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WATER LEVELS IN CONTINUOUSLY MONITORED WELLS IN THE YUCCA MOUNTAIN AREA, NEVADA, 1985-88

by Richard R. Luckey, David H. Lobmeyer, and Douglas J. Burkhardt

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U.S. GEOLOGICAL SURVEY

Open-File Report 91-493

Prepared in cooperation with the
U. S. DEPARTMENT OF ENERGY under
Interagency Agreement DE-AI08-92NV10874

Denver, Colorado
1993

U.S. DEPARTMENT OF THE INTERIOR

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CONVERSION TABLE

Multiply	*By*	*To obtain*
kilometer (km)	0.6214	mile
liter	0.03531	cubic foot
meter (m)	3.2808	foot
millimeter (mm)	0.03937	inch
pounds per square inch (psi)	703.1	kilograms per square meter
square kilometer (km^2)	0.3861	square mile

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "Sea Level Datum of 1929."

WATER LEVELS IN CONTINUOUSLY MONITORED WELLS IN THE YUCCA MOUNTAIN AREA, NEVADA, 1985-88

By Richard R. Luckey, David H. Lobmeyer and Douglas J. Burkhardt

ABSTRACT

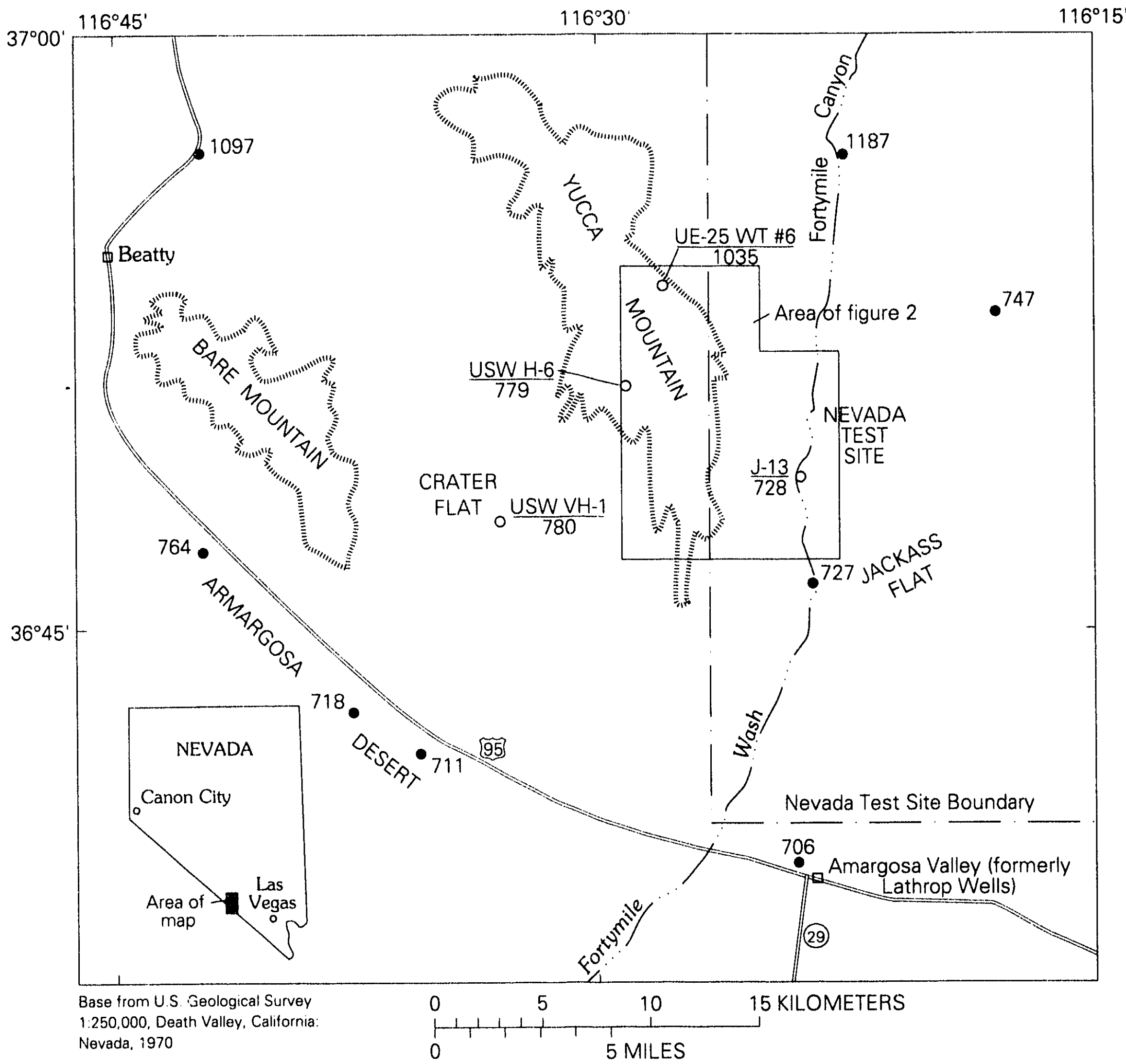
Water levels have been monitored hourly in 15 wells completed in 23 depth intervals in the Yucca Mountain area, Nevada. Water levels were monitored using pressure transducers and were recorded by data loggers. The pressure transducers were periodically calibrated by raising and lowering them in the wells. The water levels were normally measured at approximately the same time that the transducers were calibrated. Where the transducer output appeared reasonable, it was converted to water levels using the calibrations and manual water-level measurements. The amount of transducer output that was converted to water levels ranged from zero for several intervals to about 98 percent for one interval.

Fourteen of the wells were completed in Tertiary volcanic rocks and one well was completed in Paleozoic carbonate rocks. Each well monitored from one to four depth intervals. Water-level fluctuation caused by barometric pressure changes and earth tides were observed. Transducer output is presented in graphic form and, where appropriate, water-leve! altitude is presented in graphical and tabular form.

INTRODUCTION

The Yucca Mountain area is being evaluated by the U.S. Department of Energy for suitability to store high-level nuclear waste in a mined, underground repository. A 150-km^2 area located about 150 km northwest of Las Vegas in southern Nevada is being studied extensively (fig. 1). Water levels in selected wells have been periodically measured beginning in 1981 and have been continuously measured beginning in 1983 to gain a better understanding of the ground-water flow system in the area. Water levels can be used to determine the direction and rate of ground-water flow. They also can be used to estimate hydraulic properties of the flow system. In the Yucca Mountain area, the water table is in air-fall and ash-flow tuffs of Tertiary age. Saturated carbonate rocks of Paleozoic age underlie the Tertiary volcanic rocks. The terminology for stratigraphic units in this report follow Carr (1988), Carr and others (1986), Byers and others (1976) and Winograd and Thordarson (1975)

This report describes the equipment and methods used to collect and process continuous water-level data, presents the data collected and lists water-level altitudes for 15 wells. Water levels were monitored using pressure transducers and electronic data loggers. The transducer/ data logger systems were calibrated by raising and lowering the transducers in the wells, and at approximately the same time, manual water-level measurements were made using steel tapes or multiconductor cables. The manual water-level measurements were adjusted for thermal expansion, mechanical stretch, equipment calibration, and borehole deviation from vertical. Water-level



EXPLANATION

USW VH-1 / 780 o WELL—Upper number is well number; lower number is approximate altitude of water level, in meters above sea level

•747 WELL—Number is altitude of water level reported in Waddell (1982), in meters above sea level

Figure 1.--Location of Yucca Mountain area and selected water-level altitudes (modified from Robinson and others, 1988).

altitudes were computed based on the calibration, the manual water-level measurement and the surveyed altitude of the reference point.

This report is a companion and supplement to reports (Robison and others 1988; Gemmell, 1990) about periodically measured water levels in the Yucca Mountain area. Robison and others (1988) described the details of how the manual water-level measurements were made and corrected to compute the altitude of water level.

The water-level data were obtained as part of the Yucca Mountain Project of the U.S. Department of Energy. The Yucca Mountain Project is described by a Site Characterization Plan (U.S. Department of Energy, 1988). The data in this study were collected by the U.S. Geological Survey in cooperation with the U.S. Department of Energy under Interagency Agreement DE-AI08-92NV10874.

The data contained in this report were collected by Ronald J. Spaulding and Gary L. Otto, hydrologic technicians for Foothills Engineering, Inc. under the direction of Darrell A. Baldwin, U.S. Geological Survey. The data processing techniques were checked and verified by Michelle S. Boucher, Quality Assurance Specialist with Foothills Engineering, Inc. The authors processed the data and are responsible for all the data. The authors acknowledge the assistance of James H. Robison, U.S. Geological Survey (retired), who initially conceived of and designed the water-level network, and Leonard E. Wollitz, U.S. Geological Survey (retired), who implemented the water-level network.

WELL DESIGNATIONS

Each well used in the study of the Yucca Mountain area has a unique name or number. Wells on the Nevada Test Site (NTS) use a NTS designation, whereas wells off the NTS use a slightly different designation. Wells on the NTS begin with UE (U for underground and E for exploratory), followed by the NTS area number (always 25 in this report). This designation --UE-25-- commonly is followed by one or more letters signifying the purpose of the well or simply by a sequential letter, followed by a sequence number. Wells off the NTS begin with the letters USW (U for underground, S for southern Nevada, and W for waste). The designation--USW--is followed by one or more letters signifying the purpose of the well followed by a sequence number. The letters signifying purpose that are used in this report are G (drilled primarily to collect geologic data), H (drilled primarily to collect hydrologic data), p (drilled to collect data on rocks of Paleozoic age), and WT (drilled primarily to determine the altitude of the water table). The only well not using this designation system and referred to in this report is well J-13, which was drilled prior to development of the designation system used here.

Nevada State Coordinates are used to identify the location of wells cited in this report. These coordinates are for the central zone of Nevada and are based on a Transverse Mercator projection. The origin of this projection for the central zone of Nevada is latitude 34° 45′ N., and the central meridian is at longitude 116° 40′ W. The Nevada State Coordinates listed in the "Well Data, Transducer Output, and Water Levels" section are in meters north of the origin and in meters plus 152,400 east of the central meridian. The Nevada State Coordinates for the wells were determined by Holmes & Narver, Inc[1]., contractor to the U.S. Department of Energy for surveying at the NTS and Yucca Mountain area. Latitude and longitude values of the wells were calculated from the Nevada State Coordinates.

The Site ID number is used for unique identification of the well in the U.S. Geological Survey's computer files. The Site ID is generated by combining the original designations of the latitude and longitude with a two-digit sequence number. The Site ID is for convenience of identification only and should not be used as an actual location number because the original designations of latitude and longitude may be inaccurate. Even if original values of the latitude and longitude are revised later, the site ID for the well is not changed. If more than one well exists within the 1-second rectangle of latitude and longitude, the two-digit sequence number is used to ensure uniqueness of the Site ID.

Some wells within the water-level network have had packers or piezometers installed so the water level of discrete intervals could be measured. In these instances, before the packers or piezometers were installed, the well was assigned one Site ID (generally with a sequence number of 01), and each depth interval was assigned its own unique Site ID by incrementing the sequence number. Hence, some wells within the network have several Site ID's. When this occurs, all site ID's are listed by location in the "Well Data, Transducer Output, and Water Levels" section, and the interval of the well that is represented by each Site ID is identified. Water levels from different intervals in the well might represent different hydrologic conditions and may not be comparable.

WATER-LEVEL NETWORK

Well drilling for preliminary evaluation of the suitability of the Yucca Mountain site began in 1980; the first wells were completed in 1981. Water levels were measured as each well was completed and tested. After these initial water-level measurements, the U.S. Geological Survey began to measure the water levels periodically to determine stability of the original measurements and to determine if any cycles or trends occur in the water levels that might provide insight about the hydrologic system. The almost horizontal potentiometric surface beneath part of the area (Robison, 1984) indicated that long-term water levels might be needed at a number of wells to determine the hydraulic gradients with adequate precision. In addition, periodic measurements were not adequate to determine short-term water-level changes that could be used to evaluate conceptual models and mechanisms of ground-water flow beneath Yucca Mountain. In late 1983, testing of methods for continuous water-level monitoring began at well UE-25b #1. Continuous water-level records were obtained intermittently in well USW H-1 in 1983 and in well USW H-4 in 1984, while procedures and equipment were tested to overcome operational difficulties. In early 1985, procedures were sufficiently developed that formal data collection began. By 1986, the present water-level network for continuous monitoring had essentially evolved.

Short-term water-level changes, induced by barometric-pressure changes and earth tides, can be used to estimate hydraulic properties of the flow system. Hourly water levels are sufficient to make these estimates; hence that is the normal frequency of measurement in the continuous water-level network. Very short-term water-level changes, such as those induced by earthquakes

[1]Use of firm, brand, and trade names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey

and underground nuclear explosions, would normally not be detected by hourly measurements. To detect water-level changes with a duration of a few seconds would be very difficult with the equipment used in the continuous water-level network.

The water-level network has evolved into one that, by the end of 1988, included 25 wells (table 1), 14 of which were monitored continuously and 10 of which were monitored periodically, and 1 which was not monitored. During 1985-88, a maximum of 15 wells were monitored continuously. A summary of these wells is given in table 1; the location of the wells are shown in figures 1 and 2.

GENERAL DESCRIPTION OF WATER-LEVEL ALTITUDE

The water-level altitudes in the Yucca Mountain area range from about 706 m above sea level at well 230 S15 E50 18 CC 2 near Amargosa Valley to the south to about 1,187 m above sea level at well UE-29a #2 along Fortymile Canyon to the north. Water-level altitudes of selected wells are shown in figure 1. Water-level altitudes beneath Yucca Mountain are shown in greater detail in figure 2. Some of the wells in figure 2 are from the periodic water-level network described by Robison and others (1988) and are not discussed in this report. The highest water-level altitude is to the north at well UE-25 WT #6, at about 1,035 m above sea level.

In wells USW H-6, USW WT-7, and USW WT-10, west of Yucca Mountain, and in well USW H-5 on Yucca Mountain, the water levels all are about 775 to 776 m above sea level. Water-level altitudes are about 44 m lower at well USW H-3, approximately 1.4 kilometers east of well USW WT-7. From the eastern edge and southern end of Yucca Mountain to western Jackass Flats, the water level decreases from about 730 to about 728 m in altitude (fig. 2) and decreases further to 706 m at Amargosa Valley (fig. 1).

Well UE-25p #1 has a water-level altitude of approximately 752 m above sea level while nearby wells have a water-level altitude of approximately 730 m. However, well UE-25p #1 is completed in Paleozoic carbonate rocks, whereas all other wells were completed in overlying Tertiary volcanic rocks.

GENERAL DESCRIPTION OF WATER-LEVEL FLUCTUATIONS

The first wells in the Yucca Mountain area were completed in 1981 and some water-level measurements were made. By 1983, the water-level-measuring techniques were sufficiently developed to obtain high-precision water-level measurements. Between 1983 and 1988, water levels in the Yucca Mountain area have remained relatively stable. The water-level altitude for 1983-1988 in well UE-25 WT #17, which is located about 3 km south-southwest of the design perimeter drift (fig. 2), is shown in figure 3. For more than 5 years, the water-levels have been within a 0.5-m range with no apparent trend. The apparent water-level rise of about 0.2 m between April and June 1985 (fig. 3) corresponded to a change in measuring equipment and probably is not real (Robison and others, 1988, p. 67). This apparent change of about 0.2 m is small compared to the depth to water of 394 m.

Water levels in other wells in the area, for example, UE-25 WT #6 (Robison and others, 1988, p.37) and the lower intervals of USW H-1 (Robison and others, 1988, p. 101-102), had some significant changes following completion of the well, but the changes decreased over time and eventually stabilized. For example, well UE-25 WT#6, completed June 29, 1983, had a water-level

Table 1. *Summary of wells monitored for water levels*
[p, periodic measurements; c, continuous monitoring; d, discontinued]

Well number	Drilled depth (meters)	Date completed	Water level[1] Approximate depth (meters)	Water level[1] Approximate altitude (meters)	Water level[1] Frequency monitored at end of 1988
USW WT-1	515	5-83	471	730	p
USW WT-2	628	7-83	571	731	c
UE-25 WT #3	348	5-83	300	730	c
UE-25 WT #4	482	6-83	438	731	p
UE-25 WT #6	383	6-83	280	1,035	c
USW WT-7	491	7-83	421	776	p
USW WT-10	431	8-83	347	776	p
USW WT-11	441	8-83	363	731	c
UE-25 WT #12	399	8-83	345	730	p
UE-25 WT #13	354	7-83	304	729	c
UE-25 WT #14	399	9-83	346	730	p
UE-25 WT #15	415	11-83	354	729	p
UE-25 WT #16	521	11-83	473	738	c
UE-25 WT #17	443	10-83	394	730	p
UE-25b #1	1,220	9-81	470	731	c
UE-25c #1	914	10-83	400	731	d
UE-25p #1	1,805	5-83	362	752	c
USW G-3	1,533	3-82	750	731	c
USW H-1	1,829	1-81	572	731	c
USW H-3	1,219	3-82	752	732	c
USW H-4	1,219	6-82	518	730	c
USW H-5	1,219	8-82	703	775	c
USW H-6	1,220	10-82	526	776	c
USW VH-1	762	2-81	184	779	p
J-13	1,063	1-63	283	728	p

[1]Composite water level of saturated interval, or level of shallowest interval monitored

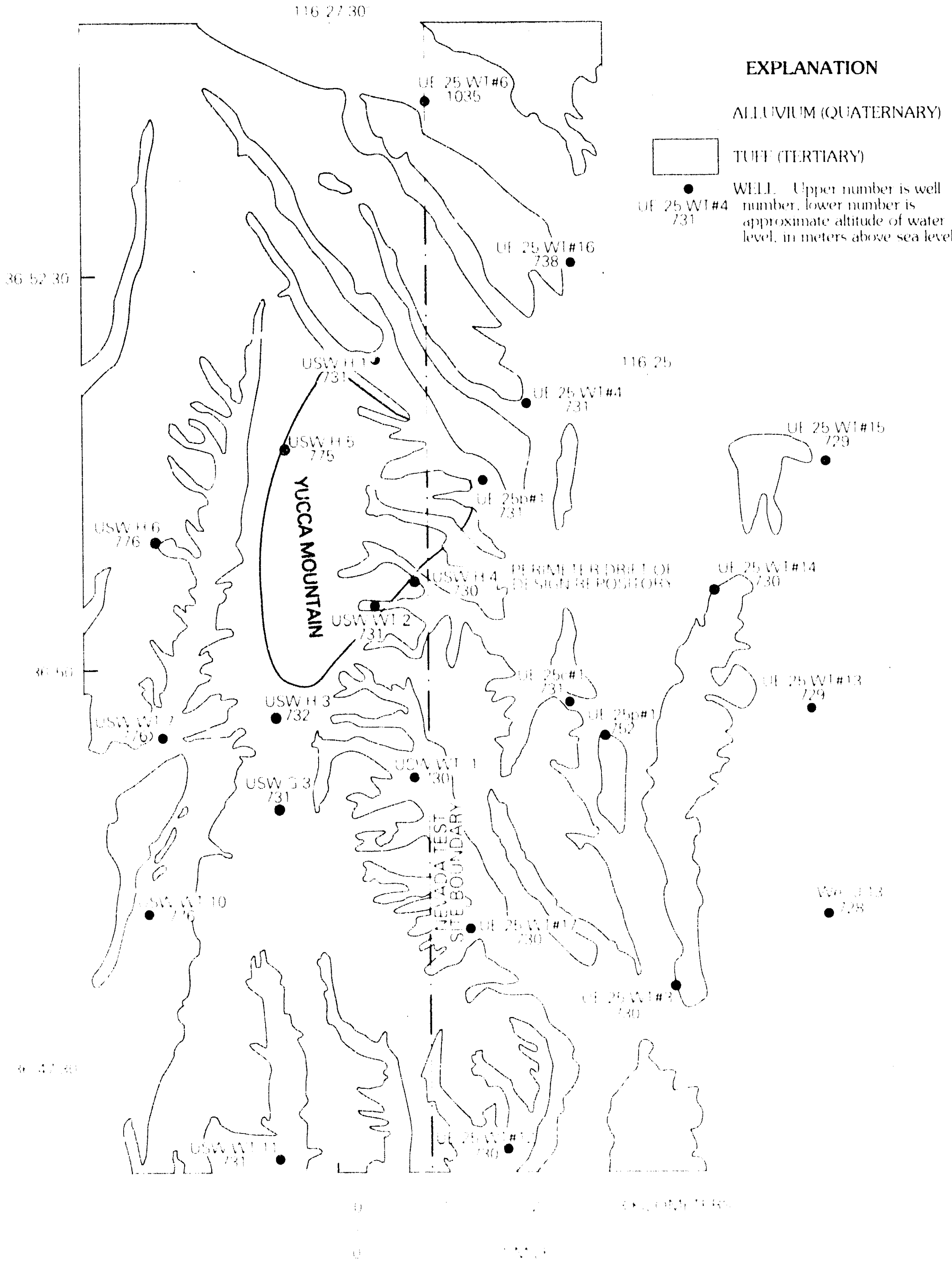


Figure 2.--Location of wells and 1988 water-level altitudes in the vicinity of Yucca Mountain (modified from Robison and others, 1988 and Gemmell, 1990).

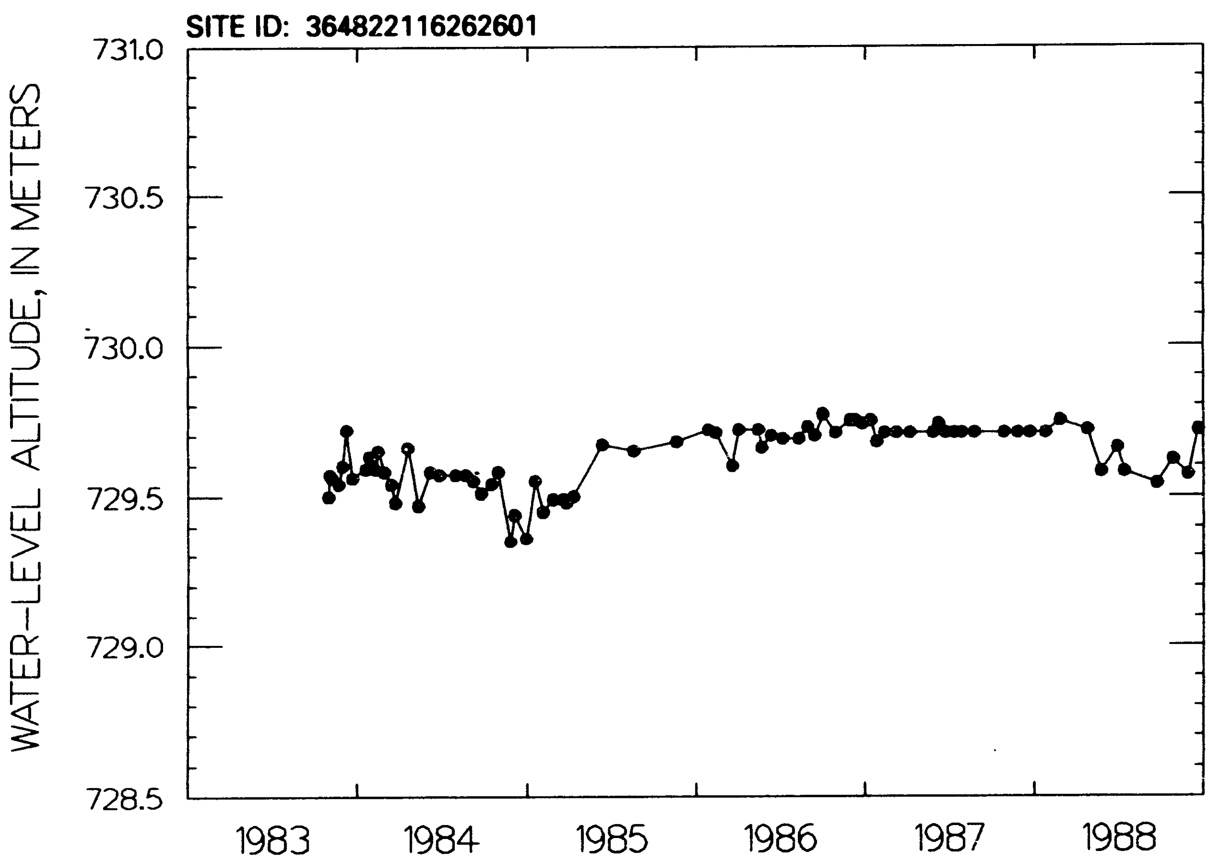


Figure 3.--Water-level measurements for well UE-25 WT #17 from 1983 through 1988.

altitude of 1,030.5 m on September 7, 1983 (Robison and others, 1988, p.36). One year later, the water level had risen about 2.7 m, 2 years later it had risen an additional 0.8 m and 3 years later, it had risen an additional 0.1 m (Robison and others, 1988, p. 36). Data in this report in the section "Well Data, Transducer Output, and Water Levels" indicate that by 1988, the water level may have stabilized at about 1035 m. The lower two intervals of well USW H-1 appeared to stabilize after about 2 years (Robison and others, 1988, p. 101-102). The early changes probably represent the length of time that water levels in these wells needed to return to equilibrium following drilling and testing. The long recovery period probably indicates very low permeability of the rocks penetrated by these wells.

Short-term changes in barometric pressure can cause corresponding short-term changes in water levels (Ferris and others, 1962, p. 83-85). In an open well that is cased below the water table and is completed in partially confined or deep unconfined aquifers (typical of the wells in the continuous water-level monitoring network), water levels may decline in response to increases in barometric pressure. Similarly, decreases in barometric pressure may induce a rise in water levels. These barometrically induced water-level changes are less than 0.2 m. Barometrically induced water-level changes occur periodically at semidiurnal and diurnal periods due to heating and cooling of the atmosphere. Other changes occur aperiodically over days to weeks and are associated with weather systems. The water-level altitude for March 1988 for well USW WT-11 is shown in figure 4. The barometric pressure (inverted) at well USW H-4 for the same period at land surface is shown in figure 5. There is a very close correspondence between the trends in figures 4 and 5. Barometric pressure changes at Yucca Mountain tend to be largest during the early spring and smallest during midsummer. Thus, water-level fluctuations tend to be largest during early spring and smallest during midsummer.

Water levels also respond to earth tides (Ferris and others, 1962, p. 86-87); water levels in some wells near Yucca Mountain exhibit response to earth tides. Earth tides, similar to ocean tides, are caused by the gravitational attraction of the Earth, the moon, and the sun. There are five principal earth tides (Melchior, 1966), with periods of approximately 12 and 24 hours. Near Yucca Mountain, the combined effect of the earth tides can cause water levels to fluctuate as much as 0.15 m over several hours to about 1 day. The water levels for March 1988 for well UE-25p #1 are shown in figure 6. The calculated earth tide (Harrison, 1971) for the same period is shown in figure 7. Although there is a general correspondence between the water level in the well (fig. 6) and the barometric pressure at well USW H-4 (fig. 5), there also is a very noticeable tidal component in the water-level fluctuations. During early, mid and late March, when the earth tides were large, the water-level fluctuations have two distinct daily peaks. During minimal earth tides, the two distinct daily peaks are not present.

DATA-COLLECTION SYSTEM

Periodic Measurements

Periodic water-level measurements at wells require onsite visits by trained personnel who make the measurements and record the results. Frequency of periodic measurements have varied over time. Some newly drilled wells were measured more frequently immediately after completion; at times, some wells have been measured less frequently because of temporary shortage of personnel, breakdown of equipment, or inaccessibility due to road washouts. Frequency of periodic measurements generally has been once to twice per month with a decrease in frequency since 1988.

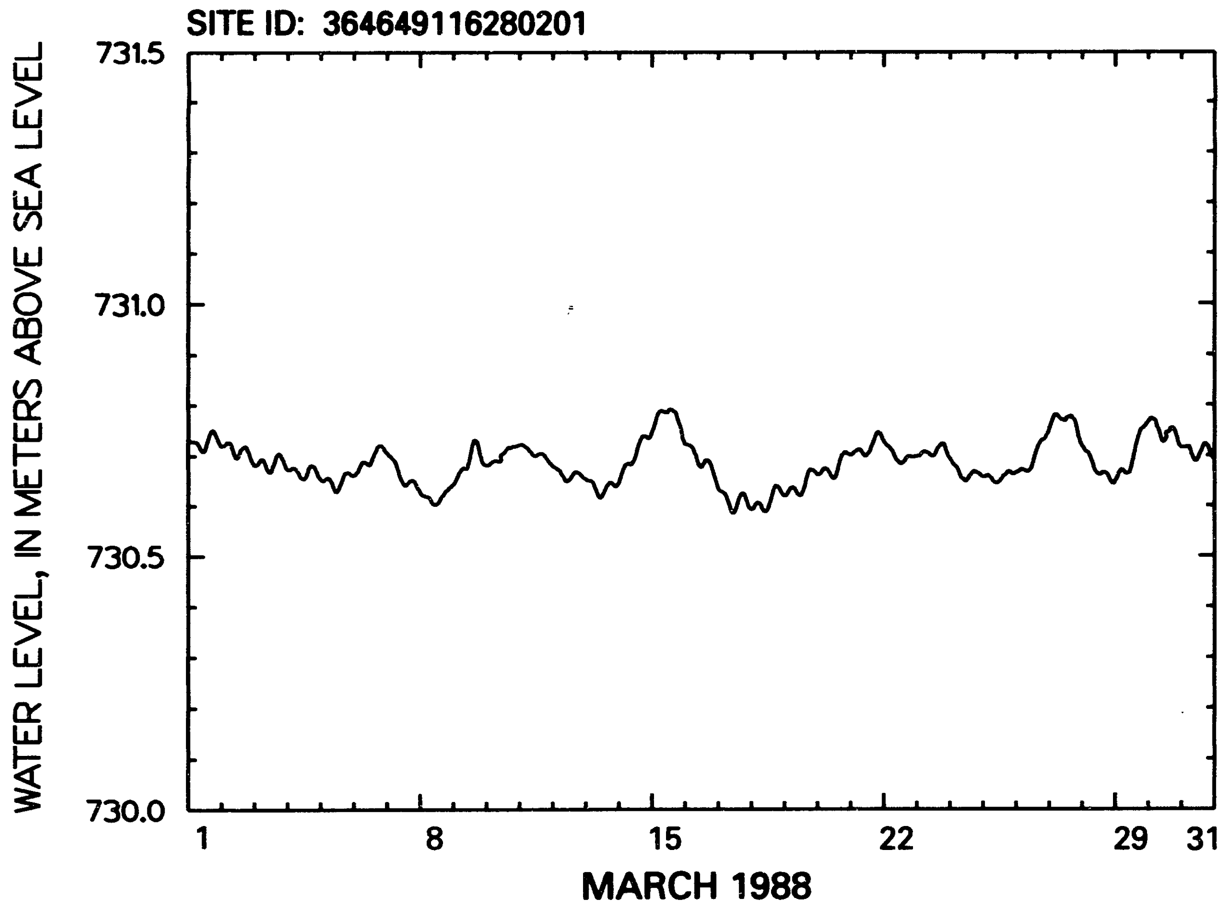


Figure 4.--Water-level measurements for well USW WT-11 for March 1988.

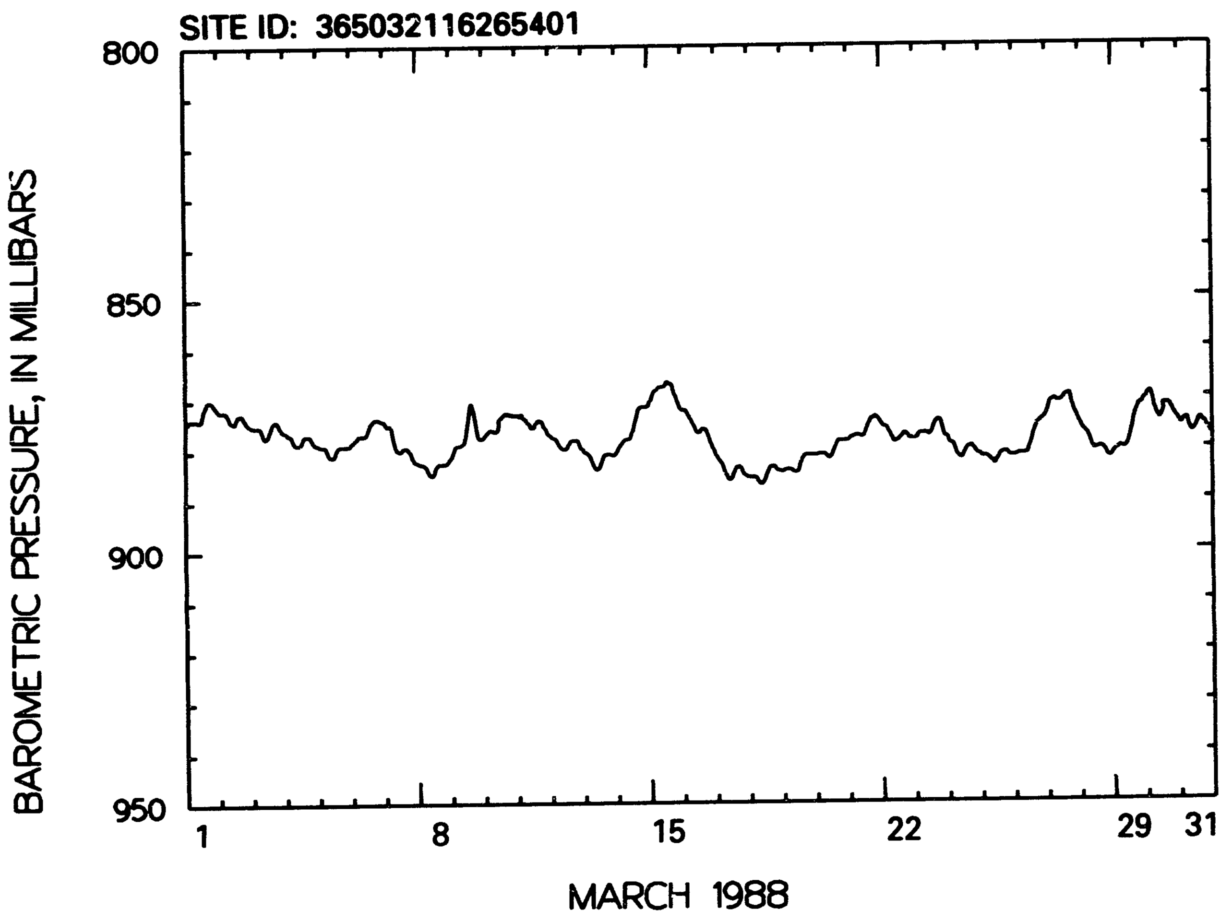


Figure 5.--Barometric pressure (inverted) at well USW H-4 for March 1988.

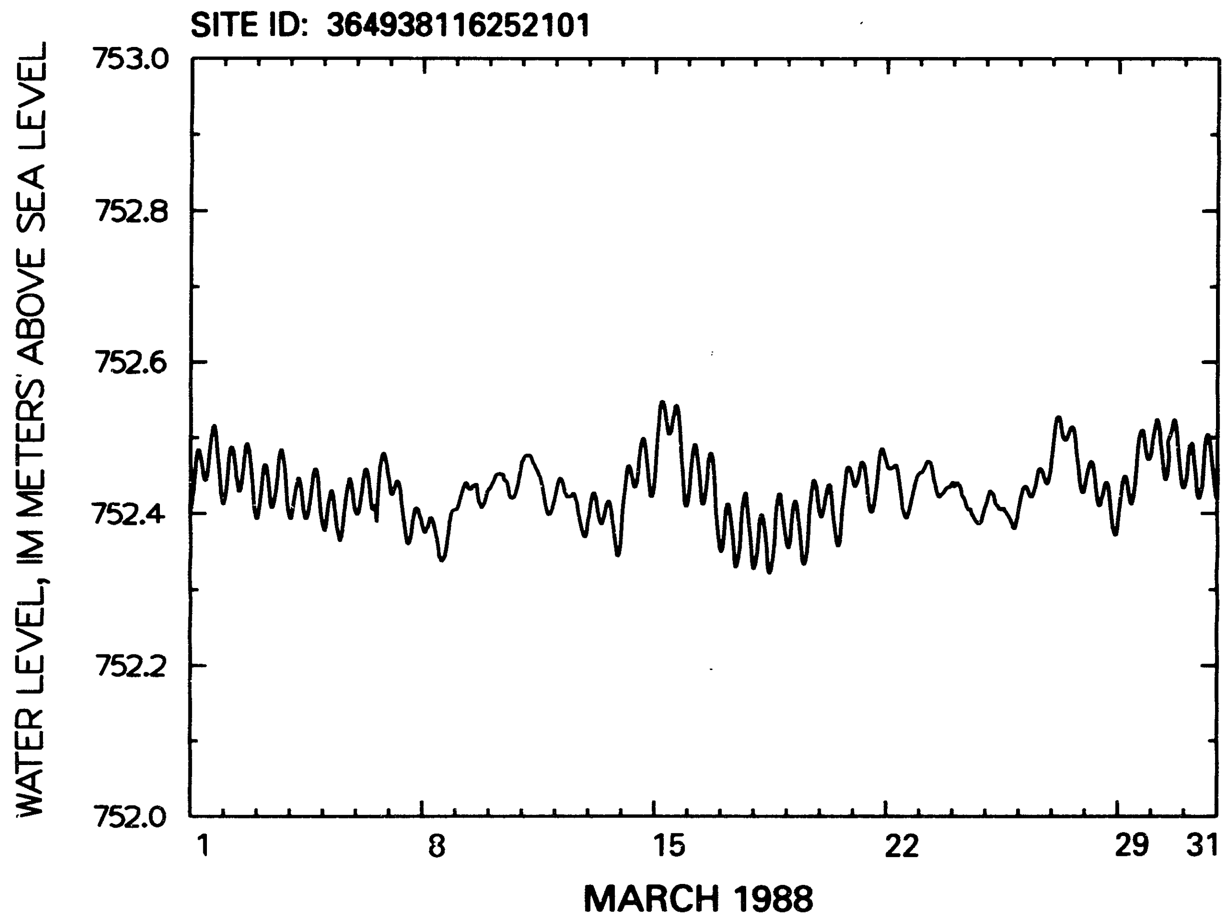


Figure 6.--Water-level measurements for well UE-25p #1 for March 1988.

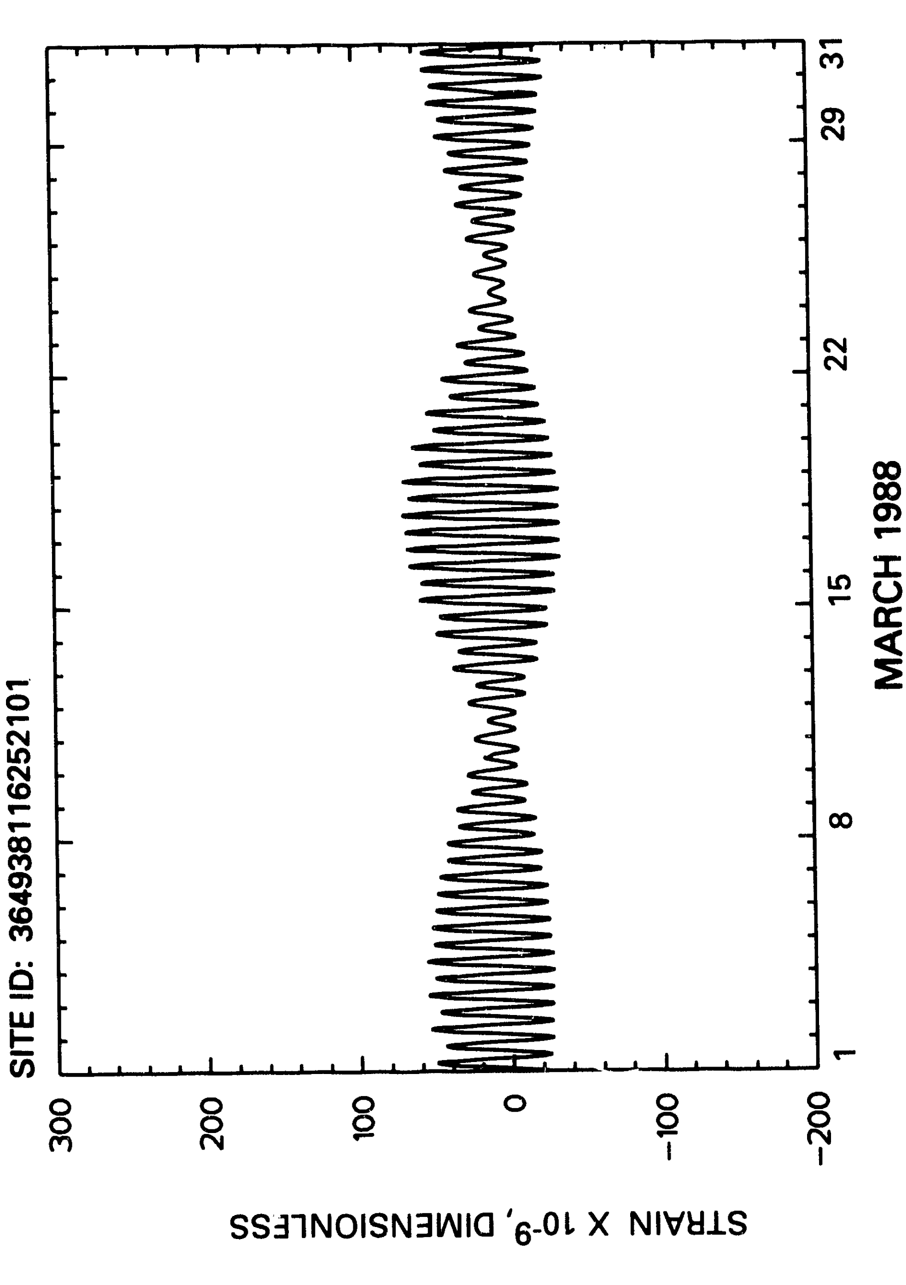


Figure 7.--Calculated earth tides for March 1988.

Periodic water-level measurements of the water-level network have been made using single and multiconductor cables and steel tapes. The equipment and measuring techniques vary and depend on a number of factors, such as development and availability of equipment, well construction that limits some equipment or techniques, or length of time and number of personnel needed for a technique. Robison and others (1988) described the equipment and techniques used to make periodic measurements. The precision of the measurements has increased over time as the calibration techniques and use of the equipment have been refined and as personnel have gained experience.

Periodic water-level measurements have been made near Yucca Mountain since 1981. Most water-level measurements made in 1981 and in the first part of 1982 were made using a single-conductor cable. Most measurements from September 1982 through April 1985 were made using a four-conductor cable. Most measurements after May 1985 were made using steel tapes. A four-conductor cable was used after May 1985 only if the steel tape could not be lowered into and retrieved from the well.

Continuous Measurements

Continuous water-level measurements require that equipment be left in the well to record water levels. Trained personnel install the equipment in the well, occasionally calibrate or replace equipment, and periodically retrieve the data from the recorder.

The data presented in this report are not actually continuous data; they are a series of discrete points of sufficient frequency that they seem to be continuous. At the end of 1988, standard operation in the continuous water-level network was to collect one reading every hour, although before 1988 at some wells, standard operation was to collect one reading every 10 minutes and to average the six readings to obtain an hourly mean. The hourly readings or the 1-hour averages were stored and later retrieved from the site. In some instances, data were collected more frequently.

Pressure transducers were used to measure water-level fluctuations. Because of the large depths to water, as much as 750 m, traditional water-level sensing methods -- float-cable-pulley system, water-seeking device, and bubble tube -- were not feasible. However, electronic signals from a submerged pressure transducer were relatively easy to transmit through a multi-conductor suspension cable to a recording device accessible to personnel on the surface. Electronic data loggers at the surface were used to power the transducer and to record data from the transducers.

Equipment

The continuous water-level network used a transducer to sense its submergence depth, a wireline cable to transmit the information between the transducers and the surface, and a data logger to power the transducer and to record the data. An external 12-volt battery provided power to the system and a solar panel kept the battery charged.

A wireline cable, consisting of four conductors, appropriate insulation, and two external wire wraps (for strength and stability), was used to transmit signals between the surface and the downhole pressure transducer. The required length of wireline cable to monitor a typical well at Yucca

Mountain weighed several tens of kilograms, so power equipment was used to install it and calibrate the system.

The water-level monitoring systems were periodically calibrated; the calibration usually included a manual water-level measurement. These manual water-level measurements were made using either a four-conductor cable or a steel tape. Equipment for these manual measurements, its use, and the necessary corrections and adjustments are described in detail by Robison and others (1988). The manual measurements, after adjustments, result in altitudes of water surface at the time of calibration.

Transducers

A transducer is a device to convert a change in a mechanical quantity (such as pressure) into a change in an electrical quantity (such as resistance). Pressure transducers are a type of transducer used to measure pressure and a depth-measurement transducer is a specific type of pressure transducer that can be immersed in water to measure the depth of submersion. In this report, the term "transducer" refers to a depth-measurement pressure transducer.

The transducer consists of a strain gage to convert pressure into electrical resistance and a Wheatstone bridge to allow measurement of the change in resistance. A constant voltage is applied across the bridge, and the voltage difference between the fixed-resistance part of the bridge and the variable-resistance part (because of the strain gage) is measured. As depth of submergence increases, transducer output voltage increases. The applied voltage is in the 5- to 10-volt range, whereas the output voltage (with 10 volts applied and the transducer submerged to its pressure limit) is in the 30- to 100-millivolt range. Output voltage is directly proportional to input voltage, assuming constant submergence, so if the input is decreased by one-half, the output is decreased by one-half.

Transducers are made for a range of pressures. Pressure ranges in the continuous water-level network have varied from 0-5 pounds per square inch (submergence to 3.5 m) to 0-100 pounds per square inch (submergence to 70 m) with the smaller pressure range more frequently used. An absolute transducer measures absolute pressure, whereas a gage transducer measures pressure relative to atmospheric pressure. A gage transducer has a vent tube from one side of the strain gage to above the water surface. A gage transducer is preferable in the water-level network because then only water-level fluctuations (and not air-pressure changes also) affect the transducer output. Both gage and absolute transducers have been used in the water-level network.

The transducers were calibrated when installed in the well, when removed from the well (if possible), and at times while in service in the well. The transducers were calibrated every 4 months while in service in 1988 but only infrequently before 1988.

The calibration consisted of manually raising or lowering the transducer in increments and noting the change in transducer output. The data logger (described in the next section) was used in the calibration to provide the applied voltage and to measure the output voltage, so the calibration was for the transducer data-logger system and not just for the transducer.

On October 1, 1987, the transducer data-logger system at well USW WT-2 was calibrated. The calibration started with the transducer submerged about 1.52 m below the water surface; this starting point is referred to as the set point. The following values were obtained:

Displacement from set point (meters)	Transducer output (millivolts)
0.000	9.845
0.061	9.564
0.122	9.076
0.183	8.721
0.244	8.286
0.305	7.853
0.610	5.943
0.914	3.899
1.219	1.958
1.524	0.004
1.676	-0.081

The transducer output is the average of three readings taken after the transducer output had stabilized. The last point is off the trend of the rest of the points (fig. 8) indicating that the transducer was no longer submerged. A regression analysis was performed on the data, excluding the last point. The slope of the regression line was -6.506 millivolts per meter, the intercept of the regression line was 9.891 millivolts, and the coefficient of determination was 100.0 percent. The slope of the regression line, the transducer output at the set point after calibration, and the manual water-level measurement were used to convert transducer output to water-level altitude.

Data Loggers

The Campbell Scientific 21X Micrologger (data logger) used in the continuous water-level network is a microprocessor-based data-acquisition system. The data logger is a combination microprocessor, clock, voltage regulator, controller, data processor, and data-storage device. It must be continuously powered to maintain its electronic memory. The power requirements are so small that a battery can provide the needed power. The data logger is a programmable unit, and most aspects of its operation can be altered. The variables described in this section were defined while programming the data logger.

The data logger provided a 5,000-millivolt excitation to the transducer for 10 seconds and then read the transducer output for 250 microseconds. The data logger could read ±50 millivolts. If multiple transducers were installed in a single well, one data logger controlled all the transducers.

In 1985, the data logger made one reading on each transducer every 10 minutes and saved the readings in temporary memory. After six readings were collected, the data logger calculated the arithmetic mean and stored the result. Later, the programs were changed, and by 1988, all data loggers made and stored one reading per hour. In special cases, readings were made more frequently. In addition to transducer output, the data logger also read the battery voltage, the excitation voltage, and the internal temperature of the data logger. These variables were important to evaluate the reliability of the recorder. The data logger stored all of the preceding data in its memory plus the Julian day and time of the reading. Using output from one transducer plus

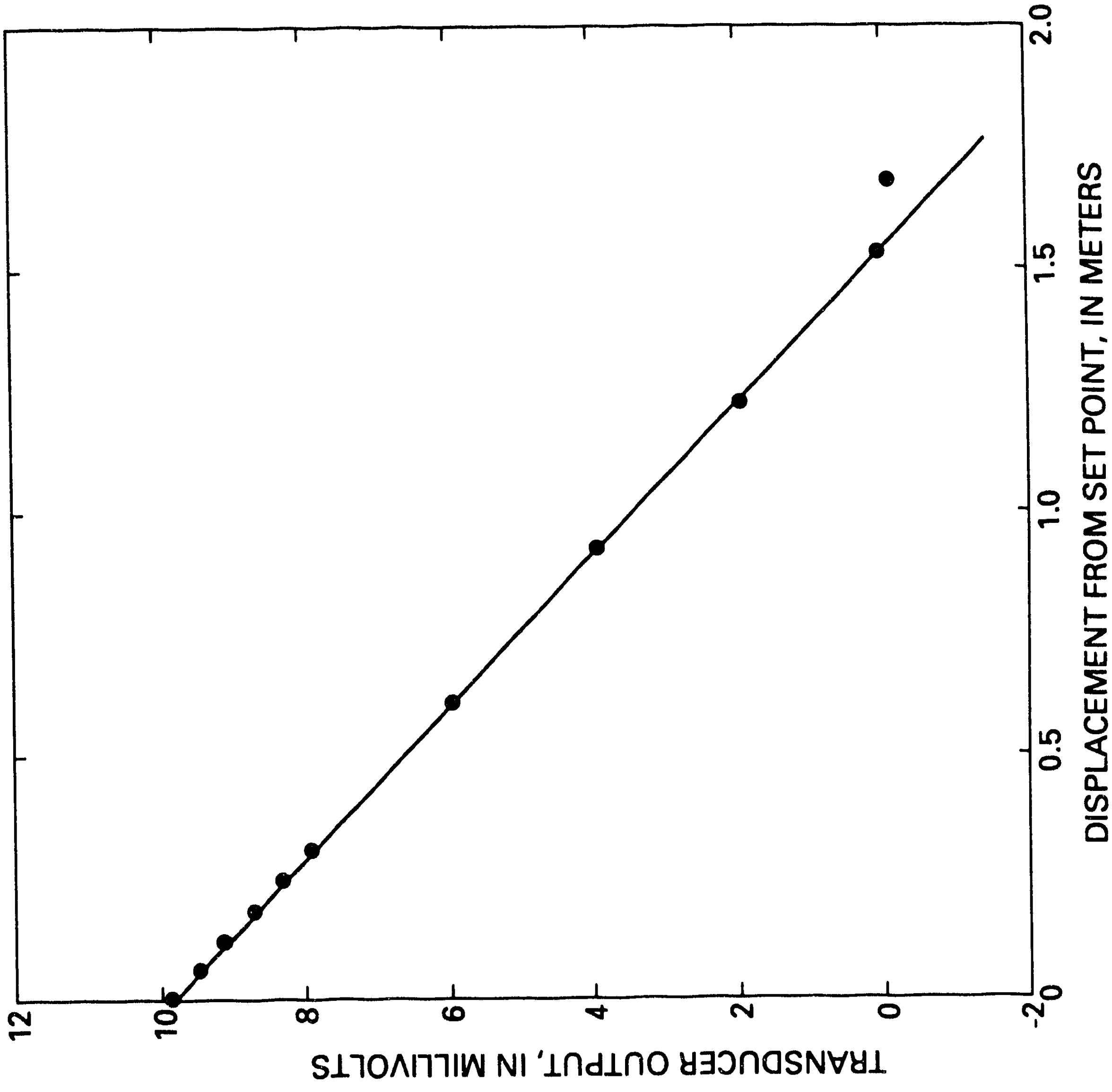


Figure 8.--Transducer calibration for well USW WT-2 on October 1, 1987.

the indicator data, the data logger, which has maximum memory, had sufficient memory for 4 months of data. Using four transducers, the data logger could store 3 months of data. The data logger used a "write-over ring memory," in which, when the memory is full, new data were written over the oldest data.

Data from the data logger were transferred to cassette tapes through a serial port on the data logger approximately every 15 days. Two separate cassette tapes in two separate tape recorders were made in case one system malfunctioned. A voice recording on the tape identified the well from which the data were recorded. The data on the cassette tape were then transferred to a computer for subsequent processing.

Processing and Adjustments

The data stored in the data loggers and transferred to a computer were not water-level data but rather transducer output. Several steps were taken to convert the transducer output to water-level data. First-level filtering removed extraneous values and converted the data to a convenient format. The data then were evaluated to determine reliable periods of record. Data for these periods were converted to water-level altitude with adjustments, if necessary, for absolute transducers.

First-Level Filtering

First-level filtering edited the transducer output for non-data points and calibration data. Non-data points were recorded when the data logger could not obtain a voltage from the transducer. Instrument malfunction, instrument failure, and other undetermined effects caused non-data points to be recorded. The non-data points were recorded as ±6,999 or ±99,999 depending on how the data logger was programmed. These values were deleted from the data file and the deletion resulted in gaps in the record. Transducer output recorded during calibration also were deleted from the data file during first-level filtering.

First-level filtering also adjusted the transducer output to a standard voltage. The excitation voltage to the transducer was normally 5,000 millivolts. This voltage, while not exact, generally was maintained within very close tolerances by the data logger. All transducer output was adjusted to 5,000 millivolts excitation using the equation:

$$T_C = T_R\, 5000/V_X \qquad (1)$$

where:

T_C is the adjusted transducer output, in millivolts;
T_R is the unadjusted transducer output, in millivolts;
V_X is the excitation voltage, in millivolts; and
5,000 is the standard excitation voltage, in millivolts.

The first-level filtering was done using a computer program. The program also reformatted the data into a more usable format. The format of the data, as transferred from the data logger, depended on how the data logger was programmed. If the program in the data logger was changed, the format of the data would change. To eliminate problems due to format changes, all transducer output was converted to a standard format for further processing.

The first-level filtered output is graphically displayed in the sections of this report pertaining to individual wells. These graphs show that each transducer had its own characteristic output. Some transducers tended to have output that drifted more than others. Some transducers were more sensitive than others. Some transducers seemed to be sensitive to large pressure changes but insensitive to small pressure changes. These transducer-output graphs should not be interpreted as water-level changes; they are only graphs of first-level filtered transducer output.

Conversion to Water-Level Altitude

If a transducer were to function for a long time so it was calibrated several times during its life, if its output were free of drift, and if its characteristics did not change with time, the transducer output could have been converted relatively easily to water-level altitude. However, this ideal situation never occurred in the continuous water-level network and, in most cases, the transducer output was far from ideal. As a result, much of the transducer output in this report could not be converted to water-level altitude.

First-level-filtered transducer output was evaluated by two hydrologists for data that could be converted to water-level altitude. The hydrologists examined the data at a time scale at which hourly and daily variation could be clearly seen to determine the validity of the data. The data were compared to barometric-pressure record, earth-tide potential, and other periods of record for the same site and depth interval. The examination was done by the hydrologists independently of one another; when both agreed the data were valid, the data were selected for conversion to water-level altitudes. Only full days of data were selected for conversion; the one exception being partial days may have been converted when a transducer was initially installed. If one or both hydrologists were not convinced the data were valid, the status of the data was left as indeterminate and the conversion from transducer output to water-level altitude was not done. The indeterminate status did not necessarily mean the data were invalid; it simply meant the hydrologists were not convinced the data were valid.

For those data that were selected for conversion, the regression-line slope and the manual water-level measurement determined during calibration were used to convert the transducer output to water-level altitude. The manual measurement indicated the altitude of the water level at the time of the calibration, whereas the slope of the regression line related the change in depth of submergence to change in transducer output.

The equation for converting transducer output to water-level altitude under ideal conditions is:

$$W = W_c + (T_c - T)/S_c \qquad (2)$$

where:

W is the water-level altitude, in meters;

W_c is the water-level altitude at calibration, in meters;

T_c is the transducer output at set point following calibration, in millivolts;

T is the transducer output, in millivolts; and

S_c is the slope of the regression line, in millivolts per meter.

For example, for well USW WT-2 on October 1, 1987, the water-level altitude at calibration was 730.64 m level (based on a manual measurement). The calibration indicated that a 1-m decline in water level would cause the transducer output to decline by approximately 6.5 millivolts. After calibration, the transducer output increased 0.07 millivolts in the next 2 hours, remained constant for 1 hour, and then decreased 0.18 millivolts in the next 16 hours. This change in transducer output would indicate a water-level altitude of 730.65 m 2 hours after calibration and 730.62 m 17 hours later.

Although the slope of regression generally did not change dramatically between calibrations, it usually changed some. The change in slope was assumed to occur linearly between calibrations, so S_c in equation 2 changed between calibrations. The water-level altitude was assumed to have remained constant from the last transducer output prior to calibration through the first transducer output after calibration. This assumption probably introduced, at most, a few hundredths of a meter error in the water-level altitude as calculated. If more than one calibration was done on a transducer on the same day, the last calibration was used to calculate water-level altitude unless the coefficients of determination of the regression lines indicated that another calibration was superior. Some specific assumptions were made for processing certain periods of record for some wells; specific assumptions are discussed in the "Well Data, Transducer Output and Water Levels" section.

Adjustment for Absolute Transducer

One further adjustment was made for output obtained using absolute transducers. An absolute transducer responds not only to water-level changes but also to barometric-pressure changes. The response of the absolute transducer to barometric-pressure change was removed from the output to attain the water-level altitude.

Barometric-pressure data were obtained from barometers at wells USW H-4, USW UZ-1 (near well USW H-1), and USW G-1 (also near well USW H-1). The barometer at well USW H-4 was the primary source of data; the other barometers used only to supply data for missing periods of record. The barometer at USW UZ-1 was used to supply data for the gaps whenever possible. The data were merged into a single data set, in millibars, at the altitude of well USW H-4. These barometric-pressure data were converted to an equivalent column of water and were used to adjust the apparent water level for the individual wells during those periods when an absolute transducer was used. The adjustment was zero at the calibration because the water level was a measured value. When the barometric pressure was higher than at calibration, the increase was subtracted from the apparent water level to obtain a true water-level altitude. When the barometric pressure was lower than at calibration, the decrease was added. One millibar change in barometric pressure translated to approximately 10.2 mm adjustment in the water level.

Quality Assurance

Data in this report will be used in the evaluation of the suitability of the Yucca Mountain site for a potential high-level nuclear-waste repository. Confidence in the reliability of collection, processing, and reporting of the water-level data is necessary so the data may be used with confidence to assess the expected performance of the potential repository. A quality-assurance program has been implemented to support the reliability of the data.

Onsite Checks and Processing

Water-level measurements were obtained by methods described by formal technical procedures as required by the quality-assurance program. The technical procedures included tests and adjustments done during the measuring operation to ensure that the equipment was operating properly and that expected precision and accuracy were attained. For example, the procedure for measuring water-level changes with a pressure transducer specified how to install the transducer, how to calibrate it in place, and how to maintain the records of the calibrations.

Data were recorded in logbooks at the well site. Data recorded were: time and date of the visit or calibration; names of operators making the visit; technical procedure used (for calibration); identification of specific equipment used for calibration; and correction factors, if any, applied to the data at the well site. In addition, the entry in the logbooks may have included comments about anything that may have been relevant to the data, such as discussion of problems with equipment or weather conditions during the calibration.

Office Processing and Review

After completion of the calibration, the data were reviewed for completeness and accuracy by the supervisor responsible for onsite operations. The original logbooks and records were maintained at the onsite operations headquarters on the Nevada Test Site. Photocopies were periodically transmitted to the office of the project chief for water-level measurements, which is located in Denver, Colo. The records were reviewed, and any needed adjustments not done during onsite operations were made.

The transducer output was entered into a temporary data base and was plotted to facilitate general review for reasonableness and to discover any instrumentation problems. After this review, the transducer output was converted to water levels (if appropriate). In addition to being published by the U.S. Geological Survey, both the first-level filtered transducer output and the water-level altitude were placed in permanent computer data bases, such as the Unit Values file of the National Water Information System used by the U.S. Geological Survey.

WELL DATA, TRANSDUCER OUTPUT, AND WATER LEVELS

Information and data for individual wells are included in the following sections. Each well is presented in a separate section; each section is further subdivided. Each section begins with sources of information about the well. Much of this is published information; complete bibliographic citations are in the "References Cited" section. "Well specifications" summarizes information about the well, including location, drilling specifications, and intervals monitored. "History of instrumentation, calibrations, and comments" lists equipment used to monitor water levels, including a list of transducers used and their calibrations. The character of the transducer output is described in "Transducer output" and the periods of record that were converted is given in "Water-level altitude". First-level filtered transducer output is presented in graphical form in a figure. The scales used in the figure were selected to present the data in as much detail as possible while still presenting most of the data. Some data may be off scale in these plots, but these data are very unlikely to be usable. Some periods of record may be plotted twice at different scales to present as much detail as possible and, in some cases, the scale may change during the period of record. Another figure presents water-level altitude if transducer output was converted to water levels. The scales may change in this figure, but full scale is always 2.5 m. The daily mean water-level altitudes where transducer output was converted to water-level altitude is presented in a table. A daily mean water-level altitude was not calculated if a 5-hour or larger gap occurred during the day. Monthly mean, minimum, and maximum water-level altitudes were calculated from the daily mean values if a complete month of daily mean water-level altitudes existed.

Water-Table Wells

A series of water-table wells were drilled from April 1983 to May 1985. The purpose of these holes was to determine the location of the water table. Data about six water-table wells are presented in this section of the report. Fourteen wells are listed in table 1. In addition to these wells, well UE-25 WT #5 was drilled but was abandoned because of adverse hole conditions and well UE-25 WT #18 was drilled but the access tubing in it did not reach the water table. Two wells, USW WT-8 and USW WT-9, were planned but were not yet started when drilling was suspended in 1986.

The water-table wells were drilled in a similar manner. Drilling started with a 375-mm bit and surface casing was set. Drilling continued with a 222-mm bit to below the water table. Depth of penetration below the water table ranged from 44 m to 99 m. The wells were not cased below the water table. A 62-mm inside-diameter tubing with a well screen on the bottom provided an access for measuring water levels.

Well USW WT-2

Information about the history of well USW WT-2 and about previous data from the well was obtained from various sources. These sources are: Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1986a, 1987c).

Well specifications

The following are specifications for well USW WT-2:

1. Location and identification:

   Latitude and longitude: 36°50'23" N.; 116°27'18" W.
   Nevada State Central Zone Coordinates (m): N 231,849; E 171,274.
   U.S. Geological Survey Site ID: 365023116271801.

2. Drilling and casing information

   Well started: July 8, 1983.
   Well completed: July 16, 1983.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; bottom-hole core obtained.
   Total drilled depth: 628 m.
   Bit diameter below water level: 222 mm.
   Casing extending below water level: None [surface casing only, to a depth of 18 m].

3. Access to and description of interval for measuring water levels:

   62-mm inside-diameter access tubing that has a 3.6-m long well screen on bottom, extending from land surface to a depth of 622 m; saturated interval of borehole within the Prow Pass Member of Crater Flat Tuff.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,301.13 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.53 m, based on depth to water of 571 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from July 20, 1983, through March 20, 1985. Beginning in March 1985, the water level has been monitored continuously, using a downhole pressure transducer and a data logger at the land surface.

The following transducers were used in well USW WT-2:

[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
03-20-85	09-23-85	Gage	Psi-Tronix	15	1845
09-23-85	08-21-86	Gage	Senso-metric	10	4J309
08-21-86	10-01-87	Gage	Druck PDCR 10/D	10	135534
10-01-87	12-31-88	Gage	Druck PDCR 10/D	10	153536

The following calibrations of the water-level monitoring system were performed in well USW WT-2:

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1845	03-20-85	-4.381	1.000	03-20-85	730.14
4J309	09-23-85	-12.574	0.995	09-23-85	730.56
135534	08-22-86	-6.471	1.000	08-21-86	730.58
153536	10-01-87	-6.506	1.000	10-01-87	730.64
153536	02-11-88	-6.247	0.997	02-11-88	730.66
153536	06-15-88	-6.470	1.000	06-15-88	730.68
153536	10-25-88	-6.350	0.999	10-25-88	730.73

Transducer output

Transducer output from March 1985 through December 1988 is shown in figure 9. These data are the transducer output after first-level filtering (described in the "First-Level Filtering" section) had been applied. The first transducer (serial number 1845), in use between March and September 1985, generally produced erratic output (fig. 9-A). The second transducer (serial number 4J309), in use between September 1985 and August 1986, produced output that drifted downward over time. The rate of drift increased with time until the transducer failed completely in August 1986. The transducer output in figures 9-B and 9-C for 1986 is shown at two different scales so that both the total range and part of the details can be seen. The third transducer (serial number 135534), in use between August 1986 and October 1987, produced reasonable output for about 8 months with some exceptions. There was a gap in the output in November 1986 due to data-logger failure. There were some apparently anomalous outputs in December 1986, but the cause of the anomalies could not be determined. The third transducer produced apparently anomalous output beginning in May 1987 (fig. 9-D). The anomalies continued until the transducer was replaced. The fourth transducer (serial number 153536), in use between October 1987, and December 1988, produced apparently reasonable output for more than 1 year until November 1988 (fig. 9-E), when the system was grounded, causing total system failure.

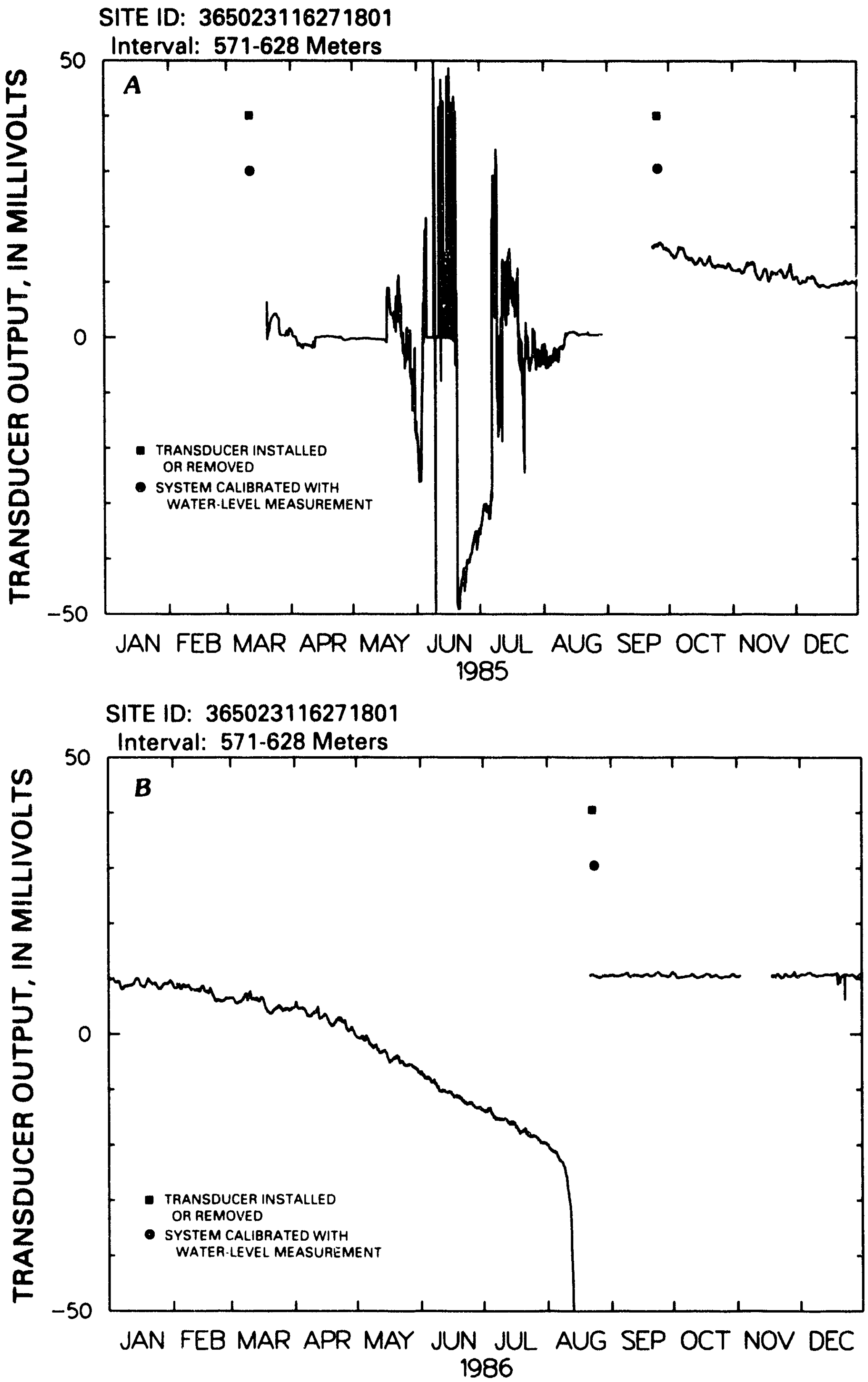
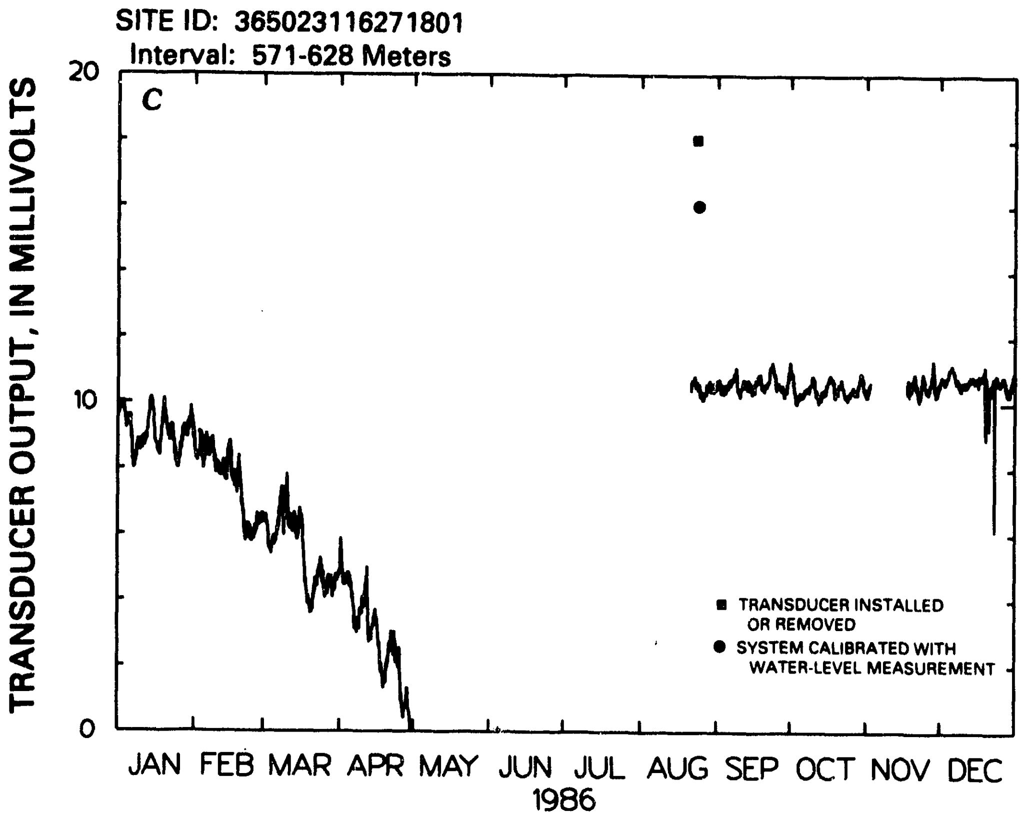


Figure 9.--Transducer output for well USW WT-2.



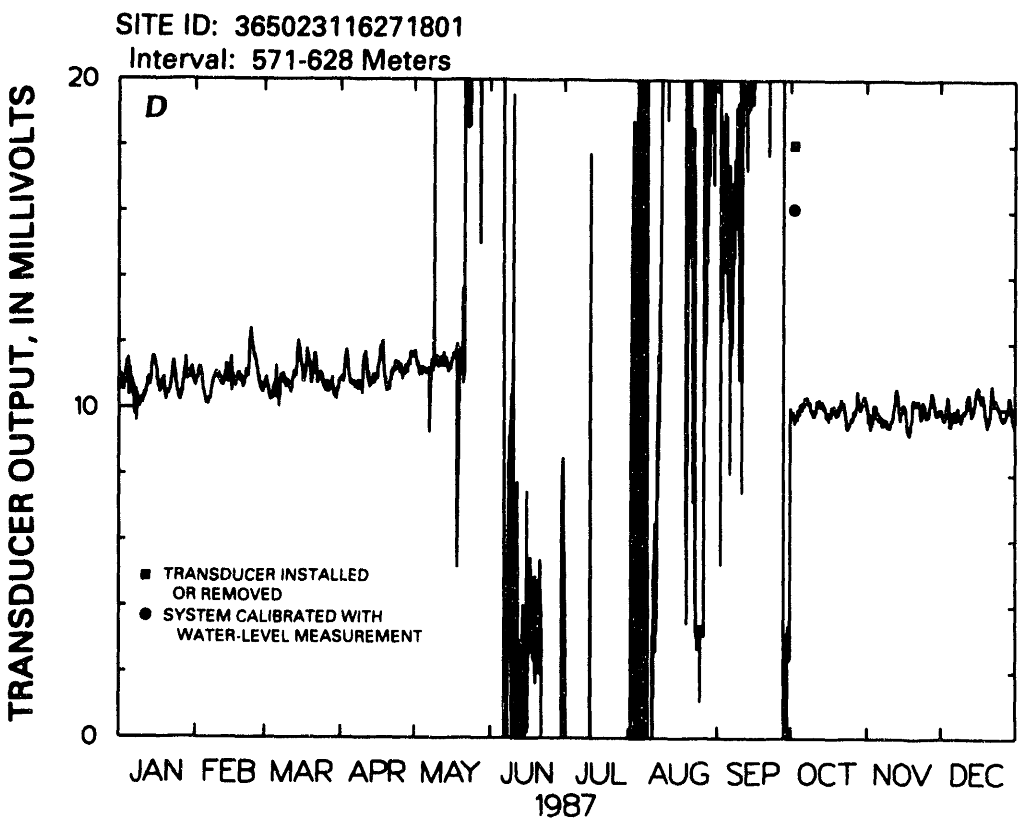


Figure 9.--Transducer output for well USW WT-2.--Continued

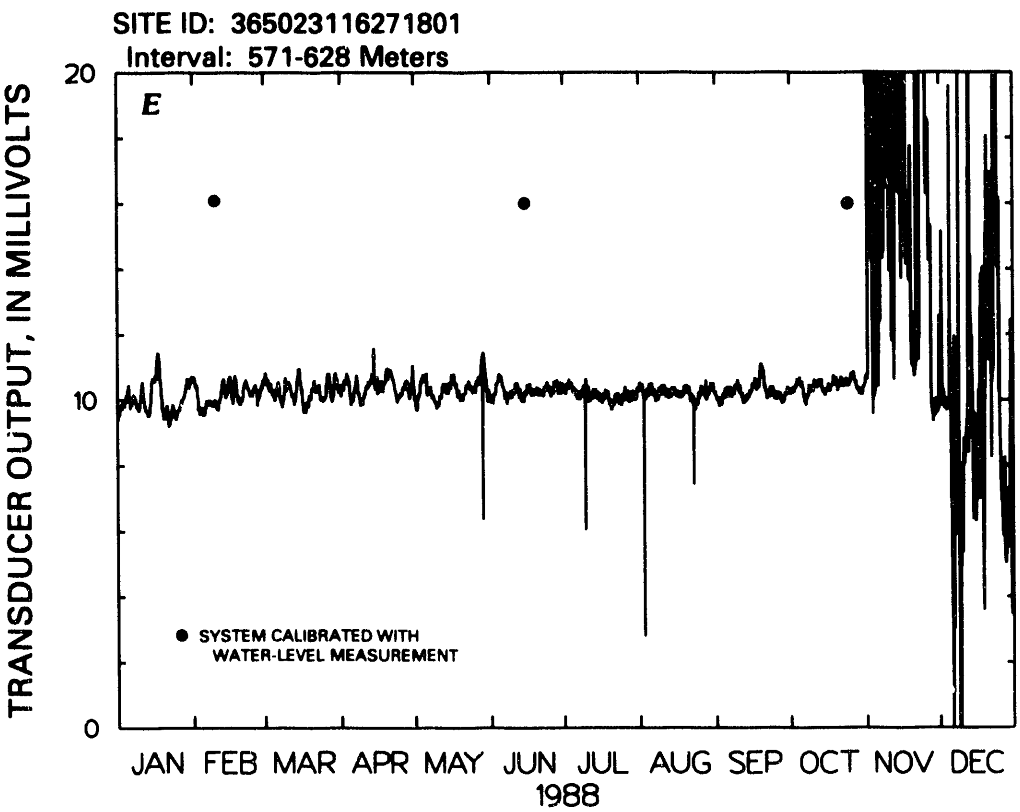


Figure 9.--Transducer output for well USW WT-2.--Continued

Water-level altitude

In addition to measured water-level altitudes, water-level altitudes were estimated on the following days:

Date	Estimated water-level altitude (meters)
04-20-86	730.64
07-31-86	730.64
05-07-87	730.58

The first two altitudes were estimated to remove what was judged to be transducer drift. The third altitude was estimated to end a convertible period; transducer 135534 failed about 5 months before a measured water-level altitude.

There were four spikes in the in the transducer output in 1988 (fig. 9-E). Each of these spikes represents a single transducer output that deviates from the trend of the record. These spikes were not coincident with a site visit or any other identifiable event and probably represent a system malfunction of some type. The details of the spikes are as follows:

Date	Time	Value (millivolts)	
		Recorded	Expected
05-29-88	0700	6.35	11.20
07-10-88	1200	6.02	10.34
08-03-88	1300	2.78	10.12
08-23-88	1500	7.41	10.04

In this table, the expected value is the mean of the transducer output 1 hour before and 1 hour after the spike. The spikes, if converted to water levels, would represent water-level changes in a 1-hour period from 0.4 to 1.1 m. Because the possibility exists for some sort of system malfunction, these four points were not converted to water-level altitude.

Transducer output was converted to water-level altitude for the following periods:

Beginning date	Ending date
08-22-86	11-02-86
11-18-86	12-19-86
12-24-86	01-03-87
01-08-87	03-04-87
03-08-87	05-06-87
10-01-87	02-10-88
02-12-88	11-01-88

Only transducer output for the latter part of November 18, 1986, after a new data logger was installed, was converted to water-level altitude. The water-level altitudes are shown in figure 10 and the daily mean water-level altitudes are given in table 2. Approximately 46 percent of the transducer output was converted to water-level altitudes. The longest period was 264 days, February 12 through November 1, 1988.

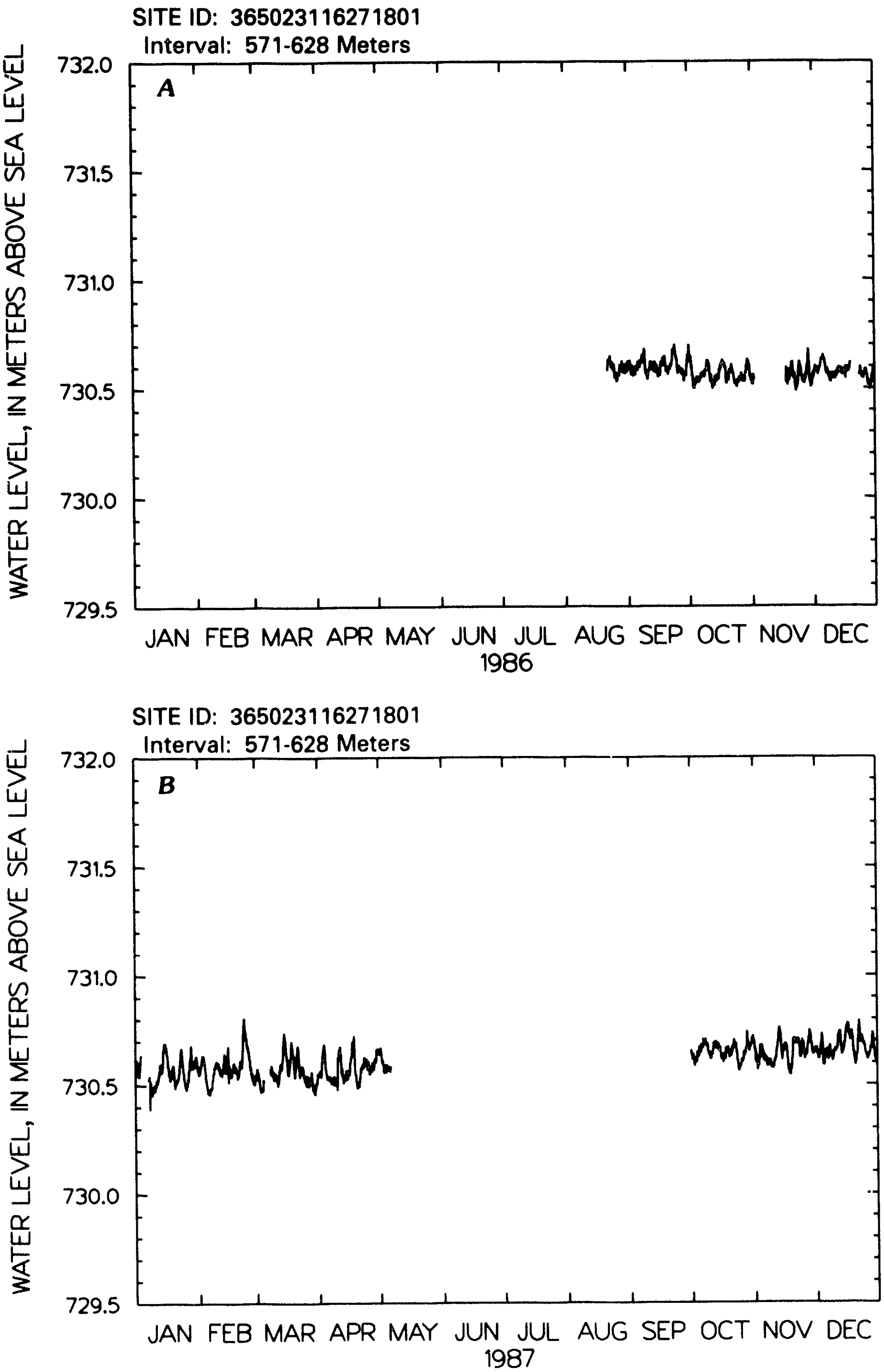


Figure 10.--Water-level altitude for well USW WT-2.

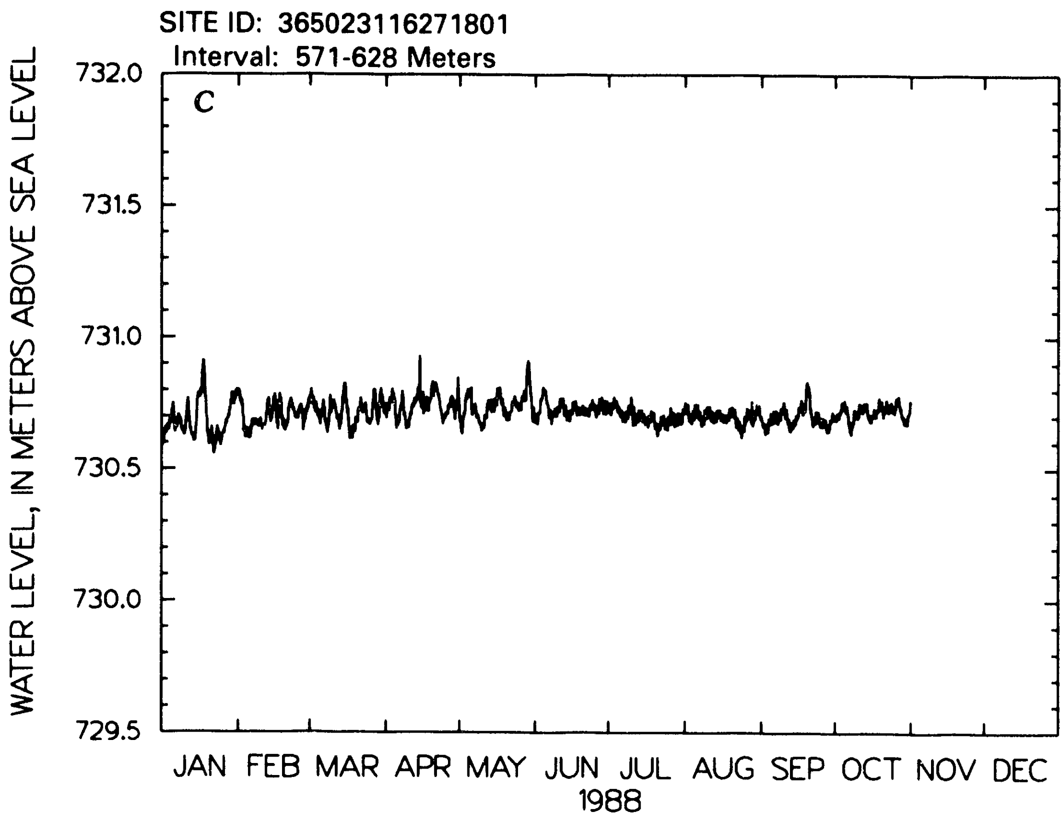


Figure 10.--Water-level altitude for well USW WT-2.--Continued

Table 2.--*Daily mean water-level altitude, in meters above sea level, for well USW WT-2*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 471-511 m

Site ID: 365023116271801

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	—	—	—	—	—	—	—	—	730.60	730.66	730.55	730.55
2	—	—	—	—	—	—	—	—	730.61	730.63	730.54	730.58
3	—	—	—	—	—	—	—	—	730.59	730.56	—	730.58
4	—	—	—	—	—	—	—	—	730.58	730.51	—	730.58
5	—	—	—	—	—	—	—	—	730.58	730.53	—	730.62
6	—	—	—	—	—	—	—	—	730.60	730.53	—	730.64
7	—	—	—	—	—	—	—	—	730.61	730.55	—	730.61
8	—	—	—	—	—	—	—	—	730.63	730.56	—	730.58
9	—	—	—	—	—	—	—	—	730.66	730.56	—	730.56
10	—	—	—	—	—	—	—	—	730.58	730.60	—	730.55
11	—	—	—	—	—	—	—	—	730.56	730.60	—	730.56
12	—	—	—	—	—	—	—	—	730.60	730.54	—	730.56
13	—	—	—	—	—	—	—	—	730.60	730.52	—	730.57
14	—	—	—	—	—	—	—	—	730.60	730.53	—	730.58
15	—	—	—	—	—	—	—	—	730.59	730.55	—	730.58
16	—	—	—	—	—	—	—	—	730.58	730.56	—	730.58
17	—	—	—	—	—	—	—	—	730.59	730.60	—	730.58
18	—	—	—	—	—	—	—	—	730.62	730.61	—	730.58
19	—	—	—	—	—	—	—	—	730.63	730.59	730.55	730.60
20	—	—	—	—	—	—	—	—	730.59	730.54	730.56	—
21	—	—	—	—	—	—	—	—	730.58	730.56	730.60	—
22	—	—	—	—	—	—	—	—	730.59	730.59	730.54	—
23	—	—	—	—	—	—	—	730.63	730.64	730.56	730.50	—
24	—	—	—	—	—	—	—	730.61	730.68	730.52	730.56	730.56
25	—	—	—	—	—	—	—	730.59	730.64	730.52	730.58	730.56
26	—	—	—	—	—	—	—	730.56	730.58	730.54	730.54	730.56
27	—	—	—	—	—	—	—	730.55	730.58	730.55	730.54	730.58
28	—	—	—	—	—	—	—	730.58	730.57	730.54	730.58	730.53
29	—		—	—	—	—	—	730.60	730.55	730.55	730.61	730.50
30	—		—	—	—	—	—	730.59	730.58	730.61	730.52	730.54
31	—		—		—		—	730.59		730.59		730.58
MONTHLY												
MEAN	—	—	—	—	—	—	—	—	730.60	730.56	—	—
MAX	—	—	—	—	—	—	—	—	730.68	730.66	—	—
MIN	—	—	—	—	—	—	—	—	730.55	730.51	—	—

Table 2.--*Daily mean water-level altitude, in meters above sea level, for well USW WT-2*--Continued

Interval: 471-511 m

Site ID: 365023116271801

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						<u>1987</u>						
1	730.59	730.57	730.55	730.55	730.65	—	—	—	—	—	730.69	730.66
2	730.55	730.61	730.53	730.56	730.61	—	—	—	—	730.62	730.64	730.64
3	730.60	730.61	730.48	730.66	730.57	—	—	—	—	730.60	730.59	730.63
4	—	730.53	730.49	730.60	730.57	—	—	—	—	730.62	730.65	730.70
5	—	730.47	—	730.53	730.57	—	—	—	—	730.65	730.65	730.62
6	—	730.47	—	730.53	730.57	—	—	—	—	730.66	730.62	730.63
7	—	730.50	—	730.52	—	—	—	—	—	730.68	730.61	730.65
8	730.51	730.56	730.57	730.52	—	—	—	—	—	730.69	730.60	730.65
9	730.48	730.59	730.55	730.51	—	—	—	—	—	730.68	730.60	730.63
10	730.48	730.59	730.54	730.57	—	—	—	—	—	730.64	730.58	730.64
11	730.51	730.56	730.52	730.65	—	—	—	—	—	730.63	730.59	730.66
12	730.54	730.56	730.53	730.57	—	—	—	—	—	730.67	730.64	730.70
13	730.58	730.61	730.58	730.53	—	—	—	—	—	730.68	730.72	730.72
14	730.61	730.58	730.65	730.54	—	—	—	—	—	730.67	730.72	730.65
15	730.68	730.61	730.69	730.55	—	—	—	—	—	730.66	730.64	730.68
16	730.64	730.57	730.61	730.57	—	—	—	—	—	730.63	730.67	730.75
17	730.55	730.55	730.56	730.65	—	—	—	—	—	730.62	730.66	730.76
18	730.55	730.59	730.65	730.69	—	—	—	—	—	730.64	730.58	730.72
19	730.57	730.57	730.64	730.55	—	—	—	—	—	730.65	730.56	730.71
20	730.50	730.54	730.56	730.50	—	—	—	—	—	730.64	730.65	730.62
21	730.52	730.59	730.64	730.52	—	—	—	—	—	730.65	730.70	730.62
22	730.57	730.61	730.60	730.57	—	—	—	—	—	730.68	730.70	730.73
23	730.64	730.76	730.56	730.60	—	—	—	—	—	730.67	730.68	730.71
24	730.56	730.71	730.57	730.60	—	—	—	—	—	730.61	730.64	730.70
25	730.50	730.65	730.53	730.59	—	—	—	—	—	730.57	730.68	730.68
26	730.51	730.58	730.51	730.57	—	—	—	—	—	730.60	730.63	730.63
27	730.59	730.53	730.52	730.58	—	—	—	—	—	730.63	730.66	730.63
28	730.62	730.52	730.53	730.59	—	—	—	—	—	730.65	730.73	730.65
29	730.59		730.49	730.63	—	—	—	—	—	730.70	730.69	730.71
30	730.62		730.48	730.65	—	—	—	—	—	730.67	730.65	730.66
31	730.58		730.52		—		—	—		730.70		730.61
MONTHLY												
MEAN	—	730.58	—	730.57	—	—	—	—	—	—	730.65	730.67
MAX	—	730.76	—	730.69	—	—	—	—	—	—	730.73	730.76
MIN	—	730.47	—	730.50	—	—	—	—	—	—	730.56	730.61

Table 2.--*Daily mean water-level altitude, in meters above sea level, for well USW WT-2*--Continued

Interval: 471-511 m

Site ID: 365023116271801

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	730.61	730.78	730.77	730.72	730.70	730.70	730.74	730.73	730.70	730.71	730.75	—
2	730.64	730.75	730.75	730.74	730.66	730.69	730.73	730.73	730.67	730.71	—	—
3	730.66	730.66	730.73	730.78	730.73	730.73	730.75	730.70	730.66	730.71	—	—
4	730.68	730.64	730.71	730.76	730.78	730.78	730.75	730.70	730.67	730.74	—	—
5	730.72	730.63	730.69	730.68	730.79	730.80	730.73	730.71	730.70	730.75	—	—
6	730.67	730.66	730.73	730.69	730.73	730.75	730.72	730.73	730.71	730.74	—	—
7	730.68	730.68	730.69	730.76	730.73	730.72	730.70	730.71	730.71	730.69	—	—
8	730.68	730.68	730.65	730.72	730.70	730.70	730.70	730.69	730.70	730.66	—	—
9	730.64	730.67	730.72	730.67	730.68	730.72	730.72	730.70	730.72	730.71	—	—
10	730.66	730.67	730.74	730.68	730.66	730.72	730.71	730.72	730.74	7 .0.72	—	—
11	730.73	—	730.74	730.72	730.68	730.74	730.72	730.72	730.72	730.73	—	—
12	730.65	730.69	730.70	730.75	730.72	730.76	730.69	730.71	730.69	730.74	—	—
13	730.62	730.75	730.67	730.77	730.75	730.73	730.70	730.70	730.66	730.74	—	—
14	730.64	730.70	730.74	730.82	730.74	730.70	730.71	730.70	730.68	730.75	—	—
15	730.77	730.74	730.81	730.76	730.74	730.70	730.70	730.71	730.69	730.71	—	—
16	730.78	730.74	730.72	730.75	730.77	730.73	730.69	730.70	730.72	730.70	—	—
17	730.87	730.69	730.64	730.75	730.79	730.75	730.68	730.70	730.75	730.72	—	—
18	730.80	730.75	730.64	730.74	730.76	730.72	730.70	730.69	730.73	730.72	—	—
19	730.65	730.68	730.67	730.78	730.72	730.72	730.70	730.71	730.77	730.75	—	—
20	730.61	730.66	730.70	730.80	730.70	730.72	730.67	730.72	730.82	730.75	—	—
21	730.62	730.70	730.74	730.82	730.70	730.72	730.65	730.71	730.74	730.73	—	—
22	730.58	730.75	730.72	730.78	730.73	730.72	730.67	730.68	730.69	730.75	—	—
23	730.64	730.73	730.73	730.73	730.76	730.72	730.69	730.65	730.70	730.74	—	—
24	730.61	730.70	730.69	730.68	730.75	730.74	730.67	730.65	730.71	730.75	—	—
25	730.62	730.70	730.68	730.70	730.74	730.74	730.68	730.67	730.69	730.74	—	—
26	730.65	730.73	730.72	730.72	730.75	730.72	730.70	730.71	730.69	730.76	—	—
27	730.68	730.68	730.79	730.75	730.78	730.74	730.70	730.71	730.69	730.78	—	—
28	730.71	730.70	730.70	730.76	730.81	730.75	730.69	730.70	730.66	730.74	—	—
29	730.77	730.74	730.73	730.72	730.85	730.74	730.69	730.70	730.67	730.71	—	—
30	730.77		730.77	730.78	730.79	730.74	730.69	730.72	730.71	730.69	—	—
31	730.79		730.73		730.71		730.70	730.73		730.70		—
MONTHLY												
MEAN	730.68	—	730.72	730.74	730.74	730.73	730.70	730.70	730.71	730.73	—	—
MAX	730.87	—	730.81	730.82	730.85	730.80	730.75	730.73	730.82	730.78	—	—
MIN	730.58	—	730.64	730.67	730.66	730.69	730.65	730.65	730.66	730.66	—	—

Well UE-25 WT #3

Information about the history of well UE-25 WT #3 and about previous data from the well was obtained from various sources. These sources are: Robison (1984, 1986); Robison and others (1988); Holmes & Narver (written commun., 1986); Fenix & Scisson, Inc. (1986a, 1987c).

