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Prepared in cooperation with the U.S. Department of Energy,
National Nuclear Security Administration Nevada Site Office,
Office of Environmental Management under Interagency
Agreement DE-A152-07NA28100

Ground-Water Temperature Data, Nevada Test Site and Vicinity, Nye, Clark, and Lincoln Counties, Nevada, 2000–2006

Data Series 269

U.S. Department of the Interior
U.S. Geological Survey

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By Steven R. Reiner

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Conversion Factors

Multiply	By	To obtain
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

°F=(1.8×°C)+32

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

°C=(°F-32)/1.8

Datums

Vertical coordinate information is referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Altitude, as used in this report, refers to distance above the vertical datum.

Abbreviations and Acronyms

Abbreviations and Acronyms	Definition
CET	Calibrated electric tape
DTW	Depth to water
DTWR	Depth to water rounded to the nearest foot
HP	Hang point
MP	Measuring point
NIST	National Institute of Standards and Technology
NTS	Nevada Test Site
UET	Uncalibrated electric tape
USDOE	U.S. Department of Energy
USGS	U.S. Geological Survey

Ground-Water Temperature Data, Nevada Test Site and Vicinity, Nye, Clark, and Lincoln Counties, Nevada, 2000–2006

By Steven R. Reiner

Abstract

Ground-water temperature data were collected by the U.S. Geological Survey in wells at and in the vicinity of the Nevada Test Site during the years 2000–2006. Periodic ground-water temperatures were collected in 166 wells. In general, periodic ground-water temperatures were measured annually in each well at 5 and 55 feet below the water surface. Ground-water temperature profiles were collected in 73 wells. Temperatures were measured at multiple depths below the water surface to produce these profiles. Databases were constructed to present the ground-water temperature data.

Introduction

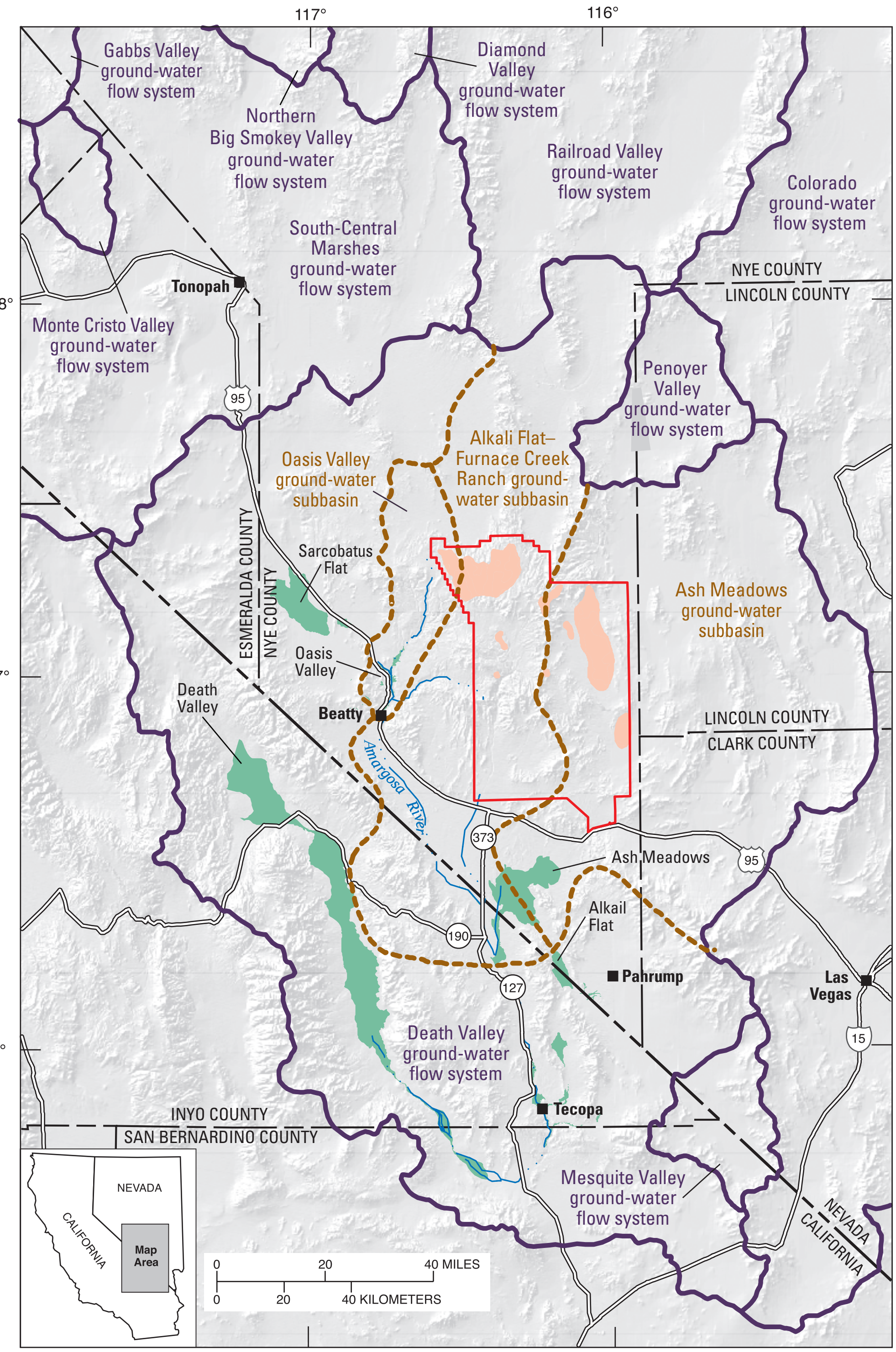
The Nevada Test Site (NTS) is located in Nye County, southern Nevada (fig. 1). The NTS was established in 1950 as a continental proving ground for the testing of nuclear weapons and alternative uses of nuclear explosions (U.S. Department of Energy, 2000, p. 48). Atmospheric nuclear testing at or above land surface at the NTS was conducted from 1951 to 1962. Underground nuclear testing at the NTS began in 1951 and continued until a worldwide moratorium on nuclear testing began in 1992. From 1951 to 1992, 828 underground nuclear tests were completed at the NTS (Laczniak and others, 1996, p. 21–22, table 4). Radionuclide contaminants may be introduced to ground water during underground nuclear tests if the depth at which the nuclear device is detonated or the depth of the shock cavity produced by the detonation is below the pre-test water table. Of the 828 underground nuclear tests conducted at the NTS, about 220 were detonated below or near the water table and are considered by Laczniak and others (1996, table 4) certain or probable sources of ground-water contamination.

A long-term program to investigate and remediate radionuclide contaminants generated at the NTS is a mission of the U.S. Department of Energy (USDOE), National Nuclear Security Administration Nevada Site Office, Environmental Restoration Program. Models of the ground-water flow system at and in the vicinity of the NTS are being developed to help the USDOE evaluate the risk that radionuclide contaminants may have on the public and the environment (Waddell, 1982; Belcher, 2004; Stoller-Navarro Joint Venture, 2006a, 2006b). Accurate ground-water temperatures are useful when developing ground-water flow models. Periodic ground-water temperature measurements can be used to detect temporal changes in ground-water temperature. Ground-water temperature depth profiles provide the data needed to correct measured water levels for temperature effects, to evaluate the direction and magnitude of ground-water flow within a well, and to calibrate hydrologic models with temperature targets.

Purpose and Scope

This report presents ground-water temperature data collected by the U.S. Geological Survey (USGS) at and in the vicinity of the NTS. Periodic ground-water temperatures were measured in 166 wells during calendar years 2000 through 2006 (pl. 1). Generally, periodic ground-water temperatures were measured annually at about 5 and 55 ft below the water surface. Periodic ground-water temperature data are presented in appendix A.

Ground-water temperature profiles were collected in 73 wells during calendar years 2004 and 2005 (pl. 1). Ground-water temperatures were collected on one occasion in each well at multiple depths within the accessible water column. Ground-water temperature profile data are presented in appendix B.



