in water travel time through the unsaturated zone at Yucca Mountain, based on an analytic solution for water flow. Results of the investigation of uncertainty for the unsaturated zone indicated that uncertainty in percolation estimate contributed significantly more to uncertainty in travel time that uncertainty in estimates of hydraulic conductivity. Monte Carlo and first-order approaches were used to investigate uncertainty in ground-water travel time for different cases that varied in the treatment of the input parameters to the hydrologic model of the unsaturated zone. Comparison of the Monte Carlo and first-order estimates of mean ground-water travel time and travel time uncertainty in the saturated zone demonstrates that the first-order approach underestimates both the mean and variance of travel time for all cases considered.

NRC DOCUMENT DATA BASE

WWL Document Number: 196

Document Summary

TITLE: Chemical Composition of Ground Water in the Yucca Mountain Area, Nevada, 1971-84

AUTHOR: Benson, L. V. and McKinley, P. W.

Document Number: USGS-OFR-85-484
Requested From: NRC
Received From: NRC

Publication Date: 1985
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Groundwater, Water Chemistry

KEY DATA: Water Chemistry

COMMENTS:

SUMMARY:
Fifteen test wells in the Yucca Mountain area of southern Nevada have been sampled for chemical analysis at least once during 1971-84. Samples were obtained by pumping water from the entire well bore (composite sample), and, in three instances, by pumping from one or more isolated intervals within a well bore. Sodium was the most abundant cation, and bicarbonate was the most abundant anion in all water samples. Samples from the deep carbonate aquifer penetrated by well UE-25p#1 contained higher relative concentrations of calcium and magnesium than did samples from overlying volcanic tuffs. Concentrations of the stable isotopes of oxygen and hydrogen were relatively negative (light) and had deuterium-excess values ranging from +5 to +10. The distribution of uncorrected radiocarbon ages of water from volcanic tuffs sampled with 1 kilometer of the exploratory block on Yucca Mountain ranged from 12,000 to 18,5000 years before present. Variation in the concentrations of inorganic constituents and of stable and radioactive isotopes indicates a significant degree of lateral and vertical chemical inhomogeneity in ground water of the Yucca Mountain area.

NRC DOCUMENT DATA BASE

WWL Document Number: 197

Document Summary

TITLE: Geohydrology of Rocks Penetrated by Test Well USW H-4, Yucca Mountain, Nye County, Nevada

AUTHOR: Whitfield, M. S., Jr., Eshom, E. P., Thordarson, W., and Schaefer, D. H.

Document Number: USGS-WRI-85-4030
Requested From: NRC
Received From: NRC

Publication Date: 1985
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geohydrologic Data, Geology, Geophysical Logs, Groundwater, Hydraulic Conductivity, Lithology, Stratigraphy, Transmissivity, Well Tests

KEY DATA: Hydraulic Conductivity, Transmissivity

COMMENTS:

SUMMARY:
Static water level was at a depth of 519 meters below land surface. Hydraulic-head measurements made at successively lower depth during drilling in this test hole indicate no noticeable head change. A radioactive-tracer, borehole-flow survey indicated that the two most productive zones in this borehole occurred in the upper part of the Bullfrog Member, depth interval from 721 to 731.5 meters, and in the underlying upper part of the Tram Member, depth interval from 864 to 920 meters, both in the Crater Flat Tuff. Hydraulic coefficients calculated from pumping-test data indicate that transmissivity ranged from 200 to 790 meters squared per day. The hydraulic conductivity ranged from 0.29 to 1.1 meters per day. Chemical analysis of water pumped from the saturated part of the borehole (composite sample) indicates that the water is typical of water produced from tufaceous rocks in souther Nevada. The water is predominantly a sodium bicarbonate type with small concentrations of calcium, magnesium, and sulfate. The apparent age of this composite water sample was determined by a carbon-14 date to be 17,200 years before present.

NRC DOCUMENT DATA BASE

WWL Document Number: 198

Document Summary

TITLE: Repository Site Data Report for Unsaturated Tuff, Yucca Mountain, Nevada

AUTHOR: Tien, P. L., Siegel, M. D., Updegraff, C. D., Wahi, K. K., and Guzowski, R. V.

Document Number: SAND84-2668
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1985
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Stratigraphy, Petrology, Mineralogy, Geology, Ground Water, Thermomechanical Properties

KEY DATA: Sorption Data, Stratigraphic Descriptions, Lithologic Descriptions, Porosity, Saturation, Fracture Densities, Effective Porosity, Relative Permeability, Fracture Hydraulic Conductivity, Hydraulic Conductivity

COMMENTS:

SUMMARY:
Geochemical, hydrologic and thermomechancial data available on the unsaturated tuffs of Yucca Mountain are tabulated in this report. Where the data are very sparse, they have been supplemented by data from the saturated zone or from areas other than Yucca Mountain. The report is divided into nine major sections: (1) Regional Setting, (2) Stratigraphy, (3) Petrology and Mineralogy, (4) Geologic Structures, (5) Geochemistry, (6) Ground Water Hydrology, (7) Thermomechanical Properties, (8) Recommendations for Future Work, (9) Data. Specific recommendations for future work which pertain to hydrology are: (1) Collection of in-situ pressure head data for air and liquid phases. (2) Obtain data for relative air and liquid hydraulic conductivities vs. pressure head. (3) Collection of degree of saturation vs. pressure head data. (4) Determination of how much recharge enters the unsaturated zone by way of fractures and how much enters by way of pore space. (5) Determination of the fracture network in the tuffs and the possibility that fracture flow may dominate pore flow in the unsaturated zone. Other recommendations are:

Detailed correlation from hole to hole of the subsurface distributions of the tuff units is impossible. More subsurface data are needed to adequately model the site.

NRC DOCUMENT DATA BASE

WWL Document Number: 199 Document Summary

TITLE: Reaction of the Topopah Spring Tuff With J-13 Water at 120 C

AUTHOR: Oversby, V. M.

Document Number: UCRL-53574
Requested From: NRC
Received From: NRC

Publication Date: July, 1984
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Heat Load Effect, Water Chemistry

KEY DATA: Water Data, Anion Concentration, Element Concentration

COMMENTS:

SUMMARY:
This report describes a series of hydrothermal experiments using crushed tuff from the Topopah Spring Member and natural ground water from well J-13. The purpose of these experiments is to define the changes in water chemistry that would result from temperature changes caused by emplacing high level nuclear waste in a repository in the Topopah Spring tuff. Experiments were conducted and 120 C in Teflon-lined reaction vessels at four separate rock-to-water ratios and for reaction times up to 72 days. The composition of evaporite deposits contained in the pores of the surface-outcrop rock material used in these experiments is determined from solution compositions resulting from treatment of the rock before the start of the experiments. Results from the experiments at 120 C are compared with previous experimental results form hydrothermal reaction of the Topapah Spring tuff with J-13 water at 90 and 150 C. The main conclusion that can be drawn from this work is that changes in the water chemistry due to heating of the rock-water system can be expected to be very minor. There is no significant source of anions (F, Cl, NO3, or SO4)

in the rock; solution anion compositions after reaction of pretreated rock with J- 13 water differ very little form the starting compositions. The major changes in cations are an increase in silica to approximately the level of cristobalite solubility, supersaturation of aluminum followed by slow precipitation, and fairly rapid precipitation of calcium and magnesium due to the retrograde solubility of calcite. These results are in good agreement.

NRC DOCUMENT DATA BASE

WWL Document Number: 200

Document Summary

TITLE: Changes in Permeability and Fluid Chemistry of the Topopah Spring Member of the Paintbrush Tuff (Nevada Test Site) When Held in a Temperature Gradient: Summary of Results)

AUTHOR: Moore, D. E., Morrow, C. A., and Byerlee, J. D.

Document Number: USGS-OFR-84-273
Publication Date: 1984
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Groundwater, Heat Load Effect, Permeability, Water Chemistry

KEY DATA: Permeability, Groundwater Chemistry

COMMENTS:

SUMMARY:
A series of permeability experiments has been conducted to model the flow of groundwater away from canisters heated by radioactive decay at a nuclear wasted disposal site in Tuffaceous rock. The purpose of the study was to determine the effects of localized heating around the canisters on the repository rock and associated groundwaters. This work was performed as a support study for the Nevada Nuclear Waste Storage Investigations (NNWSI) project under a contract to Lawrence Livermore Laboratory which is conducting waste packaging studies. Studies concentrated on two tuff units from the Nevada Test Site which had been proposed as possible disposal horizons: The Bullfrog Member of the Crater Flat Tuff, and the Topopah Spring Member of the Paintbrush Tuff. Results for the Bullfrog Member have been presented in Morrow et al. (1983) and Byerlee et al. (1983). This paper reports the permeability and groundwater chemistry results for the Topopah Spring Member and compares those results with the previous work on Bullfrog.

NRC DOCUMENT DATA BASE

WWL Document Number: 201 Document Summary

TITLE: Permeability and Fluid Chemistry Studies of the Topopah Spring Member of the Paintbrush Tuff, Nevada Test Site: Part II

AUTHOR: Moore, D. E., Morrow, C. A., and Byerlee, J. D.

Document Number: USGS-OFR-84-848 Publication Date: 1984
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Geochemistry, Groundwater, Heat Load Effect, Permeability, Water Chemistry

KEY DATA: Permeability, Water Chemistry

COMMENTS:

SUMMARY:
The Topopah Spring Member of the Paintbrush Tuff is being considered as a possible emplacement horizon for the disposal of nuclear waste. ^A^AThe permeability and pore-fluid chemistry of the Topopah Spring Member have been investigated experimentally. The work reported here represents a continuation of previous permeability studies on the Topopah Spring Member. Three experiments were run, to test the effect of pore pressure, sample orientation, and flow direction on permeability and pore fluid chemistry. In the experiments, water flowed either up or down a temperature gradient established across the tuff sample in response to a small pore pressure gradient. The maximum temperature of the gradient was 150 C, and the minimum was 43-45 C. The confining pressure was 100 bars, corresponding to disposal depth of 400 meters. J13 water was the starting pore fluid. The heated tuff samples showed few changes in permeability from their initial, room-temperature values. In addition, the fluids discharged from both the low and high-temperature sides of the tuff samples wee dilute, nearly neutral solutions whose compositions did not differ greatly from the starting J13 compositions.

NRC DOCUMENT DATA BASE

WWL Document Number: 204

Document Summary

TITLE: An Assessment of the Important Radionuclides in Nuclear Waste

AUTHOR: Kerrisk, J. F.

Document Number: LA-10414-MS
Requested From: NRC
Received From: NRC

Publication Date: Oct, 1985
Request Date: Oct. 85
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Radionuclide Transport, Retardation, Traveltime

KEY DATA: Inventory of Various Nuclear Wastes, EPA Release Limits, Solubility, Traveltime

COMMENTS:

SUMMARY:
The relative importance of the various radionuclides contained in nuclear waste has been assessed by consideration of (1) the quantity of each radionuclide present, (2) the Environmental Protection Agency's release limits for radionuclides, (3) how retardation processes such as solubility and sorption affect radionuclide transport, and (4) the physical and chemical forms of radionuclides in the waste. Three types of waste were reviewed: spent fuel, high-level waste, and defense high-level waste. Conditions specific to the Nevada Waste Storage Investigations project potential site at Yucca Mountain were used to describe radionuclide transport. The actinides Am, Pu, Np, and U were identified as the waste elements for which solubility and sorption data were most urgently needed. Other important waste elements were identified as Sr, Cs, C, Ni, Zr, Tc, Th, Ra, and Sn. Under some conditions, radionuclides of three elements (C, Tc, and I) may have high solubility and negligible waste sorption. The potential for transport of some waste elements (C and I) in the gas phase must also be evaluated for the Yucca Mountain Site.

NRC DOCUMENT DATA BASE

WWL Document Number: 205

Document Summary

TITLE: Uranium-Trend Dating of Quaternary Deposits in the Nevada Test Site Area, Nevada and California

AUTHOR: Rosholt, J. N., Bush, C. A., Carr, W. J., Hoover, D. L., Swadley, W. C., and Dooley, J. R., Jr.

Document Number: USGS-OFR-85-540
Publication Date: 1985
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology, Stratigraphy

KEY DATA: Uranium and Thorium Concentrations, Isotropic Ratios

COMMENTS:

SUMMARY:
The uranium-trend dating method has been used to estimate the ages of alluvium, colluvium, altered volcanic ash, and eolian deposits in the Nevada Test Site area. At best, the uranium-trend ages have an estimated accuracy of about +-10 percent for depositional units between 60,000 and 600,000 years old; however, the uncertainty in the slope is strongly dependent on the quality of the linear trend regarding scatter of data points and the length of the line defined by the points. Analyses of 36 sample suites are included in this report; U-trend dates were determined on 31 of these suites establishing the age ranges for deposition of four major stratigraphic units at the Nevada Test Site. Median ages for these deposits indicate ages of 40 +- 50 Ka for Q2a sediments, 170 +- 40 Ka for Q2b sediments, 270 +- 50 Ka for the young Q2c stratigraphic unit and 440 +- 60 Ka for the older Q2c unit. Q2s stratigraphic units range in age from about 200 to 500 Ka. Uranium-trend ages of laminar carbonate deposits indicate the time of strong calcium carbonate development rather that the time of deposition of their older host sediments.

NRC DOCUMENT DATA BASE

WWL Document Number: 208 Document Summary

TITLE: The Potential Effect of Water Influx on the Dissolution Rate of UO2 in Spent Fuel at the Yucca Mountain, Nevada Site

AUTHOR: Sandia National Laboratories

Document Number: SAND84-1007 Publication Date: Dec, 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Dec,1985

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Flux, Groundwater, Radionuclide Transport, Saturated Flow, Water Chemistry

KEY DATA: Groundwater Chemistry, Water Flux

COMMENTS:

SUMMARY:
This study identifies the potential effect of groundwater influx on the dissolution rate of uranium dioxide (UO2) from spent fuel for expected conditions at a prospective site for the disposal of radioactive waste. The analysis is based on the hydrological characteristics of the unsaturated zone at Yucca Mountain, Nevada. Although conditions that could lead to inundation of the waste packages are improbable at the site, dissolution resulting form either complete or partial exposure of the spent fuel to water was considered. Estimates were made of the lower limit of water- contact time with the UO2 in spent fuel under partially saturated conditions. If spent fuel is inundated, the dissolution rate of the UO2 is constrained by its solubility limit. If partially saturated conditions exist, the uranium dioxide leach rate could control the dissolution process. Under conditions of both partial or complete saturation, the dissolution rate of the uranium is shown to be a linear function of the water influx. The practical application of the results of this study for determining radionuclide-release rates from spent fuel is also discussed.

NRC DOCUMENT DATA BASE

WWL Document Number: 214

Document Summary

TITLE: Bibliography With Abstracts of Geological Literature Pertaining to Southern Nevada With Particular Reference to the Nevada Test Site

AUTHOR: Connolly, J. R., Hicks, R. T., Emmanuel, K. M., Cappon, J. P., and Sinnock, Scott

Document Number: SAND82-2212
Requested From: NRC
Received From: NRC

Publication Date: May, 1983
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Bibliography

KEY DATA:

COMMENTS:

SUMMARY:
This document contains a bibliography, with abstracts, of geological literature pertaining to the Nevada Test Site (NTS) and its southern Nevada environs. Its purpose is to provide a convenient, general reference document for published geological information potentially useful for radioactive waste studies conducted by the Nevada Nuclear Waste Storage Investigation project (NNWSI) at the NTS. It is organized so that users of geological information about southern Nevada may find subject matter in their areas or topics of interest.