Well specifications

The following are specifications for well UE-25 WT #3:

1. Location and identification:

   Latitude and longitude: 36°47'57" N.; 116°24'58" W.
   Nevada State Central Zone Coordinates (m): N 227,379; E 174,768.
   U.S. Geological Survey Site ID: 364757116245801.

2. Drilling and casing information:

   Well started: April 29, 1983.
   Well completed: May 25, 1983.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; bottom-hole core obtained.
   Bit diameter below water level: 222 mm.
   Casing extending below water level: None [surface casing only, to a depth of 12 m].
   Total drilled depth: 348 m.

3. Access to and description of interval for measuring water levels:

   62-mm inside-diameter tubing that has a 3.6-m long well screen on bottom, extending from land surface to a depth of 343 m; saturated interval of borehole within the Bullfrog Member of the Crater Flat Tuff.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,030.11 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.27 m, based on approximate depth to water of 300 m.

History of instrumentation, calibrations, and comments

Manual water-level were made from June 7, 1983, through March 22, 1985. Beginning in March 1985, the water level has been monitored continuously using a downhole pressure transducer with a data logger at the land surface.

The following transducers were used in well: UE-25 WT #3:

[Range is pressure limit for transducer, in pounds per square inch; dashes indicate serial number unknown]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
03-22-85	12-13-88	Absolute	Bell&Howell	10	1950
03-22-85	11-26-85	Gage	Psi-Tronix	15	--
12-13-88	12-31-88	Gage	Druck PTX	5	3018

The following calibrations of the water-level monitoring system were performed in well UE-25 WT #3:

[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1950	03-22-85	-2.641	1.000	03-22-85	729.52
1950	11-26-85	-2.669	1.000	11-26-85	729.40
1950	11-27-85	-2.694	1.000	11-27-85	729.40
1950	10-14-87	-2.662	1.000	--	--
1950	02-10-88	-2.642	0.999	02-10-88	729.45
1950	06-15-88	-2.658	0.999	06-15-88	729.47
1950	10-12-88	-2.694	1.000	10-12-88	729.44
1950	12-13-88	-2.720	0.999	12-13-88	729.85
3018	12-13-88	-2.138	1.000	12-13-88	729.85

Transducer output

Transducer output from March 1985 through December 1988 is shown in figure 11. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 1950) in use between March 1985 and December 1988, was set 3.0 m

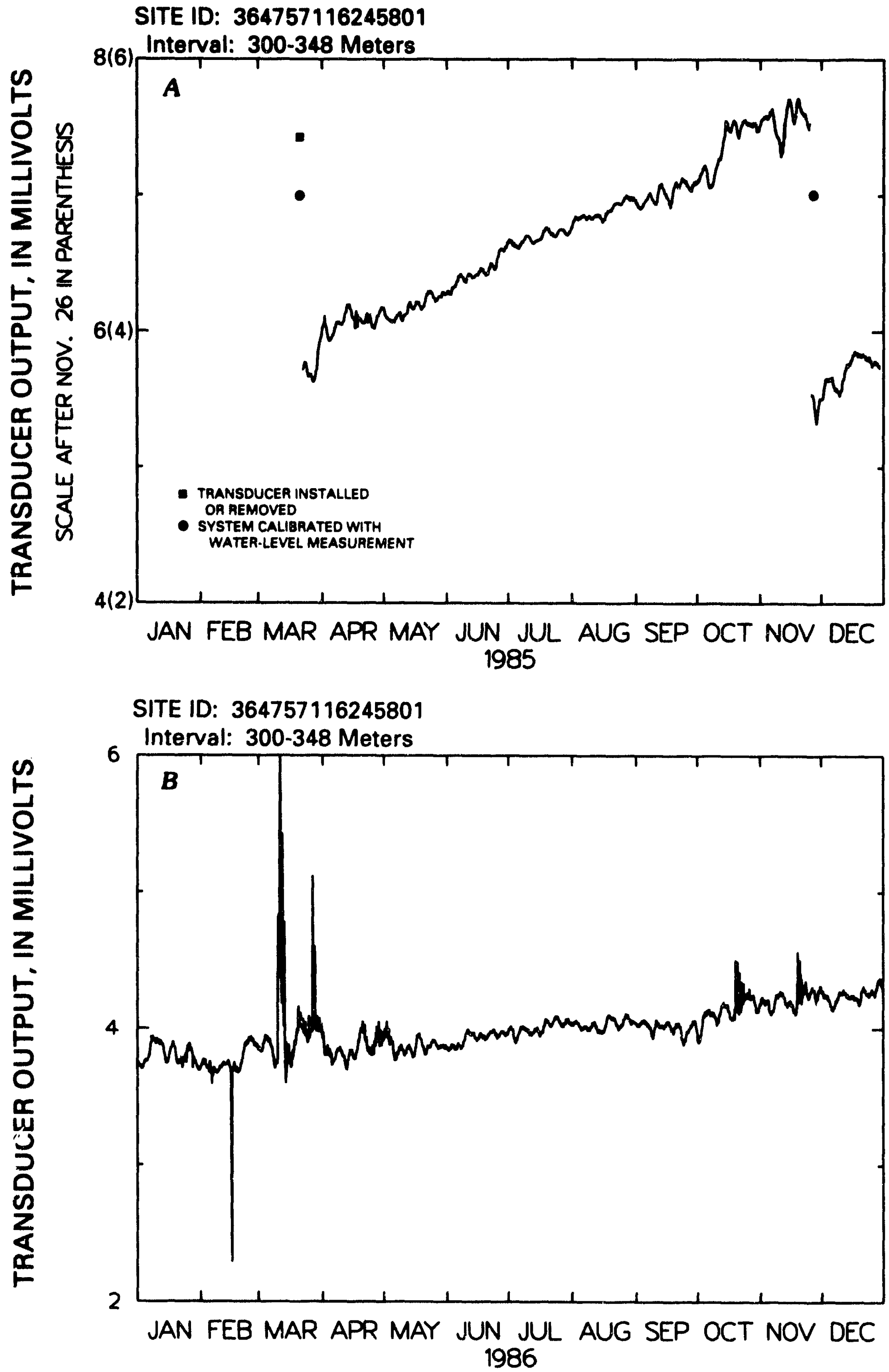
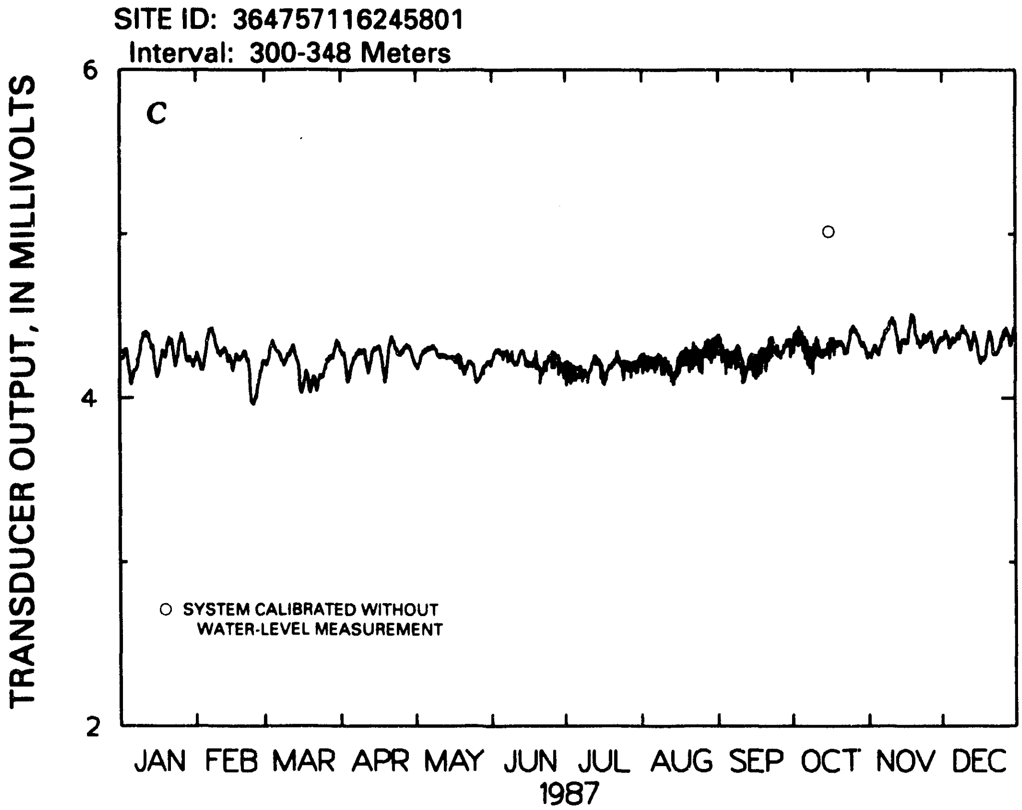


Figure 11.--Transducer output for well UE-25 WT #3.



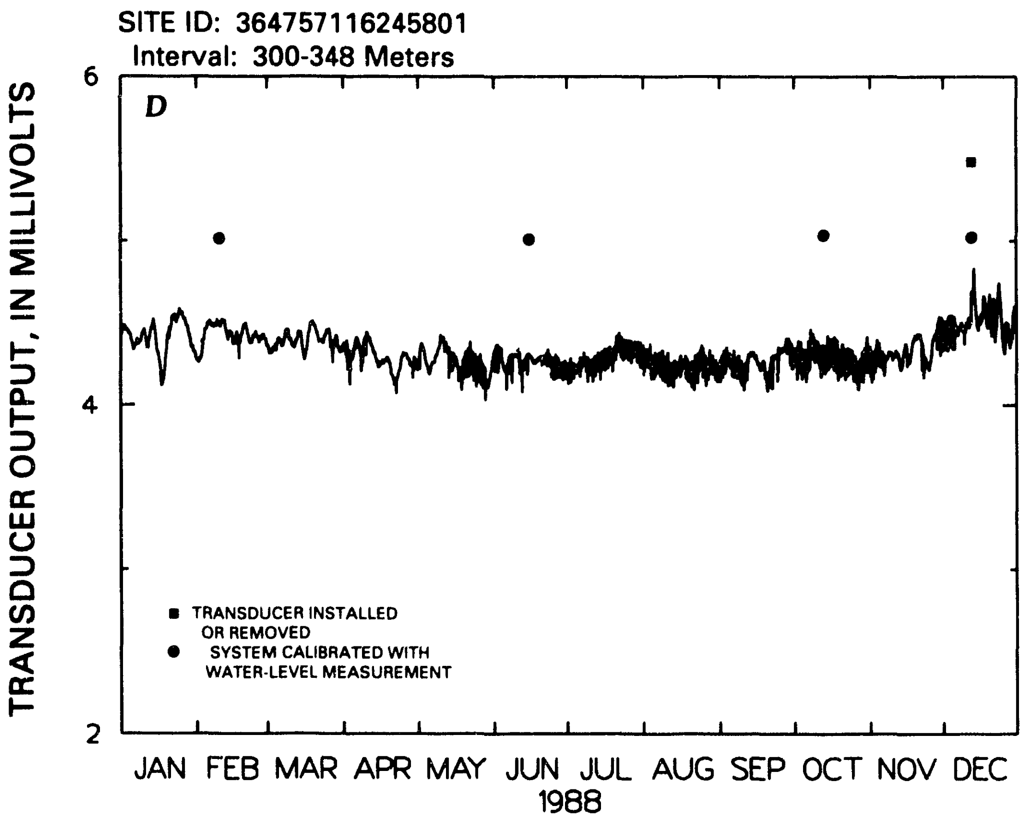


Figure 11.--Transducer output for well UE-25 WT #3.--Continued

below the water surface from March to late November 1985. After the November 1985 calibration, the transducer was reset 1.5 m below the water surface. The change in transducer depth caused the offset in the output shown in figure 11-A. From March through November 1985, the transducer output increased about 2 millivolts (fig. 11-A); such a rise would correspond to a water level rise of about 0.75 m. However, water-level measurements indicated that, during this period, the water level rose only 0.14 m, therefore much of the apparent rise was transducer-output drift. From mid-February to late March 1986, the transducer produced some anomalous output (fig. 11-B); the cause of this anomalous output could not be determined. During October and November 1986, spurious output of unknown origin was again observed (fig. 11-B). During the summer of 1987 and again throughout much of 1988, a high-frequency component can be seen in the transducer output (fig. 11-C and 11-D). This high-frequency component occurs throughout most of the transducer output but becomes more noticeable when the amplitude of the high-frequency component increases. This high-frequency component was not related to barometric pressure or earth tides. The second transducer (serial number unknown, not recorded in logbook), in use between March 1985 and November 1985, was used concurrently with the first transducer and shared some common wiring with it. This transducer did not produce any reasonable output and attempts to calibrate it on installation were unsuccessful. The third transducer (serial number 3018) was in use for only a few weeks in late 1988. The period of record was not long enough to evaluate its characteristics. The high-frequency component was not observed with this transducer. This transducer was the only one in the network that used current-mode excitation; all other transducers used voltage-mode excitation.

Water-level altitude

Transducer output was converted to water-level altitude for the following periods:

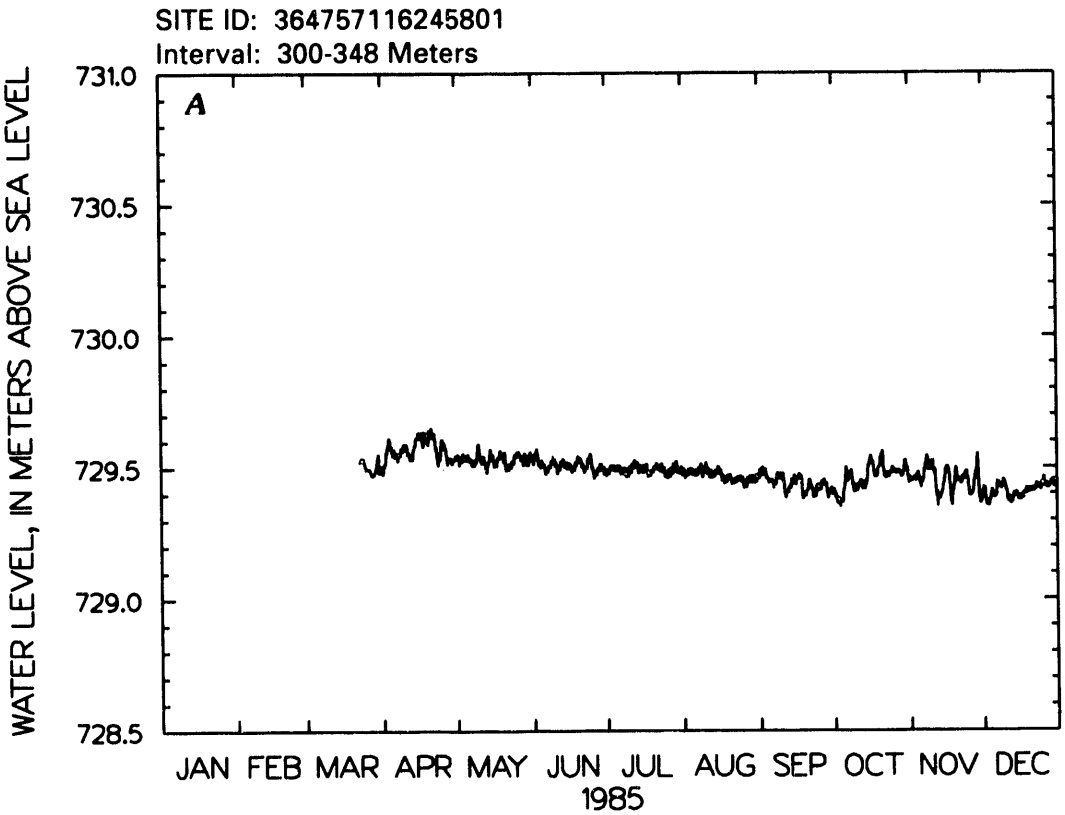
Beginning date	Ending date
03-22-85	03-09-86
03-29-86	10-19-86
10-29-86	11-18-86
11-24-86	12-31-88

Within the convertible periods, water-level altitude is not available for short periods because of various problems:

Beginning date	Ending date	Reason
11-26-85	11-27-85	Data logger could not read transducer
02-07-86	02-10-86	Do.
09-18-86	09-18-86	No barometric-pressure data available
12-17-86	12-17-86	Data logger could not read transducer
06-22-87	06-22-87	No barometric-pressure data available
08-06-87	08-06-87	Do.
09-03-87	09-03-87	Do.
09-17-87	09-17-87	Data logger cassette tapes unreadable
12-22-87	12-22-87	No barometric pressure data available

Water-level altitudes are shown in figure 12 and the daily mean water-level altitudes are given in table 3. Approximately 98 percent of the transducer output was converted to water-level altitude. The longest period was 769 days, November 24, 1986 through December 31, 1988.

From March 22, 1985 to December 13, 1988, an absolute transducer was used to monitor water levels. This type of transducer responded not only to water-level changes, but also to barometric-pressure changes. The barometric-pressure effects were removed from the absolute transducer output during conversion to water levels using the procedure described in the "Adjustment for Absolute Transducer" section. The transducer output shown in figure 11 is before the barometric-pressure effects were removed.



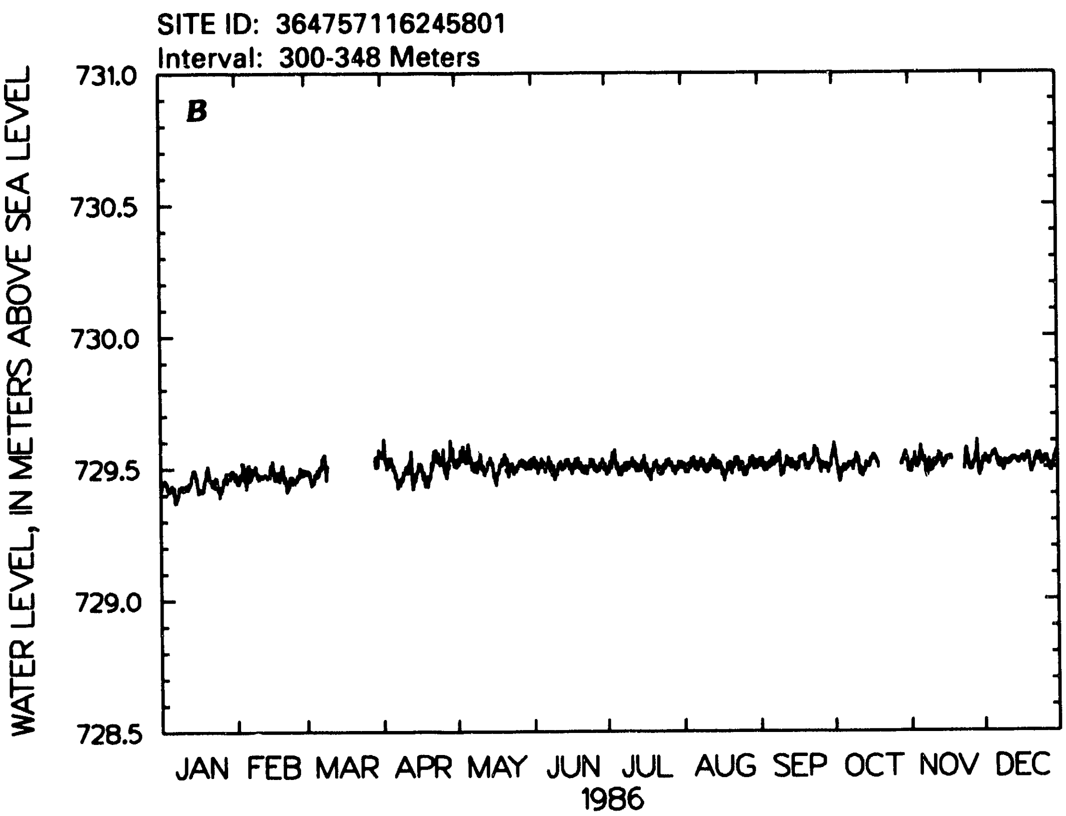
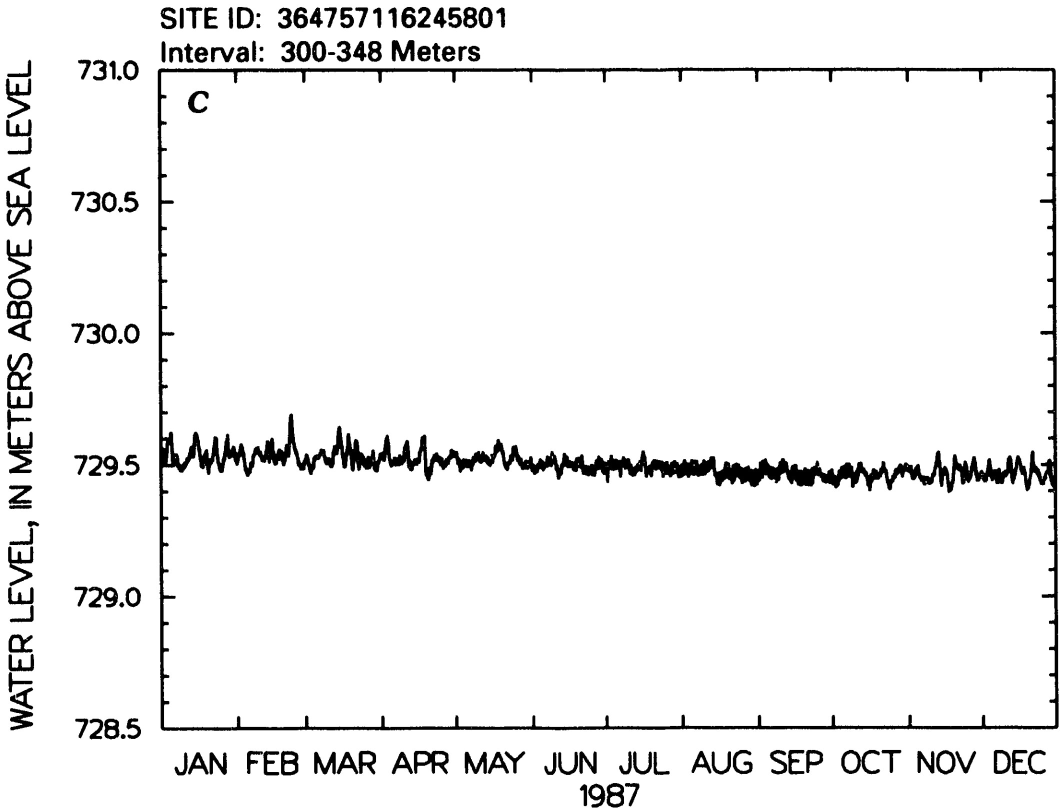


Figure 12.--Water-level altitude for well UE-25 WT #3.



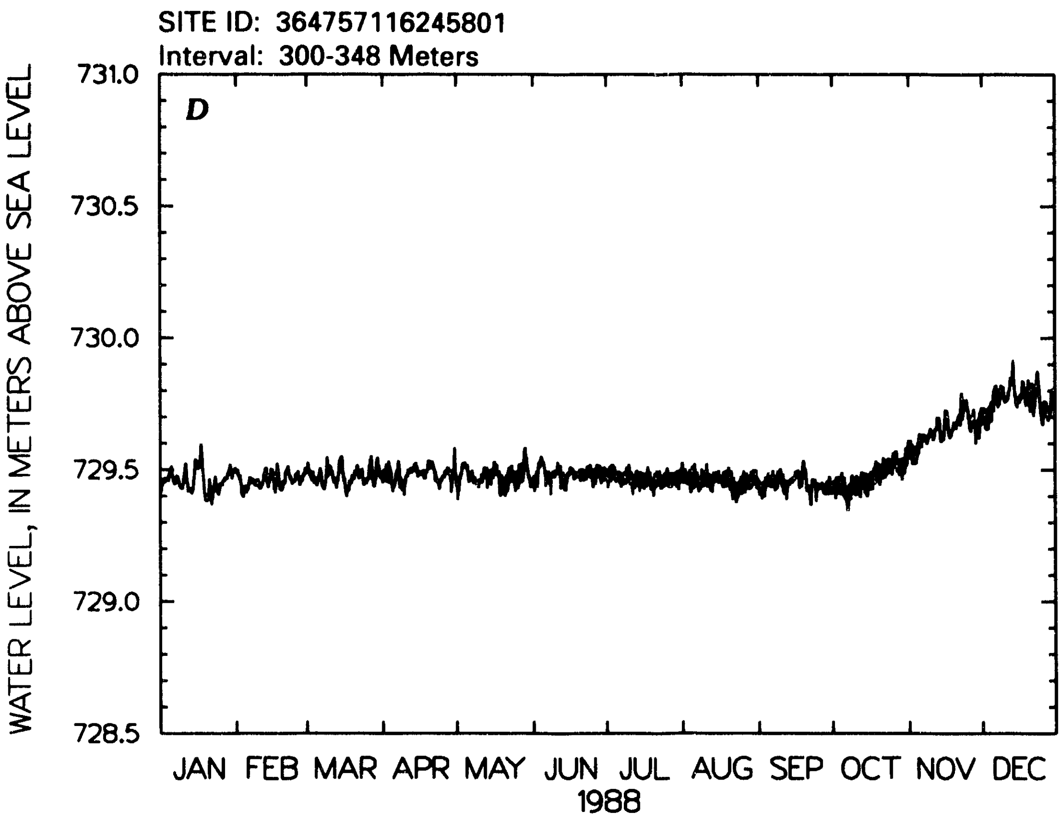


Figure 12.--Water-level altitude for well UE-25 WT #3.--Continued

Table 3.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #3*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 301-348 m   Site ID: 364757116245801

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	—	—	—	729.49	729.54	729.53	729.48	729.48	729.47	729.41	729.46	729.38
2	—	—	—	729.53	729.53	729.55	729.49	729.48	729.48	729.39	729.45	729.41
3	—	—	—	729.59	729.54	729.53	729.50	729.48	729.49	729.37	729.46	729.36
4	—	—	—	729.58	729.54	729.51	729.50	729.49	729.47	729.37	729.46	729.36
5	—	—	—	729.56	729.54	729.51	729.50	729.48	729.45	729.39	729.46	729.40
6	—	—	—	729.55	729.53	729.49	729.50	729.48	729.45	729.46	729.44	729.39
7	—	—	—	729.54	729.52	729.49	729.49	729.49	729.43	729.46	729.47	729.42
8	—	—	—	729.56	729.52	729.51	729.49	729.50	729.45	729.47	729.52	729.43
9	—	—	—	729.58	729.55	729.53	729.48	729.48	729.47	729.44	729.51	729.43
10	—	—	—	729.58	729.55	729.52	729.48	729.49	729.47	729.42	729.51	729.44
11	—	—	—	729.56	729.53	729.49	729.50	729.49	729.45	729.42	729.50	729.41
12	—	—	—	729.54	729.52	729.51	729.51	729.48	729.40	729.44	729.44	729.38
13	—	—	—	729.55	729.50	729.52	729.51	729.47	729.41	729.43	729.38	729.37
14	—	—	—	729.59	729.54	729.51	729.50	729.48	729.43	729.43	729.39	729.39
15	—	—	—	729.62	729.54	729.51	729.50	729.49	729.45	729.48	729.42	729.40
16	—	—	—	729.62	729.52	729.51	729.50	729.49	729.45	729.53	729.47	729.38
17	—	—	—	729.60	729.52	729.50	729.50	729.47	—	729.51	729.50	729.38
18	—	—	—	729.61	729.55	729.50	729.48	729.46	729.46	729.47	729.43	729.39
19	—	—	—	729.61	729.55	729.52	729.48	729.46	729.39	729.48	729.39	729.41
20	—	—	—	729.63	729.54	729.53	729.49	729.47	729.40	729.52	729.46	729.41
21	—	—	—	729.62	729.50	729.51	729.50	729.45	729.43	729.54	729.46	729.41
22	—	—	—	729.58	729.50	729.49	729.50	729.45	729.43	729.48	729.45	729.41
23	—	—	729.53	729.54	729.51	729.51	729.50	729.45	729.40	729.47	729.45	729.42
24	—	—	729.53	729.56	729.53	729.54	729.50	729.46	729.41	729.47	729.47	729.42
25	—	—	729.50	729.59	729.55	729.51	729.48	729.46	729.43	729.49	729.46	729.43
26	—	—	729.49	729.57	729.55	729.47	729.47	729.44	729.43	729.49	—	729.44
27	—	—	729.48	729.53	729.54	729.48	729.48	729.44	729.44	729.48	—	729.43
28	—	—	729.47	729.53	729.53	729.50	729.49	729.45	729.43	729.48	729.45	729.43
29	—		729.50	729.52	729.53	729.50	729.50	729.46	729.40	729.47	729.50	729.44
30	—		729.52	729.54	729.53	729.49	729.49	729.46	729.41	729.50	729.39	729.44
31	—		729.49		729.54		729.49	729.46		729.50		729.43
MONTHLY												
MEAN	—	—	—	729.57	729.53	729.51	729.49	729.47	—	729.46	—	729.41
MAX	—	—	—	729.63	729.55	729.55	729.51	729.50	—	729.54	—	729.44
MIN	—	—	—	729.49	729.50	729.47	729.47	729.44	—	729.37	—	729.36

Table 3.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #3*--Continued

Interval: 301-348 m   Site ID: 364757116245801

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	729.44	729.45	729.48	729.57	729.51	729.52	729.49	729.51	729.52	729.57	729.50	729.51
2	729.45	729.46	729.48	729.52	729.53	729.51	729.50	729.50	729.52	729.54	729.50	729.53
3	729.43	729.49	729.45	729.51	729.55	729.50	729.52	729.50	729.50	729.48	729.53	729.53
4	729.42	729.46	729.46	729.52	729.54	729.51	729.54	729.51	729.50	729.47	729.51	729.53
5	729.43	729.47	729.47	729.51	729.55	729.51	729.51	729.52	729.51	729.50	729.53	729.55
6	729.41	729.49	729.48	729.47	729.54	729.50	729.49	729.51	729.52	729.50	729.55	729.55
7	729.38	—	729.51	729.44	729.51	729.52	729.49	729.50	729.52	729.51	729.53	729.53
8	729.41	—	729.54	729.45	729.50	729.51	729.50	729.52	729.54	729.51	729.48	729.52
9	729.43	—	729.49	729.47	729.50	729.49	729.50	729.51	729.54	729.51	729.50	729.51
10	729.42	—	—	729.49	729.53	729.47	729.51	729.49	729.49	729.54	729.50	729.51
11	729.43	729.47	—	729.50	729.50	729.49	729.52	729.49	729.49	729.53	729.51	729.52
12	729.43	—	—	729.52	729.48	729.51	729.51	729.51	729.52	729.49	729.52	729.52
13	729.46	—	—	729.44	729.50	729.50	729.50	729.53	729.52	729.48	729.54	729.53
14	729.49	—	—	729.47	729.53	729.51	729.49	729.52	729.52	729.50	729.53	729.53
15	729.46	—	—	729.50	729.51	729.52	729.50	729.51	729.51	729.51	729.51	729.53
16	729.42	—	—	729.50	729.47	729.51	729.53	729.51	729.50	729.52	729.52	729.53
17	729.42	—	—	729.47	729.46	729.50	729.50	729.49	729.52	729.54	729.53	729.53
18	729.43	729.46	—	729.45	729.49	729.51	729.48	729.47	—	729.54	729.54	729.53
19	729.48	—	—	729.45	729.52	729.52	729.47	729.49	729.53	729.52	—	729.54
20	729.48	729.46	—	729.48	729.53	729.51	729.50	729.50	729.50	—	—	729.53
21	729.45	729.43	—	729.52	729.52	729.50	729.51	729.50	729.50	—	—	729.49
22	729.44	729.44	—	729.54	729.49	729.49	729.50	729.52	729.52	—	—	729.52
23	729.45	729.45	—	729.54	729.51	729.49	729.49	729.53	729.55	—	—	729.54
24	729.42	729.45	—	729.52	729.49	729.51	729.49	729.51	729.56	—	729.54	729.54
25	729.41	729.46	—	729.53	729.49	729.52	729.51	729.50	729.52	—	729.54	729.52
26	729.44	729.48	—	729.49	729.51	729.50	729.52	729.48	729.50	—	729.50	729.53
27	729.47	729.48	—	729.49	729.52	729.49	729.51	729.49	729.51	—	729.50	729.54
28	729.47	729.48	—	729.54	729.51	729.50	729.50	729.51	729.51	—	729.54	729.51
29	729.47		729.52	729.54	729.51	729.51	729.49	729.52	729.50	729.52	729.54	729.50
30	729.48		729.54	729.51	729.51	729.50	729.51	729.51	729.52	729.55	729.48	729.53
31	729.47		729.55		729.51		729.51	729.51		729.53		729.55
MONTHLY												
MEAN	729.44	—	—	729.50	729.51	729.50	729.50	729.51	—	—	—	729.53
MAX	729.49	—	—	729.57	729.55	729.52	729.54	729.53	—	—	—	729.55
MIN	729.38	—	—	729.44	729.46	729.47	729.47	729.47	—	—	—	729.49

Table 3.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #3*--Continued

Interval: 301-348 m

Site ID: 364757116245801

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	729.55	729.53	729.53	729.54	729.54	729.49	729.49	729.47	729.45	729.46	729.48	729.46
2	729.51	729.56	729.51	729.54	729.51	729.48	729.49	729.48	729.47	729.44	729.48	729.45
3	729.56	729.55	729.48	729.60	729.49	729.49	729.51	729.48	—	729.43	729.45	729.45
4	729.60	729.49	729.50	729.54	729.50	729.50	729.50	729.48	729.49	729.45	729.47	729.49
5	729.57	729.47	729.53	729.50	729.50	729.50	729.50	729.49	729.48	729.46	729.48	729.47
6	729.52	729.49	729.53	729.51	729.50	729.50	729.50	—	729.47	729.47	729.45	729.46
7	729.53	729.51	729.55	729.51	729.50	729.51	729.49	—	729.46	729.47	729.44	729.45
8	729.49	729.55	729.55	729.51	729.51	729.51	729.51	729.47	729.46	729.47	729.44	729.46
9	729.49	729.56	729.52	729.51	729.52	729.52	729.50	729.48	729.46	729.46	729.44	729.44
10	729.50	729.54	729.52	729.54	729.53	729.52	729.50	729.49	729.48	729.44	729.43	729.45
11	729.51	729.53	729.51	729.57	729.52	729.49	729.48	729.49	729.50	729.44	729.45	729.47
12	729.53	729.53	729.52	729.51	729.52	729.46	729.47	729.49	729.50	729.48	729.47	729.50
13	729.55	729.56	729.55	729.49	729.53	729.48	729.47	729.50	729.48	729.49	729.52	729.50
14	729.57	729.53	729.59	729.51	729.52	729.51	729.49	729.51	729.45	729.47	729.50	729.44
15	729.61	729.58	729.61	729.51	729.51	729.52	729.49	729.46	729.46	729.46	729.44	729.47
16	729.56	729.52	729.53	729.53	729.52	729.50	729.52	729.45	—	729.44	729.48	729.52
17	729.50	729.52	729.51	729.58	729.55	729.50	729.53	729.44	729.46	729.44	729.46	729.50
18	729.52	729.54	729.58	729.58	729.56	729.49	729.47	729.46	729.45	729.46	729.41	729.48
19	729.54	729.53	729.56	729.47	729.57	729.51	729.48	729.47	729.45	729.47	729.42	729.46
20	729.49	729.52	729.50	729.46	729.55	729.52	729.48	729.47	729.45	729.45	729.49	729.41
21	729.51	729.55	729.57	729.49	729.50	729.51	729.51	729.46	729.45	729.46	729.50	729.43
22	729.55	729.56	729.53	729.52	729.50	—	729.50	729.45	729.44	729.48	729.49	—
23	729.59	729.66	729.52	729.53	729.52	729.48	729.50	729.47	729.44	729.47	729.47	729.49
24	729.51	729.59	729.52	729.52	729.54	729.48	729.49	729.47	729.47	729.43	729.45	729.48
25	729.48	729.55	729.50	729.51	729.56	729.48	729.49	729.47	729.48	729.42	729.48	729.46
26	729.51	729.51	729.50	729.49	729.53	729.48	729.48	729.46	729.48	729.44	729.45	729.44
27	729.56	729.49	729.51	729.51	729.51	729.49	729.48	729.46	729.46	729.46	729.47	729.44
28	729.57	729.50	729.52	729.52	729.50	729.50	729.49	729.46	729.44	729.47	729.51	729.46
29	729.54		729.49	729.54	729.50	729.50	729.49	729.45	729.44	729.49	729.47	729.49
30	729.56		729.49	729.54	729.50	729.49	729.48	729.45	729.45	—	729.45	729.45
31	729.53		729.53		729.51		729.47	729.45		729.49		729.42
MONTHLY												
MEAN	729.54	729.54	729.53	729.52	729.52	—	729.49	—	—	—	729.46	—
MAX	729.61	729.66	729.61	729.60	729.57	—	729.53	—	—	—	729.52	—
MIN	729.48	729.47	729.48	729.46	729.49	—	729.47	—	—	—	729.41	—

Table 3.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #3*--Continued

Interval: 301-348 m — Site ID: 364757116245801

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	729.43	729.49	729.50	729.47	729.45	729.46	729.48	729.48	729.44	729.43	729.57	729.70
2	729.46	729.47	729.49	729.49	729.44	729.47	729.48	729.48	729.43	729.44	729.57	729.72
3	729.46	729.42	729.47	729.50	729.49	729.50	729.49	729.46	729.43	729.43	729.56	729.70
4	729.47	729.42	729.46	729.49	729.52	729.53	729.49	729.46	729.44	729.44	729.55	729.71
5	729.50	729.42	729.45	729.43	729.51	729.53	729.48	729.47	729.46	729.44	729.58	729.73
6	729.46	729.45	729.49	729.46	729.47	729.49	729.47	729.48	729.46	729.43	729.62	729.77
7	729.46	729.46	729.45	729.51	729.48	729.47	729.46	729.47	729.45	729.40	729.62	729.81
8	729.46	729.45	729.44	729.46	729.46	729.46	729.47	729.45	729.45	729.40	729.62	729.76
9	729.43	729.45	729.49	729.44	729.45	729.48	729.48	729.46	729.46	729.44	729.61	729.79
10	729.46	729.44	729.50	729.46	729.45	729.48	729.49	729.47	729.47	729.44	729.64	729.79
11	729.50	729.44	729.49	729.49	729.46	729.50	729.47	729.47	729.45	729.44	729.63	729.76
12	729.43	729.47	729.46	729.49	729.49	729.50	729.45	729.45	729.44	729.44	729.63	729.78
13	729.42	729.49	729.45	729.50	729.49	729.48	729.46	729.45	729.44	729.44	729.67	729.83
14	729.44	729.45	729.50	729.51	729.48	729.47	729.47	729.46	729.45	729.45	729.67	729.86
15	729.53	729.48	729.53	729.49	729.48	729.47	729.46	729.47	729.46	729.44	729.61	729.79
16	729.51	729.47	729.46	729.49	729.50	729.49	729.45	729.47	729.47	729.44	729.65	729.76
17	729.56	729.44	729.42	729.49	729.51	729.50	729.46	729.46	729.48	729.47	729.71	729.77
18	729.48	729.49	729.44	729.48	729.48	729.48	729.47	729.46	729.45	729.47	729.65	729.81
19	729.39	729.44	729.46	729.51	729.44	729.48	729.46	729.47	729.48	729.49	729.64	729.79
20	729.40	729.44	729.48	729.51	729.44	729.48	729.44	729.46	729.50	729.49	729.67	729.77
21	729.42	729.47	729.50	729.52	729.45	729.48	729.44	729.46	729.44	729.48	729.67	729.78
22	729.40	729.50	729.48	729.49	729.48	729.48	729.46	729.43	729.41	729.50	729.70	729.77
23	729.45	729.47	729.48	729.46	729.49	729.49	729.47	729.42	729.44	729.50	729.74	729.73
24	729.42	729.45	729.46	729.44	729.47	729.50	729.45	729.42	729.45	729.51	729.73	729.82
25	729.43	729.46	729.46	729.47	729.47	729.48	729.46	729.44	729.43	729.51	729.75	729.82
26	729.45	729.48	729.49	729.48	729.48	729.47	729.47	729.46	729.44	729.53	729.70	729.71
27	729.46	729.46	729.52	729.49	729.49	729.49	729.47	729.45	729.44	729.54	729.66	729.72
28	729.48	729.47	729.45	729.49	729.52	729.49	729.46	729.45	729.42	729.51	729.70	729.74
29	729.50	729.49	729.49	729.46	729.54	729.48	729.46	729.45	729.44	729.50	729.66	729.70
30	729.49		729.51	729.51	729.48	729.48	729.46	729.47	729.45	729.51	729.66	729.75
31	729.50		729.48		729.45		729.47	729.46		729.53		729.78
MONTHLY												
MEAN	729.46	729.46	729.48	729.48	729.48	729.49	729.47	729.46	729.45	729.47	729.65	729.77
MAX	729.56	729.50	729.53	729.52	729.54	729.53	729.49	729.48	729.50	729.54	729.75	729.86
MIN	729.39	729.42	729.42	729.43	729.44	729.46	729.44	729.42	729.41	729.40	729.55	729.70

Well UE-25 WT #6

Information about the history of well UE-25 WT #6 and about previous data from the well was obtained from various sources. These sources are: Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1986a, 1987c).

Well specifications

The following are specifications for well UE-25 WT #6:

1. Location and identification:

   Latitude and longitude: 36°53'40" N.; 116°26'46" W.
   Nevada State Central Zone Coordinates (m): N 237,920; E 172,067.
   U.S. Geological Survey Site ID: 365340116264601.

2. Drilling and casing information:

   Well started: June 20, 1983.
   Well completed: June 29, 1983.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; bottom-hole core obtained.
   Bit diameter below water level: 171 mm.
   Casing extending below water level: None [surface casing only, to a depth of 76.5 m].
   Total drilled depth: 383 m

3. Access to and description of interval for measuring water levels:

   62-mm inside-diameter tubing that has a 3.6-m long well screen on bottom, extending from land surface to a depth of 372 m; saturated interval of borehole within the tuffaceous beds of Calico Hills.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,314.78 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.24 m, based on depth to water of 280 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from July 6, 1983, through July 21, 1986. Beginning in July 1986, the water level has been monitored continuously using a downhole pressure transducer with a data logger at the land surface. The water level rose more than 8 m in the first 2 months after drilling and continued to rise at a slower rate through at least December 1987. This rise was likely the result of water levels equilibrating after drilling. The period required to equilibrate could have been unusually long because of the low permeability of the rocks (tuffaceous beds of Calico Hills) which were penetrated below the water table.

The following transducers were used in well UE-25 WT #6:

[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
07-21-86	09-30-87	Gage	Druck PDCR 10/D	10	153533
09-30-87	03-25-88	Gage	Druck 830	10	170657
03-25-88	09-27-88	Gage	Druck 930	10	226103
09-28-88	12-31-88	Gage	Druck 930	10	239128

The following calibrations of the water-level monitoring system were performed in well UE-25 WT #6:

Transducer					
		Regression line		Water level	
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
153533	07-22-86	-6.372	1.000	07-21-86	1034.13
170657	09-30-87	-6.519	0.999	09-30-87	1034.72
170657	02-10-88	-6.617	1.000	02-10-88	1034.93
226103	03-25-88	-6.519	0.999	03-25-88	1034.98
226103	07-27-88	-6.717	1.000	07-27-88	1035.14
239128	09-28-88	-6.854	1.000	09-28-88	1035.02

Transducer output

Transducer output from July 1986 through December 1988 is shown in figure 13. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 153533), in use between July 1986 and September 1987, produced reasonable output for the period July 1986 to March 1987 (fig. 13-A, 13-B, and 13-C). The downward spike on February 24, 1987 consisted of three readings from 1000 to 1200 (fig. 13-B and 13-C). The 1000 reading of -16.8 millivolts was much less than would occur even if the water level dropped below the transducer and must represent an instrument malfunction. Transducer output for the period March to September 1987 was either erratic or had a large amount of drift in it (fig. 13-B). The second transducer (serial number 170657), in use between September 1987 and March 1988, produced generally reasonable output for about 4 months, but even during this time there

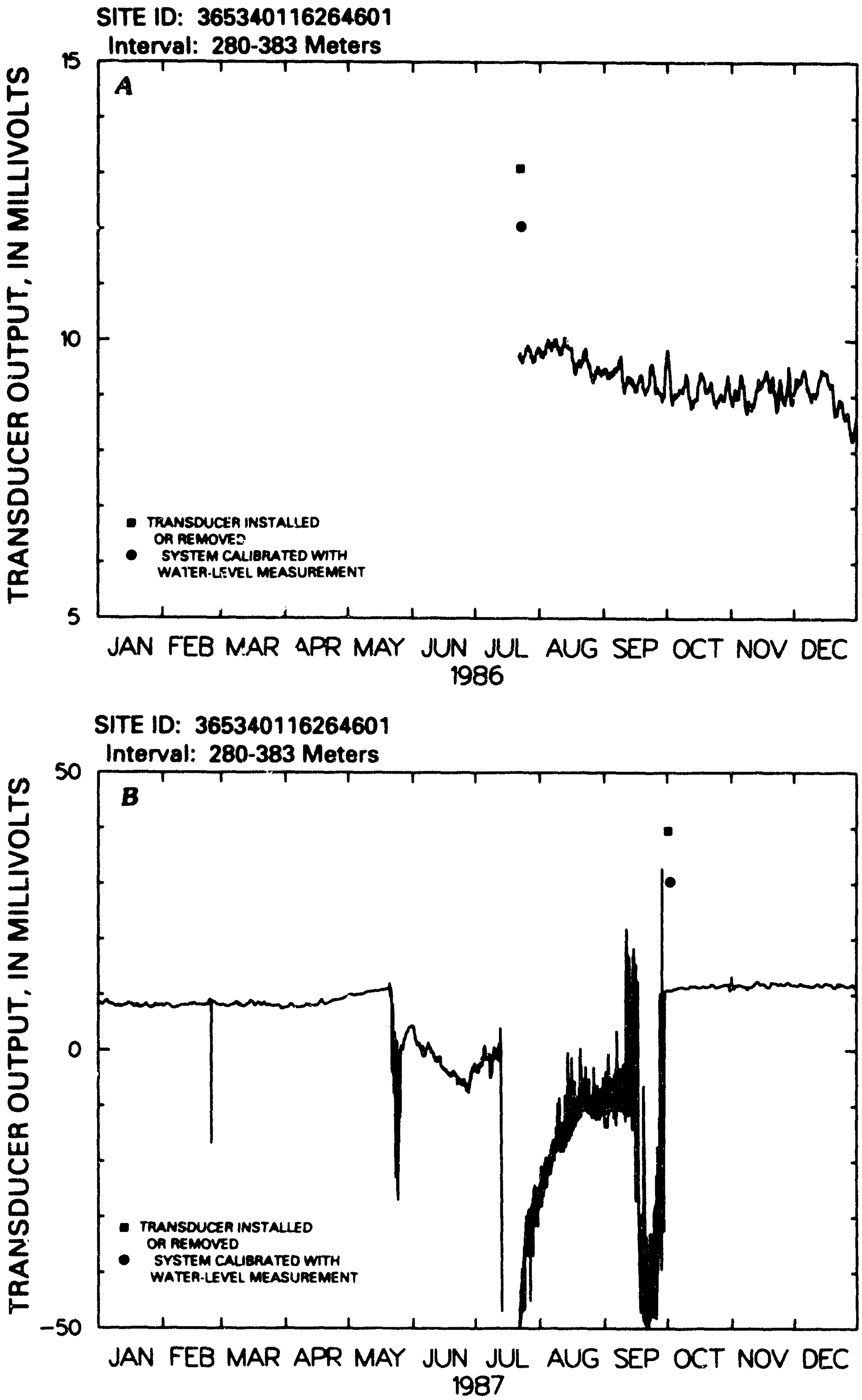


Figure 13.--Transducer output for well UE-25 WT #6.

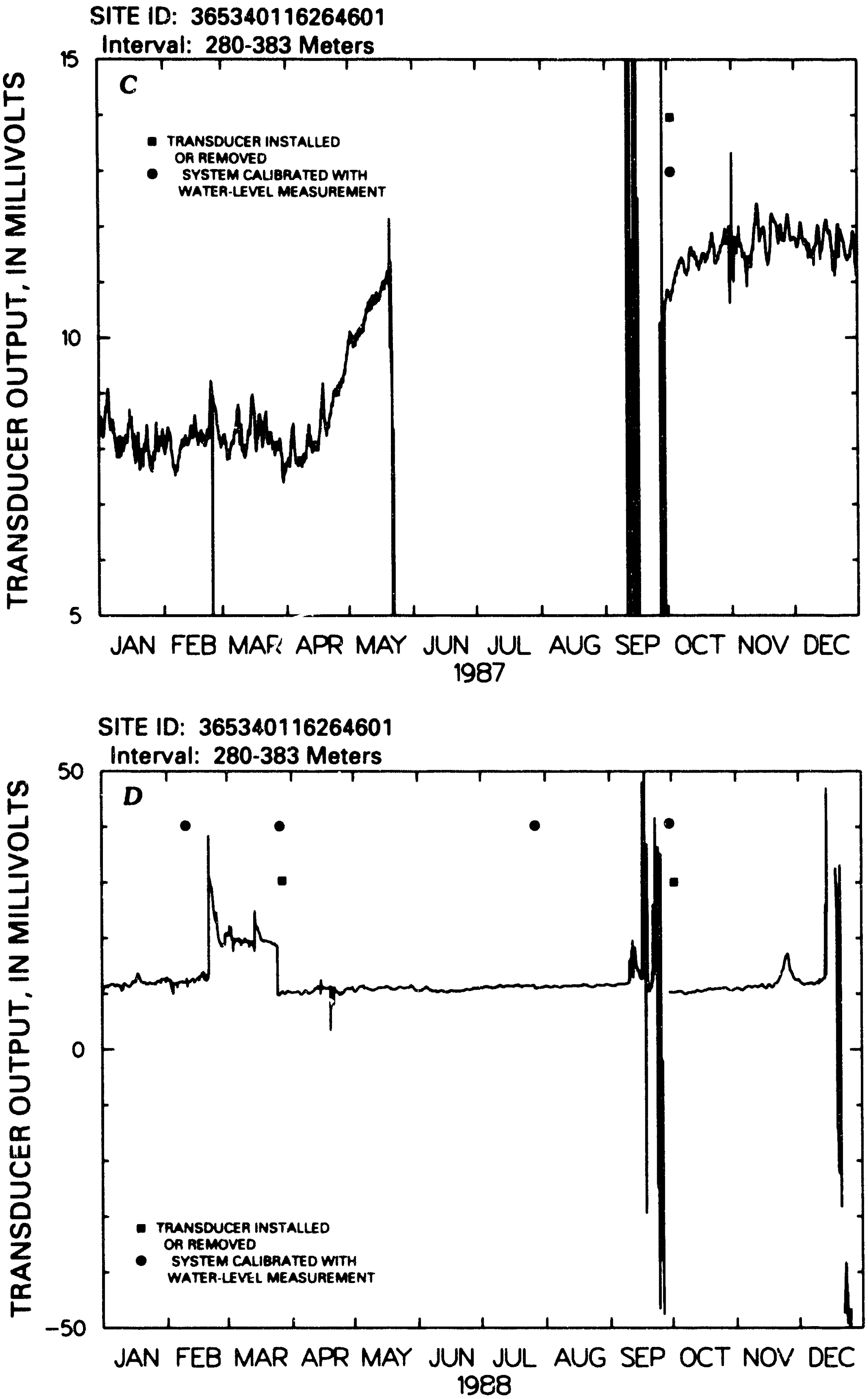


Figure 13.--Transducer output for well UE-25 WT #6.--Continued

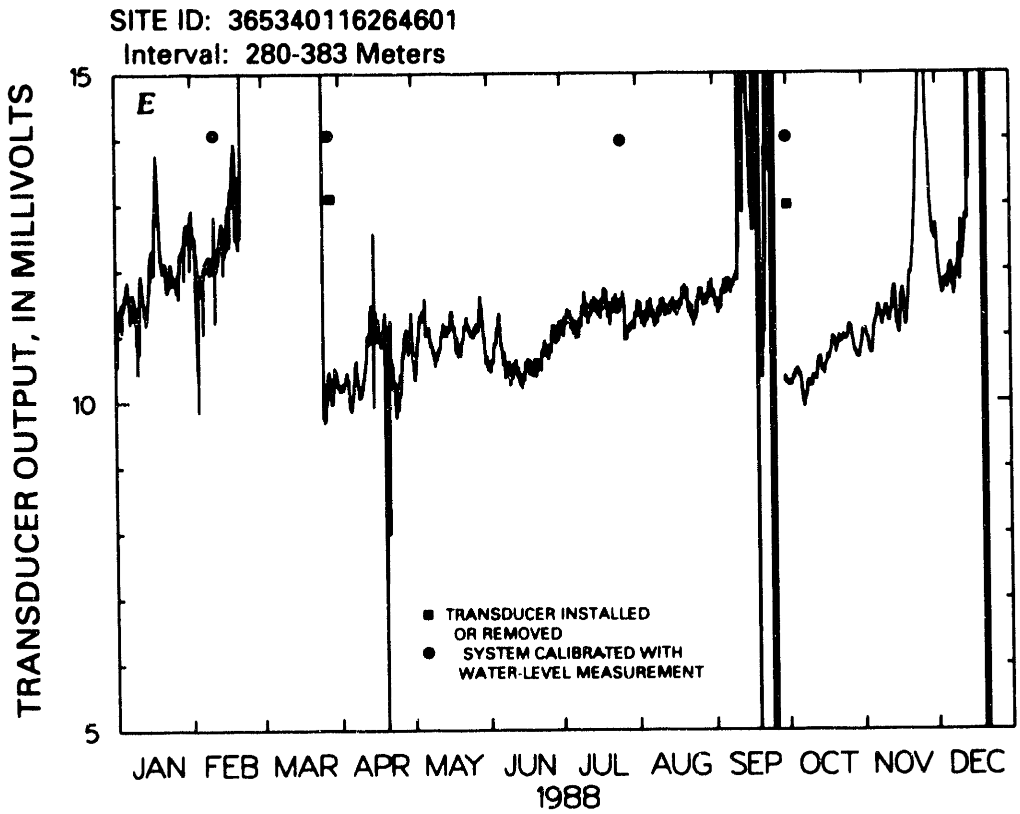


Figure 13.--Transducer output for well UE-25 WT #6.--Continued

were periods where the transducer output was erratic. The transducer output may have drifted during the period. During the final 2 months this transducer was in use, its output showed large jumps and erratic output (fig. 13-D). The third transducer (serial number 226103), in use between March and September 1988, produced a mixture of reasonable output mixed with erratic output for about for about 5 months before producing totally erratic output (fig. 13-D and 13-E). The offset in the record of about 0.4 millivolts that occurred July 27, 1988 occurred while the transducer was being calibrated (fig. 13-E). During calibration, the electrical connections were redone, probably causing the offset. The fourth transducer (serial number 239128), in use between September and December 1988, produced some reasonable output for about 50 days, but the output appeared to drift upward (fig. 13-D and 13-E). After that time, the transducer output became totally erratic.

Water-level altitude

In addition to measured water-level altitudes, water-level altitudes were estimated on the following days to remove what was judged to be transducer drift:

Date	Estimated water-level altitude (meters)
12-03-87	1034.72
11-22-88	1035.02

The estimated water-level altitudes may introduce some error into the record, but the error probably is small compared to transducer drift.

Transducer output was converted to water-level altitude for the following periods (except for 3 hours on February 24, 1987 as noted in the section "Transducer output"):

Beginning Date	Ending Date
07-22-86	03-28-87
10-01-87	10-30-87
11-04-87	12-01-87
03-25-88	04-11-88
05-07-88	09-09-88
10-01-88	11-20-88

Water-level altitudes are shown in figure 14 and the daily mean water-level altitudes are given in table 4. Approximately 56 percent of the transducer output was converted to water-level altitude. The longest period was 250 days, July 22, 1986 through March 28, 1987.

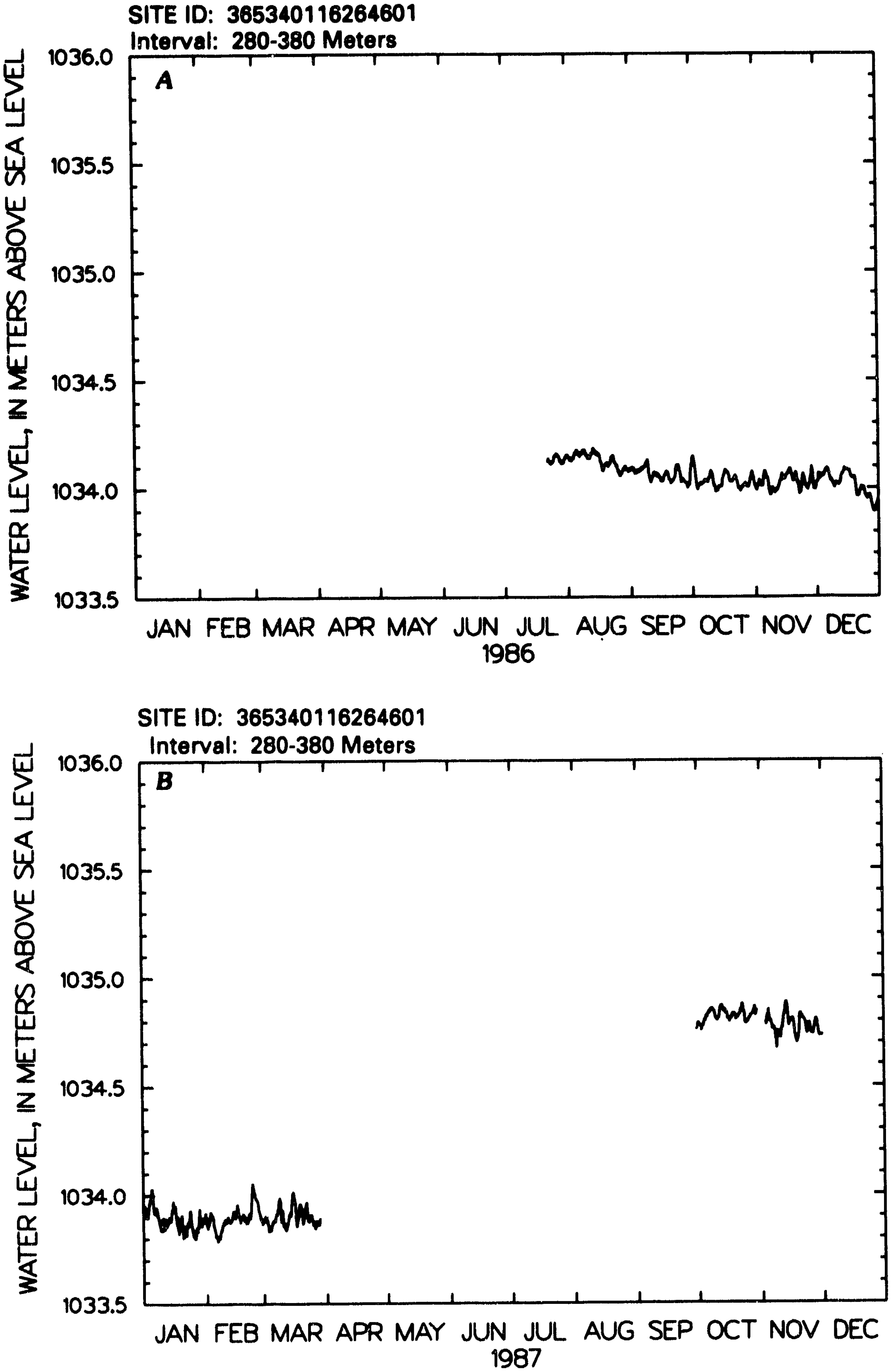


Figure 14.--Water-level altitude for well UE-25 WT #6.

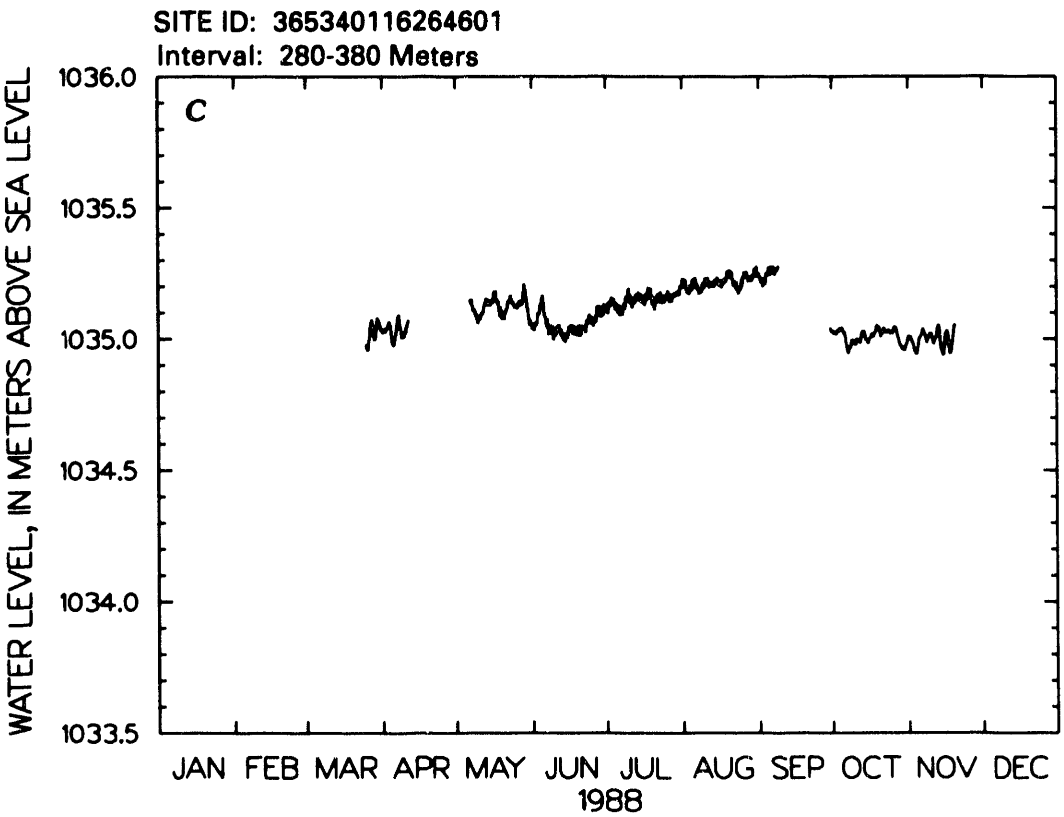


Figure 14.--Water-level altitude for well UE-25 WT #6.--Continued

Table 4.--*Daily mean water-level altitude, in meters above sea level, for UE-25 WT #6*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 281-383 m

Site ID: 365340116264601

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	—	—	—	—	—	—	—	1034.15	1034.09	1034.12	1034.01	1034.01
2	—	—	—	—	—	—	—	1034.14	1034.09	1034.12	1034.00	1034.04
3	—	—	—	—	—	—	—	1034.13	1034.07	1034.05	1034.02	1034.05
4	—	—	—	—	—	—	—	1034.15	1034.08	1034.00	1034.01	1034.06
5	—	—	—	—	—	—	—	1034.17	1034.08	1034.02	1034.03	1034.07
6	—	—	—	—	—	—	—	1034.16	1034.08	1034.02	1034.07	1034.09
7	—	—	—	—	—	—	—	1034.15	1034.09	1034.03	1034.05	1034.07
8	—	—	—	—	—	—	—	1034.16	1034.10	1034.03	1034.00	1034.04
9	—	—	—	—	—	—	—	1034.17	1034.12	1034.03	1033.98	1034.02
10	—	—	—	—	—	—	—	1034.15	1034.07	1034.06	1033.99	1034.01
11	—	—	—	—	—	—	—	1034.14	1034.03	1034.07	1033.98	1034.02
12	—	—	—	—	—	—	—	1034.15	1034.06	1034.02	1033.99	1034.02
13	—	—	—	—	—	—	—	1034.17	1034.07	1033.99	1034.02	1034.04
14	—	—	—	—	—	—	—	1034.17	1034.06	1034.00	1034.05	1034.07
15	—	—	—	—	—	—	—	1034.16	1034.05	1034.01	1034.04	1034.09
16	—	—	—	—	—	—	—	1034.15	1034.04	1034.02	1034.05	1034.08
17	—	—	—	—	—	—	—	1034.13	1034.04	1034.07	1034.07	1034.08
18	—	—	—	—	—	—	—	1034.09	1034.06	1034.08	1034.08	1034.06
19	—	—	—	—	—	—	—	1034.09	1034.07	1034.06	1034.06	1034.05
20	—	—	—	—	—	—	—	1034.11	1034.05	1034.03	1034.04	1034.03
21	—	—	—	—	—	—	—	1034.11	1034.03	1034.03	1034.06	1033.97
22	—	—	—	—	—	—	—	1034.12	1034.04	1034.05	1034.03	1033.97
23	—	—	—	—	—	—	1034.12	1034.14	1034.06	1034.04	1033.98	1034.00
24	—	—	—	—	—	—	1034.12	1034.13	1034.10	1034.00	1034.01	1034.00
25	—	—	—	—	—	—	1034.14	1034.11	1034.08	1033.99	1034.05	1033.97
26	—	—	—	—	—	—	1034.15	1034.08	1034.04	1034.01	1034.01	1033.96
27	—	—	—	—	—	—	1034.15	1034.06	1034.04	1034.02	1034.00	1033.97
28	—	—	—	—	—	—	1034.13	1034.08	1034.03	1034.01	1034.03	1033.93
29	—		—	—	—	—	1034.12	1034.09	1034.01	1034.01	1034.07	1033.90
30	—		—	—	—	—	1034.12	1034.09	1034.04	1034.05	1034.00	1033.91
31	—		—		—		1034.15	1034.08		1034.06		1033.94
MONTHLY												
MEAN	—	—	—	—	—	—	—	1034.13	1034.06	1034.04	1034.03	1034.02
MAX	—	—	—	—	—	—	—	1034.17	1034.12	1034.12	1034.08	1034.09
MIN	—	—	—	—	—	—	—	1034.06	1034.01	1033.99	1033.98	1033.90

Table 4.--*Daily mean water-level altitude, in meters above sea level, for UE-25 WT #6*--Continued

Interval: 281-383 m   Site ID: 365340116264601

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	1033.94	1033.86	1033.89	—	—	—	—	—	—	1034.77	—	1034.73
2	1033.91	1033.89	1033.89	—	—	—	—	—	—	1034.78	—	—
3	1033.92	1033.91	1033.85	—	—	—	—	—	—	1034.76	—	—
4	1033.98	1033.87	1033.84	—	—	—	—	—	—	1034.78	1034.80	—
5	1034.00	1033.82	1033.87	—	—	—	—	—	—	1034.81	1034.82	—
6	1033.92	1033.80	1033.88	—	—	—	—	—	—	1034.82	1034.80	—
7	1033.93	1033.81	1033.91	—	—	—	—	—	—	1034.84	1034.77	—
8	1033.89	1033.84	1033.96	—	—	—	—	—	—	1034.85	1034.75	—
9	1033.85	1033.87	1033.92	—	—	—	—	—	—	1034.84	1034.71	—
10	1033.86	1033.88	1033.90	—	—	—	—	—	—	1034.82	1034.74	—
11	1033.86	1033.88	1033.86	—	—	—	—	—	—	1034.81	1034.74	—
12	1033.86	1033.88	1033.85	—	—	—	—	—	—	1034.83	1034.78	—
13	1033.88	1033.90	1033.89	—	—	—	—	—	—	1034.86	1034.84	—
14	1033.89	1033.91	1033.92	—	—	—	—	—	—	1034.85	1034.87	—
15	1033.94	1033.92	1034.00	—	—	—	—	—	—	1034.84	1034.79	—
16	1033.93	1033.92	1033.96	—	—	—	—	—	—	1034.82	1034.80	—
17	1033.88	1033.89	1033.87	—	—	—	—	—	—	1034.80	1034.80	—
18	1033.85	1033.90	1033.91	—	—	—	—	—	—	1034.82	1034.74	—
19	1033.87	1033.89	1033.95	—	—	—	—	—	—	1034.83	1034.70	—
20	1033.83	1033.88	1033.89	—	—	—	—	—	—	1034.81	1034.76	—
21	1033.83	1033.89	1033.92	—	—	—	—	—	—	1034.82	1034.83	—
22	1033.85	1033.90	1033.93	—	—	—	—	—	—	1034.84	1034.81	—
23	1033.89	1034.01	1033.88	—	—	—	—	—	—	1034.86	1034.79	—
24	1033.87	1033.96	1033.90	—	—	—	—	—	—	1034.82	1034.75	—
25	1033.83	1033.98	1033.87	—	—	—	—	—	—	1034.79	1034.78	—
26	1033.81	1033.95	1033.86	—	—	—	—	—	—	1034.80	1034.75	—
27	1033.84	1033.90	1033.87	—	—	—	—	—	—	1034.81	1034.75	—
28	1033.90	1033.88	1033.87	—	—	—	—	—	—	1034.83	1034.79	—
29	1033.87		—	—	—	—	—	—	—	1034.85	1034.78	—
30	1033.88		—	—	—	—	—	—	—	1034.84	1034.73	—
31	1033.89		—		—		—	—		—		—
MONTHLY												
MEAN	1033.89	1033.89	—	—	—	—	—	—	—	—	—	—
MAX	1034.00	1034.01	—	—	—	—	—	—	—	—	—	—
MIN	1033.81	1033.80	—	—	—	—	—	—	—	—	—	—

Table 4.--*Daily mean water-level altitude, in meters above sea level, for UE-25 WT #6*--Continued

Interval: 281-383 m

Site ID: 365340116264601

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	—	—	—	1035.03	—	1035.05	1035.12	1035.21	1035.24	1035.03	1034.99	—
2	—	—	—	1035.03	—	1035.05	1035.12	1035.21	1035.22	1035.02	1035.01	—
3	—	—	—	1035.05	—	1035.07	1035.14	1035.19	1035.22	1035.02	1034.99	—
4	—	—	—	1035.05	—	1035.11	1035.14	1035.18	1035.23	1035.03	1034.96	—
5	—	—	—	1034.99	—	1035.15	1035.13	1035.20	1035.25	1035.04	1034.95	—
6	—	—	—	1034.99	—	1035.10	1035.12	1035.21	1035.26	1035.03	1035.00	—
7	—	—	—	1035.06	1035.14	1035.06	1035.11	1035.20	1035.26	1034.99	1035.02	—
8	—	—	—	1035.06	1035.11	1035.03	1035.11	1035.18	1035.26	1034.96	1035.02	—
9	—	—	—	1035.01	1035.09	1035.04	1035.14	1035.19	1035.27	1034.98	1035.00	—
10	—	—	—	1035.02	1035.07	1035.01	1035.17	1035.21	—	1034.99	1035.01	—
11	—	—	—	1035.05	1035.08	1035.03	1035.15	1035.22	—	1034.99	1035.01	—
12	—	—	—	—	1035.11	1035.04	1035.13	1035.21	—	1034.99	1034.99	—
13	—	—	—	—	1035.14	1035.03	1035.15	1035.21	—	1035.00	1035.02	—
14	—	—	—	—	1035.14	1035.01	1035.16	1035.21	—	1035.03	1035.04	—
15	—	—	—	—	1035.14	1035.00	1035.16	1035.22	—	1035.00	1034.96	—
16	—	—	—	—	1035.15	1035.02	1035.15	1035.21	—	1034.99	1034.96	—
17	—	—	—	—	1035.17	1035.04	1035.15	1035.21	—	1035.01	1035.02	—
18	—	—	—	—	1035.14	1035.04	1035.17	1035.22	—	1035.01	1034.98	—
19	—	—	—	—	1035.10	1035.03	1035.17	1035.24	—	1035.04	1034.96	—
20	—	—	—	—	1035.09	1035.03	1035.15	1035.25	—	1035.04	1035.03	—
21	—	—	—	—	1035.09	1035.03	1035.13	1035.24	—	1035.02	—	—
22	—	—	—	—	1035.13	1035.04	1035.15	1035.21	—	1035.03	—	—
23	—	—	—	—	1035.15	1035.05	1035.16	1035.20	—	1035.03	—	—
24	—	—	—	—	1035.14	1035.07	1035.15	1035.18	—	1035.03	—	—
25	—	—	—	—	1035.12	1035.07	1035.15	1035.20	—	1035.02	—	—
26	—	—	1034.98	—	1035.12	1035.06	1035.17	1035.24	—	1035.03	—	—
27	—	—	1035.05	—	1035.14	1035.08	1035.16	1035.24	—	1035.04	—	—
28	—	—	1035.02	—	1035.15	1035.11	1035.16	1035.23	—	1035.01	—	—
29	—	—	1035.02	—	1035.18	1035.10	1035.17	1035.23	—	1034.98	—	—
30	—		1035.07	—	1035.12	1035.11	1035.17	1035.25	—	1034.96	—	—
31	—		1035.04		1035.06		1035.18	1035.26		1034.96		—
MONTHLY												
MEAN	—	—	—	—	—	1035.06	1035.15	1035.21	—	1035.01	—	—
MAX	—	—	—	—	—	1035.15	1035.18	1035.26	—	1035.04	—	—
MIN	—	—	—	—	—	1035.00	1035.11	1035.18	—	1034.96	—	—

Well USW WT-11

Information about the history of well USW WT-11 and about previous data from the well was obtained from various sources. These sources are: Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1986a, 1987c).

Well specifications

The following are specifications for well USW WT-11:

1. Location and identification:

   Latitude and longitude: 36°46'49" N.; 116°28'02" W.
   Nevada State Central Zone Coordinates (m): N 225,269; E 170,193.
   U.S. Geological Survey Site ID: 364649116280201.

2. Drilling and casing information:

   Well started: August 3, 1983.
   Well completed: August 9, 1983.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; bottom-hole core obtained.
   Bit diameter below water level: 222 mm.
   Casing extending below water level: None [surface casing only, to a depth of 14 m].
   Total drilled depth: 441 m.

3. Access to and description of interval for measuring water levels:

   62-mm inside-diameter tubing that has a 3.6-m long well screen on bottom, extending from land surface to a depth of 416 m; saturated interval of borehole within the Topopah Spring Member of the Paintbrush Tuff to the tuffaceous beds of Calico Hills.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,094.11 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.12 m, based on depth to water of 363 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from September 1, 1983, through December 13, 1985. Beginning in December 1985, the water level has been monitored continuously using a downhole pressure transducer with a data logger at the land surface.

The following transducers were used in well USW WT-11:

[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
10-15-86	12-29-87	Gage	Druck PDCR 10/D	10	153539
12-29-87	12-31-88	Gage	Druck PDCR 10/D	10	79567

The following calibrations of the water-level monitoring system were performed in well USW WT-11:

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
153539	10-15-86	-6.513	0.999	10-15-86	730.56
79567	12-29-87	-5.106	1.000	12-29-87	730.70
79567	04-29-88	-5.041	1.000	04-29-88	730.70
79567	08-26-88	-5.077	1.000	08-26-88	730.72

Transducer output

Transducer output from October 1986 through December 1988 is shown in figure 15. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 153539), in use between October 1986 and December 1987, produced reasonable output for about 8 months (fig. 15-A, 15-B, and 15-C). Beginning about June 1, 1987, the transducer output appeared to drift rapidly downward and settle at about 3 millivolts below the previous output for about 2 weeks (fig. 15-B). The transducer then began producing more erratic output and never again produced reasonable output (fig. 15-B). The second transducer (serial number 79567), in use from December 1987 through December 1988, produced reasonable output for about 9 months (fig. 15-D and 15-E). Then in early October, the output rose by about 1.5 millivolts for several days and then dropped for several days (fig. 15-E). While the output was decreasing, it again became erratic. For a little more than a week in late October, the output again looked reasonable, but then became totally erratic (fig 15-D).

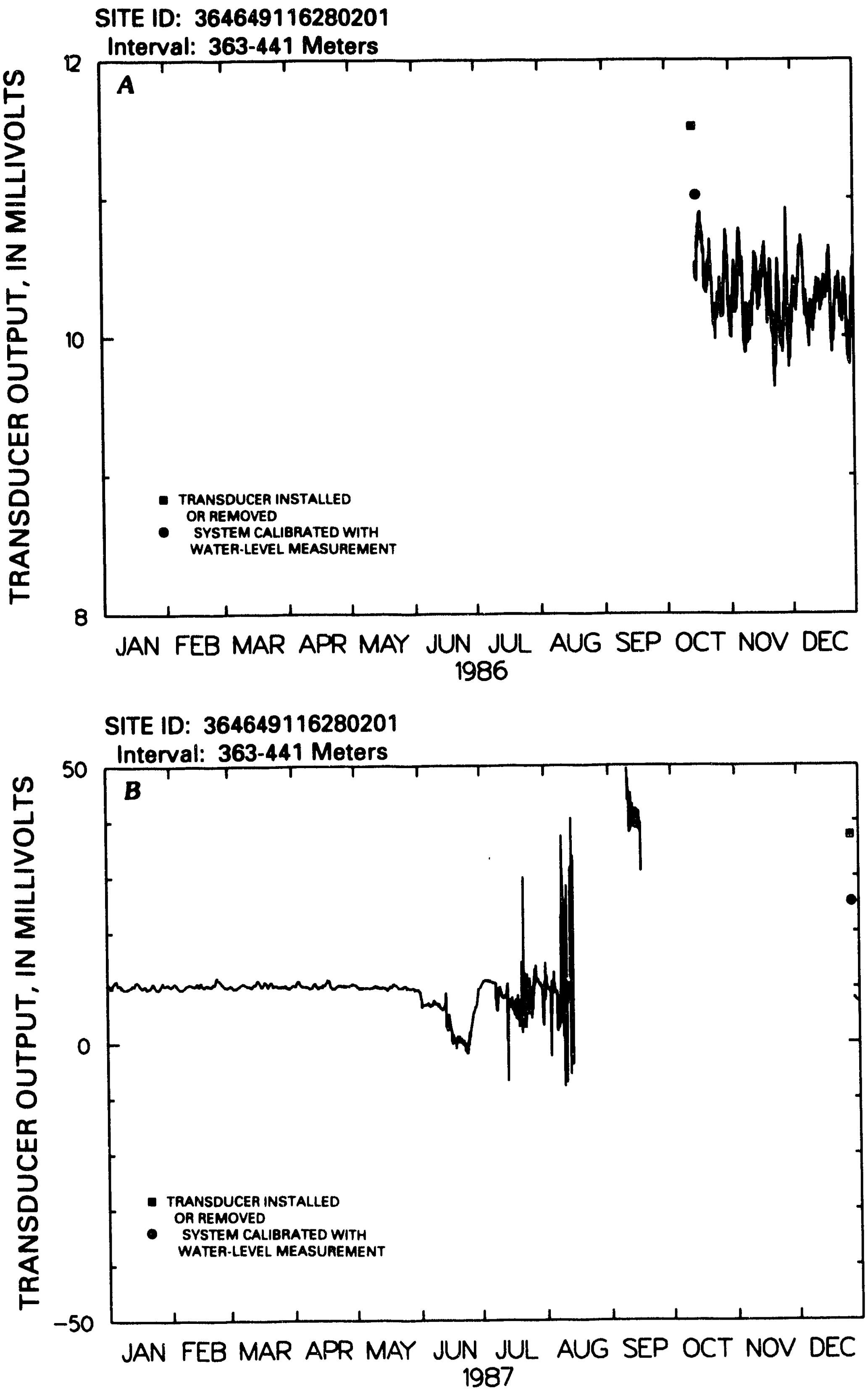
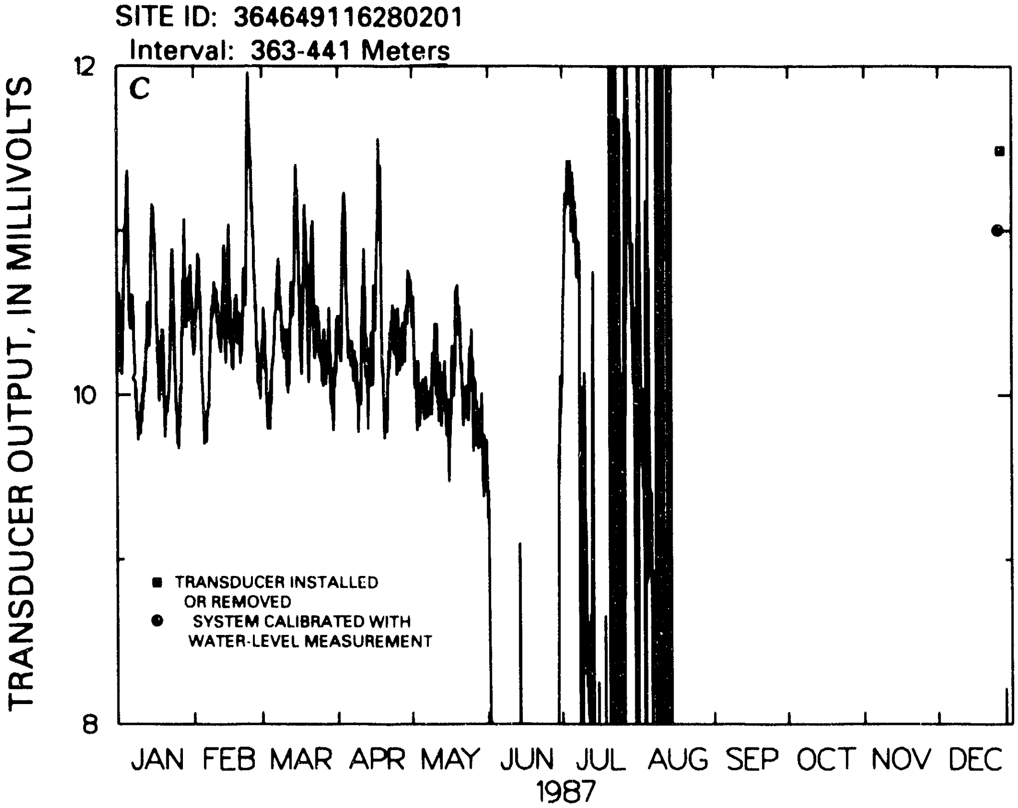


Figure 15.--Transducer output for well USW WT-11.



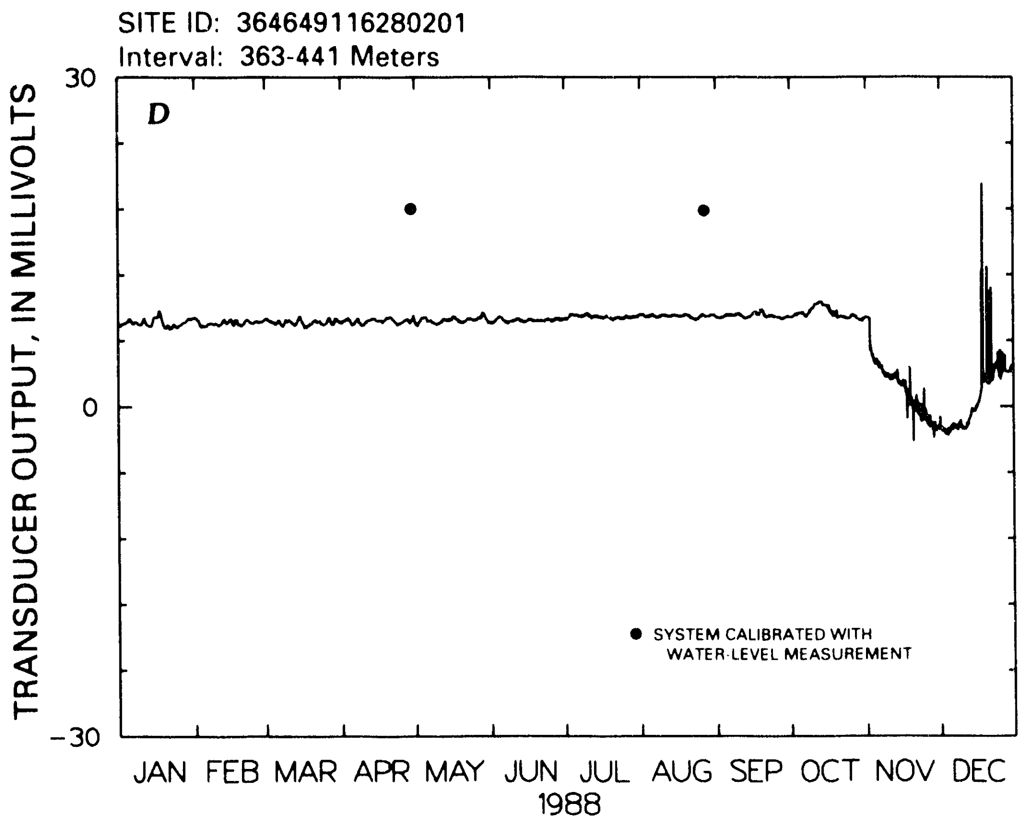


Figure 15.--Transducer output for well USW WT-11.--Continued

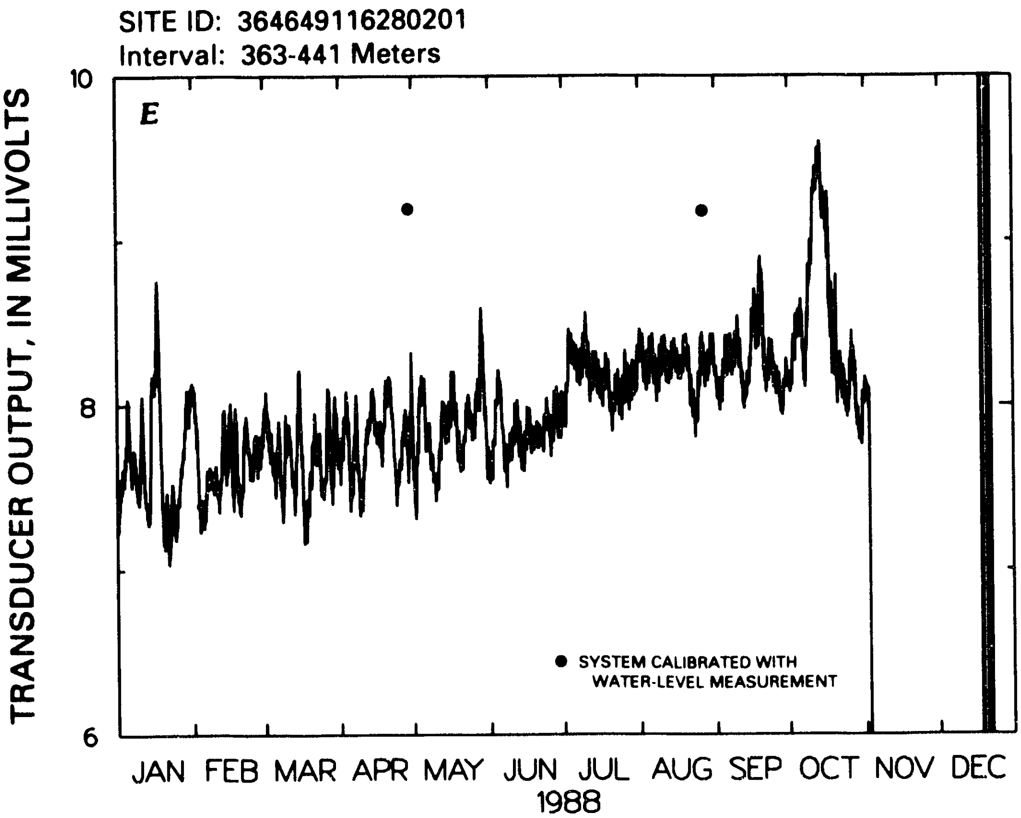


Figure 15.--Transducer output for well USW WT-11.--Continued

Water-level altitude

Transducer output was converted to water-level altitude for the following periods:

Beginning date	Ending date
10-15-86	05-31-87
12-30-87	10-07-88
10-23-88	11-02-88

Four hours of transducer output, and hence water-level altitude, is missing for January 22, 1988 while a new chip was being installed in the data logger.

The water-level altitudes are shown in figure 16 and the daily mean water-level altitudes are given in table 5. Approximately 64 percent of the transducer output was converted to water-level altitude. The longest period was 283 days, December 30, 1987 through October 7, 1988.

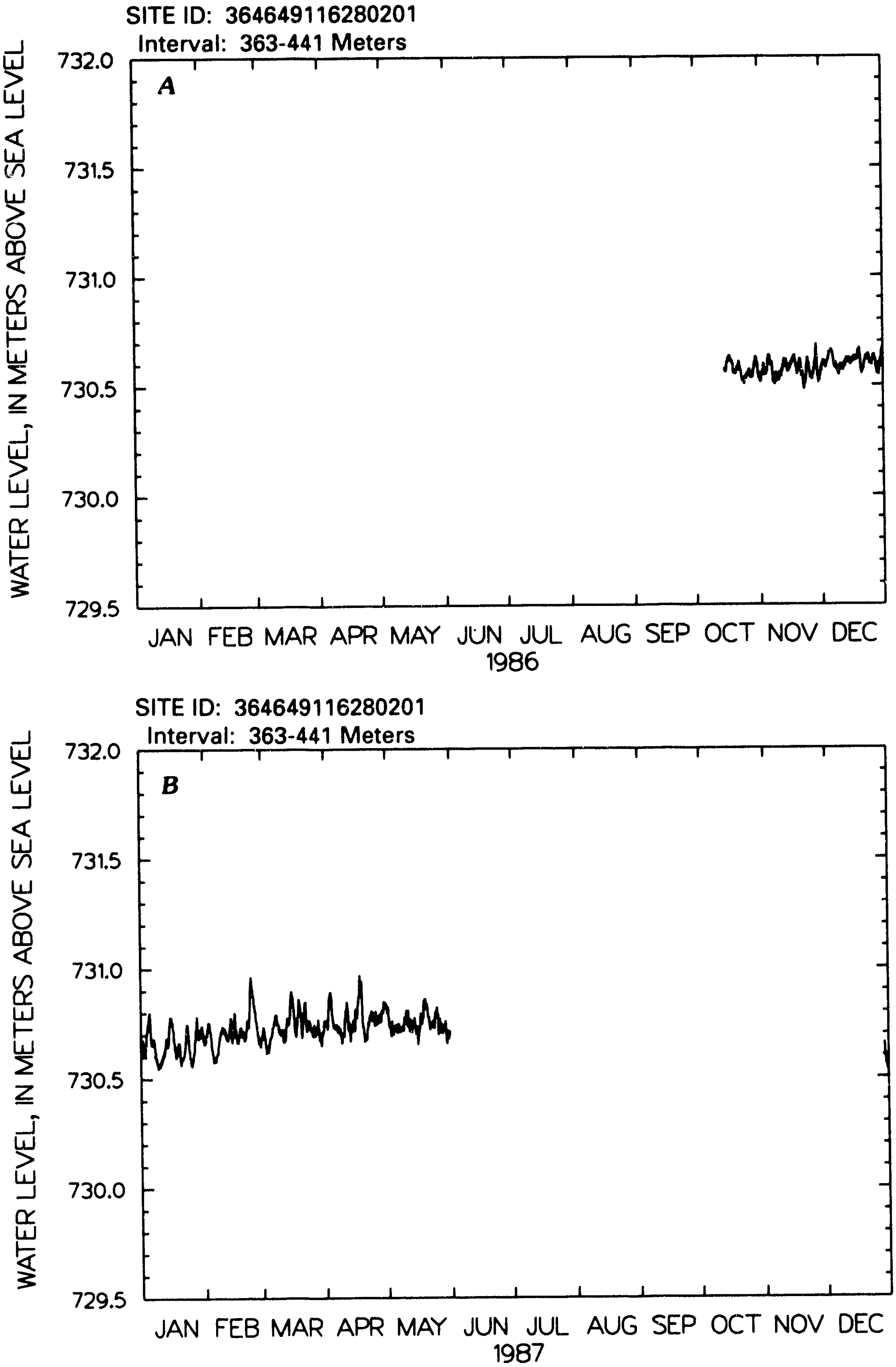


Figure 16.--Water-level altitude for well USW WT-11.

