# TABLES

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**Table 2.4-1**
**Summary of Contents of Geologic Database**

| Tables in Geologic Database | Primary (P) or Secondary (S) Tables[a] | Type of Data and Information in Table |
|---|---|---|
| BoreholeData | P | This table includes name, identification, and coordinates of boreholes in UTM NAD 27, and completion information, if available. |
| Borehole LoggerData | P | If borehole logger was used to enter data, this table contains details of borehole logs. |
| CAS[c] Index | P | This table includes names used to describe data, such as peak flow, or chemical names. Also elevation of sample and range of spatial coordinates for the specific data type are provided in this table. |
| Category | P | This table provides further specific data identification, such as precipitation or water level, historical streamflow, volatile organic compounds, carbonates, etc. It can be used to group data types. |
| FLDIndex | P | This table includes sample type, such as water, air, rock, or soil samples. |
| Image | P | This table references a directory structure where scanned or html images are stored. This table is used to direct the data in the LabData table to a specific source for quality assurance or detailed explanation purposes. |
| LabData | P | The major types of data are incorporated in this table. Every record identifies the location identification, borehole identification, image identification, and date of the list of sample information, including depth of the sample, sample identification, category identification, measurement units, amount, measurement type, CAS index, and source identification. CAS identification can be used to specify a mixture of various data in one field. |
| Lithologic Description | S | This is an optional table used to keep track of lithological naming conventions and is a supplement to the soil detail table. The contents of this table are not used in queries. |
| Location | P | This table identifies and classifies locations for the data. The geographical area of interest is organized into 13 different locations corresponding to the hydrologic basins. |
| Measure Type | P | This table specifies the level of reliability of the information. |
| Soil Type Table | P | Lithologic descriptions with their geologic symbols and colors to be used for maps are identified here. |
| Soil Detail Table | P | In this table, the top and bottom of each geologic or hydrologic unit encountered in the borehole are defined. |
| References | S | References are listed in this table. |
| Selected Boreholes | S | This temporary table is generated during database querying for borehole geology. Queries can be saved as permanent tables by renaming this table. |
| LabData Archive | S | This table is an exact duplicate of LabData and is user-maintained for quality assurance purposes. |

NOTES: [a]Primary tables are required.

[b]Secondary tables are informational.

[c]CAS = chemical abstract system. Originally, CAS was designed to keep track of chemical names using an indexing system. CAS has been expanded to include other types of data, such as temperature, pressure, humidity, water table elevation, or any other user-defined data type.

**Table 3.1-1a**
**Results of Inverse Simulation of Barometric Response in UE-25 ONC#1 Pressure Probes**

| Probe | Hydrogeologic Unit | Depth to Bottom of Layer | | Pneumatic Diffusivity[a] (cm/sec) |
|---|---|---|---|---|
| | | (ft) | (m) | |
| 1 | Tiva Canyon | 600.00 | 182.88 | 1.43E-01 |
| 2 | Paintbrush Tuff non-welded | 934.38 | 284.80 | 2.61E+01 |
| | Topopah Spring | | | |
| 3 | | 1,034.38 | 315.28 | 1.63E+01 |
| 4 | | 1,198.36 | 365.26 | 3.27E+00 |
| 5 | Fault | 1,206.56 | 367.76 | 4.90E+03 |
| 6 | Calico Hills non-welded | 1,239.37 | 377.76 | 4.90E+02 |
| 7 | | 1,403.35 | 427.74 | 4.90E+02 |
| 8 | Prow Pass | 1,485.37 | 452.74 | Saturated |
| 9 | | 1,613.65 | 491.84 | |

NOTE: [a]Pneumatic diffusivity is the ratio of pneumatic conductivity to porosity at standard temperature and pressure conditions.

**Table 3.1-1b**
**Results of Inverse Simulation of Barometric Response in USW NRG-4 Pressure Probes**

| Probe | Hydrogeologic Unit | Depth to Bottom of Layer | | Pneumatic Diffusivity[a] (cm/sec) |
|---|---|---|---|---|
| | | (ft) | (m) | |
| 1 | Tiva Canyon | 315.00 | 96.01 | 2.87E-01 |
| 2 | Paintbrush Tuff non-welded | 466.00 | 142.04 | 6.86E-03 |
| 3 | | | | |
| 4 | Topopah Spring | 514.00 | 156.67 | 4.90E-03 |
| 5 | | 544.00 | 165.81 | 4.90E+01 |
| 6 | | 653.00 | 199.03 | 2.25E+03 |
| 7 | | 719.00 | 219.15 | 2.25E+03 |

NOTE: [a]Pneumatic diffusivity is the ratio of pneumatic conductivity to porosity at standard temperature and pressure conditions.