NRC DOCUMENT DATA BASE

WWL Document Number: 215

Document Summary

TITLE: Interpretation of Geophysical Well-Log Measurements in Drill Holes UE25a-4, -5, -6, and -7, Yucca Mountain, Nevada Test Site

AUTHOR: Daniels, J. J., Scott, J. H., and Hagstrum, J. T.

Document Number: USGS-OFR-81-615
Requested From: NRC
Received From: NRC

Publication Date: 1981
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology, Geophysical Logs, Lithology

KEY DATA: Resistivity, Density, Lithology

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Exploratory holes UE25a-4, -5, -6, -7 were drilled at the Nevada Test Site (NTS) to determine the suitability of pyroclastic deposits as storage sites for radioactive waste. Studies have been conducted to investigate the stratigraphy, structure, mineralogy, petrology, and physical properties of the tuff units encountered in the drill hole. Ash-flow and bedded tuff sequences at NTS comprise complex lithologies of variously welded tuffs with superimposed crystallization and altered zones. Resistivity, density, neutron, gamma-ray, induced-polarization, and magnetic-susceptibility geophysical well-log measurements were made to determine the physical properties of these units. The interpretation of the well-log measurements was facilitated by using a computer program designed to interpret well logs. The broad features of the welded tuff units are readily distinguished by the geophysical well-log measurements. Some mineralogic features in the drill holes can be identified on the gamma ray, induced polarization, and magnetic susceptibility well logs.

NRC DOCUMENT DATA BASE

WWL Document Number: 216

Document Summary

TITLE: Empirically Determined Uncertainty in Potassium-Argon Ages For Plio-Pleistocene Basalts From Crater Flat, Nye County, Nevada

AUTHOR: Sinnock, Scott, and Easterling, R. G.

Document Number: SAND82-2441
Requested From: NRC
Received From: NRC

Publication Date: Apr, 1983
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geology, Mineralogy

KEY DATA: K-Ar Ages from Crater Flat

COMMENTS:

SUMMARY:
Six samples of basalt from each of four sites in Crater Flat, Nye county, Nevada, were dated by potassium-argon isotopic methods, by each of three separated geochronology laboratories. The mean ages of the four sites range from about 0.4 my (million years) to 4.0 my. The standard error of an age is 0.16 my, regardless of age. Variation among the reported ages can be attributed to aliquot, sample, and interlaboratory differences, with the latter two being dominant. The standard deviation of an age for a single sample dated by one laboratory is estimated as 0.34 my. Overall, the results indicate that Quaternary basalts with approximately 1.5% potassium content can be assigned an age at 90% confidence to within an interval of about 1 my if multiple samples are dated by several laboratories. If only one sample is dated by a single laboratory, the interval increases to about 1.4 my.

NRC DOCUMENT DATA BASE

WWL Document Number: 217

Document Summary

TITLE: Mineralogy of Fine Grained Alluvium From Borehole U11G, Expl. 1, Northern Frenchman Flat Area, Nevada Test Site

AUTHOR: Jones, Blair F.

Document Number: USGS-OFR-82-765
Requested From: NRC
Received From: NRC

Publication Date: 1982
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Ground Water Level, Mineralogy

KEY DATA: X-Ray Diffraction Mineralogy, Chemical Analysis

COMMENTS:

SUMMARY:
The mineralogy of matrix fines in alluvium from borehole U11g, expl. 1, north of Frenchman Flat, Nevada Test Site, has been examined for evidence of past variations in water table elevation. Although an abundance of zeolite and slightly expanded basal spacings in smectite clays suggest effects of increased hydration of material up to 50 m above the present water table, these differences might also be related to provenance or environment of deposition. However, the relative uniformity of clay hydration properties in the 50 meters above the current water table suggests long-term stability near the present level, perhaps through most of the Quaternary.

NRC DOCUMENT DATA BASE

WWL Document Number: 218

Document Summary

TITLE: Conceptual Design of Field Experiments for Welded Tuff Rock-Mechanics Program

AUTHOR: Zimmerman, R. M.

Document Number: SAND81-1768
Requested From: NRC
Received From: NRC

Publication Date: Oct, 1982
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Heat Load Effect, Numerical Model, Thermomechanical Properties

KEY DATA:

COMMENTS:

SUMMARY:
This report furnishes objectives, typical descriptions, and modeling requirements for the conceptual designs of five experiments proposed for testing in welded tuff in G-Tunnel at Nevada Test Site. Two experiments, the Small-Diameter Heater and Unit-Cell Canister Scale, will be designed for model evaluation. Three experiments designed to measure in situ geotechnical properties are planned: the Heated Block, Rocha Slot, and Thermal Probe.

NRC DOCUMENT DATA BASE

WWL Document Number: 219

Document Summary

TITLE: Monitoring the Vadose Zone in Fractured Tuff, Yucca Mountain, Nevada

AUTHOR: Montazer, Parviz, Weeks, E. P., Thamir, F., Yard, S. N., and Hofrichter, P. B.

Document Number: Proceedings of the NWWA Conf.
Publication Date: Nov, 1985
Requested From: NRC
Request Date: Oct. 85
Received From: NRC
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Flux, Groundwater Movement, Hydraulic Conductivity, Hydraulic Head, Permeability, Porosity, Unsaturated Flow

KEY DATA: Matric Potential, Density and Pressure, Hydraulic Conductivity, Porosity

COMMENTS:

SUMMARY:
A 17.5-inch- (44.5-centimeter-) diameter borehole (USW UZ-1) was drilled by the reverse-air vacuum-drilling technique to a depth of 1269 feet (387 meters). This borehole was instrumented at 33 depth levels. At 15 of the levels, 3 well screens were embedded in coarse-sand columns. The sand columns were isolated from each other by thin layers of bentonite, columns of silica flour, and isolation plugs consisting of expansive cement. Thermocouple psychrometers and pressure transducers were installed within the screens and connected to the data-acquisition system at the land surface through thermocouple and logging cables. Two of the screens at each level were equipped with access tubes to allow collection of pore-gas samples. In addition to these instruments, 18 heat-dissipation probes were installed within the columns of silica flour, some of which also had thermocouple psychrometers.

NRC DOCUMENT DATA BASE

WWL Document Number: 220 Document Summary

TITLE: Repository Sealing Concepts for the Nevada Nuclear Waste Storage Investigations Project

AUTHOR: Fernandez, J. A., Freshley, M. D.

Document Number: SAND83-1778
Requested From: NRC
Received From: NRC

Publication Date: Aug, 1984
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 0
Document Description (general, specific, etc.):
Document Read By (Initials):

KEY WORDS:

KEY DATA:

COMMENTS:

SUMMARY:
This report describes concepts for sealing a nuclear waste repository in an unsaturated tuff environment. The repository site under consideration is Yucca Mountain, which is on and adjacent to the Nevada Test Site. The hydrogeology of Yucca Mountain, preliminary repository concepts, functional requirements and performance criteria for sealing, federal and state regulations, and hydrological calculations are considered in developing the sealing concepts. Water flow through the unsaturated zone is expected to be small and generally vertically downward with some potential to occur through discrete fault and fracture zones. These assumptions are used in developing sealing concepts for shafts, ramps and boreholes. Sealing of discrete, water-producing faults and fracture zones encountered in horizontal emplacement holes and in access and emplacement drifts is also described.

NRC DOCUMENT DATA BASE

WWL Document Number: 223

Document Summary

TITLE: Hydrology and Water Resources Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada

AUTHOR: Department of Energy

Document Number: NVO-284
Requested From: NRC
Received From: NRC

Publication Date: Jun, 1981
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Bibliography, Ground Water Movement, Groundwater, Mineralogy, Water Chemistry, Water Supplies

KEY DATA: Water Quality Data

COMMENTS:

SUMMARY:
This report summarizes the literature and available unpublished data regarding hydrology and water resources utilization in the Nevada Test Site area. This report was prepared in support of the environmental studies task of the Nevada Nuclear Waste Storage Investigations. In the context of this report, hydrology is defined to include hydrometeorology, surface water, and groundwater resources. Water resources utilization is defined to include the present water supply, demand and use, and future supply, demand use; and wastewater treatment.

NRC DOCUMENT DATA BASE

WWL Document Number: 224

Document Summary

TITLE: Hydrology and Water Resources Overview for the Nevada Nuclear Waste Storage Investigations, Nevada Test Site, Nye County, Nevada: Annotated Bibliography

AUTHOR: Department of Energy

Document Number: NVO-283
Requested From: NRC
Received From: NRC

Publication Date: Jun, 1981
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Bibliography, Groundwater, Water Supplies

KEY DATA:

COMMENTS:

SUMMARY:
Scope of Work: This annotated bibliography was compiled in support of the environmental studies task of the Nevada Nuclear Waste Storage Investigations (NNWSI). It addresses the literature available regarding the hydrology and utilization of water resources in the southwestern Nevada Test Site (NTS) area. In the context of this bibliography, hydrology is defined to include hydrometeorology, surface water resources, and groundwater resources. Water utilization includes water supply, demand and use; future supply, demand and use; and wastewater treatment and disposal. It is noted that the terminology, hydrology and water utilization, implicitly encompasses the concepts of both quantity and quality. The NNWSI study area includes: (a) within the NTS, the Nevada Research and Development Area (NRDA), and (b) contiguous to the NRDA, the areas defined by extension of the northern border of the northern border of the NRDA west to the western edge of the Topapah Spring Northwest 7 1/2 minute topographic quadrangle, then east to the point where the southward extension of the southeastern boundary meets the southern edge of the Specter

Range 7 1/2 minute topographic quadrangle. In addition to this area, literature regarding the hydrology and utilization of water resources in the vicinity of the Amargosa Desert, Ash Meadows, Death Valley, Beatty (nye County, Nevada), Indian springs (Clark County, Nevada), Pahrump (Nye County, Nevada), and Lathrop Wells (Nye County, Nevada) are also considered in this bibliography.

NRC DOCUMENT DATA BASE

WWL Document Number: 226 Document Summary

TITLE: Fluid Flow in a Fractured Rock Mass

AUTHOR: Klavetter, E. A. and Peters, R. R.

Document Number: SAND85-0855 Publication Date: 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS, DBM, LAD

KEY WORDS: Capillary, Conceptual Model, Flux, Fracture Flow, Hydraulic Conductivity, Moisture Characteristic Curves, Numerical Model, Permeability, Unsaturated Flow

KEY DATA: Matrix Properties, Fracture Properties

COMMENTS: Formal reviews by WWL and W&A.

SUMMARY:
Two approaches were use to develop a continuum mode to evaluate water movement in a fractured rock mass. Both approaches assume that the pressure heads in the fractures and the matrix are identical along a line perpendicular to flow. The first approach uses this assumption and separate equations for flow in the fractures and in the matrix to derive both a single flow equation for an equivalent, porous medium and mathematical expressions for the unsaturated, hydrologic properties in this flow equation. The second approach assumes a fluid continuity equation for a porous medium. Information on the physical structure of the rock mass, along with theoretical considerations form capillary theory, is used to drive the mathematical expressions for the rock-mass unsaturated hydrologic properties. Both approaches lead to a single flow equation for a fractured rock mass. The two approaches were use to calculate unsaturated hydrologic properties, i.e., relative permeability and saturation as a function of pressure head, for several types of tuff underlying Yucca Mountain, using the best available hydrologic data for the matrix and the fractures. Comparisons of properties calculated by both approaches were found to yield qualitatively and quantitatively similar results.

NRC DOCUMENT DATA BASE

WWL Document Number: 227 Document Summary

TITLE: The Effect of Percolation Rate on Water-Travel Time in Deep, Partially Saturated Zones

AUTHOR: Peters, R. R., Gauthier, J. H., and Dudley, A. L.

Document Number: SAND85-0854C Publication Date: 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): DBM, LAD, TLS

KEY WORDS: Flux, Fracture Flow, Hydraulic Conductivity, Numerical Model, Porosity, Traveltime, Unsaturated Flow

KEY DATA: Matrix and Fracture Properties, Pressure Head, Saturation, Velocity, Traveltime

COMMENTS:

SUMMARY:
Current percolation rates through Yucca Mountain, and those that are currently postulated under future climatic conditions, are thought to be of the order of the saturated matrix conductivity of some of the units. Although it is probable that there is now little or no water movement in fractures, it is necessary to investigate the potential for fracture flow, especially that which could be initiated under future climatic conditions. Significant fracture flow, if present, could reduce the water travel time between the repository and the water table. A composite-porosity, continuum model was developed to model flow in a fractured, porous medium. Simulations using data from the Yucca Mountain site and this model in the one-dimensional code TOSPAC indicate that current estimates of the percolation rate result in water movement confined to the matrix and that the water-travel time from the repository to the water table is sensitive to the percolation rate; an increase in percolation rate of a factor of 10 may initiate water movement in the fractures, reducing the travel time significantly.

NRC DOCUMENT DATA BASE

WWL Document Number: 228

Document Summary

TITLE: Effects of Sorption and Temperature on Solute Transport in Unsaturated Steady Flow

AUTHOR: Fuentes, H. R., Polzer, W. L., and Essington, E. H.

Document Number: LA-UR-86-680
Requested From: NRC
Received From: NRC

Publication Date: 1985
Request Date: Oct. 85
Receipt Date: Jan, 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Radionuclide Transport, Retardation, Unsaturated Flow

KEY DATA: Pore Volume

COMMENTS:

SUMMARY:
It is known that temperature affects physical and chemical processes and that these processes may alter the transport of solutes in the environment. Laboratory column studies were performed in unsaturated flow conditions with a composite pulse containing iodide, cobalt, cesium and strontium each at 10^-3 M. The experiments were performed with Bandelier Tuff and Produced breakthrough curves that indicate significant changes in transport due to a temperature change from 25 C to 5 C for nonconservative solutes. Also the interpretation of the temperature and sorption data suggests that the differences in transport between 5 C and 25 C for nonconservative solutes may be predicted in a qualitative manner from batch equilibrium and nonequilibrium sorption data and the theory of sorption used in deriving the modified Freundlich isotherm equation. These effects should be of concern in modeling and management of spills and waste disposal within this range of environmental temperatures.

NRC DOCUMENT DATA BASE

WWL Document Number: 229 Document Summary

TITLE: Preliminary Estimates of Groundwater Travel Time and Radionuclide Transport At the Yucca Mountain Repository Site

AUTHOR: Sinnock,Scott (Editor), Lin, Y. T., Tierney, M. S., and others

Document Number: SAND85-2701 Publication Date: 1985
Requested From: NRC Request Date: Oct. 85
Received From: NRC Receipt Date: JUN,1986

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS,LAD,DBM

KEY WORDS: Computer Code, Conceptual Model, Fracture Flow, Ground Water Movement, Traveltime, Pore Saturation, Hydraulic Conductivity, Flux, Radionuclide Transport, Waste Dissolution, Unsaturated Flow, Numerical Model

KEY DATA: Isopach Contour Maps, Geohydrologic Data, Effective Porosity, Travel Times, Flux, Residual Saturation, Matrix Porosity, Brooks-Corey Exponents, Hydraulic Conductivity

COMMENTS: Formal reviews by WWL and W&A.

SUMMARY:
This report presents the assumptions, methods, and data used in a probabilistic approach to the calculation of groundwater travel times and total radionuclide releases to the water table below Yucca Mountain. Assumptions and mathematical principles that serve as the basis of the formulation of the calculational model are described. Results from the analyses consist of distributions of groundwater travel time from the disturbed zone to the water table and the cumulative curie releases to the water table. The report concludes that based on the present model, the Yucca Mountain repository site would be in compliance with regulatory requirements.