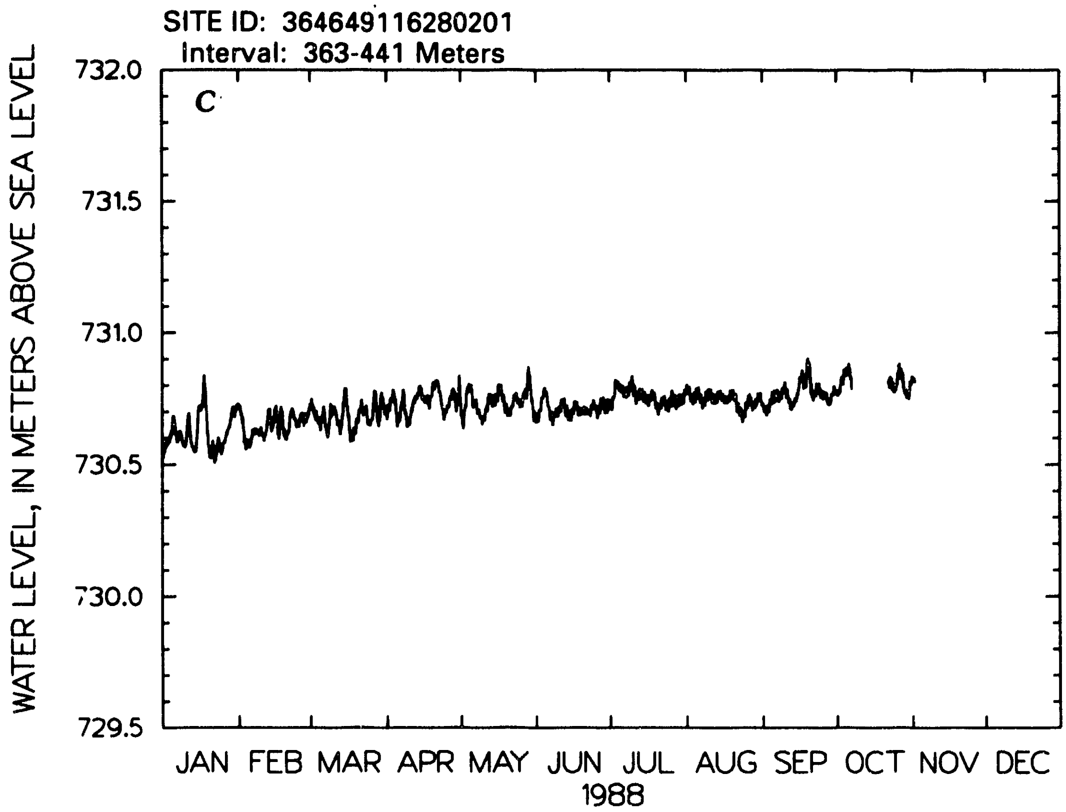


Figure 16.--Water-level altitude for well USW WT-11.--Continued

Table 5.--*Daily mean water-level altitude, in meters above sea level, for well USW WT-11*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 364-441 m

Site ID: 364649116280201

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						<u>1986</u>						
1	—	—	—	—	—	—	—	—	—	—	730.54	730.56
2	—	—	—	—	—	—	—	—	—	—	730.53	730.59
3	—	—	—	—	—	—	—	—	—	—	730.57	730.60
4	—	—	—	—	—	—	—	—	—	—	730.56	730.60
5	—	—	—	—	—	—	—	—	—	—	730.58	730.64
6	—	—	—	—	—	—	—	—	—	—	730.65	730.65
7	—	—	—	—	—	—	—	—	—	—	730.59	730.63
8	—	—	—	—	—	—	—	—	—	—	730.53	730.59
9	—	—	—	—	—	—	—	—	—	—	730.53	730.58
10	—	—	—	—	—	—	—	—	—	—	730.54	730.56
11	—	—	—	—	—	—	—	—	—	—	730.54	730.58
12	—	—	—	—	—	—	—	—	—	—	730.56	730.58
13	—	—	—	—	—	—	—	—	—	—	730.60	730.60
14	—	—	—	—	—	—	—	—	—	—	730.60	730.61
15	—	—	—	—	—	—	—	—	—	—	730.57	730.61
16	—	—	—	—	—	—	—	—	—	730.58	730.59	730.61
17	—	—	—	—	—	—	—	—	—	730.62	730.61	730.62
18	—	—	—	—	—	—	—	—	—	730.62	730.62	730.62
19	—	—	—	—	—	—	—	—	—	730.60	730.59	730.64
20	—	—	—	—	—	—	—	—	—	730.56	730.57	730.64
21	—	—	—	—	—	—	—	—	—	730.57	730.60	730.56
22	—	—	—	—	—	—	—	—	—	730.59	730.54	730.58
23	—	—	—	—	—	—	—	—	—	730.57	730.50	730.62
24	—	—	—	—	—	—	—	—	—	730.53	730.56	730.62
25	—	—	—	—	—	—	—	—	—	730.52	730.59	730.61
26	—	—	—	—	—	—	—	—	—	730.54	730.54	730.61
27	—	—	—	—	—	—	—	—	—	730.56	730.54	730.63
28	—	—	—	—	—	—	—	—	—	730.55	730.59	730.59
29	—		—	—	—	—	—	—	—	730.55	730.63	730.56
30	—		—	—	—	—	—	—	—	730.61	730.53	730.59
31	—		—		—		—	—		730.60		730.65
MONTHLY MEAN	—	—	—	—	—	—	—	—	—	—	730.57	730.60
MAX	—	—	—	—	—	—	—	—	—	—	730.63	730.65
MIN	—	—	—	—	—	—	—	—	—	—	730.50	730.56

Table 5.--*Daily mean water-level altitude, in meters above sea level, for well USW WT-11*--Continued

Interval: 364-441 m

Site ID: 364649116280201

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	730.66	730.67	730.71	730.75	730.81	—	—	—	—	—	—	—
2	730.62	730.73	730.69	730.76	730.75	—	—	—	—	—	—	—
3	730.66	730.73	730.64	730.88	730.72	—	—	—	—	—	—	—
4	730.75	730.64	730.64	730.82	730.72	—	—	—	—	—	—	—
5	730.75	730.59	730.68	730.74	730.73	—	—	—	—	—	—	—
6	730.66	730.59	730.72	730.73	730.73	—	—	—	—	—	—	—
7	730.66	730.63	730.77	730.73	730.72	—	—	—	—	—	—	—
8	730.59	730.69	730.76	730.71	730.72	—	—	—	—	—	—	—
9	730.56	730.72	730.72	730.69	730.74	—	—	—	—	—	—	—
10	730.57	730.72	730.71	730.72	730.78	—	—	—	—	—	—	—
11	730.59	730.70	730.69	730.82	730.76	—	—	—	—	—	—	—
12	730.62	730.69	730.70	730.75	730.74	—	—	—	—	—	—	—
13	730.67	730.74	730.75	730.71	730.74	—	—	—	—	—	—	—
14	730.69	730.69	730.80	730.74	730.75	—	—	—	—	—	—	—
15	730.77	730.76	730.87	730.76	730.72	—	—	—	—	—	—	—
16	730.72	730.70	730.78	730.80	730.70	—	—	—	—	—	—	—
17	730.64	730.68	730.71	730.89	730.75	—	—	—	—	—	—	—
18	730.62	730.72	730.81	730.92	730.77	—	—	—	—	—	—	—
19	730.65	730.70	730.81	730.75	730.84	—	—	—	—	—	—	—
20	730.58	730.68	730.72	730.69	730.83	—	—	—	—	—	—	—
21	730.59	730.73	730.81	730.70	730.78	—	—	—	—	—	—	—
22	730.65	730.76	730.77	730.76	730.74	—	—	—	—	—	—	—
23	730.73	730.92	730.74	730.79	730.74	—	—	—	—	—	—	—
24	730.64	730.88	730.74	730.78	730.76	—	—	—	—	—	—	—
25	730.57	730.80	730.71	730.77	730.80	—	—	—	—	—	—	—
26	730.59	730.73	730.71	730.77	730.75	—	—	—	—	—	—	—
27	730.68	730.68	730.72	730.77	730.73	—	—	—	—	—	—	—
28	730.73	730.66	730.73	730.78	730.72	—	—	—	—	—	—	—
29	730.69		730.70	730.82	730.73	—	—	—	—	—	—	—
30	730.72		730.67	730.83	730.69	—	—	—	—	—	—	730.60
31	730.68		730.73		730.70		—	—		—		730.55
MONTHLY												
MEAN	730.65	730.71	730.73	730.77	730.75	—	—	—	—	—	—	—
MAX	730.77	730.92	730.87	730.92	730.84	—	—	—	—	—	—	—
MIN	730.56	730.59	730.64	730.69	730.69	—	—	—	—	—	—	—

Table 5.--*Daily mean water-level altitude, in meters above sea level, for well USW WT-11*--Continued

Interval: 364-441 m

Site ID: 364649116280201

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	730.54	730.71	730.73	730.70	730.70	730.68	730.73	730.78	730.73	730.77	730.81	—
2	730.57	730.67	730.71	730.72	730.66	730.68	730.73	730.78	730.71	730.77	730.82	—
3	730.59	730.60	730.69	730.76	730.74	730.72	730.78	730.75	730.71	730.81	—	—
4	730.61	730.58	730.67	730.74	730.79	730.76	730.80	730.75	730.72	730.83	—	—
5	730.67	730.57	730.65	730.67	730.79	730.78	730.79	730.76	730.75	730.85	—	—
6	730.62	730.61	730.69	730.68	730.74	730.73	730.79	730.77	730.76	730.85	—	—
7	730.60	730.62	730.66	730.75	730.73	730.69	730.78	730.75	730.76	730.83	—	—
8	730.61	730.63	730.62	730.71	730.71	730.67	730.77	730.73	730.76	—	—	—
9	730.58	730.62	730.69	730.66	730.69	730.70	730.79	730.75	730.77	—	—	—
10	730.59	730.62	730.70	730.67	730.67	730.70	730.81	730.77	730.79	—	—	—
11	730.67	730.60	730.70	730.72	730.69	730.72	730.79	730.77	730.77	—	—	—
12	730.59	730.64	730.66	730.74	730.73	730.74	730.76	730.76	730.74	—	—	—
13	730.56	730.69	730.64	730.76	730.75	730.71	730.77	730.75	730.72	—	—	—
14	730.57	730.64	730.70	730.78	730.74	730.69	730.77	730.75	730.73	—	—	—
15	730.70	730.68	730.77	730.76	730.74	730.69	730.76	730.77	730.75	—	—	—
16	730.72	730.69	730.69	730.75	730.77	730.71	730.75	730.75	730.80	—	—	—
17	730.79	730.63	730.61	730.75	730.79	730.73	730.74	730.75	730.83	—	—	—
18	730.73	730.69	730.61	730.73	730.75	730.70	730.76	730.74	730.80	—	—	—
19	730.58	730.62	730.64	730.77	730.71	730.70	730.76	730.76	730.83	—	—	—
20	730.54	730.61	730.68	730.80	730.70	730.70	730.73	730.77	730.88	—	—	—
21	730.56	730.64	730.72	730.81	730.70	730.70	730.71	730.75	730.80	—	—	—
22	—	730.70	730.70	730.78	730.73	730.70	730.73	730.72	730.76	—	—	—
23	730.58	730.68	730.71	730.73	730.76	730.71	730.74	730.70	730.78	730.80	—	—
24	730.56	730.65	730.66	730.68	730.74	730.73	730.72	730.68	730.79	730.80	—	—
25	730.56	730.65	730.66	730.71	730.73	730.72	730.72	730.70	730.77	730.79	—	—
26	730.59	730.68	730.70	730.73	730.74	730.70	730.75	730.74	730.76	730.81	—	—
27	730.63	730.67	730.76	730.76	730.77	730.72	730.75	730.74	730.76	730.85	—	—
28	730.65	730.67	730.67	730.77	730.79	730.73	730.74	730.72	730.74	730.82	—	—
29	730.70	730.70	730.70	730.72	730.84	730.72	730.74	730.73	730.74	730.78	—	—
30	730.70		730.75	730.78	730.75	730.72	730.75	730.75	730.78	730.77	—	—
31	730.72		730.71		730.69		730.75	730.76		730.77		—
MONTHLY												
MEAN	—	730.65	730.69	730.74	730.74	730.71	730.76	730.75	730.77	—	—	—
MAX	—	730.71	730.77	730.81	730.84	730.78	730.81	730.78	730.88	—	—	—
MIN	—	730.57	730.61	730.66	730.66	730.67	730.71	730.68	730.71	—	—	—

Well UE-25 WT #13

Information about the history of well UE-25 WT #13 and about previous data from the well was obtained from various sources. These sources are: Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1986a, 1987c).

Well specifications

The following are specifications for well UE-25 WT #13:

1. Location and identification:

   Latitude and longitude: 36°49'43" N.; 116°23'51" W
   Nevada State Central Zone Coordinates (m): N 230,647; E 176,405.
   U.S. Geological Survey Site ID: 364945116235001.

2. Drilling and casing information:

   Well started: June 29, 1983.
   Well completed: July 7, 1983.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; bottom-hole core obtained.
   Bit diameter below water level: 222 mm.
   Casing extending below water level: None [surface casing only, to a depth of 68 m].
   Total drilled depth: 354 m.

3. Access to and description of interval for measuring water levels:

   62-mm inside-diameter tubing that has a 3.6-m long well screen on bottom, extending from land surface to a depth of 346 m; saturated interval of borehole within the Topopah Spring Member of the Paintbrush Tuff.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,032.51 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.01 m, based on depth to water of 304 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from July 8, 1983, through February 12, 1985. Beginning in February 1985, the water level has been monitored continuously using a downhole pressure transducer with a data logger at the land surface.

The following transducers were used in well UE-25 WT #13:

[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
02-12-85	09-25-85	Gage	Psi-Tronix	15	1850
09-25-85	07-09-86	Gage	Senso-metric	10	4J308
07-09-86	05-22-87	Gage	Druck PDCR 10/D	10	156886
05-22-87	11-20-87	Gage	Druck PDCR 10/D	10	156870
11-20-87	06-07-88	Gage	Druck PDCR 10/D	10	203408
06-07-88	08-05-88	Gage	Druck 930	10	237106
08-05-88	12-31-88	Gage	Druck 930	10	237110

The following calibrations of the water-level monitoring system were performed in well UE-25 WT #13:

Transducer				Water level	
		Regression line			
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1850	02-12-85	-4.583	1.000	02-12-85	728.86
1850	09-24-85	-4.178	1.000	09-24-85	728.98
4J308	09-25-85	-12.844	1.000	09-25-85	728.97
156866	07-10-86	-6.580	1.000	07-09-86	729.08
156870	05-22-87	-6.732	1.000	05-22-87	729.10
203408	11-20-87	-4.532	1.000	11-20-87	729.10
203408	03-15-88	-4.525	1.000	03-15-88	729.22
203408	06-07-88	-6.397	0.987	06-07-88	729.10
237106	06-07-88	-6.987	1.000	06-07-88	729.10
237110	08-05-88	-6.972	1.000	08-05-88	728.98

Transducer output

The transducer output from February 1985 through December 1988 is shown in figure 17. These data are the raw transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 1850), in use between February and September 1985,

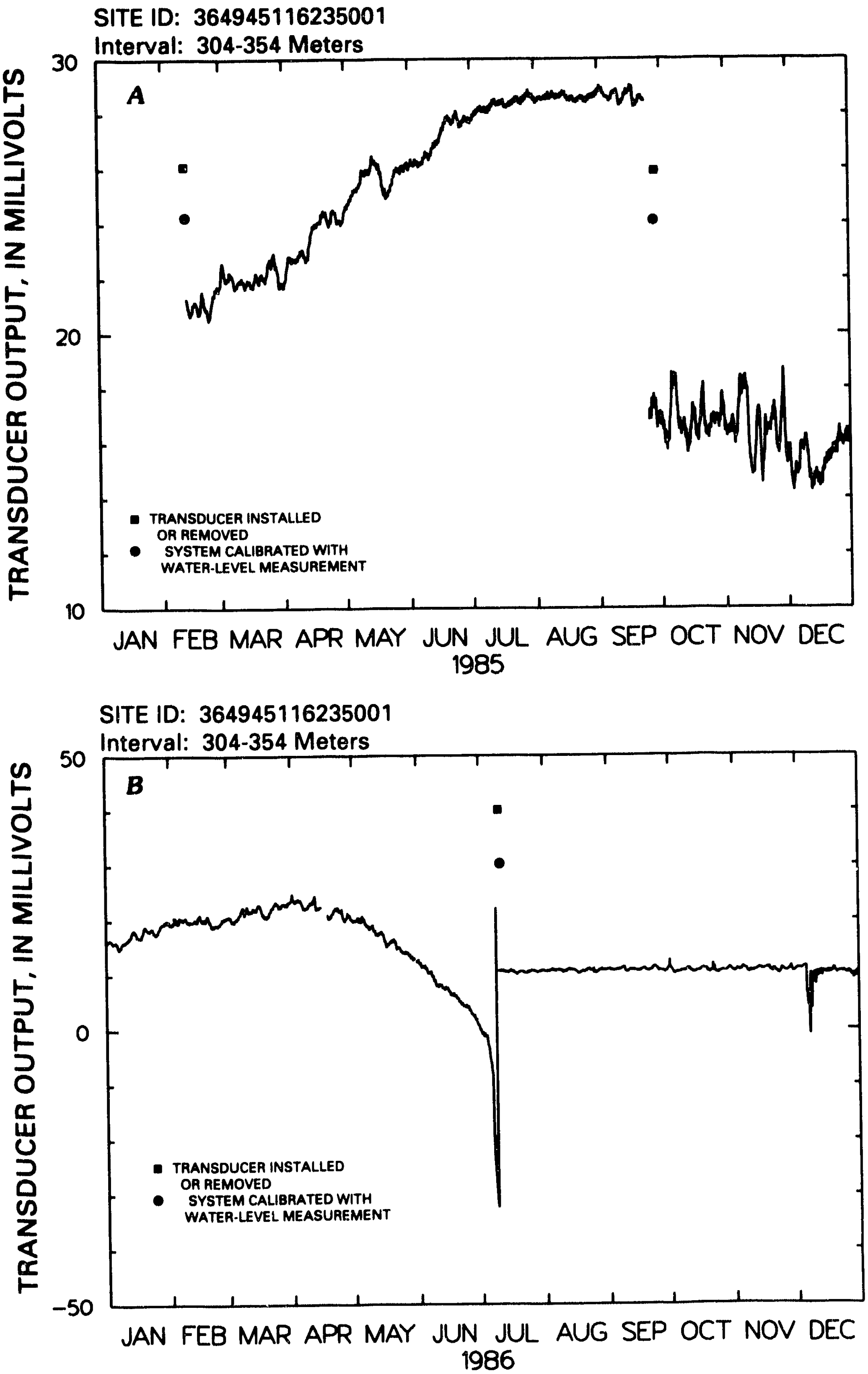
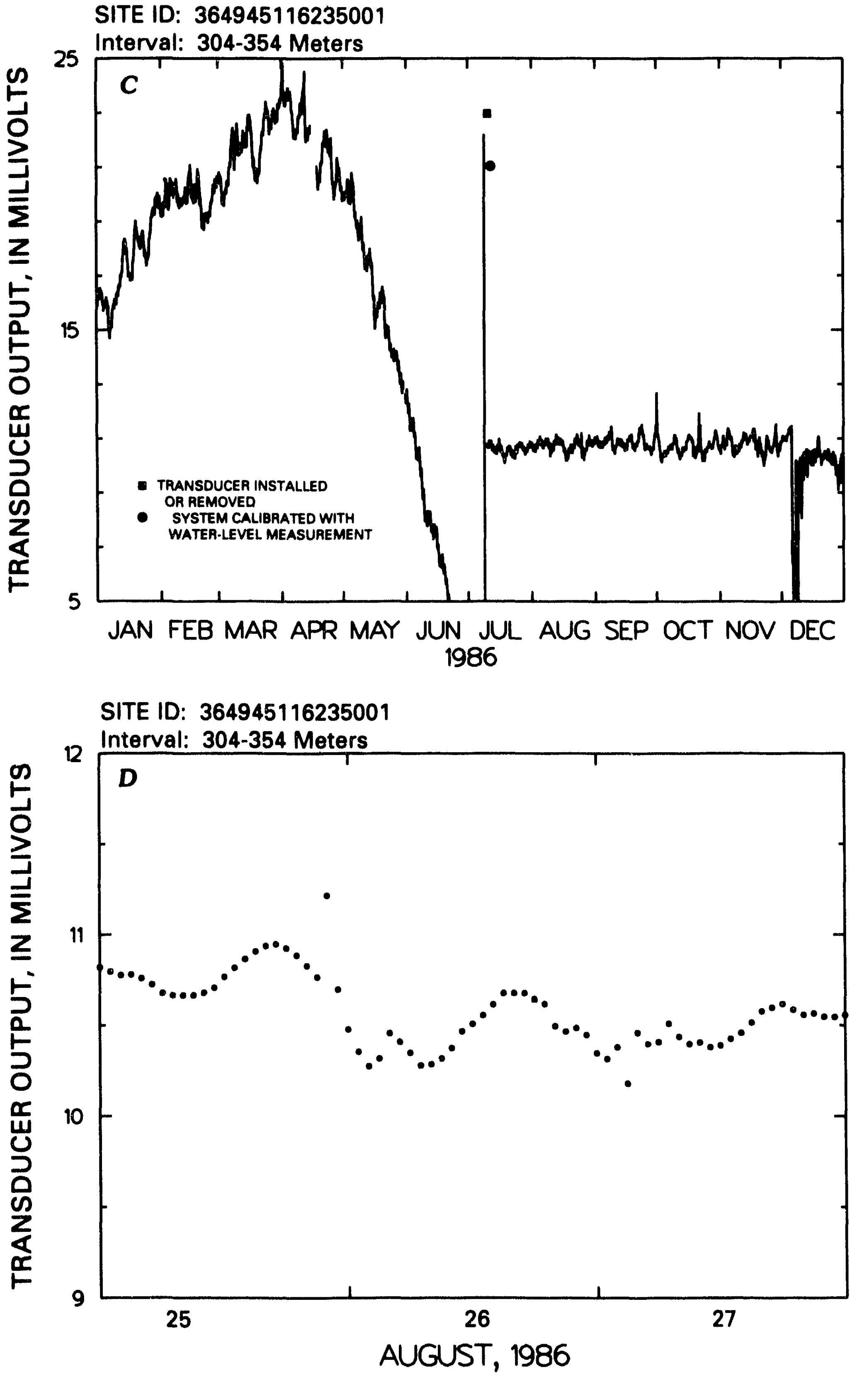
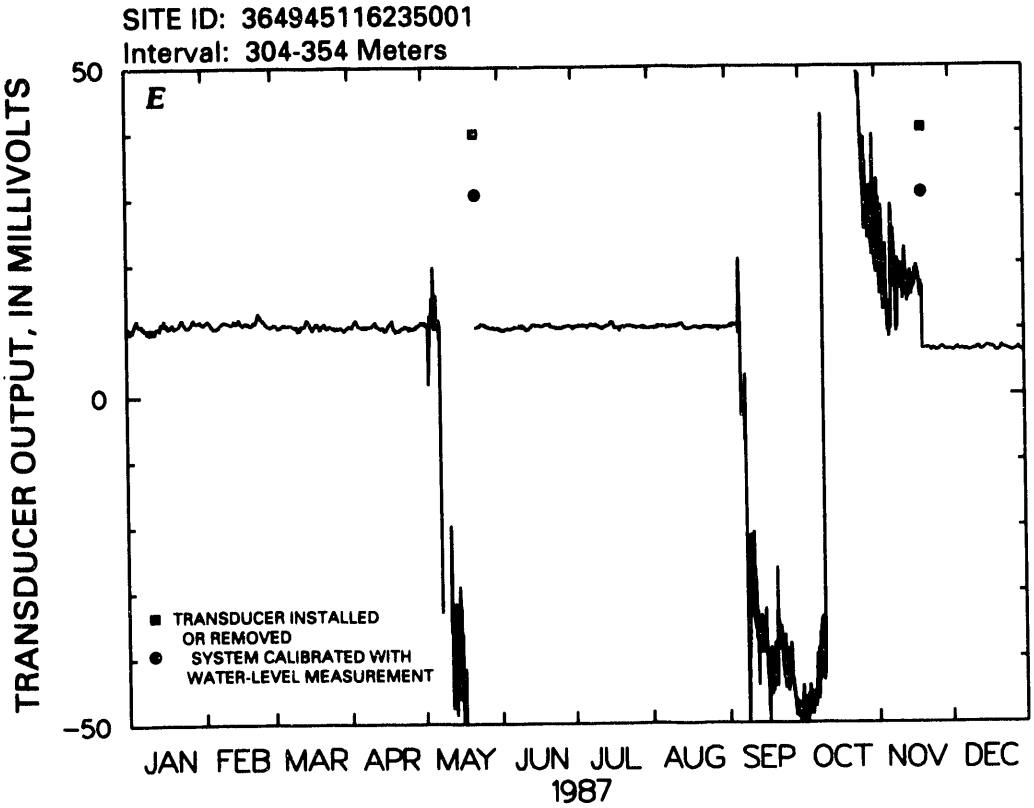


Figure 17.--Transducer output for well UE-25 WT #13.



e 17.--Transducer output for well UE-25 WT #13.--Continued



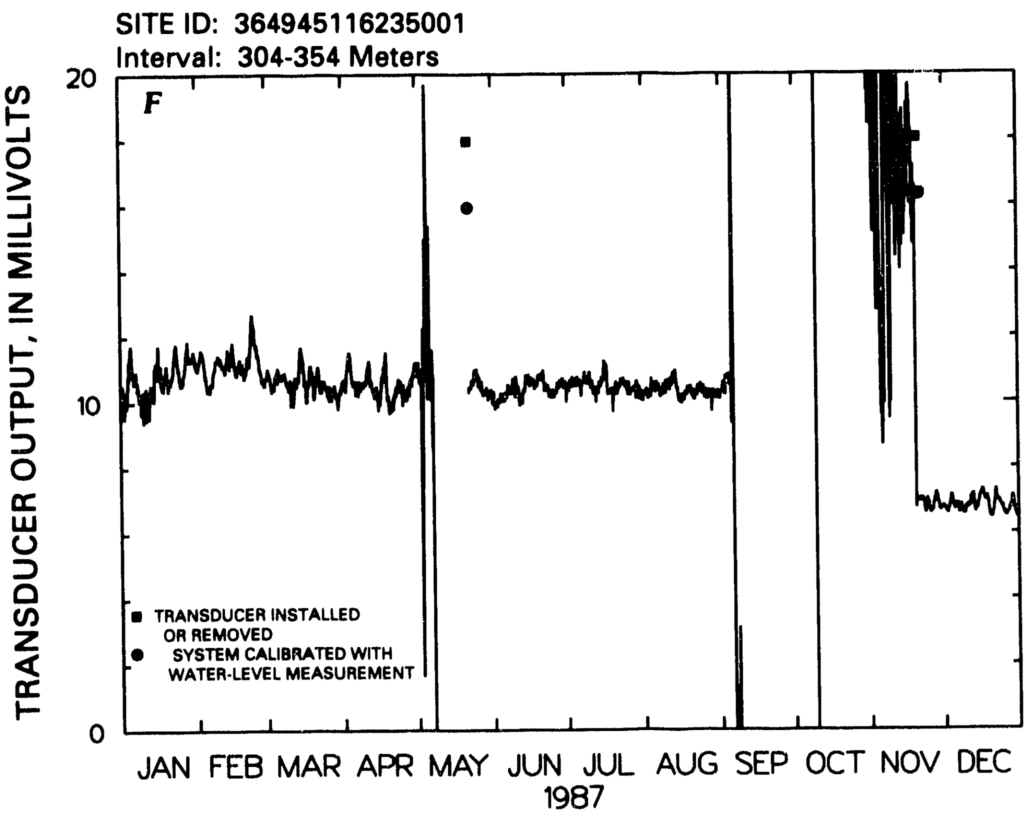
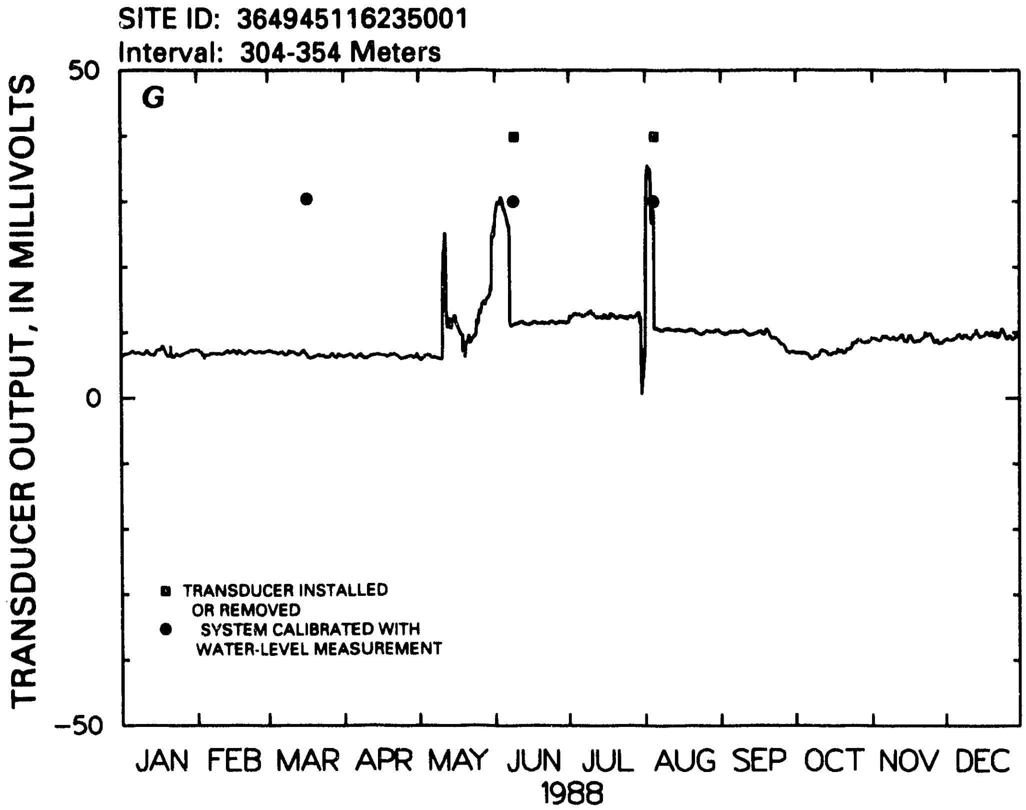


Figure 17.--Transducer output for well UE-25 WT #13.--Continued



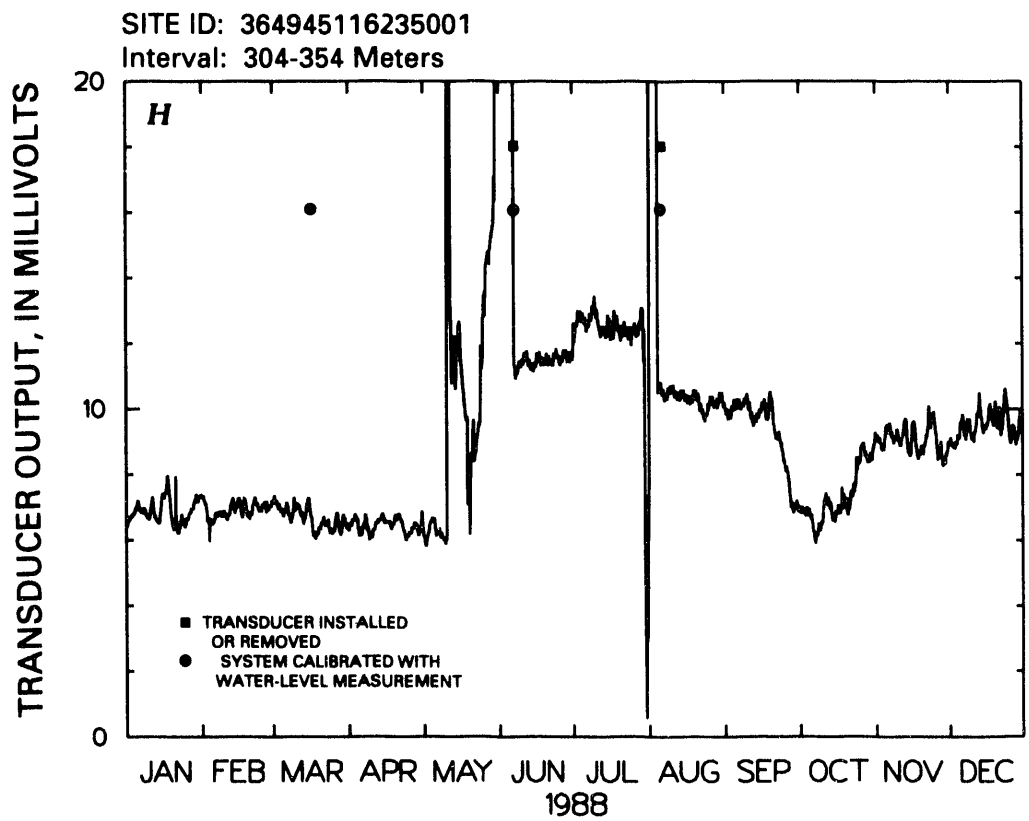


Figure 17.--Transducer output for well UE-25 WT #13.--Continued

produced output that drifted upward over time (fig. 17-A). The rate of drift decreased over time with the last 2 to 3 months relatively drift-free. The second transducer (serial number 4J308), in use between September 1985 and July 1986, produced output that appeared reasonable for about 4 months (fig. 17-A) then appeared to drift upward for about 3 months (fig. 17-B). Beginning in April, the output appeared to drift downward at an increasing rate until totally unreasonable output was produced (fig. 17-B). The third transducer (serial number 156886), in use between July 1986 and May 1987, produced reasonable output for about 5 months, but during this period, a number of spikes were observed (fig. 17-C and 17-D). The term "spike" is used to describe a single or a small number of transducer outputs that do not follow the general trend. The spikes may be some instrument malfunction not related to water-level changes. For example, late on August 25, 1986, a single transducer output was about 0.5 millivolts above the preceding and subsequent outputs while early on August 27, a single output was about 0.2 millivolts below the preceding and subsequent outputs (fig. 17-D). The transducer output became totally erratic in December 1986 (fig. 17-B). In January 1987, the transducer output again begin to appear reasonable, but close examination showed the record contained many small spikes and by May the output was totally erratic (fig. 17-E and 17-F). The fourth transducer (serial number 156870), in use between May and November 1987, produced generally reasonable transducer output for a little over 3 months, but the output contains a number of spikes (fig. 17-F). In September, this transducer began to produce totally erratic output (fig 17-E). The fifth transducer (serial number 203408), in use between November 1987 and June 1988, produced reasonable output for over 5 months with only two spikes in the record (fig. 17-F and 17-H). In early May, the readings became very erratic (fig. 17-G and 17-H). The sixth transducer (serial number 237106), in use between June and August 1988, produced reasonable output less than 2 months before becoming totally erratic (fig. 17-G and 17-H). The seventh transducer (serial number 237110), in use between August and December 1988, produced readings with that were affected by drift (fig. 17-H). In September, the readings drifted downward about 4 millivolts then came back up over the next 2 months.

Water-level altitude

In addition to measured water-level altitudes, water level altitudes were estimated on the following days to remove what was judged to be transducer drift:

Date	Estimated water-level altitude (meters)
12-04-85	728.97
04-15-86	728.97
05-07-88	729.22

The estimated water-level altitude may introduce some error into the record, but the error probably is small compared to transducer drift.

There are a number of spikes during the above periods. These spikes represent one or a few transducer outputs that deviate from the expected values. These spikes were not coincident with a site visit or any other identifiable event and probably represent some type of system malfunction. Typical spikes are shown in fig. 17-D. The details of these spikes are as follows:

Date	Time	Recorded value	Expected value
08-10-86	1900	10.32	10.77
08-10-86	2000	10.45	10.70
08-25-86	2200	11.22	10.73
08-27-86	0300	10.18	10.42
10-01-86	2000	12.70	11.57
10-19-86	2100	10.33	10.76
10-22-86	1400	11.93	10.91
10-22-86	1500	11.96	10.83
10-23-86	0900	11.50	10.62
07-13-87	0800	10.08	10.21
07-13-87	0900	9.99	10.20
07-20-87	1100	9.70	10.17
07-29-87	1700	10.09	10.37
07-30-87	1300	10.08	10.29
08-04-87	1500	10.73	10.34
08-10-87	1700	10.30	10.66
08-10-87	1800	10.24	10.66
08-29-87	0200	9.70	10.19
09-03-87	1300	10.21	10.68
01-21-88	0300	7.94	6.65
02-04-88	0400	5.96	6.54

In the above list, the expected value is the mean of the previous and subsequent values. The spikes, if converted to water levels, would represent water-level changes in a 1-hour period from 0.02 to 0.17 m. Because of the possibility of some sort of system malfunction exists, these points were not converted to water-levels.

Transducer output was converted to water-level altitude for the following periods:

Beginning date	Ending date
02-12-85	04-14-86
07-11-86	12-05-86
01-19-87	04-18-87
05-23-87	09-04-87
11-21-87	05-04-88
06-08-88	07-28-88
08-06-88	09-18-88
10-01-88	12-31-88

Within the convertible periods, water-level altitude is not available for short periods during December 15-16, 1987 and April 16-17, 1988 because the data logger could not read the transducer.

The water-level altitudes are shown in figure 18 and the daily mean water-level altitudes are given in table 6. Approximately 79 percent of the transducer output was converted to water-level altitude. The longest period was 427 days, February 12, 1985 through April 14, 1986.

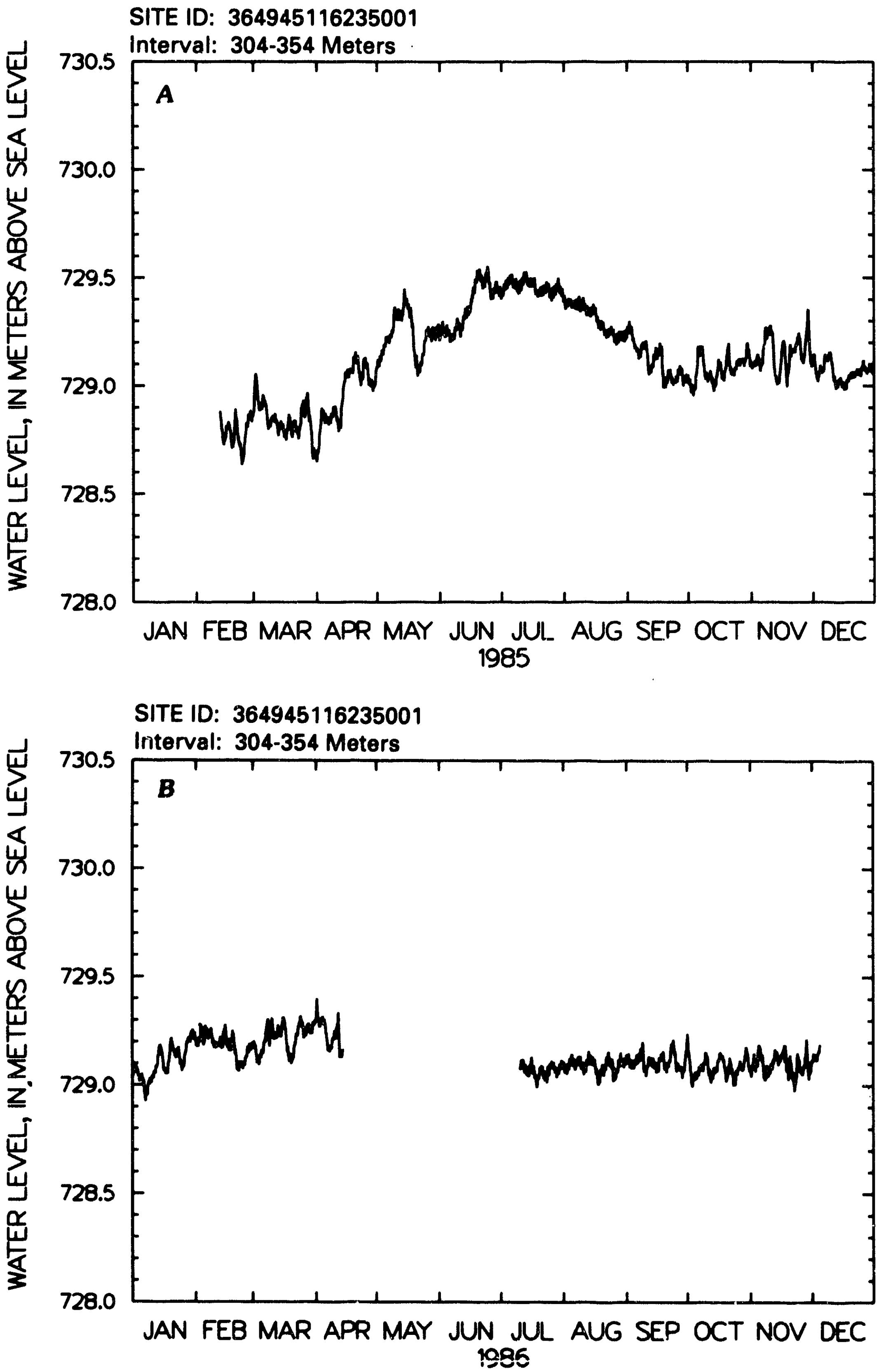


Figure 18.--Water-level altitude for well UE-25 WT #13.

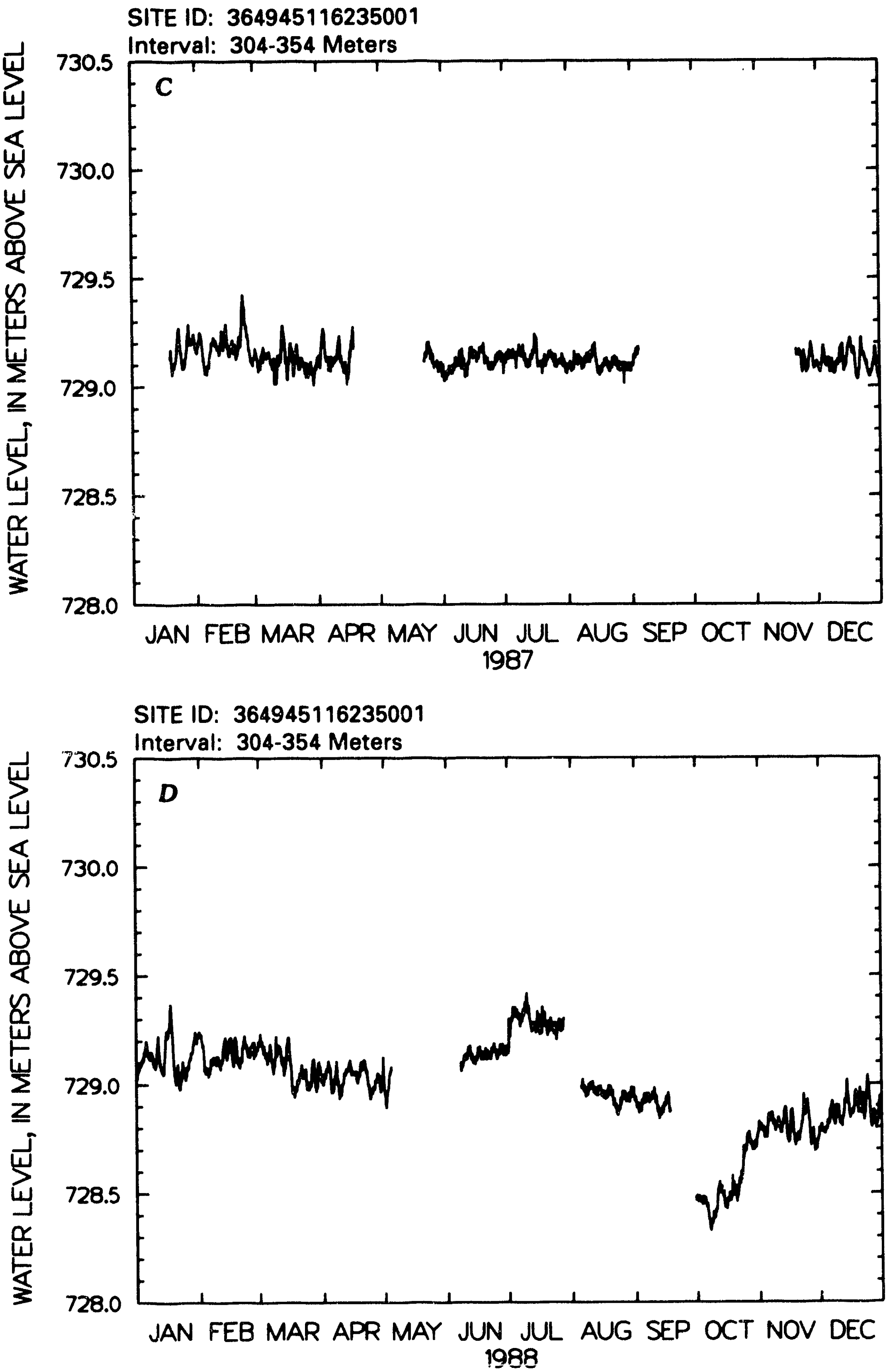


Figure 18.--Water-level altitude for well UE-25 WT #13.--Continued

Table 6.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #13*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 303-354 m

Site ID: 364945116235001

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	—	—	728.93	728.66	729.08	729.21	729.40	729.37	729.20	728.98	729.06	729.06
2	—	—	729.03	728.73	729.10	729.24	729.42	729.34	729.23	728.97	729.04	729.08
3	—	—	728.93	728.84	729.12	729.22	729.44	729.35	729.22	728.94	729.05	729.01
4	—	—	728.90	728.87	729.15	729.23	729.45	729.36	729.18	728.93	729.07	728.98
5	—	—	728.92	728.84	729.18	729.23	729.46	729.35	729.15	728.96	729.07	729.02
6	—	—	728.92	728.84	729.20	729.20	729.47	729.34	729.13	729.07	729.04	729.02
7	—	—	728.88	728.83	729.20	729.20	729.45	729.34	729.11	729.10	729.08	729.05
8	—	—	728.81	728.84	729.22	729.22	729.44	729.35	729.12	729.11	729.17	729.08
9	—	—	728.82	728.87	729.28	729.26	729.43	729.33	729.15	729.05	729.19	729.08
10	—	—	728.85	728.88	729.32	729.26	729.42	729.34	729.15	729.00	729.20	729.10
11	—	—	728.84	728.84	729.31	729.23	729.44	729.33	729.12	728.99	729.21	729.05
12	—	—	728.82	728.80	729.32	729.26	729.47	729.31	729.03	729.00	729.13	728.99
13	—	728.80	728.78	728.84	729.31	729.31	729.48	729.31	729.04	728.98	729.00	728.95
14	—	728.74	728.81	728.95	729.37	729.32	729.46	729.30	729.07	728.94	728.96	728.96
15	—	728.78	728.80	729.02	729.38	729.33	729.45	729.31	729.11	728.97	728.99	728.97
16	—	728.82	728.77	729.04	729.35	729.34	729.45	729.32	729.11	729.04	729.08	728.96
17	—	728.79	728.77	729.04	729.32	729.40	729.45	729.28	729.12	729.05	729.15	728.95
18	—	728.72	728.83	729.06	729.27	729.43	729.41	729.25	729.11	729.00	729.07	728.96
19	—	728.77	728.81	729.08	729.16	729.48	729.40	729.25	728.99	728.99	728.98	728.99
20	—	728.85	728.78	729.11	729.09	729.50	729.40	729.24	728.98	729.06	729.07	729.00
21	—	728.76	728.83	729.11	729.05	729.48	729.40	729.22	729.00	729.12	729.11	729.00
22	—	728.72	728.79	729.06	729.06	729.45	729.41	729.21	729.02	729.03	729.11	729.00
23	—	728.65	728.77	729.01	729.10	729.46	729.42	729.21	728.99	729.01	729.12	729.01
24	—	728.70	728.85	729.06	729.15	729.51	729.43	729.22	—	729.01	729.16	729.01
25	—	728.79	728.90	729.10	729.21	729.47	729.40	729.21	—	729.04	729.17	729.02
26	—	728.83	728.88	729.07	729.23	729.40	729.39	729.19	728.99	729.06	729.08	729.05
27	—	728.86	728.93	729.01	729.23	729.40	729.40	729.18	729.02	729.06	729.07	729.03
28	—	728.85	728.85	729.00	729.22	729.43	729.41	729.19	729.01	729.07	729.15	729.02
29	—		728.78	728.98	729.23	729.43	729.43	729.19	728.97	729.06	729.25	729.03
30	—		728.68	729.01	729.22	729.42	729.42	729.19	728.98	729.10	729.12	729.04
31	—		728.67		729.25		729.40	729.19		729.11		729.01
MONTHLY												
MEAN	—	—	728.84	728.95	729.22	729.34	729.43	729.28	—	729.03	729.10	729.02
MAX	—	—	729.03	729.11	729.38	729.51	729.48	729.37	—	729.12	729.25	729.10
MIN	—	—	728.67	728.66	729.05	729.20	729.39	729.18	—	728.93	728.96	728.95

Table 6.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #13*--Continued

Interval: 303-354 m   Site ID: 364945116235001

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	729.01	729.14	729.14	729.29	—	—	—	729.09	729.12	729.19	729.08	729.09
2	729.02	729.14	729.12	729.26	—	—	—	729.08	729.12	729.16	729.07	729.13
3	729.01	729.19	729.07	729.24	—	—	—	729.08	729.10	729.06	729.11	729.13
4	728.98	729.17	729.06	729.25	—	—	—	729.10	729.09	729.02	729.10	729.13
5	728.99	729.18	729.09	729.24	—	—	—	729.12	729.10	729.04	729.13	729.17
6	728.96	729.20	729.12	729.19	—	—	—	729.11	729.11	729.05	729.17	—
7	728.90	729.18	729.17	729.13	—	—	—	729.09	729.12	729.07	729.13	—
8	728.93	729.20	729.24	729.12	—	—	—	729.11	729.15	729.08	729.05	—
9	728.97	729.15	729.17	729.14	—	—	—	729.11	729.17	729.08	729.06	—
10	728.98	729.14	729.22	729.18	—	—	—	729.08	729.08	729.12	729.07	—
11	729.00	729.13	729.18	729.19	—	—	729.09	729.08	729.06	729.12	729.08	—
12	729.02	729.14	729.18	729.23	—	—	729.10	729.09	729.11	729.06	729.10	—
13	729.07	729.14	729.20	729.10	—	—	729.08	729.12	729.11	729.03	729.14	—
14	729.12	729.15	729.19	729.10	—	—	729.06	729.12	729.11	729.05	729.14	—
15	729.10	729.20	729.20	—	—	—	729.06	729.11	729.10	729.07	729.11	—
16	729.03	729.14	729.25	—	—	—	729.10	729.11	729.08	729.09	729.13	—
17	729.01	729.13	729.20	—	—	—	729.07	729.07	729.10	729.13	729.15	—
18	729.03	729.14	729.12	—	—	—	729.04	729.02	729.13	729.14	729.17	—
19	729.11	729.18	729.08	—	—	—	729.01	729.04	729.14	729.11	729.09	—
20	729.14	729.11	729.07	—	—	—	729.05	729.07	729.09	729.06	729.08	—
21	729.10	729.04	729.10	—	—	—	729.07	729.07	729.08	729.05	729.10	—
22	729.10	729.04	729.16	—	—	—	729.06	729.10	729.10	729.11	729.05	—
23	729.11	729.05	729.20	—	—	—	729.04	729.13	729.16	729.08	729.00	—
24	729.06	729.04	729.24	—	—	—	729.05	729.11	729.19	729.03	729.08	—
25	729.03	729.06	729.23	—	—	—	729.07	729.10	729.15	729.04	729.11	—
26	729.06	729.10	729.19	—	—	—	729.09	729.05	729.09	729.07	729.07	—
27	729.12	729.12	729.20	—	—	—	729.09	729.05	729.09	729.09	729.07	—
28	729.16	729.13	729.22	—	—	—	729.07	729.09	729.08	729.08	729.11	—
29	729.17		729.20	—	—	—	729.06	729.11	729.06	729.10	729.15	—
30	729.19		729.21	—	—	—	729.07	729.11	729.09	729.15	729.06	—
31	729.18		729.24		—		729.09	729.10		729.13		—
MONTHLY												
MEAN	729.05	729.13	729.17	—	—	—	—	729.09	729.11	729.09	729.10	—
MAX	729.19	729.20	729.25	—	—	—	—	729.13	729.19	729.19	729.17	—
MIN	728.90	729.04	729.06	—	—	—	—	729.02	729.06	729.02	729.00	—

Table 6.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #13*--Continued

Interval: 303-354 m   Site ID: 364945116235001

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	—	729.17	729.15	729.13	—	729.06	729.12	729.08	729.09	—	—	729.10
2	—	729.22	729.13	729.14	—	729.05	729.13	729.10	729.12	—	—	729.09
3	—	729.22	729.08	729.24	—	729.05	729.15	729.09	729.15	—	—	729.08
4	—	729.13	729.11	729.19	—	729.08	729.15	729.10	729.16	—	—	729.15
5	—	729.07	729.15	729.13	—	729.08	729.15	729.12	—	—	—	729.13
6	—	729.08	729.15	729.12	—	729.08	729.14	729.13	—	—	—	729.11
7	—	729.11	729.14	729.12	—	729.11	729.13	729.12	—	—	—	729.10
8	—	729.18	729.15	729.11	—	729.11	729.17	729.10	—	—	—	729.10
9	—	729.21	729.12	729.12	—	729.13	729.16	729.11	—	—	—	729.07
10	—	729.21	729.11	729.14	—	729.14	729.16	729.12	—	—	—	729.08
11	—	729.18	729.07	729.21	—	729.12	729.14	729.13	—	—	—	729.11
12	—	729.17	729.07	729.14	—	729.07	729.11	729.13	—	—	—	729.14
13	—	729.22	729.13	729.10	—	729.08	729.10	729.16	—	—	—	729.17
14	—	729.19	729.16	729.09	—	729.13	729.12	729.19	—	—	—	729.09
15	—	729.26	729.26	729.06	—	729.16	729.14	729.12	—	—	—	—
16	—	729.19	729.17	729.08	—	729.15	729.19	729.08	—	—	—	—
17	—	729.16	729.08	729.17	—	729.15	729.21	729.07	—	—	—	729.21
18	—	729.19	729.14	729.22	—	729.13	729.11	729.08	—	—	—	729.17
19	729.14	729.17	729.17	—	—	729.15	729.11	729.11	—	—	—	729.15
20	729.08	729.14	729.09	—	—	729.17	729.09	729.12	—	—	—	729.05
21	729.10	729.19	729.15	—	—	729.17	729.13	729.10	—	—	729.15	729.05
22	729.17	729.22	729.13	—	—	729.13	729.11	729.09	—	—	729.16	729.17
23	729.25	729.38	729.10	—	729.13	729.12	729.14	729.11	—	—	729.14	729.16
24	729.16	729.31	729.12	—	729.16	729.10	729.15	729.12	—	—	729.10	729.14
25	729.09	729.25	729.09	—	729.18	729.10	729.14	729.11	—	—	729.13	729.10
26	729.11	729.18	729.08	—	729.16	729.09	729.12	729.10	—	—	729.08	729.06
27	729.20	729.12	729.09	—	729.12	729.12	729.10	729.09	—	—	729.11	729.06
28	729.23	729.11	729.10	—	729.10	729.13	729.12	729.09	—	—	729.18	729.09
29	729.20		729.06	—	729.10	729.14	729.11	729.09	—	—	729.14	729.15
30	729.22		729.05	—	729.09	729.14	729.11	729.09	—	—	729.09	729.10
31	729.19		729.11		729.09		729.09	729.09		—		729.05
MONTHLY												
MEAN	—	729.19	729.12	—	—	729.11	729.13	729.11	—	—	—	—
MAX	—	729.38	729.26	—	—	729.17	729.21	729.19	—	—	—	—
MIN	—	729.07	729.05	—	—	729.05	729.09	729.07	—	—	—	—

Table 6.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #13*--Continued

Interval: 303-354 m　　　　Site ID: 364945116235001

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	729.04	729.22	729.20	729.02	728.96	—	729.18	—	728.93	728.48	728.80	728.77
2	729.08	729.17	729.19	729.05	728.92	—	729.27	—	728.90	728.47	728.80	728.80
3	729.10	729.08	729.16	729.08	729.01	—	729.32	—	728.89	728.47	728.79	728.78
4	729.13	729.05	729.14	729.06	729.06	—	729.33	—	728.90	728.46	728.76	728.78
5	729.18	729.05	729.11	728.98	—	—	729.32	—	728.93	728.46	728.78	728.81
6	729.14	729.09	729.16	729.00	—	—	729.31	729.00	728.93	728.44	728.85	728.85
7	729.13	729.11	729.11	729.06	—	—	729.29	728.98	728.94	728.38	728.85	728.90
8	729.13	729.11	729.07	729.02	—	729.08	729.31	728.96	728.93	728.35	728.83	728.84
9	729.09	729.11	729.14	728.96	—	729.11	729.34	728.97	728.94	728.39	728.80	728.87
10	729.11	729.11	729.16	728.97	—	729.12	729.38	728.99	728.96	728.40	728.82	728.88
11	729.19	729.09	729.16	729.02	—	729.14	729.34	728.99	728.93	728.46	728.81	728.83
12	729.09	729.14	729.11	729.05	—	729.16	729.29	728.97	728.88	728.53	728.79	728.83
13	729.06	729.19	729.07	729.07	—	729.13	729.26	728.96	728.86	728.52	728.85	728.90
14	729.08	729.14	729.14	729.09	—	729.11	729.27	728.97	728.88	728.49	728.86	728.96
15	729.22	729.18	729.19	729.06	—	729.11	729.25	728.97	728.89	728.45	728.75	728.91
16	729.23	729.18	729.09	—	—	729.14	729.31	728.96	728.92	728.45	728.78	728.86
17	729.32	729.12	728.98	—	—	729.16	729.26	728.95	728.94	728.48	728.87	728.87
18	729.24	729.19	728.96	729.02	—	729.13	729.29	728.95	728.89	728.48	728.78	728.93
19	729.07	729.11	728.99	729.06	—	729.13	729.31	728.96	—	728.52	728.74	728.94
20	729.02	729.10	729.03	729.08	—	729.14	729.27	728.97	—	728.52	728.76	728.91
21	729.06	729.14	729.06	729.10	—	729.13	729.25	728.96	—	728.48	728.76	728.92
22	729.00	729.20	729.04	729.06	—	729.13	729.27	728.92	—	728.54	728.81	728.90
23	729.07	729.17	729.04	728.99	—	729.14	729.27	728.89	—	728.57	728.89	728.86
24	729.05	729.14	729.00	728.95	—	729.16	729.25	728.87	—	728.63	728.88	728.96
25	729.05	729.15	728.99	728.97	—	729.15	729.25	728.90	—	728.69	728.91	728.99
26	729.09	729.17	729.03	728.99	—	729.13	729.28	728.94	—	728.73	728.83	728.87
27	729.13	729.15	729.10	729.03	—	729.15	729.26	728.95	—	728.77	728.74	728.84
28	729.16	729.15	729.00	729.03	—	729.17	729.28	728.93	—	728.73	728.77	728.86
29	729.22	729.18	729.03	728.99	—	729.15	—	728.93	—	728.71	728.71	728.81
30	729.21		729.07	729.05	—	729.15	—	728.96	—	728.72	728.72	728.87
31	729.23		729.03		—		—	728.97		728.74		728.93
MONTHLY												
MEAN	729.13	729.14	729.08	—	—	—	—	—	—	728.53	728.80	728.87
MAX	729.32	729.22	729.20	—	—	—	—	—	—	728.77	728.91	728.99
MIN	729.00	729.05	728.96	—	—	—	—	—	—	728.35	728.71	728.77

Well UE-25 WT #16

Information about the history of well UE-25 WT #16 and about previous data from the well was obtained from various sources. These sources are: Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1986a, 1987c).

Well specifications

The following are specifications for well UE-25 WT #16:

1. Location and identification:

   Latitude and longitude: 36°52'39" N.; 116°25'34" W.
   Nevada State Central Zone Coordinates (m): N 236,043; E 173,856.
   U.S. Geological Survey Site ID: 365239116253401.

2. Drilling and casing information:

   Well started: November 2, 1983.
   Well completed: November 10, 1983.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; bottom-hole core obtained.
   Bit diameter below water level: 222 mm.
   Casing extending below water level: None [surface casing only, to a depth of 31 m].
   Total drilled depth: 521 m.

3. Access to and description of interval for measuring water levels:

   62-mm inside-diameter tubing that has a 3.6-m long well screen on bottom, extending from land surface to a depth of 514 m; saturated interval of borehole within the tuffaceous beds of Calico Hills.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,210.63 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.06 m, based on depth to water of 473 m.

History of instrumentation, calibrations, and comments

Manual water-level were made from November 22, 1983, through August 6, 1986. Beginning in August 1986, the water level has been monitored continuously using a downhole pressure transducer with a data logger at the land surface.

The following transducers were used in well UE-25 WT #16:

[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
08-06-86	02-22-88	Gage	Druck PDCR 10/D	10	153544
02-22-88	06-17-88	Gage	Druck PDCR 10/D	5	120870
06-20-88	12-31-88	Gage	Druck PDCR 10/D	10	237105

The following calibrations of the water-level monitoring system were performed in well UE-25 WT #16:

[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
153544	08-07-86	-6.460	1.000	08-07-86	738.27
153544	10-14-87	-6.272	0.999	--	--
120870	02-22-88	-6.771	1.000	02-22-88	738.26
237105	06-20-88	-6.898	1.000	06-20-88	738.31
237105	10-25-88	-6.878	1.000	10-25-88	738.36

Transducer output

Transducer output from August 1986 through December 1988 is shown in figure 19. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 153544), in use between August 1986 and February 1988, produced reasonable output until December 1987 (fig. 19-A and 19-B); however, there were some notable exceptions. Apparently anomalous output was produced during November 1986 (fig. 19-A) and during March, July, and November 1987 (fig. 19-B). Beginning about mid-December 1987, the transducer output became totally erratic (fig. 19-C and 19-D). The second transducer (serial number 120870), in use between February and June 1988, produced generally noisy output (fig. 19-D); however, during March and April, the output appeared to improve and contained only small spikes. The term "spike" is used to describe a single or a small number of transducer outputs that do not follow the general trend. By mid-April the readings were totally erratic (fig. 19-D) and

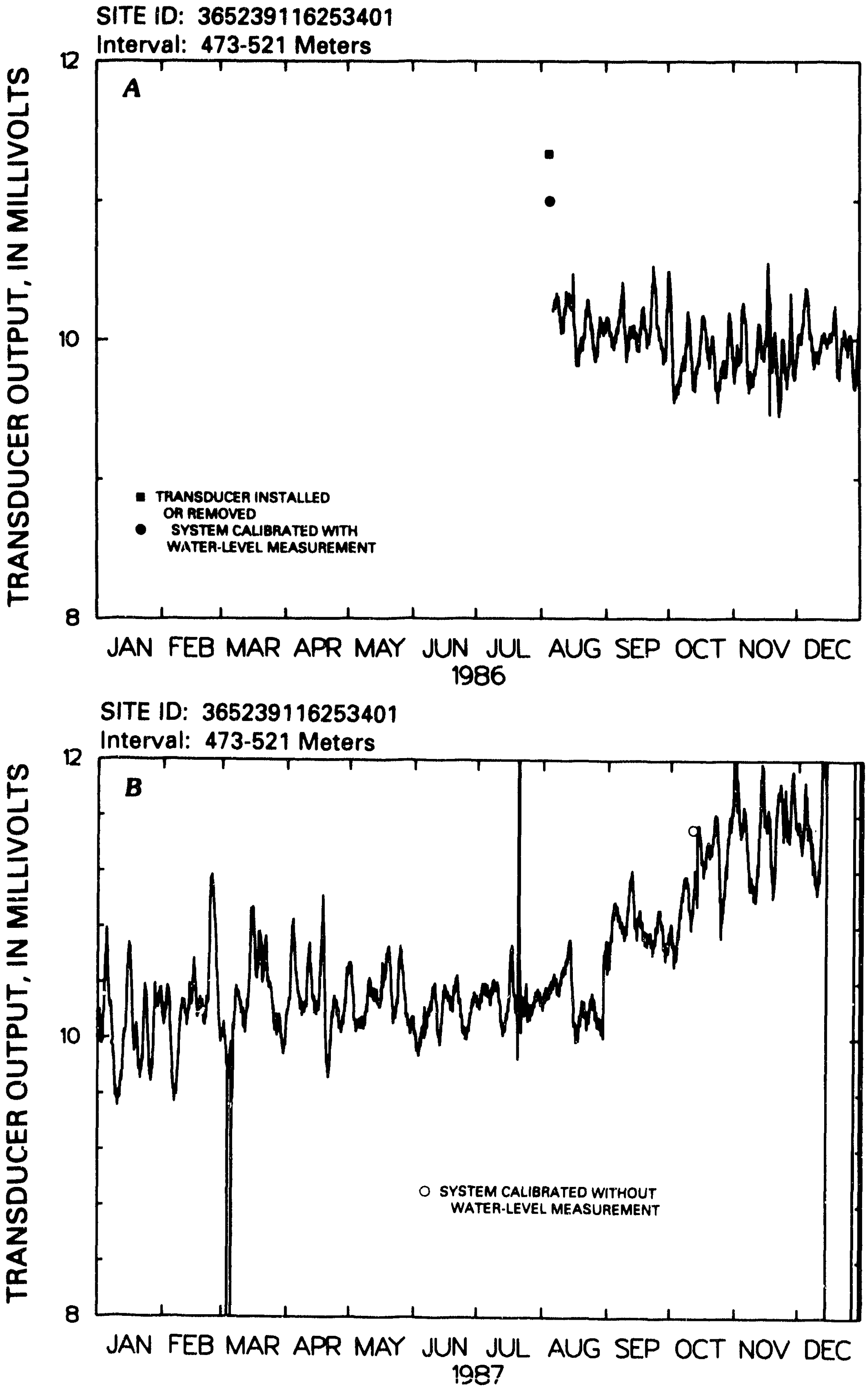
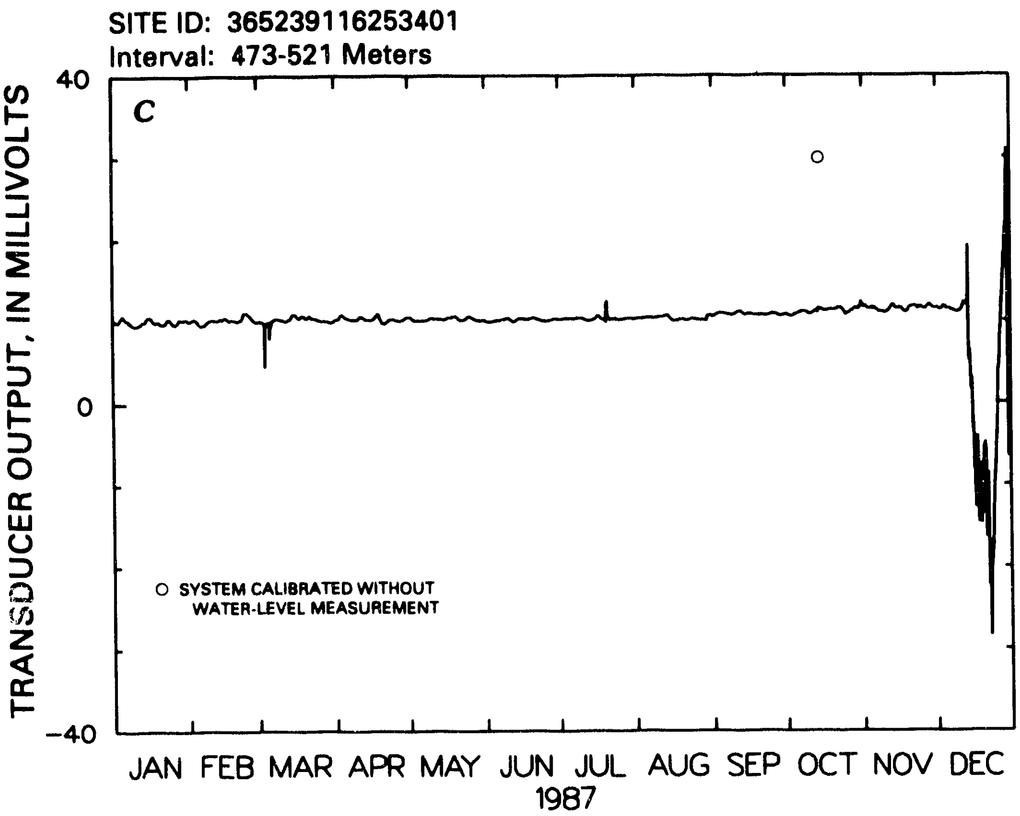


Figure 19.--Transducer output for well UE-25 WT #16.



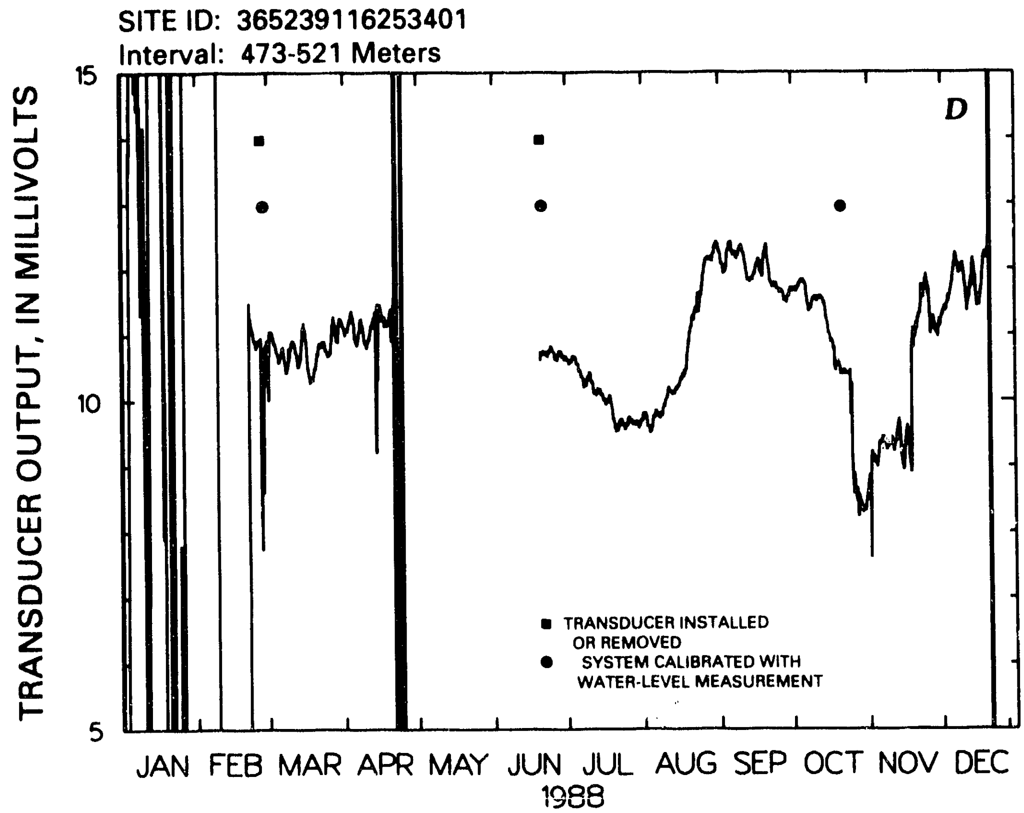


Figure 19.--Transducer output for well UE-25 WT #16.--Continued

soon drifted below zero. If these outputs were converted to pressures, the pressure would be less than atmospheric; this pressure is not possible with this type of transducer indicating some type of instrument malfunction. The third transducer (serial number 237105), in use after June 1988, produced generally reasonable output for about 4 months although the output seemed to contain high-frequency, low-amplitude noise and significant drift (fig. 19-D). To determine if the apparent drift represents water-level change or instrument drift is not possible because the water-level measurements on either end of this period were made at approximately the same transducer output. After mid-November, the output became totally erratic when the system was grounded (fig. 19-D).

Water-level altitude

In addition to measured water-level altitudes, water-level altitudes were estimated on the following days to process the record:

Date	Estimated water-level altitude (meters)
10-14-87	738.21
04-21-88	738.26
12-23-88	738.36

The estimated water-level altitude may introduce some error into the record, but the error probably is small.

Transducer output was converted to water-level altitude for the following periods:

Beginning date	Ending date
08-07-86	11-16-86
11-20-86	03-02-87
03-07-87	07-19-87
07-23-87	10-30-87
11-04-87	12-13-87
03-02-88	04-12-88
06-21-88	10-24-88
11-04-88	11-18-88

Within the convertible period, water-level altitude is not available for 5 hours on April 2, 1987 because the data logger could not read the transducer.

The water-level altitudes are shown in figure 20 and the daily mean water- level altitudes are given in table 7. Approximately 75 percent of the transducer output was converted to true water-level altitudes. The longest period was 135 days, March 7 through July 19, 1987.

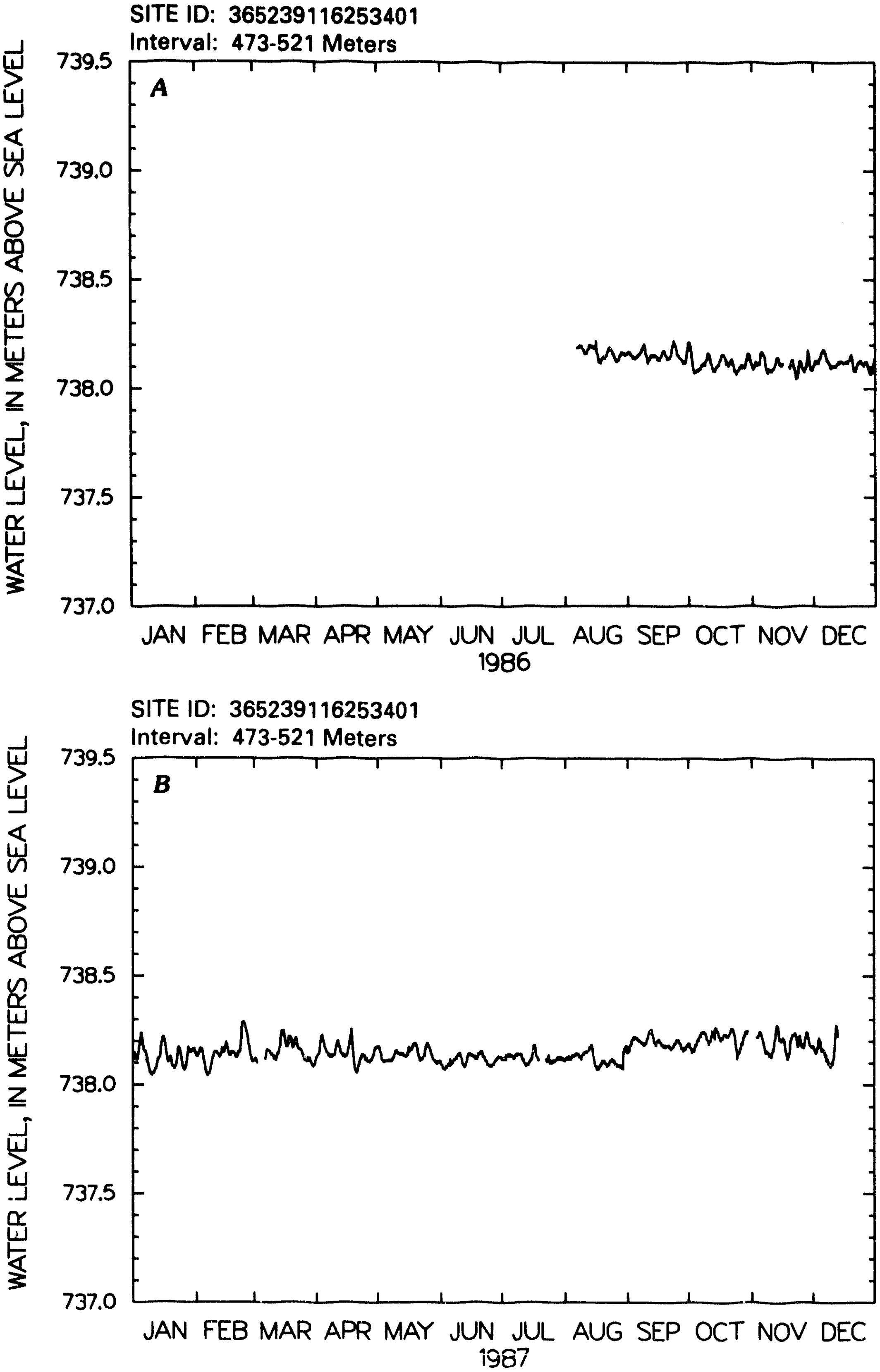


Figure 20.--Water-level altitude for well UE-25 WT #16.

AIIM

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Centimeter

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 mm

1 2 3 4 5

Inches

1.0 1.1 1.25 1.4 1.6 1.8 2.0 2.2 2.5 2.8 3.2 3.6 4.0 4.5 5.0 5.6 6.3 7.1

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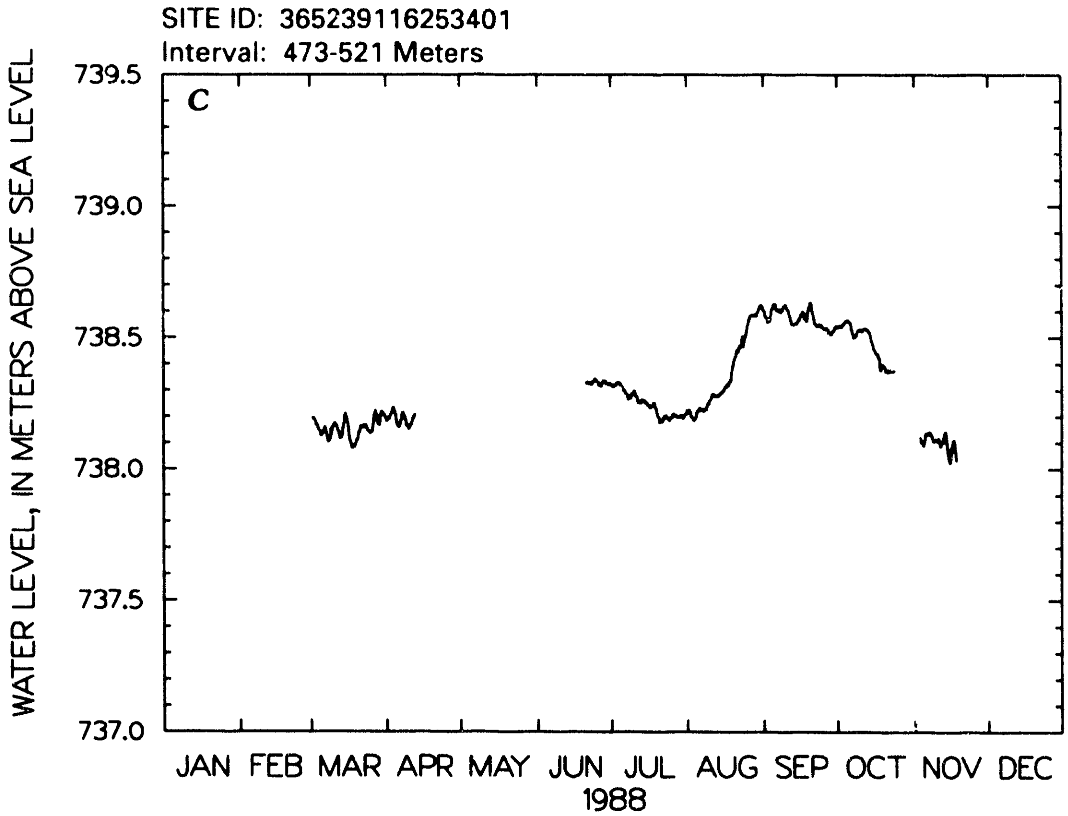


Figure 20.--Water-level altitude for well UE-25 WT #16.--Continued

Table 7.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #16*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 473-521 m

Site ID: 365239116253401

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	---	---	---	---	---	---	---	---	738.15	738.18	738.10	738.08
2	---	---	---	---	---	---	---	---	738.16	738.19	738.08	738.11
3	---	---	---	---	---	---	---	---	738.14	738.12	738.10	738.12
4	---	---	---	---	---	---	---	---	738.13	738.07	738.10	738.12
5	---	---	---	---	---	---	---	---	738.13	738.07	738.11	738.14
6	---	---	---	---	---	---	---	---	738.14	738.08	738.16	738.17
7	---	---	---	---	---	---	---	---	738.15	738.09	738.15	738.16
8	---	---	---	---	---	---	---	738.18	738.16	738.10	738.10	738.13
9	---	---	---	---	---	---	---	738.18	738.19	738.11	738.07	738.11
10	---	---	---	---	---	---	---	738.17	738.15	738.13	738.08	738.09
11	---	---	---	---	---	---	---	738.15	738.12	738.15	738.08	738.10
12	---	---	---	---	---	---	---	738.16	738.13	738.11	738.09	738.10
13	---	---	---	---	---	---	---	738.18	738.14	738.08	738.12	738.11
14	---	---	---	---	---	---	---	738.19	738.14	738.08	738.13	738.12
15	---	---	---	---	---	---	---	738.18	738.14	738.10	738.11	738.12
16	---	---	---	---	---	---	---	738.18	738.13	738.11	738.11	738.11
17	---	---	---	---	---	---	---	738.17	738.13	738.13	---	738.12
18	---	---	---	---	---	---	---	738.12	738.15	738.15	---	738.12
19	---	---	---	---	---	---	---	738.11	738.16	738.14	---	738.13
20	---	---	---	---	---	---	---	738.13	738.15	738.11	738.10	738.13
21	---	---	---	---	---	---	---	738.13	738.13	738.10	738.12	738.08
22	---	---	---	---	---	---	---	738.15	738.13	738.12	738.09	738.08
23	---	---	---	---	---	---	---	738.17	738.16	738.11	738.04	738.11
24	---	---	---	---	---	---	---	738.17	738.20	738.08	738.07	738.12
25	---	---	---	---	---	---	---	738.15	738.19	738.07	738.11	738.11
26	---	---	---	---	---	---	---	738.13	738.15	738.08	738.09	738.10
27	---	---	---	---	---	---	---	738.11	738.13	738.09	738.07	738.11
28	---	---	---	---	---	---	---	738.13	738.12	738.09	738.10	738.09
29	---		---	---	---	---	---	738.15	738.11	738.09	738.14	738.06
30	---		---	---	---	---	---	738.15	738.12	738.13	738.09	738.07
31	---		---		---		---	738.15		738.14		738.11
MONTHLY												
MEAN	---	---	---	---	---	---	---	---	738.14	738.11	---	738.11
MAX	---	---	---	---	---	---	---	---	738.20	738.19	---	738.17
MIN	---	---	---	---	---	---	---	---	738.11	738.07	---	738.06

Table 7.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #16*--Continued

Interval: 473-521 m — Site ID: 365239116253401

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	738.13	738.13	738.11	738.13	738.17	738.09	738.12	738.11	738.15	738.18	—	738.17
2	738.11	738.15	738.10	—	738.15	738.07	738.12	738.12	738.16	738.17	—	738.17
3	738.12	738.16	—	738.21	738.11	738.07	738.13	738.12	738.19	738.15	—	738.15
4	738.19	738.12	—	738.21	738.10	738.08	738.13	738.12	738.21	738.16	738.22	738.19
5	738.21	738.06	—	738.17	738.11	738.09	738.13	738.13	738.21	738.19	738.23	738.19
6	738.15	738.04	—	738.15	738.11	738.09	738.13	738.13	738.21	738.21	738.23	738.16
7	738.14	738.05	738.14	738.13	738.11	738.10	738.12	738.14	738.20	738.23	738.19	738.15
8	738.09	738.10	738.15	738.13	738.11	738.11	738.13	738.13	738.19	738.24	738.15	738.12
9	738.05	738.13	738.14	738.13	738.13	738.12	738.14	738.13	738.18	738.24	738.15	738.10
10	738.04	738.14	738.13	738.14	738.15	738.14	738.14	738.14	738.19	738.21	738.14	738.09
11	738.05	738.14	738.12	738.18	738.14	738.13	738.12	738.15	738.22	738.19	738.14	738.11
12	738.07	738.13	738.12	738.18	738.14	738.09	738.10	738.15	738.24	738.21	738.17	738.19
13	738.11	738.15	738.14	738.14	738.14	738.08	738.09	738.16	738.24	738.25	738.23	738.25
14	738.14	738.15	738.19	738.13	738.13	738.11	738.09	738.18	738.20	738.25	738.27	—
15	738.20	738.17	738.24	738.13	738.13	738.13	738.10	738.14	738.19	738.25	738.21	—
16	738.20	738.16	738.22	738.13	738.14	738.13	738.13	738.09	738.20	738.23	738.21	—
17	738.14	738.13	738.17	738.18	738.15	738.13	738.17	738.08	738.20	738.21	738.21	—
18	738.10	738.14	738.19	738.23	738.16	738.12	738.13	738.08	738.18	738.22	738.16	—
19	738.11	738.14	738.21	738.14	738.18	738.12	738.11	738.09	738.18	738.23	738.13	—
20	738.08	738.12	738.17	738.07	738.18	738.14	—	738.10	738.18	738.23	738.16	—
21	738.07	738.13	738.19	738.06	738.14	738.14	—	738.10	738.18	738.23	738.22	—
22	738.10	738.16	738.19	738.09	738.11	738.13	—	738.09	738.17	738.25	738.23	—
23	738.16	738.26	738.16	738.12	738.12	738.11	738.11	738.10	738.17	738.26	738.22	—
24	738.14	738.27	738.15	738.13	738.14	738.09	738.12	738.11	738.18	738.23	738.19	—
25	738.08	738.24	738.13	738.12	738.18	738.08	738.10	738.11	738.19	738.16	738.20	—
26	738.07	738.19	738.11	738.11	738.17	738.08	738.10	738.10	738.20	738.14	738.18	—
27	738.11	738.13	738.11	738.10	738.14	738.09	738.11	738.09	738.19	738.17	738.18	—
28	738.15	738.10	738.11	738.11	738.11	738.11	738.11	738.09	738.17	738.20	738.23	—
29	738.15		738.10	738.14	738.10	738.12	738.12	738.08	738.16	738.23	738.22	—
30	738.16		738.08	738.17	738.10	738.12	738.12	738.12	738.17	738.24	738.18	—
31	738.14		738.10		738.10		738.12	738.17		—		—
MONTHLY												
MEAN	738.12	738.14	—	—	738.13	738.11	—	738.12	738.19	—	—	—
MAX	738.21	738.27	—	—	738.18	738.14	—	738.18	738.24	—	—	—
MIN	738.04	738.04	—	—	738.10	738.07	—	738.08	738.15	—	—	—

Table 7.--*Daily mean water-level altitude, in meters above sea level, for well UE-25 WT #16*--Continued

Interval: 473-521 m Site ID: 365239116253401

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	---	---	---	738.20	---	---	738.32	738.21	738.61	738.54	---	---
2	---	---	738.20	738.20	---	---	738.31	738.22	738.58	738.54	---	---
3	---	---	738.18	738.23	---	---	738.32	738.20	738.56	738.54	---	---
4	---	---	738.16	738.23	---	---	738.33	738.19	738.58	738.55	738.10	---
5	---	---	738.14	738.19	---	---	738.32	738.20	738.61	738.56	738.10	---
6	---	---	738.16	738.17	---	---	738.30	738.22	738.62	738.56	738.13	---
7	---	---	738.15	738.21	---	---	738.29	738.22	738.60	738.53	738.14	---
8	---	---	738.12	738.21	---	---	738.27	738.22	738.60	738.50	738.13	---
9	---	---	738.14	738.18	---	---	738.27	738.23	738.61	738.51	738.11	---
10	---	---	738.17	738.17	---	---	738.29	738.25	738.62	738.53	738.11	---
11	---	---	738.18	738.19	---	---	738.28	738.27	738.61	738.53	738.11	---
12	---	---	738.16	738.21	---	---	738.26	738.28	738.58	738.53	738.09	---
13	---	---	738.13	---	---	---	738.25	738.28	738.55	738.53	738.11	---
14	---	---	738.15	---	---	---	738.26	738.28	738.55	738.52	738.13	---
15	---	---	738.21	---	---	---	738.25	738.29	738.56	738.49	738.06	---
16	---	---	738.19	---	---	---	738.24	738.30	738.57	738.46	738.04	---
17	---	---	738.12	---	---	---	738.24	738.31	738.59	738.44	738.10	---
18	---	---	738.09	---	---	---	738.24	738.32	738.58	738.42	738.07	---
19	---	---	738.10	---	---	---	738.24	738.35	738.58	738.38	---	---
20	---	---	738.12	---	---	---	738.20	738.40	738.62	738.39	---	---
21	---	---	738.16	---	---	738.33	738.18	738.44	738.60	738.37	---	---
22	---	---	738.17	---	---	738.32	738.18	738.45	738.56	738.37	---	---
23	---	---	738.17	---	---	738.33	738.20	738.47	738.54	738.37	---	---
24	---	---	738.16	---	---	738.34	738.19	738.48	738.55	738.37	---	---
25	---	---	738.15	---	---	738.34	738.19	738.51	738.54	---	---	---
26	---	---	738.16	---	---	738.32	738.20	738.56	738.53	---	---	---
27	---	---	738.22	---	---	738.32	738.20	738.58	738.53	---	---	---
28	---	---	738.20	---	---	738.33	738.20	738.58	738.52	---	---	---
29	---	---	738.19	---	---	738.33	738.20	738.59	738.52	---	---	---
30	---		738.22	---	---	738.32	738.20	738.60	738.53	---	---	---
31	---		738.21		---		738.20	738.62		---		---
MONTHLY												
MEAN	---	---	---	---	---	---	738.25	738.36	738.57	---	---	---
MAX	---	---	---	---	---	---	738.33	738.62	738.62	---	---	---
MIN	---	---	---	---	---	---	738.18	738.19	738.52	---	---	---

Geologic, Hydrologic, and Supply Wells

A series of four geologic wells, designated with the letter G, were drilled from March 1980 to January 1983, to obtain core to define the geologic framework at Yucca Mountain. When the study of the Yucca Mountain area was initially planned, the intent was to pair a hydrologic well, designated with the letter H, with each geologic well. This was done for numbers 1, 3, and 4; however, because of drilling problems at well USW G-2, hydrologic well number 2 was never drilled. Two additional hydrologic wells also were drilled without a paired geologic well.

The hydrologic wells were drilled in a similar manner. All (except USW H-1) were about 1,220 m deep and were cased to below the water table. Bit diameter below the water table was generally 222 mm. The first three geologic wells were deeper than the hydrologic wells and were drilled with a smaller bit. The fourth geologic hole was shallower than the hydrologic holes; it was drilled with a 222 mm bit.

Wells UE-25b #1 and UE-25p #1 were dual-purpose wells designed to collect both geologic and hydrologic information. In configuration, UE-25b #1 is similar to the hydrologic wells and UE-25p #1 is similar to the geologic wells.

Well J-13 predates the rest of the wells by nearly 20 years. It was initially drilled as USGS Hydrologic Test Hole #6. Its name was changed when it was converted to a water-supply well in 1963.

Well UE-25b #1

Information about the history of well UE-25b #1 and about previous data from the well was obtained from various sources. These sources are: Lobmeyer and others (1983); Lahoud and others (1984); Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1986b, 1987c).

Well specifications

The following are specifications for well UE-25b #1:

1. Location and identification:

   Latitude and longitude: 36°51'08" N.; 116°26'23" W.
   Nevada State Central Zone Coordinates (m): N 233,246; E 172,644.
   U.S. Geological Survey Site ID's:
   365108116262301 (entire well)
   365108116262302 (lower interval)
   365108116262303 (upper interval)

2. Drilling and casing information:

   Well started: April 3, 1981.
   Well completed: September 22, 1981.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; cores obtained in selected intervals.
   Bit diameter below water level: 222 mm used to 650 m; 216 mm used from 650 to 1,220 m.

Casing extending below water level: 226-mm inside diameter to 518 m; casing string is tack cemented in and perforated below the water level.
Total drilled depth: 1,220 m.

3. Access to and description of interval for measuring water levels:

48-mm inside diameter tubing, open-ended, extended to depth of about 488 m; upper interval of borehole, from near water table to top of inflatable packer, within the tuffaceous beds of Calico Hills and the Prow Pass, Bullfrog, and Tram (upper part) Members of the Crater Flat Tuff; Site ID: 365108116262303.
62-mm inside diameter tubing that has an inflatable packer on bottom end, to depth of 1,199 m; lower interval of borehole from below packer to bottom of well, within the Tram (lower part) Member of the Crater Flat Tuff, and the Lithic Ridge Tuff; Site ID: 365108116262302.

4. Information for calculating water-level altitude:

Reference point: Top of metal tag on well casing; altitude 1,200.73 m (surveyed by U.S. Geological Survey, 1984).
Depth correction for borehole deviation from vertical: 0.27 m, based on depth to water of 470 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from November 10, 1981 through September 13, 1983. Measurements made through January 21, 1983, were composite water levels of the entire saturated part of the well. Early in 1983, an inflatable packer was installed at a depth of 1,199 m, and water levels of the intervals above and below the packer were measured separately. Beginning in October 1983, the water level has been monitored continuously using a downhole pressure transducer with a data logger at the land surface. There were numerous equipment and operational difficulties, and no usable record was produced until equipment and procedures were changed in March 1985. The period between October 1983, and March 1985, was treated as a period of methods development and data from that period were not reported or processed.

The following transducers were used in well UE-25b #1:

Site ID: 365108116262303
Interval: 471-1,199 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
03-22-85	12-01-88	Absolute	Bell&Howell	15	6071
12-02-88	12-31-88	Gage	Druck PDCR 10/D	10	237109

Site ID: 365108116262302
Interval: 1,199-1,220 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
03-22-85	12-08-88	Absolute	Bell&Howell	15	6061
12-12-88	12-31-88	Gage	Druck PDCR 10/D	10	235180

The following calibrations of the water-level monitoring system were performed on well UE-25b #1:

Site ID: 365108116262303
Interval: 471-1,199 meters
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
6071	03-22-85	-1.481	1.000	--	--
6071	09-04-85	-1.460	1.000	09-04-85	730.54
6071	09-07-85	-1.439	1.000	09-07-85	730.54
6071	07-23-87	-1.458	0.998	07-23-87	730.62
6071	09-09-87	-1.459	1.000	--	--
6071	01-11-88	-1.488	1.000	01-11-88	730.67
6071	06-07-88	-1.467	1.000	06-07-88	730.58
6071	10-20-88	-1.458	1.000	10-20-88	730.64
6071	12-01-88	-1.454	1.000	12-02-88	730.66
237109	12-08-88	-6.864	1.000	--	--

Site ID: 365108116262302
Interval: 1,199-1,220 meters
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
6061	03-22-85	-1.533	1.000	--	--
6061	09-07-85	-1.504	1.000	09-07-85	728.71
6061	09-07-85	-1.685	0.989	09-07-85	728.71
6061	09-09-87	-1.452	1.000	--	--
6061	01-11-88	-1.516	0.999	01-11-87	729.33
6061	06-07-88	-1.465	1.000	06-07-88	729.57
6061	10-20-88	-1.275	0.996	10-20-88	729.65
6061	12-08-88	-1.552	0.996	--	--
235180	12-12-88	-6.897	1.000	12-12-88	729.71

Transducer output

Transducer output from March 1985 through December 1988 is shown in figure 21. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 6071), in use between March, 1985 and December 1988 in the upper interval (Site ID: 365108116262303), was set 6.1 m below the water surface from March to early September, 1985. On September 7, 1985, the transducer was moved to 1.5 m below the water surface. The movement of the transducer caused the offset in the transducer output shown in figure 21-A. This transducer, throughout its use, has produced periods of reasonable output interrupted with periods of apparently anomalous output. Even within periods that look reasonable, there are some high-frequency low-amplitude variations in the output. Beginning on August 18, 1986, at 1700 hours, the output increased about 0.7 millivolts (fig. 21-B) and the amplitude of the changes increased until about 1400 hours on August 29, 1986, when the transducer output returned to the character it had before this period. The beginning of this period did not correspond to a site visit or to any other easily identifiable event. Similar periods of apparently anomalous output occurred three more times in 1986 (fig. 21-B) and a number of times in 1987 (fig. 21-C) and 1988 (fig. 21-D). The second transducer (serial number 237109), installed in this interval in December 1988, did not produce any usable record in 1988 (fig. 21-E).