Base from U.S. Geological Survey digital data, 1:100,000, 1978-89: Universal Transverse Mercator Projection Zone 11. Shaded relief base from 1:250,000-scale Digital Elevation Model; sun illumination from northwest at 30 degrees above horizon

EXPLANATION

- **Discharge areas**—Modified after Reiner and others (2002)
- **Areas of underground nuclear testing**—Modified after Laczniak and others (1996)
- **Boundary of major ground-water flow system**—Modified after Harrill and others (1988)
- **Boundary of ground-water subbasin**—Modified after Laczniak and others (1996)
- **Boundary of Nevada Test Site**

Figure 1. Location of the Nevada Test Site and vicinity, Nevada and California.

Description of Study Area

The study area is the NTS and other areas in the vicinity of the NTS. The study area lies within the southern part of the Great Basin, an internally drained subdivision of the Basin and Range physiographic province (Fenneman, 1931). The predominant physiographic features of the Basin and Range are linear mountain ranges separating broad, elongated valleys. North-trending mountain ranges are elevated above the similarly trending sediment-filled valleys along large vertical fault displacements. Precambrian siliclastic and metamorphic rocks, Paleozoic carbonate and siliclastic rocks, and Tertiary volcanic rocks constitute the primary rock type of the hills, ridges, and mountain ranges in the study area. The valleys are filled with unconsolidated clastic sediment and semi-consolidated to consolidated clastic rocks, lacustrine limestone, and interbedded volcanic ash and lava flows (Reiner and others, 2002).

The climate at and in the vicinity of the NTS is arid. Climate information from Air Resources Laboratory, Special Operations and Research Division (2006), is summarized below. Annual precipitation ranges from about 2 in/yr at low altitudes (Laczniak and others, 1999, p. 7) to about 12 in. at high altitudes (Soule, 2006, p. vi). Precipitation is most common in winter, early spring, and mid-summer. Most precipitation is rain; however, snow is possible from autumn through late spring. Humidity at the NTS is fairly low, ranging from typically less than 35 percent in the summer to 70 percent in the winter. Average daily minimum and maximum temperatures at lower altitudes at the NTS are about -5°C to 15°C in the winter and about 15°C to 40°C in the summer. Average daily minimum and maximum temperatures at high altitudes are about -5°C to 5°C in the winter and about 15°C to 30°C in the summer.

More than 90 percent of the study area is contained within the Death Valley ground-water flow system, one of the major hydrologic subdivisions of the southern Great Basin (fig.1; Harrill and others, 1988, sheet 1). Ground water moves southward from recharge areas in central Nevada through carbonate and volcanic rock aquifers (Laczniak and others, 1996, p. 2). Precipitation at high altitudes along the flow path also recharges the carbonate and volcanic rock aquifers. Within the Death Valley ground-water flow system, ground water flows towards four major areas of surface discharge: Ash Meadows, Oasis Valley, Alkali Flat, and Death Valley (fig. 1). The remainder of the study area is contained within the Railroad Valley and South-Central Marshes ground-water flow systems.

The concept of ground-water subbasins helps explain regional ground-water flow at and in the vicinity of the NTS (fig. 1; Laczniak and others, 1996, p. 16–20). Ground-water subbasin boundaries are determined by the location of recharge and discharge areas, geology, hydraulic gradients, and ground-water chemistry. All ground water at the NTS flows within one of three ground-water subbasins of the Death Valley ground-water flow system: Ash Meadows, Oasis Valley, and Alkali Flat-Furnace Creek Ranch (fig. 1). Ground water in the vicinity of the NTS may flow either within these ground-water subbasins, in parts of the Death Valley ground-water flow system outside of these subbasins, or outside the Death Valley ground-water flow system. Ground-water levels at and in the vicinity of the NTS range in altitude from about 6,000 ft beneath the Kawich Range to below sea level at Death Valley (Laczniak and others, 1996, p. 16). The ground-water flow system or subbasin where ground-water temperature data-collection sites are located is provided in appendixes A and B.

A hydrogeologic unit is an assemblage of rocks and deposits of varying age, lithology, and structural properties (Laczniak and others, 1996, p. 10; Sweetkind and others, 2004, p. 34). Each hydrogeologic unit has distinct hydrologic properties based on this assemblage. Five significant regional hydrogeologic units are at and in the vicinity of the NTS (Laczniak and others, 1996, p. 10–16). These five regional hydrogeologic units are, from oldest to youngest, (1) the basement confining unit, (2) the carbonate-rock aquifer, (3) the Eleana confining unit, (4) the volcanic aquifers and confining units, and (5) the valley-fill aquifer.

The basement confining unit is a low-transmissivity confining unit composed of Eocambrian to Cambrian quartzite, micaceous quartzite, and siltstone. This hydrogeologic unit acts as the hydrologic basement for most of the study area.

The carbonate-rock aquifer consists of Cambrian to Devonian dolomite, interbedded limestone, and thin layers of shale and quartzite. Secondary openings from fractures and ground-water dissolution in the carbonate rocks make this regional hydrogeologic unit highly transmissive (Winograd and Thordarson, 1975, p. C74; Dettinger, 1989, p. 5). An upper carbonate-rock aquifer of Pennsylvanian age is in parts of the study area but is not considered a regional hydrogeologic unit. The upper and lower carbonate-rock aquifers are separated from each other by the Eleana confining unit; where the Eleana confining unit is absent, the upper and lower carbonate-rock aquifers act as a single hydrogeologic unit.

The Eleana confining unit, although limited in areal extent, is considered a regional hydrogeologic unit. The unit is low permeability, Mississippian to Devonian age siltstone, sandstone, and conglomerate.

Tertiary age volcanic-rock aquifers and confining units form a regional hydrogeologic unit. Highly fractured, dense volcanic rocks with abundant fractures, such as welded tuffs or lava flows, make up the volcanic aquifers whereas confining units are formed generally by nonwelded tuff that may be zeolitized (Winograd and Thordarson, 1975, p. C44). In general, this hydrogeologic unit forms localized aquifers; however, deep fractured volcanic-rock units may be considered a regional aquifer (Blankennagel and Weir, 1973, p. 6).

The valley-fill aquifer regional hydrogeologic unit consists of unconsolidated coarse- to fine-grained sediments with localized carbonate, volcanic, and sedimentary rock units (Sweetkind and others, 2004, p. 39–44). Ground-water flow within this unit is dependent on physical properties of the sediment, including grain size and amount of cementation (Belcher and others, 2006). In general, transmissive units within the valley-fill aquifer consist of coarser grained sediments like gravel and sand which, when saturated, may have high porosity and permeability (Laczniak and others, 1996, p. 15). Finer grained sediments, like silt, clay, and fine-grained sand, form confining units within the valley-fill aquifer.

The principal regional hydrogeologic unit contributing water to a well in which ground-water temperatures were measured is provided in appendixes A and B. Localized granitic stocks of Cretaceous age are not considered a regional hydrogeologic unit (Laczniak and others, 1996, p. 14, 25). However, granitic stocks are identified in appendixes A and B as a hydrogeologic unit when it is the principal rock type contributing water to a well.

Underground nuclear testing at the NTS (fig. 1) can affect local ground-water conditions. Any hydraulic property or water level measured in an underground nuclear test area may not be the same as pre-nuclear testing values (Laczniak and others, 1996, p. 42). Fractures resulting from underground nuclear testing can change aquifer permeability and storage properties. Interstitial fluid pressure in aquifers and ground-water temperature may be affected. Underground nuclear tests have changed water levels for months or years (Garber, 1971, p. C207; Thordarson, 1987, p. 12–16) and may affect ground-water flow rates and direction.

Ground-Water Temperature Data-Collection Sites

Periodic ground-water temperature data were collected in 166 wells located between latitude 36 and 39 degrees north and longitude 115 and 118 degrees west within Nye, Clark, and Lincoln Counties, Nev. (pl. 1; table 1, at back of report). A well, for the purpose of this report, is a bored, drilled, or dug hole with a depth greater than its largest surface dimension and a discrete open interval (U.S. Environmental Protection Agency, 1997; Fenelon, 2005, p. 6). Temperature data may be collected from multiple wells within a single borehole because each well has a distinct open interval. Ninety-two of the 166 wells at which periodic ground-water temperatures were collected are located within the boundaries of the NTS. About 95 percent of the wells with periodic ground-water temperature data are located in the Death Valley ground-water flow system (fig. 1). The remaining 5 percent are located either in the Railroad Valley or South-Central Marshes ground-water flow systems.