NRC DOCUMENT DATA BASE

WWL Document Number: 230

Document Summary

TITLE: Hydrogeology of the Unsaturated Zone, Yucca Mountain, Nevada

AUTHOR: Montazer, Parviz and Wilson, William E.

Document Number: NNWA-1985
Requested From:
Received From:

Publication Date: Nov, 1985
Request Date:
Receipt Date: Nov. 85

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): General
Document Read By (Initials): TLS,LAD,DBM

KEY WORDS: Capillary Barrier, Hysteresis, Conceptual Model, Faults, Flux, Fracture Flow, Geology, Ground Water Movement, Hysteresis, Lithology, Perched Water, Precipitation, Recharge, Unsaturated Flow

KEY DATA: Summary of Hydrologic Properties

COMMENTS:

SUMMARY:
A conceptual model describing the flow of fluids through the unsaturated zone at Yucca Mountain is proposed. The proposed model considers the following flow phenomena in the unsaturated region: flow through fractured rock, capillary barriers, infiltration into fractured rock, lateral movement, and capillary fringe. The proposed model gives a representation of the flow in the hydrogeologic units and structural pathways at Yucca Mountain.

NRC DOCUMENT DATA BASE

WWL Document Number: 231

Document Summary

TITLE: Estimation of Hydrologic Properties of An Unsaturated, Fractured Rock Mass

AUTHOR: Klavetter, E. A., and Peters, R. R.

Document Number: SAND84-2642
Requested From: NRC
Received From:

Publication Date: July, 1986
Request Date:
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Capillary Barrier, Conceptual Model, Fracture Flow, Geology, Ground Water Movement, Perched Water, Flux, Capillary, Fracture Analysis, Hydraulic Conductivity, Moisture Characteristic Curves, Numerical Model, Porosity, Recharge

KEY DATA: Description of Hydrologic Units, Porosity, Hydraulic Conductivity, Residual Saturation, Conductivity Curves

COMMENTS: Has received a formal review by W&A.

SUMMARY:
Two distinctly different approaches are used to develop continuum models to evaluate water movement in a fractured rock mass. Both models provide methods for estimating rock-mass hydrologic properties. Comparisons made over a range of different tuff properties show good qualitative and quantitative agreement between estimates of rock-mass hydrologic properties made by the two models.

NRC DOCUMENT DATA BASE

WWL Document Number: 232

Document Summary

TITLE: Liquid Permeability Measurements on Densely Welded Tuff over the Temperature Range 25 to 90 Degrees C.

AUTHOR: Reda, D. C.

Document Number: SAND85-2482
Requested From: NRC
Received From:

Publication Date: Dec, 1985
Request Date:
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Core Analysis, Geochemistry, Permeability, Porosity, Thermomechanical Properties

KEY DATA: Matrix Permeability

COMMENTS:

SUMMARY:
Liquid permeability experiments, using distilled and deaerated water as the pore fluid, were conducted on a sample of densely welded tuffaceous material from the Nevada Test Site. The primary independent variable was the core temperature, which was systematically increased, then decreased, over the range 25 to 90 degrees C. Confining pressure was maintained constant at 15.2 MPa. Pore water continually flowed through the tuff sample during an extensive three-month test period. The transient pressure decay technique was utilized to measure core permeability. Geochemical analyses of the pore water exiting the core at 90 degrees C showed increased chemical concentrations.

NRC DOCUMENT DATA BASE

WWL Document Number: 233

Document Summary

TITLE: SPARTAN-A Simple Performance Assessment Code for the Nevada Nuclear Waste Storage Investigations Project

AUTHOR: Lin, Y. T.

Document Number: SAND85-0602
Publication Date: Dec, 1985
Requested From: NRC
Request Date:
Received From: NRC
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Computer Code, Flux, Fracture Flow, Numerical Model, Radionuclide Transport, Retardation, Unsaturated Flow, Waste Dissolution

KEY DATA: Radionuclide Inventory, Allowable Release Limits, Repository Area, Cumulative Curies Released

COMMENTS:

SUMMARY:
SPARTAN is a simple computer model designed for the NNWSI Project to calculate radionuclide transport in geologic media. The physical processes considered are limited to Darcy's flow, radionuclide decay, and convective transport with constant retardation of radionuclides relative to water flow. Results from the model consist of radionuclide release rates from the prospective Yucca Mountain for radioactive waste and cumulative curies released across the flow boundaries at the end of the flow path. Two test problems compare the results of simulations from SPARTAN with analytical solutions.

NRC DOCUMENT DATA BASE

WWL Document Number: 234

Document Summary

TITLE: Overweight Truck Shipments to the Nuclear Waste Repositories: Legal, Political, Administrative, and Operational Considerations

AUTHOR: Battelle Memorial Institute

Document Number: BMI/OTSP-01
Requested From: NRC
Received From: NRC

Publication Date: Mar, 1986
Request Date:
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Transportation

KEY DATA:

COMMENTS:

SUMMARY:
This report identifies and analyzes legal, political, administrative, and operational issues that could affect an OCRWM decision to develop an overweight truck cask fleet for the commercial nuclear waste repository program
.

NRC DOCUMENT DATA BASE

WWL Document Number: 235

Document Summary

TITLE: First Observations of Tritium in Ground Water Outside Chimneys of Underground Nuclear Explosions, Yucca Flat, Nevada Test Site

AUTHOR: Crow, N. B.

Document Number: UCRL-52073
Requested From: NRC
Received From: NRC

Publication Date: May, 1976
Request Date:
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 6
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Radionuclide Transport, Retardation

KEY DATA:

COMMENTS:

SUMMARY:
Abnormal levels of radionuclides were detected in ground-water inflow from the tuff beneath Yucca Flat to an emplacement chamber being mined in April, 1974. A nearby underground nuclear explosion detonated beneath the water table is believed to be the source of the tritium observed. It is believed that the tritiated water passed through a network of induced and natural fractures in the tuff beneath Yucca Flat. The implication of induced fractures from the explosion which might create a pathway for the leakage of tritiated water downward from the tuff of Yucca Flat into the underlying regional aquifer in the Paleozoic carbonate rocks is discussed.

NRC DOCUMENT DATA BASE

WWL Document Number: 236

Document Summary

TITLE: Sources and Mechanisms of Recharge for Ground Water in the West-Central Amargosa Desert, Nevada- A Geochemical Interpretation

AUTHOR: Claassen, H. C.

Document Number: USGS-PP-712-F
Publication Date: 1985
Requested From: NRC
Request Date:
Received From: NRC
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Climate, Conceptual Model, Faults, Geochemistry, Geology, Ground Water Basin, Pluvial, Precipitation, Recharge, Vegetation, Water Chemistry

KEY DATA: Water Level Altitudes, Water Quality

COMMENTS:

SUMMARY:
Ground water in the west-central Amargosa Desert, Nevada, was recharged primarily by overland flow of snowmelt in or near the present-day stream channels, rather than by subsurface flow from highland recharge areas to the north. Geochemical arguments, including reaction mechanisms, are used to support these findings. Carbon-, hydrogen-, and oxygen-isotope data show that much of the recharge in the area occurred during late Wisconsin time. Absence of ground water recharged prior to late Pleistocene is considered to indicate that either climatic conditions were unfavorable for recharge or that ground-water velocities were such that they transported this earlier recharge away from the study area.

NRC DOCUMENT DATA BASE

WWL Document Number: 237 Document Summary

TITLE: Assessment of Radionuclide Vapor-Phase Transport in Unsaturated Tuff

AUTHOR: Smith, D. M., Updegraff, C. D., Bonano, E. J., and Randall, J. D.

Document Number: SAND86-1598 Publication Date: Nov, 1986
Requested From: NRC Request Date:
Received From: NRC Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 9
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Flux, Moisture Characteristic Curves, Permeability, Porosity, Radionuclide Transport, Recommendations for Future Work, Thermomechanical Properties, Unsaturated Flow, Vapor Transport, Waste Dissolution

KEY DATA: Vapor-Liquid Distribution Coefficients, Gas Relative Permeability Curve

COMMENTS:

SUMMARY:
This report describes bounding calculations performed to investigate the possibility of radionuclide migration in a vapor phase associated with the emplacement of high-level waste canister in unsaturated tuff formations. Two potential radionuclide transport mechanisms in the vapor phase were examined: aerosol migration and convection/diffusion of volatile species. The analysis indicated that for all expected repository conditions, aerosol formation is not possible. Vapor-phase transport will not be important for radionuclides such as cesium and heavier species. Vapor transport for iodine may play a role in the overall release scenario depending on the particular repository conditions.

NRC DOCUMENT DATA BASE

WWL Document Number: 239

Document Summary

TITLE: Preliminary Analysis of Geophysical Logs From the WT Series of Drill Holes, Yucca Mountain, Nye County, Nevada

AUTHOR: Muller, D. C., and Kibler, J. E.

Document Number: USGS-OFR-86-46
Publication Date: 1985
Requested From: NRC
Request Date:
Received From: NRC
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): specific
Document Read By (Initials): TLS

KEY WORDS: Fractures, Geophysical Logs, Lithology, Well Data

KEY DATA: Well Data, Lithology, Geophysical Logs

COMMENTS:

SUMMARY:
Geophysical logs from the WT series of drill holes correlate well with similar logs from other drill holes at Yucca Mountain. The in-situ physical properties of the rocks from well logs are consistent with laboratory-measured physical properties of core from other drill holes. The Topopah Spring Member is concluded to have zones that are highly fractured and lithophysal in holes where the density and neutron logs are very spiky as noted in other cored drill holes. Low levels on the uranium trace from the spectral gamma-ray log indicate that fractures are neither healed nor filled with materials that concentrate uranium. Therefore, fracture permeability is expected to be high.

NRC DOCUMENT DATA BASE

WWL Document Number: 240

Document Summary

TITLE: Environmental Assessment

AUTHOR: U. S. Department of Energy

Document Number: DOE/RW-0073
Requested From: NRC
Received From: NRC

Publication Date: May, 1986
Request Date: 1986
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Exploratory Shaft, Geology, Stratigraphy, Tectonics, Transportation, Water Supplies

KEY DATA: Conductivity, Climate Summary

COMMENTS:

SUMMARY:
Volume 1 of the final Environmental Assessment for the Yucca Mountain Site.

NRC DOCUMENT DATA BASE

WWL Document Number: 241

Document Summary

TITLE: Environmental Assessment

AUTHOR: U. S. Department of Energy

Document Number: DOE/RW-0073
Requested From: NRC
Received From: NRC

Publication Date: May, 1986
Request Date: 1986
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Climate, Conceptual Model, Erosion, Geochemistry, Recommendations for Future Work, Regional Hydrology, Retardation, Tectonics, Transportation, Traveltime, Waste Dissolution

KEY DATA: Potentiometric Surface, Travel Time Plots, Cross Sections, Hydraulic Gradient, Conductivity, Porosity, Sorption Ratios

COMMENTS:

SUMMARY:
Volume 2 of the final Environmental Assessment of Yucca Mountain.

NRC DOCUMENT DATA BASE

WWL Document Number: 242

Document Summary

TITLE: Environmental Assessment

AUTHOR: U. S. Department of Energy

Document Number: DOE/RW-0073
Requested From: NRC
Received From: NRC

Publication Date: May, 1986
Request Date: 1986
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Overview
Document Read By (Initials): TLS

KEY WORDS: Recommendations for Future Work

KEY DATA:

COMMENTS:

SUMMARY:
Volume 3 of the final Environmental Assessment for Yucca Mountain. This volume is the comment response document.

NRC DOCUMENT DATA BASE

WWL Document Number: 243 Document Summary

TITLE: Monitoring the Vadose Zone in Fractured Tuff, Yucca Mountain, Nevada

AUTHOR: Montazer, Parviz, Weeks, E. P., Thamir, Falah, Yard, S. N., and Hofrichter, P. B.

Document Number:
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1985
Request Date: 1986
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Conceptual Model, Flux, Unsaturated Flow, Well Data, Well Tests

KEY DATA: Matrix Potential, Conductivity, Permeability, Porosity

COMMENTS:

SUMMARY:
Borehole USW UZ-1 was drilled by the reverse air vacuum drilling technique to a total depth of 387 meters. This borehole was instrumented at 33 depth levels. At 15 of the levels, 3 well screens were embedded in coarse-sand columns. After more than 2 years of monitoring, the majority of the instruments were still functioning and producing reasonable data. A slow recovery from the disturbed state to natural conditions was detected during the first 90 days of monitoring. Responses to short term barometric fluctuations were detected to a maximum depth of about 91 meters in the borehole.

NRC DOCUMENT DATA BASE

WWL Document Number: 244

Document Summary

TITLE: Measurements of Matric and Water Potentials in Unsaturated Tuff at Yucca Mountain, Nevada

AUTHOR: Thamir, F., and McBride, C. M.

Document Number:
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1985
Request Date: 1986
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Moisture Tension, Unsaturated Flow, Well Data, Well Tests

KEY DATA: Water Potentials

COMMENTS:

SUMMARY:
Two types of instruments were installed in borehole USW UZ-1 in order to monitor matric and water potentials of various hydrogeologic units consisting of tuff. Heat-dissipation probes are being used to monitor matric potential, and thermocouple psychrometers are being used to monitor water potential. The report describes the instrument probes and concerns about their use.

NRC DOCUMENT DATA BASE

WWL Document Number: 245 Document Summary

TITLE: Application of Geophysical Logs to Estimate Moisture-Content Profiles in Unsaturated Tuff, Yucca Mountain, Nevada

AUTHOR: Palaz, I.

Document Number:
Requested From: NRC
Received From: NRC

Publication Date: Nov, 1985
Request Date: 1986
Receipt Date: 1986

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs, Pore Saturation, Porosity, Well Data

KEY DATA: Saturation

COMMENTS:

SUMMARY:
This paper compares the results of analyses of various geophysical logs that were obtained from two large diameter, air-drilled boreholes at Yucca Mountain. These wells are USW UZ-1 and USW UZ-6. Saturation profiles were obtained from different logs and were correlated with each other. Qualitative correlation of the degree of welding with bulk density also was conducted; overall correlations were satisfactory.

NRC DOCUMENT DATA BASE

WWL Document Number: 246 Document Summary

TITLE: Mass Balance Computation in SAGUARO

AUTHOR: Baker, B. L., and Eaton, R. R.

Document Number: SAND86-0369 Publication Date: Dec, 1986
Requested From: NRC Request Date: 1986
Received From: NRC Receipt Date: 1987

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.): Specific
Document Read By (Initials): TLS

KEY WORDS: Numerical Model

KEY DATA:

COMMENTS:

SUMMARY:
This report describes the development of the mass balance subroutines used with the finite-element code, SAGUARO, which models fluid flow in partially saturated porous media. Derivation of the basic mass storage and mass flux equations is included. The results of the SAGUARO mass-balance subroutine, MASS, are shown to compare favorably with the linked results of FEMTRAN. Implementation of the MASS option in SAGUARO is described. Instructions for use of the MASS option are demonstrated with three sample cases.

NRC DOCUMENT DATA BASE

WWL Document Number: 249 Document Summary

TITLE: The Behavior of Naturally Fractured Reservoirs

AUTHOR: Warren, J.E., Root, P.J.