The first transducer (serial number 6061), in use between March 1985 and December 1988 in the lower interval (Site ID: 365108116262302), was set 6.1 m below the water surface from March to early September 1985. On September 7, 1985, the transducer was moved to 1.5 m below the water surface. The movement of the transducer caused the offset in the output shown in figure 21-F. In late 1985, the output from this transducer began drifting upward and continued to drift throughout the life of the transducer (fig. 21-F, 21-G, 21-H, and 21-I). The rate and even the direction of drift appears to have changed at times (fig. 21-G). The transducer produced generally reasonable output despite the drift except during relatively short periods. The first obvious spike

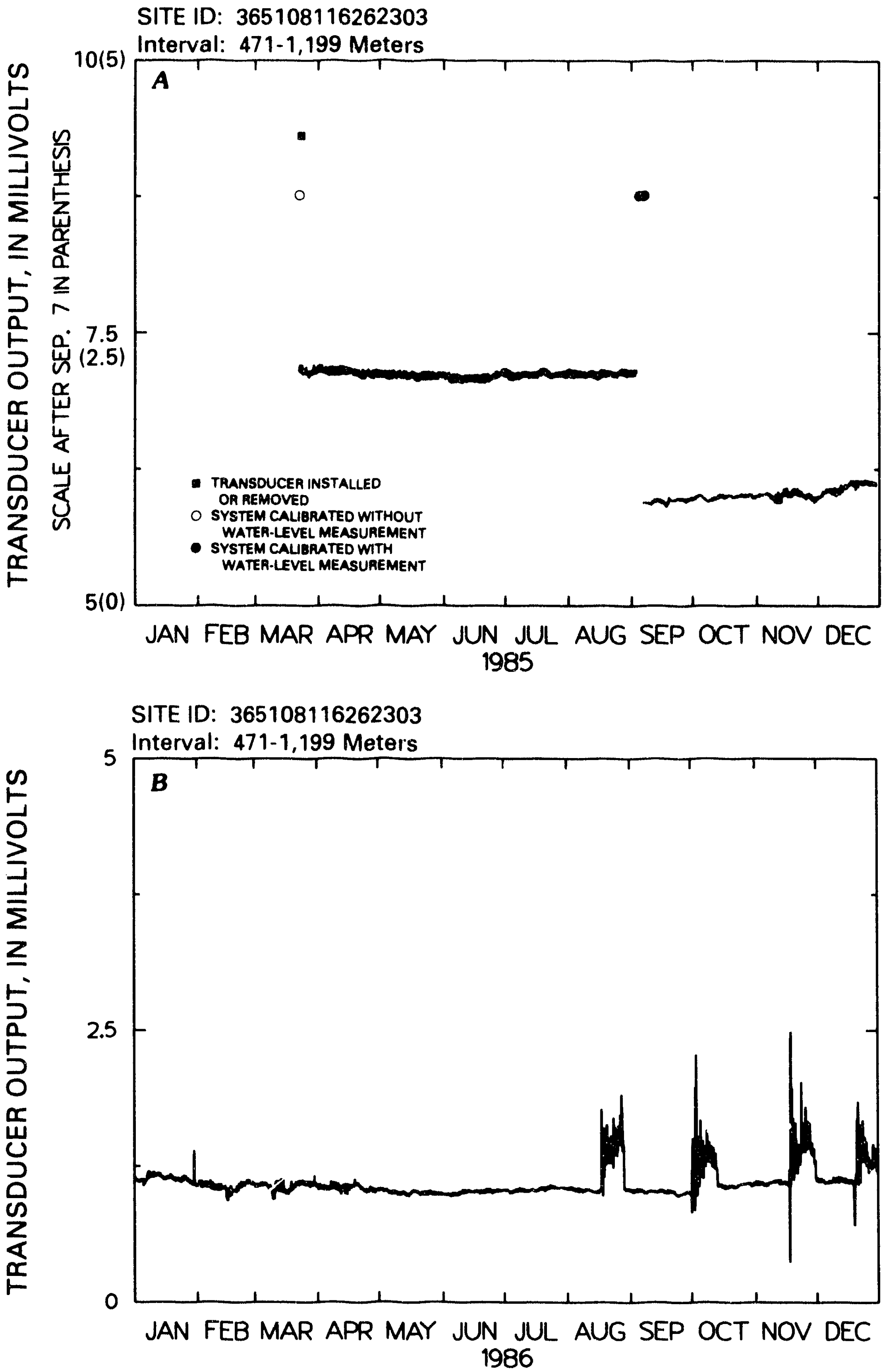
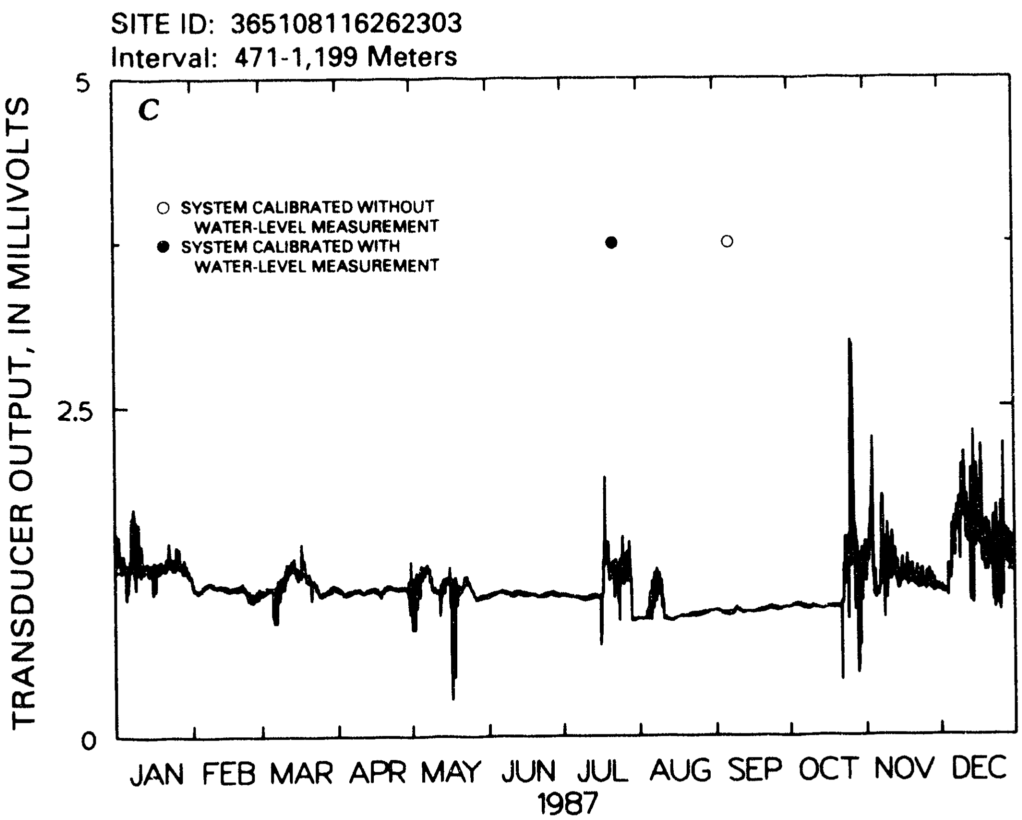


Figure 21.--Transducer output for well UE-25b #1.



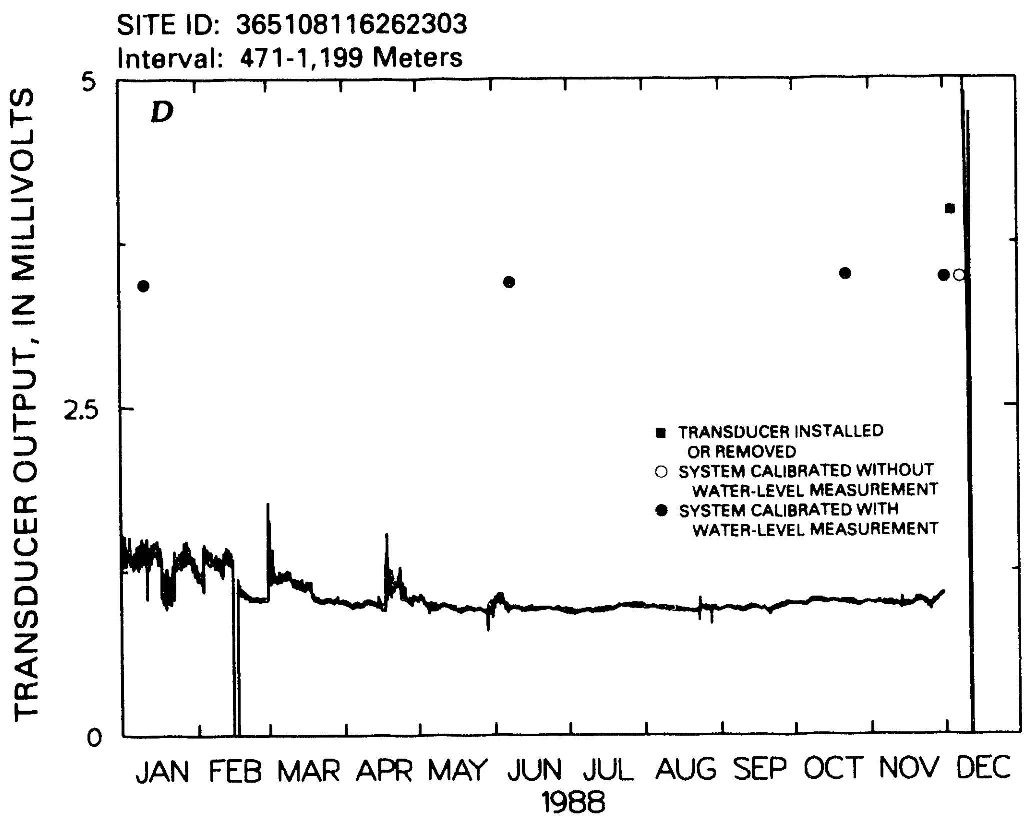
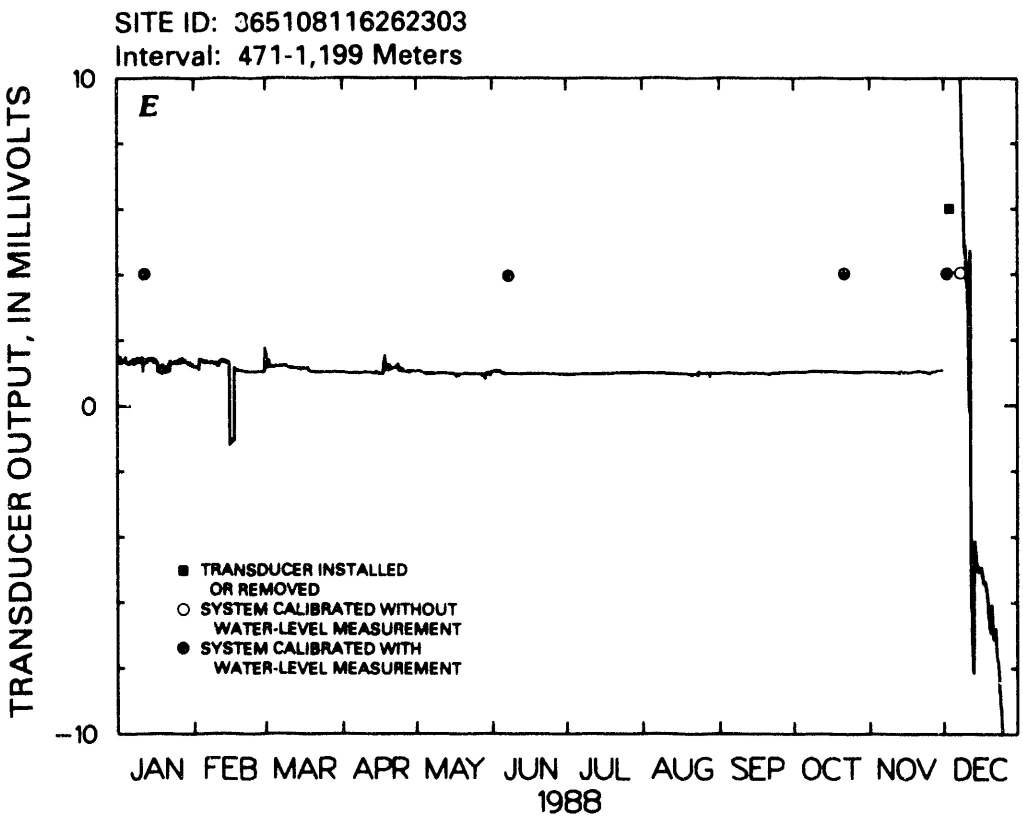


Figure 21.--Transducer output for well UE-25b #1.--Continued



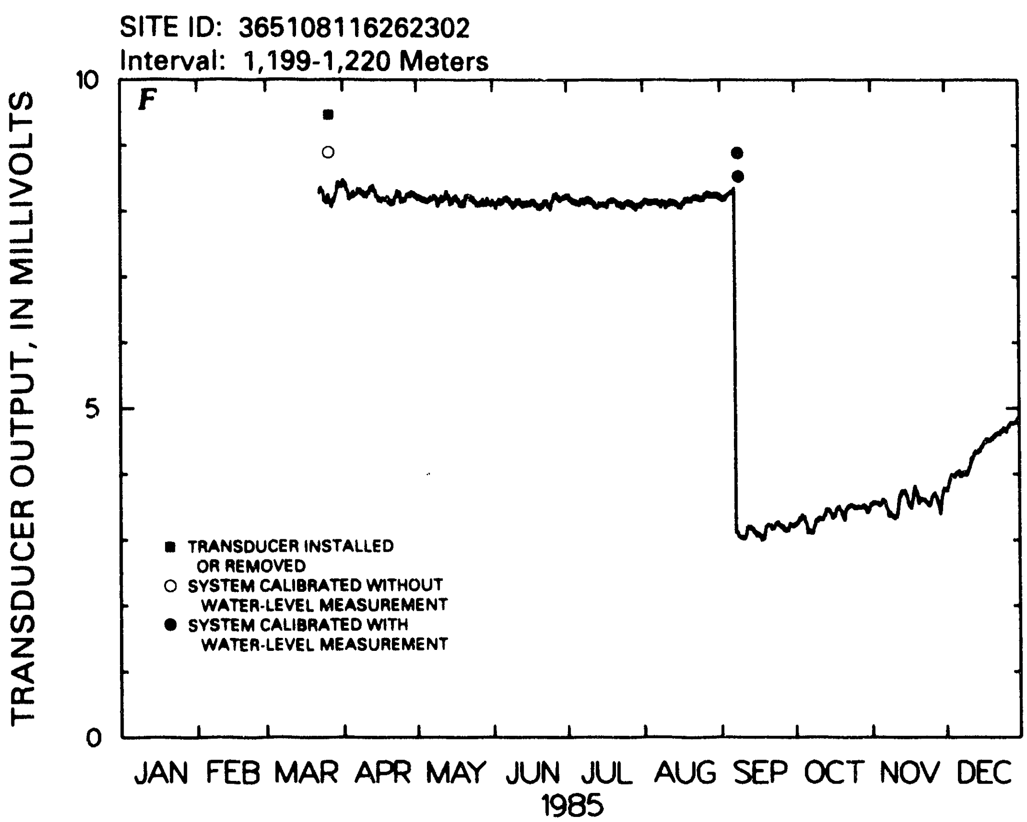
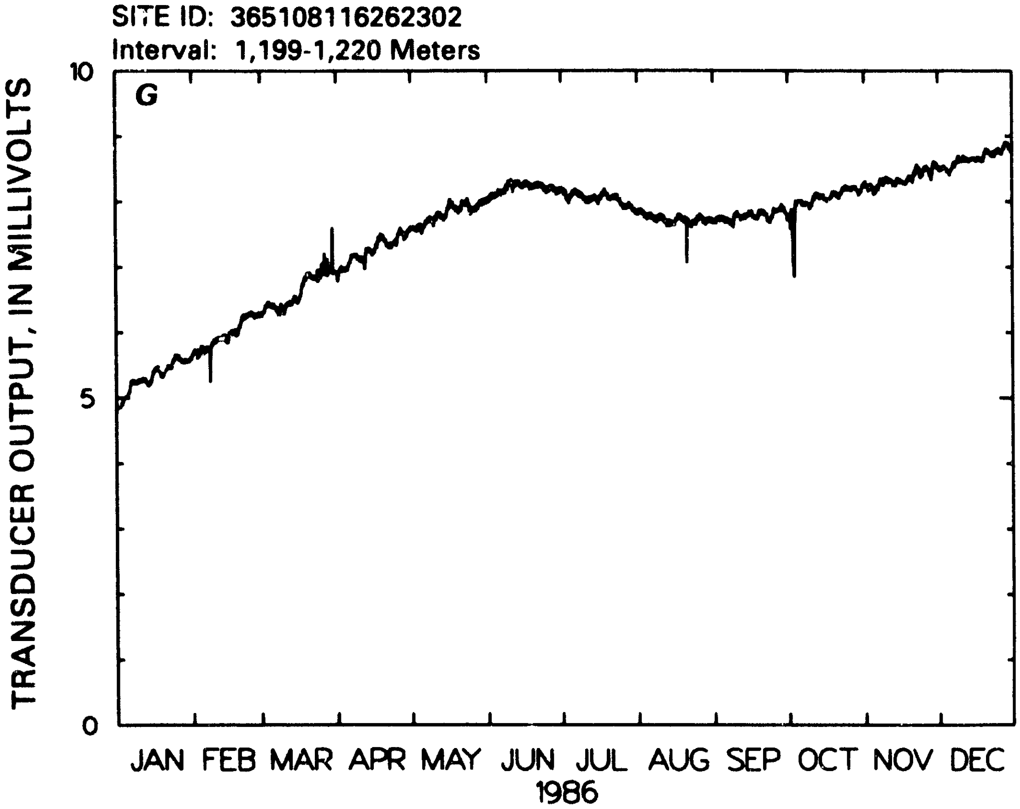


Figure 21.--Transducer output for well UE-25b #1.--Continued



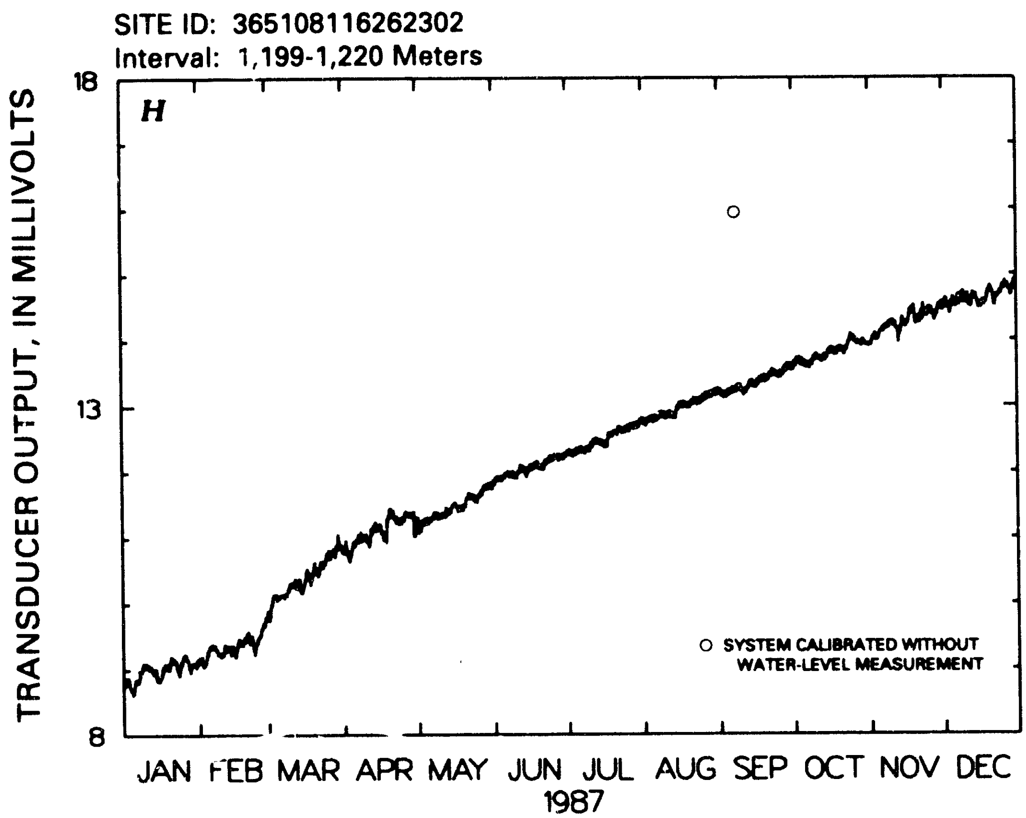


Figure 21.--Transducer output for well UE-25b #1.--Continued

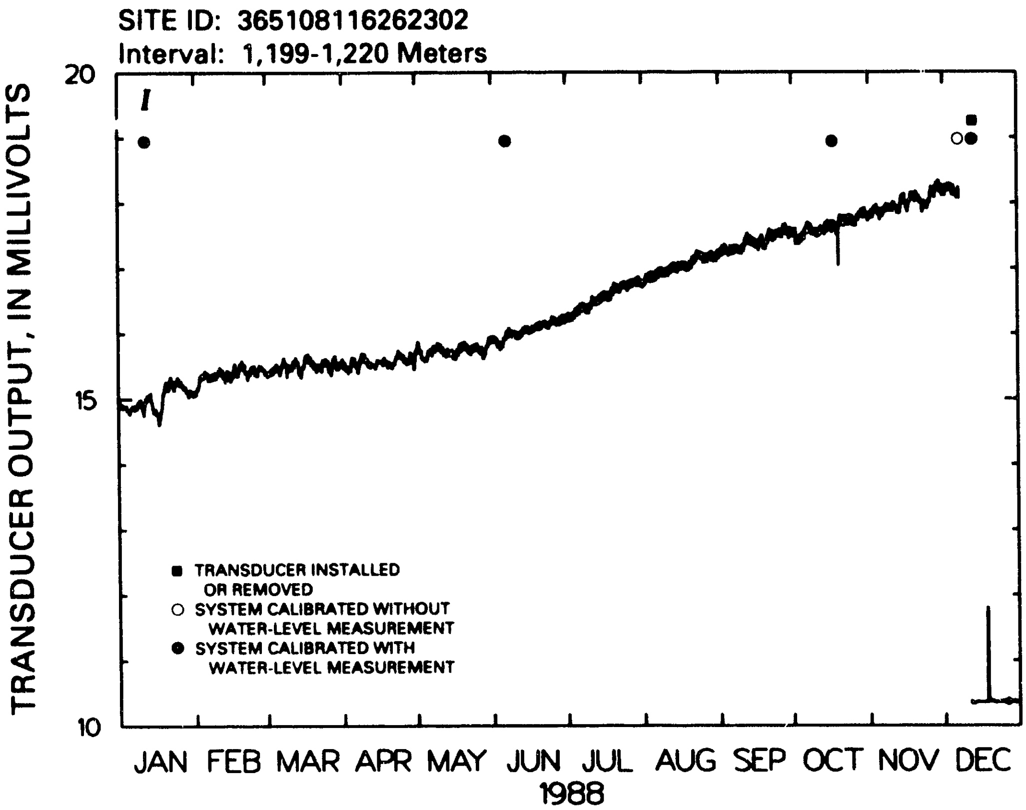


Figure 21.--Transducer output for well UE-25b #1.--Continued

in the data occurred at 1300 hours on February 8, 1986 (fig. 21-G), and consisted of a single output. Other periods of apparent anomalies occurred in March, August, and October 1986 (fig. 21-G). These anomalies occurred during periods when anomalies were occurring in the upper interval but not all anomalies in the upper interval were reflected in the lower interval. The second transducer (serial number 235180), installed in this interval in December 1988 did not produce any usable record in 1988 (fig. 21-1).

Water-level altitude

Transducer output was converted to water-level altitude for the following periods:

Site ID: 365108116262303
Interval: 471-1,199 meters

Beginning date	Ending date	Beginning date	Ending date
09-08-85	01-29-86	03-24-87	04-28-87
01-31-86	02-13-86	05-27-87	07-15-87
02-18-86	03-08-86	08-12-87	09-08-87
03-16-86	08-17-86	09-10-87	10-21-87
08-30-86	09-30-86	02-18-88	02-28-88
10-15-86	11-17-86	03-19-88	04-13-88
12-03-86	12-19-86	05-09-88	05-28-88
02-02-87	02-16-87	06-08-88	11-12-88

Site ID: 365108116262302
Interval: 1,199-1,220 meters

Beginning date	Ending date
03-22-85	09-07-85
01-11-88	06-06-88
06-08-88	10-19-88
10-21-88	12-07-88

On February 8, 1986 no transducer output was available for 4 hours for the upper interval. In addition, no barometric-pressure data were available for various periods to make adjustments to absolute-transducer output for the following periods:

Beginning date	Ending date	Interval
03-22-85	03-30-85	Lower
09-18-86	09-18-86	Upper
06-22-87	06-22-87	Do.
09-03-87	09-03-87	Do.
09-16-87	09-16-87	Do.

The water-level altitudes are shown in figure 22 and the daily mean water-level altitudes are given in table 8. Approximately 60 percent of the transducer output from the upper interval was converted to water-level altitude. The longest period was 158 days, June 8 through November 12, 1988. Approximately 35 percent of the transducer output from the lower interval was converted to water-level altitude. The longest period was 171 days, March 22 through September 7, 1985.

From March 22, 1985 to December 1, 1988 in the upper interval, and from March 22, 1985 to December 8, 1988 in the lower interval, an absolute transducer was used to monitor water levels. This type of transducer responded not only to water-level changes, but also to barometric-pressure changes. As the output from the absolute transducer was converted to water levels, the barometric-pressure effects were removed from the record using the procedure described in the "Adjustment for Absolute Transducers" section. The transducer output shown in figure 21 is before the barometric-pressure effects were removed from the record.

The transducer in the lower interval of UE-25b #1 seems to have changed rate and even direction of drift at times between September, 1985, and January, 1988. During this period, there were no manual measurements to use to remove this drift. Therefore, transducer output from the lower zone could not be converted to water-level altitude even though the short-term variations (hours to days) appear reasonable. The manual measurements made in this interval (fig. 22-G) exhibit steady long-term upward change. This may indicate that this interval has not reached equilibrium, following placement of the packer in early 1983.

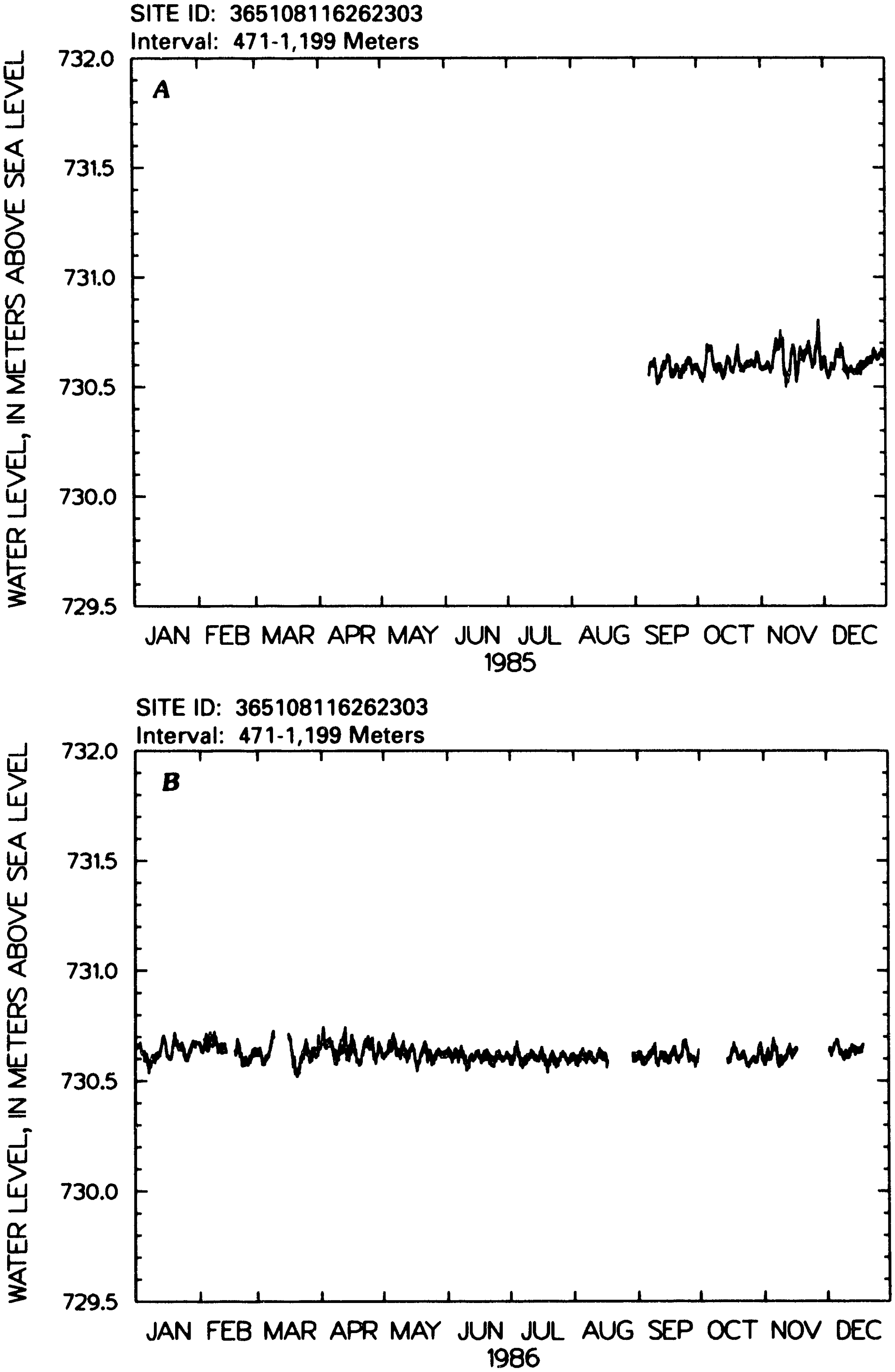
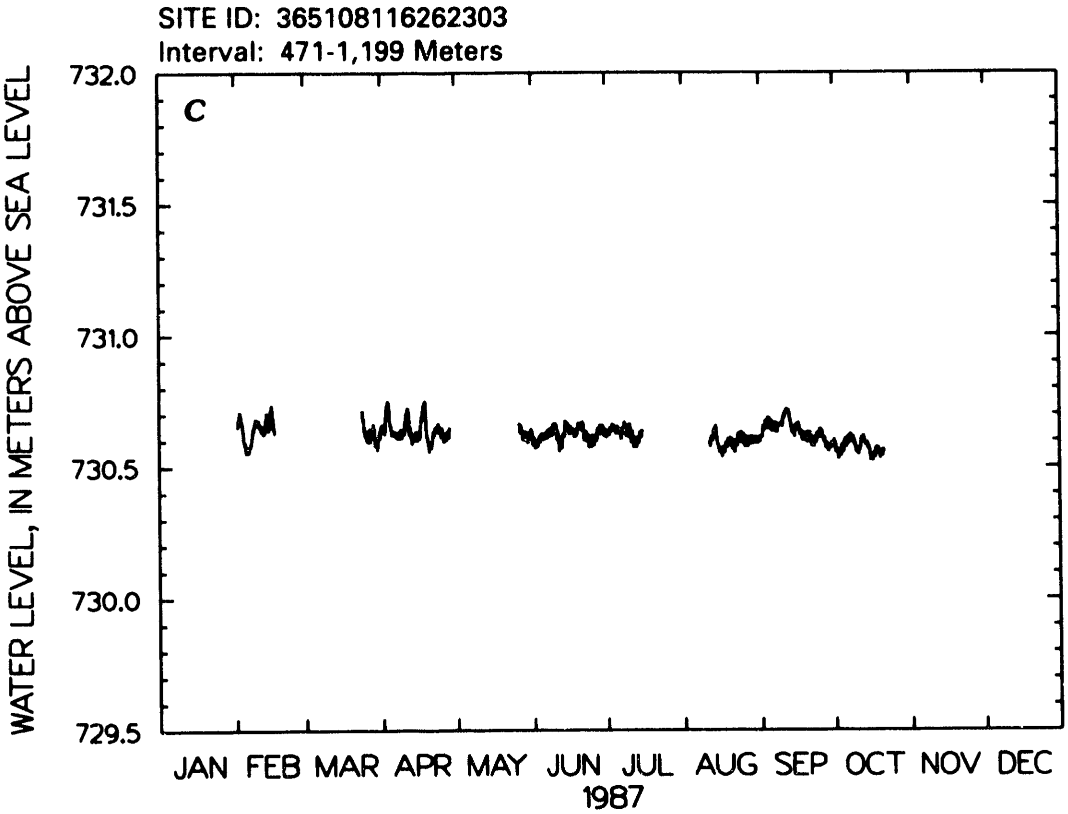


Figure 22.--Water-level altitude for well UE-25b #1.



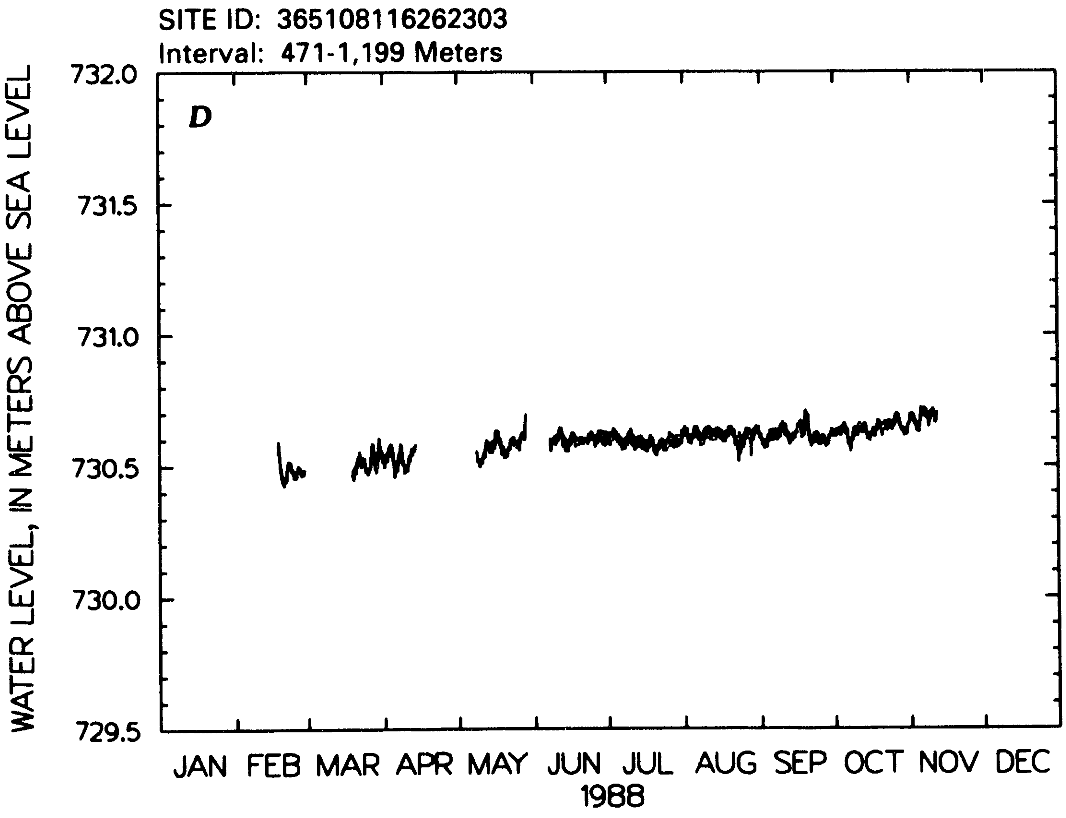
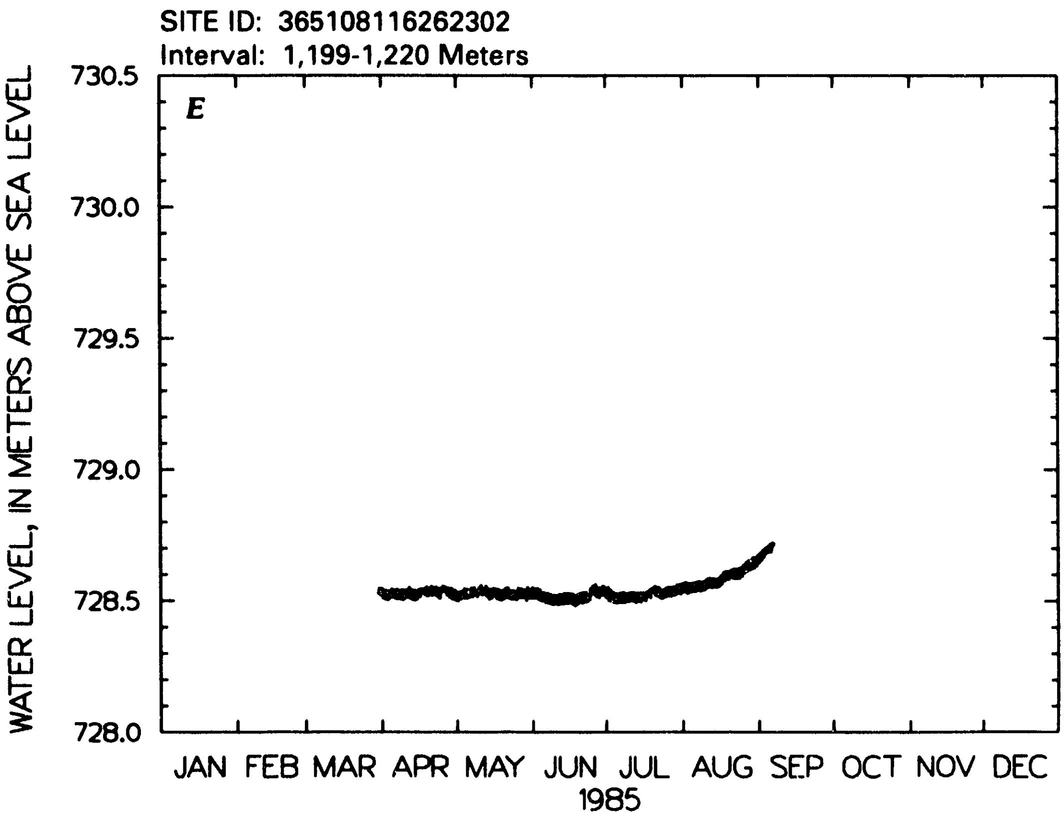


Figure 22.--Water-level altitude for well UE-25b #1.--Continued



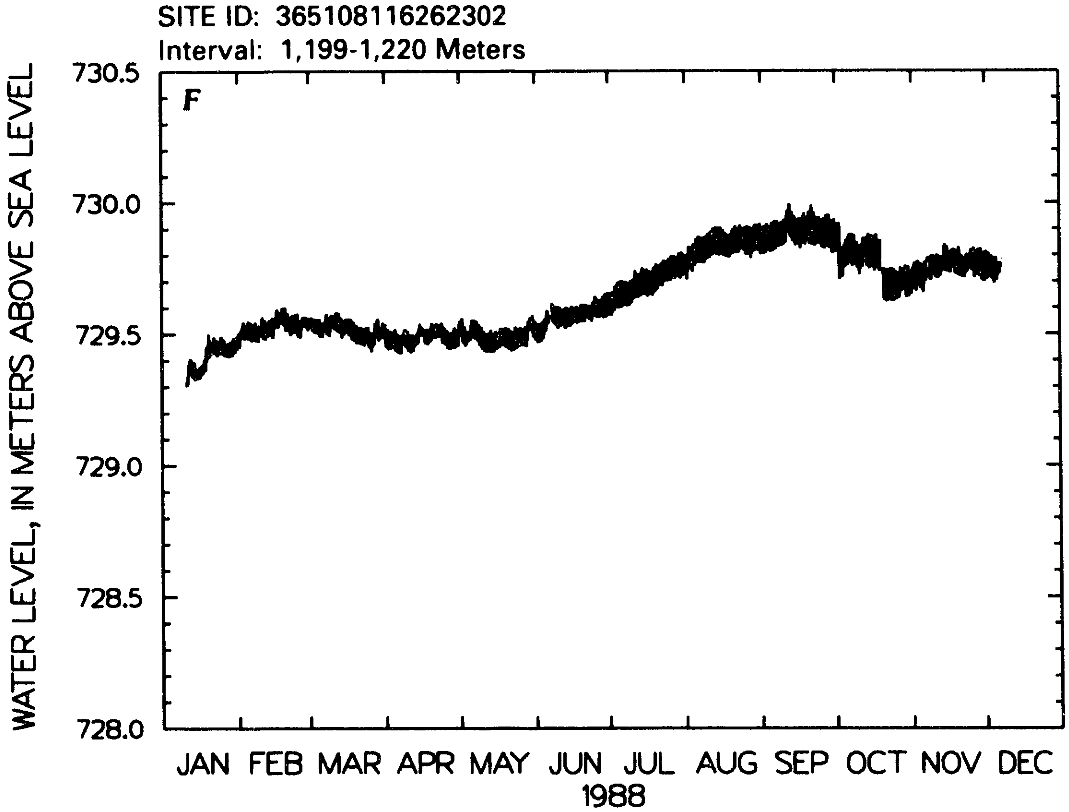


Figure 22.--Water-level altitude for well UE-25b #1.--Continued

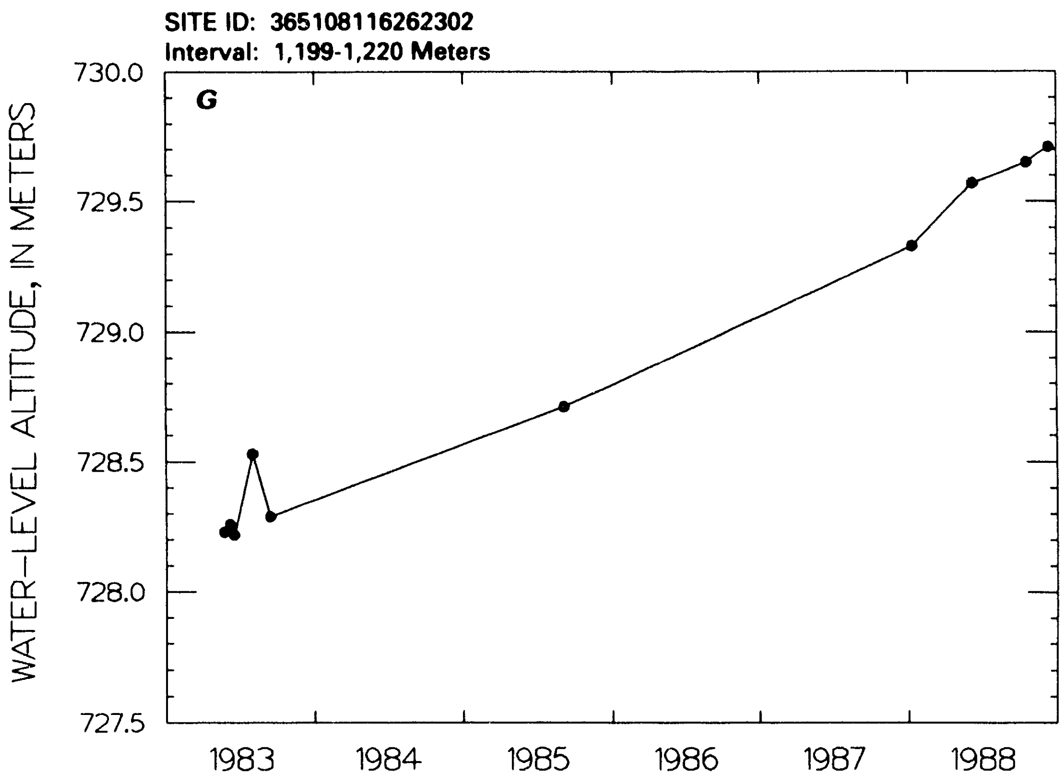


Figure 22.--Water-level altitude for well UE-25b #1.--Continued

Table 8.--*Daily mean water-level altitude, in meters above sea level, for well UE-25b #1*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 471-1,199 m　　　　Site ID: 365108116262303

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	—	—	—	—	—	—	—	—	—	730.59	730.60	730.60
2	—	—	—	—	—	—	—	—	—	730.58	730.58	730.62
3	—	—	—	—	—	—	—	—	—	730.55	730.58	730.57
4	—	—	—	—	—	—	—	—	—	730.54	730.59	730.55
5	—	—	—	—	—	—	—	—	—	730.56	730.60	730.59
6	—	—	—	—	—	—	—	—	—	730.65	730.58	730.59
7	—	—	—	—	—	—	—	—	—	730.67	730.60	730.62
8	—	—	—	—	—	—	—	—	730.57	730.68	730.67	730.65
9	—	—	—	—	—	—	—	—	730.60	730.63	730.68	730.65
10	—	—	—	—	—	—	—	—	730.61	730.59	730.69	730.67
11	—	—	—	—	—	—	—	—	730.60	730.58	730.71	730.64
12	—	—	—	—	—	—	—	—	730.53	730.59	730.66	730.59
13	—	—	—	—	—	—	—	—	730.54	730.58	730.56	730.57
14	—	—	—	—	—	—	—	—	730.56	730.55	730.54	730.57
15	—	—	—	—	—	—	—	—	730.59	730.57	730.56	730.58
16	—	—	—	—	—	—	—	—	730.60	730.61	730.63	730.57
17	—	—	—	—	—	—	—	—	730.63	730.62	730.68	730.57
18	—	—	—	—	—	—	—	—	730.63	730.58	730.62	730.58
19	—	—	—	—	—	—	—	—	730.56	730.57	730.55	730.59
20	—	—	—	—	—	—	—	—	730.56	730.62	730.62	730.60
21	—	—	—	—	—	—	—	—	730.57	730.67	730.65	730.60
22	—	—	—	—	—	—	—	—	730.59	730.61	730.64	730.60
23	—	—	—	—	—	—	—	—	730.56	730.58	730.65	730.62
24	—	—	—	—	—	—	—	—	730.56	730.58	730.67	730.62
25	—	—	—	—	—	—	—	—	730.58	730.60	730.68	730.63
26	—	—	—	—	—	—	—	—	730.60	730.60	730.61	730.65
27	—	—	—	—	—	—	—	—	730.62	730.60	730.61	730.64
28	—	—	—	—	—	—	—	—	730.62	730.61	730.67	730.63
29	—		—	—	—	—	—	—	730.58	730.60	730.75	730.65
30	—		—	—	—	—	—	—	730.59	730.63	730.64	730.65
31	—		—		—		—	—		730.64		730.64
MONTHLY												
MEAN	—	—	—	—	—	—	—	—	—	730.60	730.63	730.61
MAX	—	—	—	—	—	—	—	—	—	730.68	730.75	730.67
MIN	—	—	—	—	—	—	—	—	—	730.54	730.54	730.55

Table 8.--*Daily mean water-level altitude, in meters above sea level, for well UE-25b #1*--Continued

Interval: 471-1,199 m

Site ID: 365108116262303

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	730.65	730.64	730.63	730.69	730.61	730.63	730.59	730.61	730.62	—	730.60	—
2	730.66	730.64	730.63	730.69	730.62	730.62	730.59	730.60	730.62	—	730.59	—
3	730.65	730.67	730.59	730.66	730.65	730.61	730.62	730.60	730.60	—	730.62	730.64
4	730.62	730.66	730.58	730.67	730.65	730.62	730.65	730.61	730.59	—	730.60	730.63
5	730.61	730.67	730.61	730.67	730.67	730.63	730.63	730.63	730.60	—	730.63	730.66
6	730.60	730.69	730.62	730.65	730.69	730.61	730.59	730.61	730.61	—	730.67	730.68
7	730.56	730.67	730.66	730.61	730.64	730.63	730.58	730.60	730.62	—	730.64	730.66
8	730.58	—	730.71	730.61	730.63	730.62	730.59	730.62	730.64	—	730.59	730.63
9	730.60	730.66	—	730.62	730.62	730.60	730.60	730.62	730.66	—	730.59	730.62
10	730.60	730.65	—	730.66	730.66	730.57	730.61	730.60	730.60	—	730.59	730.61
11	730.61	730.65	—	730.67	730.63	730.58	730.62	730.59	730.58	—	730.59	730.62
12	730.62	730.65	—	730.71	730.61	730.61	730.62	730.60	730.61	—	730.61	730.62
13	730.65	730.65	—	730.62	730.62	730.60	730.61	730.63	730.62	—	730.64	730.64
14	730.69	—	—	730.63	730.65	730.61	730.60	730.62	730.61	—	730.64	730.64
15	730.68	—	—	730.66	730.65	730.63	730.61	730.62	730.61	730.59	730.62	730.64
16	730.62	—	730.70	730.68	730.59	730.62	730.63	730.61	730.60	730.60	730.63	730.64
17	730.60	—	730.66	730.64	730.56	730.60	730.61	730.59	730.61	730.64	730.64	730.64
18	730.61	730.63	730.59	730.59	730.59	730.62	730.59	—	—	730.65	—	730.64
19	730.67	730.67	730.56	730.58	730.63	730.62	730.56	—	730.64	730.63	—	730.65
20	730.69	730.63	730.54	730.60	730.65	730.62	730.59	—	730.61	730.60	—	—
21	730.66	730.59	730.56	730.64	730.65	730.60	730.61	—	730.60	730.61	—	—
22	730.65	730.59	730.60	730.67	730.61	730.59	730.60	—	730.61	730.63	—	—
23	730.66	730.59	730.63	730.68	730.63	730.59	730.58	—	730.65	730.61	—	—
24	730.62	730.59	730.66	730.67	730.60	730.61	730.58	—	730.68	730.57	—	—
25	730.60	730.60	730.64	730.67	730.60	730.62	730.60	—	730.64	730.57	—	—
26	730.62	730.63	730.61	730.62	730.62	730.61	730.62	—	730.60	730.59	—	—
27	730.65	730.63	730.62	730.60	730.63	730.60	730.62	—	730.61	730.60	—	—
28	730.66	730.63	730.64	730.64	730.63	730.60	730.60	—	730.60	730.59	—	—
29	730.66		730.63	730.65	730.62	730.62	730.59	—	730.58	730.60	—	—
30	—		730.65	730.62	730.62	730.61	730.60	730.61	—	730.65	—	—
31	730.67		730.66		730.62		730.61	730.61		730.64		—
MONTHLY												
MEAN	—	—	—	730.65	730.63	730.61	730.60	—	—	—	—	—
MAX	—	—	—	730.71	730.69	730.63	730.65	—	—	—	—	—
MIN	—	—	—	730.58	730.56	730.57	730.56	—	—	—	—	—

Table 8.--*Daily mean water-level altitude, in meters above sea level, for well UE-25b #1*--Continued

Interval: 471-1,199 m Site ID: 365108116262303

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	—	—	—	730.65	—	730.61	730.63	—	730.61	730.59	—	—
2	—	730.68	—	730.66	—	730.59	730.63	—	730.63	730.57	—	—
3	—	730.68	—	730.74	—	730.59	730.65	—	—	730.55	—	—
4	—	730.61	—	730.69	—	730.61	730.65	—	730.67	730.56	—	—
5	—	730.57	—	730.64	—	730.62	730.64	—	730.67	730.58	—	—
6	—	730.57	—	730.63	—	730.62	730.64	—	730.66	730.59	—	—
7	—	730.60	—	730.62	—	730.63	730.63	—	730.65	730.61	—	—
8	—	730.65	—	730.62	—	730.63	730.65	—	730.65	730.61	—	—
9	—	730.67	—	730.63	—	730.64	730.64	—	—	730.60	—	—
10	—	730.66	—	730.65	—	730.65	730.65	—	730.67	730.57	—	—
11	—	730.64	—	730.71	—	730.63	730.62	—	730.70	730.56	—	—
12	—	730.64	—	730.65	—	730.59	730.60	730.59	730.71	730.59	—	—
13	—	730.68	—	730.61	—	730.60	730.59	730.62	730.68	730.61	—	—
14	—	730.66	—	730.62	—	730.64	730.61	730.64	730.64	730.59	—	—
15	—	730.71	—	730.62	—	730.66	730.62	730.59	730.64	730.58	—	—
16	—	730.66	—	730.64	—	730.64	—	730.56	—	730.55	—	—
17	—	—	—	730.70	—	730.64	—	730.56	730.64	730.54	—	—
18	—	—	—	730.73	—	730.63	—	730.57	730.62	730.56	—	—
19	—	—	—	730.62	—	730.64	—	730.59	730.62	730.56	—	—
20	—	—	—	730.58	—	730.66	—	730.60	730.62	730.55	—	—
21	—	—	—	730.59	—	730.66	—	730.59	730.62	730.55	—	—
22	—	—	—	730.63	—	—	—	730.58	730.60	—	—	—
23	—	—	—	730.65	—	730.62	—	730.60	730.59	—	—	—
24	—	—	730.68	730.65	—	730.60	—	730.62	730.61	—	—	—
25	—	—	730.62	730.63	—	730.60	—	730.61	730.63	—	—	—
26	—	—	730.62	730.62	—	730.60	—	730.60	730.63	—	—	—
27	—	—	730.62	730.62	730.65	730.62	—	730.60	730.61	—	—	—
28	—	—	730.63	730.63	730.62	730.64	—	730.60	730.58	—	—	—
29	—		730.60	—	730.62	730.64	—	730.60	730.57	—	—	—
30	—		730.59	—	730.62	730.64	—	730.60	730.58	—	—	—
31	—		730.63		730.63		—	730.60		—		—
MONTHLY												
MEAN	—	—	—	—	—	—	—	—	—	—	—	—
MAX	—	—	—	—	—	—	—	—	—	—	—	—
MIN	—	—	—	—	—	—	—	—	—	—	—	—

Table 8.--*Daily mean water-level altitude, in meters above sea level, for well UE-25b #1*--Continued

Interval: 471-1,199 m

Site ID: 365108116262303

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	—	—	—	730.52	—	—	730.61	730.63	730.61	730.62	730.68	—
2	—	—	—	730.54	—	—	730.60	730.63	730.59	730.63	730.69	—
3	—	—	—	730.57	—	—	730.62	730.60	730.58	730.63	730.67	—
4	—	—	—	730.55	—	—	730.62	730.60	730.60	730.64	730.64	—
5	—	—	—	730.49	—	—	730.61	730.62	730.62	730.65	730.65	—
6	—	—	—	730.50	—	—	730.60	730.63	730.62	730.64	730.70	—
7	—	—	—	730.56	—	—	730.58	730.62	730.63	730.60	730.70	—
8	—	—	—	730.53	—	730.58	730.59	730.60	730.62	730.58	730.69	—
9	—	—	—	730.49	730.53	730.60	730.60	730.61	730.63	730.62	730.67	—
10	—	—	—	730.50	730.51	730.60	730.62	730.63	730.65	730.63	730.70	—
11	—	—	—	730.53	730.53	730.62	730.60	730.63	730.64	730.63	730.69	—
12	—	—	—	730.56	730.56	730.63	730.58	730.62	730.62	730.65	730.68	—
13	—	—	—	730.57	730.58	730.60	730.59	730.62	730.60	730.64	—	—
14	—	—	—	—	730.57	730.58	730.60	730.62	730.61	730.65	—	—
15	—	—	—	—	730.58	730.58	730.59	730.63	730.62	730.61	—	—
16	—	—	—	—	730.60	730.60	730.58	730.62	730.64	730.61	—	—
17	—	—	—	—	730.62	730.62	730.58	730.61	730.66	730.63	—	—
18	—	730.54	—	—	730.59	730.60	730.59	730.61	730.63	730.63	—	—
19	—	730.46	730.47	—	730.56	730.59	730.59	730.63	730.65	730.65	—	—
20	—	730.44	730.50	—	730.55	730.60	730.57	730.64	730.69	730.66	—	—
21	—	730.46	730.53	—	730.55	730.59	730.56	730.63	730.63	730.64	—	—
22	—	730.51	730.51	—	730.58	730.59	730.58	730.60	730.60	730.66	—	—
23	—	730.49	730.52	—	730.60	730.60	730.59	730.58	730.61	730.65	—	—
24	—	730.46	730.49	—	730.59	730.62	730.58	730.57	730.61	730.66	—	—
25	—	730.47	730.48	—	730.58	730.61	730.58	730.59	730.60	730.65	—	—
26	—	730.49	730.51	—	730.59	730.60	730.60	730.62	730.60	730.67	—	—
27	—	730.47	730.57	—	730.62	730.61	730.60	730.63	730.60	730.69	—	—
28	—	730.48	730.50	—	730.64	730.62	730.59	730.61	730.59	730.66	—	—
29	—	—	730.53	—	—	730.61	730.60	730.62	730.60	730.64	—	—
30	—		730.57	—	—	730.61	730.60	730.64	730.62	730.63	—	—
31	—		730.53		—		730.61	730.64		730.64		—
MONTHLY												
MEAN	—	—	—	—	—	—	730.59	730.62	730.62	730.64	—	—
MAX	—	—	—	—	—	—	730.62	730.64	730.69	730.69	—	—
MIN	—	—	—	—	—	—	730.56	730.57	730.58	730.58	—	—

Table 8.--*Daily mean water-level altitude, in meters above sea level, for well UE-25b #1*--Continued

Interval: 1,199-1,220 m

Site ID: 365108116262302

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	---	---	---	728.53	728.52	728.53	728.53	728.55	728.66	---	---	---
2	---	---	---	728.52	728.52	728.53	728.52	728.55	728.67	---	---	---
3	---	---	---	728.52	728.52	728.53	728.52	728.54	728.68	---	---	---
4	---	---	---	728.53	728.53	728.52	728.51	728.55	728.69	---	---	---
5	---	---	---	728.53	728.53	728.51	728.51	728.55	728.70	---	---	---
6	---	---	---	728.53	728.53	728.51	728.51	728.55	728.70	---	---	---
7	---	---	---	728.53	728.53	728.51	728.51	728.55	---	---	---	---
8	---	---	---	728.52	728.53	728.51	728.51	728.55	---	---	---	---
9	---	---	---	728.52	728.53	728.50	728.51	728.56	---	---	---	---
10	---	---	---	728.53	728.54	728.50	728.51	728.56	---	---	---	---
11	---	---	---	728.53	728.54	728.50	728.51	728.56	---	---	---	---
12	---	---	---	728.53	728.54	728.50	728.51	728.56	---	---	---	---
13	---	---	---	728.53	728.54	728.51	728.51	728.57	---	---	---	---
14	---	---	---	728.52	728.53	728.51	728.51	728.57	---	---	---	---
15	---	---	---	728.52	728.53	728.51	728.51	728.56	---	---	---	---
16	---	---	---	728.53	728.53	728.51	728.51	728.57	---	---	---	---
17	---	---	---	728.54	728.53	728.51	728.51	728.58	---	---	---	---
18	---	---	---	728.54	728.52	728.50	728.53	728.59	---	---	---	---
19	---	---	---	728.54	728.52	728.50	728.53	728.59	---	---	---	---
20	---	---	---	728.54	728.52	728.51	728.54	728.60	---	---	---	---
21	---	---	---	728.54	728.53	728.51	728.54	728.60	---	---	---	---
22	---	---	---	728.54	728.53	728.51	728.53	728.60	---	---	---	---
23	---	---	---	728.53	728.52	728.51	728.53	728.60	---	---	---	---
24	---	---	---	728.53	728.52	728.51	728.52	728.60	---	---	---	---
25	---	---	---	728.54	728.52	728.54	728.53	728.61	---	---	---	---
26	---	---	---	728.54	728.52	728.54	728.53	728.62	---	---	---	---
27	---	---	---	728.54	728.53	728.54	728.53	728.63	---	---	---	---
28	---	---	---	728.53	728.53	728.53	728.53	728.64	---	---	---	---
29	---		---	728.53	728.52	728.54	728.54	728.64	---	---	---	---
30	---		---	728.52	728.53	728.54	728.54	728.64	---	---	---	---
31	---		728.54		728.52		728.54	728.65		---		---
MONTHLY												
MEAN	---	---	---	728.53	728.53	728.52	728.52	728.58	---	---	---	---
MAX	---	---	---	728.54	728.54	728.54	728.54	728.65	---	---	---	---
MIN	---	---	---	728.52	728.52	728.50	728.51	728.54	---	---	---	---

Table 8.--*Daily mean water-level altitude, in meters above sea level, for well UE-25b #1*--Continued

Interval: 1,199-1,220 m

Site ID: 365108116262302

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	---	729.48	729.55	729.49	729.52	729.51	729.61	729.76	729.87	729.87	729.70	729.77
2	---	729.50	729.54	729.48	729.51	729.50	729.61	729.77	729.86	729.87	729.73	729.77
3	---	729.52	729.53	729.48	729.49	729.50	729.62	729.79	729.86	729.81	729.73	729.77
4	---	729.51	729.53	729.48	729.49	729.51	729.64	729.78	729.87	729.78	729.73	729.76
5	---	729.51	729.53	729.48	729.50	729.54	729.64	729.80	729.86	729.80	729.73	729.75
6	---	729.51	729.52	729.46	729.52	729.56	729.65	729.81	729.87	729.82	729.73	729.75
7	---	729.51	729.53	729.46	729.51	---	729.65	729.82	729.88	729.84	729.74	729.75
8	---	729.51	729.53	729.48	729.51	729.58	729.65	729.82	729.88	729.82	729.76	---
9	---	729.51	729.53	729.49	729.50	729.57	729.65	729.82	729.88	729.82	729.76	---
10	---	729.51	729.55	729.48	729.48	729.56	729.65	729.82	729.88	729.81	729.77	---
11	---	729.52	729.54	729.47	729.47	729.56	729.67	729.83	729.89	729.78	729.76	---
12	729.38	729.52	729.55	729.47	729.46	729.56	729.68	729.84	729.93	729.80	729.76	---
13	729.37	729.52	729.54	729.48	729.47	729.56	729.68	729.85	729.93	729.83	729.75	---
14	729.36	729.53	729.52	729.49	729.47	729.56	729.69	729.85	729.91	729.83	729.78	---
15	729.35	729.52	729.53	729.51	729.47	729.56	729.69	729.85	729.90	729.82	729.79	---
16	729.35	729.54	729.53	729.50	729.47	729.57	729.69	729.85	729.89	729.82	729.78	---
17	729.36	729.56	729.53	729.49	729.48	729.57	729.69	729.84	729.89	729.82	729.78	---
18	729.38	729.56	729.52	729.49	729.48	729.57	729.69	729.84	729.90	729.82	729.79	---
19	729.42	729.56	729.51	729.49	729.49	729.57	729.70	729.84	729.89	729.81	729.79	---
20	729.44	729.55	729.50	729.52	729.48	729.58	729.71	729.85	729.90	---	729.78	---
21	729.44	729.55	729.50	729.51	729.48	729.58	729.72	729.85	729.93	729.70	729.77	---
22	729.45	729.54	729.49	729.51	729.47	729.59	729.73	729.86	729.92	729.69	729.76	---
23	729.44	729.54	729.49	729.51	729.47	729.58	729.73	729.87	729.91	729.69	729.75	---
24	729.45	729.54	729.50	729.50	729.48	729.58	729.74	729.87	729.90	729.69	729.78	---
25	729.46	729.53	729.49	729.49	729.49	729.60	729.74	729.87	729.90	729.69	729.78	---
26	729.45	729.53	729.47	729.48	729.49	729.60	729.74	729.86	729.89	729.69	729.78	---
27	729.44	729.55	729.48	729.47	729.48	729.60	729.75	729.86	729.89	729.70	729.78	---
28	729.44	729.55	729.52	729.48	729.48	729.60	729.75	729.86	729.90	729.71	729.78	---
29	729.45	729.54	729.51	729.48	729.53	729.61	729.76	729.86	729.89	729.72	729.78	---
30	729.46		729.51	729.49	729.54	729.60	729.76	729.87	729.87	729.71	729.78	---
31	729.47		729.51		729.53		729.77	729.86		729.70		---
MONTHLY												
MEAN	---	729.53	729.52	729.49	729.49	---	729.69	729.84	729.89	---	729.76	---
MAX	---	729.56	729.55	729.52	729.54	---	729.77	729.87	729.93	---	729.79	---
MIN	---	729.48	729.47	729.46	729.46	---	729.61	729.76	729.86	---	729.70	---

Well UE-25p #1

Information about the history of well UE-25p #1 and about previous data from the well was obtained from various sources. These sources are: Craig and Robison (1984); Craig and Johnson (1984); Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1986c, 1987c).

Well specifications

The following are specifications for well UE-25p #1:

1. Location and identification:

   Latitude and longitude: 36°49'38" N.; 116°25'21" W.
   Nevada State Central Zone Coordinates (m): N 230,481; E 174,188.
   U.S. Geological Survey Site ID's:
   364938116252101 (entire well)
   364938116252102 (lower interval in rocks of Paleozoic age)

2. Drilling and casing information:

   Well started: November 13, 1982.
   Well completed: May 24, 1983.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; cores obtained in selected intervals
   Bit diameter below water level: 375 mm used to 487 m; 251 mm used from 487 to 1,304 m; 175 mm used from 1,304 to 1,317 m; 171 mm used from 1,317 to 1,798 m; 156 mm used from 1,798 to 1,805 m.
   Casing extending below water level: 255-mm inside diameter from land surface to 477 m; 177-mm inside diameter from 453 to 1,297 m, casing string is cemented in, has no perforations.
   Total drilled depth: 1,805 m.

3. Access to and description of interval for measuring water levels:

   38-mm inside-diameter tubing, open end, to depth of 418 m; well construction is such that hydraulic head of the tuffs of Tertiary age is not monitored. Only the hydraulic head in the underlying carbonate rocks of Paleozoic age is measured (Tertiary-Paleozoic contact is at 1,244 m); Site ID: 364938116252102.
   Note: To enable temperature measurements, a 38-mm inside diameter tubing, closed end and filled with water, was installed to depth of 413 m.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,114.21 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.06 m, based on approximate depth to water of 362 m

History of instrumentation, calibrations, and comments

Manual water-level measurements were made as the well was being drilled in February and May, 1983. Manual measurements were also made from October 21, 1983 through October 12, 1984. Beginning in March, 1985 the water level has been monitored continuously using a downhole pressure transducer and a data logger at the land surface.

The following transducers were used in well UE-25p #1:

[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
03-07-85	07-07-86	Absolute	Psi-Tronix	15	1854
07-07-86	05-12-87	Gage	Druck PDCR 10/D	10	153543
05-12-87	06-14-88	Gage	Druck PDCR 10/D	10	153541
06-14-88	12-31-88	Gage	Druck 930	10	237107

The following calibrations of the water-level monitoring system were performed in well UE-25p #1:

[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1854	03-07-85	-4.659	1.000	03-07-85	751.96
1854	03-07-85	-4.511	1.000	03-07-85	751.96
1854	09-13-85	-4.320	1.000	09-13-85	752.14
1854	09-13-85	-4.304	1.000	09-13-85	752.09
153543	07-09-86	-6.495	0.999	07-07-86	752.23
153541	05-12-87	-6.573	1.000	05-12-87	752.36
153541	10-08-87	-6.565	1.000	--	--
153541	02-11-88	-6.729	1.000	02-11-88	752.51
237107	06-14-88	-6.973	1.000	06-14-88	752.42
237107	10-24-88	-7.347	0.999	10-24-88	752.57

Transducer output

Transducer output from March 1985 through December 1988 is shown in figure 23. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 1854) in use between March 1985 and July 1986, showed a large amount of drift (fig. 23-A), especially in the first few months, but produced reasonable output. The drift was removed from the output using water-level measurements made during this period plus assumed drift corrections (described below). The second transducer (serial number 153543), in use between July 1986 and May 1987 (fig. 23-B and 23-C), produced reasonable output for approximately 9 months before its output became totally erratic (fig. 23-C). The third transducer (serial number 153541), in use between May 1987 and June 1988 (fig. 23-C and 23-D), produced generally reasonable output for about 11 months before its output became totally erratic. The fourth transducer (serial number 237107), in use between June and December 1988 (fig 23-D), produced generally reasonable output for about 5 months, but it contained numerous spikes. On November 2, the system was grounded and the output became totally erratic.

Water-level altitude

In addition to measured water-level altitudes, water-level altitudes were estimated on the following days to remove what was judged to be transducer drift:

Date	Estimated water-level altitude (meters)
04-29-85	752.01
07-01-85	752.07
10-13-85	752.15
12-25-85	752.17
01-24-86	752.18
02-22-86	752.19
04-08-86	752.20
06-20-86	752.22
10-08-87	752.51

The estimated water-level altitudes may introduce some error into the record, but the error probably is small compared to transducer drift.

There are a number of spikes between June and December 1988. These spikes represent one or a few readings that deviate from the expected values. These spikes were not coincident with a site visit or any other identifiable event and probably represent a system malfunction of some type. The details of these spikes are as follows:

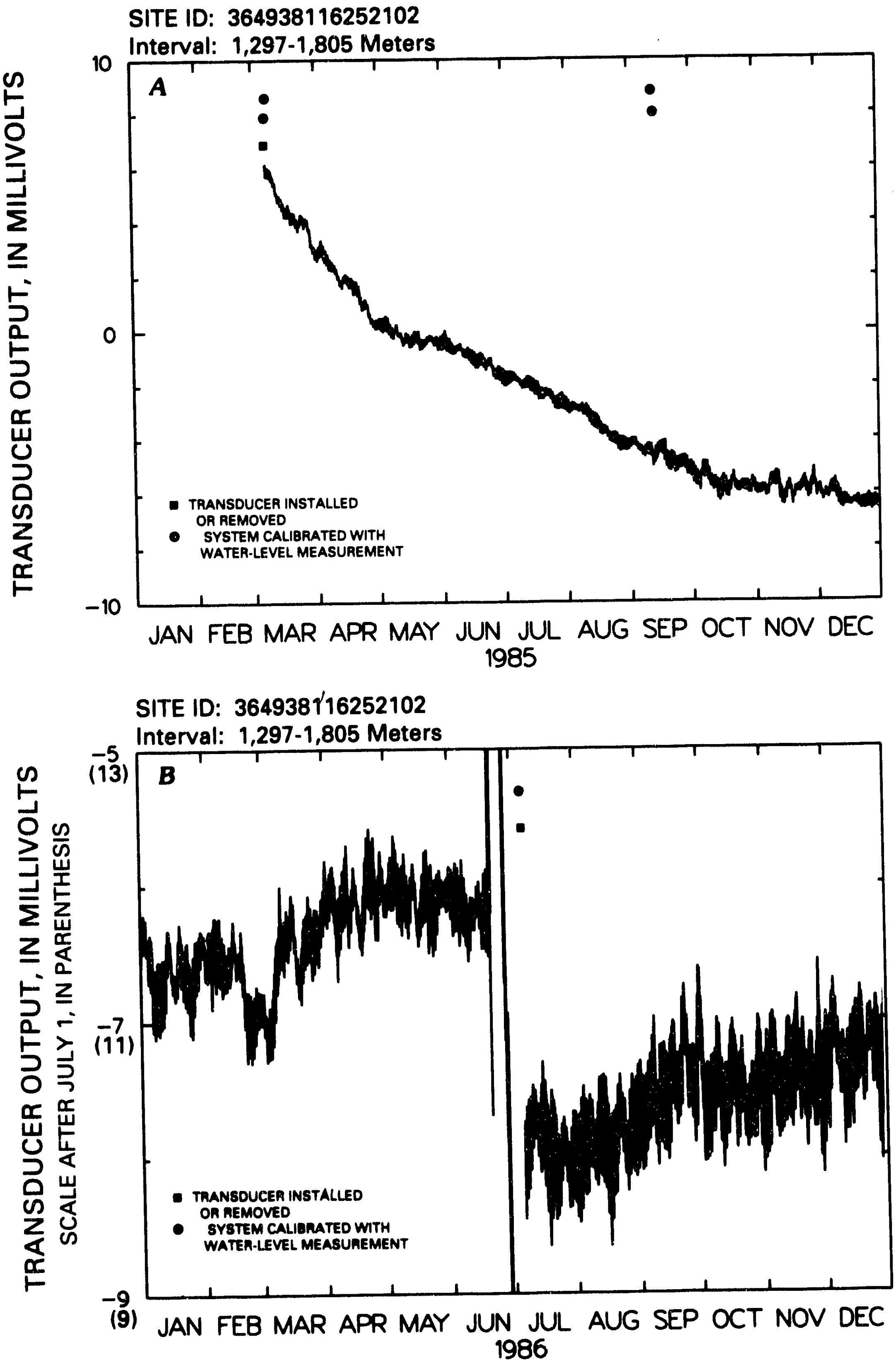
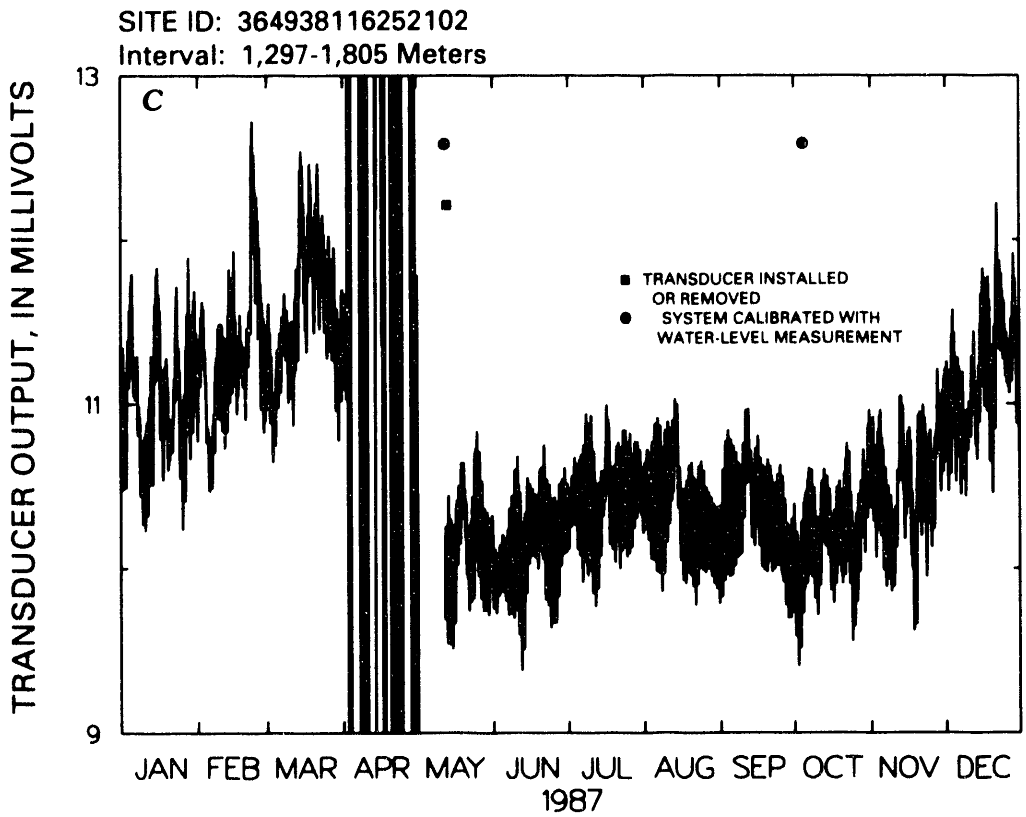


Figure 23.--Transducer output for well UE-25p #1.



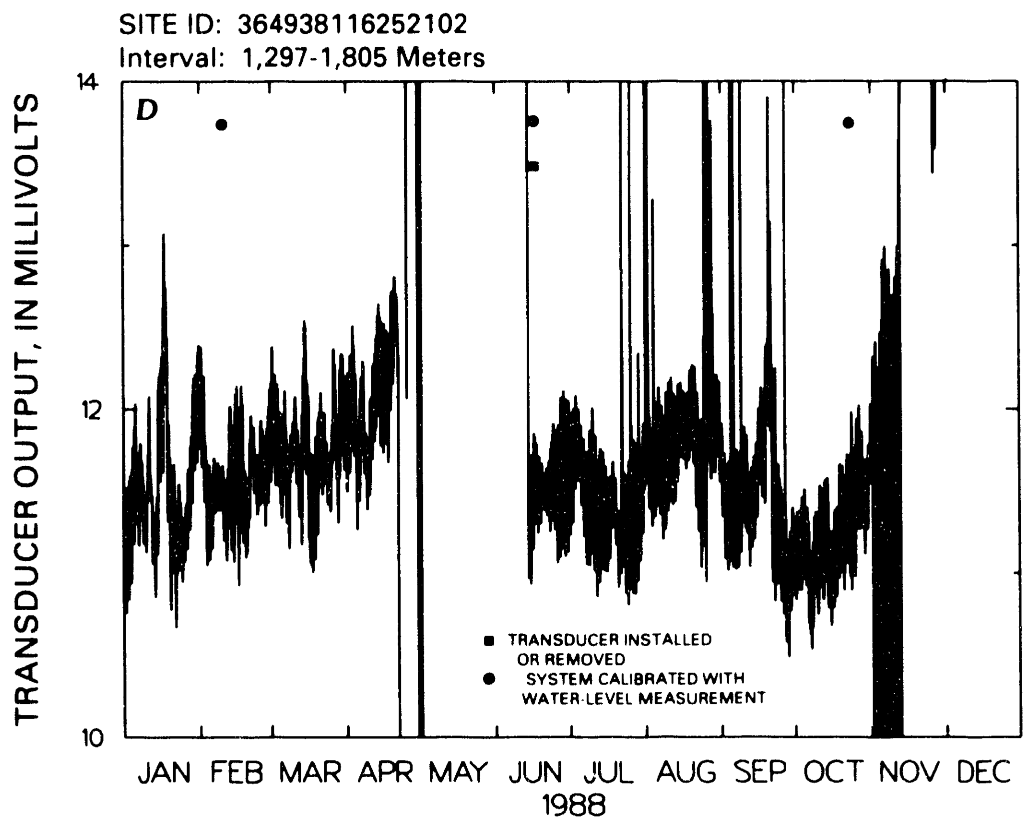


Figure 23.--Transducer output for well UE-25p #1.--Continued

Date	Time	Recorded value	Expected value
07-22-88	17:00	38.02	11.53
07-22-88	23:00	12.49	11.50
07-26-88	11:00	27.51	11.13
07-26-88	13:00	15.34	11.39
07-29-88	21:00	12.34	11.73
08-01-88	17:00	14.06	11.79
08-02-88	12:00	28.19	11.72
08-02-88	15:00	12.51	11.72
08-04-88	19:00	13.28	11.83
08-04-88	20:00	12.26	11.78
09-05-88	15:00	28.89	11.66
09-06-88	14:00	34.68	11.60
09-09-88	15:00	37.76	11.57
09-23-88	14:00	12.25	11.31
09-27-88	15:00	14.37	11.20

In this table, the expected value is the mean of the previous and subsequent values. The spikes, if converted to water levels, would represent water-level changes in a 1-hour period from 0.07 to 3.8 m. Because of the possibility of some sort of system malfunction exists, these points were not converted to water-levels.

Transducer output was converted to water-level altitude for the following periods:

Beginning date	Ending date
03-07-85	06-19-86
07-08-86	03-31-87
05-14-87	04-21-88
06-15-88	08-24-88
08-30-88	09-20-88
09-23-88	11-01-88

The water-level altitudes are shown in figure 24 and the daily mean water-level altitudes are given in table 9. Approximately 86 percent of the transducer output was converted to water-level altitudes. The longest period was 470 days, March 7, 1985 through June 19, 1986.

From March 7, 1985, to July 7, 1986, an absolute transducer was used to monitor water levels. This means type of transducer responded not only to water-level changes, but also to barometric-pressure changes. As the output from the absolute transducer was converted to water levels, the barometric-pressure effects were removed from the record using the procedure described in the "Adjustment for Absolute Transducers" section. The transducer output shown in figure 23 is before the barometric effects were removed from the record.

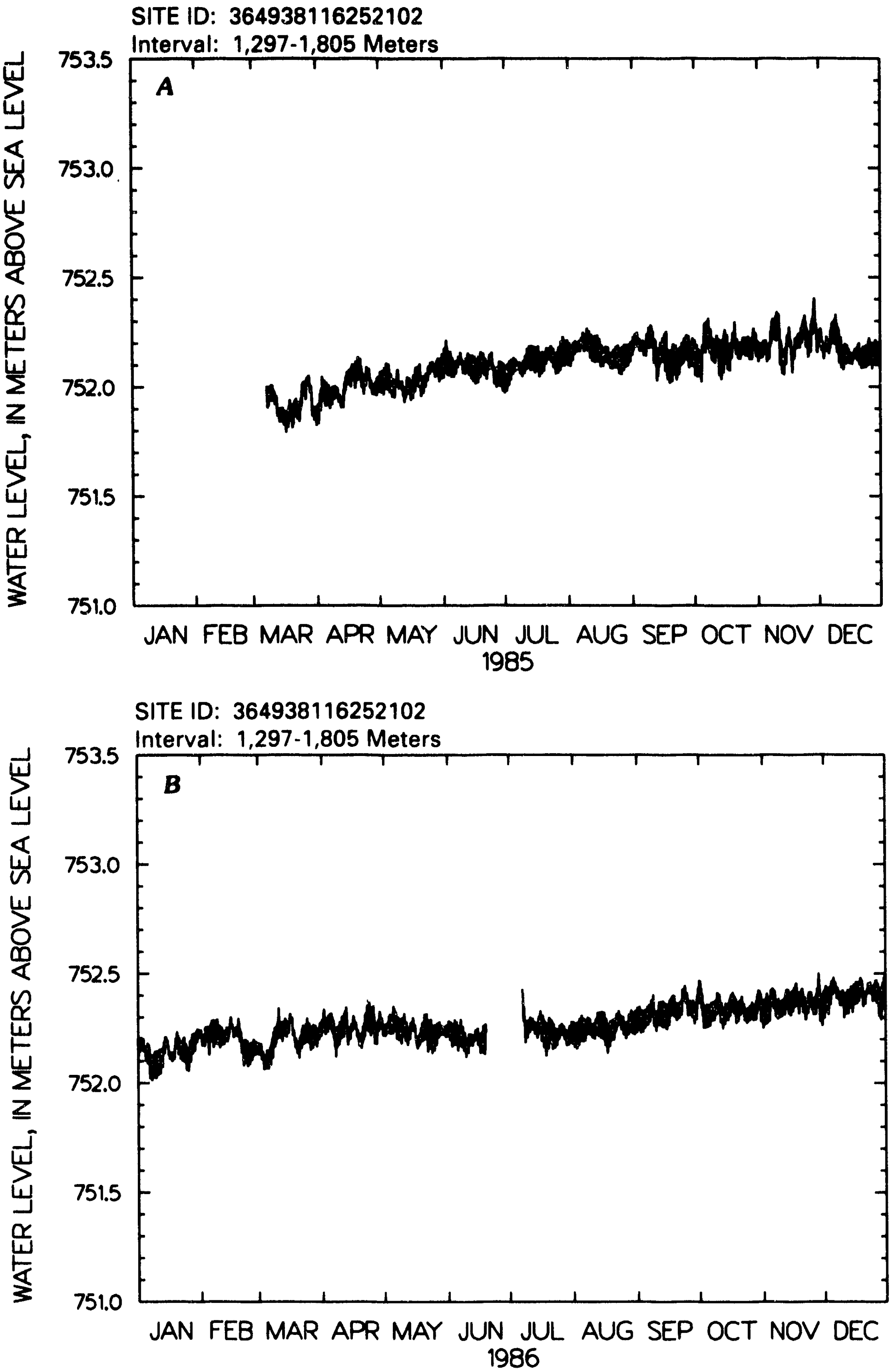


Figure 24.--Water-level altitude for well UE-25p #1.

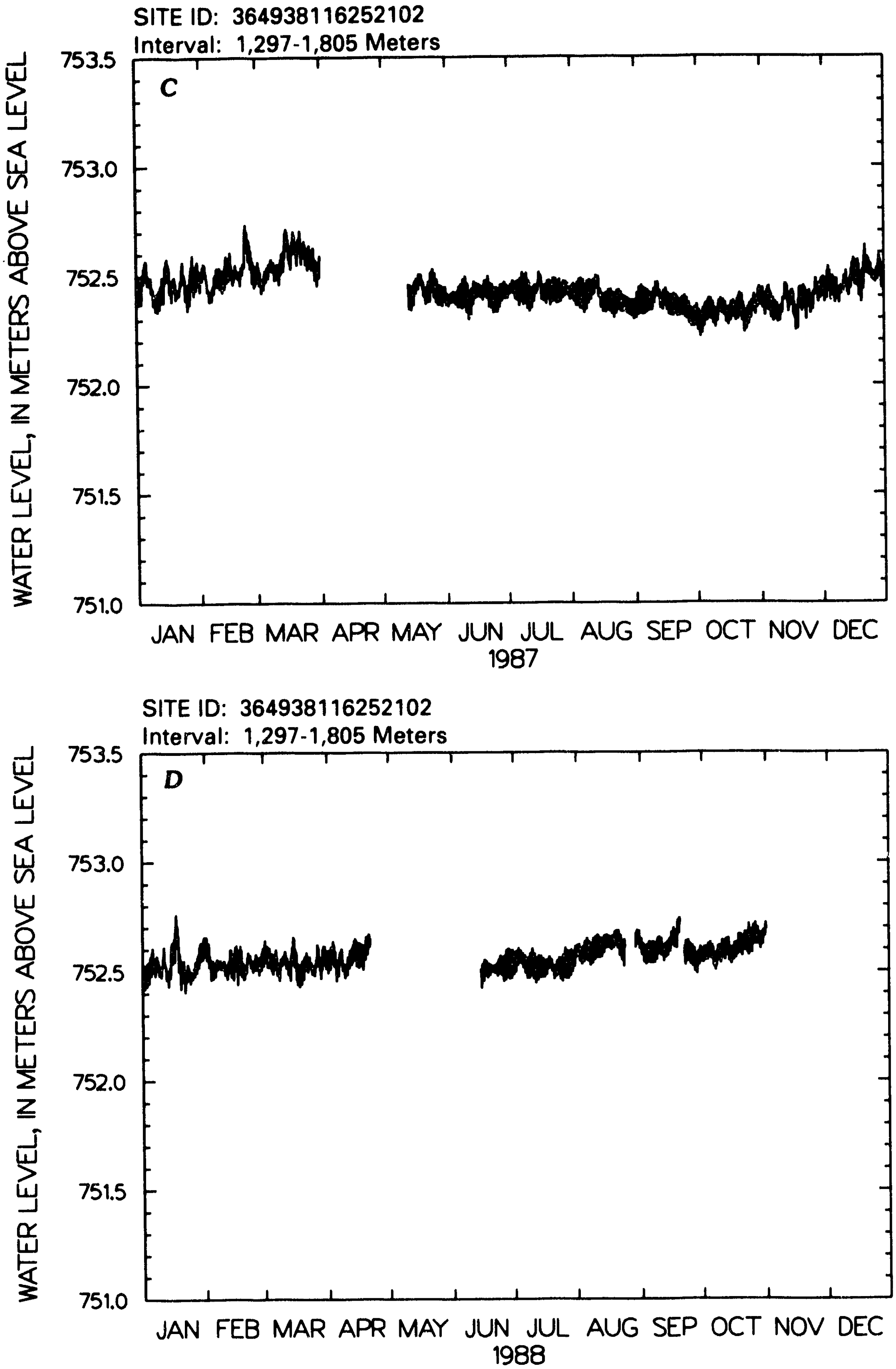


Figure 24.--Water-level altitude for well UE-25p #1. --Continued

Table 9.--*Daily mean water-level altitude, in meters above sea level, for well UE-25p #1*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 1,297-1,805 m — Site ID: 364938116252102

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	—	—	—	751.87	752.02	752.11	752.05	752.16	752.18	752.16	752.18	752.22
2	—	—	—	751.91	752.02	752.14	752.05	752.15	752.20	752.15	752.17	752.24
3	—	—	—	751.98	752.03	752.13	752.07	752.16	752.21	752.13	752.17	752.18
4	—	—	—	751.98	752.05	752.12	752.09	752.18	752.20	752.12	752.18	752.16
5	—	—	—	751.96	752.05	752.11	752.10	752.18	752.19	752.13	752.18	752.18
6	—	—	—	751.97	752.03	752.09	752.10	752.18	752.19	752.22	752.15	752.18
7	—	—	—	751.96	752.01	752.09	752.09	752.19	752.17	752.24	752.17	752.21
8	—	—	751.95	751.96	752.00	752.10	752.09	752.21	752.19	752.25	752.25	752.25
9	—	—	751.97	751.98	752.03	752.12	752.08	752.20	752.23	752.22	752.26	752.26
10	—	—	751.97	751.98	752.03	752.12	752.08	752.22	752.24	752.16	752.27	752.26
11	—	—	751.95	751.96	752.00	752.10	752.11	752.22	752.23	752.16	752.29	752.22
12	—	—	751.92	751.94	751.99	752.10	752.13	752.19	752.17	752.18	752.25	752.18
13	—	—	751.87	751.93	751.96	752.12	752.14	752.18	—	752.17	752.16	752.15
14	—	—	751.88	751.99	752.00	752.11	752.14	752.18	752.09	752.14	752.13	752.16
15	—	—	751.87	752.03	752.00	752.10	752.14	752.18	752.15	752.15	752.14	752.16
16	—	—	751.85	752.04	751.99	752.09	752.14	752.18	752.16	752.19	752.19	752.14
17	—	—	751.85	752.05	752.00	752.08	752.14	752.15	752.19	752.20	752.24	752.13
18	—	—	751.89	752.07	752.03	752.09	752.11	752.14	752.16	752.16	752.18	752.13
19	—	—	751.88	752.05	752.05	752.11	752.11	752.14	752.10	752.16	752.11	752.15
20	—	—	751.87	752.08	752.05	752.12	752.12	752.15	752.10	752.20	752.18	752.15
21	—	—	751.91	752.08	752.01	752.11	752.14	752.13	752.12	752.25	752.20	752.15
22	—	—	751.89	752.05	752.02	752.08	752.15	752.12	752.13	752.19	752.21	752.13
23	—	—	751.89	752.01	752.03	752.10	752.15	752.13	752.11	752.17	752.23	752.15
24	—	—	751.95	752.03	752.05	752.12	752.15	752.14	752.12	752.16	752.26	752.15
25	—	—	752.00	752.06	752.08	752.10	752.13	752.14	752.15	752.18	752.27	752.15
26	—	—	751.98	752.03	752.09	752.05	752.12	752.13	752.15	752.19	752.21	752.18
27	—	—	752.03	751.99	752.09	752.05	752.13	752.13	752.18	752.19	752.20	752.17
28	—	—	752.01	751.99	752.08	752.07	752.15	752.14	752.18	752.19	752.26	752.16
29	—		751.94	751.99	752.09	752.07	752.17	752.15	752.15	752.18	752.34	752.17
30	—		751.88	752.01	752.08	752.06	752.17	752.15	752.17	752.21	752.25	752.17
31	—		751.88		752.10		752.17	752.16		752.22		752.16
MONTHLY												
MEAN	—	—	—	752.00	752.03	752.10	752.12	752.16	—	752.18	752.21	752.18
MAX	—	—	—	752.08	752.10	752.14	752.17	752.22	—	752.25	752.34	752.26
MIN	—	—	—	751.87	751.96	752.05	752.05	752.12	—	752.12	752.11	752.13

Table 9.--*Daily mean water-level altitude, in meters above sea level, for well UE-25p #1*--Continued

Interval: 1,297-1,805 m

Site ID: 364938116252102

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	752.17	752.21	752.16	752.29	752.24	752.25	—	752.24	752.30	752 42	752.33	752.37
2	752.17	752.20	752.15	752.28	752.25	752.24	—	752.23	752.30	752.41	752.33	752.39
3	752.17	752.22	752.11	752.27	752.27	752.23	—	752.23	752.29	752.34	752.36	752.40
4	752.14	752.21	752.10	752.28	752.26	752.24	—	752.24	752.29	752.31	752.34	752.40
5	752.14	752.22	752.12	752.28	752.29	752.24	—	752.26	752.29	752.32	752.37	752.43
6	752.12	752.25	752.13	752.26	752.30	752.22	—	752.25	752.31	752.32	752.40	752.45
7	752.08	752.24	752.16	752.20	752.26	752.24	—	752.25	752.31	752.33	752.38	752.43
8	752.09	752.25	752.21	752.21	752.25	752.22	752.35	752.26	752.33	752.34	752.33	752.41
9	752.10	752.22	752.22	752.22	752.25	752.20	752.25	752.27	752.36	752.34	752.34	752.39
10	752.11	752.21	752.27	752.25	752.27	752.17	752.25	752.25	752.30	752.37	752.33	752.38
11	752.11	752.21	752.24	752.27	752.25	752.18	752.27	752.24	752.29	752.36	752.34	752.38
12	752.11	752.21	752.25	752.31	752.23	752.20	752.27	752.25	752.32	752.32	752.35	752.38
13	752.14	752.21	752.25	752.23	752.24	752.19	752.26	752.28	752.33	752.30	752.38	752.38
14	752.19	752.23	752.25	752.23	752.27	752.21	752.25	752.28	752.33	752.31	752.39	752.39
15	752.17	752.28	752.25	752.26	752.26	752.22	752.26	752.28	752.32	752.32	752.37	752.39
16	752.13	752.24	752.29	752.28	752.21	752.21	752.29	752.27	752.31	752.34	752.38	752.41
17	752.12	752.24	752.26	752.24	752.18	752.19	752.26	752.25	752.32	752.37	752.40	752.42
18	752.12	752.24	752.20	752.21	752.21	752.21	752.24	752.22	752.35	752.38	752.42	752.43
19	752.17	752.25	752.17	752.19	752.24	752.21	752.21	752.23	752.36	752.36	752.39	752.44
20	752.19	752.20	752.16	752.22	752.26	—	752.24	752.25	752.33	752.34	752.38	752.44
21	752.17	752.16	752.19	752.26	752.27	—	752.25	752.25	752.33	752.34	752.40	752.39
22	752.16	752.15	752.22	752.30	752.23	—	752.23	752.27	752.34	752.36	752.36	752.40
23	752.17	752.15	752.22	752.31	752.24	—	752.21	752.29	752.38	752.34	752.32	752.43
24	752.14	752.14	752.24	752.30	752.22	—	752.21	752.28	752.41	752.31	752.37	752.43
25	752.11	752.14	752.23	752.30	752.22	—	752.22	752.27	752.38	752.31	752.38	752.41
26	752.14	752.15	752.21	752.25	752.23	—	752.24	752.25	752.35	752.32	752.35	752.42
27	752.17	752.16	752.22	752.24	752.25	—	752.24	752.24	752.35	752.33	752.35	752.43
28	752.19	752.16	752.23	752.28	752.24	—	752.23	752.27	752.34	752.32	752.39	752.40
29	752.20		752.22	752.29	752.24	—	752.21	752.29	752.32	752.34	752.41	752.38
30	752.22		752.23	752.25	752.24	—	752.22	752.28	752.35	752.38	752.35	752.41
31	752.23		752.25		752.24		752.24	752.28		752.37		752.44
MONTHLY												
MEAN	752.15	752.21	752.21	752.26	752.25	—	—	752.26	752.33	752.34	752.37	752.41
MAX	752.23	752.28	752.29	752.31	752.30	—	—	752.29	752.41	752.42	752.42	752.45
MIN	752.08	752.14	752.10	752.19	752.18	—	—	752.22	752.29	752.30	752.32	752.37

Table 9.--*Daily mean water-level altitude, in meters above sea level, for well UE-25p #1*--Continued

Interval: 1,297-1,805 m Site ID: 364938116252102

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	752.45	752.48	752.52	—	—	752.40	752.43	752.42	752.35	752.32	752.40	752.45
2	752.42	752.52	752.50	—	—	752.38	752.43	752.43	752.37	752.30	752.40	752.45
3	752.46	752.52	752.46	—	—	752.39	752.45	752.43	752.39	752.28	752.37	752.44
4	752.52	752.46	752.47	—	—	752.40	752.45	752.42	752.40	752.29	752.38	752.49
5	752.53	752.41	752.50	—	—	752.40	752.44	752.43	752.40	752.31	752.41	752.47
6	752.47	752.41	752.51	—	—	752.40	752.44	752.43	752.39	752.33	752.38	752.46
7	752.47	752.43	752.54	—	—	752.41	752.44	752.43	752.39	752.35	752.36	752.45
8	752.42	752.48	752.55	—	—	752.42	752.46	752.41	752.38	752.35	752.34	752.44
9	752.39	752.51	752.53	—	—	752.43	752.45	752.42	752.37	752.34	752.34	752.42
10	752.39	752.50	752.52	—	—	752.44	752.45	752.43	752.39	752.32	752.32	752.42
11	752.40	752.49	752.51	—	—	752.42	752.43	752.43	752.43	752.31	752.33	752.44
12	752.42	752.49	752.53	—	—	752.38	752.41	752.44	752.44	752.34	752.36	752.46
13	752.46	752.53	752.57	—	—	752.39	752.41	752.45	752.41	752.36	752.42	752.48
14	752.48	752.50	752.62	—	752.42	752.42	752.42	752.47	752.38	752.36	752.42	752.43
15	752.54	752.56	752.67	—	752.41	752.44	752.43	752.42	752.39	752.35	752.37	752.45
16	752.52	752.51	752.62	—	752.42	752.43	752.46	752.39	752.40	752.32	752.39	752.51
17	752.46	752.49	752.58	—	752.45	752.43	752.49	752.38	752.39	752.31	752.39	752.53
18	752.45	752.52	752.65	—	752.46	752.42	752.43	752.38	752.37	752.33	752.32	752.52
19	752.47	752.50	752.65	—	752.48	752.43	752.43	752.39	752.37	752.34	752.31	752.51
20	752.41	752.49	752.59	—	752.47	752.45	752.42	752.40	752.37	752.33	752.37	752.46
21	752.42	752.52	752.66	—	752.43	752.45	752.44	752.38	752.37	752.34	752.41	752.47
22	752.46	752.55	752.63	—	752.42	752.42	752.43	752.37	752.36	752.37	752.41	752.56
23	752.52	752.68	752.61	—	752.43	752.42	752.44	752.38	752.35	752.37	752.40	752.56
24	752.46	752.65	752.62	—	752.45	752.40	752.45	752.39	752.36	752.33	752.37	752.54
25	752.42	752.62	752.59	—	752.49	752.40	752.44	752.39	752.37	752.30	752.40	752.52
26	752.43	752.56	752.59	—	752.47	752.40	752.44	752.37	752.36	752.31	752.37	752.49
27	752.49	752.51	752.57	—	752.45	752.41	752.43	752.37	752.34	752.33	752.39	752.48
28	752.52	752.50	752.57	—	752.42	752.43	752.44	752.36	752.32	752.35	752.44	752.50
29	752.50		752.53	—	752.42	752.44	752.44	752.36	752.31	752.37	752.42	752.55
30	752.52		752.51	—	752.41	752.43	752.44	752.35	752.31	752.36	752.42	752.51
31	752.49		752.54		752.43		752.42	752.35		752.39		752.48
MONTHLY												
MEAN	752.46	752.51	752.56	—	—	752.42	752.44	752.40	752.37	752.33	752.38	752.48
MAX	752.54	752.68	752.67	—	—	752.45	752.49	752.47	752.44	752.39	752.44	752.56
MIN	752.39	752.41	752.46	—	—	752.38	752.41	752.35	752.31	752.28	752.31	752.42

Table 9.--*Daily mean water-level altitude, in meters above sea level, for well UE-25p #1*--Continued

Interval: 1,297-1,805 m

Site ID: 364938116252102

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	752.47	752.62	752.59	752.54	—	—	752.55	752.60	752.63	752.57	752.69	—
2	752.49	752.60	752.58	752.56	—	—	752.55	752.60	752.60	752.58	—	—
3	752.50	752.53	752.56	752.58	—	—	752.57	752.57	752.58	752.58	—	—
4	752.52	752.51	752.54	752.57	—	—	752.57	752.58	752.58	752.59	—	—
5	752.56	752.50	752.53	752.51	—	—	752.56	752.59	752.59	752.60	—	—
6	752.54	752.52	752.56	752.53	—	—	752.55	752.61	752.59	752.59	—	—
7	752.53	752.53	752.52	752.57	—	—	752.53	752.60	752.59	752.56	—	—
8	752.53	752.53	752.49	752.54	—	—	752.52	752.59	752.59	752.54	—	—
9	752.50	752.52	752.54	752.50	—	—	752.54	752.60	752.60	752.57	—	—
10	752.52	752.52	752.56	752.51	—	—	752.55	752.62	752.62	752.58	—	—
11	752.57	752.50	752.56	752.54	—	—	752.53	752.62	752.61	752.60	—	—
12	752.51	752.52	752.53	752.56	—	—	752.52	752.62	752.59	752.61	—	—
13	752.48	752.56	752.51	752.58	—	—	752.53	752.62	752.59	752.61	—	—
14	752.49	752.52	752.56	752.60	—	—	752.53	752.62	752.60	752.61	—	—
15	752.59	752.56	752.61	752.59	—	752.49	752.53	752.63	752.62	752.58	—	—
16	752.61	752.56	752.55	752.59	—	752.51	752.52	752.63	752.64	752.58	—	—
17	752.69	752.52	752.48	752.58	—	752.52	752.52	752.63	752.66	752.59	—	—
18	752.65	752.57	752.48	752.57	—	752.51	752.53	752.63	752.64	752.60	—	—
19	752.53	752.51	752.49	752.61	—	752.51	752.53	752.64	752.67	752.62	—	—
20	752.50	752.49	752.52	752.63	—	752.51	752.51	752.65	752.72	752.63	—	—
21	752.50	752.52	752.55	752.64	—	752.51	752.50	752.65	—	752.61	—	—
22	752.46	752.56	752.54	—	—	752.51	752.52	752.62	—	752.63	—	—
23	752.50	752.55	752.54	—	—	752.52	752.53	752.61	752.59	752.63	—	—
24	752.48	752.53	752.51	—	—	752.54	752.52	752.60	752.59	752.65	—	—
25	752.48	752.53	752.50	—	—	752.53	752.52	—	752.58	752.65	—	—
26	752.50	752.55	752.54	—	—	752.52	752.57	—	752.58	752.66	—	—
27	752.53	752.53	752.59	—	—	752.54	752.55	—	752.59	752.68	—	—
28	752.55	752.54	752.52	—	—	752.55	752.54	—	752.54	752.67	—	—
29	752.59	752.56	752.55	—	—	752.54	752.55	—	752.55	752.65	—	—
30	752.60		752.58	—	—	752.55	752.55	752.65	752.57	752.64	—	—
31	752.62		752.55		—		752.56	752.66		752.66		—
MONTHLY												
MEAN	752.54	752.54	752.54	—	—	—	752.54	—	—	752.61	—	—
MAX	752.69	752.62	752.61	—	—	—	752.57	—	—	752.68	—	—
MIN	752.46	752.49	752.48	—	—	—	752.50	—	—	752.54	—	—

Well USW G-3

Information about the history of well USW G-3 and about previous data from the well was obtained from various sources. These sources are: Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1987b, c).