Ground-water temperature profiles were collected in 73 wells located between latitude 36 and 38 degrees north and longitude 115 and 117 degrees west within Nye County, Nev. (pl. 1; table 1). Of the 73 wells in which ground-water temperature profiles were collected, 52 are located within the NTS boundaries and 21 are located outside the NTS boundaries. Forty-one of the wells with ground-water temperature profile data are in the Ash Meadows ground-water subbasin, 16 are in the Oasis Valley ground-water subbasin, and 16 are in the Alkali-Flat-Furnace Creek Ranch ground-water subbasin.

All wells in which ground-water temperatures were measured are part of a USGS water-level monitoring network. This network is supported by the USDOE National Nuclear Security Administration Nevada Site Office, Environmental Restoration Program.

Ground-Water Temperature Data

Data presented for each well consist of depth-to-water measurements, depth below water level where ground-water temperature was measured, and ground-water temperature. Distances are reported in inch-pound units (feet) and temperatures in degrees Celsius.

Periodic Ground-Water Temperature Data

Data-Collection Method

Periodic ground-water temperature data were collected with a temperature probe attached to the end of a calibrated electric tape. In general, temperatures in each well were measured annually at depths of 5 and 55 ft below the water surface. If necessitated by well conditions, the depths of ground-water temperature measurements were varied.

Instrumentation

A temperature probe was used to collect periodic ground-water temperature data. The temperature probe protects a thermistor in which electrical resistance varies with temperature. The probe can be used to depths of 1,500 ft below the water surface and has a temperature range of -5°C to 50°C (Solinst Canada Ltd., 1995).

The temperature probe was attached to the bottom of a calibrated electric tape. A calibrated electric tape also was used to measure depth to water prior to temperature data collection. The calibrated electric tape measurements are considered accurate to within 0.1 ft.

Calibration of Temperature Probe

The temperature probe was calibrated annually. The calibration procedure begins by determining the “before” resistance of an electric tape without a temperature probe. The temperature probe is then attached to the electric tape and placed into a water-filled container. Measurements of the resistance of electric tape plus the resistance of the temperature probe thermistor are recorded at various water temperatures ranging from about 0°C to 50°C. During the procedure, water temperature is determined using a National Institute of Standards and Technology (NIST)-calibrated thermometer. After all measurements of the resistance of the electric tape plus the resistance of the thermistor are completed, the “after” resistance of the electric tape without the temperature probe is again measured. The average resistance of the electric tape is the average of the “before” and “after” measurements of electric tape resistance. The average resistance of the electric tape is subtracted from the resistance of the electric tape plus the resistance of the thermistor to determine the resistance of the thermistor at various water temperatures. An equation is used to convert the resistance of the thermistor to a temperature. A regression or best-fit line is fitted to thermistor-derived temperatures versus calibrated thermometer temperatures. The equation of the best-fit line is then used to adjust field-measured temperatures to a calibrated temperature.

Procedure

The general steps used for collecting periodic ground-water temperature data at 5 and 55 ft below the water surface are as follows:

1. Depth to water below measuring point (DTW) for the well is measured using a calibrated electric tape (CET). No correction factor is applied to the measurement. The DTW is then rounded to the nearest foot and recorded as the rounded depth to water below measuring point (DTWR).

2. A “before’’ resistance for a CET is measured before the temperature probe is attached to the CET.

3. The CET is lowered into the well to the depth at which the temperature probe would be 5 ft below the DTWR. The resistance of the CET plus the resistance of the temperature probe thermistor is recorded.

4. The CET is lowered into the well to the depth at which the temperature probe would be 55 ft below the DTWR. The resistance of the CET plus the resistance of the temperature probe thermistor is recorded. The CET is removed from the well.

5. The temperature probe is removed from the CET and an “after’’ resistance for CET is measured.

Periodic Temperature Data

Periodic ground-water temperature data collected in the field were processed using a Microsoft® Excel spreadsheet. The “before” and “after” measured resistances of the electric tape were averaged to determine an average electric tape resistance. The average electric tape resistance was subtracted from the resistance of the electric tape plus the resistance of the temperature probe thermistor to determine the resistance of the thermistor while submerged below water within the well. A raw water temperature is calculated from the resistance of the submerged thermistor. The raw water temperature is corrected for the temperature probe calibration to determine a final calibrated water temperature. Based on data-collection methods, periodic ground-water temperatures are considered accurate to within 1°C.

A table of periodic ground-water temperature measurements collected during calendar years 2000–2006 in 166 wells at and in the vicinity of the NTS is presented in appendix A. The appendix provides information on site location, well construction, hydrogeologic unit, depths-to-water, and temperature data for each of the wells.

Periodic ground-water temperatures measured in wells at and in the vicinity of the NTS ranged from about 10.7°C to 50.4°C. The minimum temperature was measured in well TTR Antelope Mine 1 at 11 ft below land surface and the maximum in well ER- 3-1-2 (shallow) at 55 ft below land surface. An example of the results from periodic ground-water temperature collection is shown in figure 2.

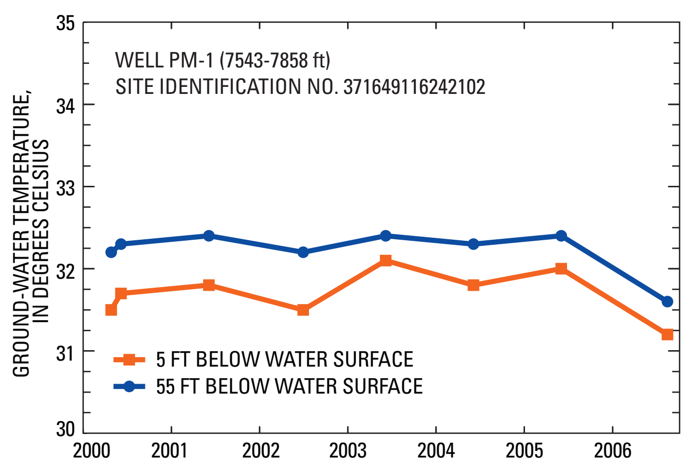


Figure 2. Periodic ground-water temperature data, well PM-1 (7543-7858 ft), Nevada Test Site, Nevada, 2000–2006.

Ground-Water Temperature Profile Data

Data-Collection Method

Ground-water temperature profile data were collected with temperature loggers attached to an electric tape. Temperatures were collected at multiple depths throughout the water column.

Instrumentation

Sealed underwater temperature loggers were used to collect ground-water temperature profile data. The loggers were depth rated to 1,000 ft, but have been known to work at pressures equivalent to 10,000 ft of water (Onset Computer Corporation, 1996). The temperature range of the loggers is -20°C to 50°C, but they will record temperatures as much as 70°C.

The sealed temperature loggers were attached to an uncalibrated electric tape at 20-ft intervals. The tape was believed to be accurate to at least the nearest foot based upon its previous use as a calibrated electric tape. This accuracy was sufficient for the ground-water temperature profiles.

Calibrated electric tapes were used to measure depth to water prior to temperature-data collection. The calibrated electric tape measurements are recorded as being accurate to within 0.1 ft.

Calibration of Temperature Loggers

Prior to field use, temperature loggers were checked for accuracy, precision, resolution, and the time needed to equilibrate to surrounding fluid temperature. To evaluate accuracy, precision, and resolution, multiple temperature loggers were activated and submerged into a container of water. The water was stabilized at various temperatures within the range of temperatures expected to be encountered in the field. Temperature loggers were allowed to equilibrate at these stable temperatures for at least 10 minutes. The accuracy of an individual logger was determined by comparing its recorded temperatures with temperatures from an NIST-calibrated thermometer. The precision of an individual logger was determined by comparing its recorded temperatures with the recorded temperatures from other loggers. The resolution of an individual logger was determined by noting the minimum difference between temperature readings that each logger could record. Each logger has 255 different temperature steps in its measurement range that can be recorded (Onset Computer Corporation, 1996).