**Table 3.1-1c**
**UE-25 ONC#1 Vacuum Test Results**

| Depth of Pumping Port | | Hydrogeologic Unit | Permeability | |
|---|---|---|---|---|
| (ft) | (m) | | ($m^2$) | (darcy) |
| 638.00 | 194.46 | Topopah Spring | 2.17E-13 | 0.22 |
| 1,164.00 | 354.79 | | 3.06E-13 | 0.31 |
| 1,195.00 | 364.24 | Calico Hills non-welded | 5.13E-12 | 5.2 |
| 1,225.00 | 373.38 | | 2.96E-12 | 3.0 |

**Table 3.1-2**
**Concentrations of Chemical Constituents in Gas Samples from the Atmosphere, the Exploratory Studies Facility, and UE-25 ONC#1 for June 1997**

| Depth (feet) or Sample Location | Lithostratigraphic Unit | Methane (pptv) | Carbon monoxide (pptv) | Carbon dioxide (ppmv) | Nitrous Oxide (ppbv) | Chlorinated Fluorocarbon F12 (pptv) | Chlorinated Fluorocarbon F11 (pptv) | Chlorinated Fluorocarbon F113 (pptv) | Trichloroethane (pptv) | Carbon tetrachloride (pptv) | Tetrachloroethylene (pptv) | Oxygen (%) | Nitrogen (%) | Deuterium (delta D) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atmo-sphere | – | 1,994 | 104 | 316 | 431 | 668 | 290 | 62 | 95 | 111 | 0 | – | – | – |
| ESF | Topopah Spring | 1,847 | 260 | 503 | 411 | 653 | 310 | 63 | 1,267 | 192 | – | – | – | – |
| ESF | Topopah Spring | 1,857 | 482 | 505 | 403 | 634 | 288 | 61 | 976 | 144 | – | – | – | – |
| 1,150 | Topopah Spring (Fault) | 385 | 32 | 799 | 572 | 316 | 149 | 29 | 0 | 56 | 0 | – | – | -160 |
| 1,195 | Topopah Spring (Fault) | 234 | 28 | 894 | 612 | 237 | 99 | 18 | 0 | 34 | 0 | – | – | -146 |
| 1,225 | Calico Hills | 0 | 0 | 2,064 | 586 | 249 | 110 | 22 | 0 | 35 | – | – | – | -150 |

NOTE: ESF = Exploratory Studies Facility; % = parts per 100 by volume; ppmv = parts per million by volume; ppbv = parts per billion by volume; pptv = parts per trillion by volume

**Table 3.1-3**
**Results of Gas Sampling in UE-25 ONC#1 for June 1997 (carbon isotopes)**

| Depth (ft) | Lithostrati-graphic Unit | Delta Carbon-13 (per mil) | % Modern Carbon | Carbon-14 Corrected Apparent Age (years BP) |
|---|---|---|---|---|
| 575 | Tiva Canyon | -11.8 | 51.83 | 5280 |
| 638 | Topopah Spring | -11.3 | 36.38 | 8120 |
| 1,164 | Topopah Spring | -6 | 44.54 | 6495 |
| 1,195 | Topopah Spring | -5.7 | 38.27 | 7715 |
| 1,225 | Calico Hills | -10.3 | 35.97 | 8215 |
| 1,428 | Prow Pass | -7.4 | 15.85 | 14800 |
| 1,501 | Prow Pass | -8.8 | 16.91 | 14275 |

NOTE: BP = before present

**Table 3.1-4**
**Diagenetic Events Observed in UE-25 ONC#1**

| Lithology | Diagenetic Events and Paragenesis |
|---|---|
| Welded Tuff | Fractures and pores filled with quartz and other silica polymorphs. |
| | Fractures filled with quartz and manganese oxide; some fractures open and close several times through various events. The fact that quartz fills the fracture does not preclude the fracture from opening and becoming reactive as a conduit. |
| | Fractures and pores filled with iron and/or manganese oxide-oxyhydroxides. |
| | Fractures and pores filled with carbonates or carbonates and opal-CT. |
| | Fractures and pores filled with zeolites and/or clays. |
| | Fractures that have coatings of the above minerals on the fracture walls but are not in the classical sense ""filled"' with these minerals. |
| | Fractures filled or partially filled with authigenics that have extensive weathering on and in the fracture walls. These are fractures with bleach zones (Figure 3.1-7). Bleach zones develop as weathering fronts in fracture conduits that are actively transporting fluids. They are compelling evidence of past flow in fractures flow. Tuff minerals and glass are dissolved, and phyllosilicates dominated by clinoptilolite and smectites are deposited. The matrix porosity in the bleach zone is greater than the porosity in the fresh unweathered tuff away from the fracture. This is due to volume changes caused by hydration of primary minerals and obsidian, the conversion of obsidian to perlite, and the conversion of the perlite to open phyllosilicates. In addition, new splay fractures in the bleached zones were formed due to differential stresses caused by hydration. These splay fractures generally are connected to the main fracture conduit. Neominerals created during this hydration process have significant capabilities for sorption and filtration of cations and complex aqueous species. Bleach zones are commonly seven to ten times the diameter of the original fracture on each wall-side of the fracture. They provide a very significant area of potential retardation along past and presently active paths of transport. The bleach zones clearly pre-date the fracture fillings (mostly quartz), and, since most of the quartz-filled fractures in the bleached zones were re-fractured at later times, the bleach zones increase the active porosity along the transport pathway by providing hydration (base exchange) reactions at the boundary between the bleached zone authigenics and the unaltered matrix. These reactions extend the alteration front into the matrix on a grain-by-grain basis, in addition to the creation of new microfracture pathways from the bleach zone into the fresh matrix. The net overall result is an increase in the overall porosity and potential sorption capacity along the bleach zone fracture pathway with time. |
| Poorly Welded Tuff | Diagenesis in poorly welded tuffs occurs both in the tuff matrix and in the fracture pathways. Both locations fill with authigenic minerals, thereby retarding fluid transport in the vadose zone. The minerals that fill pore space are mostly manganese oxyhydroxides, carbonates, clays, and zeolites. In some cases, quartz and quartz polymorphs were observed. Some of the fractures reopen, similar to the welded tuffs. Fracture fillings tend to be mostly carbonates and manganese oxyhydroxides with minor amounts of zeolites, quartz, and quartz polymorphs. Matrix pores on fracture walls tend to fill with authigenics earlier than pores that are located deeper in the matrix. In many cases, fracture flow dominates. |