Well specifications

The following are specifications for well USW G-3:

1. Location and identification:

   Latitude and longitude: 36°49'05" N.; 116°28'01" W.
   Nevada State Central Zone Coordinates (m): N 229,447; E 170,226.
   U.S. Geological Survey Site ID: 364905116280101.

2. Drilling and casing information:

   Well started: January 8, 1982.
   Well completed: March 21, 1982.
   Drilling method: Rotary, using mostly air-foam, and occasional polymer added for circulating medium; many drilling problems encountered in upper part of hole, including lost circulation and lost or stuck tools; hole cored from 795 m to 1,533 m.
   Bit diameter below water level: 222 mm used to 792 m; 121 mm used from 792 to 795 m; 100 mm used from 795 m to total depth.
   Casing extending below water level: 126-mm inside diameter to 792 m; bottom casing tack cemented; no perforations.
   Total drilled depth: 1,533 m.

3 Access to and description of interval for measuring water levels:

   Casing, 126-mm inside diameter, extending from land surface to a depth of 792 m; saturated interval of borehole within the Tram Member of the Crater Flat Tuff, and the Lithic Ridge Tuff.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,480.47 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.57 m, based on depth to water of 750 m.

History of instrumentation, calibrations, and comments

Manual water-level were made from December 22, 1982, through March 12, 1986. Beginning in March 1986, the water level has been monitored continuously using a downhole pressure transducer with a data logger at the land surface.

The following transducers were used in well USW G-3:

[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
03-13-86	09-24-86	Gage	Druck 10/D	10	130298
09-24-86	01-21-87	Gage	Druck 10/D	10	156865
01-21-87	09-21-87	Gage	Druck 10/D	10	139267
09-21-87	10-13-87	Gage	Druck 10/D	10	170670
10-13-87	03-24-88	Gage	Druck 10/D	10	129537
03-24-88	07-25-88	Gage	Druck 930	10	226110
09-01-88	10-14-88	Gage	Druck 930	10	240064
10-14-88	12-31-88	Gage	IMO	15	L305061

The following calibrations of the water-level monitoring system were performed in well USW G-3:

Transducer				Water level	
		Regression line			
Serial number	Calib- ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
130298	03-17-86	-6.196	0.999	03-13-86	730.70
156865	09-25-86	-6.302	1.000	09-24-86	730.74
156865	11-05-86	-6.252	1.000	11-05-86	730.63
139267	01-22-87	-6.217	1.000	01-21-87	730.63
170670	09-21-87	-6.612	1.000	09-21-87	730.63
129537	10-13-87	-6.479	1.000	10-13-87	730.71
129537	11-24-87	-6.369	1.000	11-24-87	730.67
129537	11-24-87	-6.425	1.000	11-24-87	730.67
226110	03-24-88	-6.419	1.000	03-24-88	730.72
240064	09-01-88	-6.716	1.000	09-01-88	730.42
L305061	10-14-88	-1.314	1.000	10-14-88	730.36

Transducer output

Transducer output from March 1986 through December 1988 is shown in figure 25. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 130298), in use between March and September 1986, produced reasonable output for about 4 months with the exception of a short period in early May (fig. 25-A). Beginning about midday on May 6, the output became erratic and continued erratic until early on May 7. The cause of the erratic record could not be determined. In early July, the record again became erratic and the transducer output began a downward drift. By early August, the output was totally erratic (fig. 25-A). The second transducer (serial number 156865) in use between September 1986 and January 1987 produced reasonable output for about 2 months and then the output became totally erratic (fig. 25-A). The third transducer (serial number 139267), in use between January and September 1987 produced reasonable output for about 5 months (fig. 25-B). The fourth transducer (serial number 170670), in use in September and October 1987, produced reasonable output for only 12 days (fig. 25-B). The fifth transducer (serial number 129537), in use between October 1987 and March 1988, produced about 3 months of reasonable output except for 4 days in early November 1987 (fig. 25-B). By late January 1988, the transducer output became very erratic (fig. 25-C). The sixth transducer (serial number 226110), in use between March and July 1988, produced alternate periods of reasonable output and erratic output (fig. 25-C). The seventh transducer (serial number 240064), in use in September and October 1988, produced about 1 month of reasonable output except a period beginning about September 20 and ending about September 21 (fig. 25-C). The eighth transducer (serial number L305061), in use between October and December 1988, produced reasonable output for about 2 months except for output on November 14 (fig. 25-C). By late December, the transducer seemed to produce some very low-amplitude noise.

Water-level altitude

In addition to measured water-level altitudes, water-level altitudes were estimated on the following days to remove what was judged to be transducer drift:

Date	Estimated water-level altitude (meters)
07-04-87	730.63
05-10-88	730.69
07-02-88	730.69
07-25-88	730.69
10-04-88	730.42

The estimated water-level altitudes may introduce some error into the record, but the error probably is small compared to transducer drift.

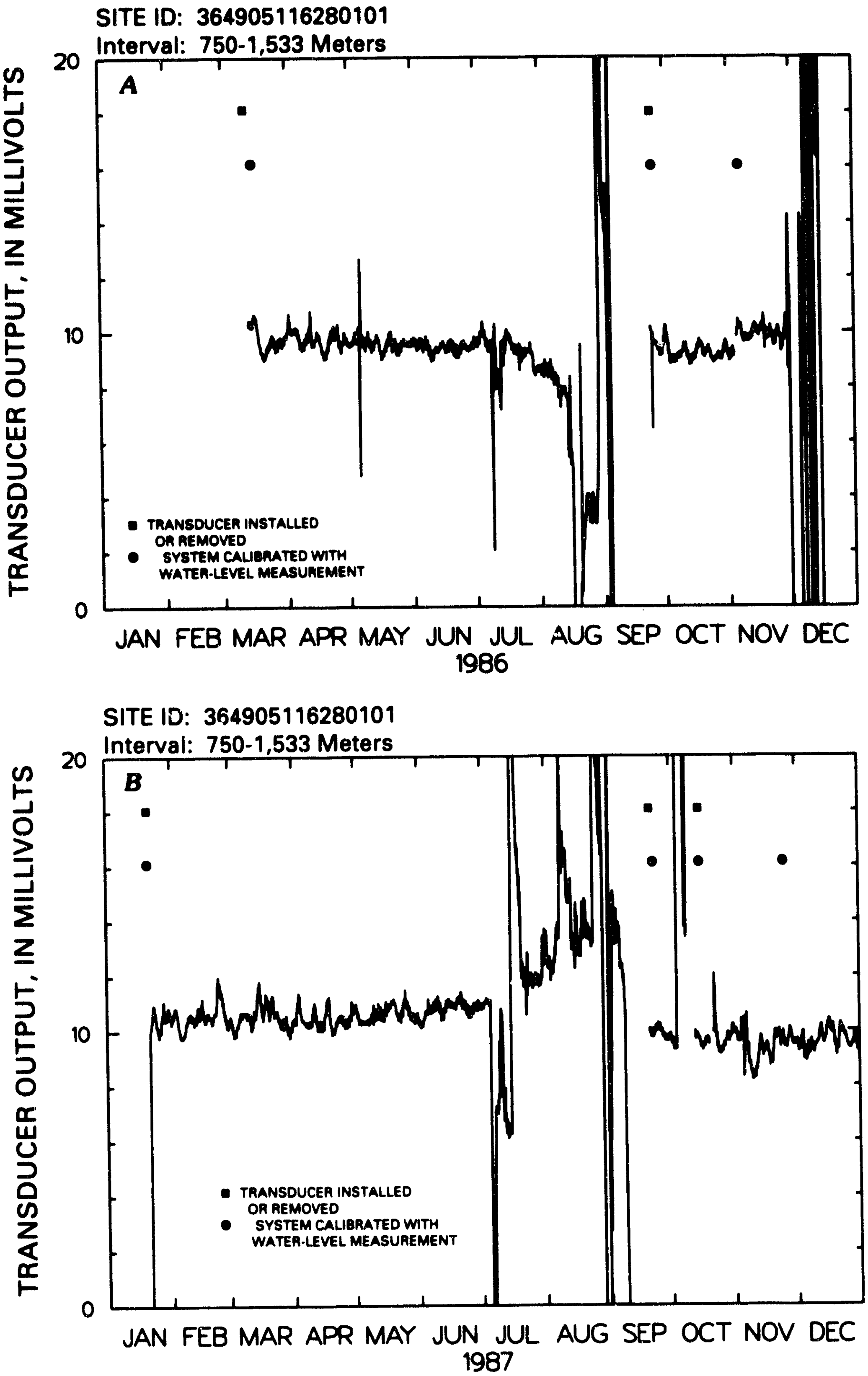


Figure 25.--Transducer output for well USW G-3.

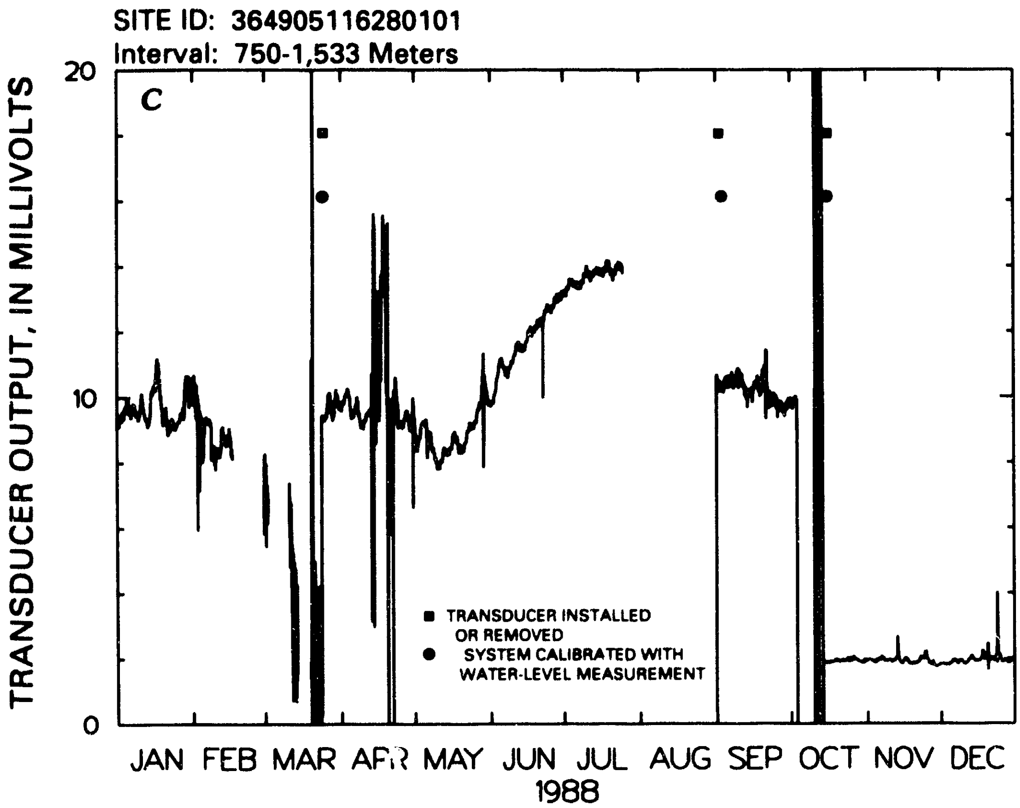


Figure 25.--Transducer output for well USW G-3.--Continued

Transducer output was converted to water-level altitude for the following periods:

Beginning date	Ending date	Beginning date	Ending date
03-13-86	05-05-86	04-25-88	05-28-88
05-08-86	07-08-86	05-30-88	06-21-88
09-26-86	11-29-86	06-24-88	07-24-88
01-23-87	07-04-87	09-02-88	09-19-88
09-21-87	10-03-87	09-22-88	10-03-88
10-14-87	10-20-87	10-15-88	11-13-88
10-24-87	11-04-87	11-15-88	12-19-88
11-09-87	01-29-88	12-26-88	12-31-88
03-25-88	04-12-88		

Some transducer output was missed during a prolonged calibration on November 4-5, 1986. Contrary to the usual practice of converting only full days of data, data for the morning of October 20, 1987 was converted; after 9:00 am that day, due to a site visit, the transducer no longer produced output.

The water-level altitudes are shown in figure 26 and the daily mean water-level altitudes are given in table 10. Approximately 67 percent of the transducer output was converted to water-level altitude. The longest period was 163 days, January 23 through July 4, 1987.

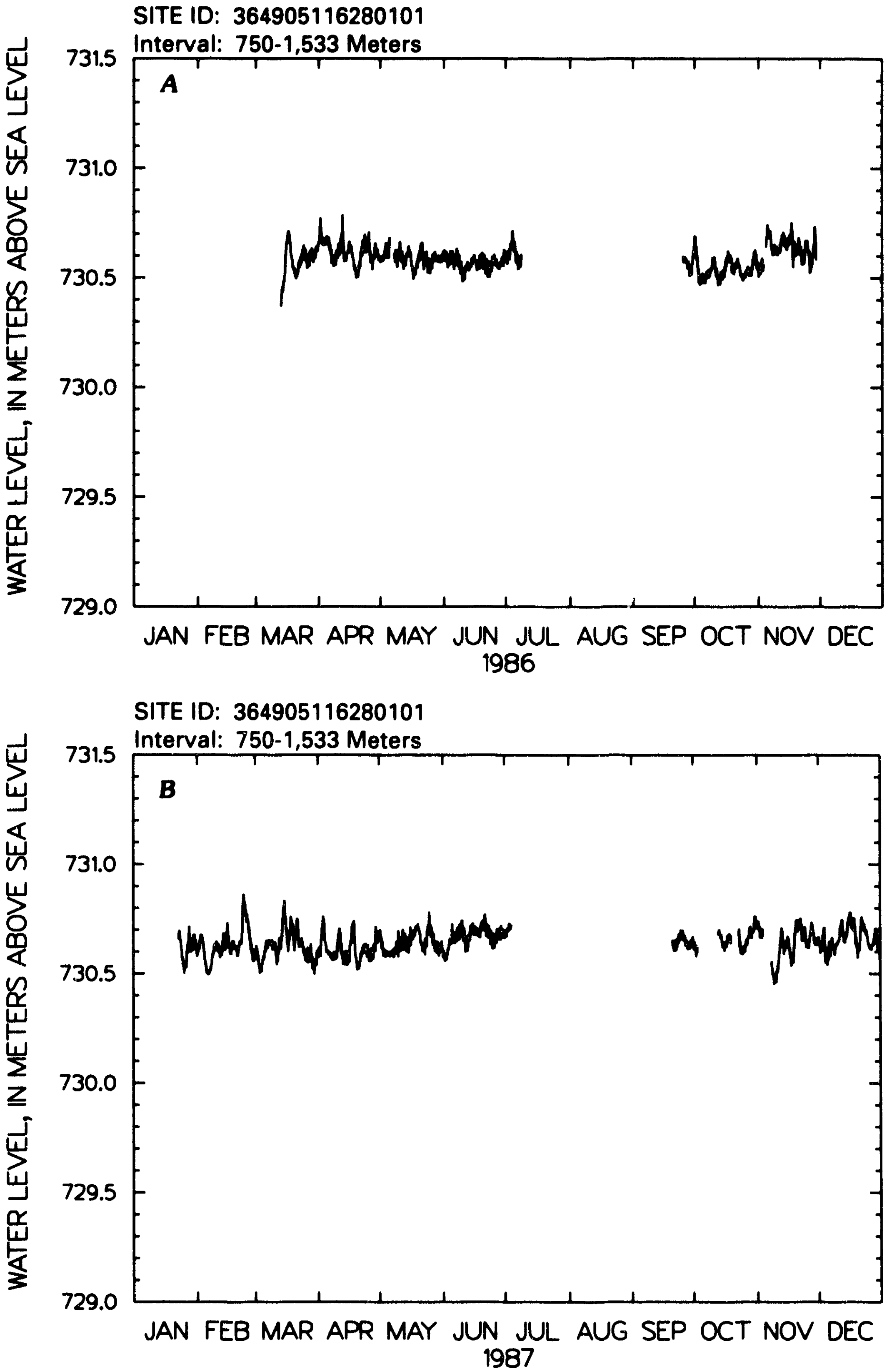


Figure 26.--Water-level altitude for well USW G-3.

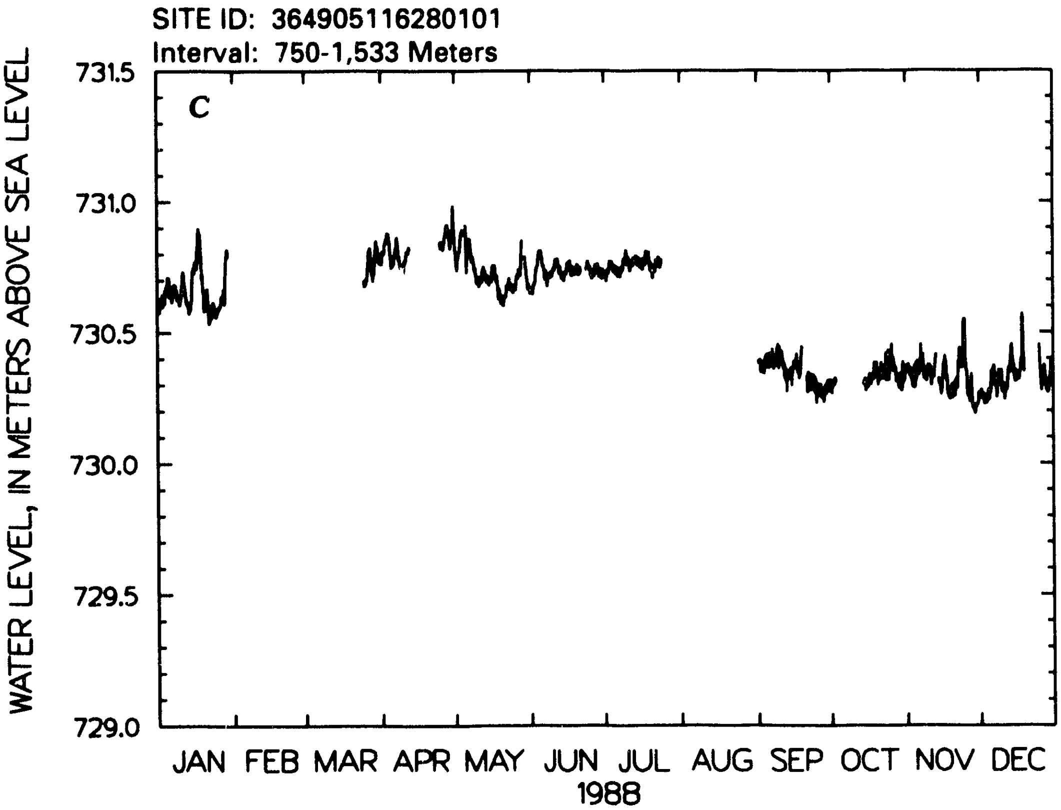


Figure 26.--Water-level altitude for well USW G-3.--Continued

Table 10.--*Daily mean water-level altitude, in meters above sea level, for well USW G-3*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 751-1,533 m Site ID: 364905116280101

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	—	—	—	730.69	730.60	730.64	730.65	—	—	730.72	730.55	—
2	—	—	—	730.70	730.61	730.64	730.65	—	—	730.71	730.53	—
3	—	—	—	730.67	730.64	730.62	730.68	—	—	730.62	730.56	—
4	—	—	—	730.68	730.64	730.63	730.73	—	—	730.56	—	—
5	—	—	—	730.68	730.66	730.64	730.70	—	—	730.57	—	—
6	—	—	—	730.65	—	730.61	730.66	—	—	730.57	730.70	—
7	—	—	—	730.60	—	730.64	730.63	—	—	730.58	730.69	—
8	—	—	—	730.59	730.62	730.63	730.64	—	—	730.59	730.62	—
9	—	—	—	730.60	730.61	730.59	—	—	—	730.59	730.62	—
10	—	—	—	730.63	730.65	730.56	—	—	—	730.62	730.62	—
11	—	—	—	730.65	730.63	730.56	—	—	—	730.63	730.61	—
12	—	—	—	730.71	730.60	730.60	—	—	—	730.58	730.63	—
13	—	—	—	730.62	730.61	730.59	—	—	—	730.54	730.67	—
14	—	—	730.46	730.61	730.64	730.61	—	—	—	730.55	730.68	—
15	—	—	730.54	730.64	730.65	730.63	—	—	—	730.56	730.65	—
16	—	—	730.67	730.66	730.59	730.62	—	—	—	730.57	730.66	—
17	—	—	730.69	730.62	730.54	730.61	—	—	—	730.62	730.68	—
18	—	—	730.61	730.57	730.57	730.62	—	—	—	730.63	730.67	—
19	—	—	730.55	730.53	730.61	730.63	—	—	—	730.62	730.64	—
20	—	—	730.52	730.55	730.64	730.63	—	—	—	730.57	730.62	—
21	—	—	730.52	730.60	730.66	730.61	—	—	—	730.58	730.65	—
22	—	—	730.56	730.65	730.62	730.60	—	—	—	730.60	730.61	—
23	—	—	730.59	730.68	730.63	730.60	—	—	—	730.58	730.57	—
24	—	—	730.62	730.67	730.60	730.61	—	—	—	730.53	730.62	—
25	—	—	730.61	730.68	730.59	730.63	—	—	—	730.52	730.65	—
26	—	—	730.58	730.63	730.61	730.62	—	—	730.68	730.53	730.60	—
27	—	—	730.59	730.59	730.63	730.61	—	—	730.67	730.55	730.56	—
28	—	—	730.62	730.63	730.63	730.61	—	—	730.65	730.53	730.62	—
29	—		730.60	730.65	730.62	730.63	—	—	730.62	730.54	730.68	—
30	—		730.62	730.62	730.62	730.65	—	—	730.64	730.60	—	—
31	—		730.64		730.63		—	—		730.59		—
MONTHLY												
MEAN	—	—	—	730.63	—	730.62	—	—	—	730.59	—	—
MAX	—	—	—	730.71	—	730.65	—	—	—	730.72	—	—
MIN	—	—	—	730.53	—	730.56	—	—	—	730.52	—	—

Table 10.--*Daily mean water-level altitude, in meters above sea level, for well USW G-3*--Continued

Interval: 751-1,533 m

Site ID: 364905116280101

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	—	730.65	730.64	730.64	730.71	730.64	730.72	—	—	730.64	730.73	730.67
2	—	730.69	730.62	730.65	730.68	730.61	730.72	—	—	730.63	730.72	730.65
3	—	730.69	730.57	730.76	730.64	730.62	730.75	—	—	730.60	730.69	730.64
4	—	730.62	730.57	730.72	730.63	730.67	730.75	—	—	—	730.68	730.70
5	—	730.55	730.61	730.65	730.63	730.69	—	—	—	—	—	730.61
6	—	730.54	730.66	730.63	730.63	730.70	—	—	—	—	—	730.60
7	—	730.57	730.67	730.62	730.63	730.71	—	—	—	—	—	730.63
8	—	730.63	730.68	730.62	730.64	730.72	—	—	—	—	—	730.65
9	—	730.66	730.67	730.62	730.66	730.73	—	—	—	—	730.52	730.64
10	—	730.66	730.67	730.64	730.68	730.75	—	—	—	—	730.48	730.64
11	—	730.65	730.63	730.72	730.68	730.73	—	—	—	—	730.49	730.66
12	—	730.64	730.62	730.67	730.69	730.68	—	—	—	—	730.54	730.71
13	—	730.69	730.67	730.61	730.69	730.68	—	—	—	—	730.63	730.74
14	—	730.67	730.73	730.61	730.68	730.72	—	—	—	730.69	730.68	730.68
15	—	730.73	730.83	730.61	730.67	730.75	—	—	—	730.67	730.61	730.69
16	—	730.68	730.75	730.63	730.71	730.73	—	—	—	730.63	730.64	730.76
17	—	730.65	730.68	730.71	730.72	730.74	—	—	—	730.62	730.64	730.77
18	—	730.68	730.75	730.76	730.73	730.72	—	—	—	730.65	730.58	730.74
19	—	730.66	730.76	730.64	730.75	730.73	—	—	—	730.66	730.56	730.73
20	—	730.63	730.68	730.57	730.74	730.77	—	—	—	—	730.65	730.64
21	—	730.67	730.75	730.58	730.69	730.78	—	—	—	—	730.72	730.63
22	—	730.70	730.72	730.63	730.66	730.75	—	—	730.63	—	730.73	730.73
23	730.71	730.86	730.67	730.65	730.67	730.73	—	—	730.63	—	730.72	730.74
24	730.64	730.83	730.67	730.66	730.71	730.71	—	—	730.65	730.65	—	730.72
25	730.58	730.78	730.63	730.64	730.76	730.69	—	—	730.67	730.61	730.69	730.69
26	730.58	730.71	730.62	730.62	730.74	730.69	—	—	730.68	730.61	730.65	730.65
27	730.65	730.65	730.62	730.63	730.70	730.71	—	—	730.66	730.63	730.66	730.63
28	730.70	730.62	730.63	730.64	730.67	730.72	—	—	730.64	730.66	730.73	730.65
29	730.67		730.59	730.69	730.66	730.73	—	—	730.63	730.70	730.70	730.71
30	730.70		730.57	730.71	730.65	730.72	—	—	730.63	730.68	730.66	730.67
31	730.66		730.61		730.67		—	—		730.72		730.62
MONTHLY												
MEAN	—	730.67	730.66	730.65	730.68	730.71	—	—	—	—	—	730.68
MAX	—	730.86	730.83	730.76	730.76	730.78	—	—	—	—	—	730.77
MIN	—	730.54	730.57	730.57	730.63	730.61	—	—	—	—	—	730.60

Table 10.--*Daily mean water-level altitude, in meters above sea level, for well USW G-3*--Continued

Interval: 751-1,533 m

Site ID: 364905116280101

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						<u>1988</u>						
1	730.61	—	—	730.80	730.83	730.66	730.72	—	—	730.30	730.35	730.24
2	730.63	—	—	730.84	730.77	730.66	730.72	—	730.38	730.30	730.36	730.26
3	730.65	—	—	730.88	730.83	730.71	730.75	—	730.37	730.31	730.34	730.25
4	730.67	—	—	730.87	730.88	730.77	730.76	—	730.37	—	730.31	730.24
5	730.71	—	—	730.78	730.90	730.80	730.75	—	730.39	—	730.31	730.26
6	730.67	—	—	730.79	730.82	730.76	730.74	—	730.39	—	730.37	730.29
7	730.68	—	—	730.85	730.84	730.72	730.73	—	730.40	—	730.37	730.35
8	730.68	—	—	730.81	730.78	730.70	730.73	—	730.39	—	730.36	730.30
9	730.64	—	—	730.76	730.75	730.72	730.76	—	730.40	—	730.33	730.32
10	730.65	—	—	730.76	730.70	730.73	730.79	—	730.42	—	730.35	730.33
11	730.73	—	—	730.80	730.69	730.75	730.77	—	730.40	—	730.35	730.28
12	730.66	—	—	730.83	730.71	730.77	730.75	—	730.37	—	730.33	730.28
13	730.62	—	—	—	730.73	730.74	730.77	—	730.34	—	730.38	730.34
14	730.62	—	—	—	730.70	730.72	730.78	—	730.34	—	—	730.41
15	730.74	—	—	—	730.70	730.71	730.77	—	730.34	730.31	730.30	730.37
16	730.78	—	—	—	730.72	730.74	730.76	—	730.37	730.30	730.30	730.32
17	730.87	—	—	—	730.74	730.76	730.76	—	730.39	730.31	730.39	730.33
18	730.83	—	—	—	730.70	730.74	730.78	—	730.35	730.32	730.32	730.38
19	730.68	—	—	—	730.65	730.73	730.79	—	730.38	730.35	730.26	730.44
20	730.62	—	—	—	730.62	730.73	730.75	—	—	730.35	730.27	—
21	730.62	—	—	—	730.62	730.73	730.73	—	—	730.33	730.27	—
22	730.57	—	—	—	730.65	—	730.75	—	730.30	730.35	730.30	—
23	730.62	—	—	—	730.69	—	730.77	—	730.31	730.35	730.38	—
24	730.60	—	—	—	730.67	730.75	730.76	—	730.31	730.35	730.38	—
25	730.59	—	730.71	730.84	730.67	730.74	—	—	730.29	730.35	730.48	—
26	730.62	—	730.75	730.83	730.69	730.72	—	—	730.28	730.37	730.35	730.37
27	730.65	—	730.83	730.89	730.72	730.73	—	—	730.28	730.39	730.26	730.31
28	730.67	—	730.75	730.90	730.76	730.75	—	—	730.26	730.35	730.27	730.34
29	730.81	—	730.78	730.85	—	730.73	—	—	730.27	730.32	730.21	730.28
30	—		730.83	730.92	730.75	730.72	—	—	730.30	730.30	730.21	730.31
31	—		730.80		730.68		—	—		730.30		730.37
MONTHLY												
MEAN	—	—	—	—	—	—	—	—	—	—	—	—
MAX	—	—	—	—	—	—	—	—	—	—	—	—
MIN	—	—	—	—	—	—	—	—	—	—	—	—

Well USW H-1

Information about the history of well USW H-1 and about previous data from the well was obtained from various sources. These sources are: Rush and others (1983); Rush and others (1984); Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1987a, c).

Well specifications

The following are specifications for well USW H-1:

1. Location and identification:

   Latitude and longitude: 36°51'57" N.; 116°27'12" W.
   Nevada State Central Zone Coordinates (m): N 234,774; E 171,416.
   U.S. Geological Survey Site ID's:
   365157116271201 (entire well)
   365157116271202 (lowermost interval)
   365157116271203 (second interval from bottom)
   365157116271204 (third interval from bottom)
   365157116271205 (uppermost interval)

2. Drilling and casing information:

   Well started: Sept. 3, 1980.
   Well completed: January 25, 1981 (initial completion, including geophysical logging and hydraulic testing); July 6, 1982 (recompletion; four piezometers installed).
   Drilling method: Rotary, using rock bits and air-foam circulating medium; cores obtained in selected intervals.
   Bit diameter below water level: 311 mm to 688 m; 222 mm 688 m to 1,829 m.
   Casing extending below water level: 226-mm inside diameter to 687 m.
   Casing string is tack cemented and perforated below the water table. See section 3 for description of intervals open to water.
   Total drilled depth: 1,829 m.

3. Access to and description of interval for measuring water levels:

   Tube, 1--44-mm inside diameter, that has a 3.6-m long well screen on bottom, extending from land surface to depth of 1,806 m; responds to depth interval from 1,783 to 1,814 m within older flows and tuffs beneath the Lithic Ridge Tuff (Carr, 1988, p. 37); Site ID: 365157116271202.
   Tube, 2--44 mm inside diameter, that has a 3.6-m long well screen on bottom, extending from land surface to depth of 1,115 m; responds to depth interval from 1,097 to 1,123 m within the Tram Member of the Crater Flat Tuff; Site ID: 365157116271203.
   Tube, 3--44-mm inside diameter, that has a 3.6-m long well screen on bottom, extending from land surface to depth of 741 m; responds to depth interval from 716 to 765 m within the Bullfrog Member of the Crater Flat Tuff; Site ID: 365157116271204.
   Tube, 4--62-mm inside diameter, open ended, extending from land surface to depth of 640 m; responds to depth interval from 573 to 673 m within the Prow Pass Member of the Crater Flat Tuff; Site ID: 365157116271205.

Note: During re-completion, a gravel pack was placed in the vicinity of the well screens for tubes 1, 2, and 3, and other intervals were grouted with cement to ensure that the piezometers are isolated hydraulically from each other.

4. Information for calculating water-level altitude:

Reference point: Top of metal tag on well casing; altitude 1,303.10 m (surveyed by U.S. Geological Survey, 1984).

Depth correction for borehole deviation from vertical: 0.14 m in tube 1, based on depth to water of 518 m. 0.17 m in tubes 2, 3, and 4, based on depth to water of 572 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements on the open hole were made from 1981 through early 1982. An unsuccessful attempt was made at continuous monitoring of water levels July 1982 through June 1983 using downhole pressure transducers and a datalogger recording data on paper tape. Manual measurements of water levels in the four piezometer tubes were made from June 1983 through February 1985. Beginning in February 1985, the water level has been monitored continuously using downhole pressure transducers with a data logger at the land surface.

The following transducers were used in well USW H-1:

Site ID: 365157116271202
Interval: 1,783-1,814 meters (Tube 1)
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
02-13-85	04-06-88	Absolute	T.T.I	15	1847
04-06-88	11-22-88	Gage	Druck 930	10	226107
11-22-88	12-31-88	Gage	Druck 930	10	240065

Site ID: 365157116271203
Interval: 1,097-1,123 meters (Tube 2)
[Range is pressure limit for transducer, in pounds per square inch]

02-13-85	04-07-88	Absolute	T.T.I	15	1851
04-07-88	11-25-88	Gage	Druck 930	10	226101
11-25-88	12-31-88	Gage	Druck 930	10	232661

Site ID: 365157116271204
Interval: 716-765 meters (Tube 3)
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
02-13-85	08-29-85	Gage	Psi-Tronix	15	1846
08-29-85	05-13-86	Gage	Psi-Tronix	15	1844
05-13-86	04-07-88	Gage	Druck PDCR 10/D	10	130344
04-08-88	08-23-88	Gage	Druck 930	10	226104
08-24-88	12-31-88	Gage	Druck 930	10	239125

Site ID: 365157116271205
Interval: 573-673 meters (Tube 4)
[Range is pressure limit for transducer, in pounds per square inch]

02-13-85	12-31-88	Gage	Psi-Tronix	15	1856

The following calibrations of the water-level monitoring system were performed in well USW H-1:

ID: 365157116271202
Interval: 1,783-1,814 meters (Tube 1)
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1847	02-13-85	-4.449	1.000	02-13-85	785.09
1847	02-13-85	-4.314	1.000	02-13-85	785.09
1847	08-20-85	-4.176	1.000	08-20-85	785.21
1847	08-20-85	-4.311	1.000	08-20-85	785.21
1847	08-23-85	-4.182	1.000	08-23-85	785.21
1847	08-26-85	-4.304	1.000	--	--
1847	09-11-87	-4.140	1.000	09-11-87	785.23
1847	01-12-88	-3.478	0.975	--	--

ID: 365157116271202
Interval: 1,783-1,814 meters (Tube 1)--Continued
[Dashes indicate water level not determined]

Transducer					
		Regression line		Water level	
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
226107	04-06-88	-6.842	1.000	04-06-88	785.10
226107	08-22-88	-6.841	1.000	08-22-88	785.15
240065	11-22-88	-7.075	1.000	11-22-88	785.00

Site ID: 365157116271203
Interval: 1,097-1,123 meters (Tube 2)
[Dashes indicate water level not determined]

Transducer					
		Regression line		Water level	
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1851	02-13-85	-4.505	1.000	--	--
1851	02-13-85	-4.354	1.000	--	--
1851	08-26-85	-4.358	1.000	08-26-85	737.08
1851	08-27-85	-4.685	0.999	08-27-85	736.26
1851	09-11-87	-4.453	1.000	09-11-87	736.28
226101	04-07-88	-6.826	1.000	04-07-88	736.19
226101	08-22-88	-6.870	0.999	08-22-88	736.23
226101	11-25-88	-7.090	1.000	11-25-88	735.92
232661	11-25-88	-7.008	0.999	11-25-88	735.92

Site ID: 365157116271204
Interval: 716-765 meters (Tube 3)
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1846	02-13-85	-4.372	1.000	--	--
1846	02-13-85	-4.221	1.000	--	--
1846	08-29-85	-4.449	0.999	08-29-85	730.62
1844	08-29-85	-4.386	1.000	08-29-85	730.62
130344	05-14-86	-8.942	1.000	05-12-86	730.63
130344	09-11-87	-8.906	1.000	09-11-87	730.68
130344	01-12-88	-13.267	0.995	--	--
226104	04-08-88	-8.831	.999	04-08-88	730.56
239125	08-25-88	-7.025	1.000	08-24-88	730.48

Site ID: 365157116271205
Interval: 573-673 meters (Tube 4)
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1856	02-13-85	-4.171	1.000	--	--
1856	02-13-85	-4.169	1.000	--	--
1856	08-28-85	-4.181	1.000	08-28-85	730.69
1856	08-28-85	-4.034	0.997	08-28-85	730.69
1856	09-11-87	-3.866	1.000	09-11-87	730.69
1856	01-12-88	-3.872	1.000	01-12-88	730.85
1856	04-08-88	-3.913	1.000	04-08-88	730.87
1856	08-23-88	-3.901	1.000	08-23-88	730.99

Transducer output

Transducer output from February 1985 through December 1988 is shown in figure 27. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 1847), in use between February 1985 and April 1988 in tube 1 (Site ID: 365157116271202), was set 6.1 m below the water surface. The transducer output drifted downward until late August (fig. 27-A). At that time, the transducer was reset at 1.5 m below the water surface. The shift in the record in mid-March (fig. 27-A) corresponded to lifting the transducer to the water surface and then resetting it. It is possible that it was not reset to exactly the same position as it previously was set at. The offsets in February and March 1986 (fig. 27-B) did not correspond to a new position of the transducer. A short period of reasonable output was produced in October and November of 1985, but the record has a large upward drift in it (fig. 27-A). Beginning in late April of 1986, the transducer started producing reasonable output and continued until November 1987 except during short periods (fig. 27-B and 27-C). In November 1987, the transducer began to produce a high-frequency fluctuation (fig. 27-C) and no more usable record was produced. The second transducer (serial number 226107), in use between April and November 1988, produced output with almost no fluctuation interspersed with very erratic output (fig. 27-D). The third transducer (serial number 240065), in use in November and December 1988, produced output with almost no fluctuation (fig. 27-D). If this record were to be converted to water levels, it would indicate a daily water-level fluctuation of about 15 mm.

The first transducer (serial number 1851), in use between February 1985 and April 1988 in tube 2 (Site ID: 365157116271203), was set 6.1 m below the water surface. The transducer output drifted downward until late August (fig. 27-E). At that time, the transducer was reset to 1.5 m below the water surface. The transducer output then drifted upward, rapidly at first and later more slowly (fig. 27-E and 27-F). The transducer produced output that was a combination of almost no fluctuation interspersed with erratic changes. The erratic periods generally lasted from a few days to a week or more. If periods of very little fluctuation were converted to water-levels, the indicated daily water-level fluctuation would be about 4 mm. If periods of erratic changes were converted to water-levels, the indicated water-level fluctuations over the several-day period would be about 500 mm. The second transducer (serial number 226101), in use between April and November 1988 (fig. 27-I), produced output that generally showed fluctuation in the range of about 0.03 millivolts but with a few fluctuations over several days in the range of about 7 millivolts. The third transducer (serial number 232661), in use in November and December 1988, produced records that contained very little fluctuation (fig. 27-I).

The first transducer (serial number 1846), in use between February and August 1985 in tube 3 (Site ID: 365157116271204), set 6.1 m below the water surface. It produced record that drifted downward for about 4 months and then had several up and down steps in it that did not correspond to a change in the position of the transducer (fig. 27-J). By mid August, the transducer was producing totally erratic record. The second transducer (serial number 1844), in use between August 1985 and May 1986, produced record that was generally erratic and contained a number of steps that were not related to a change in its position (fig 27-J and 27-K). The third transducer (serial number 130344), in use between May 1986 and April 1988, produced generally reasonable output for about 17 months, but the output contained a number of erratic periods generally lasting a day or less (fig. 27-K and 27-L). By late 1987, the output became progressively more erratic (fig. 27-L) and by early 1988 was totally erratic (fig. 27-M). The fourth transducer (serial number 226104), in use between April and August 1988 (fig. 27-M), produced reasonable output for over 3 months with the exception of a single reading at 1100 hours on June 3. The reading was about 0.8 millivolts less than the previous and subsequent readings and was not converted to water-

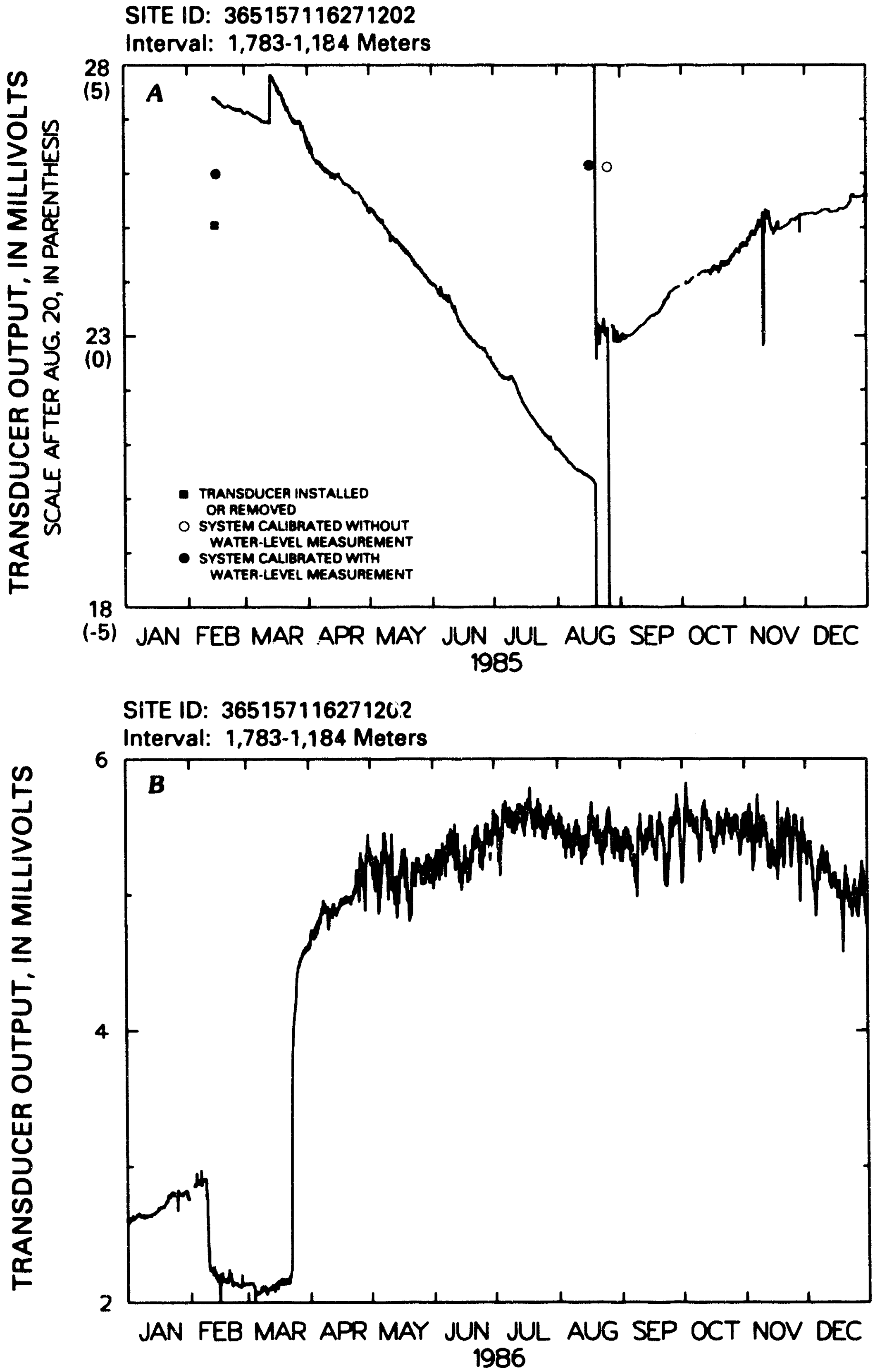
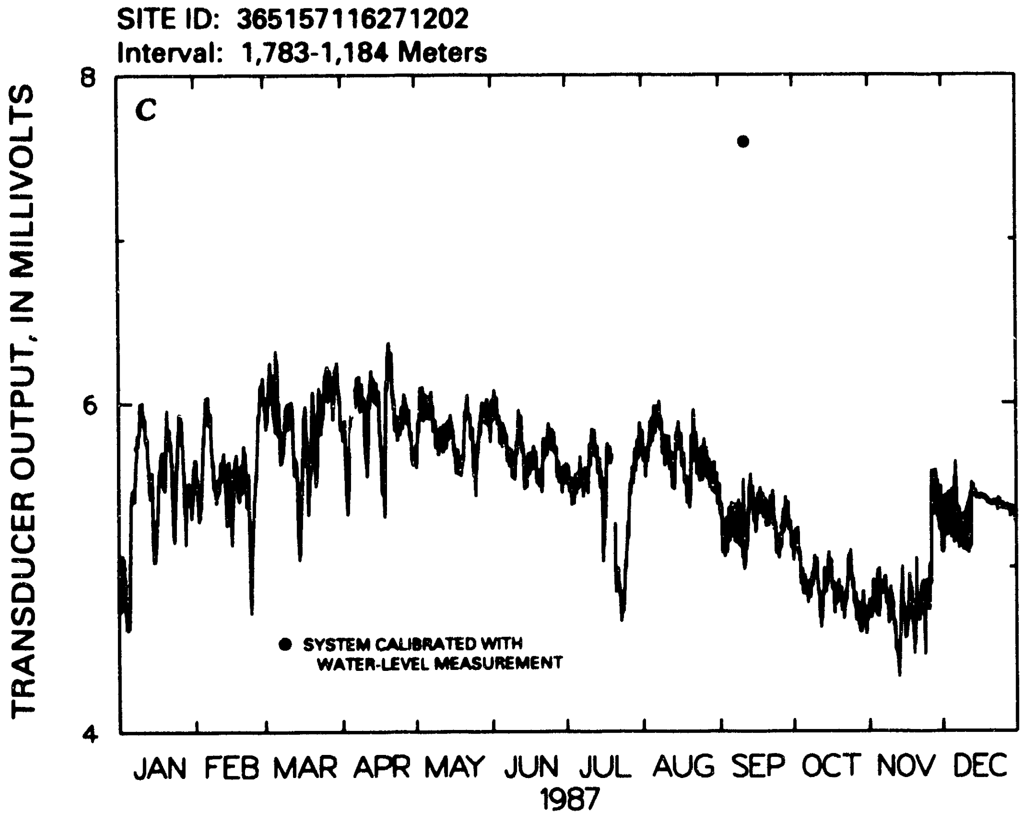


Figure 27.--Transducer output for well USW H-1.



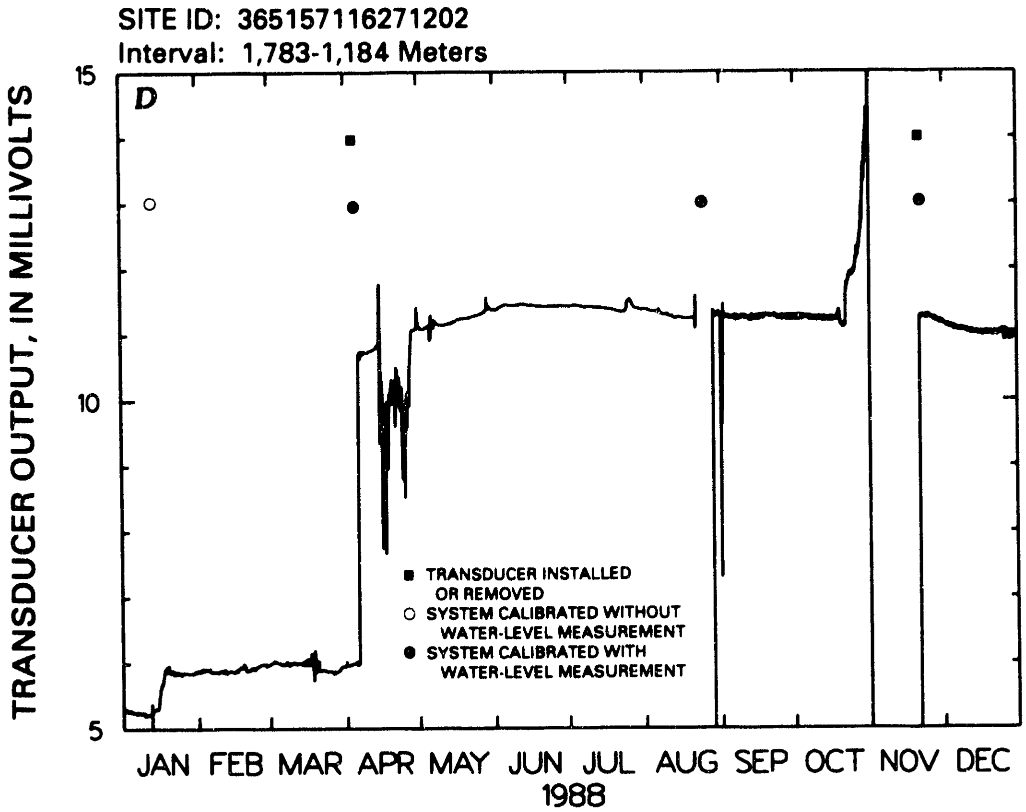
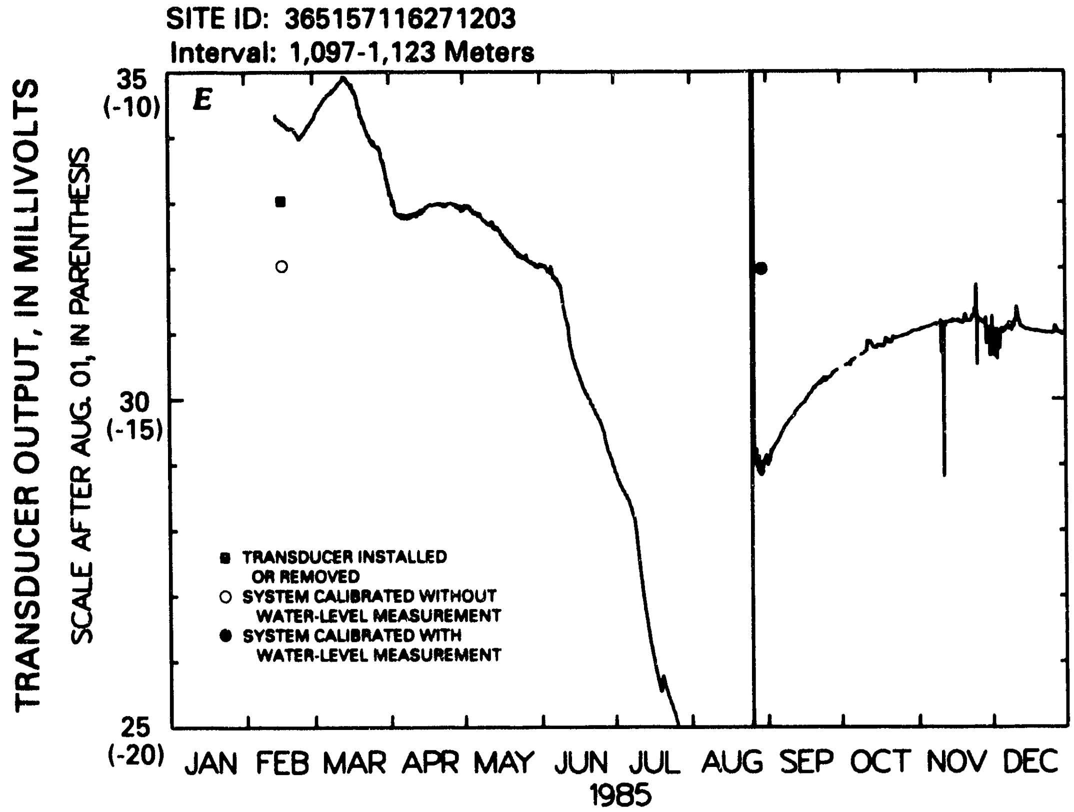


Figure 27.--Transducer output for well USW H-1.--Continued



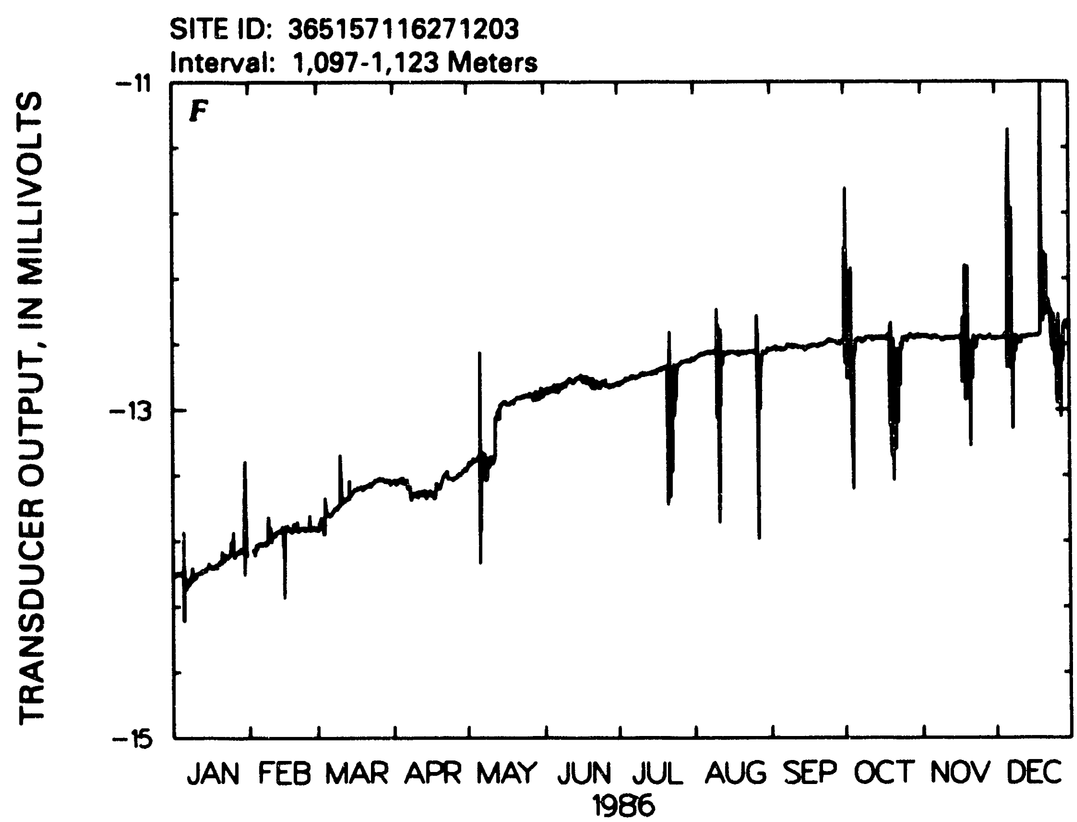
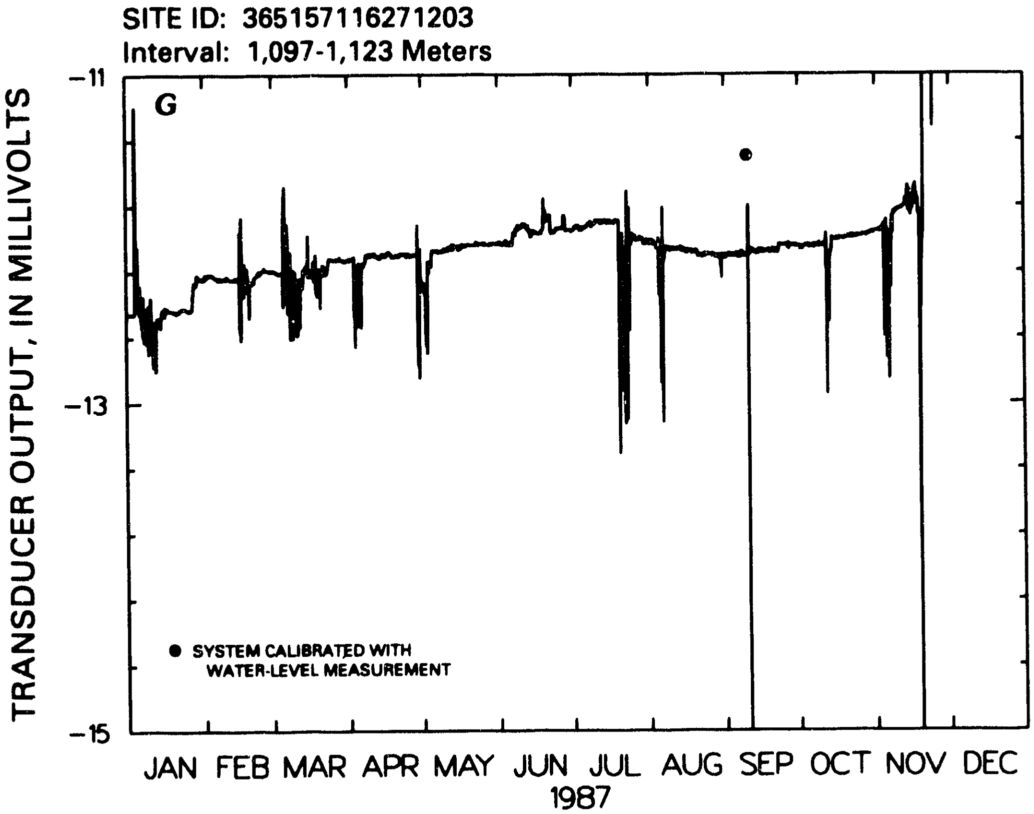


Figure 27.--Transducer output for well USW H-1.--Continued



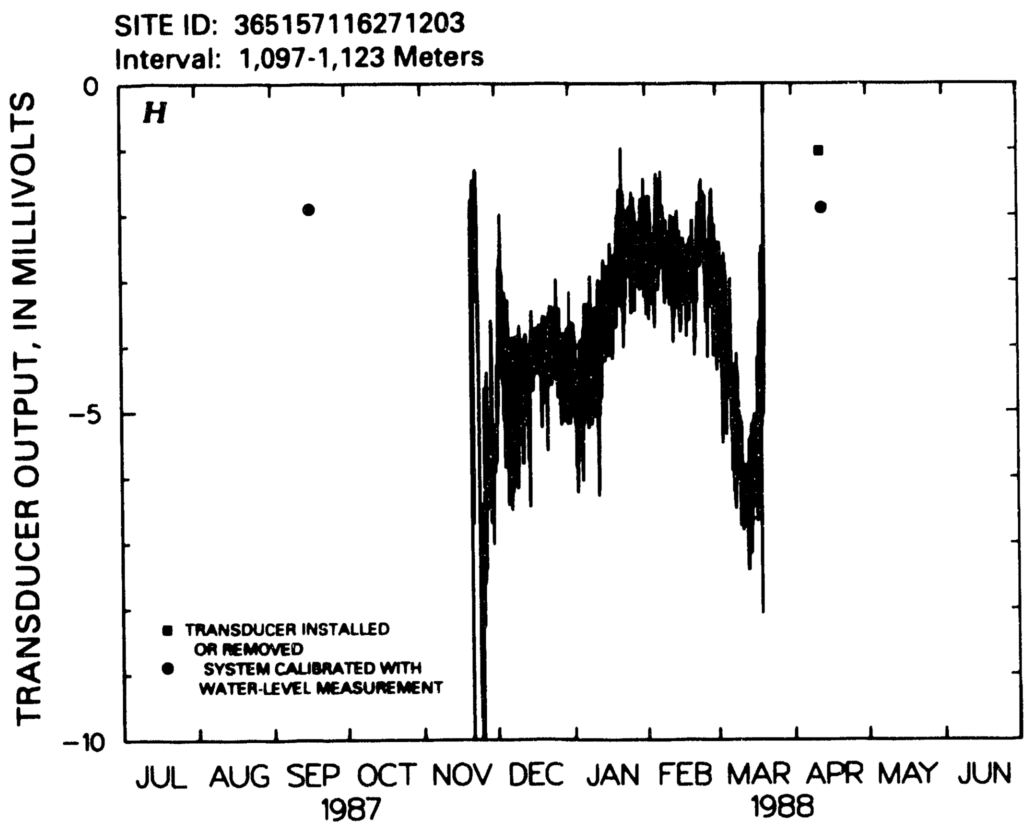
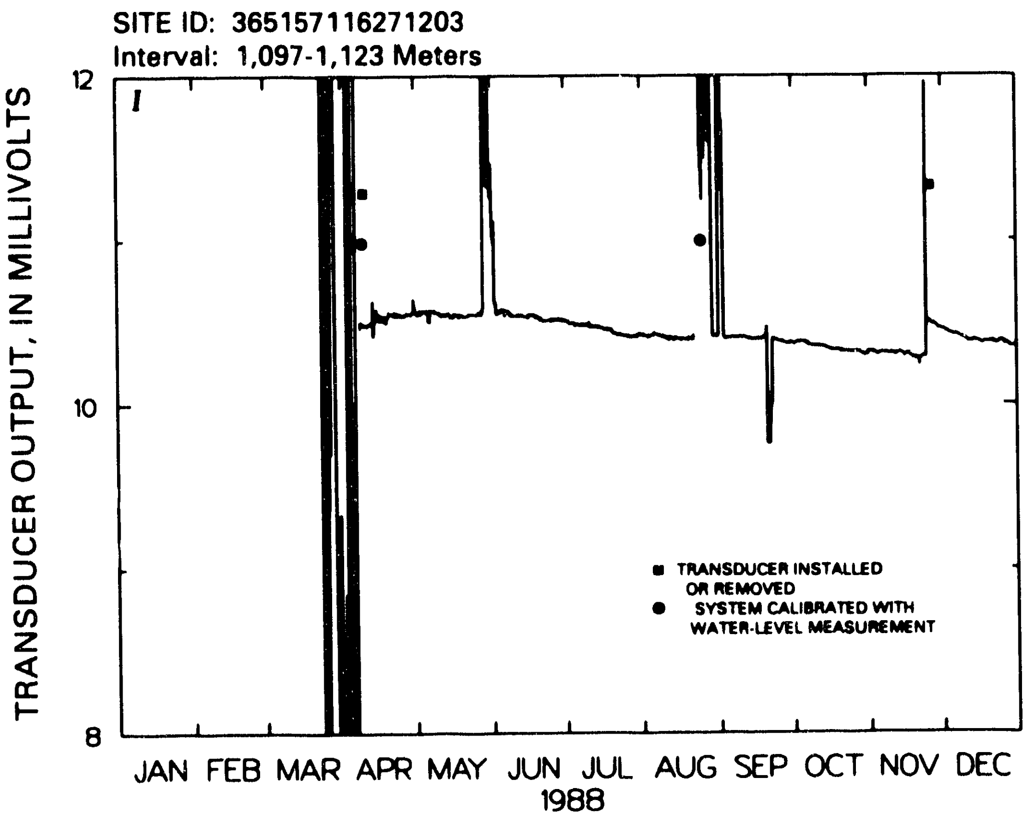


Figure 27.--Transducer output for well USW H-1.--Continued



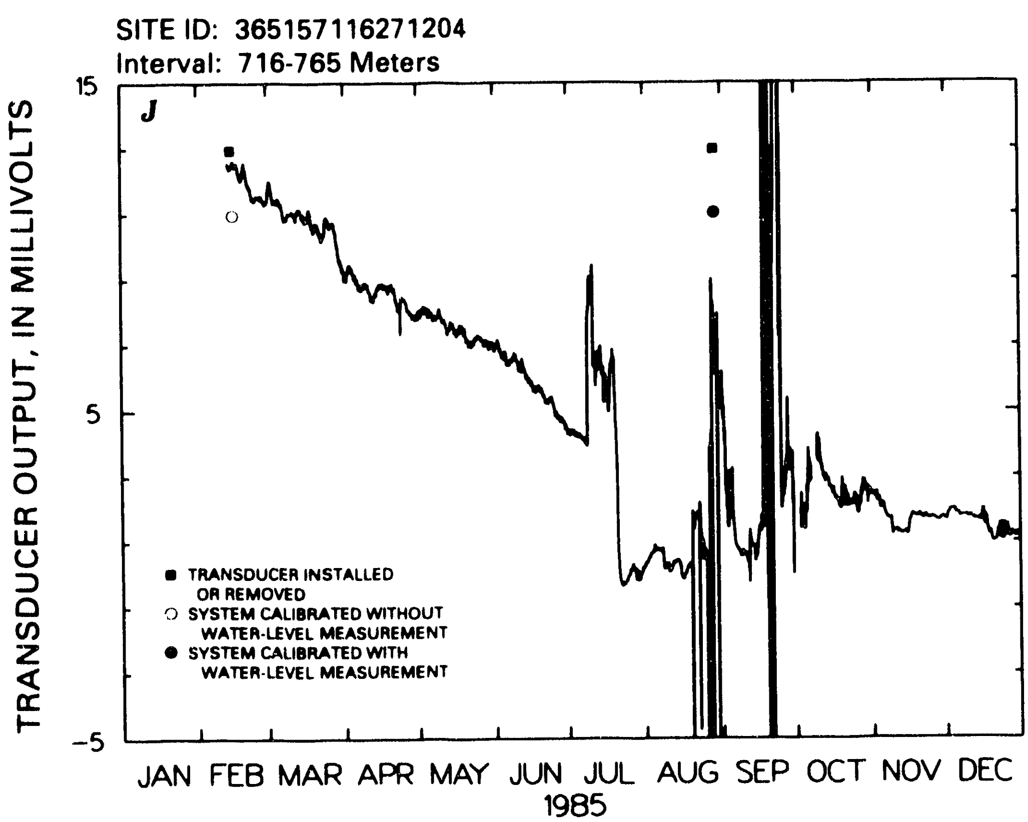
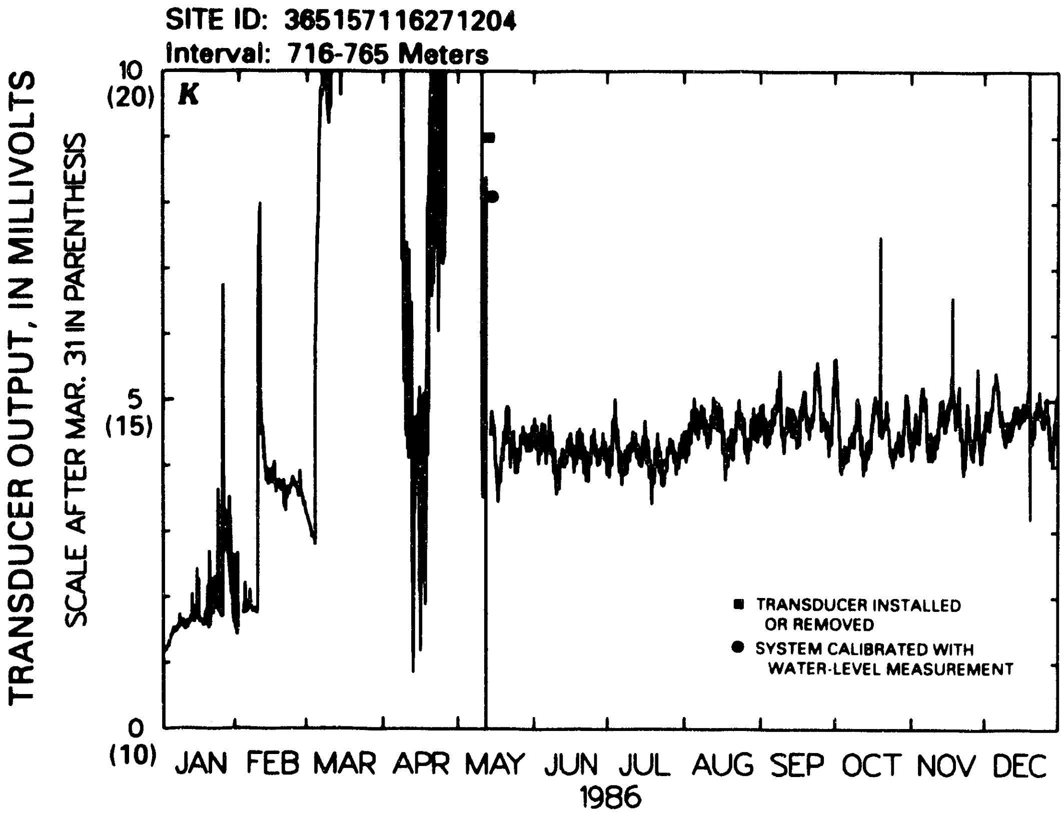


Figure 27.--Transducer output for well USW H-1.--Continued



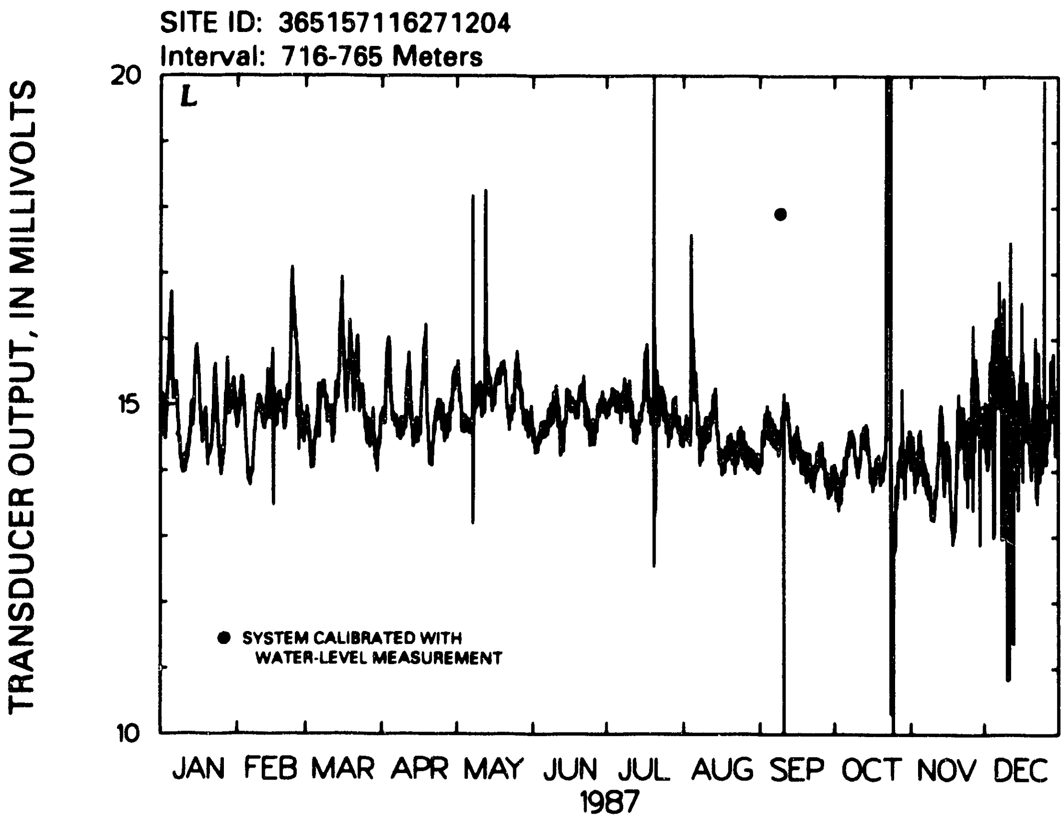
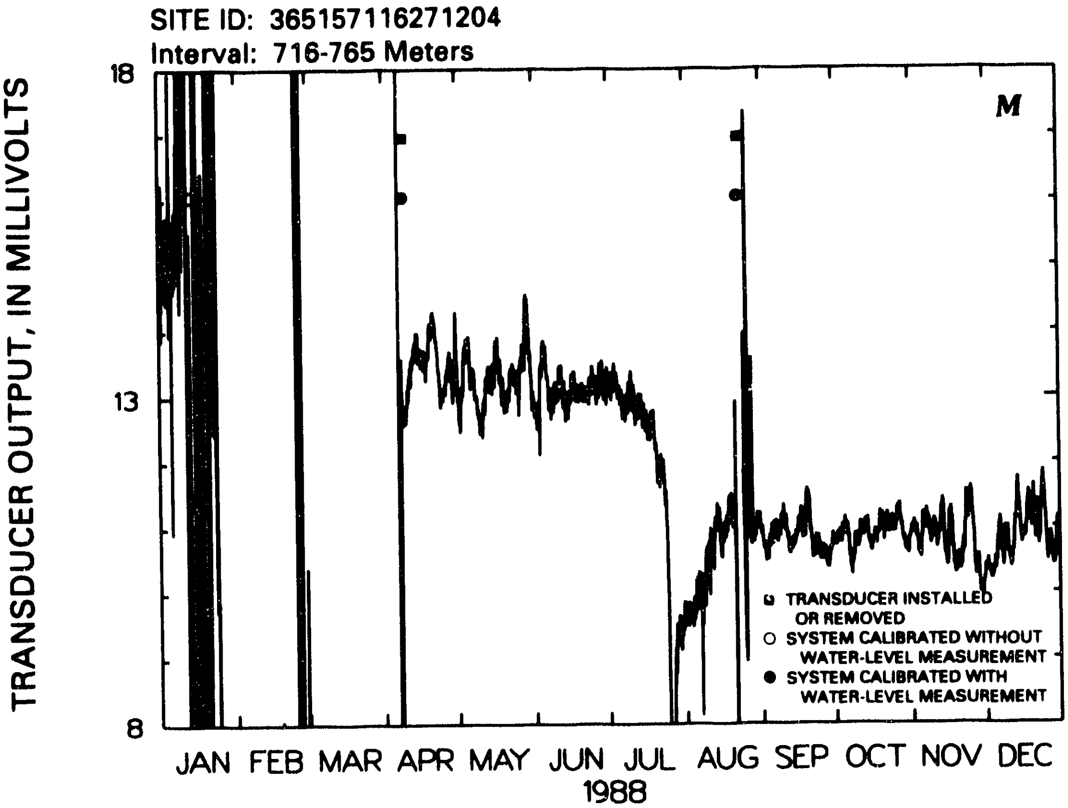


Figure 27.--Transducer output for well USW H-1.--Continued



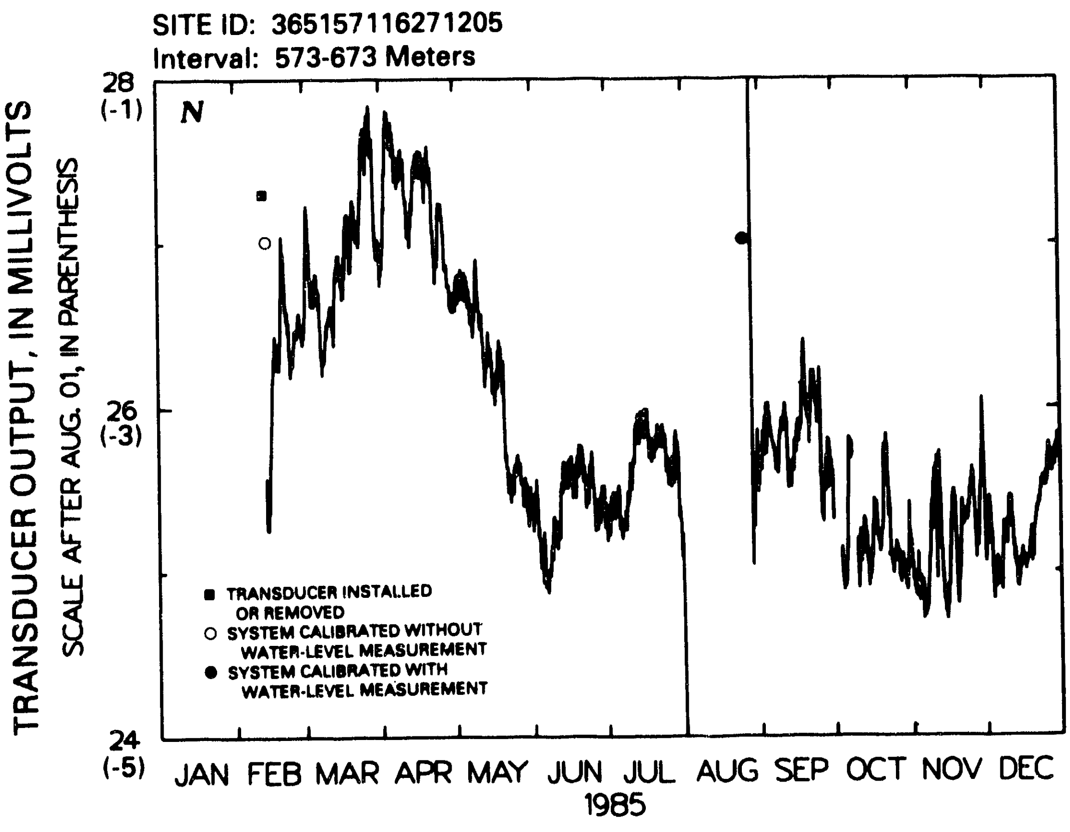
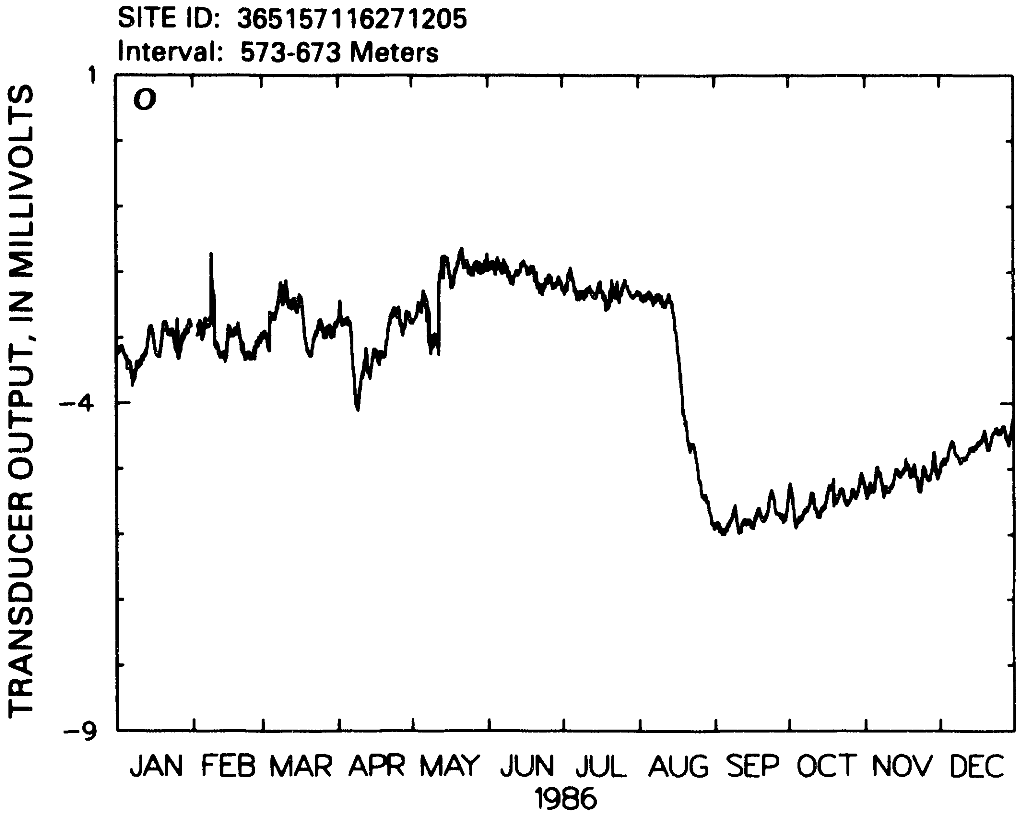


Figure 27.--Transducer output for well USW H-1.--Continued



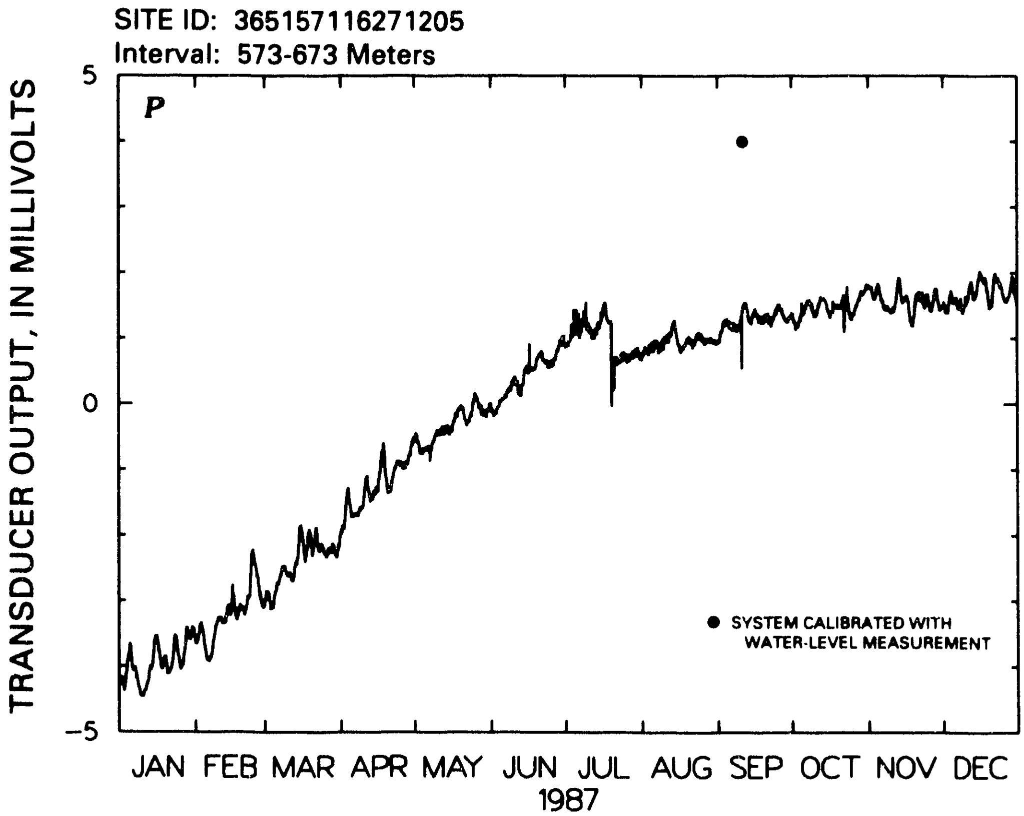


Figure 27.--Transducer output for well USW H-1.--Continued

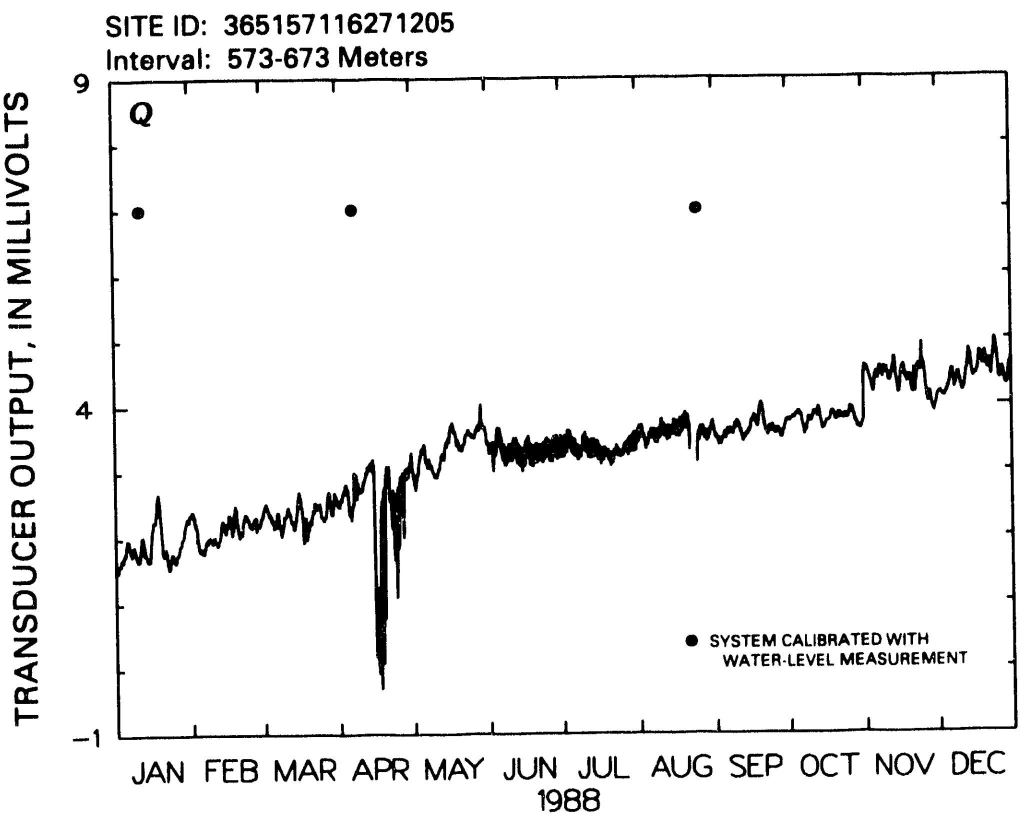


Figure 27.--Transducer output for well USW H-1.--Continued

level altitude. In mid July, the transducer output drifted downward to a minimum of about 6.9 millivolts and then drifted back upward (fig. 27-M). The fifth transducer (serial number 239125), in use between August and December 1988, produced erratic readings for several days (fig. 27-M). Then field personal noticed a bad section on the cable that could have been causing an electrical short. Once this was repaired; the transducer produced reasonable output for the remainder of 1988.

Only one transducer (serial number 1856), was used in tube 4 (Site ID: 365157116271205). It was set 6.1 m below the water surface and then raised to within 1.5 m of the surface in late August 1985 (fig. 27-N). The transducer produced reasonable output, with some possible drift and offset, until the end of July 1985 when a rapid downward shift began (fig. 27-N). Beginning in September 1985 and continuing through December 1988, the transducer produced alternate periods of reasonable output and erratic record (fig. 27-N, 27-O,27-P, and 27-Q). During the erratic periods, the output appears to change on every reading in an unpredictable manner. The record also shows periods of rapid drift (in August 1986, fig. 27-O), periods of slow drift (January to July 1987, fig. 27-O), and periods of record offset (July 1987, fig. 27-P).