The accuracy, precision, and resolution of the loggers are temperature dependent. The measured accuracies of the temperature loggers, which are the differences between logger temperature readings and measurements from an NIST-calibrated thermometer, range from ± 0.2°C to ± 0.7°C. The measured accuracies are within ± 0.3°C of the manufacturer's specifications of ± 0.4°C from 0°C to about 30°C and ± 0.5°C from about 30°C to 50°C.

The temperature logger precisions, which are the maximum differences between temperatures measured simultaneously by multiple loggers, are between 0.3°C and 0.6°C. Measured resolutions are within 0.1°C of manufacturer's resolution specifications of ± 0.3°C from about 0°C to 25°C and ± 0.4°C from 25°C to 50°C.

Based on data-collection methods and the accuracy, precision, and resolution testing, ground-water temperature profile measurements between 0.5°C and 50°C are considered accurate to within 1°C. Temperatures measured greater than 50°C may be less accurate.

The equilibration time needed for the loggers to record a consistent temperature was measured. Temperature loggers were quickly moved from a container of relatively cold, warm, or hot water and placed into a container with water of different temperature. The amount of time the logger needed to equilibrate after these changes was recorded. Equilibration times ranged from 7 to 16 minutes. Equilibration times when temperature changes were less abrupt were as short as 2 minutes.

Procedure

The general steps used for collecting ground-water temperature profile data are as follows (fig. 3):

1. Prior to data collection, the temperature loggers are attached to an uncalibrated electric tape (UET). The temperature loggers are spaced at 20-ft intervals with the initial logger to enter the well located 5 ft above the bottom of the UET and the final logger to enter the well located 185 ft above the bottom of the UET.

2. DTW for the well is measured using a calibrated electric tape. No correction factor is applied to the measurement. The DTW value is then rounded to the nearest foot and recorded as the DTWR.

3. The length of water column is estimated by subtracting the DTWR from the most recent measured accessible well depth. The length of the water column is needed to estimate the length of UET that will be lowered into the well or borehole.

4. The UET is lowered into the well. Each temperature logger is activated and time synchronized before being lowered into the well.

    - If the estimated water column length is less than 200 ft, the UET is lowered to the maximum accessible depth of the well. The UET is then raised so that the nearest whole number foot marking on the UET above that accessible depth lines up with the measuring point (MP). The whole number foot marking is recorded as the hang point (HP).

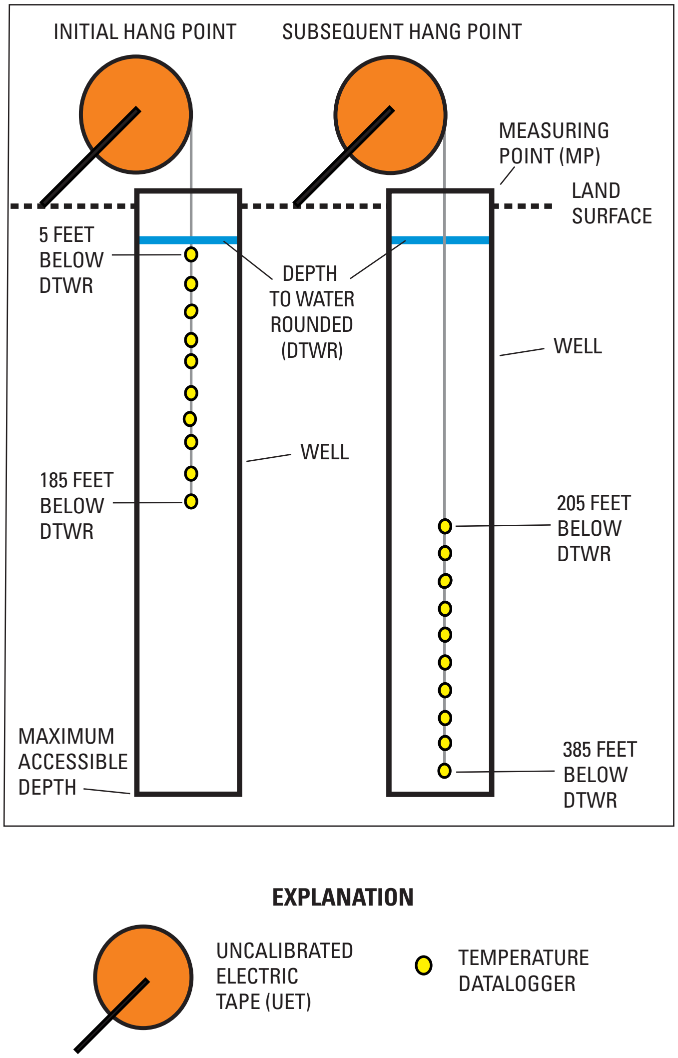


Figure 3. Ground-water temperature profile data-collection equipment.

- If the estimated water column length is equal to or greater than 200 ft, the UET is lowered to a HP such that the temperature logger located 185 ft above the bottom of the UET will be 5 ft below DTWR and the temperature logger located 5 ft above the bottom of UET will be 185 ft below DTWR (fig. 3). If the maximum accessible depth is reached before the temperature loggers are located at these depths, then the procedures used for an estimated column length of less than 200 ft should be used.

5. The UET is secured at the HP and a start time recorded. The UET is not moved from the HP for at least 10 minutes to allow the temperature loggers to equilibrate to the surrounding water temperature. Before the UET is moved, an end time is recorded.

6. The UET is moved to a different HP.

   - If the water column length was determined in step 4 to be less than 200 ft, the UET is moved so that one temperature logger measures ground-water temperature about 5 ft below the water surface. Other temperatures will be measured in 20-ft intervals below the logger at 5 ft below the water surface.

   - If the water column length was determined in step 4 to be equal to or greater than 200 ft, the UET is lowered so that the HP is 200 ft greater than in step 4 (fig. 3). If a maximum accessible depth is reached before the HP is lowered the additional 200 ft, then the UET is raised so that the nearest whole number foot marking on the UET above that maximum accessible depth lines up with the MP.

7. The UET is secured at the HP and a start time recorded. The UET is not moved from the HP for at least 8 minutes to allow the temperature loggers to equilibrate to the surrounding water temperature. Before the UET is moved, an end time is recorded.

8. In wells that have not reached maximum accessible depth by the end of step 7, steps 6 and 7 are repeated until maximum accessible depth is reached in the well, or the UET has been extended to its maximum length.

9. The UET is raised out of the well. Data is collected from each temperature logger. Each temperature logger is then deactivated.

Temperature Profile Data

Temperature profile data collected in the field were processed using a Microsoft® Excel spreadsheet. The spreadsheet used the HP, data collection times at each HP, and the position of the logger on the UET to determine the depth of each logger below the water surface and the temperature at that depth (K.J. Halford, U.S. Geological Survey, written commun., 2004). Temperature correction factors only slightly affected temperature logger readings and were not applied to these values.

A table of the ground-water temperature profiles collected in 73 wells at and in the vicinity of the NTS is presented in appendix B. The appendix provides information on site location, well construction, hydrogeologic unit, depths-to-water, and temperature data. Two graphs of temperature versus depth below land surface for each well with temperature profiles greater than 50 ft in length also are presented in appendix B. The scale chosen for one of these graphs is customized for each well to illustrate detailed changes in temperature with depth. The scale chosen for the other graph is standardized for all wells to illustrate the relative temperature profile length and change in temperature at each well when compared to all collected temperature profiles. An example of the ground-water temperature profile graphs is shown in figure 4.