Document Number:
Requested From:
Received From:

Publication Date: Oct, 1962
Request Date:
Receipt Date:

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fractures, Numerical Model, Porosity

KEY DATA:

COMMENTS:

SUMMARY:
An idealized model has been developed for the purpose of studying the characteristic behavior of a permeable medium which contains regions which contribute significantly to the pore volume of the system but contribute negligibly to the flow capacity; e.g., a naturally fractured or vugular reservoir. Un-steady-state flow in this model reservoir has been investigated analytically. The pressure build-up performance has been examined in some detail; and, a technique for analyzing the build-up data to evaluate the desired parameters has been suggested. The use of this approach in the interpretation of field data has been discussed. As a result of this study, the following general conclusions can be drawn: 1. Two parameters are sufficient to characterize the deviation of the behavior of the medium with double porosity form that of a homogeneously porous medium. 2. These parameters can be evaluated by the proper analysis of pressure build-up data obtained from adequately designed tests. 3. Since the build-up curve associated with this type of porous system is similar to that obtained from a

stratified reservoir, an unambiguous interpretation is not possible without additional information. 4. Differencing methods which utilize pressure data from the final stages of a build-up test should be used with extreme caution.

NRC DOCUMENT DATA BASE

WWL Document Number: 250

Document Summary

TITLE: Recovery of Retrograde Condensate from Naturally Fractured Gas-Condensate Reservoirs

AUTHOR: Castelijns, J.H.P., Hagoort, J.

Document Number:
Requested From:
Received From:

Publication Date: Dec. 1984
Request Date:
Receipt Date:

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fracture Flow, Fractures, Permeability

KEY DATA:

COMMENTS:

SUMMARY:
This paper considers the flow behavior of retrograde condensate in naturally fractured gas-condensate reservoirs and the possibility of recovering part of the condensate by gravity drainage. The analysis is applied to calculate the potential for retrograde condensate recovery in the Waterton reservoir in Alberta. The calculated results are in agreement with field observations: for fracture density, matrix permeability, and reservoir- layer thickness typical of the Waterton reservoir, a small part of the retrograde liquid will accumulate within a practical time span. Condensate accumulation and recovery will significantly increase if the reservoir pressure is restored-e.g., by lean gas or nitrogen injection.

NRC DOCUMENT DATA BASE

WWL Document Number: 251

Document Summary

TITLE: A New Model for Predicting the Hydraulic Conductivity of Unsaturated Porous Media

AUTHOR: Mualem, Y.

Document Number: WRR vol. 12, no. 3
Publication Date: June, 1976
Requested From:
Request Date:
Received From:
Receipt Date:

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Capillary, Hydraulic Conductivity, Numerical Model, Porosity, Unsaturated Flow

KEY DATA: Water Content

COMMENTS:

SUMMARY:
A simple analytic model is proposed which predicts the unsaturated hydraulic conductivity curves by using the moisture content- capillary head curve and the measured value of the hydraulic conductivity at saturation. It is similar to the Childs and Collis-George (1950) model but uses a modified assumption concerning the hydraulic conductivity of the pore sequence in order to take into account the effect of the larger pore section. A computational method is derived for the determination of the residual water content and for the extrapolation of the water content-capillary head curve as measured in a limited range. The proposed model is compared with the existing practical models of Averjanov (1950), Wyllie and Gardner (1958), and Millington and Quirk (1961) on the basis of the measured data of 45 soils. It seems that the new model is in better agreement with observations.

NRC DOCUMENT DATA BASE

WWL Document Number: 252

Document Summary

TITLE: Hydrology Issues for the Nevada Nuclear Waste Storage Investigations Project

AUTHOR: Division of Waste Management

Document Number: NNWSI STP-1.0
Requested From:
Received From:

Publication Date: Aug, 1984
Request Date:
Receipt Date:

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Geology, Recommendations For Future Work, Regional Hydrology, Saturated Flow, Traveltime, Unsaturated Flow, Waste Dissolution

KEY DATA:

COMMENTS:

SUMMARY:
In review of a license application for a high-level waste geologic repository, the NRC staff is required to determine whether the site and design meet the Technical Criteria (Subpart E) of 10 CFR Part 60. The NRC staff determination will be based on the answers to, and supporting analyses of, technical questions concerning hydrology, geochemical retardation, waste form and waste package, geologic stability, and facility design. During the process of Site Characterization, the Department of Energy (DOE) performs the laboratory and field investigations that develop the information needed to address these basic technical questions. This document establishes the NRC position as to the essential issues relevant to hydrology for the Nevada Nuclear Waste Storage Investigations (NNWSI) Project. Future Site Technical Positions (STP'S) and other NRC documents relevant to hydrology will address NRC staff concerns regarding selected issues and acceptable technical approaches for addressing those issues.

NRC DOCUMENT DATA BASE

WWL Document Number: 253

Document Summary

TITLE: Chapter 4: Geochemistry, Draft Site Characterization Plan for Yucca Mountain, Nevada

AUTHOR:

Document Number: SCP. 011-4.0
Requested From:
Received From:

Publication Date: July, 1986
Request Date:
Receipt Date:

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geochemistry, Groundwater, Mineralogy, Petrology, Radionuclide Transport

KEY DATA: Water Chemistry, Radionuclide Inventory, Sorption Ratios

COMMENTS:

SUMMARY:
This chapter contains geochemical information about the Yucca Mountain site that is being investigated by the Nevada Nuclear Waste Storage Investigations Project. The Chapter references plans for continued collection of geochemical data as part of the site characterization program. Details of these plans are contained in Section 8.3.1.3. This section provides a brief introduction to the geochemistry chapter. It contains discussions about 1) the concerns that drive collection of geochemical data, 2) the manner in which data presently available have been collected, 3) concepts of the site that influence geochemical data collection, and 4) the state of present data and models. In addition to the discussions in this chapter, the following concerns are addressed in Chapter 7: 1. Anticipated interactions among waste form, engineered barriers, and environment. 2. Chemical composition and form of the waste. 3. Solubility of waste form in ground water. 4. Species released by leaching of the waste form. 5. Anticipated chemical and mineralogical compositions of barriers. Anticipated interaction of the waste, water, vapor, gas, and rock.

NRC DOCUMENT DATA BASE

WWL Document Number: 254 Document Summary

TITLE: 106 Ru Migration in a Deep Tuffaceous Alluvium Aquifer, Nevada Test Site

AUTHOR: Coles, D.G., Ramspott, L.D.

Document Number: UCRL-85320 Publication Date: Feb, 1981
Requested From: Request Date:
Received From: Receipt Date:

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Ground Water Movement, Groundwater, Radionuclide Transport

KEY DATA: Radioactivity Data

COMMENTS:

SUMMARY:
Ruthenium-106 has been observed to migrate at the same velocity as H-3 in ground water from the site of an underground nuclear explosion to a pumped satellite well. These finding contradicts laboratory sorption studies using material from this site that indicate that Ru-106 should migrate at a much slower rate H-3. These field measurements raise doubts about the wisdom of relying on simple laboratory sorption measurements to predict field radionuclide migration. Field tests are needed for verification for nuclides that can exhibit complex solution chemistries.

NRC DOCUMENT DATA BASE

WWL Document Number: 255

Document Summary

TITLE: Laboratory and Field Studies Related to the Radionuclide Migration Project

AUTHOR: Daniels, W.R.

Document Number: LA-9192-PR
Publication Date: Feb, 1982
Requested From:
Request Date:
Received From:
Receipt Date:

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fracture Flow, Mineralogy, Radionuclide Transport, Retardation, Water Chemistry

KEY DATA: Tritium Concentration, Water Chemistry, Tuff Analysis, Sorption Ratios

COMMENTS:

SUMMARY:
FY-1981 laboratory and field studies related to the Radionuclide Migration project are described. Results are presented for radiochemical analyses of water samples collected from the RNM-1 well and the RNM-2S satellite well at the Cambric site. Data are included for tritium, Kr- 85, I-129, and Cl-36. The maximum-concentration tritium peak appears to have arrived at TNM-2S near the end of FY-1981. Laboratory studies emphasize the sorptive behavior of alluvium and tuff and its dependence on mineralogy. Results from batch measurements and crushed-rock and whole-core column studies are presented.

NRC DOCUMENT DATA BASE

WWL Document Number: 256

Document Summary

TITLE: Issues Hierarchy for a Mined Geologic Disposal System

AUTHOR: Office of Civilian Radioactive Waste Management

Document Number: DOE/RW-0101
Publication Date: Sept, 1986
Requested From:
Request Date:
Received From:
Receipt Date:

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Recommendations For Future Work

KEY DATA:

COMMENTS:

SUMMARY:
The OGR Issues Hierarchy presents the issues that the DOE will use to guide development of site characterization plans and the conduct of site characterization activities. These issues must be resolved to demonstrate compliance with applicable Federal regulations and to support site selection and licensing for an MGDS. Specific questions that may be identified during the licensing process and in the development of an EIS are encompassed by the general issues statements in the OGR Issues Hierarchy. The OGR Issues Hierarchy is limited to the issues related to siting and licensing requirements of applicable Federal regulations, and does not address the requirements of other regulations or functional or operating requirements for the MGDS, or Requirements for integration and design/operational efficiency of the MGDS. Although the DOE believes that this document contains a comprehensive set of siting and licensing issues, it will be revised as necessary during site characterization to encompass any additional issues that may arise.

NRC DOCUMENT DATA BASE

WWL Document Number: 258

Document Summary

TITLE: Critical Parameters for a High-Level Waste Repository Volume 2: Tuff

AUTHOR: Binnall, E.P., Wollenberg, H.A., Benson, S.M., Tsao, L.

Document Number: UCID vol. 2
Publication Date: Feb, 1986
Requested From:
Request Date:
Received From:
Receipt Date:

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fracture Flow, Geochemistry, Geology, Groundwater, Permeability, Porosity, Radionuclide Transport, Recharge, Unsaturated Flow, Water Chemistry

KEY DATA: Rock Strength, Young's Modulus and Poisson's Ratio, Thermal Expansion Coefficients, Heat Capacities

COMMENTS:

SUMMARY:
This report addresses critical parameters specific to a repository in tuff using the Topopah Springs Member of the Yucca Mountain tuffs as the principal example. For the purposes of the report, a parameter is considered to be a physical property whose value helps determine the characteristics for behavior of a repository system. Parameters which are defined as critical are those essential to evaluate and/or monitor leakage of radionuclides form the repository and to evaluate the need for retrieval. The parameters are considered with respect to the disciplines of geomechanics, geology, hydrology, and geochemistry and are rank ordered in terms of importance. The specific role of each parameter, specific factors affecting the measurement of each parameter, and the interrelationships between the parameters are considered.

NRC DOCUMENT DATA BASE

WWL Document Number: 260

Document Summary

TITLE: Reference Waste Package Environment Report

AUTHOR: Glassley, W.E.

Document Number: UCRL-53726
Publication Date: Oct, 1986
Requested From:
Request Date:
Received From:
Receipt Date:

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Dehydration, Fractures, Geochemistry, Heat Load Effect, Permeability, Petrology, Thermomechanical Properties

KEY DATA: Water Chemistry, Permeability

COMMENTS:

SUMMARY:
The candidate repository for high-level radioactive waste packages is located at Yucca Mountain, Nevada, in rhyolitic tuff 700 to 1400 ft above the static water table. Calculations indicate that the package environment will experience a maximum temperature of ~230 C at 9 years after emplacement. For the next 300 years the rock within 1 m of the waste packages will remain dehydrated. Preliminary results suggest that the waste package radiation field will have very little effect on the mechanical properties of the rock. Radiolysis products will have a negligible effect on the rock even after rehydration. Unfractured specimens of repository rock show no change in hydrologic characteristics during repeated dehydration-rehydration cycles. Fractured samples with initially high permeabilities show a striking permeability decrease during dehydration-rehydration cycling, which may be due to fracture healing via deposition of silica. rock-water interaction studies demonstrate low and benign levels of anions and most cations. The development of sorptive secondary phases such as zeolites and clays suggests that anticipated rock-water interaction may produce beneficial changes in the package environment.

NRC DOCUMENT DATA BASE

WWL Document Number: 264

Document Summary

TITLE: NNWSI Hole Histories, UE-25wt#'s 3-6,12-18, USW wt 1,2,7,10,11

AUTHOR: Fenix and Scisson, Inc.

Document Number: DOE/NV/10322-10
Publication Date: Nov, 1986
Requested From:
Request Date:
Received From:
Receipt Date:

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs, Well Data

KEY DATA: Hole Conditions

COMMENTS:

SUMMARY:
This report is a compilation of data from sixteen boreholes drilled under the guidance of the U.S. Geological Survey to help identify the areas water table. The sixteen boreholes were drilled between April, 1983 and November, 1983 in Area 25, Nevada Test Site land and in Bureau of Land Management land adjacent to the Nevada Test Site. Data presented in the hole histories include all locations, daily activities, review of hole conditions, geophysical log lists, video tape lists, and microfiche copies of the geophysical logs run by Fenix and Scisson, Inc. subcontractor.

NRC DOCUMENT DATA BASE

WWL Document Number: 265

Document Summary

TITLE: NNWSI Hole Histories, UE-29A1,2

AUTHOR: Fenix and Scisson, Inc.

Document Number: DOE/NV/10322-12
Publication Date: Nov, 1986
Requested From:
Request Date:
Received From:
Receipt Date:

Document Rating (1=poor to 10=excellent): 8
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Geophysical Logs, Well Data

KEY DATA: Hole Conditions

COMMENTS:

SUMMARY:
This report is a compilation of data from two hydrologic exploratory core holes drilled to help identify the area geology and hydrology. ^AThe two bore holes were drilled between September, 1981 and January, 1982 under the guidance of the U.S. Geological Survey in Area 29, Nevada Test Site. Data presented in the hole histories include all locations, daily activities, coring records review of hole conditions, and geophysical log lists, and microfiche copies of the geophysical logs run by the Fenix and Scisson, Inc. subcontractor.

NRC DOCUMENT DATA BASE

WWL Document Number: 266

Document Summary

TITLE: Unsaturated Flow and Transport Through Fractured Rock-Related to High-Level Wasted Repositories-Phase 2

AUTHOR: Rasmussen, T.C., Evans, D.D.

Document Number:
Requested From:
Received From:

Publication Date: Apr, 1986
Request Date:
Receipt Date:

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Fracture Analysis, Fracture Flow, Fractures, Geochemistry, Hydraulic Conductivity, Mineralogy, Numerical Model, Permeability, Porosity, Radionuclide Transport, Unsaturated Flow

KEY DATA: Fracture Data, Porosity, Density, Flow Rates

COMMENTS:

SUMMARY:
In response to high-level radioactive waste repository licensing needs of the U.S. Nuclear Regulatory Commission, this report examines and provides insights into physical characteristics and methodologies for performance assessment of candidate sites in unsaturated fractured rock. The focus is on the ability of the geologic medium surrounding an underground repository to isolate radionuclides from the accessible environment. Media of interest are consolidated rocks with variable fracturing, rock matrix permeabilities, contained water under negative pressure, and air-filled voids. Temperature gradients are also of interest. Studies present conceptual and theoretical considerations, physical and geochemical characterization, computer modeling techniques, and parameter estimation procedures. Radionuclide transport pathways are as solutes in ground water and as vapor through air- filled voids. The latter may be important near a heat source. Water flow and solute transport properties of rock matrix may be quantified using rock core analyses. Natural spatial variation dictates many samples. Observed

fractures can be characterized and combined to form a fracture network for hydraulic and transport assessments. Unresolved problems include the relation of network hydraulic conductivity to fluid pressure and to scale. Once characterized, the matrix and fracture network can be coupled. Reliable performance assessment requires additional studies.