Water-level altitude

Transducer output was converted to water-level altitude for the following periods:

Site ID: 365157116271202
Interval: 1,783-1,814 m (Tube 1)

Beginning date	Ending date
10-18-85	11-10-85
04-24-86	11-17-86
11-19-86	03-04-87
03-08-87	07-19-87
09-12-87	11-19-87

Site ID: 365157116271203
Interval: 1,097-1,123 m (Tube 2)
No convertible data

Site ID: 365157116271204
Interval: 716-115 m (Tube 3)

Beginning date	Ending date	Beginning date	Ending date
02-13-85	04-23-85	03-07-87	03-14-87
04-26-85	07-08-85	03-16-87	05-06-87
05-15-86	10-19-86	05-14-87	07-19-87
10-22-86	11-17-86	08-09-87	09-10-87
11-20-86	12-19-86	09-12-87	10-21-87
12-21-86	02-14-87	04-09-88	06-02-88
02-17-87	02-24-87	06-04-88	07-18-88
02-27-87	03-05-87	08-30-88	12-31-88

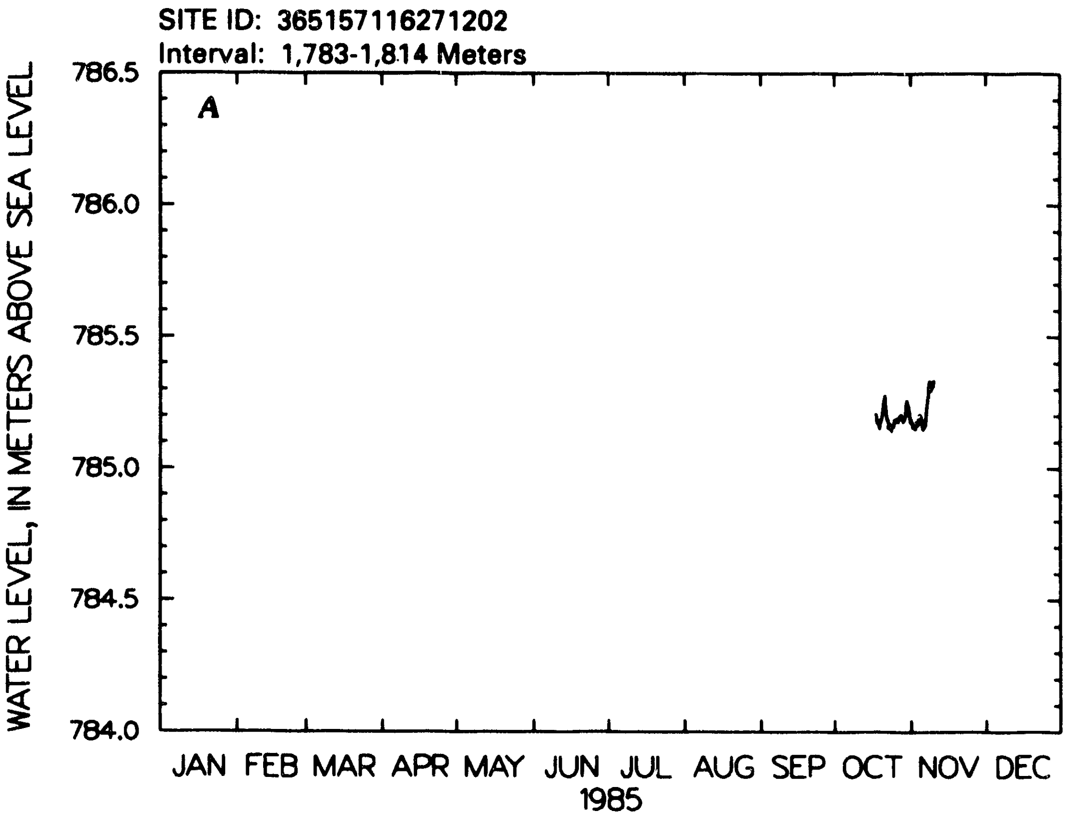
Site ID: 365157116271205
Interval: 573-673 m (Tube 4)

Beginning date	Ending date	Beginning date	Ending date
02-13-85	07-29-85	09-01-86	10-18-86
09-05-85	09-16-85	10-21-86	06-15-87
11-21-85	01-24-86	06-18-87	06-28-87
02-11-86	03-02-86	07-22-87	10-22-87
03-05-86	04-05-86	10-25-87	03-16-88
04-09-86	05-05-86	03-21-88	04-04-88
05-16-86	05-27-86	04-30-88	05-31-88
06-10-86	07-18-86	08-26-88	10-31-88
07-25-86	08-13-86	12-05-88	12-31-88

No barometric pressure data were available for various hours to make adjustments to absolute-transducer output in tube 1 on September 18, 1986 and June 22, September 16, and October 30, 1987. No transducer output was available for several hours on March 13, 1985 for tubes 3 and 4 while work was being done at the site. No transducer output was available early on May 1, 1985 for tubes 3 and 4 as a result of work done the previous day.

The water-level altitudes are shown in figure 28 and the daily mean water-level altitudes are given in table 11. Approximately 38 percent of the transducer output from tube 1 was converted to water-level altitude. The longest period was 208 days, April 24 through November 17, 1986. No transducer output from tube 2 was converted to water-level altitude. Approximately 60 percent of the transducer output from tube 3 was converted to water-level altitude. The longest period was 158 days, May 15 through October 19, 1986. Approximately 76 percent of the transducer output from tube 4 was converted to water-level altitude. The longest period was 238 days, October 21, 1986 through June 15, 1987.

From February 13, 1985 to April 6, 1988 in tube 1, and from February 13, 1985 to April 7, 1988 in tube 2, an absolute transducer was used to monitor water levels. This type of transducer responded not only to water-level changes, but also to barometric-pressure changes. The barometric-pressure effects were removed from the absolute transducer output during conversion to water levels using the procedure described in the "Adjustment for Absolute Transducer" section. The transducer output shown in figure 27 is before the barometric-pressure effects were removed from the output.



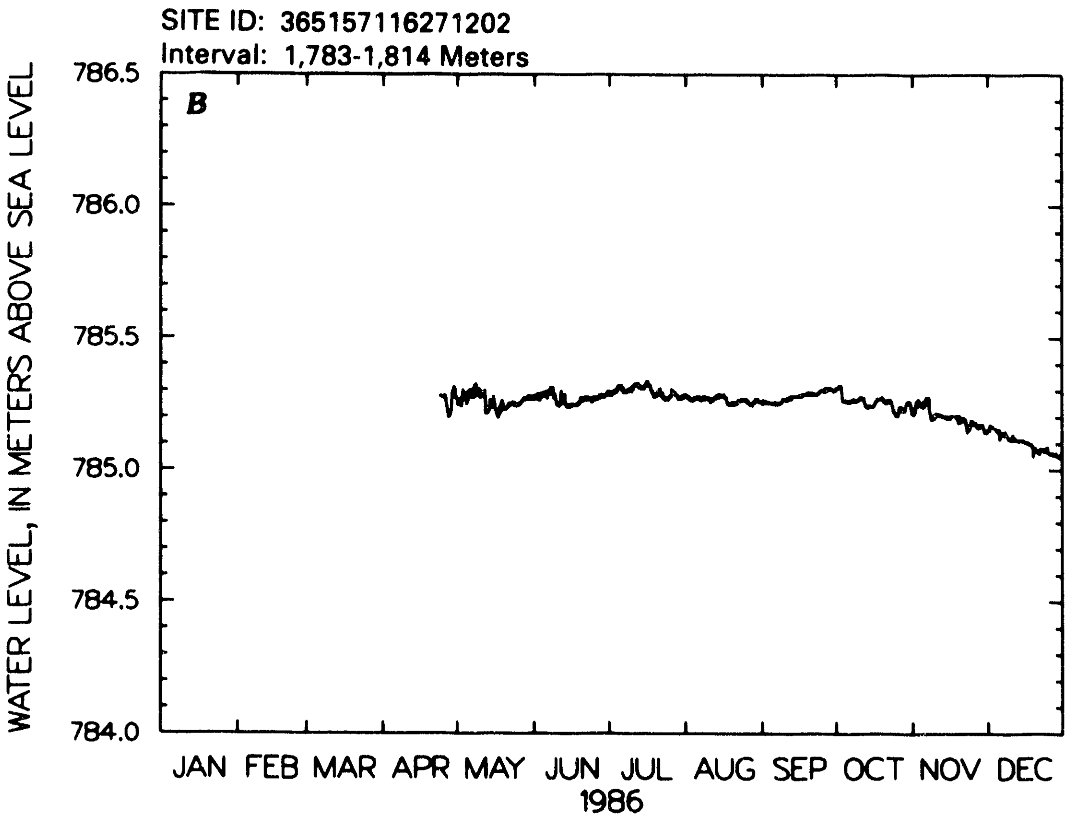


Figure 28.--Water-level altitude for well USW H-1.

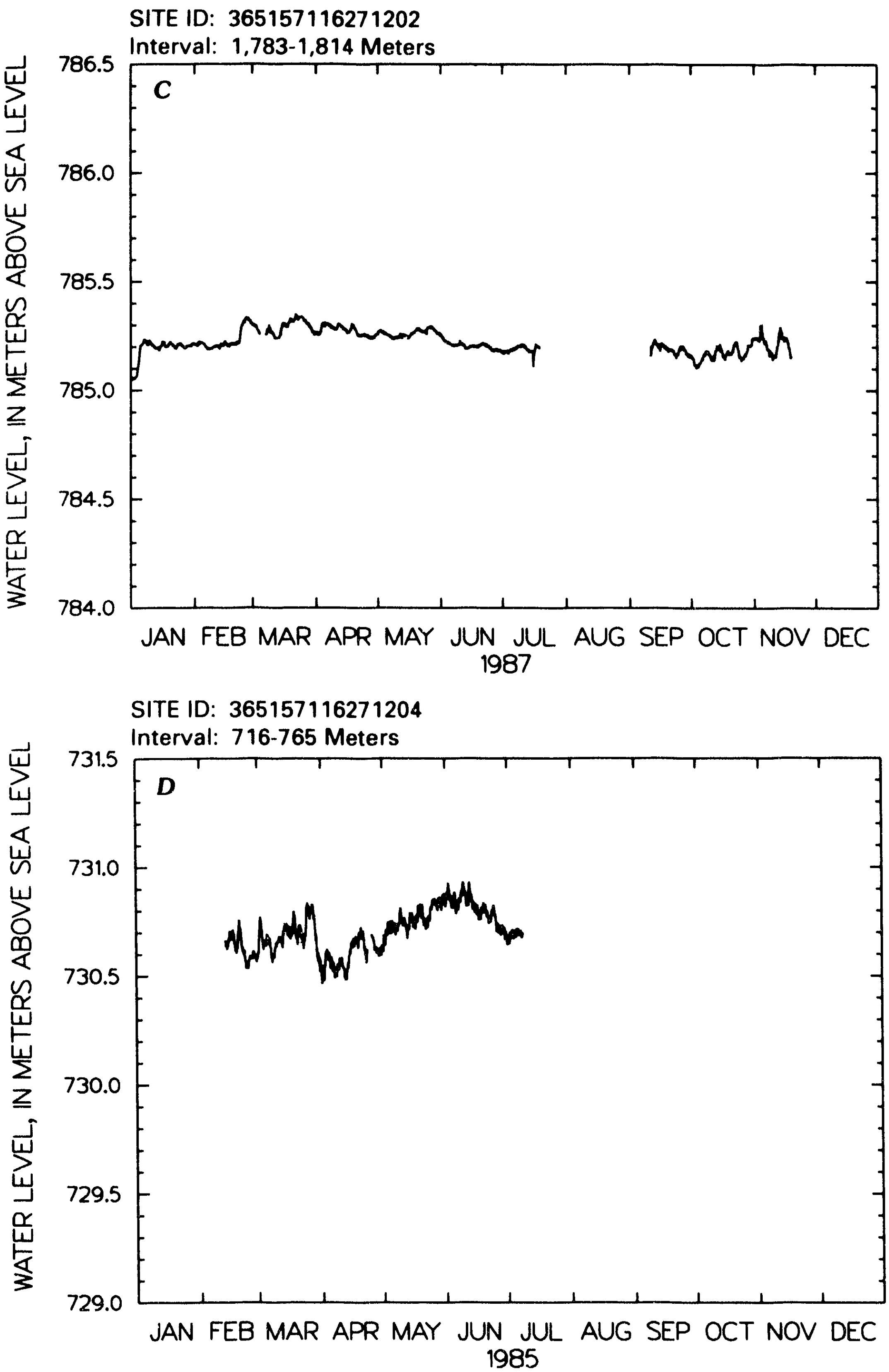
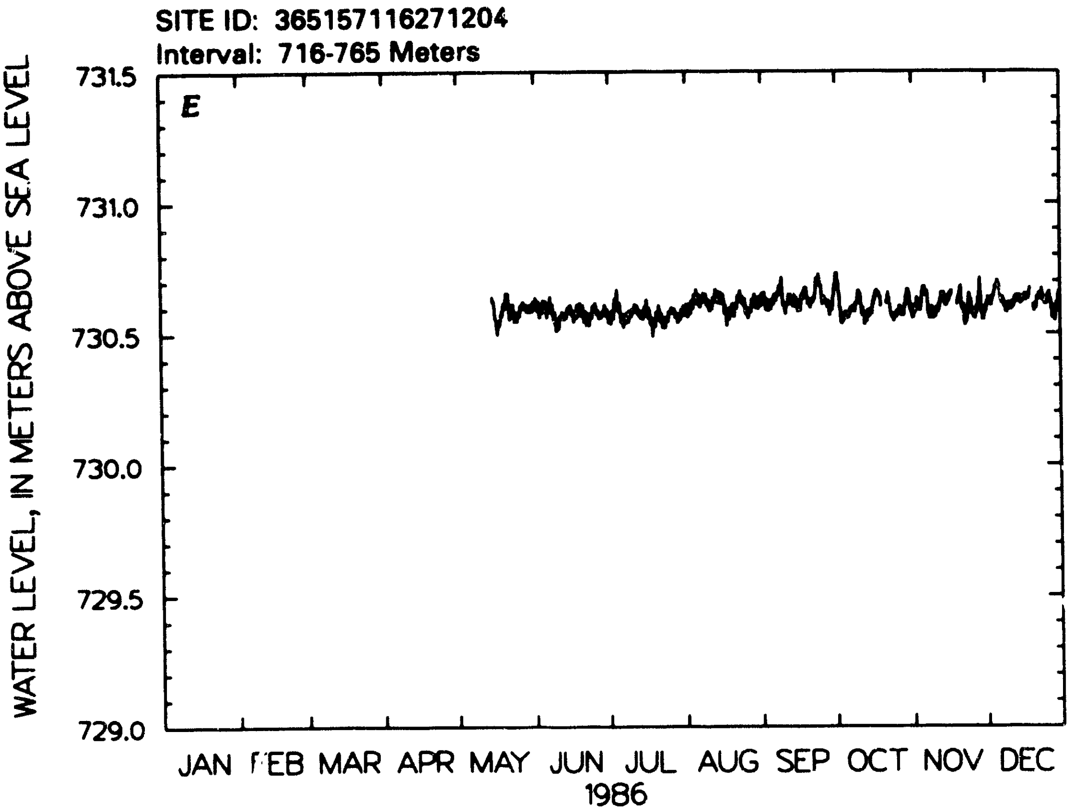


Figure 28.--Water-level altitude for well USW H-1.--Continued



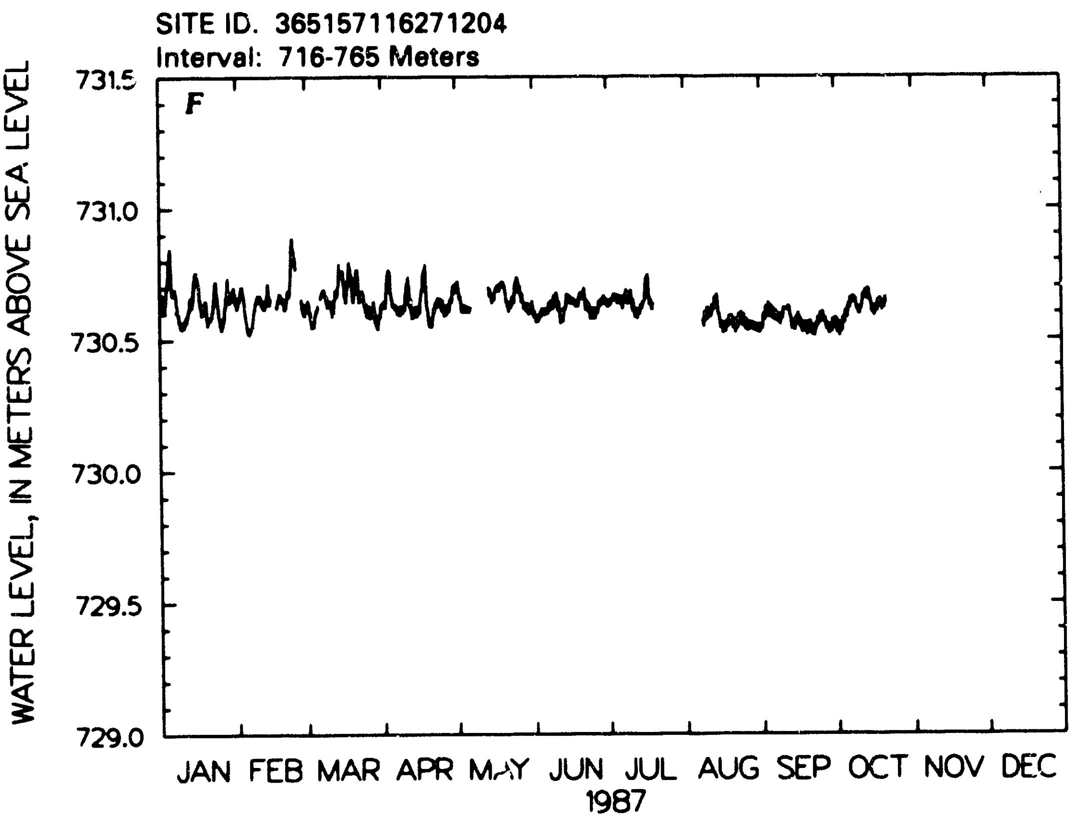
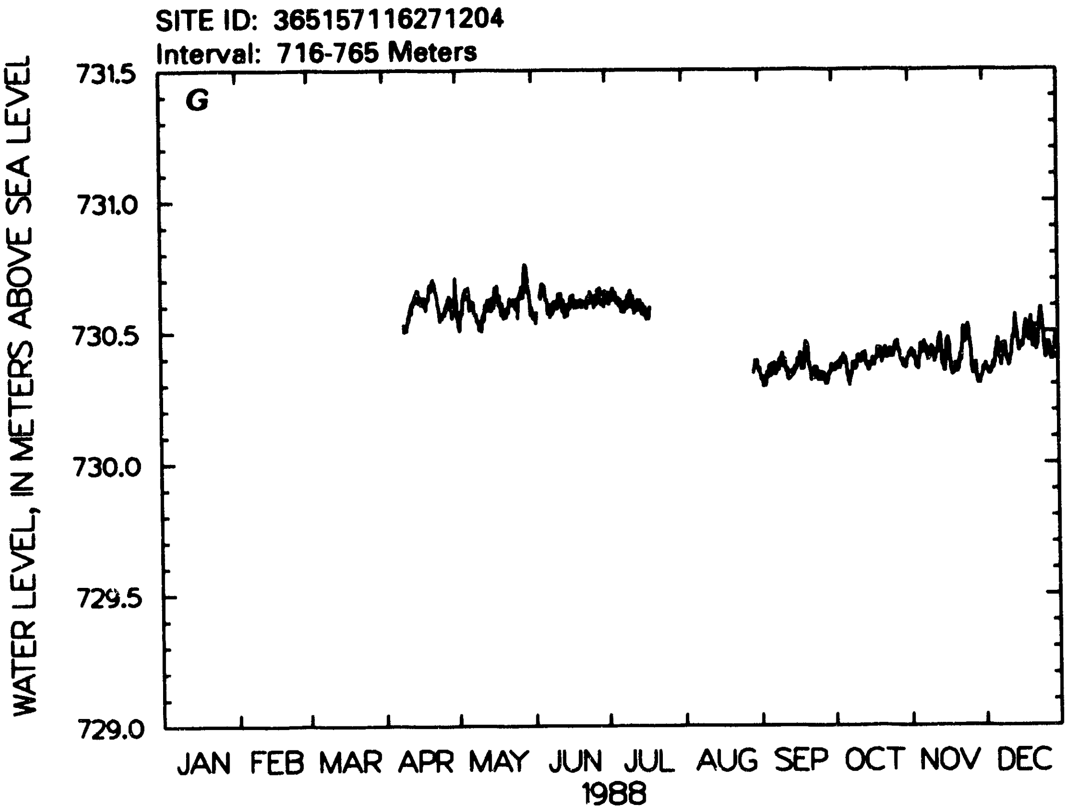


Figure 28.--Water-level altitude for well USW H-1.--Continued



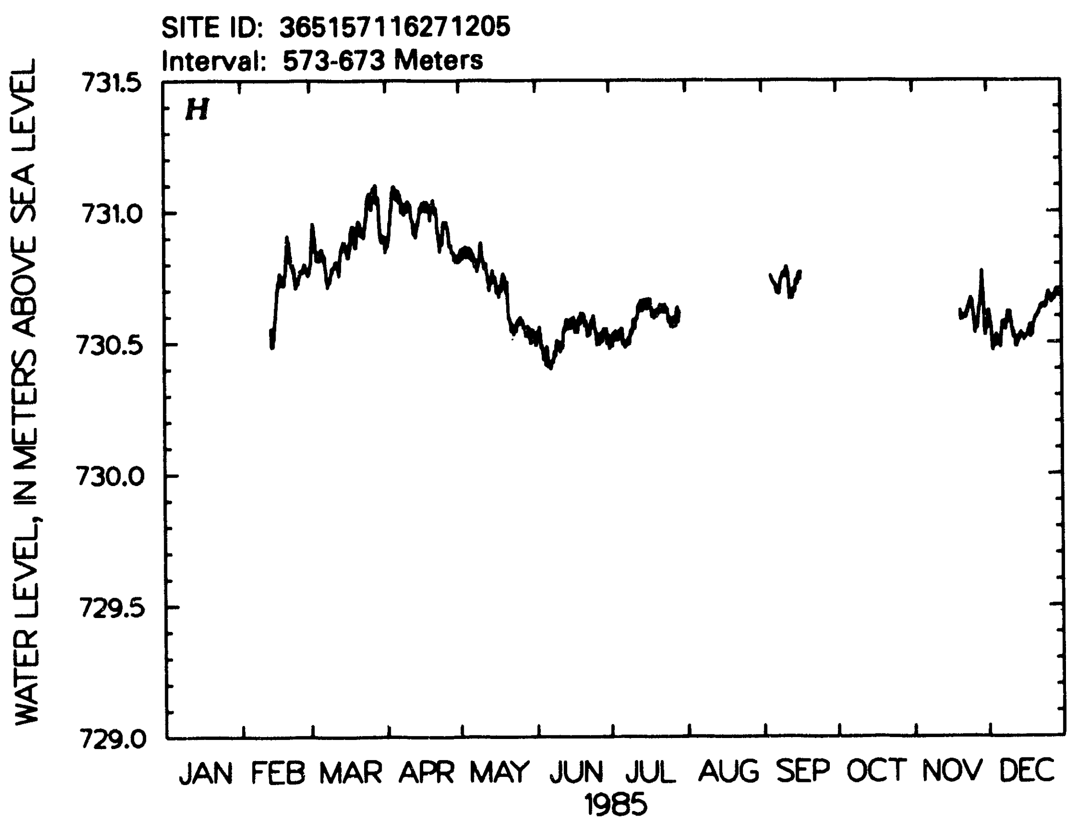
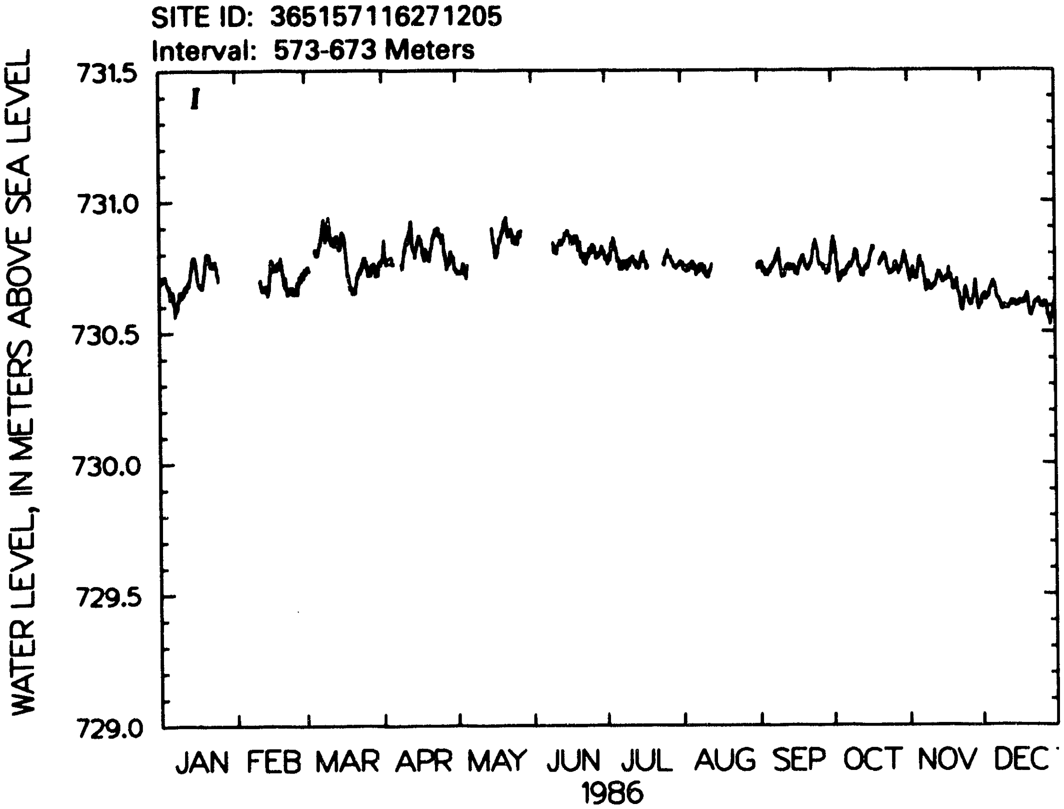


Figure 28.--Water-level altitude for well USW H-1.--Continued



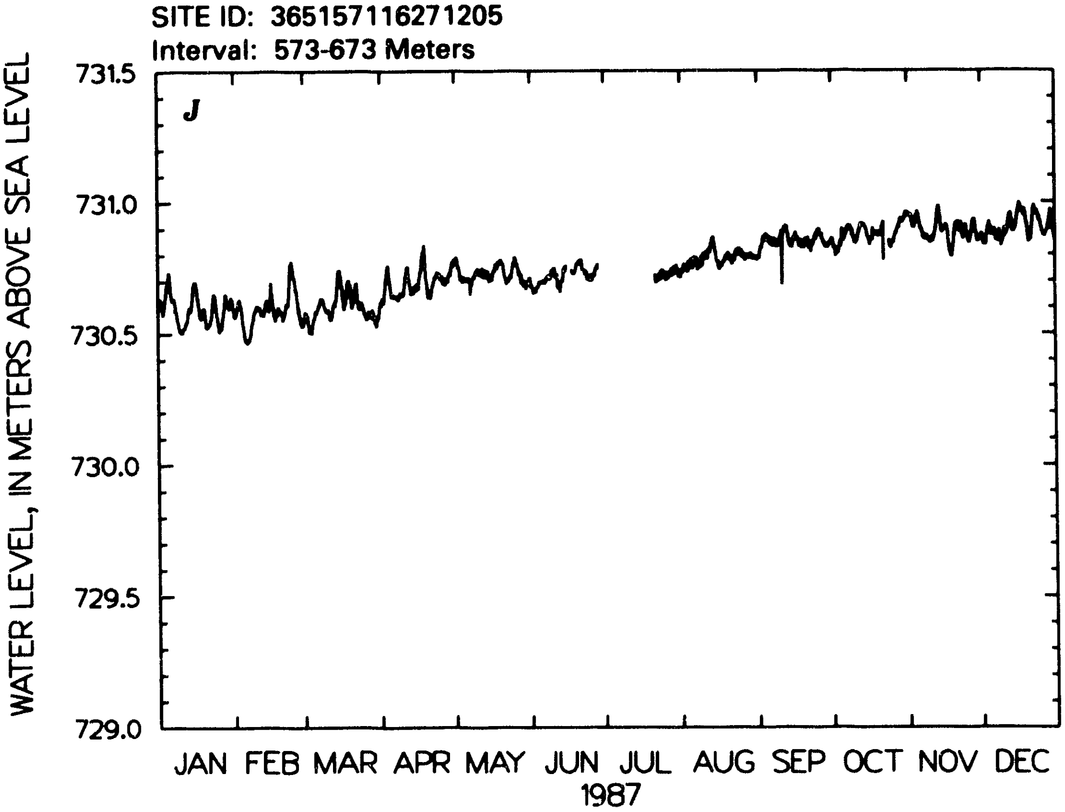


Figure 28.--Water-level altitude for well USW H-1.--Continued

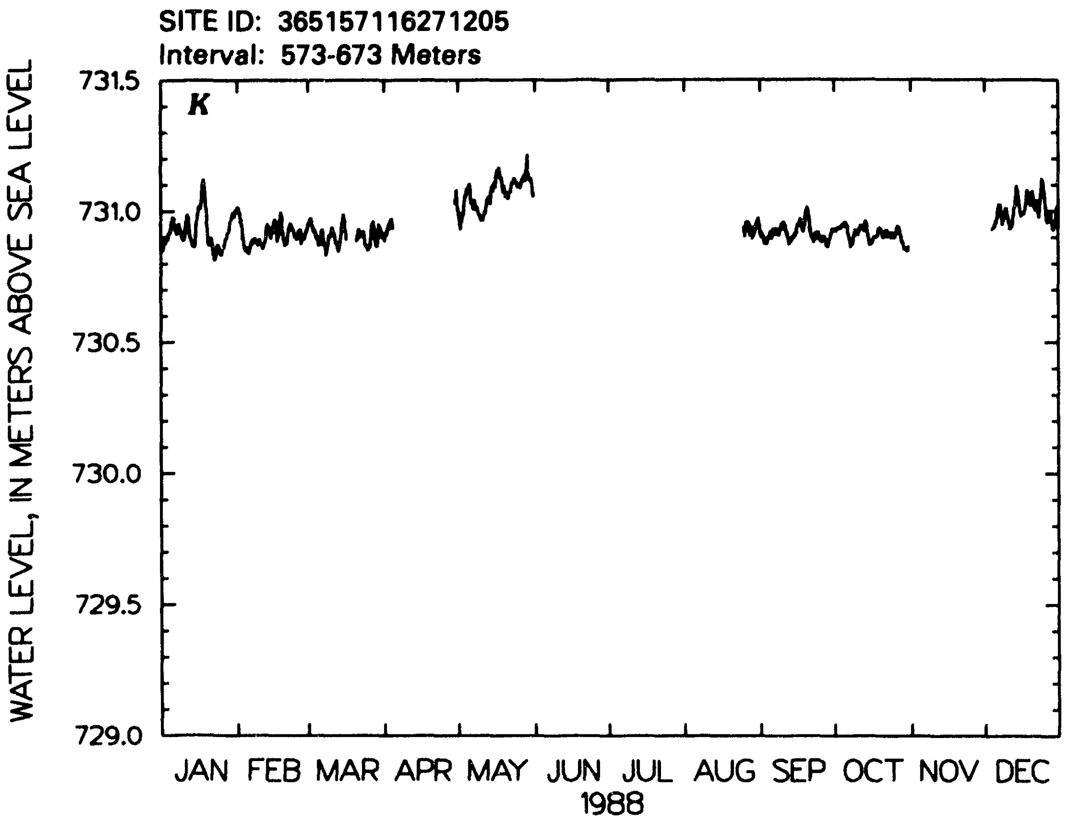


Figure 28.--Water-level altitude for well USW H-1.--Continued

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 1,783-1,814 m

Site ID: 365157116271202

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	—	—	—	—	—	—	—	—	—	—	785.19	—
2	—	—	—	—	—	—	—	—	—	—	785.16	—
3	—	—	—	—	—	—	—	—	—	—	785.16	—
4	—	—	—	—	—	—	—	—	—	—	785.18	—
5	—	—	—	—	—	—	—	—	—	—	785.20	—
6	—	—	—	—	—	—	—	—	—	—	785.16	—
7	—	—	—	—	—	—	—	—	—	—	785.18	—
8	—	—	—	—	—	—	—	—	—	—	785.27	—
9	—	—	—	—	—	—	—	—	—	—	785.31	—
10	—	—	—	—	—	—	—	—	—	—	785.32	—
11	—	—	—	—	—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	—	—	—	—
13	—	—	—	—	—	—	—	—	—	—	—	—
14	—	—	—	—	—	—	—	—	—	—	—	—
15	—	—	—	—	—	—	—	—	—	—	—	—
16	—	—	—	—	—	—	—	—	—	—	—	—
17	—	—	—	—	—	—	—	—	—	—	—	—
18	—	—	—	—	—	—	—	—	—	785.18	—	—
19	—	—	—	—	—	—	—	—	—	785.17	—	—
20	—	—	—	—	—	—	—	—	—	785.20	—	—
21	—	—	—	—	—	—	—	—	—	785.26	—	—
22	—	—	—	—	—	—	—	—	—	785.20	—	—
23	—	—	—	—	—	—	—	—	—	785.17	—	—
24	—	—	—	—	—	—	—	—	—	785.15	—	—
25	—	—	—	—	—	—	—	—	—	785.17	—	—
26	—	—	—	—	—	—	—	—	—	785.18	—	—
27	—	—	—	—	—	—	—	—	—	785.19	—	—
28	—	—	—	—	—	—	—	—	—	785.20	—	—
29	—		—	—	—	—	—	—	—	785.19	—	—
30	—		—	—	—	—	—	—	—	785.21	—	—
31	—		—		—		—	—		785.24		—
MONTHLY												
MEAN	—	—	—	—	—	—	—	—	—	—	—	—
MAX	—	—	—	—	—	—	—	—	—	—	—	—
MIN	—	—	—	—	—	—	—	—	—	—	—	—

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 1,783-1,814 m

Site ID: 365157116271202

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	---	---	---	---	785.26	785.27	785.29	785.28	785.26	785.30	785.23	785.14
2	---	---	---	---	785.26	785.28	785.29	785.28	785.26	785.31	785.22	785.16
3	---	---	---	---	785.27	785.27	785.29	785.27	785.26	785.32	785.25	785.16
4	---	---	---	---	785.28	785.28	785.30	785.27	785.25	785.27	785.25	785.16
5	---	---	---	---	785.27	785.29	785.31	785.27	785.25	785.26	785.25	785.15
6	---	---	---	---	785.29	785.29	785.31	785.27	785.25	785.26	785.25	785.14
7	---	---	---	---	785.29	785.29	785.29	785.27	785.25	785.26	785.27	785.14
8	---	---	---	---	785.30	785.30	785.30	785.27	785.25	785.26	785.24	785.14
9	---	---	---	---	785.30	785.28	785.30	785.27	785.26	785.26	785.20	785.14
10	---	---	---	---	785.29	785.25	785.31	785.27	785.27	785.26	785.20	785.12
11	---	---	---	---	785.28	785.25	785.31	785.26	785.27	785.27	785.21	785.12
12	---	---	---	---	785.25	785.26	785.32	785.26	785.27	785.27	785.21	785.12
13	---	---	---	---	785.22	785.26	785.32	785.27	785.28	785.25	785.20	785.11
14	---	---	---	---	785.24	785.24	785.31	785.28	785.28	785.24	785.20	785.11
15	---	---	---	---	785.25	785.24	785.31	785.28	785.28	785.24	785.20	785.11
16	---	---	---	---	785.23	785.24	785.32	785.28	785.28	785.24	785.20	785.11
17	---	---	---	---	785.20	785.24	785.32	785.28	785.28	785.26	785.20	785.10
18	---	---	---	---	785.23	785.24	785.31	785.26	---	785.27	---	785.10
19	---	---	---	---	785.24	785.25	785.28	785.25	785.29	785.27	785.20	785.09
20	---	---	---	---	785.23	785.27	785.28	785.25	785.29	785.26	785.18	785.07
21	---	---	---	---	785.24	785.27	785.29	785.25	785.29	785.26	785.19	785.07
22	---	---	---	---	785.25	785.27	785.29	785.25	785.29	785.26	785.19	785.07
23	---	---	---	---	785.25	785.27	785.28	785.26	785.28	785.26	785.16	785.08
24	---	---	---	785.28	785.25	785.26	785.27	785.27	785.29	785.23	785.16	785.07
25	---	---	---	785.27	785.24	785.27	785.27	785.27	785.30	785.21	785.18	785.07
26	---	---	---	785.26	785.25	785.27	785.28	785.26	785.30	785.21	785.17	785.06
27	---	---	---	785.21	785.26	785.28	785.30	785.25	785.30	785.23	785.16	785.06
28	---	---	---	785.22	785.27	785.28	785.29	785.25	785.31	785.23	785.16	785.06
29	---		---	785.30	785.27	785.28	785.27	785.26	785.31	785.23	785.16	785.06
30	---		---	785.29	785.27	785.29	785.27	785.26	785.30	785.25	785.15	785.05
31	---		---		785.27		785.28	785.26		785.26		785.05
MONTHLY												
MEAN	---	---	---	---	785.26	785.27	785.30	785.27	---	785.26	---	785.10
MAX	---	---	---	---	785.30	785.30	785.32	785.28	---	785.32	---	785.16
MIN	---	---	---	---	785.20	785.24	785.27	785.25	---	785.21	---	785.05

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 1,783-1,814 m　　　　Site ID: 365157116271202

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	785.05	785.21	785.30	785.26	785.26	785.26	785.18	—	—	785.16	785.24	—
2	785.06	785.21	785.29	785.26	785.27	785.24	785.17	—	—	785.15	785.24	—
3	785.06	785.22	785.28	785.26	785.27	785.23	785.17	—	—	785.13	785.24	—
4	785.10	785.22	785.26	785.30	785.26	785.22	785.18	—	—	785.11	785.23	—
5	785.18	785.21	—	785.31	785.26	785.22	785.18	—	—	785.11	785.27	—
6	785.21	785.20	—	785.30	785.25	785.21	785.18	—	—	785.13	785.24	—
7	785.23	785.19	—	785.30	785.25	785.21	785.19	—	—	785.15	785.22	—
8	785.22	785.19	785.26	785.29	785.24	785.20	785.19	—	—	785.16	785.20	—
9	785.22	785.19	785.28	785.29	785.24	785.20	785.20	—	—	785.18	785.18	—
10	785.22	785.20	785.27	785.28	785.24	785.21	785.20	—	—	785.17	785.17	—
11	785.21	785.20	785.26	785.28	785.24	785.21	785.21	—	—	785.15	785.15	—
12	785.20	785.20	785.24	785.30	785.25	785.21	785.20	—	785.19	785.14	785.16	—
13	785.19	785.20	785.24	785.29	785.25	785.19	785.19	—	785.22	785.16	785.21	—
14	785.19	785.21	785.24	785.28	785.25	785.19	785.18	—	785.22	785.19	785.27	—
15	785.20	785.21	785.27	785.28	785.25	785.19	785.18	—	785.20	785.19	785.25	—
16	785.22	785.21	785.30	785.27	785.24	785.20	785.16	—	—	785.19	785.23	—
17	785.21	785.21	785.30	785.26	785.25	785.20	785.18	—	785.21	785.16	785.23	—
18	785.20	785.20	785.29	785.28	785.26	785.20	785.20	—	785.20	785.15	785.21	—
19	785.21	785.21	785.31	785.30	785.26	785.20	785.20	—	785.19	785.17	785.16	—
20	785.22	785.21	785.32	785.28	785.28	785.20	—	—	785.19	785.17	—	—
21	785.21	785.21	785.32	785.26	785.28	785.21	—	—	785.19	785.17	—	—
22	785.20	785.22	785.34	785.25	785.27	—	—	—	785.18	785.19	—	—
23	785.20	785.24	785.33	785.25	785.27	785.21	—	—	785.17	785.21	—	—
24	785.21	785.30	785.33	785.25	785.27	785.20	—	—	785.16	785.21	—	—
25	785.21	785.32	785.33	785.25	785.27	785.20	—	—	785.17	785.16	—	—
26	785.20	785.33	785.32	785.25	785.29	785.19	—	—	785.19	785.14	—	—
27	785.19	785.32	785.31	785.24	785.29	785.18	—	—	785.20	785.15	—	—
28	785.20	785.31	785.30	785.24	785.29	785.18	—	—	785.19	785.16	—	—
29	785.20		785.29	785.24	785.28	785.18	—	—	785.18	785.18	—	—
30	785.20		785.27	785.25	785.27	785.18	—	—	785.16	—	—	—
31	785.21		785.26		785.26		—	—		785.21		—
MONTHLY												
MEAN	785.19	785.23	—	785.27	785.26	—	—	—	—	—	—	—
MAX	785.23	785.33	—	785.31	785.29	—	—	—	—	—	—	—
MIN	785.05	785.19	—	785.24	785.24	—	—	—	—	—	—	—

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 1,783-1,814 m

Site ID: 365157116271202

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	—	—	730.64	730.51	—	730.85	730.67	—	—	—	—	—
2	—	—	730.74	730.53	730.68	730.89	730.67	—	—	—	—	—
3	—	—	730.66	730.60	730.71	730.87	730.69	—	—	—	—	—
4	—	—	730.65	730.59	730.73	730.84	730.69	—	—	—	—	—
5	—	—	730.66	730.57	730.73	730.85	730.70	—	—	—	—	—
6	—	—	730.67	730.55	730.73	730.82	730.70	—	—	—	—	—
7	—	—	730.64	730.52	730.71	730.82	730.70	—	—	—	—	—
8	—	—	730.58	730.53	730.72	730.86	730.69	—	—	—	—	—
9	—	—	730.60	730.55	730.76	730.90	—	—	—	—	—	—
10	—	—	730.64	730.57	730.78	730.89	—	—	—	—	—	—
11	—	—	730.67	730.55	730.74	730.84	—	—	—	—	—	—
12	—	—	730.67	730.51	730.74	730.88	—	—	—	—	—	—
13	—	—	—	730.51	730.70	730.87	—	—	—	—	—	—
14	—	730.64	730.72	730.57	730.75	730.83	—	—	—	—	—	—
15	—	730.68	730.72	730.62	730.77	730.82	—	—	—	—	—	—
16	—	730.69	730.70	730.65	730.75	730.81	—	—	—	—	—	—
17	—	730.69	730.69	730.66	730.75	730.78	—	—	—	—	—	—
18	—	730.63	730.75	730.67	730.78	730.79	—	—	—	—	—	—
19	—	730.66	730.72	730.66	730.81	730.81	—	—	—	—	—	—
20	—	730.72	730.68	730.69	730.79	730.81	—	—	—	—	—	—
21	—	730.64	730.71	730.69	730.76	730.79	—	—	—	—	—	—
22	—	730.60	730.69	730.64	730.74	730.76	—	—	—	—	—	—
23	—	730.55	730.65	730.59	730.75	730.77	—	—	—	—	—	—
24	—	730.55	730.72	—	730.78	730.81	—	—	—	—	—	—
25	—	730.58	730.81	—	730.82	730.79	—	—	—	—	—	—
26	—	730.59	730.79	730.68	730.84	730.73	—	—	—	—	—	—
27	—	730.60	730.81	730.63	730.84	730.72	—	—	—	—	—	—
28	—	730.58	730.78	730.62	730.83	730.72	—	—	—	—	—	—
29	—		730.67	730.61	730.84	730.71	—	—	—	—	—	—
30	—		730.59	730.62	730.83	730.69	—	—	—	—	—	—
31	—		730.55		730.86		—	—		—		—
MONTHLY												
MEAN	—	—	—	—	—	730.81	—	—	—	—	—	—
MAX	—	—	—	—	—	730.90	—	—	—	—	—	—
MIN	—	—	—	—	—	730.69	—	—	—	—	—	—

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 716-765 m Site ID: 365157116271204

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	—	—	—	—	—	730.63	730.58	730.62	730.65	730.72	730.62	730.62
2	—	—	—	—	—	730.63	730.58	730.61	730.66	730.72	730.60	730.65
3	—	—	—	—	—	730.61	730.61	730.62	730.64	730.63	730.64	730.65
4	—	—	—	—	—	730.62	730.66	730.64	730.63	730.58	730.62	730.66
5	—	—	—	—	—	730.63	730.63	730.66	730.63	730.59	730.65	730.70
6	—	—	—	—	—	730.61	730.59	730.65	730.65	730.59	730.70	730.72
7	—	—	—	—	—	730.63	730.57	730.64	730.66	730.61	730.68	730.69
8	—	—	—	—	—	730.62	730.58	730.66	730.68	730.62	730.61	730.66
9	—	—	—	—	—	730.58	730.59	730.66	730.71	730.62	730.61	730.64
10	—	—	—	—	—	730.55	730.60	730.64	730.64	730.66	730.60	730.62
11	—	—	—	—	—	730.56	730.61	730.62	730.62	730.66	730.61	730.63
12	—	—	—	—	—	730.59	730.62	730.64	730.65	730.61	730.62	730.63
13	—	—	—	—	—	730.58	730.60	730.67	730.66	730.58	730.66	730.65
14	—	—	—	—	—	730.60	730.59	730.66	730.65	730.59	730.67	730.66
15	—	—	—	—	730.64	730.62	730.60	730.66	730.65	730.60	730.65	730.66
16	—	—	—	—	730.58	730.61	730.63	730.66	730.63	730.62	730.66	730.66
17	—	—	—	—	730.54	730.59	730.61	730.62	730.64	730.67	730.68	730.67
18	—	—	—	—	730.57	730.61	730.58	730.58	730.67	730.68	—	730.67
19	—	—	—	—	730.61	730.62	730.54	730.60	730.69	730.66	—	730.68
20	—	—	—	—	730.64	730.61	730.57	730.61	730.65	—	730.66	—
21	—	—	—	—	730.66	730.59	730.60	730.61	730.64	—	730.68	730.63
22	—	—	—	—	730.61	730.58	730.59	730.64	730.65	730.66	730.62	730.64
23	—	—	—	—	730.62	730.58	730.56	730.67	730.70	730.64	730.57	730.67
24	—	—	—	—	730.59	730.60	730.56	730.65	730.74	730.60	730.62	730.67
25	—	—	—	—	730.59	730.62	730.58	730.64	730.71	730.59	730.65	730.65
26	—	—	—	—	730.61	730.61	730.61	730.61	730.65	730.60	730.61	730.65
27	—	—	—	—	730.63	730.59	730.61	730.60	730.65	730.62	730.60	730.67
28	—	—	—	—	730.62	730.59	730.60	730.63	730.64	730.61	730.64	730.63
29	—		—	—	730.62	730.61	730.58	730.65	730.62	730.62	730.68	730.59
30	—		—	—	730.62	730.60	730.59	730.64	730.64	730.67	730.60	730.62
31	—		—		730.62		730.61	730.64		730.66		730.67
MONTHLY												
MEAN	—	—	—	—	—	730.60	730.59	730.64	730.66	—	—	—
MAX	—	—	—	—	—	730.63	730.66	730.67	730.74	—	—	—
MIN	—	—	—	—	—	730.55	730.54	730.58	730.62	—	—	—

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 716-765 m　　　　Site ID: 365157116271204

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
	730.68	730.66	730.66	730.67	730.74	730.64	730.67	—	730.58	730.60	—	—
	730.64	730.71	730.64	730.68	730.70	730.61	730.68	—	730.60	730.59	—	—
	730.68	730.71	730.59	730.78	730.66	730.62	730.69	—	730.64	730.58	—	—
	730.79	730.63	730.60	730.73	730.65	730.64	730.70	—	730.65	730.59	—	—
5	730.80	730.57	730.64	730.67	730.65	730.64	730.69	—	730.65	730.62	—	—
6	730.70	730.56	—	730.66	730.65	730.64	730.69	—	730.64	730.65	—	—
7	730.69	730.59	730.70	730.64	—	730.65	730.68	—	730.63	730.68	—	—
8	730.62	730.65	730.71	730.64	—	730.66	730.70	—	730.62	730.69	—	—
9	730.58	730.68	730.68	730.65	—	730.68	730.69	730.61	730.61	730.69	—	—
10	730.58	730.69	730.67	730.68	—	730.69	730.70	730.63	730.64	730.66	—	—
11	730.60	730.67	730.65	730.75	—	730.67	730.67	730.64	—	730.65	—	—
12	730.63	730.66	730.66	730.68	—	730.62	730.64	730.64	730.66	730.68	—	—
13	730.67	730.71	730.71	730.63	—	730.63	730.63	730.67	730.64	730.71	—	—
14	730.70	730.68	730.77	730.64	730.72	730.67	730.65	730.70	730.59	730.71	—	—
15	730.77	—	—	730.64	730.69	730.70	730.67	730.64	730.60	730.70	—	—
16	730.74	—	730.75	730.66	730.70	730.68	730.71	730.59	730.62	730.66	—	—
17	730.66	730.66	730.70	730.74	730.73	730.68	730.76	730.58	730.61	730.65	—	—
18	730.64	730.70	730.78	730.79	730.73	730.67	730.69	730.59	730.59	730.67	—	—
19	730.67	730.68	730.78	730.66	730.75	730.68	730.67	730.61	730.59	730.68	—	—
20	730.60	730.65	730.70	730.60	730.74	730.71	—	730.62	730.58	730.67	—	—
21	730.61	730.69	730.77	730.60	730.68	730.71	—	730.60	730.59	730.68	—	—
22	730.65	730.72	730.73	730.65	730.66	730.67	—	730.59	730.58	—	—	—
23	730.73	730.88	730.70	730.68	730.68	730.66	—	730.61	730.57	—	—	—
24	730.65	730.84	730.70	730.68	730.70	730.64	—	730.62	730.60	—	—	—
25	730.59	—	730.65	730.66	730.75	730.64	—	730.62	730.62	—	—	—
26	730.60	—	730.64	730.64	730.73	730.64	—	730.60	730.63	—	—	—
27	730.67	730.66	730.64	730.65	730.70	730.66	—	730.59	730.61	—	—	—
28	730.71	730.64	730.64	730.66	730.66	730.67	—	730.59	730.59	—	—	—
29	730.69		730.61	730.70	730.66	730.69	—	730.59	730.57	—	—	—
30	730.71		730.59	730.73	730.65	730.68	—	730.58	730.59	—	—	—
31	730.68		730.64		730.66		—	730.58		—		—
MONTHLY												
MEAN	730.67	—	—	730.67	—	730.66	—	—	—	—	—	—
MAX	730.80	—	—	730.79	—	730.71	—	—	—	—	—	—
MIN	730.58	—	—	730.60	—	730.61	—	—	—	—	—	—

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 716-765 m

Site ID: 365157116271204

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	---	---	---	---	730.54	730.54	730.60	---	730.35	730.36	730.41	730.35
2	---	---	---	---	730.50	730.52	730.60	---	730.32	730.36	730.42	730.36
3	---	---	---	---	730.56	---	730.61	---	730.31	730.37	730.41	730.35
4	---	---	---	---	730.62	730.62	730.61	---	730.32	730.38	730.38	730.35
5	---	---	---	---	730.63	730.65	730.59	---	730.35	730.40	730.38	730.37
6	---	---	---	---	730.58	730.61	730.58	---	730.35	730.39	730.44	730.40
7	---	---	---	---	730.58	730.56	730.57	---	730.36	730.35	730.44	730.45
8	---	---	---	---	730.54	730.55	730.57	---	730.36	730.32	730.43	730.41
9	---	---	---	730.48	730.52	730.57	730.58	---	730.37	730.35	730.41	730.42
10	---	---	---	730.49	730.49	730.57	730.60	---	730.40	730.37	730.43	730.44
11	---	---	---	730.54	730.50	730.59	730.59	---	730.38	730.38	730.42	730.39
12	---	---	---	730.57	730.54	730.60	730.56	---	730.35	730.40	730.41	730.39
13	---	---	---	730.59	730.57	730.57	730.57	---	730.33	730.40	730.45	730.45
14	---	---	---	730.61	730.57	730.56	730.57	---	730.34	730.41	730.47	730.52
15	---	---	---	730.60	730.58	730.55	730.56	---	730.35	730.37	730.37	730.49
16	---	---	---	730.59	730.60	730.58	730.55	---	730.37	730.36	730.38	730.44
17	---	---	---	730.59	730.63	730.60	730.54	---	730.40	730.38	730.46	730.45
18	---	---	---	730.57	730.60	730.58	730.54	---	730.37	730.38	730.40	730.49
19	---	---	---	730.61	730.56	730.57	---	---	730.39	730.41	730.35	730.51
20	---	---	---	730.64	730.54	730.58	---	---	730.45	730.42	730.36	730.49
21	---	---	---	730.66	730.54	730.57	---	---	730.39	730.40	730.36	730.50
22	---	---	---	730.63	730.57	730.57	---	---	730.33	730.42	730.39	730.48
23	---	---	---	730.58	730.60	730.59	---	---	730.34	730.41	730.47	730.45
24	---	---	---	730.53	730.58	730.60	---	---	730.35	730.42	730.47	730.53
25	---	---	---	730.53	730.58	730.60	---	---	730.33	730.41	730.51	730.56
26	---	---	---	730.55	730.59	730.59	---	---	730.33	730.43	730.44	730.46
27	---	---	---	730.58	730.62	730.60	---	---	730.33	730.45	730.35	730.43
28	---	---	---	730.59	730.64	730.62	---	---	730.31	730.42	730.36	730.45
29	---	---	---	730.55	730.71	730.60	---	---	730.32	730.39	730.31	730.40
30	---		---	730.61	730.64	730.60	---	730.37	730.35	730.37	730.31	730.43
31	---		---		730.56		---	730.38		730.38		730.49
MONTHLY												
MEAN	---	---	---	---	730.58	---	---	---	730.35	730.39	730.41	730.44
MAX	---	---	---	---	730.71	---	---	---	730.45	730.45	730.51	730.56
MIN	---	---	---	---	730.49	---	---	---	730.31	730.32	730.31	730.35

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 573-673 m

Site ID: 365157116271205

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	—	—	730.83	730.88	—	730.51	730.50	—	—	—	—	730.48
2	—	—	730.93	730.92	730.84	730.53	730.51	—	—	—	—	730.53
3	—	—	730.85	731.03	730.85	730.50	730.53	—	—	—	—	730.48
4	—	—	730.83	731.08	730.85	730.46	730.53	—	—	—	—	730.42
5	—	—	730.83	731.06	730.85	730.45	730.54	—	730.67	—	—	730.44
6	—	—	730.83	731.06	730.83	730.43	730.52	—	730.65	—	—	730.43
7	—	—	730.79	731.02	730.81	730.41	730.49	—	730.63	—	—	730.45
8	—	—	730.73	731.01	730.79	730.43	730.50	—	730.63	—	—	730.50
9	—	—	730.74	731.02	730.83	730.47	730.52	—	730.68	—	—	730.50
10	—	—	730.78	731.02	730.84	730.50	730.56	—	730.69	—	—	730.54
11	—	—	730.80	730.99	730.79	730.48	730.57	—	730.70	—	—	730.52
12	—	—	730.79	730.93	730.77	730.51	730.61	—	730.62	—	—	730.47
13	—	—	—	730.92	730.72	730.56	730.64	—	730.62	—	—	730.43
14	—	730.50	730.86	730.97	730.75	730.57	730.64	—	730.64	—	—	730.44
15	—	730.60	730.88	731.01	730.74	730.57	730.65	—	730.67	—	—	730.46
16	—	730.71	730.85	731.02	730.71	730.58	730.65	—	730.69	—	—	730.45
17	—	730.75	730.85	731.02	730.69	730.56	730.65	—	—	—	—	730.45
18	—	730.72	730.92	731.02	730.72	730.56	730.62	—	—	—	—	730.46
19	—	730.78	730.91	731.00	730.75	730.59	730.61	—	—	—	—	730.48
20	—	730.88	730.89	731.02	730.71	730.60	730.61	—	—	—	—	730.49
21	—	730.82	730.95	731.01	730.61	730.58	730.63	—	—	—	730.53	730.52
22	—	730.78	730.92	730.94	730.57	730.55	730.63	—	—	—	730.53	730.54
23	—	730.72	730.92	730.88	730.55	730.55	730.63	—	—	—	730.53	730.56
24	—	730.73	730.99	730.90	730.56	730.59	730.63	—	—	—	730.57	730.57
25	—	730.77	731.05	730.95	730.58	730.56	730.60	—	—	—	730.59	730.57
26	—	730.78	731.04	730.94	730.58	730.52	730.58	—	—	—	730.52	730.61
27	—	730.78	731.08	730.88	730.57	730.51	730.58	—	—	—	730.49	730.60
28	—	730.76	731.06	730.85	730.54	730.53	730.59	—	—	—	730.55	730.60
29	—		730.99	730.82	730.54	730.54	730.61	—	—	—	730.64	730.61
30	—		730.89	730.82	730.52	730.53	—	—	—	—	730.57	730.63
31	—		730.89		730.53		—	—		—		730.62
MONTHLY												
MEAN	—	—	—	730.97	—	730.52	—	—	—	—	—	730.51
MAX	—	—	—	731.08	—	730.60	—	—	—	—	—	730.63
MIN	—	—	—	730.82	—	730.41	—	—	—	—	—	730.42

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 573-673 m

Site ID: 365157116271205

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	730.62	—	730.66	730.73	730.66	—	730.71	730.69	730.68	730.74	730.68	730.53
2	730.64	—	730.67	730.72	730.65	—	730.70	730.68	730.69	730.77	730.64	730.56
3	730.63	—	—	730.70	730.66	—	730.73	730.67	730.68	730.70	730.66	730.57
4	730.60	—	—	730.70	730.67	—	730.77	730.68	730.66	730.63	730.64	730.56
5	730.58	—	730.73	730.70	730.65	—	730.76	730.69	730.66	730.64	730.65	730.59
6	730.57	—	730.73	—	—	—	730.72	730.68	730.67	730.65	730.71	730.61
7	730.52	—	730.78	—	—	—	730.69	730.67	730.68	730.66	730.68	730.60
8	730.53	—	730.84	—	—	—	730.69	730.67	730.70	730.68	730.64	730.56
9	730.57	—	730.80	730.69	—	—	730.69	730.68	730.73	730.68	730.60	730.54
10	730.57	—	730.83	730.75	—	730.75	730.69	730.67	730.69	730.71	730.61	730.52
11	730.59	730.61	730.80	730.78	—	730.74	730.70	730.65	730.64	730.73	730.60	730.53
12	730.61	730.59	730.78	730.82	—	730.77	730.71	730.65	730.66	730.69	730.61	730.52
13	730.64	730.59	730.77	730.78	—	730.77	730.70	730.67	730.68	730.65	730.63	730.53
14	730.70	730.60	730.77	730.73	—	730.78	730.69	—	730.68	730.65	730.65	730.54
15	730.70	730.68	730.76	730.76	—	730.81	730.68	—	730.68	730.67	730.63	730.54
16	730.64	730.67	730.80	730.79	730.79	730.80	730.72	—	730.67	730.68	730.63	730.54
17	730.61	730.67	730.76	730.75	730.73	730.78	730.71	—	730.66	730.72	730.64	730.54
18	730.61	730.68	730.66	730.73	730.74	730.78	730.68	—	730.69	730.75	730.65	730.54
19	730.67	730.68	730.61	730.72	730.79	730.79	—	—	730.71	—	730.63	730.55
20	730.72	730.62	730.58	730.71	730.83	730.76	—	—	730.69	—	730.59	730.56
21	730.70	730.60	730.59	730.76	730.85	730.73	—	—	730.67	730.70	730.62	730.51
22	730.68	730.59	730.64	730.80	730.81	730.72	—	—	730.68	730.72	730.58	730.51
23	730.69	730.59	730.66	730.82	730.81	730.71	—	—	730.71	730.71	730.52	730.54
24	730.65	730.58	730.69	730.81	730.79	730.73	—	—	730.77	730.67	730.54	730.55
25	—	730.59	730.70	730.79	730.78	730.74	730.69	—	730.75	730.65	730.59	730.54
26	—	730.61	730.66	730.75	730.79	730.76	730.72	—	730.70	730.66	730.55	730.53
27	—	730.64	730.66	730.69	730.81	730.72	730.72	—	730.69	730.69	730.53	730.54
28	—	730.65	730.68	730.70	—	730.72	730.70	—	730.67	730.67	730.56	730.52
29	—		730.66	730.72	—	730.74	730.68	—	730.66	730.67	730.61	730.48
30	—		730.66	730.69	—	730.74	730.68	—	730.67	730.70	730.54	730.48
31	—		730.69		—		730.69	—		730.72		730.53
MONTHLY												
MEAN	—	—	—	—	—	—	—	—	730.69	—	730.61	730.54
MAX	—	—	—	—	—	—	—	—	730.77	—	730.71	730.61
MIN	—	—	—	—	—	—	—	—	730.64	—	730.52	730.48

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 573-673 m

Site ID: 365157116271205

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	730.55	730.50	730.49	730.54	730.71	730.62	—	730.64	730.69	730.76	730.87	730.78
2	730.53	730.53	730.49	730.56	730.69	730.60	—	730.66	730.70	730.74	730.86	730.78
3	730.53	730.55	730.45	730.64	730.65	730.59	—	730.67	730.74	730.71	730.84	730.76
4	730.61	730.49	730.44	730.66	730.63	730.61	—	730.67	730.77	730.72	730.82	730.80
5	730.64	730.42	730.49	730.59	730.63	730.62	—	730.68	730.77	730.75	730.86	730.82
6	730.57	730.40	730.51	730.57	730.63	730.62	—	730.69	730.76	730.77	730.84	730.80
7	730.55	730.41	730.54	730.57	730.62	730.63	—	730.69	730.75	730.79	730.81	730.80
8	730.50	730.47	730.56	730.57	730.63	730.64	—	730.68	730.75	730.81	730.78	730.79
9	730.45	730.51	730.54	730.58	730.65	730.65	—	730.68	730.74	730.80	730.78	730.78
10	730.44	730.53	730.52	730.59	730.67	730.67	—	730.70	730.75	730.78	730.77	730.77
11	730.45	730.52	730.51	730.66	730.66	730.66	—	730.71	730.75	730.75	730.77	730.80
12	730.47	730.50	730.49	730.65	730.66	730.62	—	730.71	730.80	730.78	730.78	730.82
13	730.51	730.53	730.53	730.59	730.66	730.61	—	730.73	730.79	730.81	730.84	730.87
14	730.53	730.53	730.57	730.59	730.66	730.64	—	730.77	730.74	730.82	730.89	730.83
15	730.61	730.56	730.66	730.60	730.64	730.68	—	730.74	730.74	730.81	730.82	730.82
16	730.61	730.54	730.62	730.61	730.65	—	—	730.69	730.77	730.78	730.81	730.88
17	730.54	730.49	730.54	730.67	730.67	—	—	730.66	730.77	730.76	730.82	730.91
18	730.50	730.52	730.58	730.74	730.69	730.66	—	730.67	730.75	730.77	730.76	730.88
19	730.52	730.51	730.62	730.67	730.70	730.67	—	730.69	730.74	730.79	730.72	730.88
20	730.47	730.49	730.55	730.58	730.70	730.70	—	730.71	730.74	730.79	730.76	730.81
21	730.46	730.51	730.57	730.57	730.66	730.70	—	730.70	730.75	730.79	730.82	730.78
22	730.49	730.54	730.59	730.61	730.63	730.68	730.63	730.69	730.75	730.80	730.82	730.85
23	730.57	730.65	730.53	730.64	730.64	730.66	730.63	730.70	730.73	—	730.82	730.90
24	730.53	730.68	730.54	730.66	730.66	730.65	730.64	730.72	730.75	—	730.79	730.88
25	730.46	730.62	730.51	730.65	730.70	730.64	730.65	730.72	730.78	730.75	730.82	730.86
26	730.45	730.56	730.49	730.63	730.70	730.65	730.64	730.71	730.79	730.75	730.78	730.82
27	730.50	730.50	730.50	730.63	730.66	730.66	730.64	730.70	730.78	730.78	730.78	730.80
28	730.56	730.47	730.50	730.64	730.64	730.68	730.65	730.70	730.75	730.80	730.83	730.81
29	730.54		730.49	730.66	730.62	—	730.66	730.70	730.74	730.83	730.83	730.86
30	730.55		730.47	730.70	730.61	—	730.66	730.69	730.74	730.84	730.78	730.87
31	730.54		730.50		730.63		730.65	730.69		730.85		730.81
MONTHLY												
MEAN	730.52	730.52	730.53	730.62	730.66	—	—	730.70	730.75	—	730.81	730.83
MAX	730.64	730.68	730.66	730.74	730.71	—	—	730.77	730.80	—	730.89	730.91
MIN	730.44	730.40	730.44	730.54	730.61	—	—	730.64	730.69	—	730.72	730.76

Table 11.--*Daily mean water-level altitude, in meters above sea level, for well USW H-1*--Continued

Interval: 573-673 m — Site ID: 365157116271205

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	730.78	730.94	730.88	730.83	730.95	—	—	—	731.01	731.00	—	—
2	730.80	730.90	730.89	730.85	730.91	—	—	—	730.99	731.00	—	—
3	730.82	730.84	730.86	730.88	730.96	—	—	—	730.97	731.00	—	—
4	730.84	730.79	730.84	730.88	731.02	—	—	—	730.97	731.01	—	—
5	730.88	730.78	730.81	—	731.05	—	—	—	730.99	731.02	—	730.98
6	730.88	730.79	730.83	—	731.02	—	—	—	730.99	731.02	—	731.00
7	730.86	730.81	730.83	—	730.99	—	—	—	731.00	730.99	—	731.05
8	730.87	730.82	730.78	—	730.98	—	—	—	731.00	730.95	—	731.03
9	730.84	730.81	730.81	—	730.96	—	—	—	731.00	730.95	—	731.01
10	730.83	730.81	730.84	—	730.94	—	—	—	731.02	730.99	—	731.04
11	730.90	730.79	730.85	—	730.94	—	—	—	731.02	730.98	—	731.00
12	730.86	730.81	730.82	—	730.97	—	—	—	731.00	731.00	—	730.98
13	730.81	730.87	730.79	—	731.01	—	—	—	730.97	731.00	—	731.02
14	730.80	730.85	730.82	—	731.02	—	—	—	730.97	731.01	—	731.09
15	730.89	730.85	730.89	—	731.06	—	—	—	730.98	730.97	—	731.10
16	730.94	730.88	730.86	—	731.09	—	—	—	731.00	730.94	—	731.03
17	730.99	730.83	—	—	731.13	—	—	—	731.03	730.95	—	731.03
18	731.02	730.89	—	—	731.11	—	—	—	731.02	730.96	—	731.05
19	730.89	730.87	—	—	731.07	—	—	—	731.01	730.98	—	731.10
20	730.81	730.81	—	—	731.05	—	—	—	731.08	730.99	—	731.06
21	730.81	730.82	730.83	—	731.04	—	—	—	731.04	730.97	—	731.09
22	730.76	730.87	730.84	—	731.06	—	—	—	730.98	730.97	—	731.05
23	730.78	730.87	730.84	—	731.09	—	—	—	730.97	730.97	—	731.04
24	730.78	730.84	730.81	—	731.09	—	—	—	730.98	730.97	—	731.06
25	730.77	730.83	730.79	—	731.08	—	—	—	730.98	730.97	—	731.14
26	730.79	730.85	730.80	—	731.08	—	—	731.02	730.97	730.97	—	731.07
27	730.82	730.83	730.87	—	731.11	—	—	731.03	730.97	730.99	—	731.00
28	730.85	730.83	730.83	—	731.12	—	—	731.01	730.95	730.97	—	731.02
29	730.89	730.85	730.81	—	731.14	—	—	731.01	730.95	730.94	—	730.97
30	730.91		730.86	731.00	731.11	—	—	731.01	730.98	730.91	—	730.97
31	730.93		730.84		731.06		—	731.04		730.91		731.04
MONTHLY												
MEAN	730.85	730.84	—	—	731.04	—	—	—	730.99	730.98	—	—
MAX	731.02	730.94	—	—	731.14	—	—	—	731.08	731.02	—	—
MIN	730.76	730.78	—	—	730.91	—	—	—	730.95	730.91	—	—

Well USW H-3

Information about the history of well USW H-3 and about previous data from the well was obtained from various sources. These sources are: Thordarson, Rush, Spengler, and Waddell (1984); Thordarson, Rush, and Waddell (1984); Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1987a, c).

Well specifications

The following are specifications for well USW H-3:

1. Location and identification:

   Latitude and longitude: 36°49′42" N.; 116°28′00" W.
   Nevada State Central Zone Coordinates (m): N 230,594; E 170,216.
   U.S. Geological Survey Site ID's:
   364942116280001 (entire well)
   364942116280004 (upper interval)
   364942116280005 (lower interval)

2. Drilling and casing information:

   Well started: January 27, 1982.
   Well completed: March 19, 1982.
   Drilling method: Rotary, using rock bits and air-foam circulating medium.
   Bit diameter below water level: 375 mm used from land surface to 808 m; 222 m used from 808 m to 1,219 m.
   Casing extending below water level: 253 mm diameter to 792 m, not perforated below the water level.
   Total drilled depth: 1,219 m.

3. Access to and description of intervals for measuring water levels:

   41-mm inside-diameter open ended tubing, extending from land surface to depth of about 762 m; upper interval of well, from near water table to top of inflatable packer, within the Tram Member of the Crater Flat Tuff; Site ID: 36494211628004.
   62-mm inside-diameter tubing that has an inflatable packer on bottom end, extending from land surface to 1,114 m.; lower interval from below packer to bottom of well, within the Lithic Ridge Tuff; Site ID: 364942116280005.
   Note: Inflatable packer installed January 1983 at a depth of 1,190 m; removed late November 1983 during period of additional hydraulic testing; re-installed in May 1984 at depth of 1,114 m.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1483.47 m (surveyed by U.S. Geological Survey, 1984).

Depth correction for borehole deviation from vertical: 0.08 m, based on approximate depth to water of 752 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from March 19, 1982, through October 15, 1985. Beginning in October 1985, the water level has been monitored continuously using a downhole pressure transducers with a data logger at the land surface.

In December 1990, the inflatable packer was removed for maintenance. Inspection of the packer revealed that the 62-mm access tube to the lower interval of the well was completely plugged and had been plugged since the packer was installed in May 1984. Water levels previously reported by Robison and others (1988) in this well for Site ID 364942116280005 are therefore invalid and should not be used. These water levels only represent water levels in a closed tube. Water levels for this well reported under other Site ID's are not suspect.

The following transducers were used in well USW H-3:

Site ID: 364942116280004
Interval: 753-1,114 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
10-15-85	05-05-88	Absolute	Bell&Howell(?)	100 (?)	1949
05-12-88	12-31-88	Gage	Druck 930	15	203409

Site ID: 364942116280005
Interval: 1,114-1,219 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
10-15-85	04-10-86	Gage	Senso-Metric	10	4J307
04-10-86	09-23-87	Gage	Druck PDCR 10/D	10	144612
09-23-87	11-09-87	Gage	Druck 830	10	172804
11-19-87	05-05-88	Gage	Druck 930	15	203409

The following calibrations of the water-level monitoring system were performed in well USW H-3:

Site ID: 364942116280004
Interval: 752-1,114 meters
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1949	10-15-85	-2.557	1.000	10-15-85	731.68
1949	01-10-86	-2.584	1.000	01-09-86	731.71
1949	09-14-87	-2.571	1.000	--	--
1949	02-09-88	-2.577	1.000	02-09-88	731.74
1949	05-05-88	-2.589	1.000	05-12-88	731.74
203409	05-12-88	-4.292	0.999	05-12-88	731.74
203409	10-11-88	-4.338	.999	10-11-88	731.39

Site ID: 364942116280005
Interval: 1,114-1,219 meters

Transducer				Water level[3]	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
4J307	10-15-85	-12.561	1.000	10-15-85	772.97
144612	04-14-86	-6.480	1.000	04-10-86	772.89
172804	09-23-87	-6.622	0.999	09-23-87	773.04
203409	11-19-87	-4.444	1.000	11-19-87	773.08
203409	02-09-88	-4.561	1.000	02-09-87	772.99
226109	05-05-88	-4.492	0.999	05-06-88	772.97

[3]These water levels represent the level in a closed-ended access tube and do not represent the water level in the aquifer. See explanation earlier in this section.

Transducer output

Transducer output from October 1985 through December 1988 is shown in figure 29. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 1949) was in use between October 1985 and May 1988 in the upper interval (Site ID: 364942116280004). The field logbook indicates that this transducer was a Bell& Howell 100 psi transducer; however, the serial number is similar to those of Psi-Tronix transducers in use at this time. The range of the output is not consistent with a 100 psi transducer; the range is consistent with 25 psi transducers with similar serial numbers. However, neither the model nor the range is critical because the transducer was calibrated in the well several times. Initially, the transducer output was somewhat erratic (fig. 29-A) but generally became less erratic by early 1986 (fig. 29-B). Throughout 1986 and 1987, the transducer produced generally reasonable output with some erratic periods (fig 29-B and 29-C). The frequency and amplitude of the erratic periods seemed to increase over time and by 1988, the output was very erratic (fig. 29-D). The second transducer (serial number 203409), in use from May through December 1988, was previously used in the lower interval of this same well. It produced output that contained short intervals of reasonable output interrupted with short intervals of erratic output (fig. 29-D). The erratic output often contained generally reasonable-looking points with a single or a few points very different from points prior to then and immediately after them. Examples of erratic output for both transducers are shown in figures 29-E and 29-F.

As noted in the previous section, the access tube to the lower interval of this well was completely blocked during the entire period of this report. There was standing water in the tube; the level should not have changed. Transducer output for the lower zone is reported here because it gives some indication of the potential errors with transducer output.

The first transducer (serial number 4J307), in use between October 1985 and April 1986 in the lower interval (Site ID: 364942116280005) produced output that decreased rapidly for about 3 months (fig. 29-G) and then increased for about 3 months (fig. 29-H) before the transducer failed completely. Output from the second transducer (serial number 144612), in use between April 1986 and September 1987, seemed to change character over time. For about 6 months, there was very little fluctuation in transducer output (fig 29-H). In October 1986, there was a sudden change in output and the fluctuations increased (fig. 29-H). In December, there was another sudden change in output and the fluctuations increased even more. In August 1987, the output began to drift downward fairly rapidly (fig. 29-I). The third transducer (serial number 172804), in use between September and November 1987, produced totally erratic output (fig. 29-I). The fourth transducer (serial number 203409), in use between November 1987 and May 1988, produced output that contained high-frequency, low-amplitude fluctuations with a significant number of high-amplitude fluctuations (fig. 29-I and 29-J). In May, 1988 two more transducers were lowered into the access tube in an attempt to have them confirm or deny each other's readings. During the calibration process the transducers wedged in the tube and completely blocked access to the water. All attempts to clear the tube were futile. No further data were collected after May 1988.

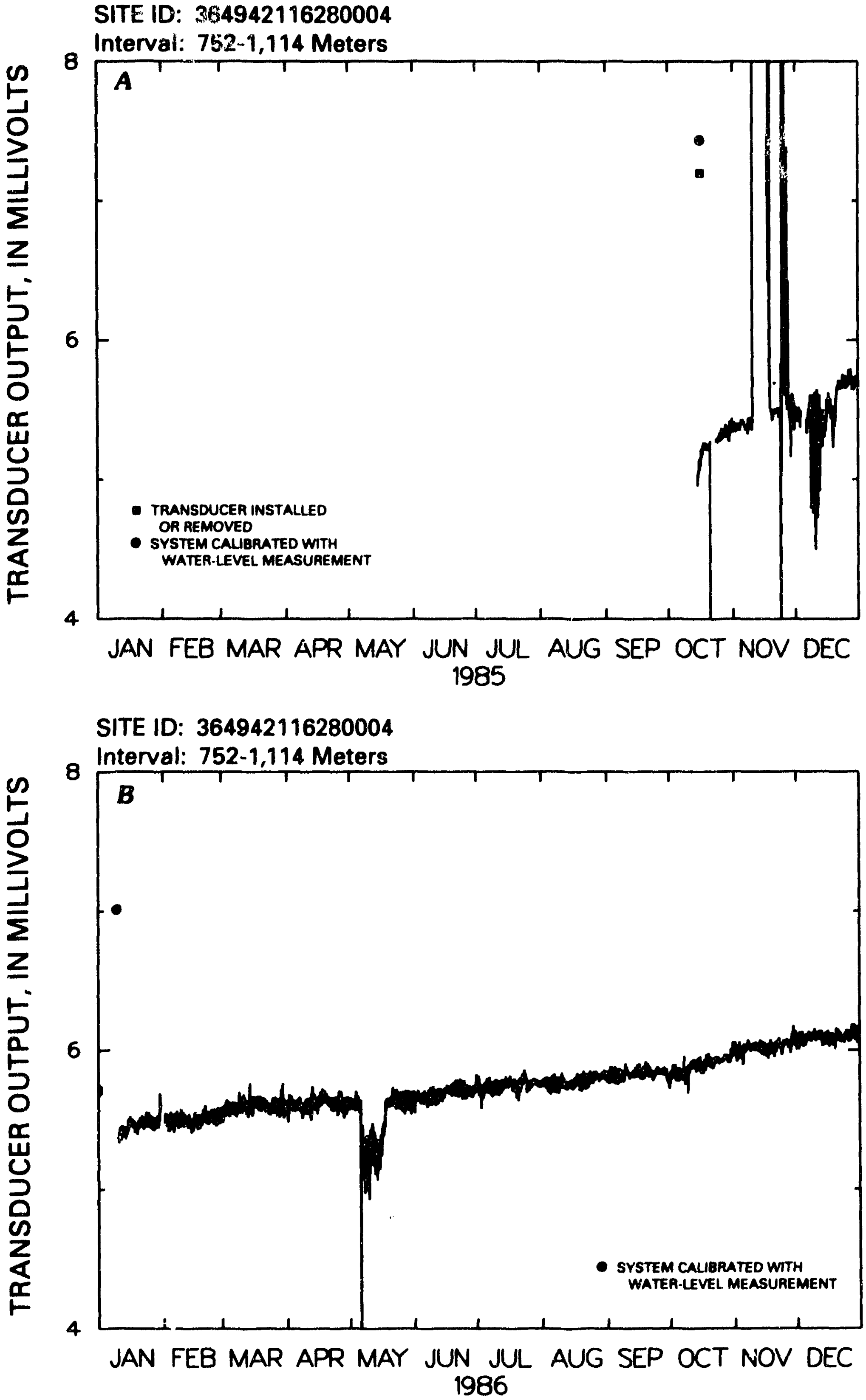


Figure 29.--Transducer output for well USW H-3.

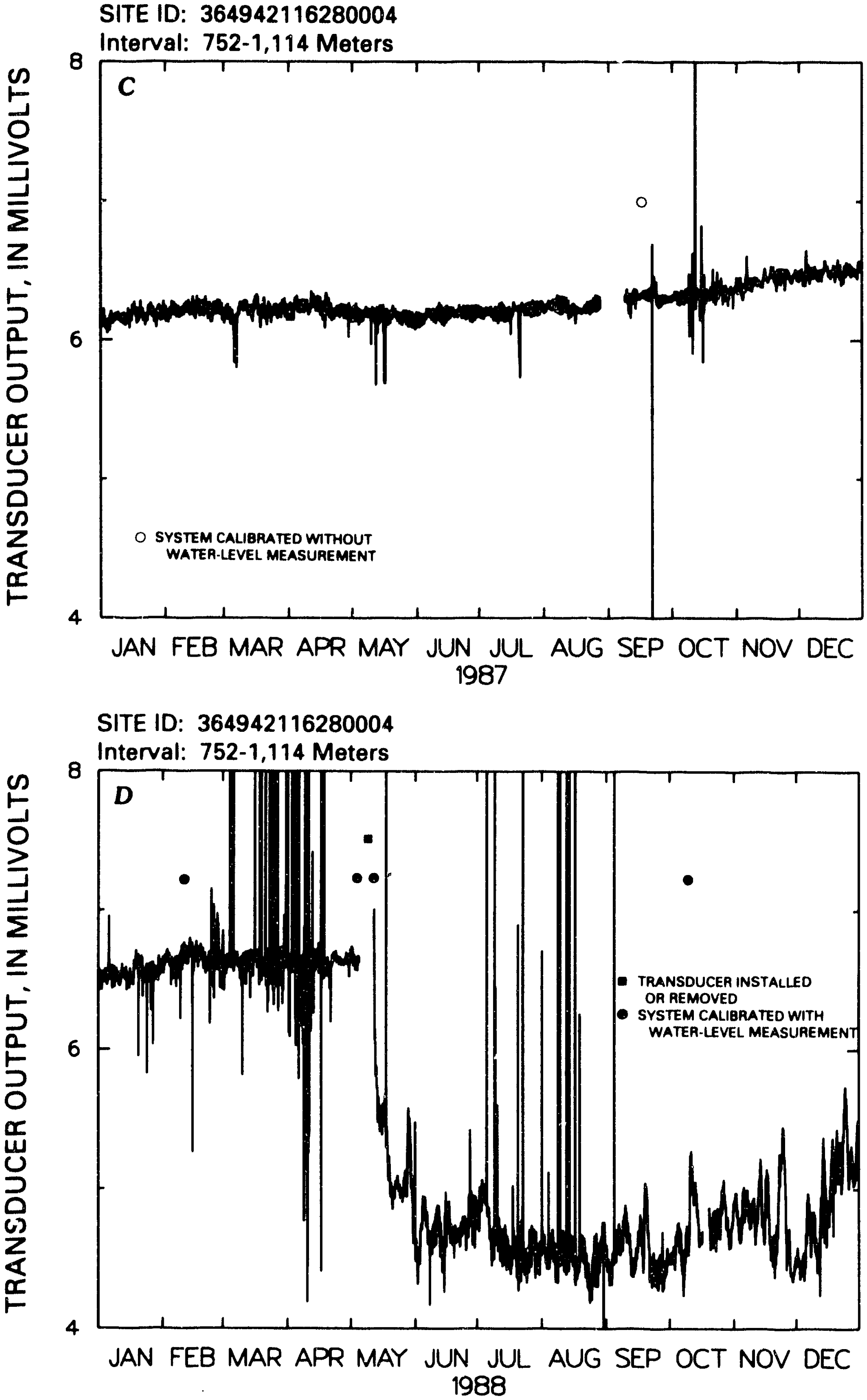
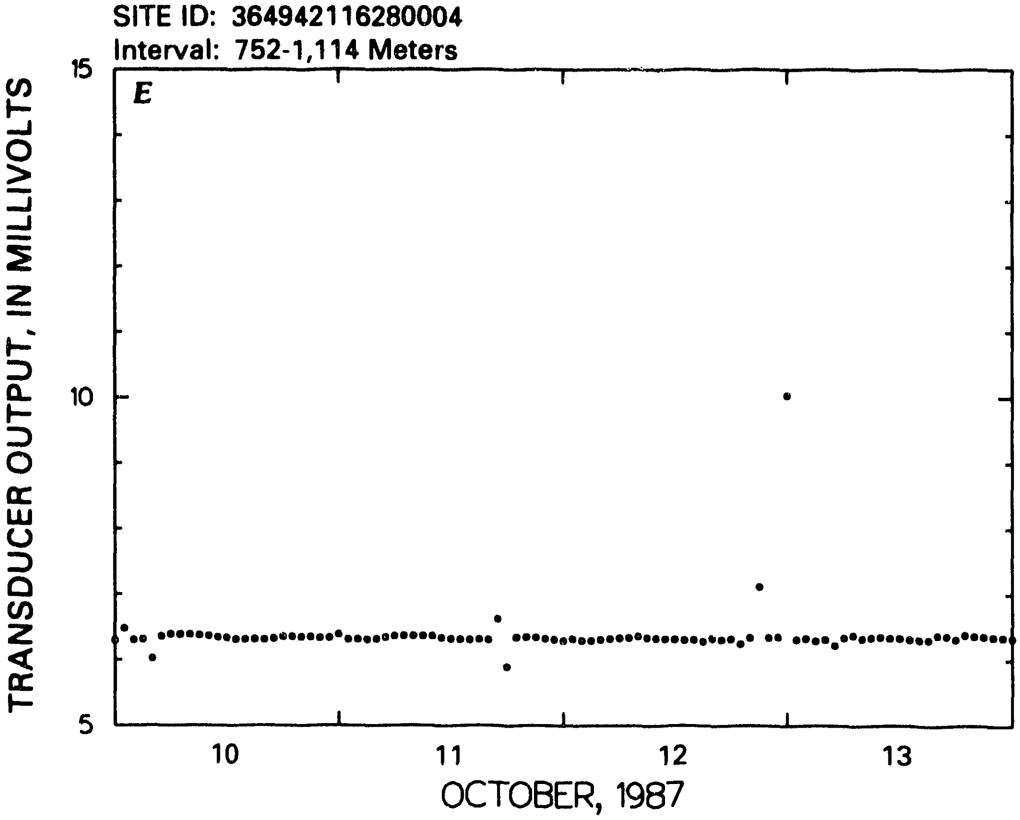


Figure 29.--Transducer output for well USW H-3.--Continued



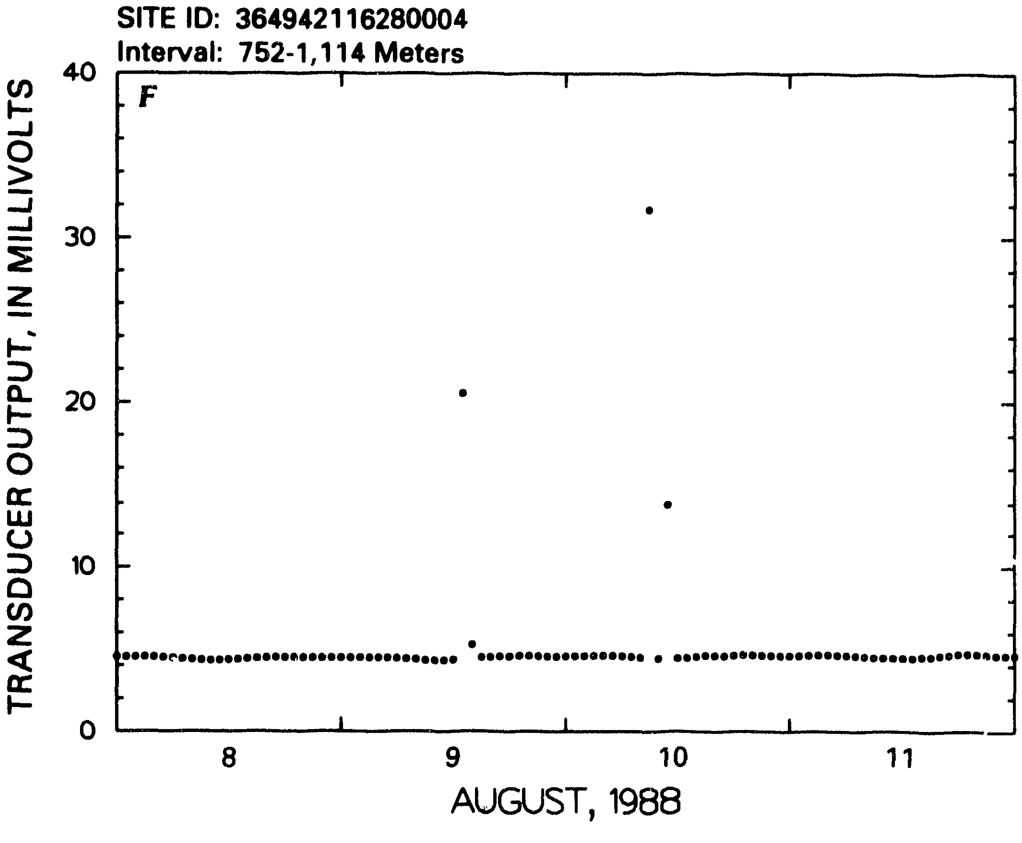
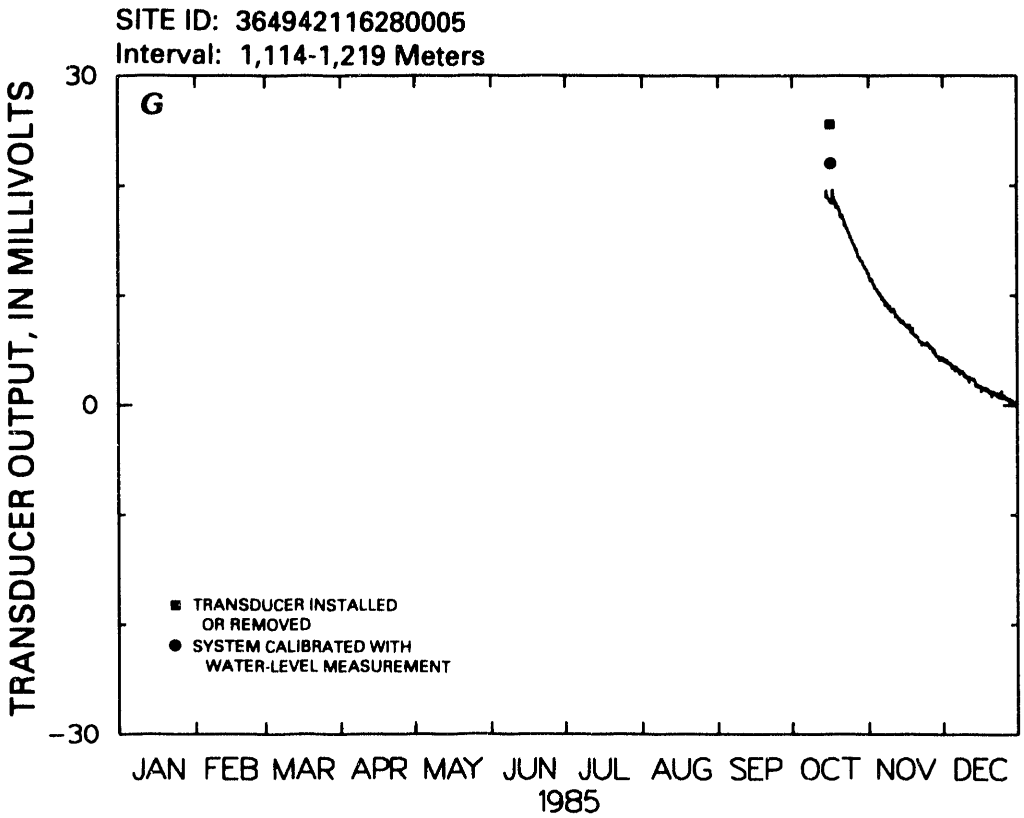


Figure 29.--Transducer output for well USW H-3.--Continued



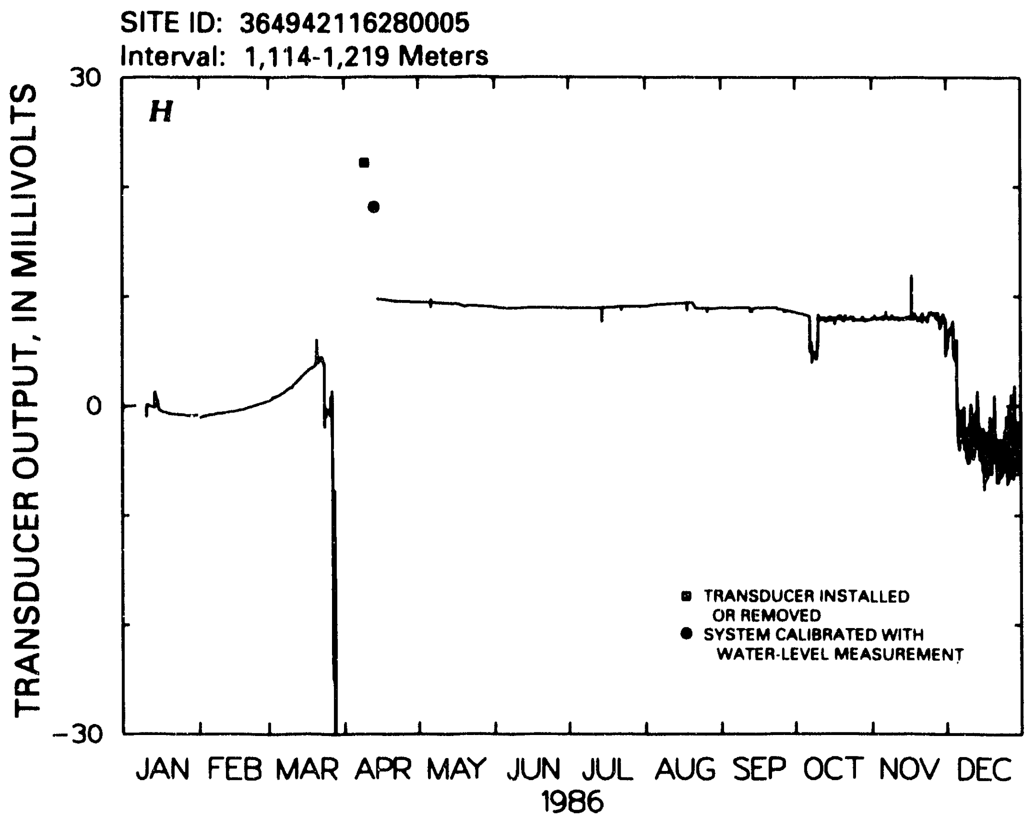
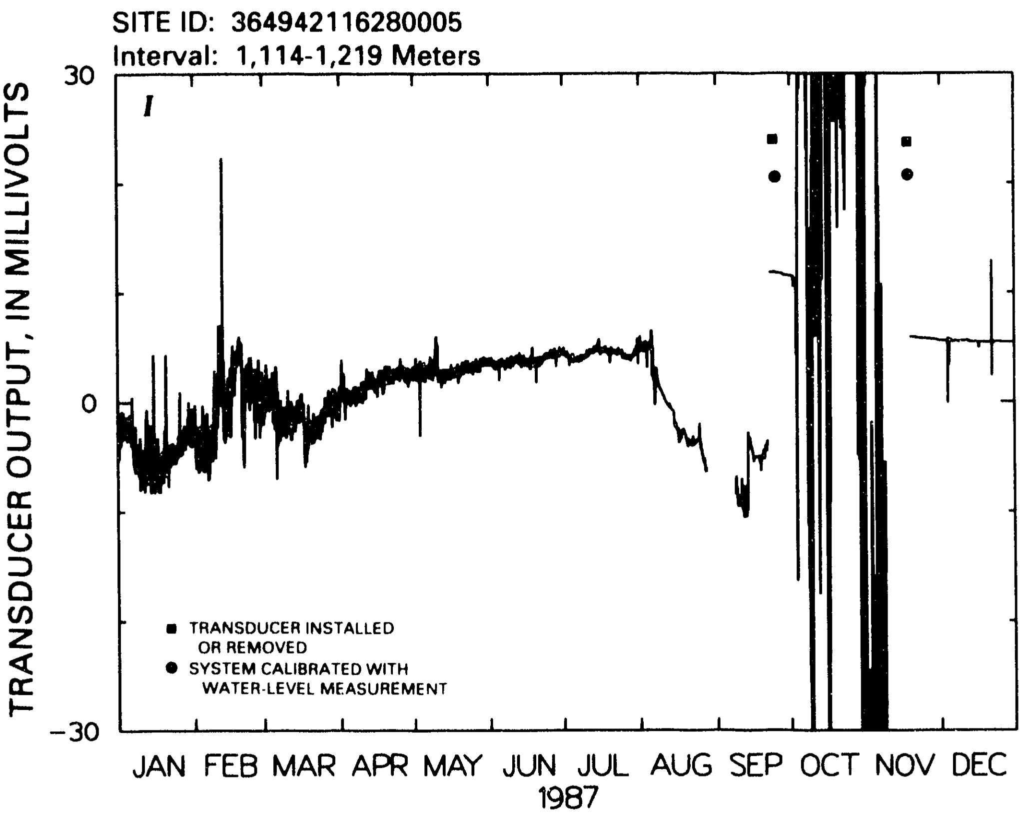


Figure 29.--Transducer output for well USW H-3.--Continued



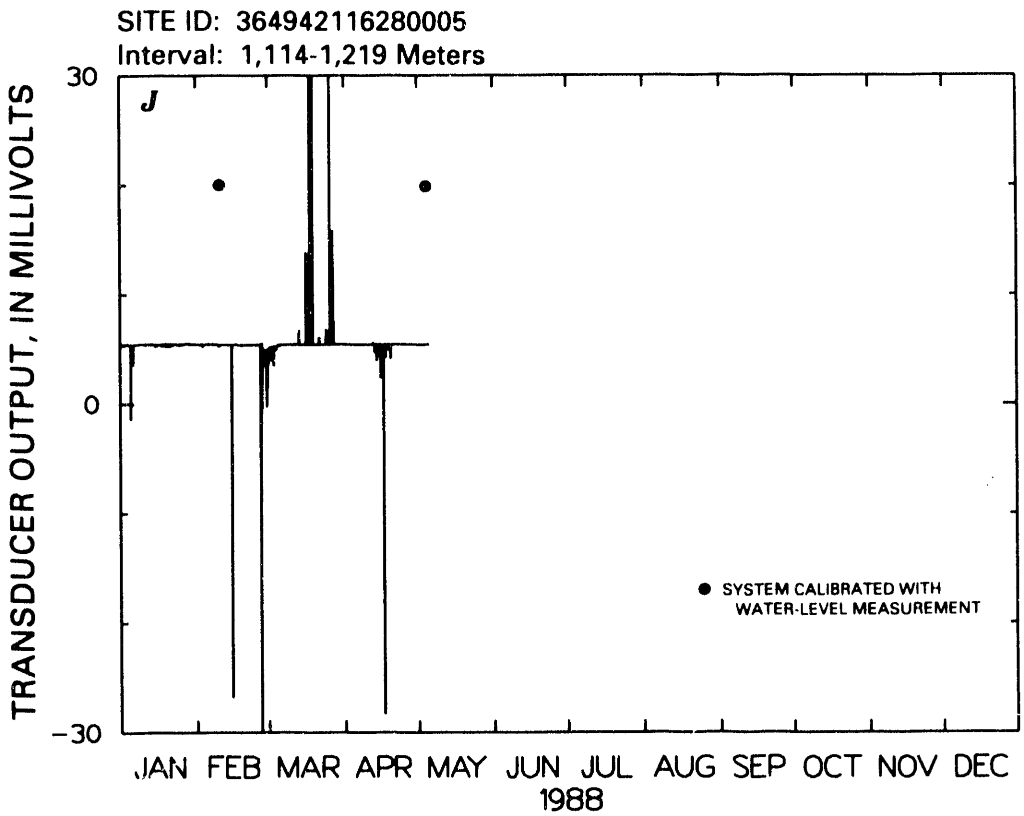


Figure 29.--Transducer output for well USW H-3.--Continued

Water-level altitude

Transducer output was converted to water-level altitude for the following periods:

Site ID: 364942116280004
Interval: 752-1,114 m (upper)

Beginning date	Ending date	Beginning date	Ending date
10-24-85	11-10-85	04-23-88	05-04-88
12-24-85	01-01-86	05-18-88	05-31-88
01-11-86	05-05-86	06-09-88	06-27-88
05-19-86	03-05-87	06-29-88	07-08-88
03-08-87	05-11-87	07-12-88	07-17-88
05-18-87	07-19-87	07-24-88	07-31-88
07-22-87	08-27-87	08-20-88	08-30-88
09-10-87	09-21-87	09-06-88	09-27-88
09-23-87	10-10-87	09-29-88	12-12-88
10-17-87	01-04-88	12-20-88	12-31-88

Site ID: 364942116280005
Interval: 1,114-1,219 m
No convertible data.