Temperatures measured while collecting ground-water temperature profiles in wells at and in the vicinity of the NTS during the period of record ranged from about 18.8°C to 59.0°C. The minimum temperature was measured in wells ER- 2-1 piezometer (deep) and UE- 4t 1 (1906–2010 ft) at 5 ft below land surface and the maximum in well PM-1 at 3,565 ft

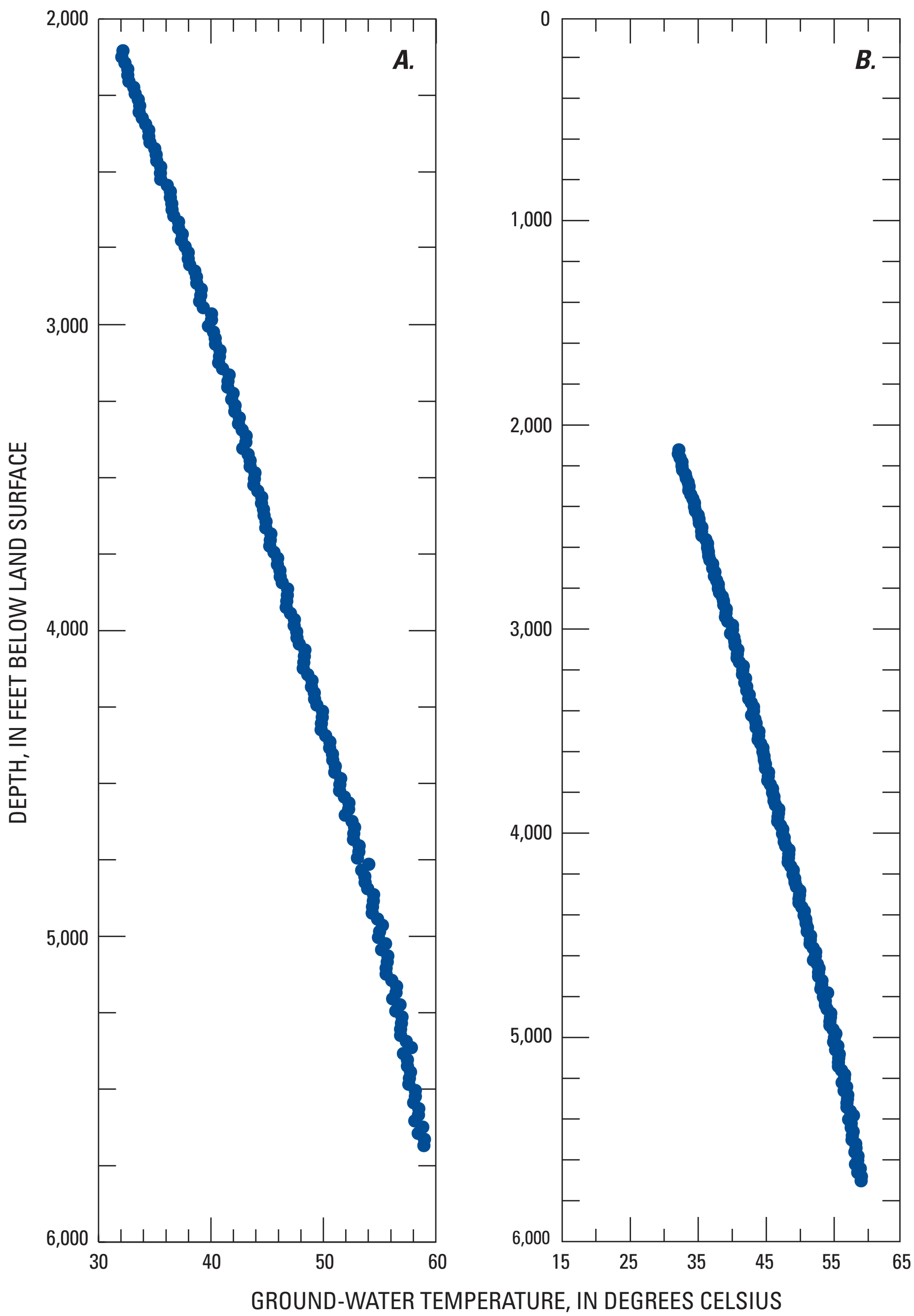


Figure 4. Ground-water temperature profile data, well PM-1 (7543-7858 ft), Nevada Test Site, Nevada, November 3, 2004. The scale chosen for graph A is customized for this well to illustrate detailed changes in temperature with depth. The scale chosen for graph B is standardized to illustrate the relative temperature profile length and change in temperature of this profile when compared to all collected ground-water temperature profiles.

below land surface. The deepest temperature measurement was at 3,982 ft below land surface and the longest ground-water temperature profile was 3,977 ft.

When available, ground-water temperature profile measurements in a well were compared to periodic temperature measurements closest in depth and measurement date in the same well. The ground-water temperature profile measurements were collected at or within 10 ft of the periodic measurements and, except in three cases, within 400 days. The maximum difference between temperature profile and periodic temperature measurements at similar depths was 1.1°C, but was less than 0.5°C in about 90 percent of the compared measurements.

Summary

Periodic ground-water temperature data and ground-water temperature profiles were collected in wells at and in the vicinity of the Nevada Test Site (NTS) during the years 2000 through 2006. Periodic ground-water temperatures were collected in 166 wells at and in the vicinity of the NTS. In general, these periodic ground-water temperatures were measured at about 5 and 55 ft below the water surface. Periodic ground-water temperatures are measured using a calibrated temperature probe attached to the bottom of a calibrated electric tape. Depth measurements are considered accurate to the nearest foot and temperatures are considered accurate to the nearest degree Celsius.

Ground-water temperature profiles were measured in 73 wells at and in the vicinity of the NTS. Temperature loggers attached to an uncalibrated electric tape recorded temperatures at multiple depths below the water surface to produce these profiles. Depth measurements are considered accurate to the nearest foot and temperature measurements accurate to the nearest degree Celsius. The deepest temperature measurement was measured at 3,982 ft below land surface. Differences between periodic and ground-water temperature profile measurements at similar depths were typically less than 0.5°C.

Acknowledgments

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Table 1. Characteristics of ground-water temperature data-collection sites at and in the vicinity of the Nevada Test Site, Nye, Clark, and Lincoln Counties, Nevada.

[**USGS site identification No.:** The U.S. Geological Survey (USGS) site identification number. Each site is identified by a unique 15-digit number based on the original latitude-longitude of the site. The first six digits denote degrees, minutes, and seconds of latitude; the next seven digits denote degrees, minutes, and seconds of longitude; and the last two digits are the sequence number of the well within the 1-second grid of latitude and longitude. The assigned number is retained as a permanent identifier even if a more precise latitude and longitude are later determined. To determine the geographic location of a well, the latitude and longitude coordinates should be used rather than the site identifier. **Latitude and Longitude:** In decimal degrees; referenced to the North American Datum of 1983 (NAD 83). **Land-surface altitude:** Altitude is in feet above or below the National Geodetic Vertical Datum of 1929 (NGVD 1929). **Depth drilled:** Total depth to which the hole was drilled, in feet below land surface. **Well depth:** Accessible depth of the well, in feet below land surface. Well depths are obtained from drilling records or field measurements. **Open interval:** Depth range, in feet below land surface, within the well where, if surrounding lithologic units are saturated, ground water may enter. The open interval of the well may be openings in the casing and (or) uncased borehole. When more than one open interval occurs in a well, depths are in feet below land surface to the top of the uppermost opening and the bottom of the lowermost opening. **Hydrogeologic unit:** Principal hydrogeologic unit contributing water to the well. B, basement confining unit; C, carbonate-rock aquifer; F, valley-fill aquifer; S, Eleana confining unit; V, volcanic-rock aquifers and confining units; X, other (granitic stocks). **Ground-water flow system or subbasin:** The ground-water flow system or, when defined, ground-water subbasin where the well is located. Ground-water subbasins are subdivisions of the Death Valley ground-water flow system (Laczniak and others, 1996). AFFCR, Alkali Flat-Furnace Creek Ranch ground-water subbasin; AM, Ash Meadows ground-water subbasin; DTVSU, Death Valley ground-water flow system, undivided; OV, Oasis Valley ground-water subbasin; RDVSU, Railroad Valley ground-water flow system, undivided; SCMU, South-Central Marshes ground-water flow system, undivided. **Available ground-water temperature data:** Periodic, periodic ground-water temperature measurements available; Profile, periodic ground-water temperature and ground-water temperature profile measurements available. **Abbreviations:** –, unknown]