**Table 3.3-1**
**Estimated Fluid Particle Velocity through Fractures in Various Percolation/ Infiltration Scenarios**

| | | Average Particle Velocity through Fractures at Repository Level (Topopah Spring welded unit) (mm/yr.)[a] | | | | |
|---|---|---|---|---|---|---|
| | | Present-Day Climate Infiltration/Percolation Rate | | | Extreme Climate Infiltration/ Percolation Rate | |
| | | Lower Bound | Mean | Upper Bound | Monsoon | Glacial Transition |
| Effective Porosity | Matrix K (mm/yr.) | 2 mm/yr. | 7 mm/yr. | 12 mm/yr. | 20 mm/yr. | 30 mm/yr. |
| 0.001154 | 0.0263 | 1,711 | 6,044 | 10,378 | 17,311 | 25,978 |
| 0.000536 | 0.0263 | 3,685 | 13,022 | 22,358 | 37,296 | 55,968 |
| 0.001154 | 2.63 | full matrix flow | 3,789 | 8,123 | 15,056 | 23,723 |
| 0.000536 | 2.63 | full matrix flow | 8,164 | 17,500 | 32,438 | 51,110 |

NOTE: [a]Percolation was estimated from maps (DOE [2000c, Figures 6-12, 6-13, 6-14, 6-43, 6-44]). Full matrix flow is assumed to occur when percolation rate is smaller than matrix K.

**Table 4.1-1**
**Drilling Methods, Well Types, Casing Sizes, and Screened Intervals**

| Well/ Borehole ID [a] | Well Type[b] | Drilling Method[c] | Total Depth (feet below ground surface) | Screened Interval(s) (feet[d] below ground surface) | Sand Pack or Open Hole Intervals (feet[d] below ground surface) | Well Casing Depth (feet[d] below ground surface) | Well Casing Outside Diameter (inches[e]) |
|---|---|---|---|---|---|---|---|
| 1DX[f] | W | ARC | 2,500 | 72.1-52.4<br>NA<br>2,160-2,240 | 39.5-72.5<br>NA<br>2,160-2,240[g] | 72.5<br>1,375.9<br>2,294.7 | 2.375<br>2.375<br>2.375 |
| 1S | W | AH/ARC | 310 | 160-180<br>210-270 | 151.8-189.3<br>203.7-321.0 | 290.5 | 6.625 |
| 2DB | W | FR | 3,075 | NA | 2,685-3,075 | 2,685 | 8.625 |
| 3S | W | AH/ARC | 550.0 | 249.8-269.8 | 238.5-274.1<br>295.6-550.0 | 294.8 | 6.625 |
| 4PA | P | AH | 499.7 | 405.3-485.2 | 394.7-499.7 | 495.2 | 2.875 |
| 4PB | P | AH | 849.5 | 739.5-839.2 | 718-849.5 | 849.2 | 2.875 |
| 5S | P | AH/ARC | 1,200.0 | 601.4-779.9 | 597.6-1,200.0 | 790 | 2.375 |
| 5SB | P | AH | 499.4 | 379.3-489.0 | 366.0-499.4 | 499.4 | 2.875 |
| 7S | P | ARC | 53.2 | 28.0-40.0 | 26.0-53.2 | 45.0 | 2.875 |
| 7SC | W | ARC | 778.5 | 80.0-90.0; 180.0-210.0; 270.0-370.0; 429.8-449.8 | 75.9-99.8; 164.7-220; 262.9-379.3; 422.4-470.0 | 459.7 | 6.625 |
| 9SX[f] | W | DC/AH | 397 | 90.0-120.0; 140.1-160.1; 250.1-290.1; 330.1-340.1 | 85.0-126.1; 134.1-167.1; 245.5-295.6; 325.0-360.5 | 360.5 | 6.625 |
| 12PA | P | AH | 389.5 | 324.7-384.4 | 317.5-389.5 | 389.5 | 2.875 |
| 12PB | P | AH | 399.8 | 325.0-384.7 | 316.2-399.8 | 399.75 | 2.875 |
| 12PC | P | AH | 249.6 | 170.1-229.6 | 160.4-249.6 | 249.6 | 2.875 |
| 15P | P | AH | 289.6 | 200.1-259.9 | 191.0-274.5 | 270 | 2.875 |
| 19D1[f] | W | FR | 1,456.3 | 413.0-431.2; 498.0-516.1; 577.8-675.7; 722.6-795.2; 882.2-980.3; 1,122.2-1,219.6; 1,296.7-1,379.7 | 405.0-437.0; 487.0-519.0; 563.0-691.0; 711.0-795.0; 831.0-1,060.0; 1,109.0-1,220.0; 1,252.0-1,456.3 | 1,421.9 | 7 |
| 19D | X | ARC | 1,438.3 | NA | NA | NA | NA |
| 19P | P | AH | 499.2 | 359.2-468.6 | 351.5-474.5 | 468.6 | 2.875 |
| Washburn-1X | P | ARC | 658.0 | 333.0-353.0; 420.0-480.0 | 310.0-353.0; 399.5-658.0 | 353; 510 | 1.9 |
| 3DB | C | FR | 505 | NA | NA | NA | NA |
| 12D | C | FR | 68 | NA | NA | NA | NA |
| 15D | C | FR | 607 | NA | NA | NA | NA |
| 1D[h] | X | DC | 57.7 | NA | NA | NA | NA |
| 2D | X | ARC | 1,618.4 | NA | NA | NA | NA |
| 3D | X | ARC | 2,500 | NA | NA | 521.7 | 7 |