Within the convertible periods, water-level altitude is not available for short periods because of various problems:

Beginning date	Ending date	Reason
10-24-85	10-29-85	Data logger could not read transducer
02-01-86	02-01-86	Water in electrical connections
09-18-86	09-18-86	No barometric-pressure data available
06-22-87	06-22-87	Do.
08-06-87	08-07-87	Do.
09-16-87	09-16-87	Do.
12-22-87	12-22-87	Do.
10-17-88	10-20-88	No data, unknown reason

The water-level altitudes are shown in figure 30 and the daily mean water-level altitudes are given in table 12. Approximately 76 percent of the transducer output from the upper interval was converted to water-level altitude. The longest period was 291 days, May 19, 1986 through March 5, 1987. No transducer output from the lower interval was converted to water-level altitude.

From October 15, 1985 to May 5, 1988 in the upper interval, an absolute transducer was used to monitor water levels. This type of transducer responded not only to water-level changes, but also to barometric-pressure changes. Before the output from the absolute transducer was converted to water levels, the barometric-pressure effects were removed from the record using the procedure described in the "Adjustment for Absolute Transducer" section. The transducer output shown in figure 29 is before the barometric-pressure effects were removed from the record.

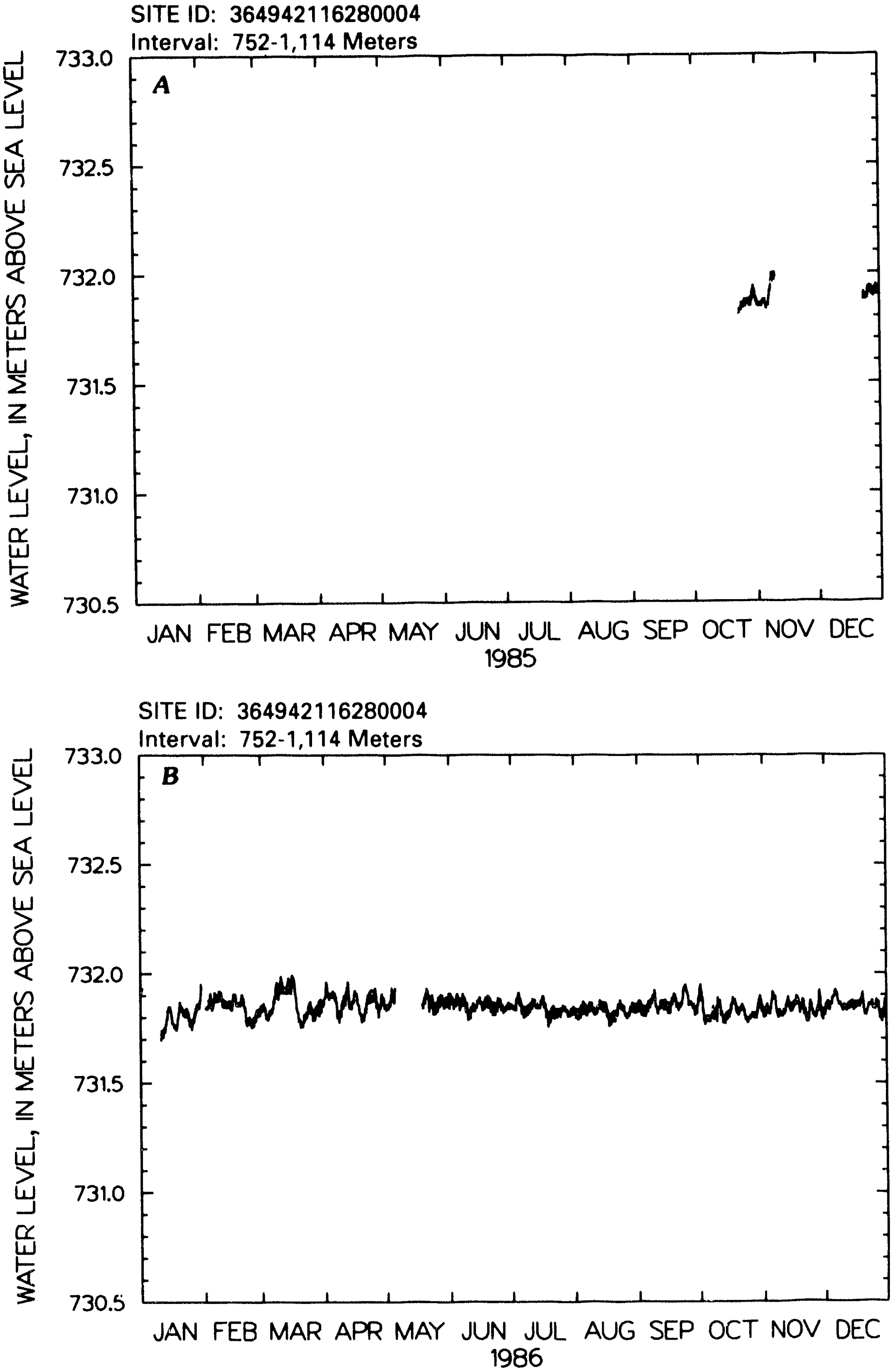


Figure 30.--Water-level altitude for well USW H-3.

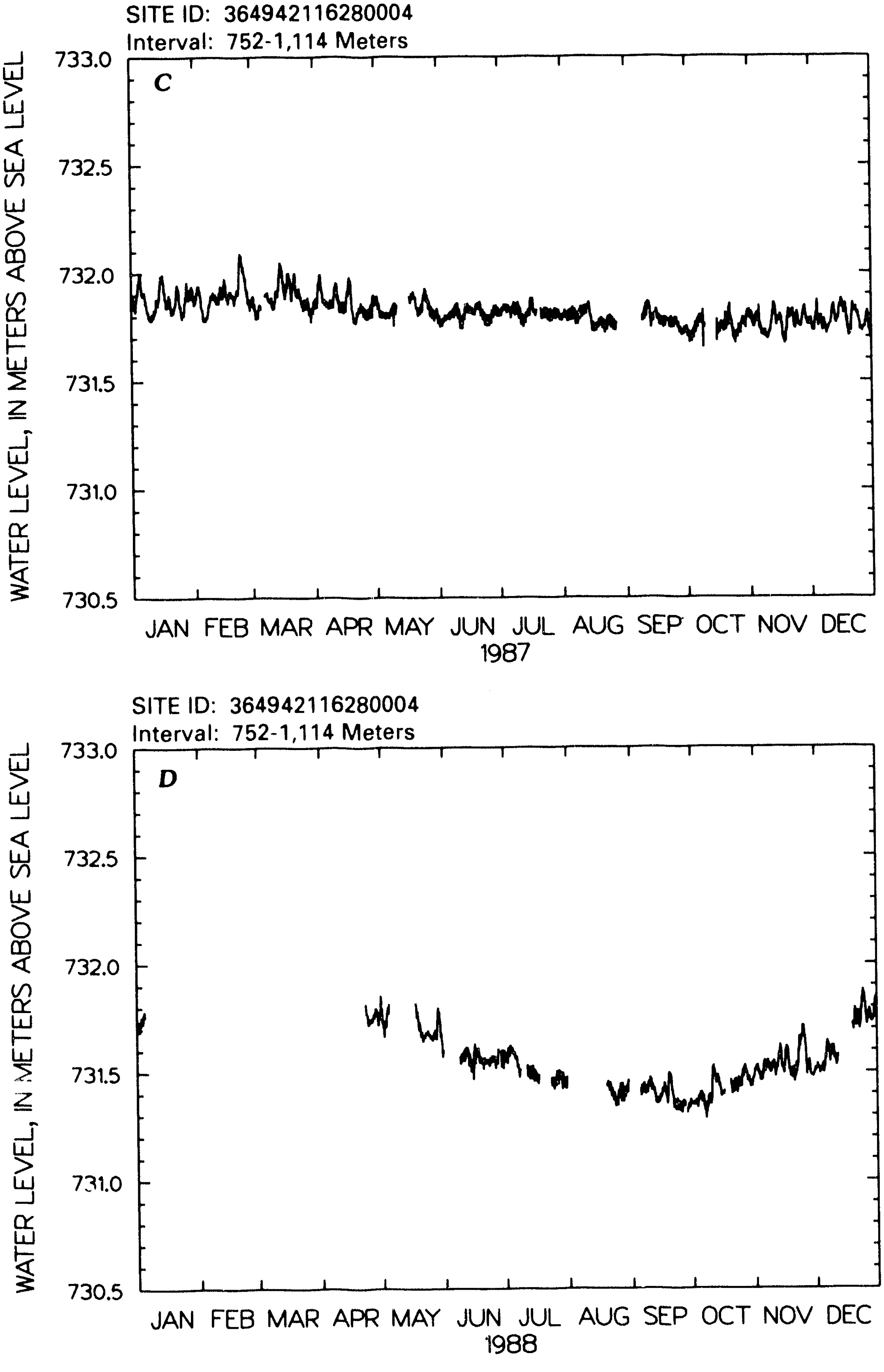


Figure 30.--Water-level altitude for well USW H-3.--Continued

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Centimeter

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 mm

1 2 3 4 5

Inches

1.0 1.1 1.25 1.4 1.6 1.8 2.0 2.2 2.5 2.8 3.2 3.6 4.0 4.5 5.0 5.6 6.3 7.1 8.0

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3 of 3

Table 12.--*Daily mean water-level altitude, in meters above sea level, for well USW H-3*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 752-1,190 m

Site ID: 364942116280004

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	---	---	---	---	---	---	---	---	---	---	731.88	---
2	---	---	---	---	---	---	---	---	---	---	731.85	---
3	---	---	---	---	---	---	---	---	---	---	731.85	---
4	---	---	---	---	---	---	---	---	---	---	731.86	---
5	---	---	---	---	---	---	---	---	---	---	731.87	---
6	---	---	---	---	---	---	---	---	---	---	731.85	---
7	---	---	---	---	---	---	---	---	---	---	731.87	---
8	---	---	---	---	---	---	---	---	---	---	731.94	---
9	---	---	---	---	---	---	---	---	---	---	731.97	---
10	---	---	---	---	---	---	---	---	---	---	731.99	---
11	---	---	---	---	---	---	---	---	---	---	---	---
12	---	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	---	---	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	---	---	---	---
21	---	---	---	---	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
23	---	---	---	---	---	---	---	---	---	---	---	---
24	---	---	---	---	---	---	---	---	---	---	---	731.89
25	---	---	---	---	---	---	---	---	---	---	---	731.89
26	---	---	---	---	---	---	---	---	---	---	---	731.92
27	---	---	---	---	---	---	---	---	---	---	---	731.92
28	---	---	---	---	---	---	---	---	---	---	---	731.91
29	---		---	---	---	---	---	---	---	---	---	731.92
30	---		---	---	---	---	---	---	---	731.89	---	731.93
31	---		---		---		---	---		731.92		731.92
MONTHLY												
MEAN	---	---	---	---	---	---	---	---	---	---	---	---
MAX	---	---	---	---	---	---	---	---	---	---	---	---
MIN	---	---	---	---	---	---	---	---	---	---	---	---

Table 12.--*Daily mean water-level altitude, in meters above sea level, for well USW H-3*--Continued

Interval: 752-1,190 m

Site ID: 364942116280004

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	731.92	---	731.84	731.90	731.84	731.89	731.85	731.83	731.85	731.90	731.83	731.82
2	---	731.84	731.85	731.92	731.85	731.88	731.84	731.82	731.86	731.91	731.81	731.85
3	---	731.86	731.81	731.89	731.87	731.86	731.85	731.82	731.84	731.84	731.84	731.86
4	---	731.87	731.80	731.90	731.89	731.88	731.89	731.83	731.83	731.79	731.83	731.86
5	---	731.86	731.82	731.90	731.90	731.88	731.88	731.85	731.83	731.79	731.84	731.88
6	---	731.90	731.83	731.89	---	731.86	731.84	731.84	731.85	731.79	731.90	731.91
7	---	731.88	731.88	731.83	---	731.88	731.83	731.83	731.86	731.80	731.88	731.90
8	---	731.90	731.94	731.81	---	731.88	731.83	731.84	731.88	731.81	731.83	731.87
9	---	731.89	731.91	731.83	---	731.85	731.83	731.85	731.90	731.82	731.82	731.86
10	---	731.86	731.96	731.87	---	731.81	731.84	731.83	731.86	731.85	731.82	731.84
11	731.72	731.86	731.94	731.89	---	731.82	731.86	731.82	731.83	731.86	731.81	731.84
12	731.74	731.86	731.92	731.93	---	731.84	731.86	731.83	731.85	731.82	731.83	731.84
13	731.77	731.85	731.93	731.87	---	731.84	731.85	731.85	731.86	731.79	731.86	731.85
14	731.83	731.85	731.94	731.86	---	731.85	731.84	731.86	731.86	731.79	731.87	731.86
15	731.83	731.90	731.93	731.88	---	731.87	731.85	731.85	731.86	731.81	731.84	731.86
16	731.78	731.87	731.98	731.91	---	731.87	731.88	731.85	731.84	731.82	731.84	731.85
17	731.76	731.86	731.93	731.87	---	731.85	731.86	731.82	731.85	731.85	731.86	731.86
18	731.75	731.86	731.85	731.83	---	731.86	731.83	731.79	---	731.87	731.88	731.86
19	731.81	731.89	731.80	731.79	731.86	731.88	731.79	731.79	731.89	731.86	731.86	731.87
20	731.85	731.86	731.77	731.80	731.89	731.87	731.81	731.81	731.86	731.83	731.84	731.88
21	731.83	731.80	731.77	731.84	731.91	731.86	731.83	731.81	731.85	731.83	731.86	731.82
22	731.82	731.78	731.80	731.89	731.87	731.85	731.82	731.83	731.85	731.84	731.83	731.82
23	731.83	731.78	731.81	731.90	731.88	731.84	731.81	731.85	731.89	731.83	731.78	731.85
24	731.80	731.77	731.85	731.90	731.85	731.86	731.82	731.85	731.94	731.80	731.81	731.86
25	731.77	731.78	731.84	731.91	731.84	731.87	731.82	731.84	731.91	731.78	731.85	731.85
26	731.78	731.80	731.81	731.87	731.86	731.85	731.84	731.81	731.87	731.80	731.81	731.84
27	731.82	731.82	731.82	731.83	731.87	731.84	731.84	731.80	731.86	731.81	731.80	731.86
28	731.84	731.83	731.84	731.86	731.88	731.84	731.83	731.82	731.85	731.80	731.84	731.83
29	731.85		731.84	731.88	731.87	731.85	731.81	731.84	731.83	731.81	731.88	731.80
30	---		731.84	731.86	731.87	731.85	731.82	731.85	731.84	731.86	731.81	731.82
31	---		731.87		731.88		731.83	731.84		731.87		731.86
MONTHLY MEAN	---	---	731.86	731.87	---	731.86	731.84	731.83	---	731.83	731.84	731.85
MAX	---	---	731.98	731.93	---	731.89	731.89	731.86	---	731.91	731.90	731.91
MIN	---	---	731.77	731.79	---	731.81	731.79	731.79	---	731.78	731.78	731.80

Table 12.--*Daily mean water-level altitude, in meters above sea level, for well USW H-3*--Continued

Interval: 752-1,190 m — Site ID: 364942116280004

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	731.88	731.87	731.87	731.86	731.87	731.80	731.82	731.79	---	731.74	731.81	731.77
2	731.85	731.91	731.86	731.87	731.86	731.77	731.82	731.80	---	731.72	731.80	731.76
3	731.87	731.92	731.81	731.96	731.82	731.77	731.83	731.80	---	731.70	731.78	731.74
4	731.94	731.86	731.81	731.95	731.81	731.78	731.84	731.80	---	731.71	731.77	731.79
5	731.97	731.80	731.84	731.88	731.80	731.79	731.84	731.81	---	731.73	731.80	731.81
6	731.90	731.78	---	731.87	731.80	731.80	731.83	---	---	731.75	731.78	731.77
7	731.90	731.80	---	731.85	731.80	731.81	731.82	---	---	731.77	731.74	731.77
8	731.84	731.85	731.90	731.85	731.81	731.81	731.84	731.80	---	731.78	731.72	731.76
9	731.80	731.89	731.89	731.85	731.82	731.82	731.84	731.79	---	731.78	731.72	731.74
10	731.79	731.89	731.87	731.87	731.84	731.84	731.84	731.81	731.79	731.75	731.70	731.73
11	731.80	731.88	731.86	731.93	731.84	731.82	731.82	731.82	731.83	---	731.71	731.75
12	731.82	731.87	731.85	731.90	---	731.78	731.79	731.82	731.85	---	731.74	731.80
13	731.87	731.91	731.90	731.85	---	731.77	731.78	731.83	731.84	---	731.81	731.84
14	731.89	731.90	731.94	731.84	---	731.81	731.79	731.85	731.79	---	731.84	731.78
15	731.98	731.94	732.03	731.85	---	731.84	731.81	731.81	731.79	---	731.77	731.79
16	731.96	731.92	731.97	731.85	---	731.83	731.84	731.75	---	---	731.79	731.84
17	731.89	731.88	731.91	731.92	---	731.83	731.88	731.75	731.80	731.73	731.79	731.86
18	731.86	731.91	731.95	731.96	731.88	731.82	731.83	731.75	731.78	731.74	731.72	731.83
19	731.88	731.90	731.98	731.86	731.89	731.82	731.81	731.76	731.78	731.76	731.69	731.82
20	731.83	731.88	731.91	731.79	731.89	731.85	---	731.78	731.77	731.75	731.75	731.75
21	731.83	731.90	731.95	731.78	731.85	731.85	---	731.77	731.78	731.75	731.81	731.73
22	731.86	731.92	731.95	731.81	731.82	---	731.81	731.75	---	731.78	731.81	---
23	731.93	732.06	731.90	731.83	731.83	731.81	731.82	731.77	731.77	731.79	731.80	731.83
24	731.88	732.05	731.91	731.84	731.85	731.79	731.82	731.78	731.77	731.75	731.76	731.82
25	731.82	732.00	731.87	731.83	731.90	731.79	731.81	731.78	731.77	731.70	731.80	731.80
26	731.81	731.94	731.85	731.81	731.89	731.79	731.81	731.76	731.78	731.70	731.76	731.75
27	731.87	731.88	731.85	731.81	731.86	731.80	731.81	731.76	731.76	731.73	731.76	731.73
28	731.92	731.85	731.86	731.82	731.83	731.82	731.81	---	731.73	731.74	731.82	731.75
29	731.90		731.83	731.85	731.82	731.83	731.82	---	731.72	731.78	731.81	731.79
30	731.92		731.81	731.87	731.81	731.83	731.81	---	731.73	---	731.77	731.78
31	731.90		731.84		731.82		731.80	---		731.80		731.72
MONTHLY												
MEAN	731.88	731.90	---	731.86	---	---	---	---	---	---	731.77	---
MAX	731.98	732.06	---	731.96	---	---	---	---	---	---	731.84	---
MIN	731.79	731.78	---	731.78	---	---	---	---	---	---	731.69	---

Table 12.--*Daily mean water-level altitude, in meters above sea level, for well USW H-3*--Continued

Interval: 752-1,190 m

Site ID: 364942116280004

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	731.70	—	—	—	731.75	—	731.57	—	—	731.35	731.49	731.51
2	731.72	—	—	—	731.70	—	731.57	—	—	731.35	731.52	731.52
3	731.74	—	—	—	731.74	—	731.60	—	—	731.35	731.50	731.51
4	731.76	—	—	—	731.79	—	731.61	—	—	731.36	731.47	731.51
5	—	—	—	—	—	—	731.59	—	—	731.39	731.48	731.52
6	—	—	—	—	—	—	731.57	—	731.42	731.39	731.53	731.54
7	—	—	—	—	—	—	731.53	—	731.43	731.36	731.53	731.62
8	—	—	—	—	—	—	731.50	—	731.41	731.32	731.53	731.59
9	—	—	—	—	—	731.56	—	—	731.42	731.36	731.51	731.59
10	—	—	—	—	—	731.57	—	—	731.45	731.37	731.53	731.60
11	—	—	—	—	—	731.58	—	—	731.44	731.43	731.53	731.56
12	—	—	—	—	—	731.60	731.50	—	731.41	731.50	731.51	731.55
13	—	—	—	—	—	731.56	731.50	—	731.37	731.46	731.56	—
14	—	—	—	—	—	731.53	731.51	—	731.36	731.46	731.60	—
15	—	—	—	—	—	731.54	731.49	—	731.37	731.42	731.52	—
16	—	—	—	—	—	731.59	731.48	—	731.40	731.39	731.52	—
17	—	—	—	—	—	731.59	731.47	—	731.43	—	731.60	—
18	—	—	—	—	731.78	731.57	—	—	731.40	—	731.55	—
19	—	—	—	—	731.72	731.55	—	—	731.41	—	731.49	—
20	—	—	—	—	731.69	731.55	—	731.44	731.48	—	731.49	731.71
21	—	—	—	—	731.66	731.55	—	731.43	731.42	731.42	731.49	731.75
22	—	—	—	—	731.67	731.55	—	731.41	731.36	731.44	731.52	731.74
23	—	—	—	731.78	731.68	731.55	—	731.39	731.35	731.44	731.61	731.73
24	—	—	—	731.73	731.68	731.56	731.46	731.36	731.35	731.44	731.65	731.80
25	—	—	—	731.73	731.66	731.56	731.45	731.38	731.34	731.45	731.70	731.86
26	—	—	—	731.74	731.66	731.55	731.47	731.41	731.34	731.48	731.63	731.78
27	—	—	—	731.77	731.68	731.57	731.48	731.41	731.35	731.51	731.52	731.74
28	—	—	—	731.78	731.70	—	731.49	731.40	—	731.49	731.53	731.77
29	—	—	—	731.74	731.77	731.58	731.47	731.41	731.33	731.47	731.49	731.73
30	—		—	731.79	731.69	731.57	731.46	731.43	731.35	731.45	731.48	731.76
31	—		—		731.60		731.45	—		731.45		731.82
MONTHLY												
MEAN	—	—	—	—	—	—	—	—	—	—	731.54	—
MAX	—	—	—	—	—	—	—	—	—	—	731.70	—
MIN	—	—	—	—	—	—	—	—	—	—	731.47	—

Well USW H-4

Information about the history of well USW H-4 and about previous data from the well was obtained from various sources. These sources are: Whitfield and others (1984); Whitfield and others (1985); Robison (1984, 1986); Robison and others (1988); Erickson and Waddell (1985); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1987a, c).

Well specifications

The following are specifications for well USW H-4:

1. Location and identification:

   Latitude and longitude: 36°50'32" N.; 116°26'54" W.
   Nevada State Central Zone Coordinates (m): N 232,149; E 171,880.
   U.S. Geological Survey Site ID's:
   365032116265401 (entire well)
   365032116265402 (upper interval)
   365032116265403 (lower interval)

2. Drilling and casing information:

   Well started: March 22, 1982.
   Well completed: June 7, 1982.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; selected core obtained.
   Bit diameter below water level: 222 mm.
   Casing extending below water level: 253 mm diameter to 560.5 m, perforated below the water level.
   Total drilled depth: 1,219 m.

3. Access to and description of interval for measuring water levels:

   48-mm inside-diameter open ended tubing, extending from land surface to depth of 525 m; upper interval of well near water table to top of inflatable packer within the Prow Pass, Bullfrog, and Tram Members of the Crater Flat Tuff, and the Lithic Ridge (upper part) Tuff; Site ID: 365032116265402.
   62-mm inside-diameter tubing, extending from surface to inflatable packer on bottom end at a depth of 1,188 m; within lower interval of well, Lithic Ridge (lower part) Tuff; Site ID: 365032116265403.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,248.74 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.06 m, based on depth to water of 518 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from June 7, 1982 through 1984. Beginning in 1984, barometric pressure and water level have been monitored continuously using a recording barometer and downhole pressure transducers with a data logger at the land surface. Data were recorded on a paper tape from 1984 through February 1985. Data has been recorded electronically since February 1985.

The following transducers were used in well USW H-4:

Site ID: 365032116265402
Interval: 518-1,181 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
02-14-85	03-12-85	Absolute	Psi-Tronix	15	1858
03-12-85	05-02-86	Gage	Psi-Tronix	15	1952
05-02-86	05-31-88	Gage	Druck PDCR 10/D	10	144605
06-02-88	12-31-88	Gage	Druck 930	10	226106

Site ID: 365032116265403
Interval: 1,181-1,219 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
02-14-85	09-11-85	Gage	Psi-Tronix	15	1840
09-11-85	06-25-86	Gage	Psi-Tronix	15	1849
06-25-86	10-16-87	Gage	Druck PDCR 10/D	10	139271
10-16-87	01-13-88	Gage	Druck PDCR 10/D	10	164687
01-14-88	05-31-88	Gage	Druck PDCR 10/D	21	89451
06-01-88	12-31-88	Gage	Druck 930	10	226105

The following calibrations of the water-level monitoring system were performed in well USW H-4. The calibration made October 8, 1987 on the transducer in the upper interval had a lower than usual coefficient of determination and may have indicated that, at that time, the transducer was malfunctioning. This calibration was not used in converting the transducer output to water levels.

Site ID: 365032116265402
Interval: 518-1,181 meters
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1858	02-14-85	-4.310	1.000	02-14-85	730.21
1952	03-12-85	-4.308	1.000	03-12-85	730.16
1952	09-09-85	-4.169	0.998	09-09-85	730.35
1952	09-09-85	-3.854	.996	09-09-85	730.35
144605	05-09-86	-6.357	1.000	05-09-86	730.28
144605	10-08-87	-5.374	0.988	--	--
144605	01-13-88	-6.333	1.000	01-13-88	730.30
226106	06-02-88	-6.547	1.000	06-02-88	730.30
226106	10-12-88	-6.695	1.000	10-12-88	730.33

Site ID: 365032116265403
Interval: 1,181-1,219 meters

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1840	02-14-85	-4.431	1.000	02-14-85	730.24
1849	09-11-85	-3.852	0.996	09-10-85	730.44
139271	06-30-86	-6.044	.998	06-27-86	730.46
164687	10-16-87	-7.902	.997	10-16-87	730.52
89451	01-14-88	-3.049	1.000	01-14-88	730.16
226105	06-01-88	-6.302	0.999	06-01-88	730.24
226105	10-12-88	-6.670	1.000	10-12-88	730.27

Transducer output

Transducer output from February 1985 through December 1988 is shown in figure 31. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 1858), in use in February and March 1985 in the upper interval (Site ID: 365032116265402), was set 6.1 m below the water surface. Output decreased rapidly downward and the transducer was replaced within 1 month of its installation (fig. 31-A). The second transducer (serial number 1952), in use between March 1985 and May 1986, also was set 6.1 m below the water surface (fig. 31-A). In September 1985, this transducer was reset 1.5 m below the water's surface. This transducer produced periods of reasonable output but with considerable drift and periods of rapid offset. The offsets (for example on June 9, June 30, and October 15, 1985, fig. 31-A) generally do not correspond to a change in position of the transducer although the offset on September 9, 1985, does correspond to a change in position. The third transducer (serial number 144605), in use between May 1986 and May 1988, initially produced some very erratic readings but after calibration 3 days later, produced reasonable output (fig. 31-C, 31-D, and 31-E). There is no indication of a loose connection in the logbook, but the erratic readings may have been a result of a loose connection that was tightened after calibration. The fourth transducer (serial number 226106), in use after June 1988, produced some periods of reasonable output but also produced numerous periods of erratic-looking output (fig. 31-E).

The first transducer (serial number 1840), in use between February and September 1985 in the lower interval (Site ID: 365032116265403), was set 6.1 m below the water surface. This transducer produced output that had a large amount of downward drift with some major offsets (fig. 31-F). Within this drift, there are some periods where the output looks reasonable. The second transducer (serial number 1849), in use between September 1985 and June 1986, produced a few weeks of reasonable output but with strong downward drift before producing very erratic readings (fig. 31-F and 31-G). The transducer then produced output that contained high-frequency, low-amplitude changes in output with some higher-amplitude changes and offsets. The third transducer (serial number 139271), in use between June 1986 and October 1987, produced reasonable output for about 5 months (fig 31-H). In late November, 1986, the record seemed to change character and by early December the output became very erratic (fig. 31-G and 31-H). During 1987, the output contained many high-frequency changes and significant offsets (fig. 31-I). The fourth transducer (serial number 164687), in use between October 1987 and January 1988, produced a few periods of reasonable output with periods of erratic output. There are offsets in the output (for example, on December 2 and December 10, 1987, fig. 31-I) that do not correspond to a visit to the site by field personnel. The fifth transducer (serial number 89451), in use between January and May 1988, produced reasonable output interspersed with small but rapid offsets or low-amplitude spikes (fig. 31-J). The sixth transducer (serial number 226105), in use beginning in June 1988, produced generally reasonable output until late December with the exception of a several-day period in late August (fig. 31-J).

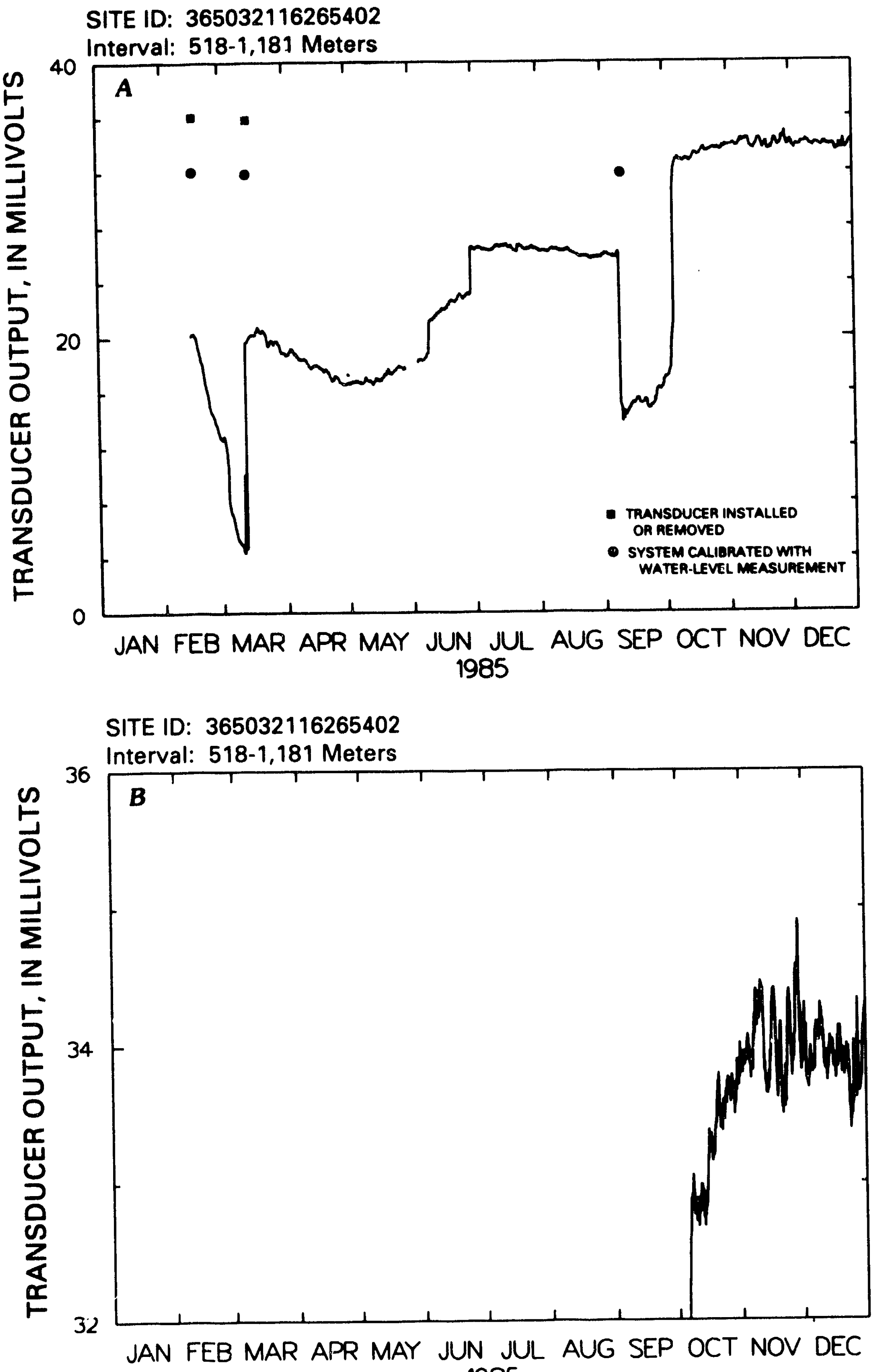


Figure 31.--Transducer output for well USW H-4.

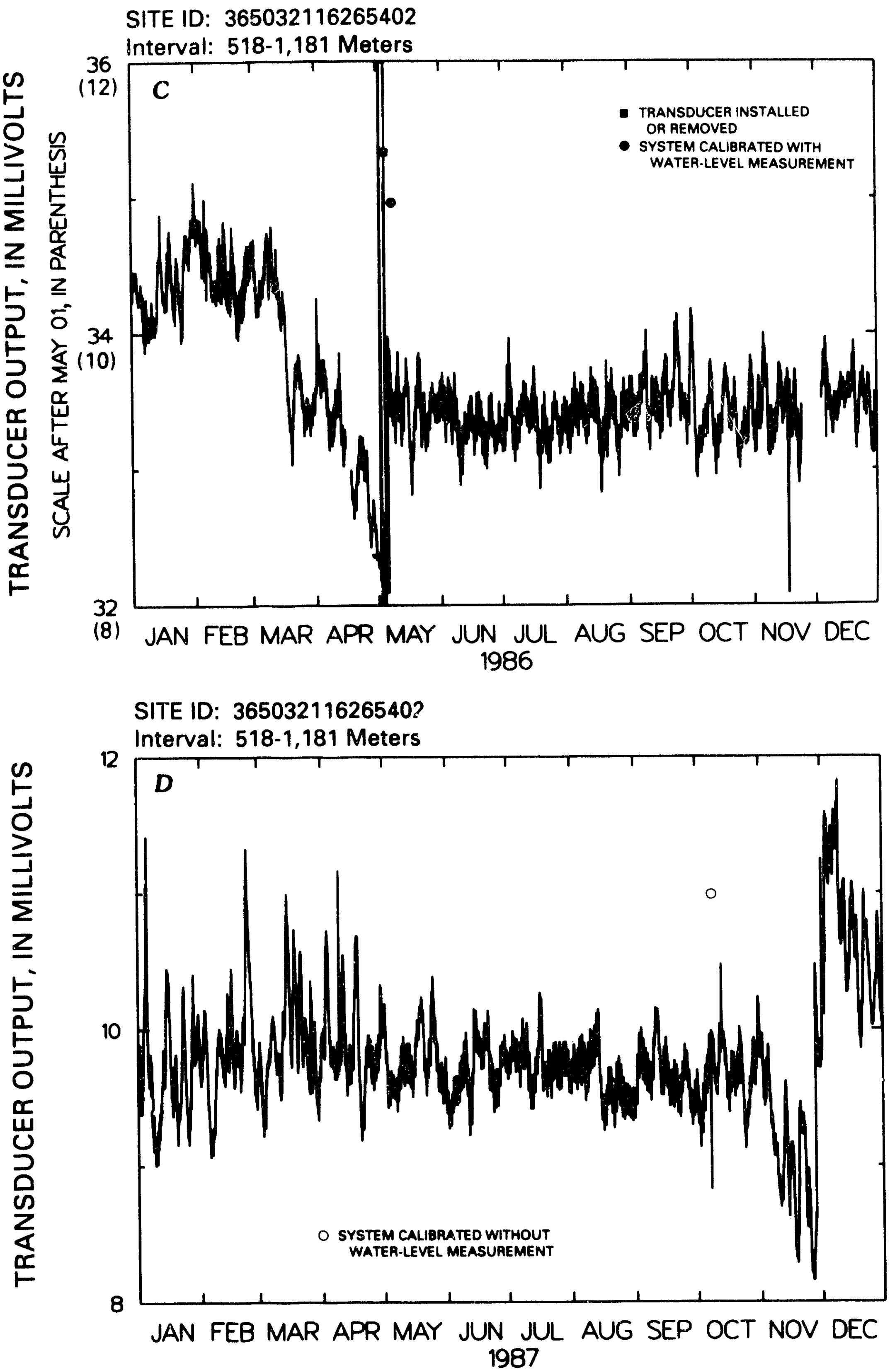


Figure 31.--Transducer output for well USW H-4.--Continued

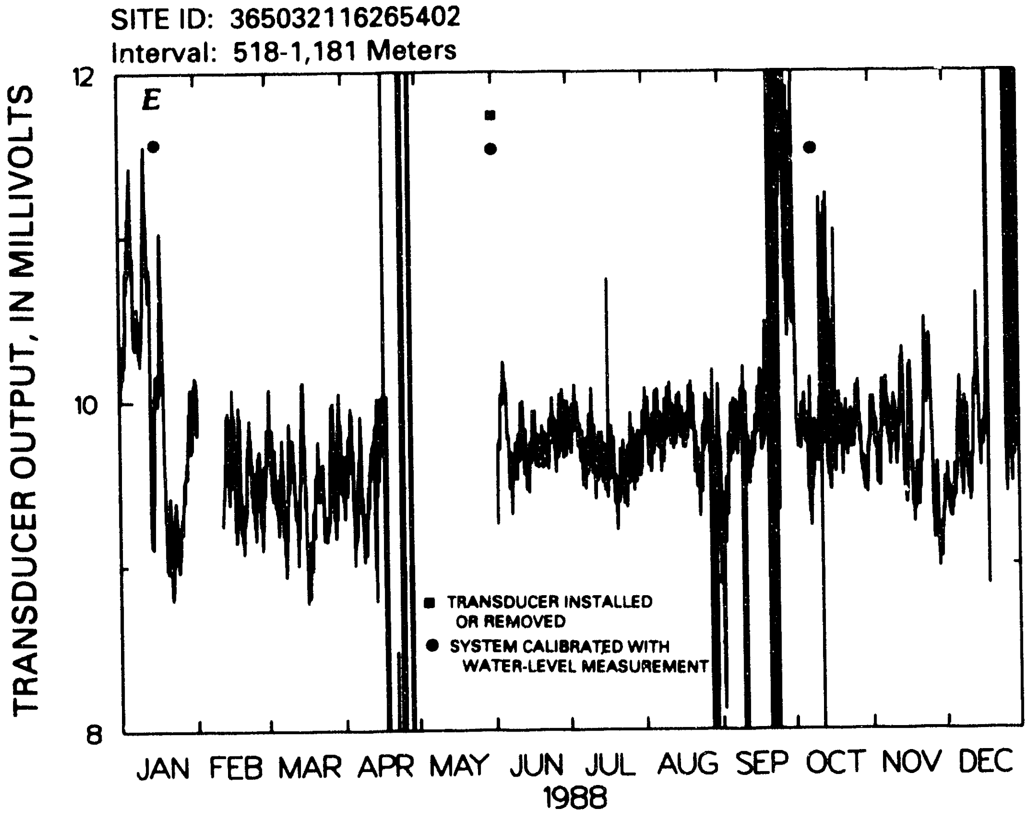
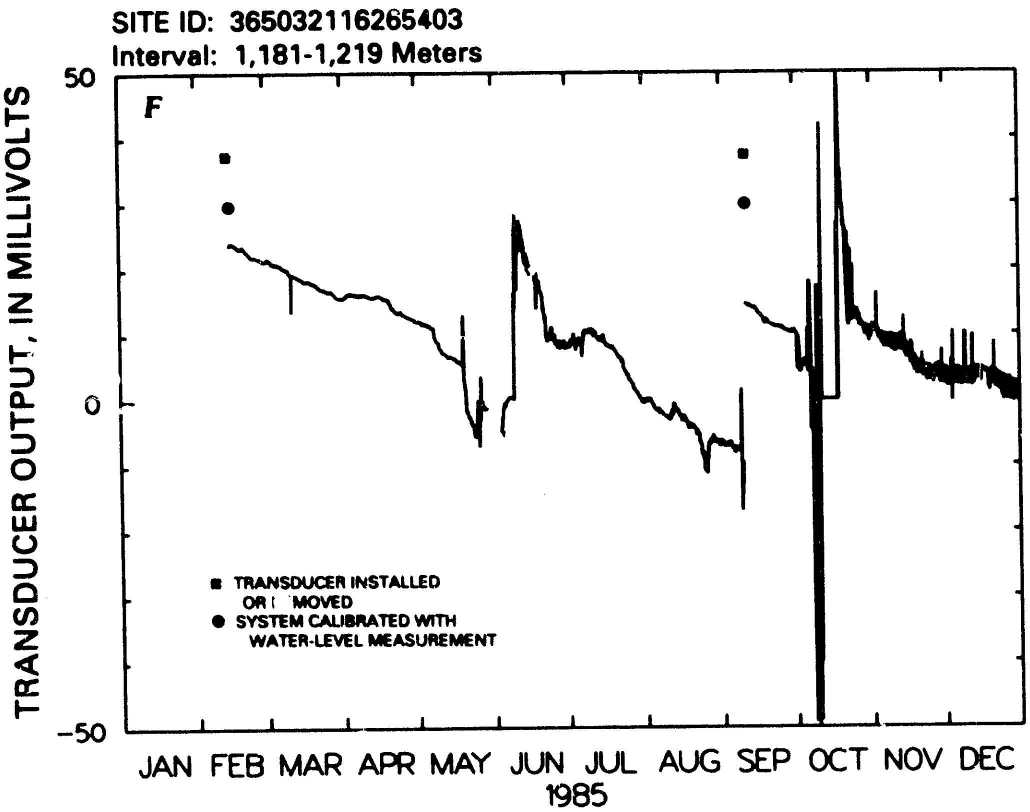


Figure 31.--Transducer output for well USW H-4.--Continued



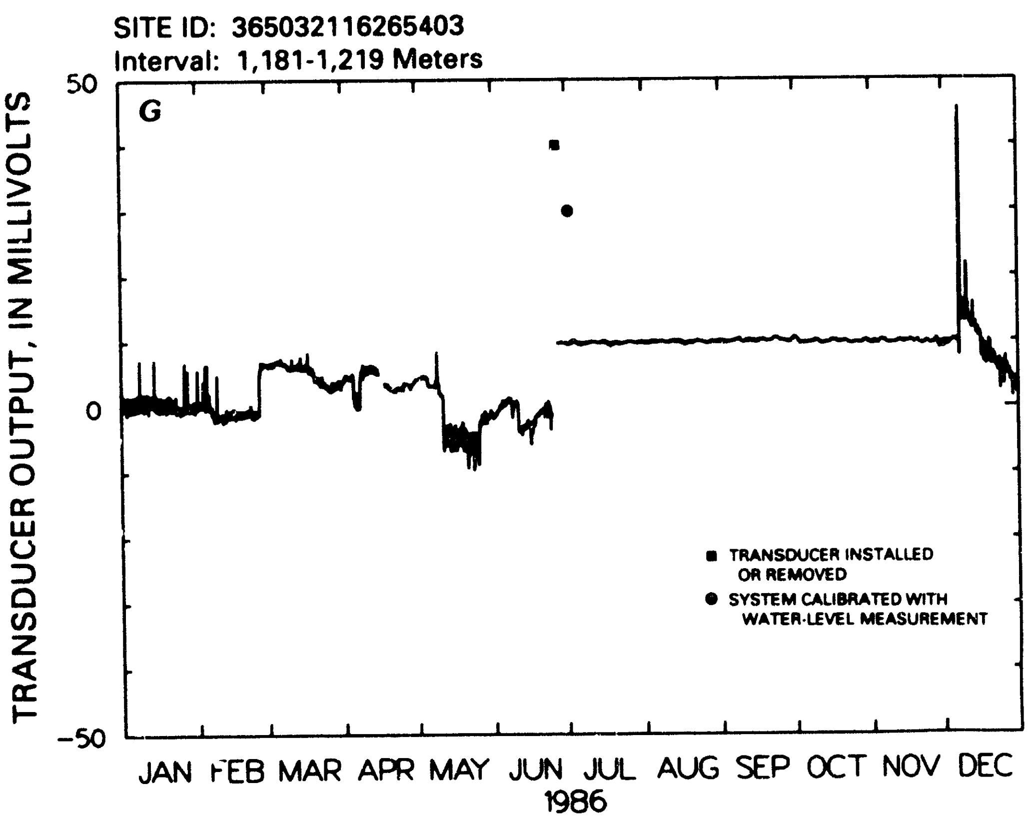
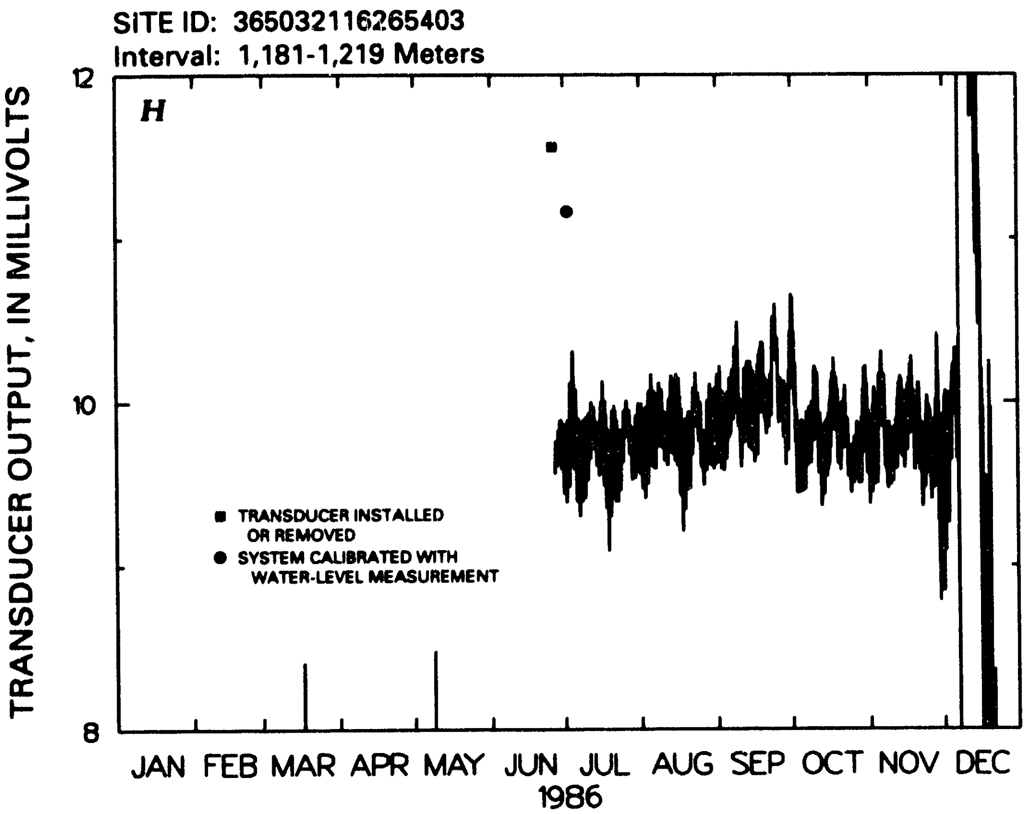


Figure 31.--Transducer output for well USW H-4.--Continued



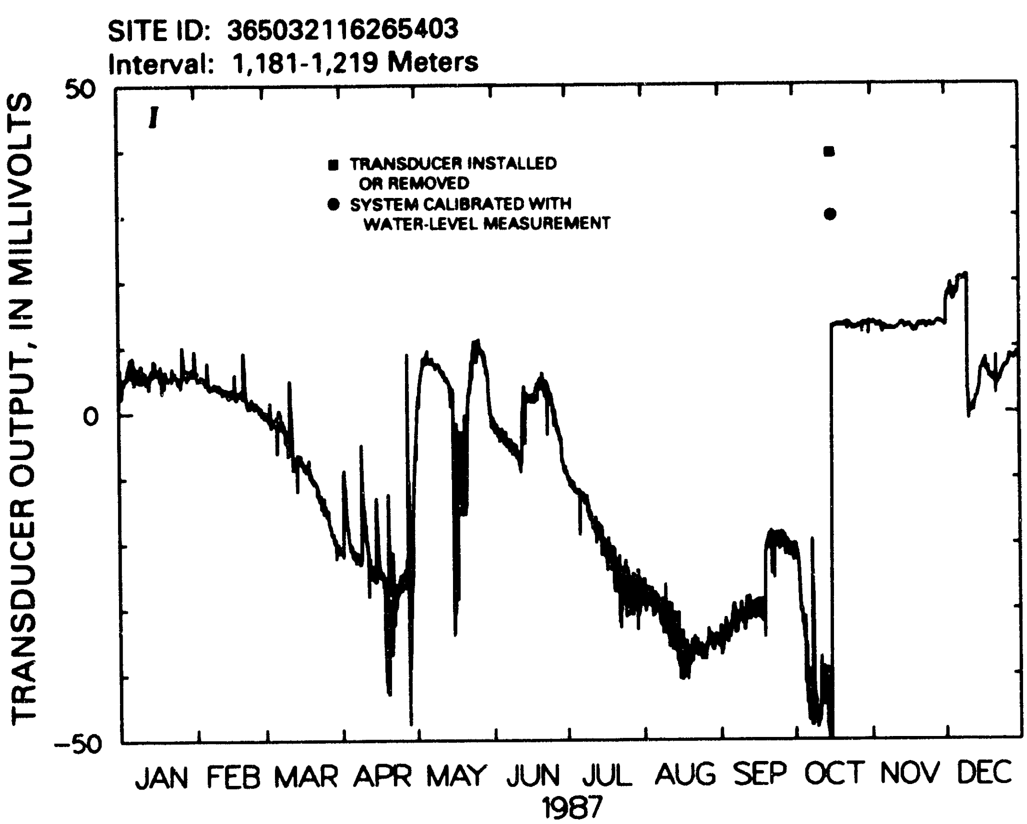


Figure 31.--Transducer output for well USW H-4.--Continued

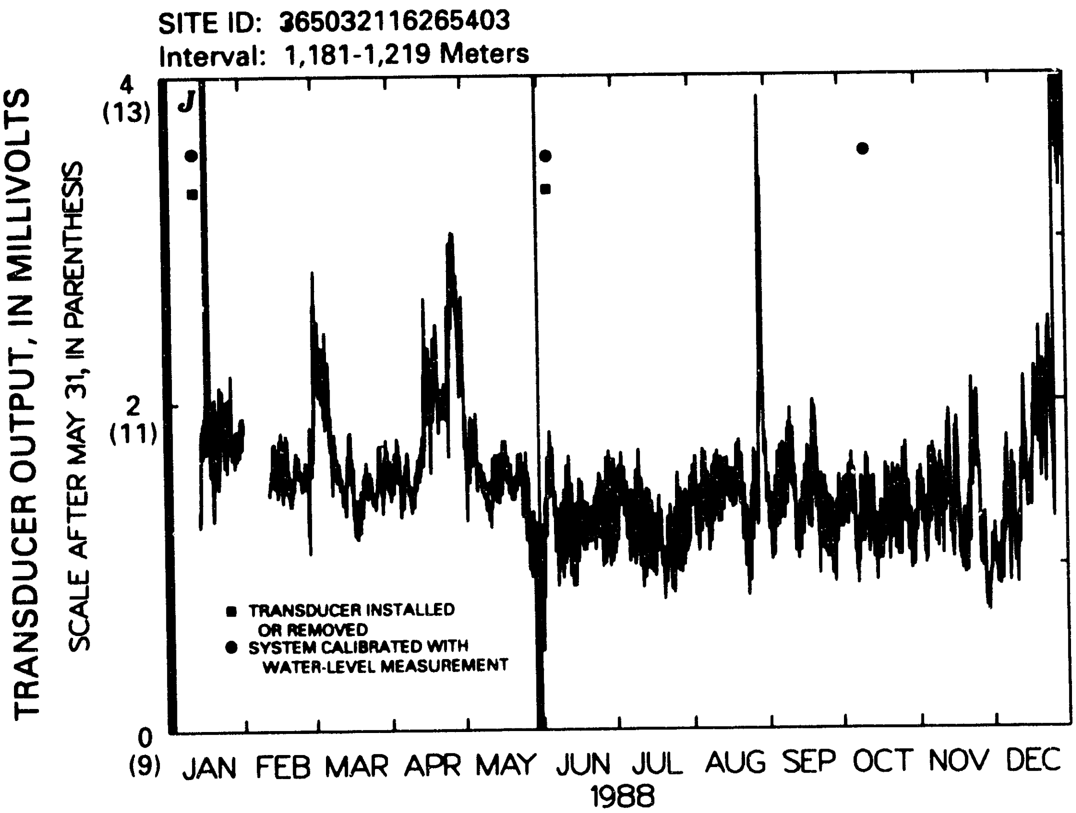


Figure 31.--Transducer output for well USW H-4.--Continued

Water-level altitude

Transducer output was converted to water-level altitude for the following periods:

Site ID: 365032116265402
Interval: 518-1,181 m

Beginning date	Ending date	Beginning date	Ending date
03-13-85	06-08-85	04-10-87	10-07-87
06-11-85	06-29-85	10-09-87	11-27-87
07-01-85	09-08-85	12-11-87	01-31-88
09-13-85	09-29-85	02-12-88	04-12-88
10-08-85	12-22-85	06-03-88	07-16-88
01-01-86	02-11-86	07-18-88	08-27-88
03-01-86	05-01-86	09-12-88	09-20-88
05-06-86	11-16-86	10-19-88	12-17-88
12-08-86	04-08-87		

Site ID: 365032116265403
Interval: 1,181-1,219 m

Beginning date	Ending date
02-14-85	03-10-85
03-12-85	05-07-85
09-11-85	09-30-85
06-27-86	11-28-86
11-07-87	12-01-87
01-28-88	01-30-88
02-13-88	02-26-88
03-12-88	04-13-88
05-02-88	05-23-88
06-02-88	08-27-88
09-01-88	12-26-88

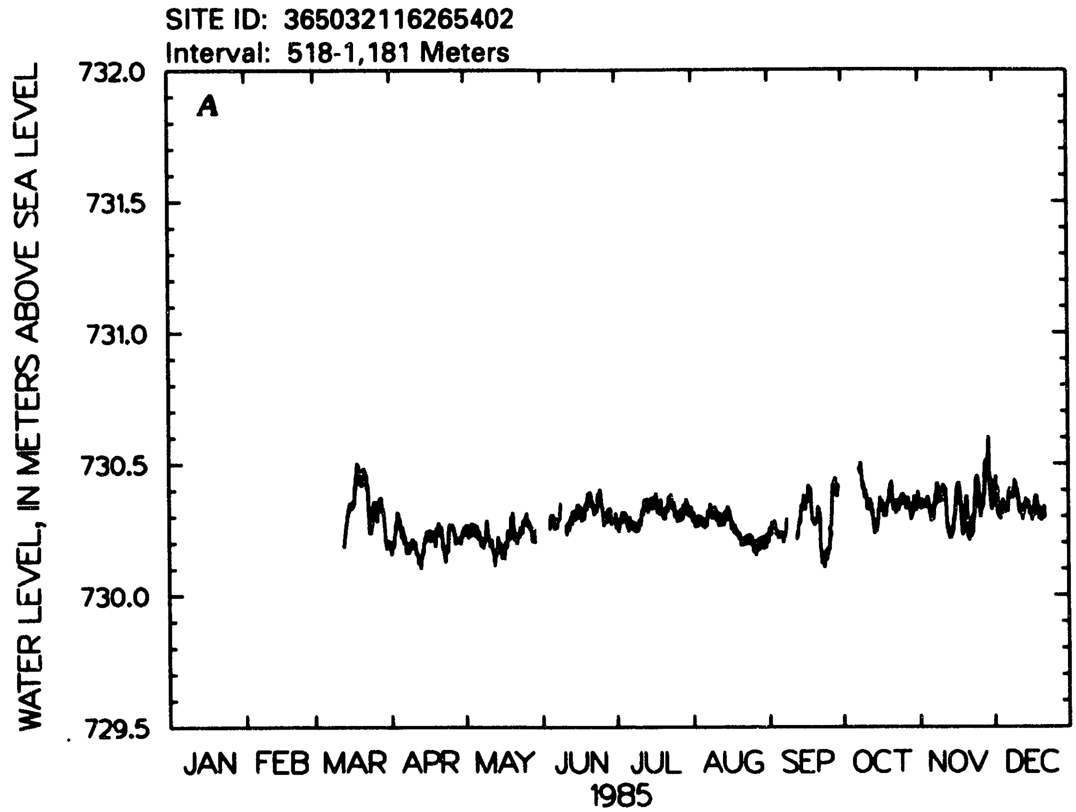
Within the convertible periods, water-level altitude is not available for various periods in the upper interval:

Beginning date	Ending date	Reason
05-29-85	06-04-85	No data recorded due to site visit on 05-28-85
04-15-86	04-17-86	No data recorded due to site visit on 04-15-86
12-22-87	12-22-87	Transducer was being tested
02-12-88	02-12-88	Error in programming data logger
11-26-88	11-26-88	Data logger could not read transducer

On March 12, 1985, the data logger was producing erratic output for a few hours; transducer output for the lower interval was not converted to water-level altitude during this time. On June 27, 1986 and November 26 and December 24-25, 1988, the data logger could not read the transducer in the lower interval.

The water-level altitudes are shown in figure 32 and the daily mean water-level altitudes are given in table 13. Approximately 84 percent of the transducer output from the upper interval was converted to water-level altitude. The longest period was 195 days, May 6 through November 16, 1986. Approximately 39 percent of the transducer output from the lower interval was converted to water-level altitude. The longest period was 155 days, June 27 through November 28, 1986.

From February 14, 1985 to March 12, 1985 in the upper interval, an absolute transducer was used to monitor water levels. This type of transducer responded not only to water-level changes, but also to barometric-pressure changes. Before the output from the absolute transducer was converted to water levels, the barometric-pressure effects were removed from the record using the procedure described in the "Adjustment for Absolute Transducer" section. The transducer output shown in figure 31 is before the barometric-pressure effects were removed from the record.



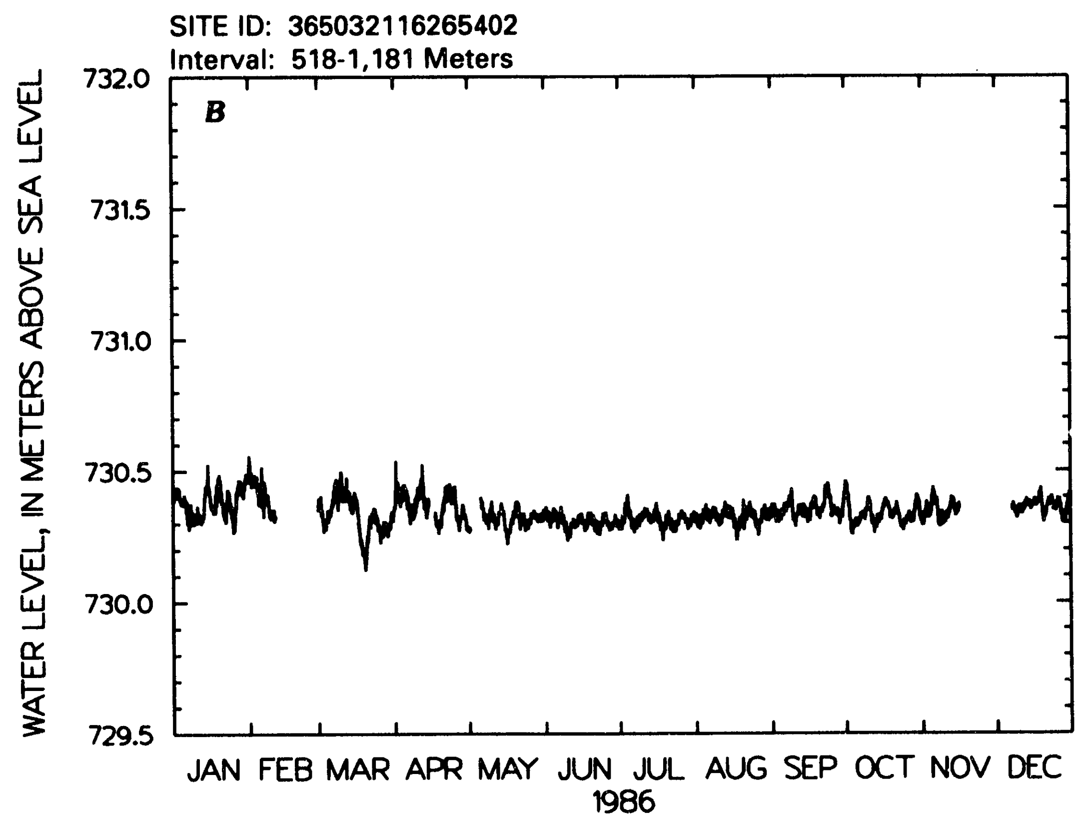
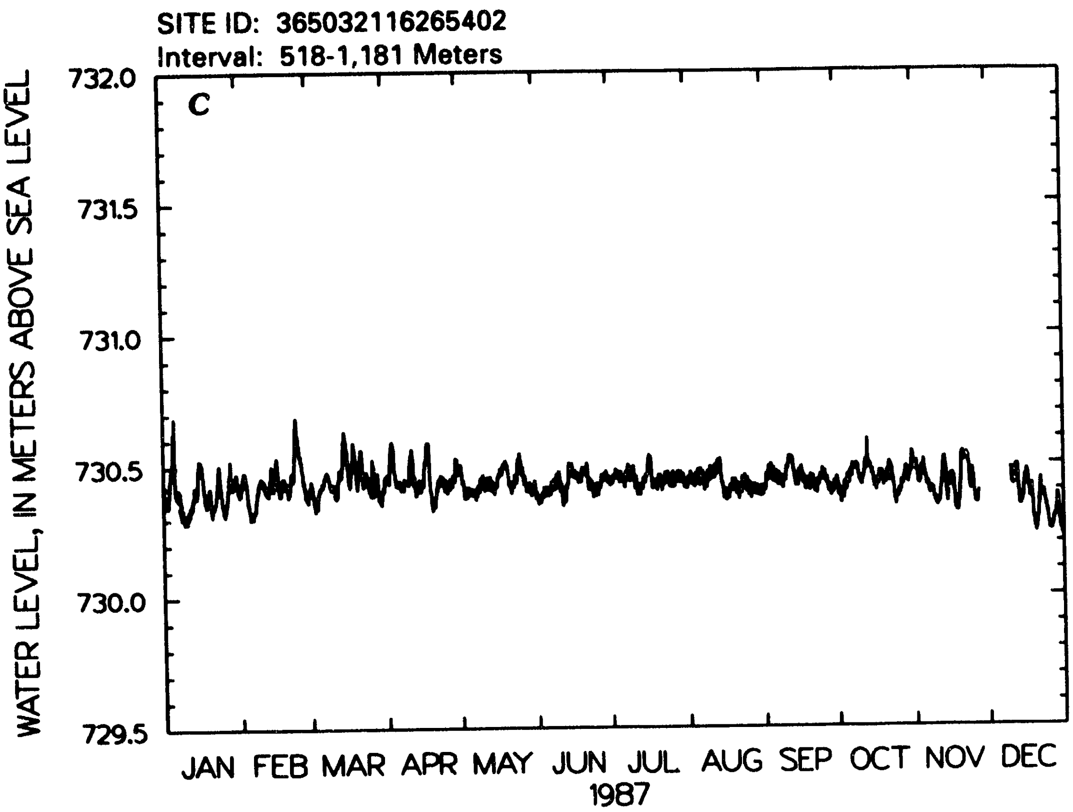


Figure 32.--Water-level altitude for well USW H-4.



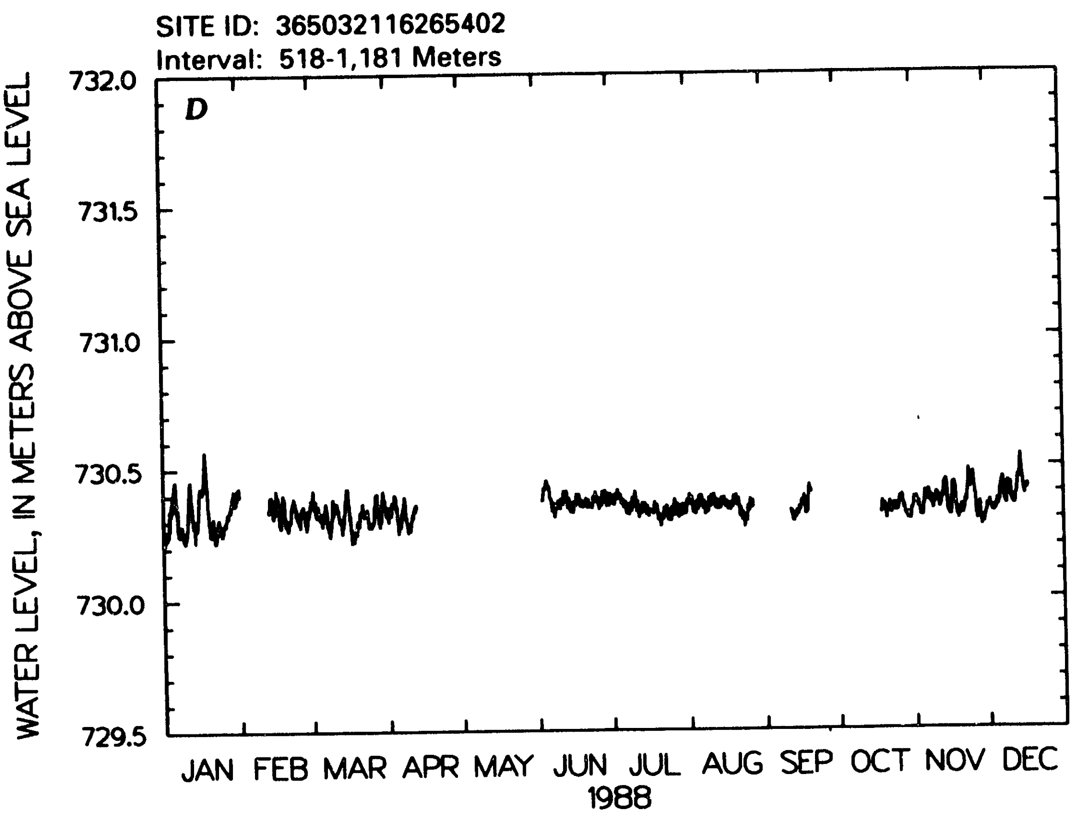
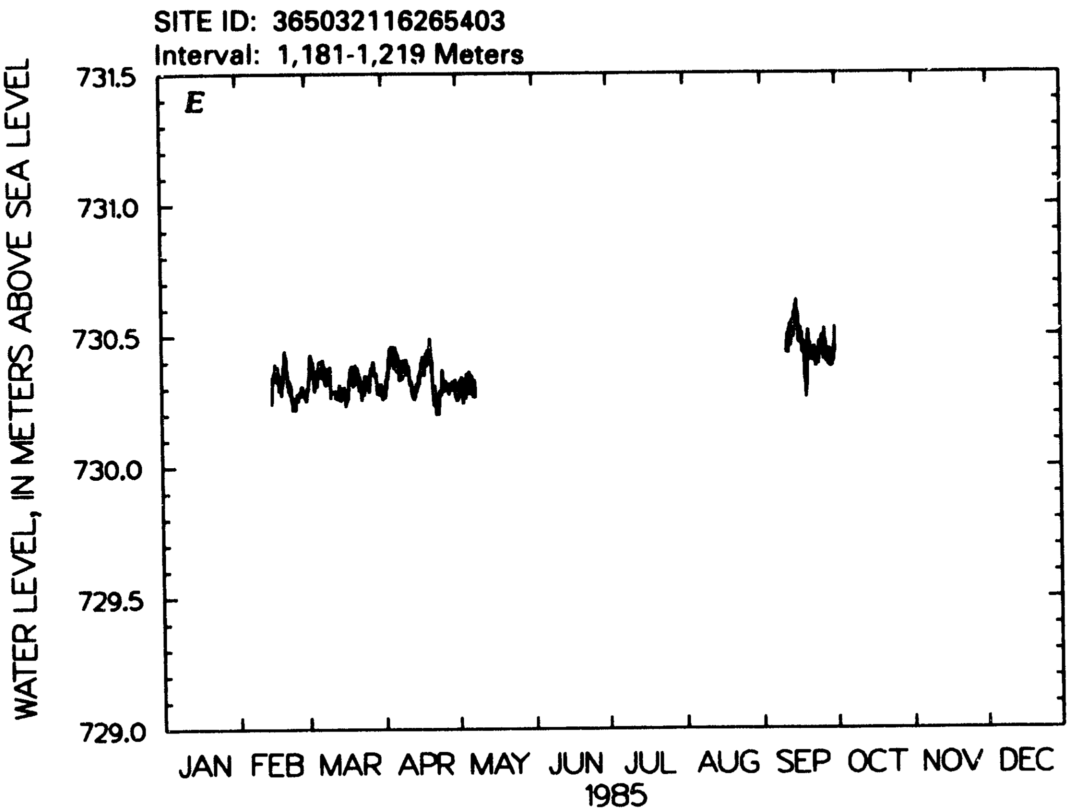


Figure 32.--Water-level altitude for well USW H-4.--Continued



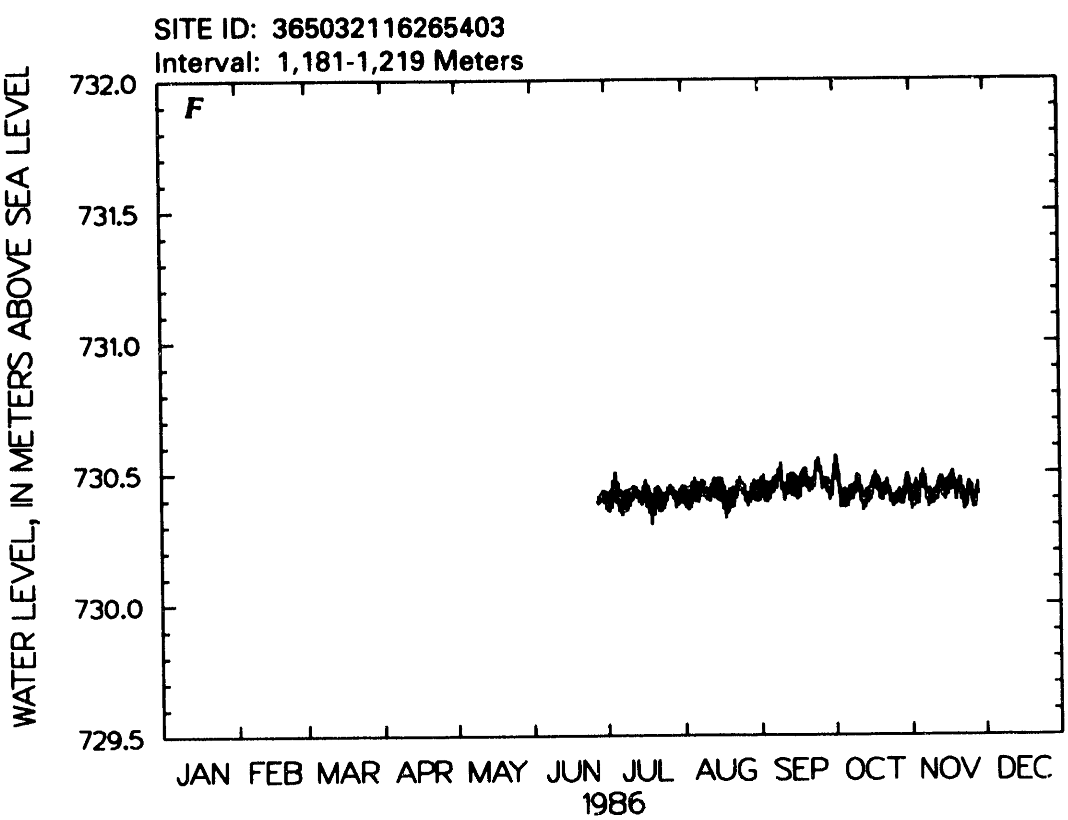
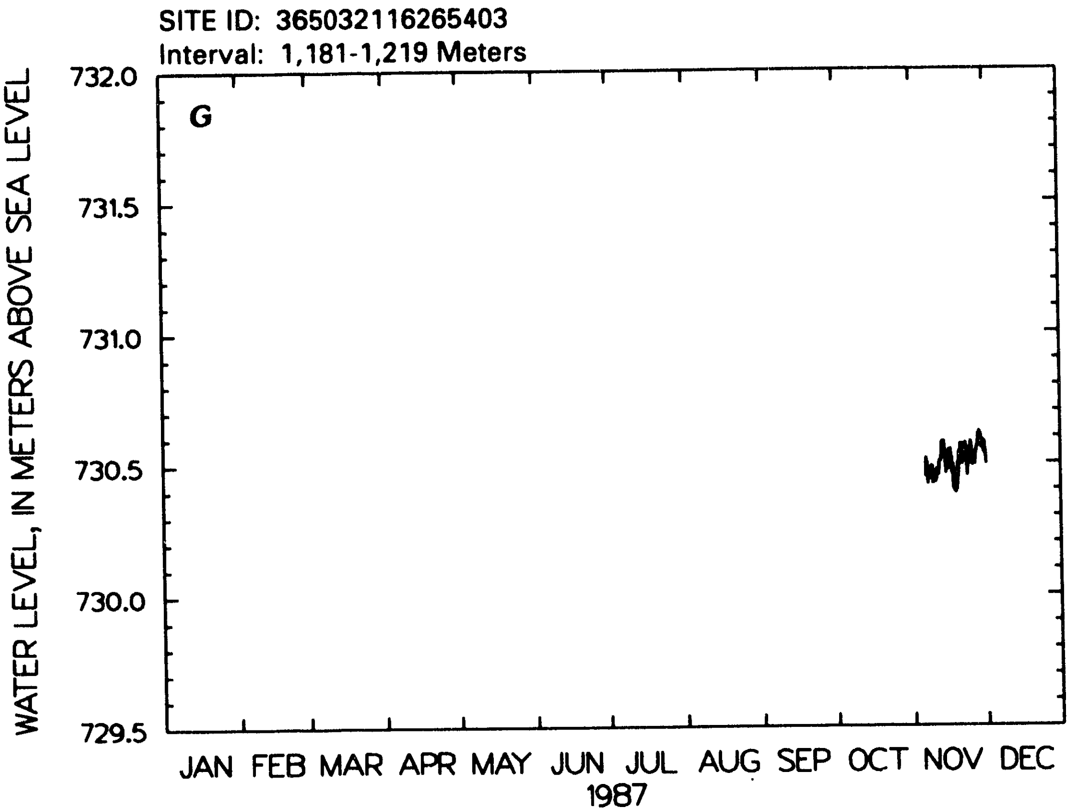


Figure 32.--Water-level altitude for well USW H-4.--Continued



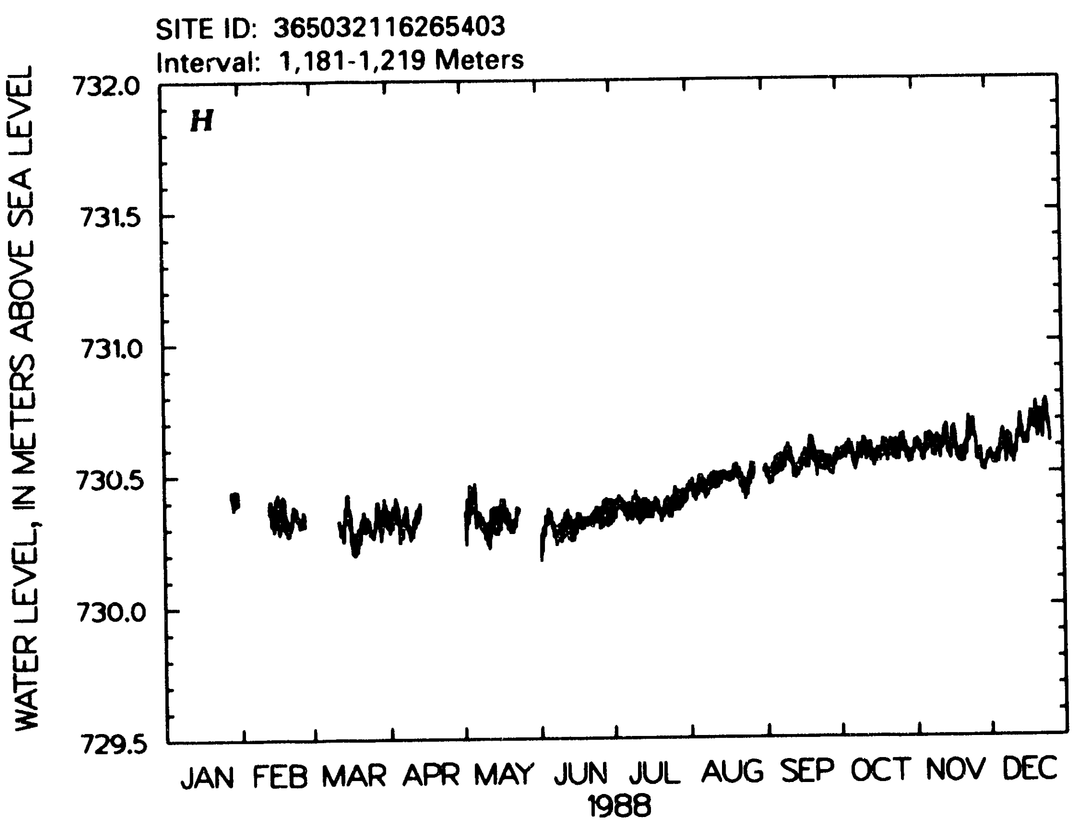


Figure 32.--Water-level altitude for well USW H-4.--Continued

Table 13.--*Daily mean water-level altitude, in meters above sea level, for well USW H-4*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 518-1,181 m

Site ID: 365032116265402

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	---	---	---	730.18	730.25	---	730.28	730.30	730.22	---	730.35	730.37
2	---	---	---	730.21	730.25	---	730.27	730.28	730.25	---	730.35	730.41
3	---	---	---	730.28	730.25	---	730.29	730.28	730.27	---	730.35	730.32
4	---	---	---	730.28	730.25	---	730.30	730.29	730.25	---	730.35	730.30
5	---	---	---	730.25	730.25	730.29	730.29	730.28	730.23	---	730.34	730.34
6	---	---	---	730.22	730.23	730.27	730.27	730.28	730.23	---	730.30	730.33
7	---	---	---	730.18	730.21	730.27	730.27	730.29	730.22	---	730.32	730.35
8	---	---	---	730.18	730.20	730.31	730.26	730.33	730.25	730.48	730.39	730.39
9	---	---	---	730.20	730.23	---	730.26	730.31	---	730.43	730.38	730.39
10	---	---	---	730.20	730.24	---	730.26	730.32	---	730.39	730.38	730.41
11	---	---	---	730.17	730.20	730.25	730.29	730.31	---	730.35	730.39	730.37
12	---	---	---	730.13	730.18	730.27	730.33	730.29	---	730.35	730.34	730.33
13	---	---	730.20	730.13	730.14	730.30	730.35	730.29	730.24	730.32	730.24	730.31
14	---	---	730.28	730.18	730.18	730.31	730.34	730.29	730.30	730.26	730.23	730.34
15	---	---	730.33	730.22	730.19	730.32	730.35	730.31	730.35	730.26	730.27	730.35
16	---	---	730.34	730.23	730.16	730.33	730.36	730.31	730.35	730.33	730.36	730.32
17	---	---	730.37	730.23	730.17	730.31	730.36	730.27	730.38	730.35	730.42	730.30
18	---	---	730.47	730.23	730.21	730.32	730.33	730.26	730.40	730.31	730.33	730.33
19	---	---	730.45	730.22	730.23	730.35	730.33	730.24	730.30	730.32	730.27	730.35
20	---	---	730.44	730.25	730.29	730.38	730.31	730.23	730.27	730.37	730.35	730.32
21	---	---	730.46	730.24	730.23	730.36	730.31	730.20	730.30	730.41	730.24	730.31
22	---	---	730.42	730.19	730.21	730.32	730.33	730.21	730.28	730.34	730.24	730.31
23	---	---	730.27	730.16	730.24	730.34	730.37	730.21	730.14	730.34	730.28	---
24	---	---	730.29	730.20	730.25	730.39	730.35	730.22	730.14	730.34	730.41	---
25	---	---	730.34	730.26	730.28	730.35	730.32	730.21	730.16	730.36	730.40	---
26	---	---	730.31	730.25	730.29	730.29	730.30	730.19	730.20	730.37	730.32	---
27	---	---	730.36	730.21	730.27	730.30	730.31	730.18	730.34	730.35	730.36	---
28	---	---	730.34	730.21	730.23	730.32	730.32	730.20	730.43	730.35	730.47	---
29	---		730.26	730.21	---	730.29	730.34	730.20	730.40	730.31	730.53	---
30	---		730.20	730.24	---	---	730.33	730.20	---	730.34	730.39	---
31	---		730.19		---		730.32	730.21		730.35		---
MONTHLY												
MEAN	---	---	---	730.21	---	---	730.31	730.26	---	---	730.34	---
MAX	---	---	---	730.28	---	---	730.37	730.33	---	---	730.53	---
MIN	---	---	---	730.13	---	---	730.26	730.18	---	---	730.23	---

Table 13.--*Daily mean water-level altitude, in meters above sea level, for well USW H-4*--Continued

Interval: 518-1,181 m — Site ID: 365032116265402

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	730.40	730.49	730.37	730.39	730.28	730.34	730.30	730.32	730.35	730.43	730.32	—
2	730.42	730.47	730.35	730.42	—	730.33	730.30	730.31	730.35	730.41	730.31	—
3	730.41	730.47	730.29	730.41	—	730.31	730.34	730.31	730.33	730.32	730.35	—
4	730.38	730.43	730.30	730.41	—	730.33	730.38	730.33	730.32	730.28	730.33	—
5	730.39	730.42	730.33	730.42	—	730.33	730.34	730.35	730.33	730.30	730.36	—
6	730.35	730.41	730.35	730.39	730.38	730.31	730.30	730.33	730.35	730.30	730.41	—
7	730.31	730.42	730.40	730.34	730.33	730.33	730.29	730.32	730.36	730.32	730.38	—
8	730.33	730.39	730.45	730.35	730.31	730.32	730.30	730.34	730.38	730.33	730.31	730.36
9	730.32	730.35	730.40	730.36	—	730.29	730.31	730.34	730.40	730.33	730.32	730.35
10	730.32	730.33	730.46	730.40	730.36	730.25	730.32	730.31	730.33	730.37	730.32	730.34
11	730.32	730.33	730.41	730.42	730.33	730.27	730.34	730.30	730.31	730.37	730.32	730.35
12	730.32	—	730.41	730.47	730.30	730.30	730.34	730.32	730.35	730.31	730.34	730.35
13	730.35	—	730.40	730.39	730.32	730.29	730.32	730.35	730.35	730.28	730.38	730.37
14	730.43	—	730.38	730.35	730.35	730.31	730.31	730.35	730.35	730.30	730.38	730.38
15	730.44	—	730.36	—	730.35	730.33	730.32	730.34	730.34	730.32	730.35	730.37
16	730.37	—	730.40	—	730.28	730.31	730.36	730.34	730.33	730.33	730.36	730.37
17	730.35	—	730.34	—	730.25	730.29	730.33	730.31	730.34	730.37	—	730.38
18	730.39	—	730.24	730.31	730.28	730.31	730.29	730.26	730.37	730.38	—	730.38
19	730.42	—	730.20	730.29	730.32	730.32	730.27	730.29	730.38	730.36	—	730.40
20	730.42	—	730.16	730.32	730.35	730.32	730.30	730.31	730.34	730.32	—	730.39
21	730.34	—	730.26	730.38	730.36	730.30	730.32	730.32	730.34	730.34	—	730.32
22	730.35	—	730.31	730.42	730.31	730.29	730.30	730.33	730.35	730.36	—	730.34
23	730.41	—	730.33	730.42	730.32	730.29	730.28	730.36	730.40	730.33	—	730.38
24	730.35	—	730.33	730.41	730.30	730.31	730.28	730.34	730.44	730.29	—	730.38
25	730.29	—	730.29	730.41	730.30	730.32	730.31	730.33	730.40	730.29	—	730.36
26	730.37	—	730.26	730.34	730.32	730.30	730.33	730.29	730.35	730.31	—	730.36
27	730.44	—	730.28	730.30	730.34	730.28	730.33	730.29	730.35	730.33	—	730.38
28	730.44	—	730.29	730.34	730.33	730.29	730.31	730.32	730.34	730.31	—	730.34
29	730.42		730.28	730.33	730.32	730.31	730.30	730.34	730.32	730.33	—	730.31
30	730.47		730.30	730.29	730.32	730.30	730.31	730.34	730.35	730.38	—	730.35
31	730.48		730.33		730.33		730.33	730.33		730.37		730.40
MONTHLY												
MEAN	730.38	—	730.33	—	—	730.31	730.31	730.32	730.35	730.33	—	—
MAX	730.48	—	730.46	—	—	730.34	730.38	730.36	730.44	730.43	—	—
MIN	730.29	—	730.16	—	—	730.25	730.27	730.26	730.31	730.28	—	—

Table 13.--*Daily mean water-level altitude, in meters above sea level, for well USW H-4*--Continued

Interval: 518-1,181 m

Site ID: 365032116265402

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	730.41	730.40	730.42	730.45	730.48	730.39	730.44	730.43	730.40	730.43	730.50	—
2	730.36	730.46	730.40	730.46	730.44	730.37	730.44	730.45	730.43	730.40	730.49	—
3	730.41	730.45	730.34	730.57	730.40	730.37	730.46	730.44	730.46	730.37	730.44	—
4	730.50	730.37	730.36	730.51	730.40	730.40	730.46	730.44	730.47	730.40	730.46	—
5	730.53	730.31	730.41	730.44	730.40	730.40	730.45	730.45	730.46	730.43	730.49	—
6	730.40	730.31	730.42	730.43	730.40	730.40	730.45	730.45	730.45	730.45	730.45	—
7	730.39	730.35	730.46	730.42	730.39	730.41	730.44	730.45	730.44	730.47	730.42	—
8	730.33	730.41	730.46	730.43	730.40	730.42	730.47	730.43	730.44	—	730.40	—
9	730.30	730.44	730.43	—	730.42	730.44	730.46	730.44	730.43	730.48	730.39	—
10	730.31	730.43	730.42	730.46	730.44	730.45	730.47	730.46	730.46	730.44	730.36	—
11	730.33	730.41	730.40	730.54	730.43	730.42	730.44	730.46	730.50	730.43	730.35	730.44
12	730.36	730.40	730.41	730.46	730.43	730.37	730.41	730.47	730.52	730.48	730.38	730.45
13	730.41	730.46	730.47	730.41	730.43	730.39	730.40	730.48	730.48	730.51	730.47	730.47
14	730.44	730.43	730.53	730.42	730.42	730.45	730.43	730.51	730.43	730.49	730.47	730.36
15	730.51	730.50	730.60	730.43	730.41	730.49	730.44	730.43	730.44	730.47	730.39	730.36
16	730.47	730.43	730.50	730.45	730.43	730.47	730.49	730.39	730.47	730.43	730.43	730.43
17	730.38	730.40	730.44	730.54	730.47	730.46	730.52	730.38	730.45	730.42	730.43	730.45
18	730.37	730.44	730.53	730.56	730.48	730.44	730.43	730.40	730.43	730.44	730.35	730.39
19	730.40	730.42	730.53	730.41	730.50	730.46	730.43	730.42	730.43	730.45	730.34	730.36
20	730.33	730.40	730.44	730.35	730.49	730.48	730.43	730.43	730.43	730.43	730.46	730.27
21	730.35	730.45	730.53	730.37	730.43	730.48	730.45	730.41	730.43	730.44	730.52	730.27
22	730.41	730.47	730.48	730.42	730.42	730.43	730.43	730.40	730.42	730.47	730.52	—
23	730.48	730.64	730.45	730.44	730.44	730.43	730.45	730.42	730.41	730.47	730.49	730.39
24	730.39	730.58	730.46	730.44	730.47	730.40	730.45	730.43	730.44	730.41	730.42	730.37
25	730.33	730.52	730.41	730.43	730.52	730.41	730.44	730.42	730.46	730.36	730.44	730.32
26	730.35	730.45	730.43	730.42	730.48	730.41	730.44	730.41	730.46	730.38	730.36	730.26
27	730.43	730.40	730.43	730.43	730.44	730.43	730.43	730.40	730.43	730.41	730.36	730.25
28	730.46	730.38	730.43	730.44	730.42	730.45	730.45	730.40	730.40	730.44	—	730.29
29	730.43		730.39	730.48	730.42	730.46	730.45	730.40	730.39	730.47	—	730.35
30	730.46		730.37	730.49	730.40	730.44	730.45	730.39	730.41	730.44	—	730.29
31	730.41		730.42		730.42		730.42	730.39		730.49		730.24
MONTHLY												
MEAN	730.40	730.43	730.44	—	730.44	730.43	730.45	730.43	730.44	—	—	—
MAX	730.53	730.64	730.60	—	730.52	730.49	730.52	730.51	730.52	—	—	—
MIN	730.30	730.31	730.34	—	730.39	730.37	730.40	730.38	730.39	—	—	—

Table 13.--*Daily mean water-level altitude, in meters above sea level, for well USW H-4*--Continued