USGS site identification No.	USGS local site name	Latitude	Longitude	Land-surface altitude	Depth drilled	Well depth	Open interval		Hydro-geologic unit	Ground-water flow system or subbasin	Available ground-water temperature data
							Depth to top	Depth to bottom			
362936116153001	Amargosa Flat Playa Well	36.493	116.259	2,322	15	15	9	14	F	AM	Periodic
363255115515801	Army 2	36.548	115.867	3,813	658	627	6	658	F	AM	Periodic
363238115464601	Army 3	36.544	115.780	3,617	826	826	310	826	V	AM	Periodic
363437116010801	Army 6A	36.577	116.020	3,445	1,253	1,253	1,157	1,228	B	AM	Periodic
364329116402901	Ash-B Deep Well	36.726	116.676	2,677	1,220	1,214	1,062	1,185	V	AFFCR	Periodic
364329116402902	Ash-B Shallow Well	36.726	116.676	2,677	1,220	457	362	428	F	AFFCR	Periodic
371309117074901	BC-1	37.219	117.131	4,001	410	410	339	410	V	DTVSU	Periodic
371309117074902	BC-2	37.217	117.130	4,000	125	103	63	103	V	DTVSU	Periodic
365640116431501	Beatty Wash Terrace Well	36.944	116.722	3,460	75	39	55	75	–	OV	Periodic
361515116100901	BLM Stewart Valley Well	36.254	116.170	2,469	69	69	–	–	–	DTVSU	Periodic
363422115433701	Cactus Springs 3	36.573	115.728	3,265	100	100	83	100	–	AM	Periodic
370725116033901	ER- 2-1 main (shallow)	37.125	116.063	4,216	2,600	2,079	1,642	2,177	V	AM	Profile
370725116033902	ER- 2-1 piezometer (deep)	37.125	116.063	4,216	2,600	2,559	2,313	2,600	V	AM	Profile
370116115561302	ER- 3-1-2 (shallow)	37.019	115.937	4,407	2,807	2,310	2,208	2,310	C	AM	Periodic
370214116021002	ER- 3-2-2 (middle)	37.037	116.037	4,010	3,000	2,655	2,588	2,636	F	AM	Profile
365223115561702	ER- 5-3 deep piezometer	36.873	115.939	3,334	2,606	2,212	1,995	2,235	F	AM	Profile
365223115561701	ER- 5-3 main (upper zone)	36.873	115.939	3,334	2,606	1,890	1,446	1,782	F	AM	Profile
365223115561703	ER- 5-3 shallow piezometer	36.873	115.939	3,334	2,606	1,237	105	1,048	F	AM	Profile
365223115561801	ER- 5-3-2	36.873	115.939	3,334	5,683	4,908	4,674	5,683	C	AM	Profile
365223115561704	ER- 5-3-3	36.873	115.939	3,335	1,800	1,745	1,412	1,800	F	AM	Profile
364928115574801	ER 5-4 main	36.824	115.964	3,132	3,732	3,438	1,715	3,732	F	AM	Profile
364928115574802	ER 5-4 piezometer	36.824	115.964	3,132	3,732	814	119	813	F	AM	Profile
364927115574801	ER 5-4-2	36.824	115.964	3,132	7,000	6,658	4,850	7,000	V	AM	Periodic
365904115593405	ER-6-1 main (2243 ft)	36.984	115.994	3,937	3,206	2,243	1,819	2,243	C	AM	Periodic

Table 1. Characteristics of ground-water temperature data-collection sites at and in the vicinity of the Nevada Test Site, Nye, Clark, and Lincoln Counties, Nevada.—Continued

USGS site identification No.	USGS local site name	Latitude	Longitude	Land-surface altitude	Depth drilled	Well depth	Open interval: Depth to top	Open interval: Depth to bottom	Hydro-geologic unit	Ground-water flow system or subbasin	Available ground-water temperature data
365904115593401	ER- 6-1 main (3206 ft)	36.984	115.994	3,937	3,206	3,045	1,819	3,206	C	AM	Profile
365904115593403	ER- 6-1 piezometer	36.984	115.994	3,937	2,129	1,790	1,435	1,542	V	AM	Periodic
365904115593402	ER- 6-1-1	36.984	115.994	3,937	2,085	1,940	1,835	2,052	C	AM	Profile
365901115593501	ER- 6-1-2 main	36.984	115.994	3,935	3,200	3,070	1,775	3,200	C	AM	Profile
365901115593502	ER- 6-1-2 piezometer	36.984	115.994	3,935	3,200	1,587	120	1,587	V	AM	Profile
365740116043501	ER- 6-2	36.961	116.077	4,231	3,430	3,408	1,746	3,430	C	AM	Profile
370424115594301	ER- 7-1	37.073	115.996	4,246	2,500	2,500	1,775	2,500	C	AM	Periodic
371106116110401	ER-12-1 (1641-1846 ft)	37.185	116.185	5,817	3,588	3,434	1,641	1,846	C	AM	Profile
371019116072102	ER-12-2 main (lower zone)	37.171	116.123	4,705	6,883	6,883	5,203	6,883	S	AM	Profile
371019116072103	ER-12-2 main (upper zone)	37.171	116.123	4,705	6,883	5,203	2,964	5,203	S	AM	Profile
371019116072104	ER-12-2 piezometer	37.171	116.123	4,705	6,883	579	120	650	V	AM	Profile
371142116125101	ER-12-3 piezometer	37.195	116.215	7,391	4,908	1,532	55	2,210	V	AFFCR	Periodic
371311116105902	ER-12-4 main	37.220	116.184	6,884	3,715	3,713	2,501	3,715	C	AM	Periodic
371311116105901	ER-12-4 piezometer	37.220	116.184	6,884	3,715	1,968	56	1,988	V	AM	Periodic
370615116222401	ER-18-2	37.104	116.374	5,437	2,500	2,143	1,351	2,500	V	AFFCR	Profile
371043116142101	ER-19-1-1 (deep)	37.178	116.240	6,140	3,595	3,578	3,210	3,560	S	AFFCR	Profile
371043116142102	ER-19-1-2 (middle)	37.178	116.240	6,140	3,595	2,720	2,550	2,738	V	AFFCR	Profile
371043116142103	ER-19-1-3 (shallow)	37.178	116.240	6,140	3,595	1,381	1,301	1,422	V	AFFCR	Periodic
371321116292301	ER-20-1	37.222	116.492	6,181	2,065	2,065	1,940	2,065	V	AFFCR	Profile
371246116240101	ER-20-2-1	37.213	116.401	6,705	2,524	2,494	2,293	2,524	V	AFFCR	Profile
371537116251501	ER-20-6-1 (3-in string)	37.260	116.422	6,475	3,200	2,930	2,437	2,947	V	AFFCR	Periodic
371536116251601	ER-20-6-2 (3-in string)	37.260	116.422	6,475	3,200	2,933	2,414	2,945	V	AFFCR	Periodic
371533116251801	ER-20-6-3 (3-in string)	37.259	116.422	6,466	3,200	2,790	2,436	2,807	V	AFFCR	Periodic
371223116314701	ER-EC-1	37.206	116.531	6,026	5,000	4,791	2,258	4,895	V	OV	Profile
370852116340502	ER-EC-2a (1635-2236 ft)	37.145	116.568	4,902	4,974	2,450	1,635	2,236	V	OV	Profile
370852116340501	ER-EC-2a (1635-4973 ft)	37.145	116.568	4,902	4,974	4,961	1,635	4,974	V	OV	Periodic
370935116375302	ER-EC-4 (952-2295 ft)	37.159	116.632	4,760	3,487	2,365	952	2,296	V	OV	Profile
370935116375301	ER-EC-4 (952-3487 ft)	37.159	116.632	4,760	3,487	3,445	952	3,487	V	OV	Periodic
370504116335201	ER-EC-5	37.084	116.565	5,077	2,500	2,449	1,169	2,500	V	AFFCR	Profile
371120116294802	ER-EC-6 (1581-3820 ft)	37.189	116.498	5,604	5,000	4,302	1,581	3,820	V	AFFCR	Profile
365910116284401	ER-EC-7	36.985	116.479	4,805	1,386	1,304	890	1,386	V	AFFCR	Profile
370610116375301	ER-EC-8	37.103	116.632	4,334	2,000	1,950	632	2,000	V	OV	Profile
370504116404901	ER-OV-01	37.084	116.681	4,073	180	180	150	170	V	OV	Profile
370210116421501	ER-OV-02	37.036	116.705	3,880	200	200	170	190	F	OV	Profile
365956116421601	ER-OV-03a	36.999	116.705	3,844	251	251	220	240	V	OV	Profile
365956116421602	ER-OV-03a2	36.999	116.705	3,844	821	642	602	622	V	OV	Profile