NRC DOCUMENT DATA BASE

WWL Document Number: 267

Document Summary

TITLE: Annual Report to Congress

AUTHOR: Office of Civilian Management

Document Number: DOE/RW-0144
Requested From:
Received From:

Publication Date: Apr, 1987
Request Date:
Receipt Date:

Document Rating (1=poor to 10=excellent): 7
Document Description (general, specific, etc.):
Document Read By (Initials): TLS

KEY WORDS: Recommendations For Future Work

KEY DATA:

COMMENTS:

SUMMARY:
This is the fourth Annual Report to Congress by the Office of Civilian Radioactive Waste Management (OCRWM). As required by the Nuclear Waste Policy Act (NWPA) of 1982 (P.L. 97-425), the report covers the activities and expenditures of OCRWM for fiscal year 1986 which ended on September 30, 1986.

ATTACHMENT C

NNWSI DATA

August 6, 1987

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
UE-25b#1	TSw	C	0.12	9.61E-12		225.7		13	13
UE-25b#1	CHnz +	W Pumping		5.21E-06		471.0	1220.0	13	20
UE-25b#1	CHnz +	W Injection		4.05E-07		477.0	579.0	13	20
UE-25b#1	CHnz	W Injection		1.39E-06		477.0	491.0	13	20
UE-25b#1	CHnz	C	0.25	1.97E-09		479.3		13	13
UE-25b#1	CHnz	W Injection		4.05E-07		491.0	505.0	13	20
UE-25b#1	CHnz	W Injection		4.05E-07		504.0	544.0	13	20
UE-25b#1	CHnz +	W Injection		5.21E-07		505.0	579.0	13	20
UE-25b#1	CHnz +	W Injection		4.98E-07		514.0	579.0	13	20
UE-25b#1	PP	W Injection		1.06E-05		581.0	621.0	13	20
UE-25b#1	PP	W Injection		6.13E-07		621.0	661.0	13	20
UE-25b#1	PPn	C	0.24	7.64E-10		625.8		13	13
UE-25b#1	PPw	C	0.10	9.61E-12		679.5		13	13
UE-25b#1	PP +	W Injection		5.32E-08		703.0	743.0	13	20
UE-25b#1	BF	W Injection		2.89E-08		743.0	783.0	13	20
UE-25b#1	BF	C	0.23	7.64E-09		752.7		13	13
UE-25b#1	BF	W Injection		1.15E-05		779.0	819.0	13	20
UE-25b#1	BF	C	0.21	7.64E-10		788.9		13	13
UE-25b#1	BF +	W Injection		1.27E-06		792.0	1220.0	13	20
UE-25b#1	BF	C	0.22	5.79E-10		814.1		13	13
UE-25b#1	BF	W Injection		3.82E-06		820.0	860.0	13	20
UE-25b#1	BF	C	0.23	9.61E-11		843.5		13	13
UE-25b#1	Tram	C	0.19	3.24E-10		923.9		13	13
UE-25b#1	Tram	C	0.19	2.08E-10		948.8		13	13
UE-25b#1	Tram	W Injection		1.13E-09		1006.0	1220.0	13	20
UE-25b#1	Tram	C	0.15	3.36E-09		1141.4		13	13
UE-25b#1	Tram	C	0.13	3.24E-09		1171.0		13	13
UE-25b#1	Tram	C	0.11	1.27E-09		1201.8		13	13
USW H-3	Tram +	W Pumping		9.95E-09		754.0	1219.0	15	13
USW H-3	Tram +	W Pumping		1.25E-08		754.0	1219.0	15	13
USW H-3	Tram	W Injection		3.50E-08	4.00E-06	792.0	850.0	15	13
USW H-3	Tram +	W Swabbing		2.99E-08		792.0	1219.0	15	13
USW H-3	Tram +	W Pumping		2.92E-08		822.0	1219.0	15	13
USW H-3	Tram	W Injection		3.51E-09		851.0	917.0	15	13
USW H-3	Tram	W Injection		1.14E-08	6.00E-06	911.0	972.0	15	13
USW H-3	Tram	W Injection		5.69E-09		911.0	972.0	15	13
USW H-3	Tram +	W Injection		4.69E-09	7.00E-06	972.0	1219.0	15	13
USW H-3	Tram +	W Injection		1.40E-09		972.0	1219.0	15	13
USW H-3	Tram +	W Injection		5.69E-09		1063.0	1124.0	15	13
USW H-3	Tram +	W Injection		1.90E-08	7.00E-06	1063.0	1124.0	15	13
USW H-3	Tram +	W Swabbing		1.90E-08		1063.0	1124.0	15	13
USW H-3	LR	W Injection		1.25E-09		1126.0	1219.0	15	13
USW H-1	PTn	C	0.45			33.5		16	8
USW H-1	TSw	C	0.22			128.0		16	8
USW H-1	TSw	C	0.23			129.1		16	8

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW H-1	TSw	C	0.21			134.9		16	8
USW H-1	TSw	C	0.19			136.6		16	8
USW H-1	TSw	C	0.17			142.5		16	8
USW H-1	TSw	C	0.15			143.3		16	8
USW H-1	TSw	C	0.17			219.2		16	8
USW H-1	TSw	C	0.28			221.4		16	8
USW H-1	TSw	C	0.18			222.1		16	8
USW H-1	TSw	C	0.16			390.4		16	8
USW H-1	TSw	C	0.16			390.6		16	8
USW H-1	TSw	C	0.14			397.9		16	8
USW H-1	TSw	C	0.10			398.7		16	8
USW GU-3	TCw	C	0.09			16.5		22	6
USW G-4	TCw	C	0.06			18.0		22	22
USW G-4	TCw	C	0.08			27.7		22	22
USW GU-3	TCw	C	0.12			29.4		22	6
USW GU-3	TCw	C	0.06			48.4		22	6
USW G-4	PTn	C	0.52			51.7		22	22
USW GU-3	TCw	C	0.05			63.3		22	6
USW GU-3	TCw	C	0.08			78.4		22	6
USW G-4	TSw	C	0.13			85.5		22	22
USW GU-3	TCw	C	0.08			93.2		22	6
USW G-4	TSw	C	0.16			101.3		22	22
USW GU-3	PTn	C	0.39			113.1		22	6
USW G-4	TSw	C	0.13			119.0		22	22
USW GU-3	TSw	C	0.17			132.7		22	6
USW GU-3	TSw	C	0.18			140.6		22	6
USW G-4	TSw	C	0.20			167.2		22	22
USW GU-3	TSw	C	0.14			168.4		22	6
USW GU-3	TSw	C	0.17			175.6		22	6
USW G-4	TSw	C	0.17			183.7		22	22
USW GU-3	TSw	C	0.14			186.1		22	6
USW GU-3	TSw	C	0.17			201.3		22	6
USW G-4	TSw	C	0.12			203.8		22	22
USW GU-3	TSw	C	0.09			217.6		22	6
USW G-4	TSw	C	0.07			226.4		22	22
USW GU-3	TSw	C	0.13			233.2		22	6
USW G-4	TSw	C	0.12			250.4		22	22
USW GU-3	TSw	C	0.07			251.7		22	6
USW G-4	TSw	C	0.10			266.9		22	22
USW GU-3	TSw	C	0.10			269.5		22	6
USW GU-3	TSw	C	0.11			282.0		22	6
USW G-4	TSw	C	0.11			285.9		22	22
USW GU-3	TSw	C	0.10			292.0		22	6
USW GU-3	TSw	C	0.10			321.9		22	6
USW G-4	TSw	C	0.14			324.5		22	22

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW GU-3	TSw	C	0.08			338.1		22	6
USW GU-3	TSw	C	0.09			355.5		22	6
USW GU-3	TSwv	C	0.01			369.9		22	6
USW G-4	TSw	C	0.09			377.8		22	22
USW GU-3	TSwv	C	0.03			384.7		22	6
USW GU-3	CHnv	C	0.29			399.7		22	6
USW G-4	CHnz	C	0.17			415.1		22	22
USW G-4	CHnz	C	0.37			436.4		22	22
USW G-4	CHnz	C	0.32			447.6		22	22
USW GU-3	CHnv	C	0.37			450.4		22	6
USW GU-3	CHnv	C	0.34			457.9		22	6
USW G-4	CHnz	C	0.32			460.8		22	22
USW GU-3	CHnv	C	0.44			477.4		22	6
USW G-4	CHnz	C	0.36			478.8		22	22
USW G-4	CHnz	C	0.33			496.1		22	22
USW GU-3	PPw	C	0.36			499.3		22	6
USW GU-3	PPw	C	0.32			508.1		22	6
USW G-4	CHnz	C	0.34			511.7		22	22
USW GU-3	PPw	C	0.27			520.3		22	6
USW GU-3	CFn	C	0.40			542.6		22	6
USW G-4	CHnz	C	0.30			544.0		22	22
USW GU-3	CFn	C	0.36			552.9		22	6
USW G-4	PPw	C	0.35			555.7		22	22
USW GU-3	CFn	C	0.29			569.2		22	6
USW G-4	PPw	C	0.30			570.3		22	22
USW GU-3	CFn	C	0.31			583.1		22	6
USW G-4	PPw	C	0.19			584.1		22	22
USW GU-3	CFn	C	0.34			597.1		22	6
USW G-4	CFn	C	0.33			602.4		22	22
USW GU-3	CFn	C	0.30			612.3		22	6
USW G-4	CFn	C	0.35			619.6		22	22
USW G-4	CFn	C	0.21			632.0		22	22
USW GU-3	BFw	C	0.30			632.6		22	6
USW GU-3	BFw	C	0.13			643.3		22	6
USW G-4	CFn	C	0.24			649.8		22	22
USW GU-3	BFw	C	0.18			660.8		22	6
USW G-4	CFn	C	0.29			665.2		22	22
USW GU-3	BFw	C	0.09			672.2		22	6
USW G-4	CFn	C	0.29			679.4		22	22
USW GU-3	BFw	C	0.08			688.0		22	7
USW G-4	BFw	C	0.25			700.6		22	22
USW GU-3	BFw	C	0.08			705.8		22	7
USW G-4	BFw	C	0.24			712.4		22	22
USW GU-3	BFw	C	0.07			718.5		22	7
USW G-4	BFw	C	0.21			726.1		22	22

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW GU-3	BFw	C	0.07			733.9		22	7
USW G-4	BFw	C	0.26			742.7		22	22
USW GU-3	BFw	C	0.06			752.6		22	7
USW G-4	BFw	C	0.25			755.5		22	22
USW GU-3	Tram	C	0.10			768.8		22	7
USW G-4	BFw	C	0.22			769.4		22	22
USW GU-3	Tram	C	0.27			781.2		22	7
USW G-4	BFw	C	0.18			785.9		22	22
USW GU-3	Tram	C	0.22			798.0		22	7
USW G-4	BFw	C	0.11			804.1		22	22
USW GU-3	Tram	C	0.31			811.1		22	7
USW G-4	BFw	C	0.28			821.5		22	23
USW G-4	Tram	C	0.25			829.1		22	23
USW GU-3	Tram	C	0.31			832.6		22	7
USW GU-3	Tram	C	0.28			845.0		22	7
USW GU-3	Tram	C	0.26			859.1		22	7
USW G-4	Tram	C	0.28			861.7		22	23
USW G-4	Tram	C	0.20			871.0		22	23
USW GU-3	Tram	C	0.24			874.5		22	7
USW GU-3	Tram	C	0.18			888.3		22	7
USW G-4	Tram	C	0.19			895.9		22	23
USW G-4	Tram	C	0.15			908.5		22	23
USW GU-3	Tram	C	0.17			910.4		22	7
USW GU-3	Tram	C	0.15			915.9		22	7
USW GU-3	Tram	C	0.14			933.5		22	7
USW GU-3	Tram	C	0.13			949.8		22	7
USW GU-3	Tram	C	0.16			963.3		22	7
USW GU-3	Tram	C	0.06			986.3		22	7
USW GU-3	Tram	C	0.02			993.7		22	7
USW GU-3	Tram	C	0.24			1009.4		22	7
USW GU-3	Tram	C	0.23			1024.5		22	7
USW GU-3	Tram	C	0.22			1040.0		22	7
USW GU-3	Tram	C	0.22			1056.1		22	7
USW GU-3	Tram	C	0.21			1070.5		22	7
USW GU-3	Tram	C	0.21			1085.4		22	7
USW GU-3	Tram	C	0.16			1101.0		22	7
USW GU-3	Tram	C	0.17			1115.6		22	7
USW GU-3	Tram	C	0.14			1131.1		22	7
USW GU-3	Tram	C	0.11			1165.5		22	7
USW GU-3	Tram	C	0.17			1177.2		22	7
USW H-1	PP	W		3.47E-05		572.0	597.0	26	40
USW H-1	PP	W		1.16E-05		597.0	616.0	26	40
USW H-1	PP	W		1.16E-05		616.0	652.0	26	40
USW H-1	PP	C	0.28	1.16E-09		640.0		26	10
USW H-1	PP	C	0.29	8.10E-10		641.0		26	10

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW H-1	PP	C	0.29	6.94E-10		641.0		26	10
USW H-1	PP	W		2.08E-04		652.0	653.0	26	40
USW H-1	PP	W		4.63E-07		653.0	688.0	26	40
USW H-1	PP	W		2.31E-07		687.0	694.0	26	40
USW H-1	PP +	W		2.31E-09		694.0	736.0	26	40
USW H-1	BF	C	0.32	3.47E-09		709.0		26	10
USW H-1	BF	C	0.27	3.47E-10		709.0		26	10
USW H-1	BF	C	0.34	9.26E-09		710.0		26	10
USW H-1	BF	C	0.20	1.16E-09		713.0		26	10
USW H-1	BF	W		1.16E-06		736.0	741.0	26	40
USW H-1	BF	W		1.16E-07		741.0	758.0	26	40
USW H-1	BF	W		3.47E-09		758.0	792.0	26	40
USW H-1	BF	C	0.28	1.16E-08		764.0		26	10
USW H-1	BF	C	0.25	6.94E-09		772.0		26	10
USW H-1	BF	C	0.19	4.63E-10		790.0		26	10
USW H-1	BF	C	0.20	6.94E-10		791.0		26	10
USW H-1	BF +	W		1.16E-10		792.0	1829.0	26	40
USW H-1	BF	C	0.22	8.10E-10		792.0		26	10
USW H-1	BF	C	0.25	4.63E-10		830.0		26	10
USW H-1	Tram	C	0.26	1.16E-09		833.0		26	10
USW H-1	Tram	C	0.26	2.31E-10		840.0		26	10
USW H-1	Tram	C	0.21	4.63E-11		844.0		26	10
USW H-1	Tram	C	0.21	4.63E-09		1031.0		26	10
USW H-1	Tram	C	0.23	3.47E-09		1031.0		26	10
USW H-1	Tram	C	0.22	2.31E-09		1032.0		26	10
USW H-1	Tram	C	0.18	2.31E-09		1039.0		26	10
USW H-1	Tram	C	0.18	1.16E-09		1039.0		26	10
USW H-1	Tram	C	0.21	5.79E-10		1040.0		26	10
USW H-1	FB	C	0.07	9.26E-12		1201.0		26	10
USW H-1	Older +	C	0.17	6.94E-10		1569.0		26	10
USW H-1	Older +	C	0.09	3.47E-09		1820.0		26	10
UE25a-1	CHnz	C	0.28			474.0		37	31
UE25a-1	CHnz	C	0.30			475.8		37	31
UE25a-1	CF	C	0.19			594.0		37	31
UE25a-1	CF	C	0.17			602.9		37	31
UE25a-1	BF	C	0.24			738.5		37	31
UE25a-1	BF	C	0.18			741.3		37	31
USW G-1	CFn	C	0.35			680.6		49	29
USW G-1	CFn	C	0.33			698.0		49	29
USW G-1	CFn	C	0.33			698.0		49	63
USW G-1	CFn	C	0.31			698.0		49	51
USW G-1	BFw	C	0.37			711.1		49	51
USW G-1	BFw	C	0.36			711.1		49	63
USW G-1	BFw	C	0.36			711.1		49	29
USW G-1	BFw	C	0.36			711.1		49	63