| Well/ Borehole ID [a] | Well Type[b] | Drilling Method[c] | Total Depth (feet below ground surface) | Screened Interval(s) (feet[d] below ground surface) | Sand Pack or Open Hole Intervals (feet[d] below ground surface) | Well Casing Depth (feet[d] below ground surface) | Well Casing Outside Diameter (inches[e]) |
|---|---|---|---|---|---|---|---|
| 9S[h] | X | DC | 100 | NA | NA | NA | NA |
| 7SB | X | ARC | 102.5 | NA | NA | NA | 16 |

NOTES: [a] "NC-EWDP-" is the official prefix of all new Nye County wells.
[b] W = single or multiple screen well; P = piezometer (single or multiple string); C = conductor casing only; X = exploratory borehole
[c] DC = diamond drill coring; AH = dual wall air hammer; ARC = dual wall air reverse circulation; FR = flooded mud reverse circulation
[d] Conversion for feet to meters: 1 ft = 0.3048 m
[e] Conversion for inches to centimeters: 1 in. = 2.54 cm
[f] X-designation only refers to samples sent to the Yucca Mountain Sample Management Facility
[g] Fractured cement grout
[h] Original cored borehole
NA = not applicable.

## Table 4.1-2
## Geophysical Logging Conducted in Phase I Boreholes/Wells

| Hole/Well ID[a] | Date | Log Type | Borehole Depth at time of Logging (feet) | Logged Interval (feet) | Comments |
|---|---|---|---|---|---|
| Washburn-1X | 12/6/98 | 1[b] | 657 | 0-657 | None |
| | | 2[c] | 657 | 340-511 | None |
| 1D | | | | | Not logged |
| 1DX/1D | 1/10/99 | 1,2[d] | 2,040 | 0-1,600 | Caliper log to 228 ft |
| | 1/14/99 | 2[d] | 2,320 | 0-1,155 | Single run to 1,155 ft; unstable hole |
| | 1/23/99 | 1 | 2,500 | 0-2,470 | Run inside HX drill rod |
| | 1/23/99 | 2[d] | 2,500 | 1,147-2,425 [d] | Resistivity, fluid resistivity, temperature, spontaneous potential, and natural gamma in pieces: 2,425-2,292 ft; 2,300-2,086 ft; 2,100-1,886 ft; 1,900-1,686 ft; 1,700-1,486 ft; 1,500-1,227 ft; 1,160-1,147 ft |
| | 1/24/99 | 2[d] | 2,500 | 0-2,488 | Temperature log only |
| | 4/26/99 | 3[e] | 2,500 | 0-1,133 | Density and casing collar locator logs |
| | | | | 0-1,152 | None |
| 1S | 2/3/99 | 2 | 309 | 0-309 | None |
| 9S | | | | | Not logged |
| 9SX/9S | 12/14/98 | 1 | 397 | 0-397 | None |
| | 1/15/99 | 4 | 397 | 0-397 | None |
| 3S | 3/11/99 | 2[d] &3 | 550 | 0-530 | Well was cased to 294.8 ft |
| | 3/30/01 | 2[d] | 550 | 0-515 | Caliper only |
| 3D | 1/22/99 | 1 | 1,275 | 0-1,250 | Spontaneous potential, natural gamma, temperature, fluid resistivity. Logging was conducted in drill pipe. |
| | 2/3/99 | 2 | 2,229 | 0-2,260 | None |
| | 2/5/99 | 2 | 2,500 | 0-2,500 | None |
| | 2/17/99 | 3[d] | 2,500 | 0-975 | Spinner logs only |
| | 5/17/99 | 3[d] | 2,500 | 60-815 | Idronaut[f] hydrochemistry tool. |
| 5S | 2/21/99 | 1 | 1,200 | 0-1,160 | None |
| | | 2[d] | 1,200 | 500-950 | Caliper log for 500-690 ft only |
| 2D | 2/22/99 | 1 | 1,618 | 0-428 | None |