Table 1. Characteristics of ground-water temperature data-collection sites at and in the vicinity of the Nevada Test Site, Nye, Clark, and Lincoln Counties, Nevada.—Continued

USGS site identification No.	USGS local site name	Latitude	Longitude	Land-surface altitude	Depth drilled	Well depth	Open interval		Hydro-geologic unit	Ground-water flow system or subbasin	Available ground-water temperature data
							Depth to top	Depth to bottom			
365956116421603	ER-OV-03a3	36.999	116.705	3,844	821	133	113	133	V	OV	Profile
370139116390501	ER-OV-03b	37.027	116.652	4,233	400	395	353	373	F	OV	Profile
365948116360401	ER-OV-03c	36.997	116.602	4,192	542	542	512	532	V	AFFCR	Profile
365948116360402	ER-OV-03c2	36.997	116.602	4,192	321	321	292	312	V	AFFCR	Profile
365705116424201	ER-OV-04a	36.951	116.713	3,491	151	151	111	131	F	OV	Profile
370246116461901	ER-OV-05	37.046	116.773	3,938	200	200	170	190	F	OV	Profile
370504116404902	ER-OV-06a	37.084	116.681	4,073	536	536	506	526	V	OV	Profile
370504116404903	ER-OV-06a2	37.084	116.681	4,073	71	65	56	65	V	OV	Profile
373228116472001	Hammel Mine Well	37.541	116.790	5,540	–	123	–	–	–	DTVSU	Periodic
383734116124501	HTH-1	38.626	116.213	6,011	3,704	3,695	150	3,665	V	RDVSU	Periodic
383023116012201	HTH-23	38.506	116.024	5,797	7,503	6,445	4,510	7,503	–	RDVSU	Periodic
363317116270801	LWS-A Deep Well	36.555	116.453	2,396	2,025	1,859	1,706	1,827	F	AFFCR	Periodic
363317116270802	LWS-A Shallow Well	36.555	116.453	2,396	2,025	312	212	278	F	AFFCR	Periodic
365253116450801	Narrows South Well 2	36.881	116.753	3,180	120	120	20	120	F	AFFCR	Periodic
370753116502701	NDOT TPJ-2	37.131	116.842	4,005	–	–	–	–	–	DTVSU	Periodic
371649116242102	PM- 1 (7543-7858 ft)	37.280	116.407	6,558	7,858	7,731	7,543	7,858	V	AFFCR	Profile
372042116340501	PM- 2	37.345	116.569	5,592	8,788	8,788	2,506	8,788	V	OV	Periodic
371421116333703	PM- 3-1 (1919-2144 ft)	37.239	116.561	5,823	3,019	2,145	1,872	2,192	V	OV	Profile
371421116333704	PM- 3-2 (1442-1667 ft)	37.239	116.561	5,823	3,019	1,667	1,379	1,687	V	OV	Profile
375533116580601	Ralston Valley Well	37.926	116.969	5,219	–	–	–	–	–	SCMU	Periodic
373320117090601	Ralston Well	37.555	117.152	4,756	–	409	–	–	–	DTVSU	Periodic
364928115580101	RNM-1	36.824	115.968	3,135	1,302	999	120	999	F	AM	Periodic
364923115575701	RNM-2	36.823	115.967	3,129	935	825	118	935	F	AM	Profile
364922115580101	RNM-2S	36.823	115.968	3,130	1,156	1,120	118	1,156	F	AM	Periodic
371615117053601	SF-1	37.271	117.094	4,022	899	879	839	879	V	DTVSU	Periodic
371615117053602	SF-2	37.271	117.094	4,021	496	496	456	496	F	DTVSU	Periodic
363905116005801	SM-23-1	36.651	116.017	3,543	1,338	1,332	1,298	1,338	C	AM	Periodic
362521116160801	Spring Meadows 11	36.422	116.270	2,442	215	215	–	–	–	AM	Periodic
370131116440801	Springdale Upper Well	37.025	116.736	3,775	–	91	–	–	–	OV	Periodic
375045116460201	TTR 3A WW	37.846	116.768	5,362	805	805	537	805	–	SCMU	Periodic
375055116460201	TTR 3BB	37.849	116.768	5,358	–	–	–	–	–	SCMU	Periodic
373622116434601	TTR Antelope Mine 1	37.606	116.730	6,350	–	–	–	–	–	DTVSU	Periodic
373622116434701	TTR Antelope Mine 2	37.606	116.730	6,356	–	–	–	–	–	DTVSU	Periodic
373623116434701	TTR Antelope Mine 3	37.606	116.730	6,362	–	–	–	–	–	DTVSU	Periodic
374619116435401	TTR EH-4	37.771	116.734	5,458	743	490	150	490	–	DTVSU	Periodic
375139116460001	TTR EH-6	37.861	116.767	5,355	535	535	0	310	–	SCMU	Periodic
375453116450501	TTR Reeds Ranch Well	37.915	116.752	5,384	–	127	–	–	–	SCMU	Periodic
374725116452701	TTR Sandia 2	37.790	116.758	5,478	525	525	325	485	–	DTVSU	Periodic
374739116453401	TTR Sandia 4	37.794	116.760	5,468	580	580	351	466	–	DTVSU	Periodic
374959116431301	TTR Sandia 5	37.833	116.721	5,334	300	300	–	–	–	DTVSU	Periodic

Table 1. Characteristics of ground-water temperature data-collection sites at and in the vicinity of the Nevada Test Site, Nye, Clark, and Lincoln Counties, Nevada.—Continued

USGS site identification No.	USGS local site name	Latitude	Longitude	Land-surface altitude	Depth drilled	Well depth	Open interval		Hydro-geologic unit	Ground-water flow system or subbasin	Available ground-water temperature data
							Depth to top	Depth to bottom			
373446116433301	TTR Sulfide Mine	37.579	116.727	6,130	–	–	–	–	–	DTVSU	Periodic
370929116132311	TW- 1 (1615-4206 ft)	37.158	116.224	6,156	4,206	3,694	1,615	4,206	V	AFFCR	Profile
370353116020201	TW- 7	37.065	116.035	4,058	2,272	2,239	41	2,272	V	AM	Profile
365849116002101	TW- B	36.979	116.015	3,932	1,675	1,670	1,432	1,675	V	AM	Profile
370418116044501	TW- D	37.074	116.076	4,150	1,950	1,950	1,700	1,950	C	AM	Profile
364534116065902	TW- F (3400 ft)	36.759	116.117	4,143	3,392	3,392	3,142	3,392	C	AM	Periodic
370720116041601	U - 2gk	37.122	116.072	4,242	1,809	1,802	116	1,809	F	AM	Periodic
370320116012001	U - 3cn 5	37.059	116.023	4,009	3,030	2,830	2,832	3,030	C	AM	Profile
370020115593001	U - 3mi	37.006	115.993	4,006	1,794	1,651	372	1,794	V	AM	Profile
370451116024101	U - 7cd	37.081	116.046	4,115	1,625	1,523	117	1,625	V	AM	Periodic
371342116125102	U -12s (1480 ft)	37.228	116.217	6,794	1,596	1,467	12	1,480	X	AFFCR	Periodic
371346116032601	U- 15k Test Hole	37.229	116.058	5,168	857	857	404	857	X	AM	Profile
371349116222001	U -19bh	37.230	116.373	6,768	2,148	2,107	72	2,148	V	AFFCR	Periodic
371736116184701	U -19bj	37.293	116.314	7,035	2,153	2,149	57	2,153	V	AFFCR	Periodic
371714116230301	U -19bk	37.287	116.385	6,670	2,198	2,192	57	2,198	V	AFFCR	Profile
371505116254501	U -20 WW (cased)	37.251	116.430	6,468	3,268	3,268	65	3,268	V	AFFCR	Periodic
371414116242901	U -20bg	37.237	116.409	6,567	2,200	2,200	58	2,200	V	AFFCR	Periodic
383806116125951	UC-1-P-2SR	38.635	116.216	6,084	3,600	2,734	1,148	2,790	–	RDVSU	Periodic
370254116070601	UE- 1a	37.048	116.119	4,304	957	562	78	957	S	AM	Profile
370254116064201	UE- 1b	37.048	116.112	4,273	1,254	701	76	1,254	S	AM	Periodic
370253116055201	UE- 1c	37.048	116.099	4,207	1,880	1,772	74	1,880	C	AM	Periodic
370005116040301	UE- 1h	37.001	116.068	3,995	3,358	3,228	2,134	3,358	C	AM	Profile
370254116082002	UE- 1L (recompleted)	37.048	116.140	4,457	5,339	2,284	716	2,284	S	AM	Periodic
370337116033002	UE- 1q (2600 ft)	37.060	116.059	4,081	2,600	2,600	2,459	2,600	C	AM	Profile
370831116080701	UE- 2ce	37.142	116.136	4,765	1,650	1,505	1,377	1,650	C	AM	Periodic
370411116025910	UE- 3e 4-1 (2181 ft)	37.070	116.051	4,081	2,300	2,181	2,094	2,192	V	AM	Periodic
370411116025911	UE- 3e 4-2 (1919 ft)	37.070	116.051	4,081	2,300	1,919	1,832	1,926	V	AM	Profile
370411116025912	UE- 3e 4-3 (1661 ft)	37.070	116.051	4,081	2,300	1,661	1,540	1,668	V	AM	Periodic
370556116025405	UE- 4t 1 (1906-2010 ft)	37.099	116.049	4,141	2,413	1,993	1,906	2,010	V	AM	Profile
370556116025406	UE- 4t 2 (1564-1754 ft)	37.099	116.049	4,141	2,413	1,724	1,564	1,754	V	AM	Profile
364915115574101	UE- 5n	36.821	115.962	3,113	1,687	1,523	82	1,460	F	AM	Periodic
365905116033201	UE- 6d	36.985	116.060	3,947	3,896	3,864	2,125	3,896	F	AM	Profile
365905116012002	UE- 6e (2090-2230 ft)	36.985	116.023	3,938	4,209	2,230	2,090	2,230	V	AM	Profile