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW G-1	Tram	C	0.20			850.4		49	29
USW G-1	Tram	C	0.20			850.4		49	29
USW G-1	Tram	C	0.15			850.4		49	29
USW G-1	Tram	C	0.27			865.6		49	63
USW G-1	Tram	C	0.27			865.6		49	29
USW G-1	Tram	C	0.27			865.6		49	63
USW G-1	Tram	C	0.19			884.2		49	51
USW G-1	Tram	C	0.19			884.2		49	63
USW G-1	Tram	C	0.19			884.2		49	29
USW G-1	Tram	C	0.08			949.8		49	29
USW G-1	Tram	C	0.27			949.8		49	29
USW G-4	TCw	C	0.08	9.70E-12		13.1		56	23
USW G-4	PTn	C	0.27	2.63E-11		37.8		56	23
USW G-4	PTn	C	0.27	2.86E-12		37.8		56	23
USW G-4	PTn	C	0.65	2.40E-06		63.4		56	23
USW G-4	TSw	C	0.03	8.60E-13		75.3		56	23
USW G-4	TSw	C	0.09	2.17E-11		263.3		56	23
USW G-4	TSw	C	0.09	1.97E-11		263.3		56	23
USW G-4	TSw	C	0.16	3.90E-11		263.3		56	23
USW G-4	TSw	C	0.09	1.31E-11		263.3		56	23
USW G-4	TSw	C	0.09	2.17E-11		263.3		56	23
USW G-4	TSw	C	0.11	1.90E-11		353.0		56	23
USW G-4	TSw	C	0.11	7.11E-12		370.3		56	23
USW G-4	TSw	C	0.11	9.19E-12		370.3		56	23
USW G-4	TSw	C	0.11	3.77E-12		370.3		56	23
USW G-4	TSw	C	0.10	1.30E-11		382.8		56	23
USW G-4	TSw	C	0.06	1.48E-11		389.5		56	23
USW G-4	TSw	C	0.06	1.34E-12		389.5		56	23
USW G-4	TSw	C	0.06	8.58E-12		389.5		56	23
USW G-4	TSwv	C	0.09	4.50E-10		395.9		56	23
USW G-4	TSwv	C	0.04	3.00E-12		403.6		56	23
USW G-4	Chnv	C	0.21	1.99E-11		414.2		56	23
USW G-4	Chnv	C	0.21	8.03E-11		414.2		56	23
USW G-4	Chnv	C	0.21	3.25E-11		414.2		56	23
USW G-4	Chnz	C	0.41	3.00E-12		428.2		56	23
USW G-4	Chnz	C	0.28	1.97E-11		471.8		56	23
USW G-4	Chnz	C	0.28	5.90E-12		471.8		56	23
USW G-4	Chnz	C	0.28	1.31E-11		471.8		56	23
USW G-4	Chnz	C	0.28	2.37E-14		471.8		56	23
USW G-4	Chnz	C	0.33	1.33E-11		472.7		56	23
USW G-4	Chnz	C	0.33	5.06E-11		472.7		56	23
USW G-4	Chnz	C	0.33	1.88E-11		472.7		56	23
USW G-4	Chnz	C	0.30	4.24E-12		513.9		56	24
USW G-4	Chnz	C	0.22	1.97E-11		526.7		56	24
USW G-4	Chnz	C	0.22	4.69E-14		526.7		56	24

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW G-4	CHnz	C	0.22	1.86E-11		526.7		56	24
USW G-4	CHnz	C	0.22	2.45E-11		526.7		56	24
USW G-4	CHnz	C	0.24	2.48E-11		529.4		56	24
USW G-4	CHnz	C	0.24	1.59E-12		529.4		56	24
USW G-4	CHnz	C	0.24	4.59E-13		529.4		56	24
USW G-4	CHnz	C	0.24	1.31E-11		529.4		56	24
USW G-4	CHnz	C	0.26	2.30E-12		539.2		56	24
USW G-4	CHnz	C	0.28	6.89E-12		541.9		56	24
USW G-4	CHnz	C	0.28	2.25E-11		541.9		56	24
USW G-4	CHnz	C	0.28	1.83E-11		541.9		56	24
USW G-4	CHnz	C	0.25	6.50E-12		541.9		56	24
USW G-4	CHnz	C	0.28	1.24E-10		544.7		56	24
USW G-4	CHnz	C	0.28	1.61E-10		544.7		56	24
USW G-4	CHnz	C	0.28	1.97E-11		544.7		56	24
USW G-4	CHnz	C	0.28	1.66E-12		544.7		56	24
USW G-4	PPw	C	0.24	4.46E-09		578.8		56	24
USW G-4	PPw	C	0.24	1.58E-09		578.8		56	24
USW G-4	PPw	C	0.24	1.38E-08		578.8		56	24
USW G-4	PPw	C	0.24	2.34E-09		578.8		56	24
USW G-4	CFn	C	0.29	2.00E-11		611.4		56	24
USW G-4	CFn	C	0.19	4.40E-10		640.4		56	24
USW G-4	BFw	C	0.24	2.30E-09		731.8		56	24
USW G-4	BFw	C	0.27	6.30E-09		733.7		56	24
USW GU-3	CHnv	C	0.32	1.5000E-12		474.0		58	8
USW G-1	CFn	C	0.33			696.9		61	10
USW G-1	BFw	C	0.21			771.5		61	10
USW G-1	BFw	C	0.22			773.0		61	15
USW G-1	BFw	C	0.24			786.4		61	10
USW G-1	Tram	C	0.21			857.2		61	10
USW G-1	Tram	C	0.24			857.7		61	15
USW G-1	Tram	C	0.15			892.8		61	15
USW G-1	Tram	C	0.16			893.6		61	10
USW G-1	Tram	C	0.18			895.7		61	15
USW G-1	Tram	C	0.16			895.9		61	15
USW H-1	PPw	W Recovery		3.30E-05	3.00E-01	572.0	688.0	66	22
USW H-1	PPw	W Drawdown		1.67E-05	5.00E-01	572.0	688.0	66	22
USW H-1	PPw +	W Recovery		1.67E-07	5.00E-07	687.0	1829.0	66	22
USW H-1	PPw +	W Drawdown		5.00E-08	2.00E-04	687.0	1829.0	66	22
USW H-1	PPw +	W Recovery		1.50E-07	1.00E-05	687.0	1829.0	66	22
USW H-1	PPw	W Injection		3.50E-07	2.90E-05	687.0	697.0	66	22
USW H-1	BFw +	W Injection		4.06E-10	2.90E-05	811.0	1829.0	66	22
USW H-1	Tram +	W Injection		1.35E-10	2.90E-04	926.0	1829.0	66	22
USW H-1	Older	W Injection		1.17E-09	5.90E-05	1200.0	1829.0	66	22
USW H-1	Older	W Injection		1.76E-10	5.90E-05	1407.0	1829.0	66	22
USW H-1	Older	W Injection		1.17E-10	2.90E-05	1621.0	1829.0	66	22

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
J-13	TSw	W Pumping		1.16E-05		303.6	422.5	87	23
J-13	CHn +	W Swabbing		1.50E-07		471.2	612.6	87	23
J-13	CHn +	W Swabbing		1.02E-07		471.2	912.9	87	24
J-13	CHn	W Swabbing		1.50E-06		471.2	502.0	87	23
J-13	CHn	W Swabbing		1.09E-06		471.2	502.0	87	23
J-13	CHn	W Injection		1.74E-06		471.2	502.0	87	23
J-13	CHn +	W Swabbing		1.10E-07		471.2	661.4	87	24
J-13	CHn +	W Injection		1.50E-07		501.1	562.1	87	23
J-13	CHn +	W Swabbing		3.01E-07		501.1	562.1	87	23
J-13	CHn +	W Injection		6.60E-08		505.4	565.7	87	23
J-13	CHn +	W Swabbing		7.18E-08		505.4	565.7	87	23
J-13	PP +	W Injection		1.04E-07		584.6	645.6	87	24
J-13	BF	W Injection		3.36E-08		639.8	670.3	87	24
J-13	BF	W Injection		1.85E-07		666.7	669.2	87	24
J-13	BF +	W Injection		3.82E-08		719.3	749.8	87	24
J-13	Tram	W Swabbing		6.48E-08		772.7	803.1	87	24
J-13	Tram +	W Swabbing		3.01E-08		819.9	1063.1	87	24
UE25a-1	TCw	C	0.06	1.80E-12		17.7		99	23
UE25a-1	TCw	C	0.07	2.80E-11		31.1		99	23
UE25a-1	TCw	C	0.06	2.41E-11		46.7		99	23
UE25a-1	TCw	C	0.23	4.84E-10		57.0		99	23
UE25a-1	PTn	C	0.30	1.34E-11		61.6		99	23
UE25a-1	PTn	C	0.53			64.6		99	23
UE25a-1	PTn	C	0.53			71.3		99	23
UE25a-1	PTn	C	0.52			80.2		99	23
UE25a-1	PTn	C	0.27			83.2		99	23
UE25a-1	TSw	C	0.22	2.45E-10		100.0		99	23
UE25a-1	TSw	C	0.13			109.8		99	23
UE25a-1	TSw	C	0.15	1.52E-11		128.4		99	23
UE25a-1	TSw	C	0.19	1.06E-10		143.6		99	23
UE25a-1	TSw	C	0.18	4.73E-09		159.8		99	23
UE25a-1	TSw	C	0.18			173.5		99	23
UE25a-1	TSw	C	0.18			189.9		99	23
UE25a-1	TSw	C	0.08	3.48E-11		201.2		99	23
UE25a-1	TSw	C	0.11	1.19E-11		223.5		99	23
UE25a-1	TSw	C	0.13	4.97E-10		235.4		99	23
UE25a-1	TSw	C	0.10	7.74E-12		248.8		99	23
UE25a-1	TSw	C	0.09	1.62E-11		264.0		99	23
UE25a-1	TSw	C	0.10	1.11E-11		280.8		99	23
UE25a-1	TSw	C	0.12	1.28E-11		307.9		99	23
UE25a-1	TSw	C	0.11	1.31E-10		317.1		99	23
UE25a-1	TSw	C	0.09	2.40E-11		339.0		99	23
UE25a-1	TSw	C	0.09	3.19E-11		360.7		99	23
UE25a-1	TSw	C	0.08	2.80E-11		380.8		99	23
UE25a-1	TSw	C	0.13	2.53E-10		386.0		99	23

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
UE25a-1	TSw	C	0.06	3.46E-11		397.6		99	24
UE25a-1	CHnz	C	0.30			403.7		99	24
UE25a-1	CHnz	C	0.28			407.9		99	24
UE25a-1	CHnz	C	0.24			411.3		99	24
UE25a-1	CHnz	C	0.23	3.93E-10		414.9		99	24
UE25a-1	CHnz	C	0.30			430.2		99	24
UE25a-1	CHnz	C	0.28			446.3		99	24
UE25a-1	CHnz	C	0.32	1.21E-10		462.2		99	24
UE25a-1	CHnz	C	0.29	2.33E-09		478.1		99	24
UE25a-1	CHnz	C	0.34	3.54E-09		499.4		99	24
UE25a-1	CHnz	C	0.31			514.0		99	24
UE25a-1	CHnz	C	0.34	5.05E-10		530.8		99	24
UE25a-1	CHnz	C	0.20	4.37E-11		546.0		99	24
UE25a-1	CHnz	C	0.21			558.8		99	24
UE25a-1	CF	C	0.33	5.93E-10		561.6		99	24
UE25a-1	CF	C	0.25	1.49E-08		575.6		99	24
UE25a-1	CF	C	0.20	6.96E-10		592.1		99	24
UE25a-1	CF	C	0.13	1.10E-09		606.1		99	24
UE25a-1	CF	C	0.22	2.76E-10		619.5		99	24
UE25a-1	CF	C	0.20	4.84E-10		633.5		99	24
UE25a-1	CF	C	0.22	2.32E-09		642.7		99	24
UE25a-1	CF	C	0.22			655.2		99	24
UE25a-1	CF	C	0.10	1.09E-09		658.2		99	24
UE25a-1	CF	C	0.15	1.00E-08		671.0		99	24
UE25a-1	CF	C	0.18			701.2		99	24
UE25a-1	CF	C	0.16			710.7		99	24
UE25a-1	BF	C	0.24	1.47E-08		724.7		99	24
UE25a-1	BF	C	0.18	2.12E-09		743.9		99	24
UE25a-1	BF	C	0.17	4.57E-09		760.7		99	24
UE25a-1	CF	C	0.23			685.1		99	24
UE25a-3	CH	C	0.04			65.9		100	19
UE25a-3	CH	C	0.08			107.9		100	19
UE25a-3	CH	C	0.10			196.0		100	19
UE25a-3	CH	C	0.07			203.0		100	19
UE25a-3	CH	C	0.12			206.1		100	19
UE25a-3	CH	C	0.08			217.4		100	19
UE25a-3	CH	C	0.09			229.6		100	19
UE25a-3	CH	C	0.06			264.0		100	19
UE25a-3	CH	C	0.11			284.2		100	19
UE25a-3	CH	C	0.09			390.9		100	19
UE25a-3	CH	C	0.12			401.5		100	19
UE25a-3	CH	C	0.05			424.7		100	19
UE25a-3	CH	C	0.12			435.1		100	19
UE25a-3	CH	C	0.12			441.5		100	19
UE25a-3	CH	C	0.10			462.8		100	19

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
UE25a-3	CH	C	0.06			473.5		100	19
UE25a-3	CH	C	0.11			487.2		100	19
UE25a-3	CH	C	0.02			502.7		100	19
UE25a-3	CH	C	0.14			510.7		100	20
UE25a-3	CH	C	0.05			524.7		100	20
UE25a-3	CH	C	0.17			529.3		100	20
UE25a-3	CH	C	0.11			554.9		100	20
UE25a-3	CH	C	0.07			599.7		100	20
UE25a-3	CH	C	0.04			612.5		100	20
UE25a-3	CH	C	0.11			632.9		100	20
UE25a-3	CH	C	0.23			647.9		100	20
UE25a-3	CH	C	0.08			655.5		100	20
UE25a-3	CH	C	0.10			683.2		100	20
UE25a-3	CH	C	0.06			714.0		100	20
UE25a-3	CH	C	0.01			722.9		100	20
UE25a-3	CH	C	0.16			725.6		100	20
UE25a-3	CH	C	0.03			733.5		100	20
UE25a-3	CH	C	0.03			751.5		100	20
UE25a-3	CH	C	0.08			769.2		100	20
USW G-4	TSw	C	0.13			85.5		229	B-7
USW G-4	TSw	C	0.16			101.3		229	B-7
USW G-4	TSw	C	0.13			119.0		229	B-7
USW GU-3	TSw	C	0.17			132.6		229	B-5
USW GU-3	TSw	C	0.23			132.8		229	B-5
USW GU-3	TSw	C	0.20			137.9		229	B-6
USW GU-3	TSw	C	0.18			140.5		229	B-6
USW GU-3	TSw	C	0.17			145.0		229	B-6
USW GU-3	TSw	C	0.20			149.5		229	B-6
USW GU-3	TSw	C	0.17			150.0		229	B-6
USW GU-3	TSw	C	0.16			158.4		229	B-6
USW GU-3	TSw	C	0.20			165.4		229	B-6
USW GU-3	TSw	C	0.19			165.7		229	B-6
USW G-4	TSw	C	0.20			167.2		229	B-7
USW GU-3	TSw	C	0.14			168.3		229	B-6
USW GU-3	TSw	C	0.12			171.0		229	B-6
USW GU-3	TSw	C	0.17			175.6		229	B-6
USW GU-3	TSw	C	0.21			178.8		229	B-6
USW GU-3	TSw	C	0.21			182.9		229	B-6
USW GU-3	TSw	C	0.18			183.0		229	B-6
USW G-4	TSw	C	0.17			183.7		229	B-7
USW GU-3	TSw	C	0.14			186.0		229	B-6
USW GU-3	TSw	C	0.12			192.4		229	B-6
USW GU-3	TSw	C	0.17			198.7		229	B-6
USW GU-3	TSw	C	0.17			201.3		229	B-6
USW G-4	TSw	C	0.12			203.8		229	B-7