NOTES: [a] "NC-EWDP-" is the official prefix of all new Nye County wells.
[b] Logged inside drill pipe or casing (cased log) generally includes natural gamma, density (gamma/gamma), neutron moisture, temperature, and deviation logs.
[c] Logged in open borehole (open hole logs) generally includes logs in footnote b and normal, lateral, and single point resistivity, natural gamma, spontaneous potential, temperature, fluid resistivity, and caliper logs.
[d] Not a complete suite of logs for type; see comments column.
[e] Logged inside well casing (completion log) generally includes natural gamma, density (gamma/gamma), and temperature logs.
[f] Idronaut hydrochemistry tool includes: salinity, conductivity, pressure, oxygen saturation, redox, oxygen concentration, pH, temperature.

**Table 4.1-3**
**Geophysical Logging Conducted in Phase II Boreholes/Wells**

| Hole/Well ID[a] | Date | Log Type | Borehole Depth at time of Logging (feet) | Logged Interval (feet) | Comments |
|---|---|---|---|---|---|
| 4PA | 1/10/00 | 1[b] | 500 | 0-500 | None |
| 4PB | 1/23/00 | 1 | 850 | 0-850 | None |
| 2DB | 1/23/00 | 2[c] | 503 | 0-503 | None |
| | 8/14/00 | 2 | 2142 | 0-1910 | Borehole cased to 500 ft |
| | 8/24/00 to 8/25/00 | 2 | 2723 | 0-2723 | None |
| | 8/31/00 | 2 | 3075 | 0-2495 | Hole bridged |
| | 9/24/00 | 2[d] | 3075 | 0-2635 | Caliper log only; pre-casing |
| | 10/19/00 | 2[d] | 3075 | 2655-2814 | Caliper log only; post-casing |
| 5SB | 2/7/00 | 1 | 500 | 0-500 | None |
| 7S | 2/28/00 | 2 | 53 | 0-49 | Surface casing to 25 ft |
| 15P | 2/28/00 | 1 | 290 | 0-290 | None |
| 19P | 3/10/00 | 1 | 500 | 0-500 | None |
| 12PA | 3/23/00 | 1 | 390 | 0-390 | None |
| | 3/24/00 | 2 | 390 | 205-390 | Logged in segments |
| 12PB | 3/30/00 | 1 | 400 | 0-400 | None |
| | 3/30/00 to 3/31/00 | 2 | 400 | 230-385 | None |
| 12PC | 4/11/00 | 1 | 250 | 0-242 | None |
| 19D | 3/26/00 | 2 | 350 | 0-350 | None |
| | 3/30/00 | 1[d] | 657 | 0-654 | Deviation log only |
| | 4/2/00 | 1 | 1437 | 0-1418 | None |
| 19D1/19D | 4/14/00 | 1[d] | 846 | 0-800 | Deviation log only |
| | 4/16/00 | 2 | 1448 | 0-1448 | None |
| | 4/24/00 | 2[d] | 1448 | 0-1432 | Temperature, density, and caliper logs only |
| | 5/3/00 | 3[d,e] | 1456 | 0-1430 | Temperature and density logs only |
| | 5/10/00 | 3 | 1456 | 0-1420 | Includes spinner logs |
| | 5/11/00 to 5/12/00 | 3[d] | 1456 | 0-1400 | Various spinner logs only |
| 15D | 4/3/00 | 2 | 607 | 0-600 | None |
| 7SC | 4/15/00 | 1 | 779 | 0-779 | None |
| | 1/16/01 | 2 | 779 | 0-418 | Hole cleaned out to 468 ft only |
| | 3/26/01 to 3/27/01 | 3[d] | 779 | 0-450 | Spinner logging only |
| | 3/30/01 | 3 | 779 | 0-459 | Includes Idronaut hydrochemistry tool[f] |

NOTES: [a]“NC-EWDP-“ is the official prefix of all new Nye County wells.
[b]Logged inside drill pipe or casing (cased log) generally includes natural gamma, density (gamma/gamma), neutron moisture, temperature, and deviation logs.