Table 1. Characteristics of ground-water temperature data-collection sites at and in the vicinity of the Nevada Test Site, Nye, Clark, and Lincoln Counties, Nevada.—Continued

USGS site identification No.	USGS local site name	Latitude	Longitude	Land-surface altitude	Depth drilled	Well depth	Open interval		Hydro-geologic unit	Ground-water flow system or subbasin	Available ground-water temperature data
							Depth to top	Depth to bottom			
370556116000901	UE- 7nS	37.099	116.003	4,367	2,205	2,022	1,707	2,205	C	AM	Periodic
371108116045303	UE-10j (2232-2297 ft)	37.185	116.082	4,574	2,613	2,532	2,232	2,297	C	AM	Profile
371332116112802	UE-12t 6 (1461 ft)	37.225	116.192	6,907	1,461	1,461	23	1,461	V	AM	Periodic
365550116091101	UE-14b	36.931	116.154	4,353	3,680	3,680	2,051	3,680	V	AM	Profile
370208116092402	UE-16f (1479 ft)	37.036	116.158	4,651	1,479	1,409	1,293	1,479	S	AM	Profile
370425116095801	UE-17a	37.074	116.167	4,697	1,214	1,207	745	1,214	S	AM	Profile
370806116264001	UE-18r	37.135	116.446	5,538	5,004	2,183	1,629	5,004	V	AFFCR	Profile
370741116194501	UE-18t	37.128	116.330	5,201	2,600	2,600	120	2,600	V	AFFCR	Periodic
371608116191002	UE-19c WW	37.269	116.320	7,033	8,489	2,493	2,421	8,489	V	AFFCR	Periodic
372034116222504	UE-19h (recompleted)	37.343	116.374	6,780	3,705	2,288	2,050	2,287	V	AFFCR	Profile
371442116243301	UE-20bh 1	37.245	116.410	6,637	2,810	2,810	1,941	2,810	V	AFFCR	Profile
371425116251902	UE-20n 1 (2834 ft)	37.240	116.423	6,461	3,300	2,834	2,308	2,834	V	AFFCR	Periodic
363045115280201	USAF Alpha 2	36.512	115.468	3,066	200	200	165	195	–	AM	Periodic
363135115281401	USAF Alpha 3	36.526	115.471	3,057	210	210	155	205	–	AM	Periodic
363529115392101	USAF MW-20	36.591	115.657	3,093	65	65	35	65	–	AM	Periodic
363529115391301	USAF MW-21	36.591	115.654	3,095	76	75	45	75	–	AM	Periodic
363508115391701	USAF MW-22	36.586	115.656	3,100	65	65	35	65	–	AM	Periodic
363447115404601	USAF Well 106-2	36.580	115.681	3,085	604	604	133	418	–	AM	Periodic
363205115335601	USAF Well 2278-1	36.535	115.567	3,200	400	353	240	353	–	AM	Periodic
362830115270501	USAF Well 2372-1	36.475	115.450	3,180	300	300	–	–	–	AM	Periodic
363452115405101	USAF Well 3	36.580	115.682	3,130	600	600	210	600	–	AM	Periodic
370840116510101	USBLM TPJ-1	37.145	116.851	3,991	107	107	–	–	–	DTVSU	Periodic
363332115244001	USFWS DR-1	36.558	115.411	3,579	957	930	870	930	C	AM	Periodic
363212115240301	USFWS SBH-1	36.537	115.402	3,475	720	720	665	695	–	AM	Periodic
363407115215301	USGS - Cow Camp	36.569	115.366	4,175	1,403	1,403	–	–	–	AM	Periodic
365502115134101	USGS DDL-2	36.917	115.229	3,288	460	460	13	460	C	AM	Periodic
370958116051512	WW- 2 (3422 ft)	37.166	116.088	4,470	3,422	3,422	2,700	3,412	C	AM	Profile
365942116032901	WW- 3 (1800 ft)	36.995	116.059	3,969	1,800	1,800	1,209	1,800	F	AM	Profile
365418116012601	WW- 4	36.905	116.025	3,602	1,479	1,438	115	1,479	V	AM	Periodic
365412116013901	WW- 4A	36.903	116.028	3,606	1,517	1,502	536	1,517	V	AM	Periodic
364635115572901	WW- 5A	36.776	115.959	3,093	910	910	642	910	F	AM	Profile
364805115580801	WW- 5B	36.801	115.970	3,092	900	900	700	900	F	AM	Periodic
370142116021101	WW- A (1870 ft)	37.037	116.037	4,006	1,870	1,870	1,555	1,870	F	AM	Periodic

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Appendix A. Periodic Ground-Water Temperature Data, Nevada Test Site and Vicinity, 2000–2006

Data from periodic ground-water temperature measurements in 166 wells at and in the vicinity of the NTS are presented in a Microsoft® Excel spreadsheet. The spreadsheet provides information on site location, well construction, hydrogeologic unit, depths-to-water, and temperature data for these wells. Appendix A data are available for download at URL: http://pubs.water.usgs.gov/ds269/.

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Appendix B. Ground-Water Temperature Profile Data, Nevada Test Site and Vicinity, 2004–2005

Data from ground-water temperature profile measurements in 73 wells at and in the vicinity of the NTS are presented in a Microsoft® Excel spreadsheet. The spreadsheet provides information on site location, well construction, hydrogeologic unit, depths-to-water, and temperature data for these wells. Two graphs of temperature versus depth below land surface for each well with temperature profiles greater than 50 feet are also presented in appendix B. The scale chosen for one of these graphs is customized for each well to illustrate detailed changes in temperature with depth. The scale chosen for the other graph is standardized for all wells to illustrate the relative temperature profile length and change in temperature at each well when compared to all collected temperature profiles. Data are available for download at URL:

http://pubs.water.usgs.gov/ds269/.

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Reiner

Ground-Water Temperature Data, Nevada Test Site and Vicinity, Nye, Clark, and Lincoln Counties, Nevada, 2000–2006

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