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW GU-3	TSw	C	0.15			204.0		229	B-6
USW GU-3	TSw	C	0.18			204.3		229	B-6
UE25a-1	TSw	C	0.10			207.3		229	B-5
UE25a-1	TSw	C	0.10			207.3		229	B-5
UE25a-1	TSw	C	0.10			207.7		229	B-5
UE25a-1	TSw	C	0.13			207.7		229	B-5
USW GU-3	TSw	C	0.12			211.4		229	B-6
UE25a-1	TSw	C	0.12			212.4		229	B-5
UE25a-1	TSw	C	0.09			216.0		229	B-5
UE25a-1	TSw	C	0.08			216.0		229	B-5
USW GU-3	TSw	C	0.08			217.1		229	B-6
USW GU-3	TSw	C	0.09			217.4		229	B-6
UE25a-1	TSw	C	0.13			220.4		229	B-5
UE25a-1	TSw	C	0.09			222.7		229	B-5
UE25a-1	TSw	C	0.10			222.7		229	B-5
UE25a-1	TSw	C	0.11			223.4		229	B-5
USW G-4	TSw	C	0.08			226.3		229	B-7
USW G-1	TSw	C	0.18			229.1		229	B-7
USW GU-3	TSw	C	0.12			229.5		229	B-6
USW GU-3	TSw	C	0.12			229.6		229	B-6
USW GU-3	TSw	C	0.13			233.2		229	B-6
USW GU-3	TSw	C	0.14			234.7		229	B-6
UE25a-1	TSw	C	0.13			235.3		229	B-5
USW GU-3	TSw	C	0.10			242.3		229	B-6
USW G-1	TSw	C	0.11			242.3		229	B-7
USW G-1	TSw	C	0.10			246.9		229	B-7
USW G-1	TSw	C	0.10			246.9		229	B-7
USW G-4	TSw	C	0.11			250.3		229	B-7
USW GU-3	TSw	C	0.07			251.6		229	B-6
USW GU-3	TSw	C	0.06			251.9		229	B-6
USW GU-3	TSw	C	0.10			255.2		229	B-6
USW GU-3	TSw	C	0.09			256.3		229	B-6
USW GU-3	TSw	C	0.12			261.2		229	B-6
USW GU-3	TSw	C	0.15			266.3		229	B-6
USW G-4	TSw	C	0.10			266.9		229	B-7
USW GU-3	TSw	C	0.10			269.5		229	B-6
USW G-1	TSw	C	0.11			271.4		229	B-7
USW GU-3	TSw	C	0.15			280.9		229	B-6
USW GU-3	TSw	C	0.15			281.5		229	B-6
USW GU-3	TSw	C	0.11			281.9		229	B-6
USW G-4	TSw	C	0.11			285.8		229	B-7
USW GU-3	TSw	C	0.18			286.0		229	B-6
USW G-1	TSw	C	0.12			286.2		229	B-7
USW G-1	TSw	C	0.16			286.2		229	B-7
USW GU-3	TSw	C	0.15			290.7		229	B-6

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW GU-3	TSw	C	0.11			291.9		229	B-6
USW G-1	TSw	C	0.12			292.4		229	B-7
UE25a-1	TSw	C	0.09			295.4		229	B-5
USW GU-3	TSw	C	0.17			300.7		229	B-6
USW G-1	TSw	C	0.13			310.2		229	B-7
USW GU-3	TSw	C	0.12			312.0		229	B-6
USW G-1	TSw	C	0.11			319.2		229	B-7
USW GU-3	TSw	C	0.10			321.8		229	B-6
USW G-4	TSw	C	0.14			324.5		229	B-7
USW GU-3	TSw	C	0.12			325.9		229	B-6
USW GU-3	TSw	C	0.12			326.1		229	B-6
USW GU-3	TSw	C	0.11			330.6		229	B-6
UE25a-1	TSw	C	0.12			332.2		229	B-5
UE25a-1	TSw	C	0.11			332.2		229	B-5
UE25a-1	TSw	C	0.25			332.7		229	B-5
USW G-1	TSw	C	0.15			335.3		229	B-7
UE25a-1	TSw	C	0.12			335.6		229	B-5
UE25a-1	TSw	C	0.07			335.6		229	B-5
UE25a-1	TSw	C	0.11			335.8		229	B-5
USW GU-3	TSw	C	0.09			336.6		229	B-6
UE25a-1	TSw	C	0.09			337.2		229	B-5
UE25a-1	TSw	C	0.10			337.2		229	B-5
USW GU-3	TSw	C	0.08			338.0		229	B-7
USW GU-3	TSw	C	0.11			342.7		229	B-7
USW GU-3	TSw	C	0.10			344.8		229	B-7
USW GU-3	TSw	C	0.11			350.3		229	B-7
USW G-1	TSw	C	0.16			350.9		229	B-7
USW GU-3	TSw	C	0.08			351.2		229	B-7
USW GU-3	TSw	C	0.09			355.4		229	B-7
USW GU-3	TSwv	C	0.01			364.2		229	B-7
USW GU-3	TSwv	C	0.03			364.5		229	B-7
USW G-1	TSw	C	0.11			369.0		229	B-7
USW GU-3	TSwv	C	0.01			369.8		229	B-7
USW GU-3	TSwv	C	0.04			370.1		229	B-7
USW GU-3	TSwv	C	0.03			376.2		229	B-7
USW G-4	TSw	C	0.10			377.7		229	B-7
USW G-1	TSw	C	0.10			379.5		229	B-7
USW GU-3	TSwv	C	0.02			380.1		229	B-7
USW GU-3	TSwv	C	0.03			380.3		229	B-7
UE25a-1	TSw	C	0.09			381.9		229	B-5
USW GU-3	TSwv	C	0.03			384.6		229	B-7
UE25a-1	TSw	C	0.02			391.8		229	B-5
UE25a-1	TSw	C	0.01			391.9		229	B-5
USW GU-3	CHnv	C	0.14			392.6		229	B-8
USW G-1	TSw	C	0.04			392.7		229	B-7

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW GU-3	CHnv	C	0.16			395.6		229	B-8
UE25a-1	TSw	C	0.06			397.5		229	B-5
USW GU-3	CHnv	C	0.29			399.6		229	B-8
USW GU-3	CHnv	C	0.32			399.9		229	B-8
USW GU-3	CHnv	C	0.32			400.1		229	B-8
UE25a-1	CHnz	C	0.30			403.6		229	B-9
USW G-1	TSw	C	0.03			405.4		229	B-7
USW G-1	TSw	C	0.03			405.4		229	B-7
USW G-1	TSw	C	0.04			405.4		229	B-7
USW GU-3	CHnv	C	0.41			405.5		229	B-8
USW G-1	TSw	C	0.04			406.2		229	B-7
UE25a-1	CHnz	C	0.27			407.8		229	B-9
UE25a-1	CHnz	C	0.24			411.2		229	B-9
USW GU-3	CHnv	C	0.40			411.9		229	B-8
UE25a-1	CHnz	C	0.23			414.8		229	B-9
USW G-4	CHnv	C	0.17			415.0		229	B-8
USW GU-3	CHnv	C	0.48			419.9		229	B-8
USW GU-3	CHnv	C	0.43			420.0		229	B-8
USW G-1	TSn	C	0.33			422.2		229	B-8
UE25a-1	CHnz	C	0.29			425.2		229	B-9
UE25a-1	CHnz	C	0.31			425.2		229	B-9
UE25a-1	CHnz	C	0.30			430.1		229	B-9
UE25a-1	CHnz	C	0.22			434.0		229	B-9
USW G-4	CHnz	C	0.37			436.3		229	B-10
UE25a-1	CHnz	C	0.27			440.7		229	B-9
UE25a-1	CHnz	C	0.26			440.7		229	B-9
UE25a-1	CHnz	C	0.29			445.3		229	B-9
UE25a-1	CHnz	C	0.28			446.2		229	B-9
USW G-4	CHnz	C	0.32			447.4		229	B-10
USW G-1	CHnz	C	0.37			448.1		229	B-9
USW GU-3	CHnv	C	0.37			450.3		229	B-8
UE25a-1	CHnz	C	0.26			450.5		229	B-9
UE25a-1	CHnz	C	0.26			450.5		229	B-9
USW GU-3	CHnv	C	0.39			451.7		229	B-8
UE25a-1	CHnz	C	0.28			454.2		229	B-9
USW GU-3	CHnv	C	0.39			456.3		229	B-8
USW GU-3	CHnv	C	0.38			456.5		229	B-8
USW GU-3	CHnv	C	0.34			457.7		229	B-8
USW G-1	CHnz	C	0.38			458.1		229	B-9
USW GU-3	CHnv	C	0.38			458.1		229	B-8
USW G-1	CHnz	C	0.31			458.7		229	B-9
USW G-4	CHnz	C	0.32			460.6		229	B-10
UE25a-1	CHnz	C	0.27			461.3		229	B-9
USW G-1	CHnz	C	0.33			461.8		229	B-9
UE25a-1	CHnz	C	0.32			462.1		229	B-9

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW GU-3	CHnv	C	0.34			467.5		229	B-8
USW GU-3	CHnv	C	0.41			472.1		229	B-8
USW G-1	CHnz	C	0.35			473.4		229	B-9
USW GU-3	CHnv	C	0.35			473.9		229	B-8
UE25a-1	CHnz	C	0.32			474.0		229	B-9
USW GU-3	CHnv	C	0.44			477.3		229	B-8
UE25a-1	CHnz	C	0.26			477.3		229	B-9
UE25a-1	CHnz	C	0.29			477.9		229	B-9
USW G-4	CHnz	C	0.36			478.5		229	B-10
USW G-1	CHnz	C	0.39			478.8		229	B-9
USW GU-3	CHnv	C	0.46			478.9		229	B-8
USW GU-3	CHnv	C	0.45			486.0		229	B-8
UE25a-1	CHnz	C	0.30			489.2		229	B-9
USW G-1	CHnz	C	0.39			489.5		229	B-9
USW G-1	CHnz	C	0.32			489.5		229	B-9
USW G-1	CHnz	C	0.30			489.5		229	B-9
USW G-1	CHnz	C	0.31			489.5		229	B-9
UE25a-1	CHnz	C	0.23			491.3		229	B-9
UE25a-1	CHnz	C	0.20			491.3		229	B-9
USW G-4	CHnz	C	0.33			495.9		229	B-10
USW GU-3	PPw	C	0.38			499.0		229	B-11
USW GU-3	PPw	C	0.36			499.3		229	B-11
UE25a-1	CHnz	C	0.34			499.3		229	B-9
UE25a-1	CHnz	C	0.26			500.3		229	B-9
UE25a-1	CHnz	C	0.31			500.3		229	B-9
USW G-1	CHnz	C	0.36			503.5		229	B-9
USW G-1	CHnz	C	0.32			503.5		229	B-9
USW GU-3	PPw	C	0.35			503.8		229	B-11
UE25a-1	CHnz	C	0.35			506.6		229	B-9
USW G-1	CHnz	C	0.33			507.0		229	B-9
USW G-1	CHnz	C	0.35			508.1		229	B-10
USW GU-3	PPw	C	0.32			508.1		229	B-11
UE25a-1	CHnz	C	0.29			508.4		229	B-9
UE25a-1	CHnz	C	0.28			508.4		229	B-9
UE25a-1	CHnz	C	0.24			508.4		229	B-9
USW G-4	CHnz	C	0.34			511.5		229	B-10
UE25a-1	CHnz	C	0.31			512.2		229	B-9
UE25a-1	CHnz	C	0.30			513.9		229	B-9
UE25a-1	CHnz	C	0.37			515.7		229	B-9
USW GU-3	PPw	C	0.29			517.9		229	B-11
USW G-1	CHnz	C	0.33			519.8		229	B-10
USW GU-3	PPw	C	0.26			520.3		229	B-11
USW GU-3	PPw	C	0.25			521.7		229	B-11
USW GU-3	PPw	C	0.25			521.8		229	B-11
USW G-1	CHnz	C	0.36			524.9		229	B-10

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW GU-3	PPw	C	0.26			527.6		229	B-11
UE25a-1	CHnz	C	0.34			530.7		229	B-9
USW GU-3	CFn	C	0.40			533.1		229	B-12
USW GU-3	CFn	C	0.45			542.5		229	B-12
USW GU-3	CFn	C	0.40			542.5		229	B-12
USW GU-3	CFn	C	0.44			542.8		229	B-12
USW G-4	CHnz	C	0.30			543.8		229	B-10
USW G-1	CHnz	C	0.24			543.9		229	B-10
UE25a-1	CHnz	C	0.20			545.9		229	B-9
USW GU-3	CFn	C	0.42			546.5		229	B-12
USW GU-3	CFn	C	0.38			551.4		229	B-12
USW GU-3	CFn	C	0.36			552.8		229	B-12
USW G-4	PPw	C	0.34			555.7		229	B-11
USW GU-3	CFn	C	0.39			557.2		229	B-12
USW G-1	PPw	C	0.36			558.4		229	B-10
USW G-1	PPw	C	0.35			558.4		229	B-10
UE25a-1	CHnz	C	0.21			558.7		229	B-9
UE25a-1	CF	C	0.33			561.4		229	B-9
USW G-1	PPw	C	0.35			562.7		229	B-10
USW G-1	PPw	C	0.37			563.0		229	B-10
USW GU-3	CFn	C	0.33			564.2		229	B-12
USW GU-3	CFn	C	0.35			564.5		229	B-12
USW GU-3	CFn	C	0.29			569.1		229	B-12
USW G-4	PPw	C	0.30			570.3		229	B-11
USW GU-3	CFn	C	0.33			570.9		229	B-12
UE25a-1	CF	C	0.25			575.5		229	B-11
USW GU-3	CFn	C	0.33			577.6		229	B-12
USW GU-3	CFn	C	0.35			581.6		229	B-12
USW GU-3	CFn	C	0.31			583.1		229	B-12
USW G-4	PPw	C	0.20			584.0		229	B-11
USW G-1	PPw	C	0.32			587.3		229	B-11
USW GU-3	CFn	C	0.36			588.0		229	B-12
USW G-1	PPw	C	0.35			588.3		229	B-11
UE25a-1	CF	C	0.21			588.3		229	B-11
UE25a-1	CF	C	0.21			588.3		229	B-11
UE25a-1	CF	C	0.20			591.9		229	B-11
USW G-1	PPw	C	0.22			593.4		229	B-11
UE25a-1	CF	C	0.19			593.8		229	B-11
USW G-1	PPw	C	0.26			593.8		229	B-11
UE25a-1	CF	C	0.19			594.1		229	B-11
USW GU-3	CFn	C	0.34			594.4		229	B-12
USW GU-3	CFn	C	0.34			596.8		229	B-12
UE25a-1	CF	C	0.19			599.2		229	B-11
UE25a-1	CF	C	0.18			599.8		229	B-11
USW GU-3	CFn	C	0.38			600.8		229	B-12