[c] Logged in open borehole (open hole logs) generally includes logs in footnote b and normal, lateral, and single point resistivity, natural gamma, spontaneous potential, temperature, fluid resistivity, and caliper logs.
[d] Not a complete suite of logs for type; see comments column.
[e] Logged inside well casing (completion log) generally includes natural gamma, density (gamma/gamma), and temperature logs.
[f] Idronaut hydrochemistry tool includes: salinity, conductivity, pressure, oxygen saturation, redox, oxygen concentration, pH, temperature.

**Table 4.1-4**
**Summary of Early Warning Drilling Program Well Test Interpretations**

| Well | Horizontal Permeability ($m^2$) | Transmissivity ($m^2$/d) | Storativity | No. of Boundaries Inferred | Distance to Boundaries (m) |
|---|---|---|---|---|---|
| NC-EWDP-1S | $3 \times 10^{-10}$ | 7,330 | N/A | 2 | 30 |
| NC-EWDP-3D | $1.34 \times 10^{-11}$ | 900 | N/A | 0 | N/A |
| NC-EWDP-3S | $4.3 \times 10^{-14}$ | 4.2 | N/A | 0 | N/A |
| NC-EWDP-3D Interference | $6.2 \times 10^{-14}$ | 6.0 | 13 | 0 | N/A |
| NC-EWDP-7SC | $3.3 \times 10^{-12}$ | 67 | N/A | 0 | N/A |
| NC-EWDP-7S Interference | $7 \times 10^{-12}$ | 145 | 0.026 | 0 | N/A |
| NC-EWDP-9SX | $4 \times 10^{-11}$ to $7.5 \times 10^{-11}$ | 1,860 to 3,600 | N/A | 2 or 3 | 600 to 900 |
| NC-EWDP-19D | $2.3 \times 10^{-12}$ | 372 | N/A | 2 | 200 |
| Aeropark AD-2 | N/A | 266 | N/A | 0 | N/A |
| Garlic Interference | N/A | 196 | 0.00022 | 0 | N/A |
| BGMW #13 | N/A | 307 | N/A | 2 | 30 to 60 |

NOTE: N/A = not applicable

**Table 4.1-5**
**List of Analytes Measured in Water Samples, Laboratories Used, and Methods Used**

| Analyte | Laboratory | Method |
|---|---|---|
| Gross chemistry: chloride, sulfate, bromide, calcium, magnesium, sodium, potassium, bicarbonate, nitrate, phosphate, dissolved silica | Desert Research Institute--Water Resource Center | Greenberg et al. (1992) |
| Electrode/probe measurements: iodide, fluoride, pH, specific conductivity | Desert Research Institute--Water Resource Center | Skougstad et al. (1985) |
| Trace elements | Desert Research Institute--Water Resource Center | EPA (1994) |
| Tritium | Desert Research Institute--Water Resource Center | Krieger and Whitaker (1980) |
| Gross alpha | Barringer Laboratories (Golden, Colorado) | EPA method 900.0 (Krieger and Whitaker, 1980) |
| Gross beta | Barringer Laboratories (Golden, Colorado) | EPA method 900.0 (Krieger and Whitaker, 1980) |
| Uranium activities | Barringer Laboratories (Golden, Colorado) | EPA method 908.0M (Krieger and Whitaker, 1980) |
| Thorium activities | Barringer Laboratories (Golden, Colorado) | USAEC RMO 3008, unpublished Barringer Laboratories internal procedure |
| Tritium | Barringer Laboratories (Golden, Colorado) | EPA method 906.0 (Krieger and Whitaker, 1980) |
| Radium-222 | Barringer Laboratories (Golden, Colorado) | SM7500Ra-BM (Clesceri et al., 1996) |
| Radiocarbon | Institute of Geological and Nuclear Sciences (New Zealand) | Taylor, C.B.; Trompetter, V.J.; Brown, L.J.; and G. Bekesi. In press. "Hydrogeology of the Manawatu aquifers, North Island, New Zealand: clarification using a multi-disciplinary environmental tracer approach." *J. Hydrology.* |
| Tritium | Institute of Geological and Nuclear Sciences (New Zealand) | Wolf et al. (1981) |
| Total dissolved inorganic carbon | Institute of Geological and Nuclear Sciences (New Zealand) | Taylor and Fox (1996) |
| Stable isotopic ratio analyses (SIRA): carbon (del 13C), oxygen (del 18O), hydrogen (del D) | Institute of Geological and Nuclear Sciences (New Zealand) and Geochron Laboratories (Cambridge, Massachusetts) | McCrea (1950); O'Neil and Epstein (1966); Craig (1961) |
| Stable isotopic ratio analyses (SIRA): nitrogen (del 15N) | Geochron Laboratories (Cambridge, Massachusetts) | Pang and Nriagu (1977) |
| Stable isotopic ratio analyses (SIRA): sulfur (del 34S) | Geochron Laboratories (Cambridge, Massachusetts) | Thode et al. (1961) |
| Unstable isotopic ratios: strontium isotopic ratios, uranium isotopic ratios, lead isotopic ratios | Geochron Laboratories (Cambridge, Massachusetts)/Massachusetts Institute of Technology | Bowring, unpublished internal laboratory procedures; Huh et al. (1998); Sherrell et al. (2000) |
| Chlorine-36 isotopic ratio | University of Arizona/Purdue Rare Isotope Measurement Facility | Bentley et al. (1986) |

**Table 4.1-6**
**Average Concentrations of Selected Constituents from Shallowest Zones (well screens) in Boreholes Aligned along an Approximately East-West Transect from NC-EWDP-5SB in the East to NC-EWDP-1S in the West**

| Well ID | Rock Type | Average Concentration of Constituent | | | |
|---|---|---|---|---|---|
| | | Fluoride (mg/L) | Strontium (µg/L) | Percent Modern Carbon | Cl-36/Cl (x $1X10^{15}$) |
| NC-EWDP-5SB | Valley-fill alluvium | 1.0 | 284 | 1.58 | 244 |
| NC-EWDP-4PB | Valley-fill alluvium | 1.9 | 38 | 12.55 | 654 |
| NC-EWDP-4PA | Valley-fill alluvium | 1.2 | 50 | 17.70 | 605 |
| NC-EWDP-19P | Valley-fill alluvium | 1.8 | 64 | 17.77 | 425 |
| NC-EWDP-15P | Valley-fill alluvium | 1.8 | 57 | 8.19 | 493 |
| NC-EWDP-3S | Tertiary volcanics | 2.6 | 4 | 17.00 | 245 |
| NC-EWDP-7S | Valley-fill alluvium | 0.8 | 683 | 6.50 | nd |
| NC-EWDP-9SX | Valley-fill alluvium | 1.8 | 143 | 9.36 | 313 |
| NC-EWDP-12PA | Mud flow tuff and ash, tuffaceous sandstones, pyroclastic flows | 3.3 | 346 | 2.60 | 343 |
| NC-EWDP-12PB | Tuffaceous sandstones, conglomerate, tuff | 3.2 | 320 | 2.87 | 314 |
| NC-EWDP-12PC | Valley-fill alluvium | 1.0 | 506 | 5.43 | 370 |
| NC-EWDP-1S | Tertiary volcanics | 0.5 | 594 | 5.21 | 349 |

NOTE: nd = not determined yet

**Table 4.1-7**
**Summary of Water Level Monitoring in Early Warning Drilling Program Wells and Boreholes**

| Well No. (NC-EWDP-)[a] | Methods | Frequency | Duration |
|---|---|---|---|
| 1DX | Manual | Weekly/Monthly | 5/99 to Present |
| 1S | Transducers/Datalogger | Semi-continuous | 3/99 to Present |
| 2D | Manual | N/A[b] | 1/99 |
| 3D | Manual | Weekly/Monthly | 1/99 to Present |
| 3S | Transducers/Datalogger | Semi-continuous | 3/99 to Present |
| 5S[c] | Manual | Weekly/Monthly | 3/99 to 4/99 |
| 9SX | Transducers/Datalogger | Semi-continuous | 1/99 to Present |
| Washburn-1X | Manual | Weekly/Monthly[d] | 12/98 to Present |
| 2DB | Manual | Weekly/Monthly | 10/00 to Present |
| 4PA | Manual | Weekly/Monthly[d] | 1/00 to Present |
| 4PB | Manual | Weekly/Monthly[d] | 1/00 to Present |
| 5SB | Manual | Weekly/Monthly | 2/00 to Present |
| 7S | Manual | Weekly/Monthly | 2/00 to Present |
| 7SC | Transducers/Datalogger | Semi-continuous | 4/01 to Present |
| 12PA | Manual | Weekly/Monthly | 3/00 to Present |
| 12PB | Manual | Weekly/Monthly | 3/00 to Present |
| 12PC | Manual | Weekly/Monthly | 4/00 to Present |
| 15P | Manual | Weekly/Monthly[d] | 3/00 to Present |
| 19P | Manual | Weekly/Monthly[d] | 3/00 to Present |
| 19D | Manual | Periodic[d] | 4/00 to Present |
| 3DB, 12D, 15D[e] | | | |

NOTES: [a] Prefix for all Early Warning Drilling Program wells.

[b] Borehole cannot be sounded; no depth to water is available; N/A = not applicable.

[c] Well plugged; data valid through 4/99.

[d] Ancillary digital transducer/datalogger data available with U.S. Geological Survey Alluvial Testing Complex work.

[e] Wells are not complete.