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW G-1	PPw	C	0.31			601.7		229	B-11
UE25a-1	CF	C	0.15			605.0		229	B-11
UE25a-1	CF	C	0.13			605.9		229	B-11
USW GU-3	CFn	C	0.31			608.7		229	B-12
USW GU-3	CFn	C	0.30			612.0		229	B-12
USW G-1	PPw	C	0.31			612.6		229	B-12
USW GU-3	CFn	C	0.33			613.9		229	B-12
UE25a-1	CF	C	0.17			613.9		229	B-12
USW GU-3	CFn	C	0.43			618.1		229	B-12
USW GU-3	CFn	C	0.39			618.4		229	B-12
UE25a-1	CF	C	0.22			619.4		229	B-12
USW G-4	CFn	C	0.35			619.4		229	B-13
USW G-1	PPw	C	0.28			624.8		229	B-12
USW GU-3	CFn	C	0.40			625.0		229	B-12
USW G-1	PPw	C	0.32			625.4		229	B-12
USW G-1	PPw	C	0.27			629.4		229	B-12
USW G-1	PPw	C	0.29			629.4		229	B-12
USW G-1	PPw	C	0.29			629.7		229	B-12
USW GU-3	CFn	C	0.35			630.9		229	B-12
USW G-1	PPw	C	0.29			630.9		229	B-12
USW G-4	CFn	C	0.21			631.9		229	B-13
USW GU-3	BFw	C	0.30			632.5		229	B-14
USW G-1	PPw	C	0.32			635.8		229	B-12
USW GU-3	BFw	C	0.21			637.3		229	B-14
USW GU-3	BFw	C	0.28			637.5		229	B-14
UE25a-1	CF	C	0.22			642.5		229	B-12
USW GU-3	BFw	C	0.14			643.1		229	B-14
USW GU-3	BFw	C	0.17			645.6		229	B-14
USW G-1	PPw	C	0.32			648.6		229	B-12
USW GU-3	BFw	C	0.19			649.2		229	B-14
USW G-4	CFn	C	0.24			649.5		229	B-13
UE25a-1	CF	C	0.23			655.0		229	B-12
USW GU-3	BFw	C	0.21			655.3		229	B-14
UE25a-1	CF	C	0.10			658.1		229	B-12
USW GU-3	BFw	C	0.18			660.7		229	B-14
USW GU-3	BFw	C	0.25			661.1		229	B-14
USW G-1	CFn	C	0.26			661.4		229	B-12
USW G-1	CFn	C	0.28			661.4		229	B-12
USW GU-3	BFw	C	0.18			663.1		229	B-14
USW G-4	CFn	C	0.29			665.1		229	B-13
USW GU-3	BFw	C	0.25			666.3		229	B-14
USW G-1	CFn	C	0.31			668.1		229	B-12
UE25a-1	CF	C	0.15			670.9		229	B-12
USW GU-3	BFw	C	0.09			672.1		229	B-14
USW G-1	CFn	C	0.33			672.4		229	B-12

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW GU-3	BFw	C	0.18			673.3		229	B-14
USW G-1	CFn	C	0.39			678.8		229	B-12
USW G-4	CFn	C	0.28			679.2		229	B-13
USW GU-3	BFw	C	0.22			680.0		229	B-14
USW G-1	CFn	C	0.39			680.3		229	B-13
USW G-1	CFn	C	0.38			680.6		229	B-13
USW G-1	CFn	C	0.35			680.6		229	B-13
USW GU-3	BFw	C	0.10			681.5		229	B-14
UE25a-1	CF	C	0.23			684.9		229	B-12
USW GU-3	BFw	C	0.24			685.5		229	B-14
USW GU-3	BFw	C	0.09			687.9		229	B-14
USW G-1	CFn	C	0.36			689.2		229	B-13
USW G-1	CFn	C	0.36			690.4		229	B-13
USW GU-3	BFw	C	0.09			690.7		229	B-14
USW G-1	CFn	C	0.35			692.8		229	B-13
USW G-1	CFn	C	0.35			693.1		229	B-13
USW G-1	CFn	C	0.32			693.1		229	B-13
USW G-1	CFn	C	0.34			693.7		229	B-13
USW G-1	CFn	C	0.37			696.5		229	B-13
USW G-1	CFn	C	0.36			696.8		229	B-13
USW GU-3	BFw	C	0.10			697.7		229	B-14
USW G-1	CFn	C	0.33			698.0		229	B-13
USW GU-3	BFw	C	0.09			698.0		229	B-14
USW G-4	BFw	C	0.25			700.4		229	B-16
UE25a-1	CF	C	0.18			701.0		229	B-12
USW G-1	CFn	C	0.37			704.1		229	B-13
USW G-1	CFn	C	0.39			704.1		229	B-13
USW G-1	CFn	C	0.39			704.4		229	B-13
USW G-1	CFn	C	0.36			704.4		229	B-13
USW G-1	CFn	C	0.36			704.5		229	B-13
USW G-1	CFn	C	0.36			704.5		229	B-13
USW G-1	CFn	C	0.36			704.7		229	B-13
USW G-1	CFn	C	0.38			705.0		229	B-13
USW GU-3	BFw	C	0.09			705.6		229	B-14
USW GU-3	BFw	C	0.09			706.2		229	B-14
USW G-1	BFw	C	0.36			707.4		229	B-14
USW G-1	BFw	C	0.38			707.4		229	B-14
USW G-1	BFw	C	0.36			707.4		229	B-14
USW G-1	BFw	C	0.37			707.4		229	B-14
USW G-1	BFw	C	0.36			707.4		229	B-14
USW G-1	BFw	C	0.37			707.4		229	B-14
USW GU-3	BFw	C	0.09			708.1		229	B-14
UE25a-1	CF	C	0.16			710.5		229	B-12
USW G-1	BFw	C	0.36			710.8		229	B-14
USW G-1	BFw	C	0.37			711.1		229	B-14

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW G-1	BFw	C	0.35			711.1		229	B-14
USW G-4	BFw	C	0.25			712.3		229	B-16
USW G-1	BFw	C	0.38			712.6		229	B-15
USW G-1	BFw	C	0.40			712.6		229	B-15
USW G-1	BFw	C	0.40			712.6		229	B-15
USW G-1	BFw	C	0.38			712.6		229	B-15
USW G-1	BFw	C	0.39			712.6		229	B-15
USW G-1	BFw	C	0.38			712.6		229	B-15
USW G-1	BFw	C	0.37			712.6		229	B-15
USW G-1	BFw	C	0.40			712.6		229	B-15
USW GU-3	BFw	C	0.09			715.7		229	B-14
USW GU-3	BFw	C	0.08			716.3		229	B-14
USW G-1	BFw	C	0.30			717.8		229	B-15
USW G-1	BFw	C	0.28			718.1		229	B-15
USW GU-3	BFw	C	0.07			718.4		229	B-14
USW G-1	BFw	C	0.25			721.8		229	B-15
USW GU-3	BFw	C	0.07			722.4		229	B-14
USW G-1	BFw	C	0.27			722.7		229	B-15
USW G-1	BFw	C	0.24			725.4		229	B-15
USW G-1	BFw	C	0.26			725.7		229	B-15
USW G-1	BFw	C	0.26			725.7		229	B-15
USW G-1	BFw	C	0.27			725.7		229	B-15
USW G-4	BFw	C	0.21			726.0		229	B-16
USW G-1	BFw	C	0.26			726.3		229	B-15
USW G-1	BFw	C	0.28			726.9		229	B-15
USW G-1	BFw	C	0.29			726.9		229	B-15
USW G-1	BFw	C	0.27			726.9		229	B-15
USW G-1	BFw	C	0.27			726.9		229	B-15
USW G-1	BFw	C	0.27			726.9		229	B-15
USW G-1	BFw	C	0.27			727.9		229	B-15
USW G-1	BFw	C	0.26			727.9		229	B-15
USW G-1	BFw	C	0.26			727.9		229	B-15
USW G-1	BFw	C	0.26			729.1		229	B-15
USW GU-3	BFw	C	0.06			732.7		229	B-14
USW G-1	BFw	C	0.25			733.0		229	B-15
USW G-1	BFw	C	0.26			733.0		229	B-15
USW G-1	BFw	C	0.26			733.0		229	B-15
USW GU-3	BFw	C	0.07			733.7		229	B-14
USW GU-3	BFw	C	0.06			734.3		229	B-14
USW G-1	BFw	C	0.29			735.8		229	B-15
USW G-1	BFw	C	0.27			735.8		229	B-15
USW G-1	BFw	C	0.28			740.1		229	B-15
USW G-1	BFw	C	0.30			740.1		229	B-15
USW G-1	BFw	C	0.28			740.1		229	B-15
USW G-1	BFw	C	0.29			740.1		229	B-15

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW G-1	BFw	C	0.28			740.1		229	B-15
USW G-1	BFw	C	0.35			740.1		229	B-15
USW G-1	BFw	C	0.29			740.1		229	B-15
USW G-1	BFw	C	0.29			740.1		229	B-15
USW G-1	BFw	C	0.28			740.1		229	B-15
USW G-1	BFw	C	0.30			740.1		229	B-15
USW G-1	BFw	C	0.31			740.1		229	B-15
USW G-1	BFw	C	0.27			740.4		229	B-15
USW G-1	BFw	C	0.27			740.4		229	B-15
USW GU-3	BFw	C	0.06			741.3		229	B-14
USW G-4	BFw	C	0.26			742.5		229	B-16
USW G-1	BFw	C	0.26			745.2		229	B-15
USW GU-3	BFw	C	0.07			745.8		229	B-14
USW G-1	BFw	C	0.26			752.2		229	B-15
USW GU-3	BFw	C	0.06			752.4		229	B-14
USW GU-3	BFw	C	0.07			753.5		229	B-14
USW G-1	BFw	C	0.30			753.5		229	B-15
USW G-1	BFw	C	0.34			753.5		229	B-15
USW G-1	BFw	C	0.28			753.6		229	B-15
USW G-1	BFw	C	0.27			753.6		229	B-15
USW G-1	BFw	C	0.29			753.9		229	B-16
USW G-1	BFw	C	0.28			753.9		229	B-16
USW G-1	BFw	C	0.31			754.1		229	B-16
USW G-1	BFw	C	0.30			754.1		229	B-16
USW GU-3	BFw	C	0.08			754.7		229	B-14
USW G-4	BFw	C	0.25			755.3		229	B-16
USW G-1	BFw	C	0.26			755.9		229	B-16
USW G-1	BFw	C	0.23			757.7		229	B-16
USW GU-3	BFw	C	0.08			758.6		229	B-14
USW G-1	BFw	C	0.26			759.9		229	B-16
USW G-1	BFw	C	0.27			759.9		229	B-16
USW G-1	BFw	C	0.24			762.3		229	B-16
USW G-1	BFw	C	0.23			764.7		229	B-16
USW G-1	BFw	C	0.23			765.0		229	B-16
USW GU-3	Tram	C	0.11			766.0		229	B-17
USW GU-3	Tram	C	0.09			766.9		229	B-17
USW G-1	BFw	C	0.20			767.2		229	B-16
USW G-1	BFw	C	0.20			767.5		229	B-16
USW GU-3	Tram	C	0.10			768.6		229	B-17
USW G-4	BFw	C	0.22			769.3		229	B-16
USW GU-3	Tram	C	0.13			770.9		229	B-17
USW G-1	BFw	C	0.20			771.1		229	B-16
USW G-1	BFw	C	0.24			773.0		229	B-16
USW G-1	BFw	C	0.20			773.0		229	B-16
USW G-1	BFw	C	0.24			773.6		229	B-16

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW G-1	BFw	C	0.32			776.9		229	B-17
USW G-1	BFw	C	0.26			777.2		229	B-17
USW GU-3	Tram	C	0.36			777.5		229	B-17
USW G-1	BFw	C	0.24			777.7		229	B-17
USW G-1	BFw	C	0.23			780.6		229	B-17
USW GU-3	Tram	C	0.27			780.9		229	B-17
USW G-1	BFw	C	0.21			781.2		229	B-17
USW G-1	BFw	C	0.32			782.7		229	B-17
USW G-1	BFw	C	0.28			782.7		229	B-17
USW GU-3	Tram	C	0.23			782.7		229	B-17
USW G-1	BFw	C	0.33			783.0		229	B-17
USW GU-3	Tram	C	0.21			783.0		229	B-17
USW G-1	BFw	C	0.30			783.0		229	B-17
USW G-1	BFw	C	0.29			783.0		229	B-17
USW G-1	BFw	C	0.34			783.0		229	B-17
USW G-4	BFw	C	0.18			785.8		229	B-16
USW G-1	BFw	C	0.24			787.9		229	B-17
USW G-1	BFw	C	0.27			788.5		229	B-17
USW G-1	BFw	C	0.27			788.8		229	B-17
USW GU-3	Tram	C	0.32			790.0		229	B-17
USW G-1	Tram	C	0.25			794.6		229	B-17
USW G-1	Tram	C	0.23			794.9		229	B-17
USW GU-3	Tram	C	0.22			797.8		229	B-17
USW G-4	BFw	C	0.11			803.9		229	B-16
USW G-1	Tram	C	0.28			805.0		229	B-17
USW G-1	Tram	C	0.30			808.6		229	B-17
USW G-1	Tram	C	0.31			810.2		229	B-17
USW G-1	Tram	C	0.29			810.5		229	B-17
USW G-1	Tram	C	0.27			810.5		229	B-17
USW G-1	Tram	C	0.22			810.5		229	B-17
USW G-1	Tram	C	0.23			810.5		229	B-17
USW G-1	Tram	C	0.23			820.2		229	B-17
USW G-4	BFw	C	0.28			821.4		229	B-17
USW G-1	Tram	C	0.31			823.3		229	B-17
USW G-1	Tram	C	0.30			823.3		229	B-17
USW G-4	Tram	C	0.25			828.9		229	B-17
USW G-1	Tram	C	0.29			830.6		229	B-17
USW G-4	Tram	C	0.28			861.4		229	B-17
UE25a-4	TCw	W		1.74E-04		0.0	37.8	243	-
USW UZ-1	ALLUVIUM	W		6.94E-05		0.0	12.8	243	-
USW UZ-1	Pbn	W		2.32E-05		12.8	28.3	243	-
USW UZ-1	Pbn	W		6.94E-05		28.3	39.9	243	-
UE25a-4	TCw	W		2.32E-07		37.8	45.7	243	-
USW UZ-1	Pbn	W		3.47E-05		39.9	61.3	243	-
UE25a-4	Pbn	W		4.63E-07		45.7	95.4	243	-

Well #	Formation	Core test or Well test	Porosity	Conductivity (saturated) m/s	Storage	Depth meters	Depth (Second) meters	WWL #	page num.
USW UZ-1	Pbn	W		2.32E-06		61.3	81.1	243	-
USW UZ-1	TSw	W		8.10E-06		81.1	103.6	243	-
UE25a-4	Pbn	W		1.16E-04		95.4	107.0	243	-
UE25a-4	TSw	W		6.94E-06		107.0	121.6	243	-