**Table 5.1-1**
**Low and Moderate Temperature Springs and Wells in Nye County**

| Name | Type | Temperature (° C) | Flow (L/min.) | Depth (m) |
|---|---|---|---|---|
| McLeod 88 Spring | Spring | 87.9 | – | – |
| Pott's Ranch Hot Spring | Spring | 45 | 125 | – |
| Diana's Punch Bowl | Spring | 59 | – | – |
| Hot Well | Well | hot | – | – |
| Gene Sawyer Well | Well | 54 | – | 84.0 |
| Gabbs Area | Well | 47.8 | – | 66.0 |
| Charnock (Big Blue) Springs | Spring | 26.7 | 1,03 | – |
| Big-Blue, Charnock Spring | Spring | 32 | – | – |
| Darrough's Well | Well | 90.5 | – | 244.0 |
| Darrough's North Spring | Spring | 71.2 | – | – |
| Warm Spring | Spring | warm | – | – |
| Stanley A. Tanner Well | Well | warm | – | – |
| Indian Springs | Spring | warm | – | – |
| Hall Mine Well (Anaconda) | Spring | 27.7 | – | – |
| Well | Well | 28 | – | – |
| Wells | Well | hot | – | – |
| Belmont Mine, 1,500 ft level | Well | 37.2 | – | 457.0 |
| Mosquito Ranch Springs | Spring | 31.6 | – | – |
| Spring | Spring | 40 | – | – |
| Test Hole UCE-10 | Well | 48 | – | 903.1 |
| Spring | Spring | 35 | – | – |
| Old Dugan Place Hot Spring | Spring | 36.1 | – | – |
| Hot Creek Ranch Spring | Spring | 62.8 | 2,888 | – |
| Hot Creek Valley Spring | Spring | 61.1 | – | – |
| Warm Spring | Spring | 26.1 | 19 | – |
| Salisbury Spring | Spring | 30 | – | – |
| Spring | Spring | 21 | – | – |
| Upper? Mud Spring | Spring | 25.5 | – | – |
| Spring | Spring | 25 | – | – |
| Spring | Spring | 29 | – | – |
| Warm Springs | Spring | 63 | 170 | – |
| Spring | Spring | 22 | – | – |
| Spring | Spring | 25 | – | – |
| Duckwater Area | Spring | 33.9 | – | – |
| Big Spring | Spring | 38 | – | – |
| Blue Eagle Springs | Spring | 29 | 7,030 | – |

| Name | Type | Temperature (° C) | Flow (L/min.) | Depth (m) |
|---|---|---|---|---|
| Moorman Spring | Spring | 37 | 1,294 | – |
| Flag Spring No. 3 | Spring | 22.8 | – | – |
| Butterfield (Flag, Sunnyside) Springs | Spring | 23.9 | 7,571 | – |
| Hot Creek Ranch Springs | Spring | 26.7 | – | – |
| Moon River Springs | Spring | 32.5 | – | – |
| Bacon Flat 24-17 Oil Well | Well | 113 | – | 1,653 |
| Chimney Hot Springs | Spring | 60 | – | – |
| Spring | Spring | 45 | – | – |
| Spring | Spring | 46 | – | – |
| Cedar Spring | Spring | 25 | 9 | – |
| Climax Seep | Well | 41.5 | – | – |
| Tippipah Spring No. 2 | Spring | 22 | – | – |
| Yucca Flat Test Well 84-69, TW-E | Well | 42.2 | – | 572 |
| Yucca Flat Well 79-69A, TW-C | Well | 37.2 | – | 519 |
| Sarcobatus Flat-Beatty Area | Well | 22.2 | – | – |
| Spring | Spring | 21 | – | – |
| Hicks (Burrell) Hot Springs | Spring | 38 | 19 | – |
| Beatty Mineral Springs | Spring | 24.4 | 379 | – |
| TW- F Well | Well | 64 | 882.96 | 1,036 |
| Well | Well | 46 | – | 32 |
| Cooks East Well | Well | 32 | – | 91 |
| Fairbanks Spring | Spring | 27.2 | – | – |
| Rodgers Springs | Spring | 27.8 | – | – |
| Longstreet Spring | Spring | 27.8 | – | – |
| Unnamed Spring | Spring | 27 | – | – |
| Scruggs Spring | Spring | 30 | – | – |
| Devils Hole | Spring | 33 | – | – |
| Point of Rock (King) Spring | Spring | 32 | 4,399 | – |
| Jack Rabbit Spring | Spring | 28 | – | – |
| Big, Ash Meadows, and Deep Springs | Spring | 28 | – | – |
| Crystal Spring | Spring | 30 | – | – |
| U.S. Geological Survey Tracer Well 2 | Well | 30.6 | – | – |
| Cherry Patch Well | Well | 27.5 | – | 66 |
| Manse Ranch Springs | Spring | 25 | 4,542 | – |
| Pahrump Springs | Spring | 25 | 1,840 | – |
| Pahrump Community Church Well | Well | 27 | – | – |

Source: Garside (1994)

NOTE: – = not applicable or not measured