Interval: 518-1,181 m

Site ID: 365032116265402

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	730.23	—	730.38	730.33	—	—	730.38	730.37	—	—	730.36	730.33
2	730.25	—	730.36	730.35	—	—	730.37	730.37	—	—	730.37	730.35
3	730.30	—	730.33	730.37	—	730.39	730.39	730.34	—	—	730.35	730.33
4	730.37	—	730.32	730.36	—	730.43	730.39	730.34	—	—	730.32	730.33
5	730.42	—	730.30	730.28	—	730.43	730.37	730.36	—	—	730.33	730.35
6	730.31	—	730.34	730.30	—	730.39	730.36	730.37	—	—	730.39	730.38
7	730.26	—	730.30	730.36	—	730.35	730.34	730.36	—	—	730.39	730.43
8	730.26	—	730.26	730.32	—	730.34	730.34	730.34	—	—	730.37	730.38
9	730.23	—	730.33	730.27	—	730.36	730.36	730.35	—	—	730.35	730.40
10	730.30	—	730.35	730.28	—	730.36	730.38	730.37	—	—	730.38	730.41
11	730.42	—	730.35	730.33	—	730.38	730.36	730.37	—	—	730.37	730.37
12	730.32	—	730.31	730.35	—	730.40	730.33	730.36	730.32	—	730.36	730.37
13	730.29	730.38	730.28	—	—	730.37	730.34	730.36	730.30	—	730.41	730.43
14	730.29	730.33	730.35	—	—	730.35	730.35	730.36	730.31	—	730.42	730.49
15	730.41	730.38	730.41	—	—	730.35	730.34	730.37	730.33	—	730.32	730.45
16	730.42	730.35	730.32	—	—	730.37	730.33	730.36	730.35	—	730.35	730.40
17	730.51	730.30	730.24	—	—	730.39	—	730.35	730.37	—	730.42	730.42
18	730.44	730.37	730.25	—	—	730.36	730.34	730.35	730.33	—	730.35	—
19	730.30	730.30	730.27	—	—	730.36	730.34	730.36	730.37	730.34	730.31	—
20	730.26	730.28	730.31	—	—	730.36	730.31	730.37	730.41	730.34	730.33	—
21	730.28	730.32	730.34	—	—	730.36	730.30	730.37	—	730.32	730.33	—
22	730.24	730.37	730.33	—	—	730.36	730.32	730.33	—	730.34	730.36	—
23	730.29	730.35	730.33	—	—	730.37	730.33	730.31	—	730.34	730.44	—
24	730.26	730.31	730.29	—	—	730.39	730.32	730.30	—	730.34	730.43	—
25	730.27	730.31	730.28	—	—	730.38	730.32	730.32	—	730.34	730.46	—
26	730.30	730.34	730.32	—	—	730.36	730.34	730.35	—	730.36	—	—
27	730.33	730.31	730.39	—	—	730.38	730.34	730.36	—	730.38	730.30	—
28	730.35	730.31	730.31	—	—	730.39	730.33	—	—	730.34	730.33	—
29	730.39	730.35	730.34	—	—	730.38	730.34	—	—	730.31	730.28	—
30	730.39		730.37	—	—	730.38	730.34	—	—	730.31	730.29	—
31	730.41		730.34		—		730.34	—		730.31		—
MONTHLY												
MEAN	730.33	—	730.32	—	—	—	—	—	—	—	—	—
MAX	730.51	—	730.41	—	—	—	—	—	—	—	—	—
MIN	730.23	—	730.24	—	—	—	—	—	—	—	—	—

Table 13.--*Daily mean water-level altitude, in meters above sea level, for well USW H-4*--Continued

Interval: 1,181-1,219 m

Site ID: 365032116265403

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	---	---	730.31	730.28	730.30	---	---	---	---	---	---	---
2	---	---	730.40	730.33	730.33	---	---	---	---	---	---	---
3	---	---	730.35	730.41	730.32	---	---	---	---	---	---	---
4	---	---	730.34	730.43	730.33	---	---	---	---	---	---	---
5	---	---	730.36	730.42	730.35	---	---	---	---	---	---	---
6	---	---	730.37	730.41	730.35	---	---	---	---	---	---	---
7	---	---	730.37	730.38	730.34	---	---	---	---	---	---	---
8	---	---	730.34	730.38	---	---	---	---	---	---	---	---
9	---	---	730.35	730.38	---	---	---	---	---	---	---	---
10	---	---	730.32	730.38	---	---	---	---	---	---	---	---
11	---	---	---	730.34	---	---	---	---	---	---	---	---
12	---	---	---	730.29	---	---	---	---	730.48	---	---	---
13	---	---	730.27	730.27	---	---	---	---	730.51	---	---	---
14	---	---	730.28	730.31	---	---	---	---	730.54	---	---	---
15	---	730.34	730.29	730.34	---	---	---	---	730.58	---	---	---
16	---	730.36	730.27	730.39	---	---	---	---	730.53	---	---	---
17	---	730.34	730.27	730.38	---	---	---	---	730.49	---	---	---
18	---	730.31	730.34	730.42	---	---	---	---	730.45	---	---	---
19	---	730.34	730.34	730.44	---	---	---	---	730.31	---	---	---
20	---	730.41	730.35	730.38	---	---	---	---	730.47	---	---	---
21	---	730.33	730.35	730.28	---	---	---	---	730.43	---	---	---
22	---	730.30	730.32	730.24	---	---	---	---	730.43	---	---	---
23	---	730.24	730.29	730.24	---	---	---	---	730.42	---	---	---
24	---	730.24	730.31	730.31	---	---	---	---	730.44	---	---	---
25	---	730.27	730.33	730.31	---	---	---	---	730.46	---	---	---
26	---	730.28	730.32	730.31	---	---	---	---	730.46	---	---	---
27	---	730.29	730.37	730.30	---	---	---	---	730.43	---	---	---
28	---	730.26	730.37	730.31	---	---	---	---	730.42	---	---	---
29	---		730.32	730.31	---	---	---	---	730.41	---	---	---
30	---		730.29	730.29	---	---	---	---	730.43	---	---	---
31	---		730.29		---		---	---		---		---
MONTHLY												
MEAN	---	---	---	730.34	---	---	---	---	---	---	---	---
MAX	---	---	---	730.44	---	---	---	---	---	---	---	---
MIN	---	---	---	730.24	---	---	---	---	---	---	---	---

Table 13.--*Daily mean water-level altitude, in meters above sea level, for well USW H-4*--Continued

Interval: 1,181-1,219 m

Site ID: 365032116265403

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	---	---	---	---	---	---	730.44	730.46	730.47	730.53	730.43	---
2	---	---	---	---	---	---	730.44	730.45	730.48	730.53	730.42	---
3	---	---	---	---	---	---	730.45	730.44	730.46	730.46	730.44	---
4	---	---	---	---	---	---	730.50	730.46	730.45	730.41	730.43	---
5	---	---	---	---	---	---	730.48	730.47	730.46	730.42	730.45	---
6	---	---	---	---	---	---	730.44	730.47	730.47	730.42	730.49	---
7	---	---	---	---	---	---	730.43	730.46	730.48	730.43	730.47	---
8	---	---	---	---	---	---	730.44	730.47	730.50	730.44	730.41	---
9	---	---	---	---	---	---	730.44	730.47	730.52	730.44	730.41	---
10	---	---	---	---	---	---	730.45	730.45	730.47	730.47	730.41	---
11	---	---	---	---	---	---	730.46	730.44	730.45	730.47	730.41	---
12	---	---	---	---	---	---	730.47	730.45	730.48	730.43	730.42	---
13	---	---	---	---	---	---	730.45	730.48	730.48	730.40	730.45	---
14	---	---	---	---	---	---	730.44	730.43	730.48	730.41	730.46	---
15	---	---	---	---	---	---	730.45	730.47	730.48	730.43	730.44	---
16	---	---	---	---	---	---	730.48	730.47	730.47	730.44	730.45	---
17	---	---	---	---	---	---	730.46	730.45	730.47	730.47	730.46	---
18	---	---	---	---	---	---	730.43	730.41	730.50	730.48	730.48	---
19	---	---	---	---	---	---	730.41	730.42	730.51	730.47	730.45	---
20	---	---	---	---	---	---	730.43	730.44	730.48	730.44	730.44	---
21	---	---	---	---	---	---	730.45	730.44	730.47	730.44	730.46	---
22	---	---	---	---	---	---	730.44	730.46	730.48	730.46	730.42	---
23	---	---	---	---	---	---	730.43	730.48	730.52	730.44	730.37	---
24	---	---	---	---	---	---	730.43	730.47	730.55	730.41	730.42	---
25	---	---	---	---	---	---	730.44	730.46	730.52	730.40	730.44	---
26	---	---	---	---	---	---	730.46	730.43	730.48	730.41	730.40	---
27	---	---	---	---	---	---	730.46	730.42	730.48	730.42	730.40	---
28	---	---	---	---	---	730.42	730.45	730.45	730.47	730.41	730.43	---
29	---		---	---	---	730.45	730.44	730.46	730.45	730.42	---	---
30	---		---	---	---	730.45	730.45	730.46	730.47	730.47	---	---
31	---		---		---		730.46	730.46		730.46		---
MONTHLY												
MEAN	---	---	---	---	---	---	730.45	730.45	730.48	730.44	---	---
MAX	---	---	---	---	---	---	730.50	730.48	730.55	730.53	---	---
MIN	---	---	---	---	---	---	730.41	730.41	730.45	730.40	---	---

Table 13.--*Daily mean water-level altitude, in meters above sea level, for well USW H-4*--Continued

Interval: 1,181-1,219 m

Site ID: 365032116265403

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	--	--	--	--	--	--	--	--	--	--	--	730.54
2	--	--	--	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	730.48	--
8	--	--	--	--	--	--	--	--	--	--	730.46	--
9	--	--	--	--	--	--	--	--	--	--	730.47	--
10	--	--	--	--	--	--	--	--	--	--	730.44	--
11	--	--	--	--	--	--	--	--	--	--	730.45	--
12	--	--	--	--	--	--	--	--	--	--	730.48	--
13	--	--	--	--	--	--	--	--	--	--	730.54	--
14	--	--	--	--	--	--	--	--	--	--	730.56	--
15	--	--	--	--	--	--	--	--	--	--	730.50	--
16	--	--	--	--	--	--	--	--	--	--	730.52	--
17	--	--	--	--	--	--	--	--	--	--	730.51	--
18	--	--	--	--	--	--	--	--	--	--	730.44	--
19	--	--	--	--	--	--	--	--	--	--	730.43	--
20	--	--	--	--	--	--	--	--	--	--	730.49	--
21	--	--	--	--	--	--	--	--	--	--	730.54	--
22	--	--	--	--	--	--	--	--	--	--	730.54	--
23	--	--	--	--	--	--	--	--	--	--	730.53	--
24	--	--	--	--	--	--	--	--	--	--	730.50	--
25	--	--	--	--	--	--	--	--	--	--	730.55	--
26	--	--	--	--	--	--	--	--	--	--	730.51	--
27	--	--	--	--	--	--	--	--	--	--	730.53	--
28	--	--	--	--	--	--	--	--	--	--	730.59	--
29	--		--	--	--	--	--	--	--	--	730.59	--
30	--		--	--	--	--	--	--	--	--	730.57	--
31	--		--		--		--	--		--		--
MONTHLY												
MEAN	--	--	--	--	--	--	--	--	--	--	--	--
MAX	--	--	--	--	--	--	--	--	--	--	--	--
MIN	--	--	--	--	--	--	--	--	--	--	--	--

Table 13.--*Daily mean water-level altitude, in meters above sea level, for well USW H-4*--Continued

Interval: 1,181-1,219 m

Site ID: 365032116265403

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	---	---	---	730.19	---	---	730.35	730.42	730.47	730.50	730.56	730.52
2	---	---	---	730.21	730.21	730.25	730.35	730.42	730.45	730.51	730.57	730.53
3	---	---	---	730.24	730.26	730.30	730.37	730.40	730.44	730.51	730.56	730.52
4	---	---	---	730.23	730.28	730.34	730.38	730.40	730.45	730.52	730.53	730.51
5	---	---	---	730.16	730.28	730.35	730.36	730.42	730.48	730.54	730.54	730.53
6	---	---	---	730.17	730.23	730.31	730.35	730.43	730.49	730.53	730.58	730.55
7	---	---	---	730.22	730.22	730.28	730.35	730.42	730.49	730.49	730.58	730.61
8	---	---	---	730.19	730.19	730.27	730.35	730.41	730.49	730.47	730.57	730.56
9	---	---	---	730.15	730.17	730.29	730.36	730.42	730.51	730.51	730.55	730.58
10	---	---	---	730.15	730.15	730.29	730.38	730.44	730.53	730.52	730.58	730.58
11	---	---	---	730.19	730.15	730.31	730.36	730.45	730.52	730.53	730.57	730.54
12	---	---	730.17	730.21	730.18	730.32	730.34	730.44	730.49	730.54	730.56	730.54
13	---	730.24	730.15	730.24	730.21	730.30	730.35	730.44	730.45	730.54	730.60	730.60
14	---	730.20	730.20	---	730.20	730.29	730.36	730.44	730.45	730.55	730.62	730.65
15	---	730.24	730.26	---	730.21	730.29	730.35	730.45	730.47	730.52	730.54	730.62
16	---	730.24	730.19	---	730.22	730.31	730.34	730.44	730.49	730.51	730.55	730.58
17	---	730.20	730.12	---	730.25	730.33	730.34	730.44	730.51	730.53	730.62	730.59
18	---	730.25	730.10	---	730.23	730.31	730.35	730.44	730.48	730.53	730.56	730.64
19	---	730.18	730.13	---	730.19	730.31	730.36	730.46	730.52	730.55	730.53	730.68
20	---	730.16	730.15	---	730.18	730.31	730.33	730.47	730.57	730.55	730.54	730.66
21	---	730.19	730.19	---	730.17	730.31	730.32	730.46	730.52	730.53	730.53	730.68
22	---	730.24	730.19	---	730.20	730.32	730.34	730.44	730.48	730.55	730.56	730.67
23	---	730.22	730.19	---	730.23	730.33	730.36	730.42	730.50	730.55	730.62	730.63
24	---	730.19	730.16	---	---	730.34	730.35	730.40	730.49	730.55	730.62	---
25	---	730.19	730.15	---	---	730.34	730.35	730.42	730.48	730.55	730.65	---
26	---	730.21	730.18	---	---	730.33	730.38	730.46	730.48	730.57	---	730.64
27	---	---	730.24	---	---	730.34	730.38	730.47	730.48	730.58	730.52	---
28	730.28	---	730.17	---	---	730.35	730.37	---	730.46	730.56	730.53	---
29	730.28	---	730.20	---	---	730.35	730.38	---	730.47	730.53	730.48	---
30	730.29		730.23	---	---	730.35	730.38	---	730.50	730.52	730.49	---
31	---		730.20		---		730.39	---		730.52		---
MONTHLY												
MEAN	---	---	---	---	---	---	730.36	---	730.49	730.53	---	---
MAX	---	---	---	---	---	---	730.39	---	730.57	730.58	---	---
MIN	---	---	---	---	---	---	730.32	---	730.44	730.47	---	---

Well USW H-5

Information about the history of well USW H-5 and about previous data from the well was obtained from various sources. These sources are: Bentley and others (1983); Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1987a, c).

Well specifications

The following are specifications for well USW H-5:

1. Location and identification:

   Latitude and longitude: 36°51'22" N.; 116°27'55" W.
   Nevada State Central Zone Coordinates (m): N 233,670; E 170,355.
   U.S. Geological Survey Site ID's:
   365122116275501 (entire well)
   365122116275502 (upper interval)
   365122116275503 (lower interval)

2. Drilling and casing information:

   Well started: May 19, 1982.
   Well completed: August 1, 1982.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; selected core obtained.
   Bit diameter below water level: 375 mm used to 792 m; 222 mm used from 792 m to 1,219 m.
   Casing extending below water level: 255 mm diameter to 788 m, perforated below the water level.
   Total drilled depth: 1,219 m.

3. Access to and description of interval for measuring water levels:

   48-mm inside-diameter open-ended tubing, extending from land surface to a depth of 708 m; upper saturated interval of borehole within the Bullfrog and Tram Members of the Crater Flat Tuff, and an unnamed lava beneath the Tram Member (Carr, 1988, p.37); Site ID: 365122116275502.
   62-mm inside-diameter tubing that has an inflatable packer on bottom end, extending from land surface to 1,091 m; lower interval within an unnamed lava beneath the Tram Member of the Crater Flat Tuf (Carr, 1988, p.37); Site ID: 365122116275503.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,478.94 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.08 m, based on depth to water of 703 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from November 19, 1982 through February 2, 1985. Beginning in February 1985, the well has been monitored continuously using downhole pressure transducers, with a data logger at the land surface.

The following transducers were used in well USW H-5. The type, pressure range, and serial number of the first transducer used in the lower interval was not noted in the logbook. It is assumed but not actually known, that this transducer was removed from service October 18, 1985, when all reference to it disappears from the logbook.

Site ID: 365122116275502
Interval: 704-1,091 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
02-22-85	09-29-87	Gage	Psi-Tronix	15	1848
09-29-87	02-17-88	Gage	Druck 10/D	10	153537
02-18-88	12-31-88	Gage	Druck 930	10	219283

Site ID: 365122116275503
Interval: 1,091-1,219 meters

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
02-25-85	--	--	--	--	--
03-28-86	09-24-87	Gage	Druck PDCR 10/D	10	129230
09-24-87	01-15-88	Gage	Druck PDCR 10/D	10	153538

The following calibrations of the water-level monitoring system were performed in well USW H-5:

Site ID: 365122116275502
Interval: 704-1,091 meters
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1848	02-22-85	-4.516	1.000	02-22-85	775.04
1848	09-25-85	-4.256	1.000	09-25-85	775.41
1848	09-26-85	-4.230	0.999	09-26-85	775.41
1848	09-15-87	-4.147	0.999	--	--
1848	09-29-87	-4.003	0.998	09-29-87	775.40
153537	09-29-87	-6.130	0.998	09-29-87	775.40
219283	02-19-88	-6.401	0.991	02-19-88	775.49
219283	06-16-88	-6.634	1.000	06-16-88	775.44
219283	10-11-88	-6.445	1.000	10-11-88	775.45

Site ID: 365122116275503
Interval: 1,091-1,219 meters

Transducer				Water level	
		Regression line			
Serial number	Calibration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
153538	09-24-87	-6.711	0.999	09-24-87	775.46

Transducer output

Transducer output from February 1985 through December 1988 is shown in figure 33. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 1848), in use between February 1985 and September 1987 in the upper interval (Site ID: 365122116275502) produced output that drifted downward from February 1985 to August 1986 (fig. 33-A and 33-B). The readings were initially about 6 millivolts, within 6 months the readings were down to about -3 millivolts, and 6 months later the readings were down to about -12 millivolts. By the late August 1986 the output appeared to stabilize at about -18 millivolts (fig. 33-B). In spite of this drift, the transducer produced generally reasonable output for a number of periods in 1985 and 1986 with some erratic output in between. On November 5, 1985,

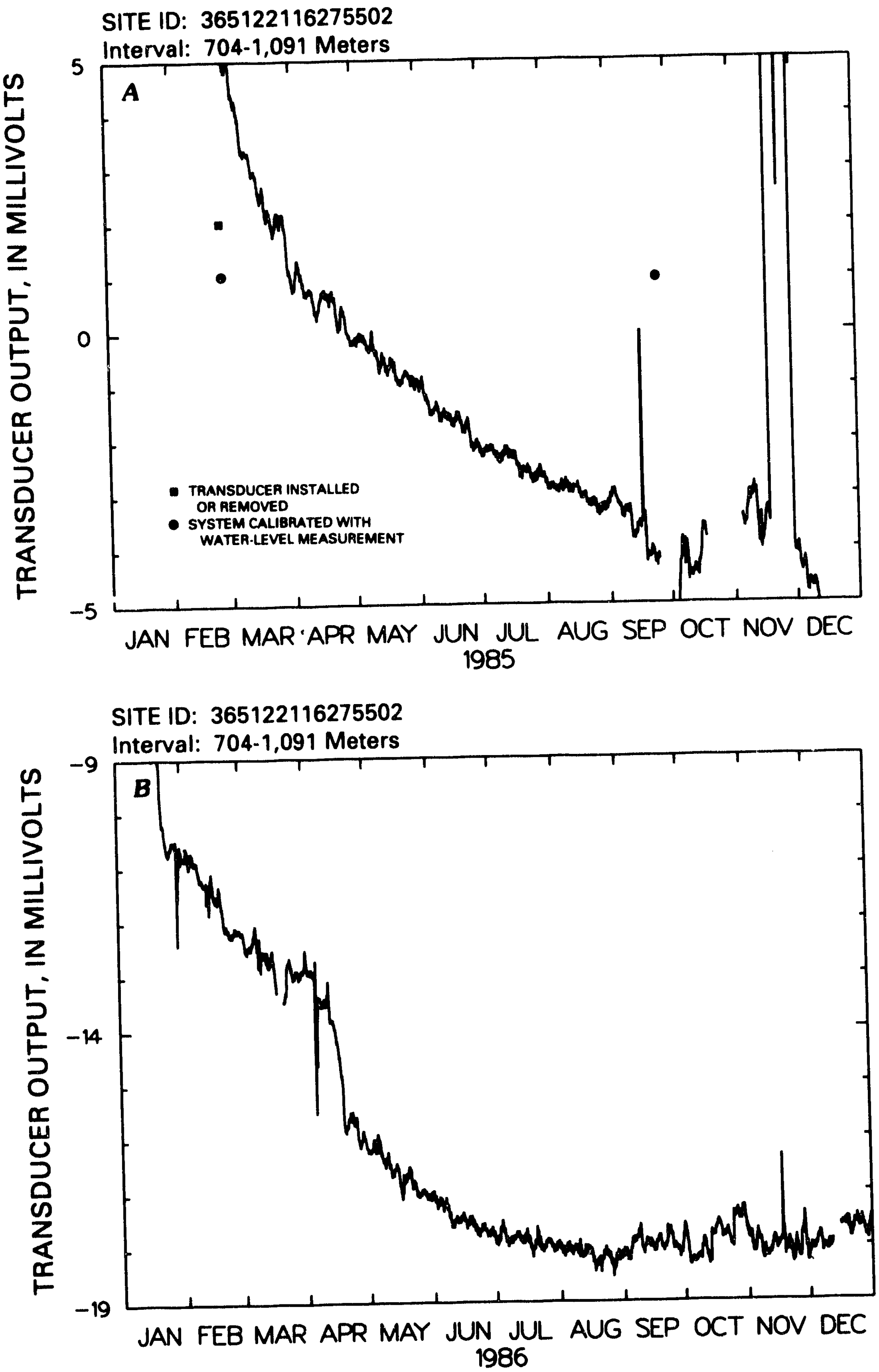
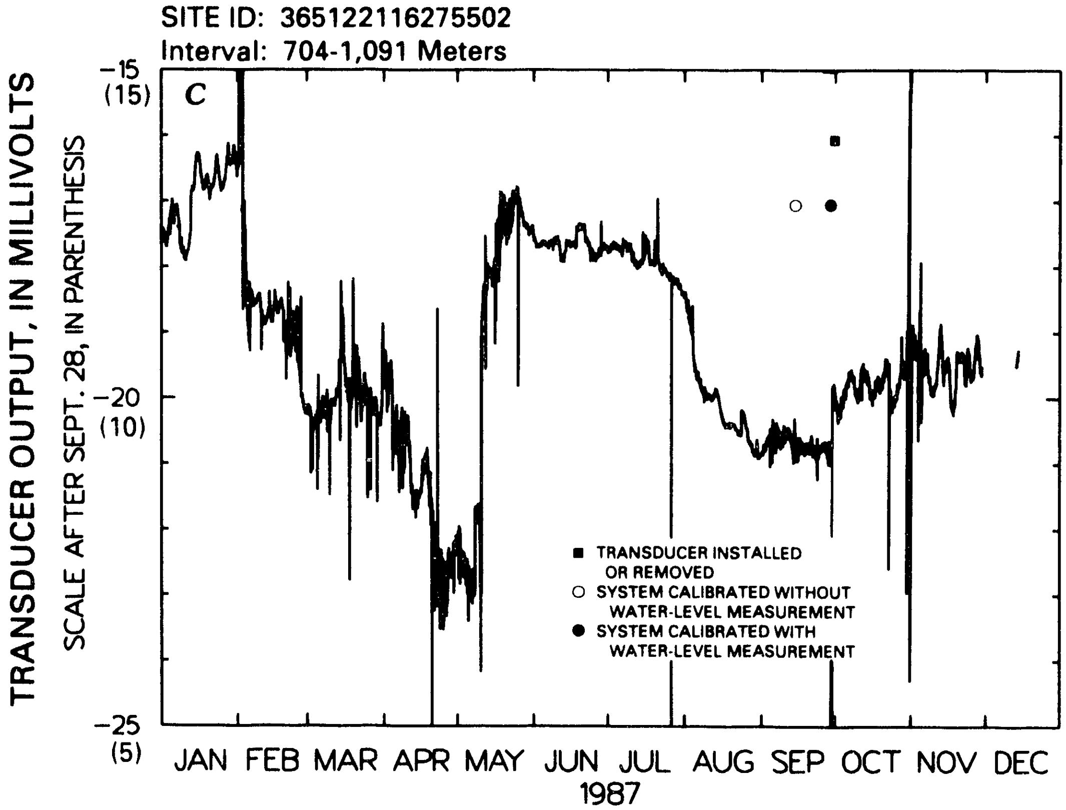


Figure 33.--Transducer output for well USW H-5.



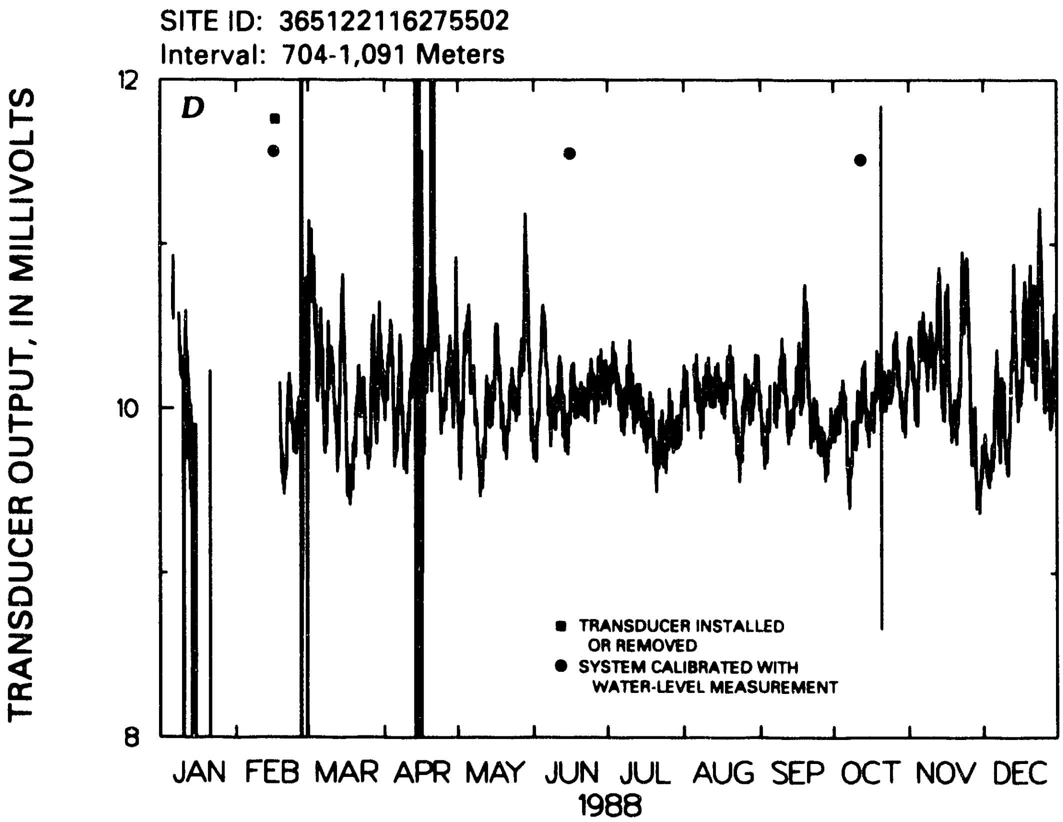
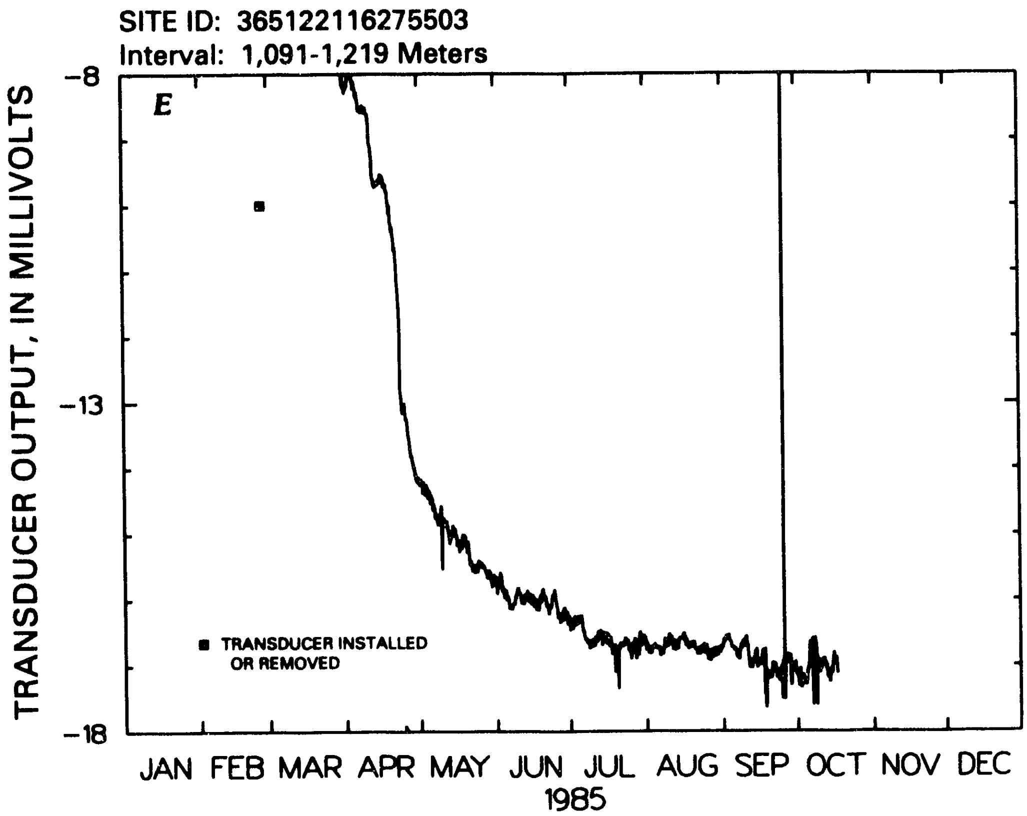


Figure 33.--Transducer output for well USW H-5.--Continued



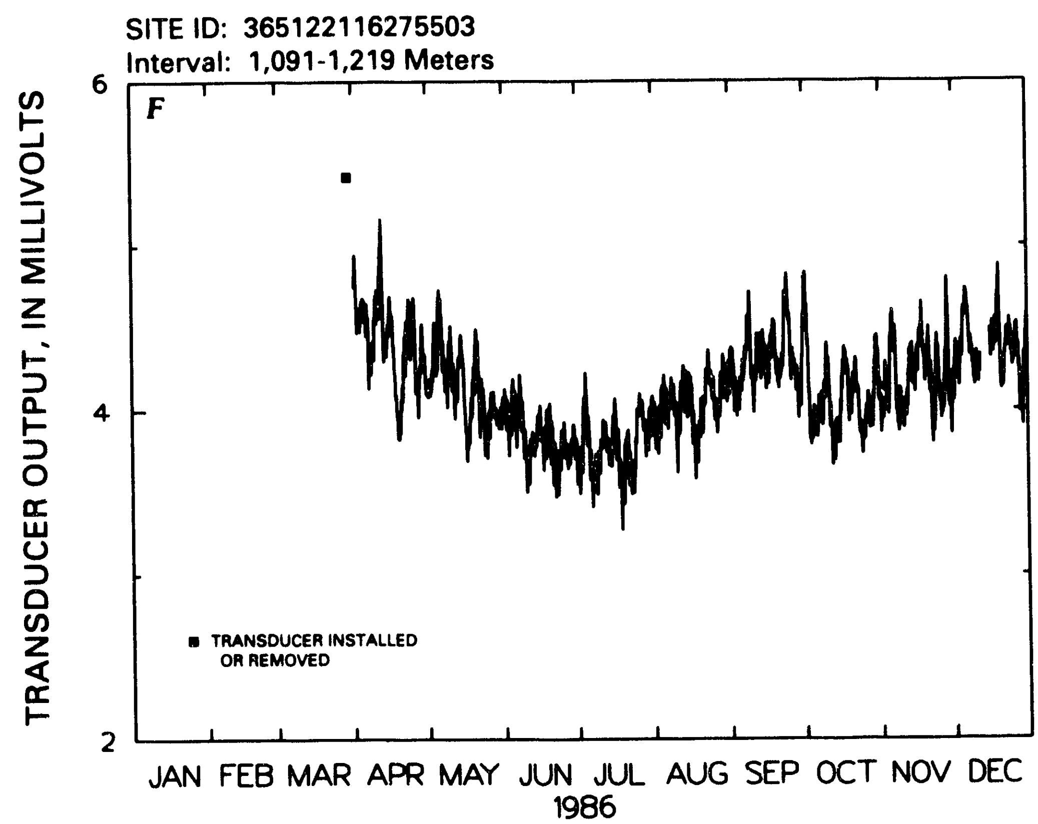
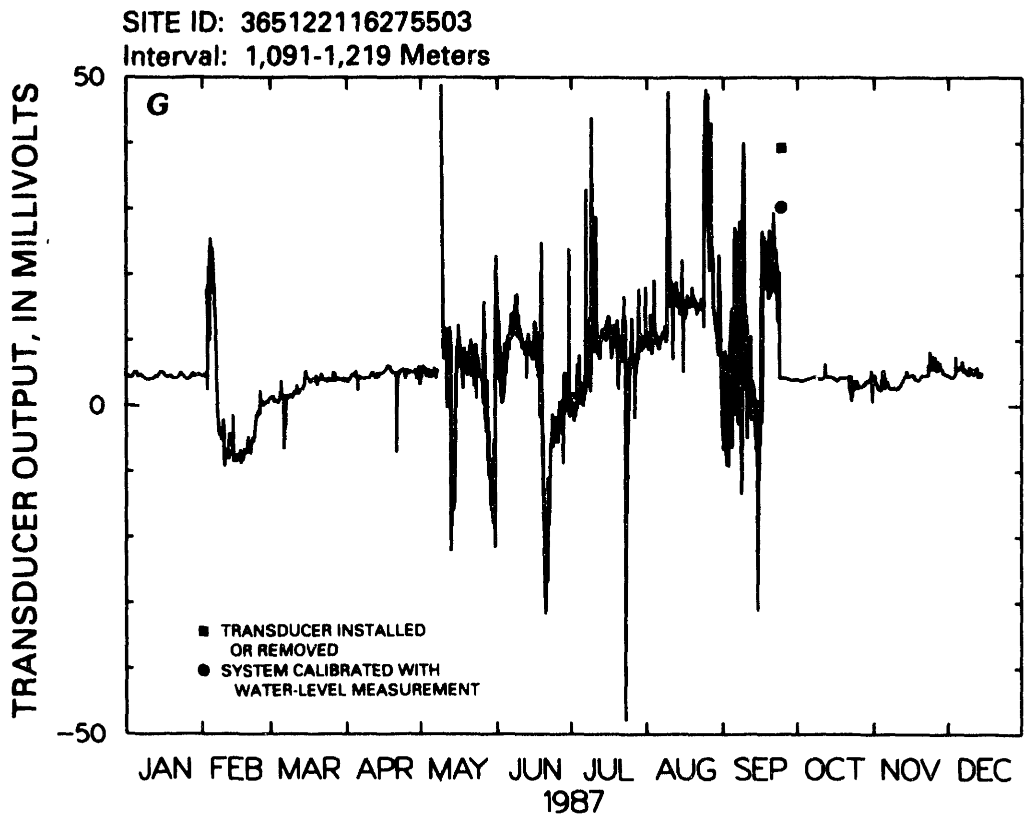


Figure 33.--Transducer output for well USW H-5.--Continued



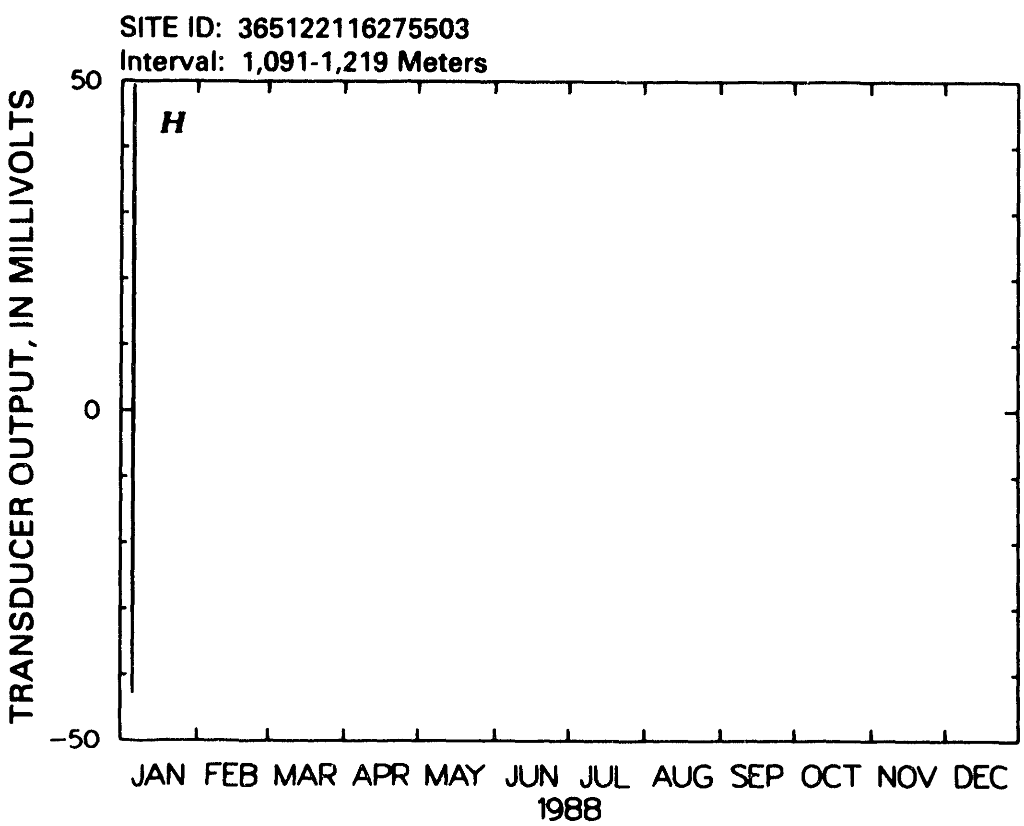


Figure 33.--Transducer output for well USW H-5.--Continued

the data logger was replaced; this replacement occurred prior to the erratic readings in mid-November (fig. 33-A). In 1986, the transducer was left undisturbed in the well. In 1987, this transducer produced mostly erratic output (fig. 33-C). The second transducer (serial number 153537), in use between September 1987 and February 1988, produced some reasonable output but, for the most part, the output was erratic (fig. 33-C and 33-D). The third transducer (serial number 219283), in use beginning in February, 1988, produced generally reasonable output (fig. 33-D). In April, 1988, erratic output was produced for over a week. On October 21, 1988, some rewiring was done on the system and this could account for the erratic output that day.

The lower interval of the well (Site ID: 365122116275503) has had an obstruction in it just below the water level at least since May, 1984. The obstruction prevented a calibration from being done when the first transducer was installed in February, 1985 (fig 33-E). The type and serial number of this transducer was not recorded in the field logbook. The second transducer (serial number 129230) was in use between March, 1986 and September 1987 (fig. 33-F and 33-G). This transducer also was not calibrated because of the obstruction. The third transducer (serial number 153538), in use between September 1987 and January 1988, was calibrated over only a 0.55 m interval because of the obstruction. This transducer quit producing output in December, 1987 (fig. 33-G). It was removed in January 1988 and was not replaced (fig 33-H). Although some reasonable output appeared to be produced in 1985 and all of the output from April 1986 through January 1987 appears to look reasonable, no valid calibration was done on these transducers. Beginning in February 1987 (fig. 33-G), only erratic output was produced with the exception of a short period of reasonable output after the third transducer was installed.

Water-level altitude

In addition to measured water-level altitudes, water-level altitudes were estimated on the following days to remove what was judged to be transducer drift or to allow additional record to be processed.

Site ID: 365122116275502
Interval: 704-1,091 meters

Date	Estimated water-level altitude (meters)
03-30-85	775.11
06-10-86	775.43
11-16-86	775.42

Site ID: 365122116275503
Interval: 1,091-1,219 meters

Date	Estimated water-level altitude (meters)
02-02-87	775.46
10-11-87	775.46

The estimated water-level altitude may introduce some error into the record, but the error probably is small compared to transducer drift.

Transducer output was converted to water-level altitude for the following periods:

Site ID: 365122116275502
Interval: 704-1,091 m

Beginning date	Ending date
02-25-85	09-16-85
02-02-86	02-11-86
02-16-86	03-08-86
03-22-86	04-05-86
04-21-86	11-16-86
09-30-87	10-23-87
11-11-87	11-30-87
03-10-88	04-12-88
04-22-88	10-20-88
10-22-88	12-31-88

Site ID: 365122116275503
Interval: 1,091-1,219 m

Beginning date	Ending date
09-25-87	10-11-87

Within the convertible periods, water-level altitude is not available for selected periods because of various problems:

Beginning date	Ending date	Reason
20-25-85	02-25-85	Transducer not hooked up until afternoon
08-15-85	08-16-85	No data due to site visit 08-15-85
11-30-87	11-30-87	Transducer was being tested
08-03-88	08-05-88	No data due to site visit 08-03-88

The water-level altitudes are shown in figure 34 and the daily mean water-level altitudes are given in table 14. Approximately 56 percent of the transducer output from the upper interval was converted to water-level altitude. The longest period was 210 days, April 21 through November 16, 1986. Approximately 1 percent of the transducer output from the lower interval was converted to water-level altitude. The only period was 17 days, September 25 through October 11, 1987.

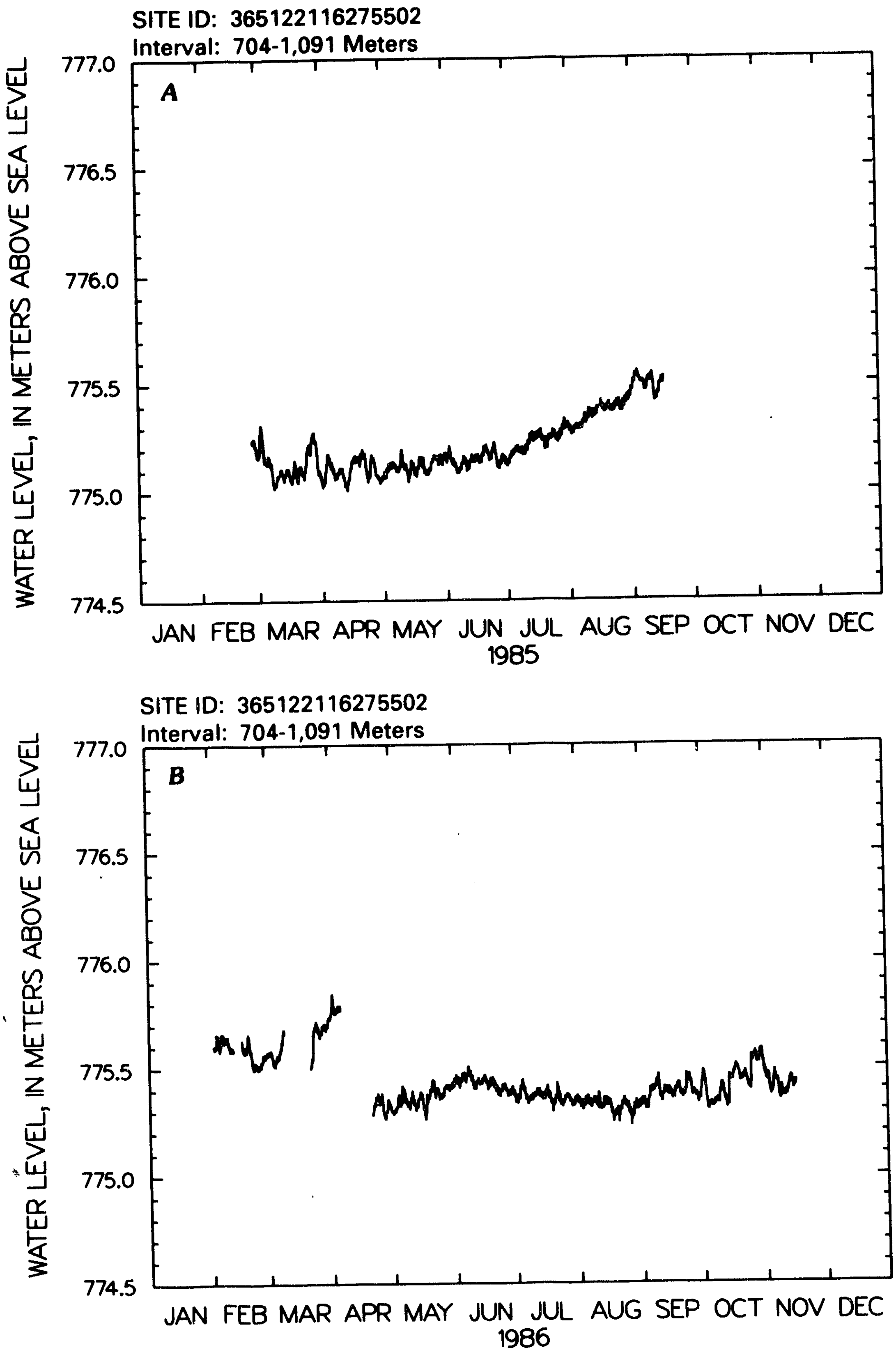
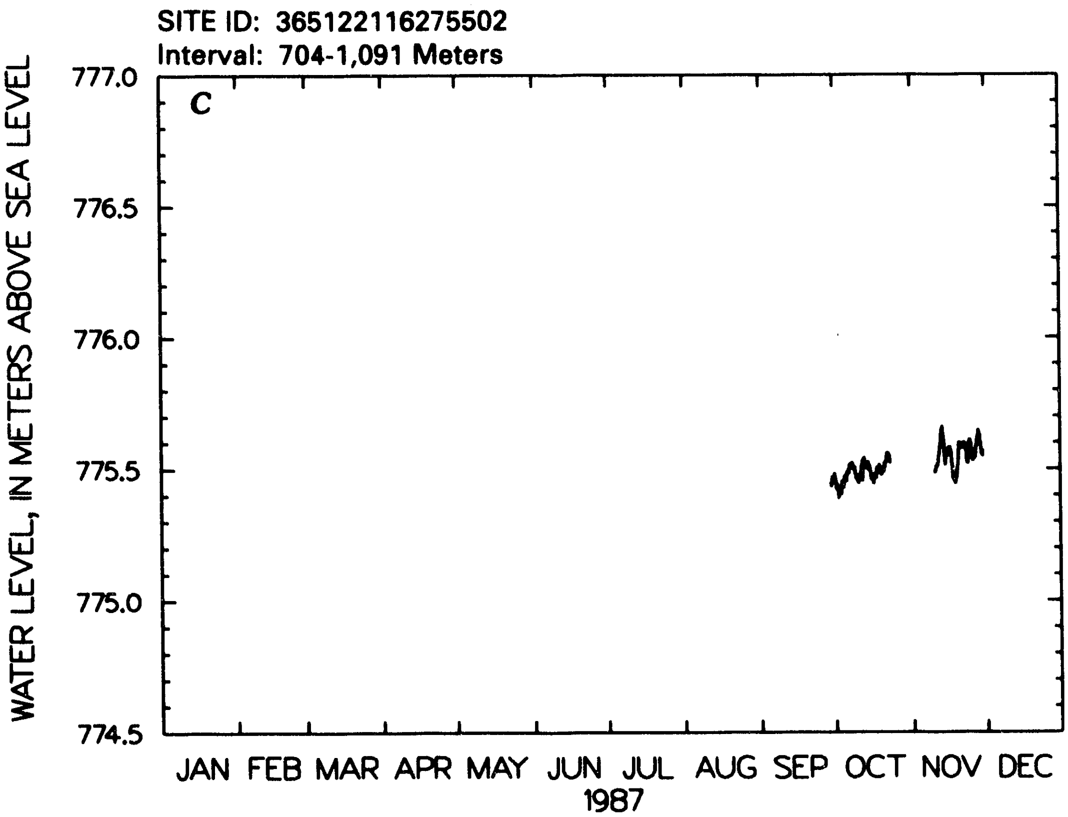


Figure 34.--Water-level altitude for well USW H-5.



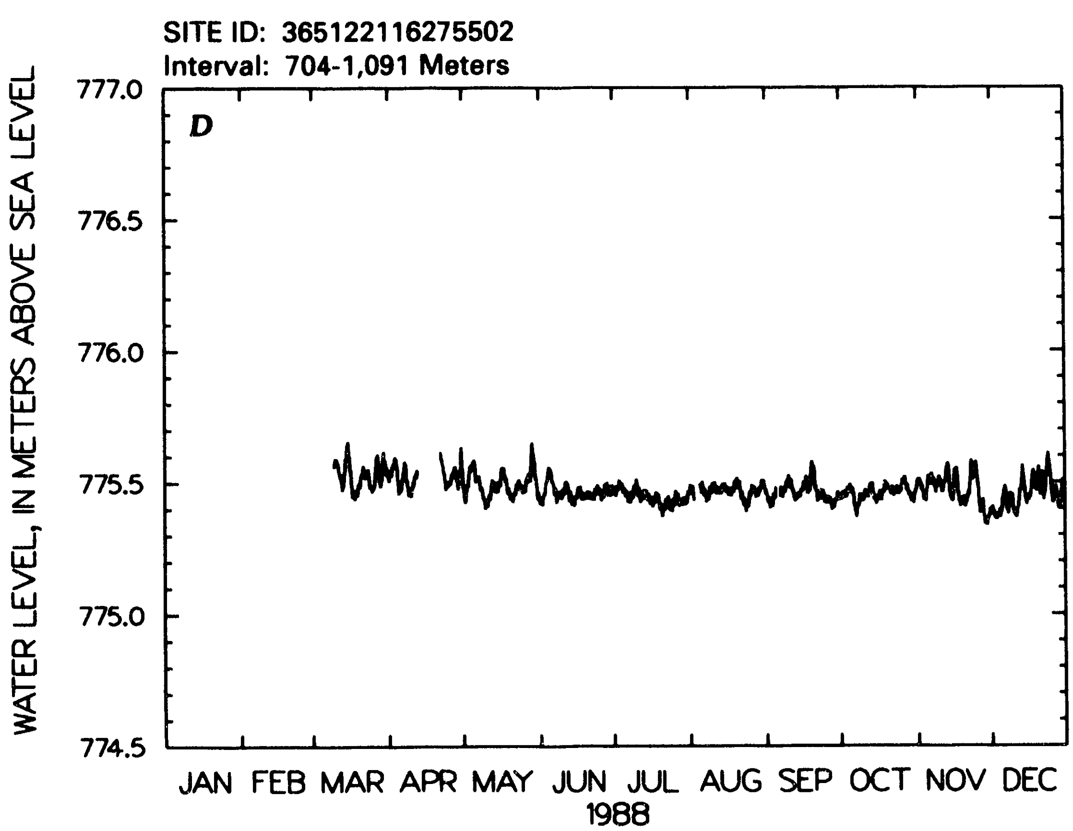


Figure 34.--Water-level altitude for well USW H-5.--Continued

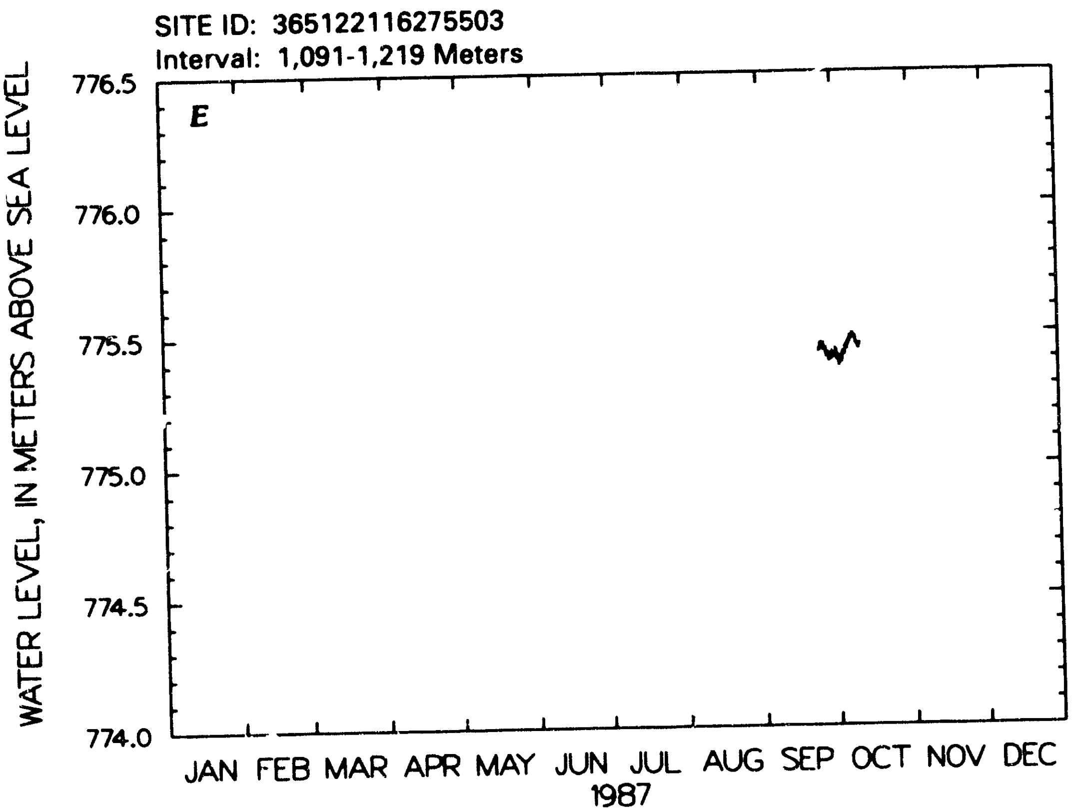


Figure 34.--Water-level altitude for well USW H-5.--Continued

Table 14.--*Daily mean water-level altitude, in meters above sea level, for well USW H-5*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 704-1,091 m   Site ID: 365122116275502

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	---	---	775.21	775.04	775.08	775.15	775.13	775.29	775.48	---	---	---
2	---	---	775.29	775.06	775.09	775.18	775.14	775.27	775.52	---	---	---
3	---	---	775.19	775.14	775.11	775.16	775.17	775.28	775.54	---	---	---
4	---	---	775.15	775.16	775.12	775.13	775.18	775.30	775.53	---	---	---
5	---	---	775.15	775.13	775.13	775.13	775.19	775.30	775.51	---	---	---
6	---	---	775.14	775.10	775.12	775.10	775.20	775.30	775.50	---	---	---
7	---	---	775.10	775.07	775.11	775.09	775.19	775.31	775.48	---	---	---
8	---	---	775.03	775.08	775.10	775.11	775.19	775.33	775.48.	---	---	---
9	---	---	775.04	775.10	775.15	775.14	775.18	775.33	775.52	---	---	---
10	---	---	775.07	775.11	775.15	775.14	775.19	775.35	775.52	---	---	---
11	---	---	775.09	775.08	775.12	775.11	775.21	775.36	775.51	---	---	---
12	---	---	775.09	775.04	775.11	775.12	775.24	775.35	775.43	---	---	---
13	---	---	775.06	775.03	775.06	775.15	775.25	775.36	775.44	---	---	---
14	---	---	775.10	775.07	775.11	775.15	775.25	775.37	775.47	---	---	---
15	---	---	775.10	775.12	775.12	775.15	775.25	---	775.50	---	---	---
16	---	---	775.07	775.15	775.10	775.16	775.26	---	775.51	---	---	---
17	---	---	775.06	775.15	775.09	775.15	775.26	775.39	---	---	---	---
18	---	---	775.12	775.15	775.13	775.15	775.24	775.38	---	---	---	---
19	---	---	775.09	775.15	775.15	775.18	775.23	775.38	---	---	---	---
20	---	---	775.07	775.17	775.13	775.21	775.23	775.40	---	---	---	---
21	---	---	775.11	775.17	775.10	775.19	775.23	775.38	---	---	---	---
22	---	---	775.09	775.11	775.09	775.15	775.25	775.38	---	---	---	---
23	---	---	775.08	775.07	775.09	775.16	775.26	775.39	---	---	---	---
24	---	---	775.15	775.10	775.11	775.21	775.27	775.40	---	---	---	---
25	---	---	775.21	775.16	775.15	775.19	775.25	775.41	---	---	---	---
26	---	775.24	775.20	775.14	775.16	775.13	775.25	775.39	---	---	---	---
27	---	775.22	775.26	775.09	775.16	775.12	775.26	775.39	---	---	---	---
28	---	775.17	775.25	775.07	775.15	775.15	775.28	775.41	---	---	---	---
29	---		775.18	775.05	775.16	775.16	775.30	775.42	---	---	---	---
30	---		775.09	775.06	775.14	775.15	775.31	775.43	---	---	---	---
31	---		775.07		775.17		775.30	775.45		---		---
MONTHLY												
MEAN	---	---	775.13	775.10	775.12	775.15	775.23	---	---	---	---	---
MAX	---	---	775.29	775.17	775.17	775.21	775.31	---	---	---	---	---
MIN	---	---	775.03	775.03	775.06	775.09	775.13	---	---	---	---	---

Table 14.--*Daily mean water-level altitude, in meters above sea level, for well USW H-5*--Continued

Interval: 704-1,091 m

Site ID: 365122116275502

1986

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	---	---	775.56	775.78	775.29	775.44	775.36	775.35	775.34	775.45	775.48	---
2	---	775.58	775.56	775.78	775.30	775.44	775.35	775.33	775.34	775.44	775.45	---
3	---	775.61	775.52	775.75	775.34	775.43	775.38	775.33	775.32	775.36	775.43	---
4	---	775.60	775.51	775.77	775.33	775.45	775.42	775.34	775.32	775.32	775.38	---
5	---	775.61	775.54	775.77	775.36	775.46	775.40	775.35	775.38	775.33	775.41	---
6	---	775.63	775.55	---	775.39	775.45	775.36	775.34	775.39	775.32	775.46	---
7	---	775.61	775.59	---	775.35	775.48	775.35	775.33	775.40	775.33	775.43	---
8	---	775.62	775.65	---	775.33	775.47	775.36	775.34	775.42	775.34	775.37	---
9	---	775.59	---	---	775.32	775.45	775.36	775.34	775.44	775.35	775.37	---
10	---	775.58	---	---	775.36	775.41	775.37	775.33	775.38	775.40	775.37	---
11	---	775.57	---	---	775.34	775.42	775.38	775.35	775.35	775.40	775.37	---
12	---	---	---	---	775.31	775.44	775.39	775.32	775.39	775.35	775.39	---
13	---	---	---	---	775.33	775.43	775.37	775.33	775.39	775.33	775.42	---
14	---	---	---	---	775.37	775.44	775.36	775.34	775.39	775.40	775.44	---
15	---	---	---	---	775.37	775.45	775.37	775.34	775.38	775.44	775.41	---
16	---	775.58	---	---	775.31	775.44	775.40	775.34	775.37	775.46	775.42	---
17	---	775.57	---	---	775.28	775.42	775.37	775.31	775.38	775.49	---	---
18	---	775.58	---	---	775.35	775.43	775.35	775.27	775.40	775.50	---	---
19	---	775.62	---	---	775.38	775.44	775.32	775.28	775.42	775.48	---	---
20	---	775.56	---	---	775.41	775.43	775.35	775.29	775.38	775.44	---	---
21	---	775.51	---	775.30	775.42	775.41	775.38	775.29	775.37	775.45	---	---
22	---	775.50	775.52	775.34	775.38	775.39	775.37	775.32	775.38	775.47	---	---
23	---	775.50	775.63	775.35	775.39	775.39	775.34	775.34	775.43	775.44	---	---
24	---	775.49	775.69	775.34	775.37	775.40	775.33	775.33	775.45	775.41	---	---
25	---	775.50	775.67	775.35	775.37	775.41	775.35	775.32	775.43	775.46	---	---
26	---	775.53	775.65	775.30	775.39	775.40	775.37	775.29	775.38	775.54	---	---
27	---	775.54	775.67	775.27	775.41	775.38	775.36	775.27	775.38	775.56	---	---
28	---	775.55	775.69	775.32	775.41	775.38	775.35	775.29	775.37	775.54	---	---
29	---		775.68	775.33	775.41	775.39	775.33	775.32	775.35	775.54	---	---
30	---		775.70	775.30	775.41	775.38	775.34	775.32	775.38	775.57	---	---
31	---		775.72		775.43		775.36	775.33		775.52		---
MONTHLY MEAN	---	---	---	---	775.36	775.42	775.36	775.32	775.38	775.43	---	---
MAX	---	---	---	---	775.43	775.48	775.42	775.35	775.45	775.57	---	---
MIN	---	---	---	---	775.28	775.38	775.32	775.27	775.32	775.32	---	---

Table 14.--*Daily mean water-level altitude, in meters above sea level, for well USW H-5*--Continued

Interval: 704-1,091 m

Site ID: 365122116275502

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	---	---	---	---	---	---	---	---	---	775.44	---	---
2	---	---	---	---	---	---	---	---	---	775.42	---	---
3	---	---	---	---	---	---	---	---	---	775.39	---	---
4	---	---	---	---	---	---	---	---	---	775.41	---	---
5	---	---	---	---	---	---	---	---	---	775.43	---	---
6	---	---	---	---	---	---	---	---	---	775.45	---	---
7	---	---	---	---	---	---	---	---	---	775.48	---	---
8	---	---	---	---	---	---	---	---	---	775.49	---	---
9	---	---	---	---	---	---	---	---	---	775.48	---	---
10	---	---	---	---	---	---	---	---	---	775.45	---	---
11	---	---	---	---	---	---	---	---	---	775.44	775.48	---
12	---	---	---	---	---	---	---	---	---	775.48	775.52	---
13	---	---	---	---	---	---	---	---	---	775.50	775.60	---
14	---	---	---	---	---	---	---	---	---	775.50	775.60	---
15	---	---	---	---	---	---	---	---	---	775.49	775.53	---
16	---	---	---	---	---	---	---	---	---	775.45	775.55	---
17	---	---	---	---	---	---	---	---	---	775.45	775.55	---
18	---	---	---	---	---	---	---	---	---	775.47	775.47	---
19	---	---	---	---	---	---	---	---	---	775.48	775.45	---
20	---	---	---	---	---	---	---	---	---	775.47	775.53	---
21	---	---	---	---	---	---	---	---	---	775.48	775.57	---
22	---	---	---	---	---	---	---	---	---	775.52	775.58	---
23	---	---	---	---	---	---	---	---	---	775.53	775.56	---
24	---	---	---	---	---	---	---	---	---	---	775.53	---
25	---	---	---	---	---	---	---	---	---	---	775.57	---
26	---	---	---	---	---	---	---	---	---	---	775.53	---
27	---	---	---	---	---	---	---	---	---	---	775.55	---
28	---	---	---	---	---	---	---	---	---	---	775.62	---
29	---		---	---	---	---	---	---	---	---	775.58	---
30	---		---	---	---	---	---	---	775.43	---	---	---
31	---		---		---		---	---		---		---
MONTHLY												
MEAN	---	---	---	---	---	---	---	---	---	---	---	---
MAX	---	---	---	---	---	---	---	---	---	---	---	---
MIN	---	---	---	---	---	---	---	---	---	---	---	---

Table 14.--*Daily mean water-level altitude, in meters above sea level, for well USW H-5*--Continued

Interval: 704-1,091 m

Site ID: 365122116275502

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	---	---	---	775.52	775.49	775.43	775.47	775.47	775.46	775.45	775.49	775.38
2	---	---	---	775.54	775.45	775.43	775.47	775.47	775.44	775.45	775.50	775.39
3	---	---	---	775.57	775.50	775.47	775.48	---	775.42	775.46	775.48	775.38
4	---	---	---	775.56	775.55	775.52	775.49	---	775.43	775.46	775.44	775.37
5	---	---	---	775.48	775.57	775.55	775.47	---	---	775.48	775.45	775.38
6	---	---	---	775.49	775.52	775.51	775.46	775.48	---	775.47	775.51	775.41
7	---	---	---	775.55	775.52	775.47	775.44	775.46	---	775.42	775.51	775.47
8	---	---	---	775.52	775.48	775.44	775.45	775.44	775.46	775.39	775.50	775.41
9	---	---	---	775.46	775.45	775.46	775.46	775.46	775.48	775.43	775.48	775.43
10	---	---	775.58	775.47	775.42	775.46	775.48	775.48	775.51	775.44	775.50	775.44
11	---	---	775.57	775.50	775.43	775.48	775.47	775.48	775.49	775.45	775.49	775.39
12	---	---	775.53	775.53	775.46	775.49	775.45	775.47	775.47	775.46	775.48	775.38
13	---	---	775.49	---	775.49	775.45	775.45	775.47	775.44	775.47	775.53	775.45
14	---	---	775.56	---	775.48	775.43	775.46	775.47	775.45	775.48	775.55	775.52
15	---	---	775.63	---	775.48	775.43	775.45	775.48	775.46	775.44	775.45	775.48
16	---	---	775.55	---	775.51	775.45	775.43	775.47	775.48	775.43	775.46	775.43
17	---	---	775.46	---	775.54	775.47	775.43	775.46	775.50	775.45	775.54	775.44
18	---	---	775.45	---	775.51	775.45	775.44	775.46	775.47	775.45	775.47	775.50
19	---	---	775.47	---	775.47	775.45	775.44	775.48	775.51	775.48	775.42	775.51
20	---	---	775.50	---	775.45	775.45	775.41	775.49	775.56	775.48	775.43	775.49
21	---	---	775.54	---	775.44	775.45	775.39	775.49	775.50	---	775.42	775.50
22	---	---	775.53	775.59	775.47	775.45	775.41	775.45	775.45	775.47	775.45	775.49
23	---	---	775.53	775.54	775.49	775.45	775.43	775.43	775.45	775.46	775.53	775.46
24	---	---	775.49	775.49	775.48	775.47	775.41	775.41	775.45	775.47	775.53	775.54
25	---	---	775.47	775.50	775.47	775.47	775.42	775.43	775.44	775.47	775.56	775.58
26	---	---	775.51	775.51	775.49	775.45	775.44	775.47	775.43	775.49	775.49	775.48
27	---	---	775.58	775.53	775.51	775.47	775.44	775.47	775.43	775.51	775.40	775.45
28	---	---	775.51	775.54	775.54	775.48	---	775.46	775.41	775.48	775.41	775.47
29	---	---	775.54	775.50	775.60	775.47	---	775.46	775.42	775.46	775.35	775.41
30	---		775.58	775.57	775.53	775.47	775.43	775.48	775.44	775.44	775.35	775.45
31	---		775.54		775.46		775.44	775.49		775.44		775.50
MONTHLY MEAN	---	---	---	---	775.49	775.46	---	---	---	---	775.47	775.45
MAX	---	---	---	---	775.60	775.55	---	---	---	---	775.56	775.58
MIN	---	---	---	---	775.42	775.43	---	---	---	---	775.35	775.37

Table 14.--*Daily mean water-level altitude, in meters above sea level, for well USW H-5*--Continued

Interval: 1,091-1,219 m

Site ID: 365122116275503

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	---	---	---	---	---	---	---	---	---	775.43	---	---
2	---	---	---	---	---	---	---	---	---	775.41	---	---
3	---	---	---	---	---	---	---	---	---	775.39	---	---
4	---	---	---	---	---	---	---	---	---	775.40	---	---
5	---	---	---	---	---	---	---	---	---	775.43	---	---
6	---	---	---	---	---	---	---	---	---	775.45	---	---
7	---	---	---	---	---	---	---	---	---	775.47	---	---
8	---	---	---	---	---	---	---	---	---	775.48	---	---
9	---	---	---	---	---	---	---	---	---	775.48	---	---
10	---	---	---	---	---	---	---	---	---	775.46	---	---
11	---	---	---	---	---	---	---	---	---	775.45	---	---
12	---	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	---	---	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	---	---	---	---
21	---	---	---	---	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
23	---	---	---	---	---	---	---	---	---	---	---	---
24	---	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	775.44	---	---	---
26	---	---	---	---	---	---	---	---	775.45	---	---	---
27	---	---	---	---	---	---	---	---	775.44	---	---	---
28	---	---	---	---	---	---	---	---	775.42	---	---	---
29	---		---	---	---	---	---	---	775.40	---	---	---
30	---		---	---	---	---	---	---	775.41	---	---	---
31	---		---		---		---	---		---		---
MONTHLY												
MEAN	---	---	---	---	---	---	---	---	---	---	---	---
MAX	---	---	---	---	---	---	---	---	---	---	---	---
MIN	---	---	---	---	---	---	---	---	---	---	---	---

Well USW H-6

Information about the history of well USW H-6 and about previous data from the well was obtained from various sources. These sources are: Craig and others (1983); Robison (1984, 1986); Robison and others (1988); Holmes & Narver, Inc. (written commun., 1986); Fenix & Scisson, Inc. (1987a, c).

Well specifications

The following are specifications for well USW H-6:

1. Location and identification:

   Latitude and longitude: 36°50'49" N.; 116°28'55" W.
   Nevada State Central Zone Coordinates (m): N 232,654; E 168,882.
   U.S. Geological Survey Site ID's:
   365049116285501 (entire well)
   365049116285504 (upper interval)
   365049116285505 (lower interval)

2. Drilling and casing information:

   Well started: August 7, 1982.
   Well completed: October 28, 1982.
   Drilling method: Rotary, using rock bits and air-foam circulating medium; selected core obtained.
   Bit diameter below water level: 375 mm used to 583 m; 222 mm used from 583 to 1,216 m; 156 mm used from 1,216 m to 1,220 m.
   Casing extending below water level: 250-mm diameter to 581 m, perforated below the water level.
   Total drilled depth: 1,220 m.

3. Access to and description of interval for measuring water levels:

   48-mm inside-diameter open-ended tubing, extending from land surface to 533 m; saturated upper interval within the Prow Pass, Bullfrog, and Tram Members of the Crater Flat Tuff; Site ID: 365049116285504.
   62-mm inside-diameter tubing that has inflatable packer on bottom end, extending from land surface to 752 m.; lower interval within the Tram Member of the Crater Flat Tuff, an unnamed lava between the Tram Member and the Lithic Ridge Tuff (Carr, 1988, p. 37), and the Lithic Ridge Tuff; Site ID: 365049116285505.

4. Information for calculating water-level altitude:

   Reference point: Top of metal tag on well casing; altitude 1,302.06 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: 0.05 m, based on depth to water of 526 m.

History of instrumentation, calibrations, and comments

Manual water-level measurements were made from December 15, 1982, through July 19, 1984. Beginning in August 1985, the water level has been monitored continuously using downhole pressure transducers with a data logger at the land surface.

The following transducers were used in well USW H-6:

Site ID: 365049116285504
Interval: 526-752 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
08-13-85	03-29-88	Gage	Druck PDCR 10/D	10	115938
03-30-88	04-13-88	Gage	Druck PDCR 10/D	10	226109
04-13-88	12-31-88	Gage	Druck PDCR 10/D	10	226102

Site ID: 365049116285505
Interval: 752-1120 meters
[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
08-13-85	12-31-88	Absolute	Bell&Howell	25	6054

The following calibrations of the water-level monitoring system were performed in well USW H-6:

Site ID: 365049116285504
Interval: 526-752 meters

Transducer		Regression line		Water level	
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
115938	08-13-85	-6.374	1.000	08-13-85	775.89
115938	09-17-87	-6.549	1.000	09-17-87	776.04
226109	03-30-88	-6.941	0.995	03-30-88	775.95
226102	04-13-88	-6.757	.999	04-13-88	775.99
226102	08-26-88	-6.654	1.000	08-26-88	775.93
226102	10-21-88	-6.576	0.999	10-21-88	775.91

Site ID: 365049116285505
Interval: 752-1,220 meters
[Dashes indicate water level not determined]

Transducer				Water level	
		Regression line			
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
6054	08-13-85	-0.845	1.000	--	--
6054	09-17-87	-0.862	0.999	--	--
6054	02-23-88	-0.854	1.000	02-23-88	775.90
6054	06-13-88	-0.852	1.000	06-13-88	775.88
6054	10-21-88	-0.852	1.000	10-21-88	775.90

Transducer output

Transducer output from August 1985 through December 1988 is shown in figure 35. These data are the transducer output after first-level filtering (described earlier) had been applied. The first transducer (serial number 115938), in use between August 1985 and March 1988 in the upper interval (Site ID: 365049116285504), produced numerous short periods of reasonable output alternating with short periods of erratic output (fig. 35-A, 35-B, 35-C, 35-D, and 35-E). This occurred through late December of 1987. Beginning in late December 1987 this transducer produced only erratic output. The second transducer (serial number 226109), was in use only 2 weeks in March and April 1988 (fig. 35-D). This transducer produced only a few readings before it failed completely. The third transducer (serial number 226102), in use after April 1988 also produced periods of reasonable output alternating with periods of erratic output.

Only one transducer (serial number 6054) was in use in the lower interval (Site ID: 365049116285505) between August 1985 and December 1988. This transducer drifted upward from August 1985 until the February 1988 calibration (fig. 35-F, 35-G, 35-H, and 35-I). After the February 1988 calibration the output was about 6 millivolts less than before calibration and the output drifted downward for the remainder of 1988 (fig. 35-J). The record contains a few noticeable spikes in late 1986 (fig. 35-G) and the first one-half of 1987 (fig 35-H), but the rest of the output is free of major spikes. It is virtually impossible to evaluate the quality of this output. Because this transducer is an absolute (unvented) transducer, it records pressure changes due to both barometric-pressure changes and water-level changes. These changes are nearly equal in amplitude and opposite in direction of transducer output so it is difficult to determine if the transducer responds correctly to barometric pressure changes. The transducer does show pressure changes that may be an earth-tide response, but without output from another transducer in this interval, it can not be determined if this is a proper earth-tide response.

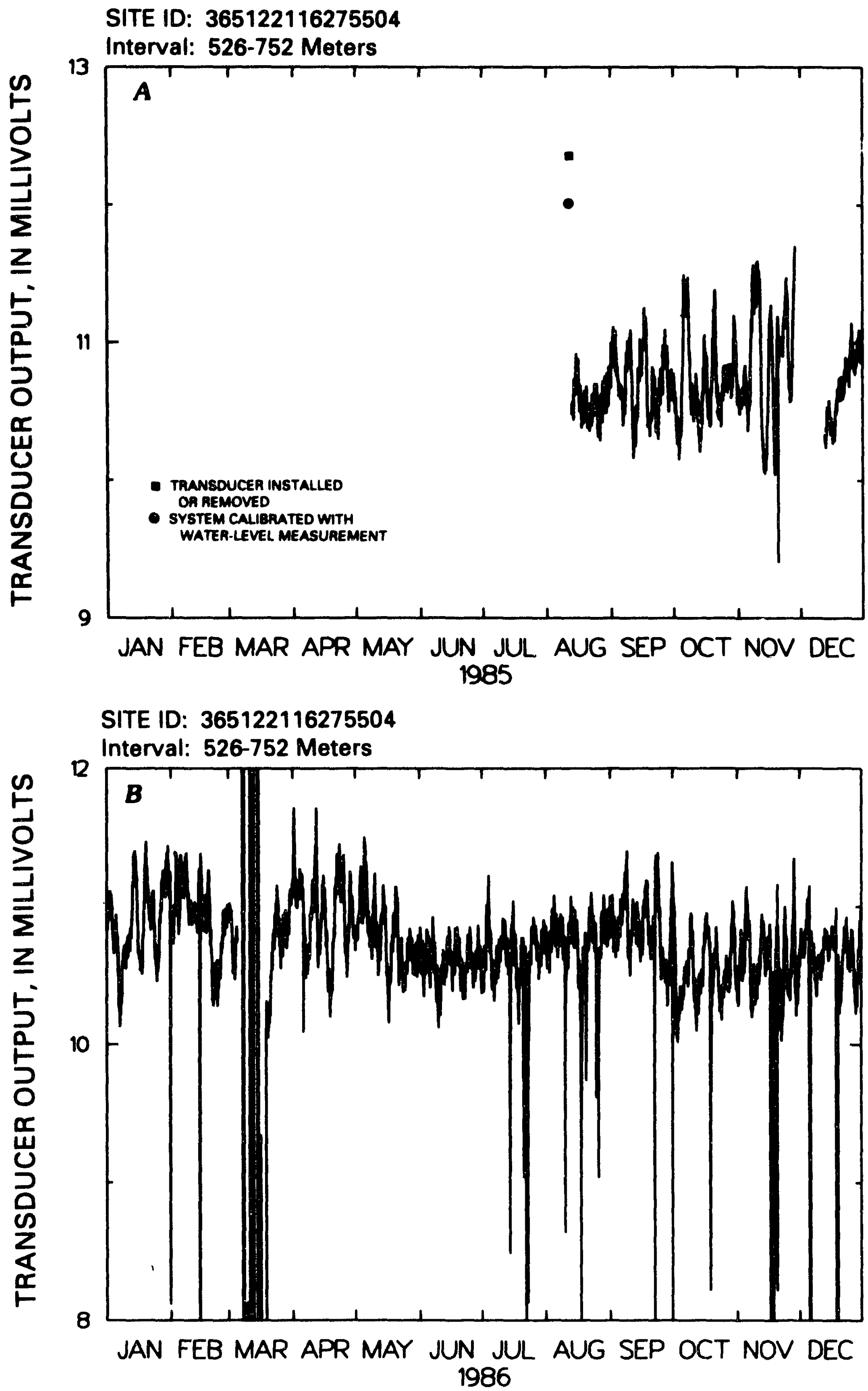
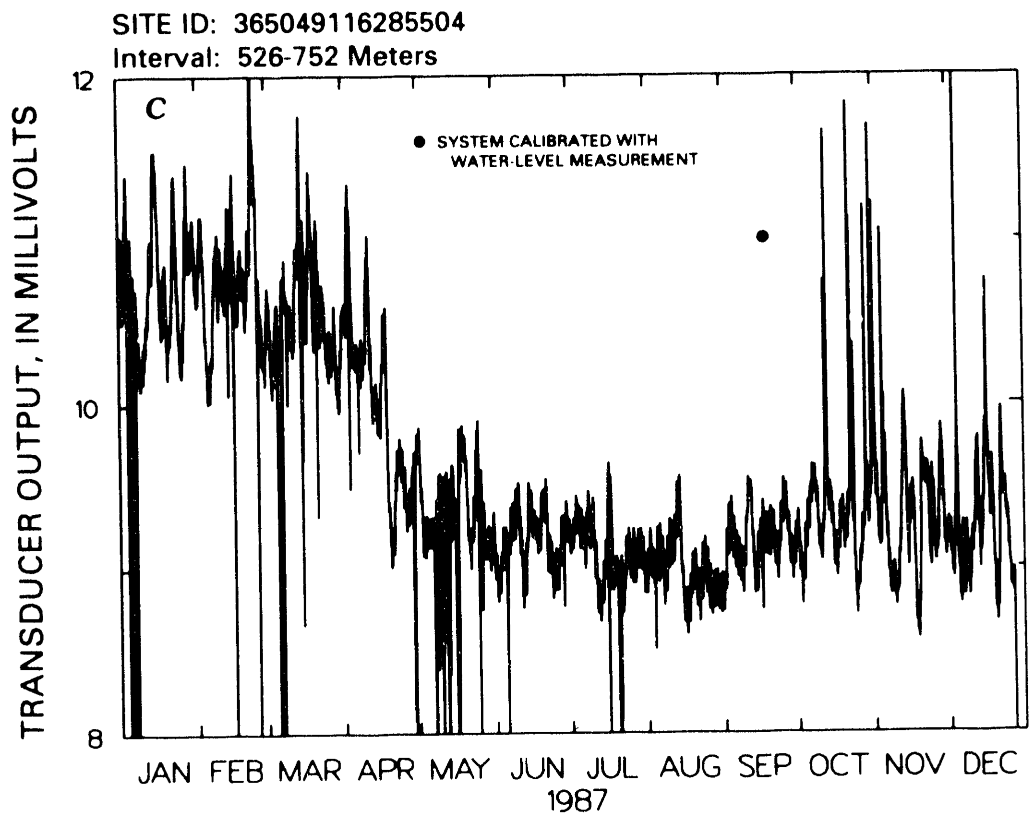


Figure 35.--Transducer output for well USW H-6.



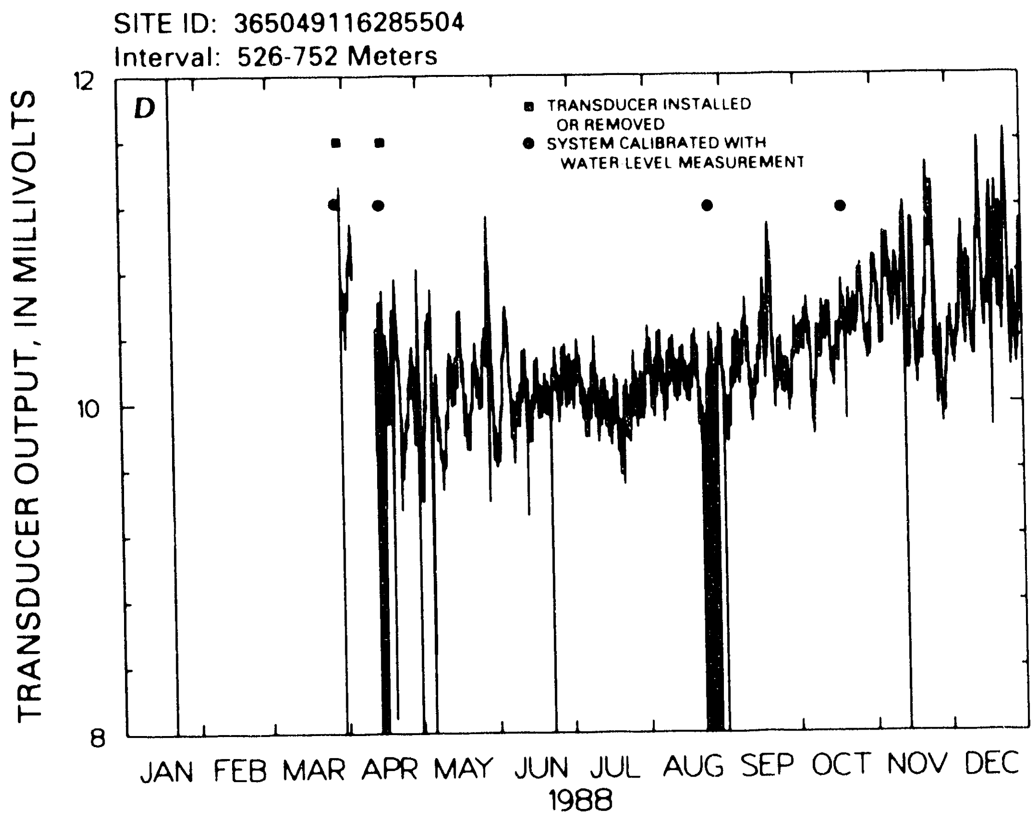
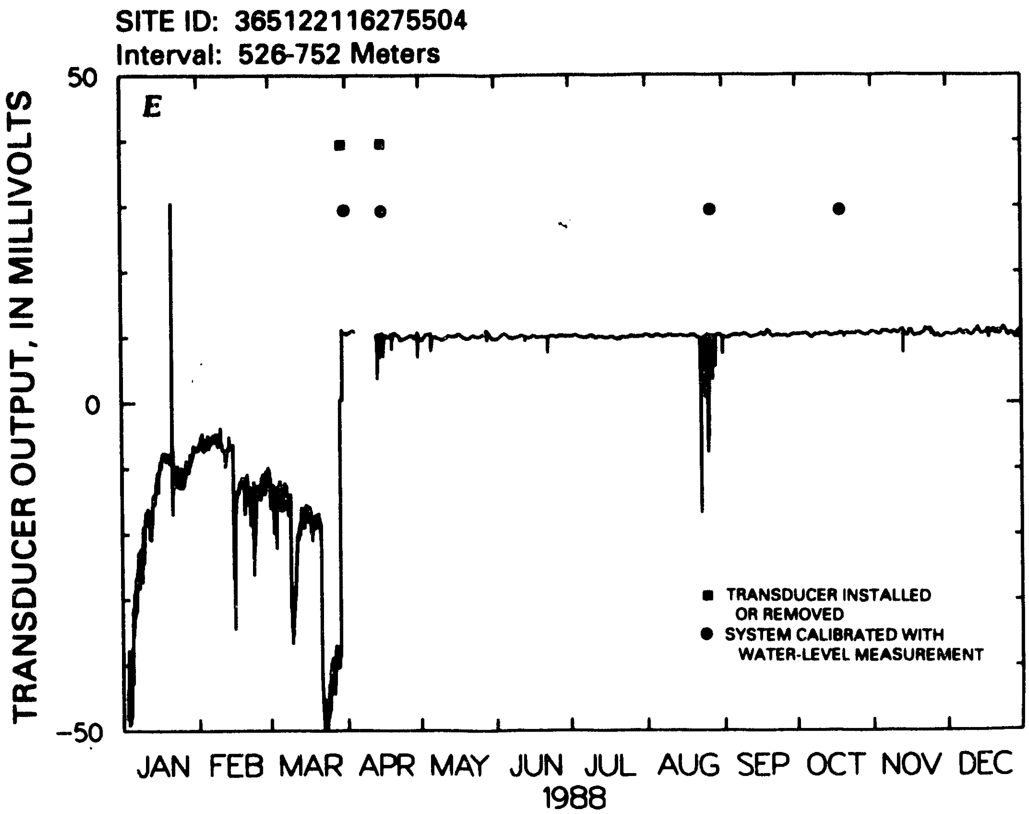


Figure 35.--Transducer output for well USW H-6.--Continued



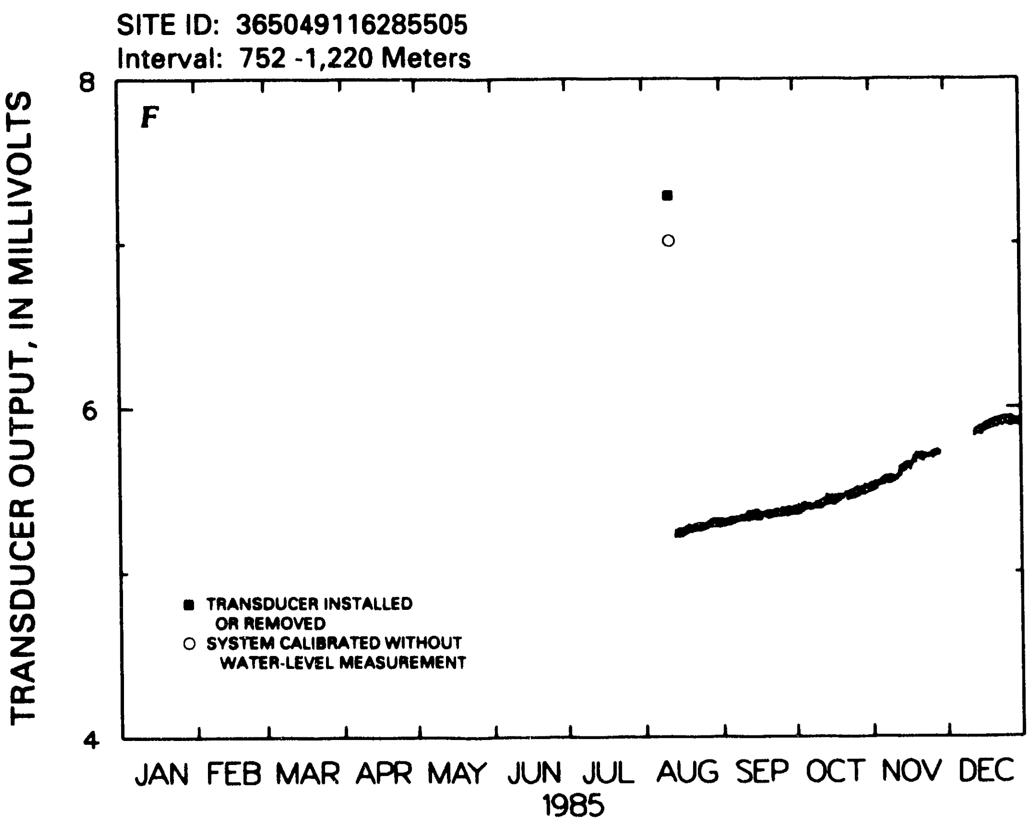
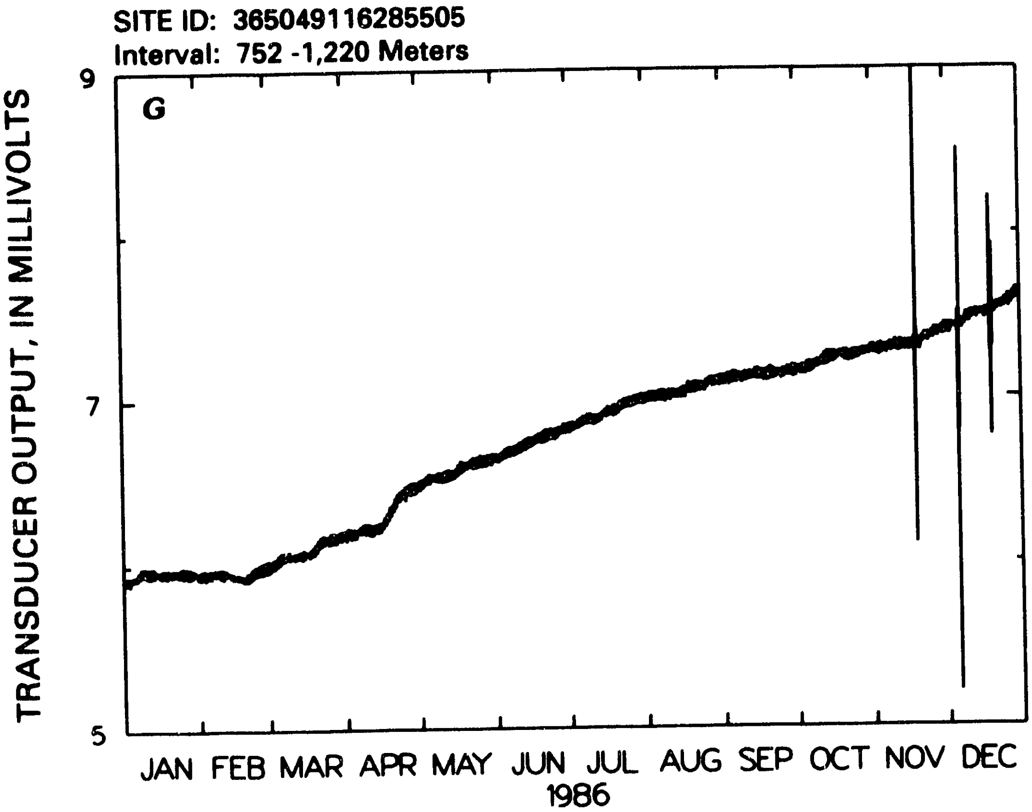


Figure 35.--Transducer output for well USW H-6.--Continued



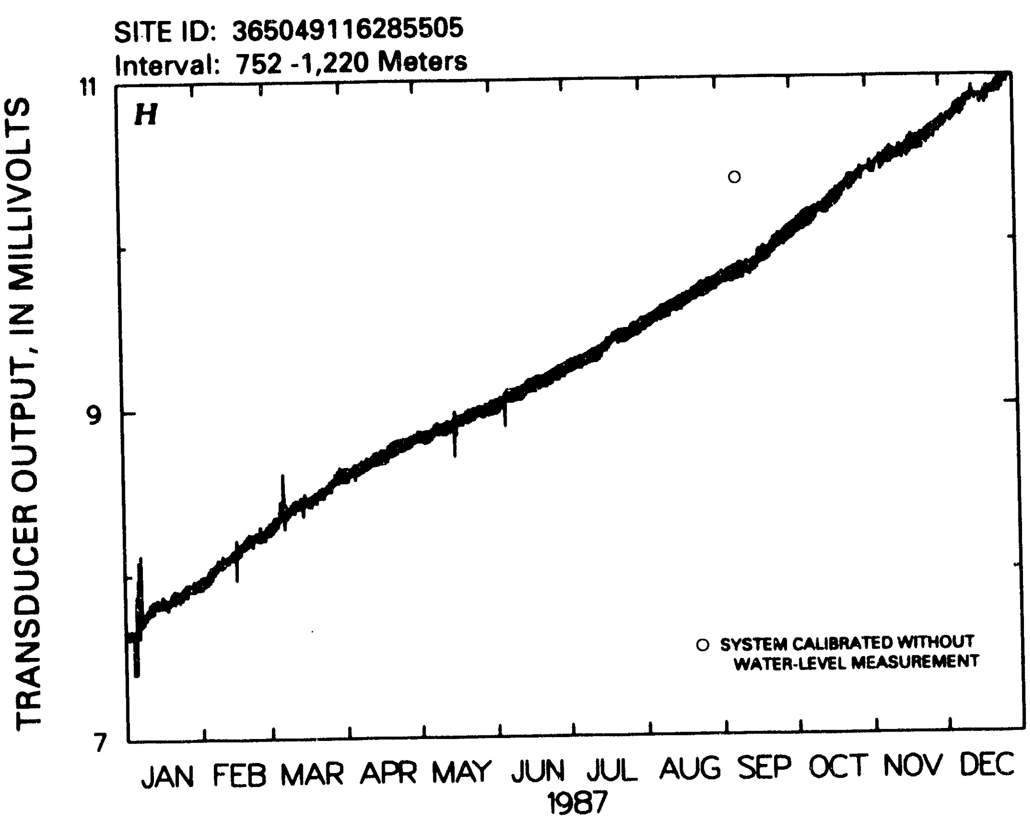


Figure 35.--Transducer output for well USW H-6.--Continued

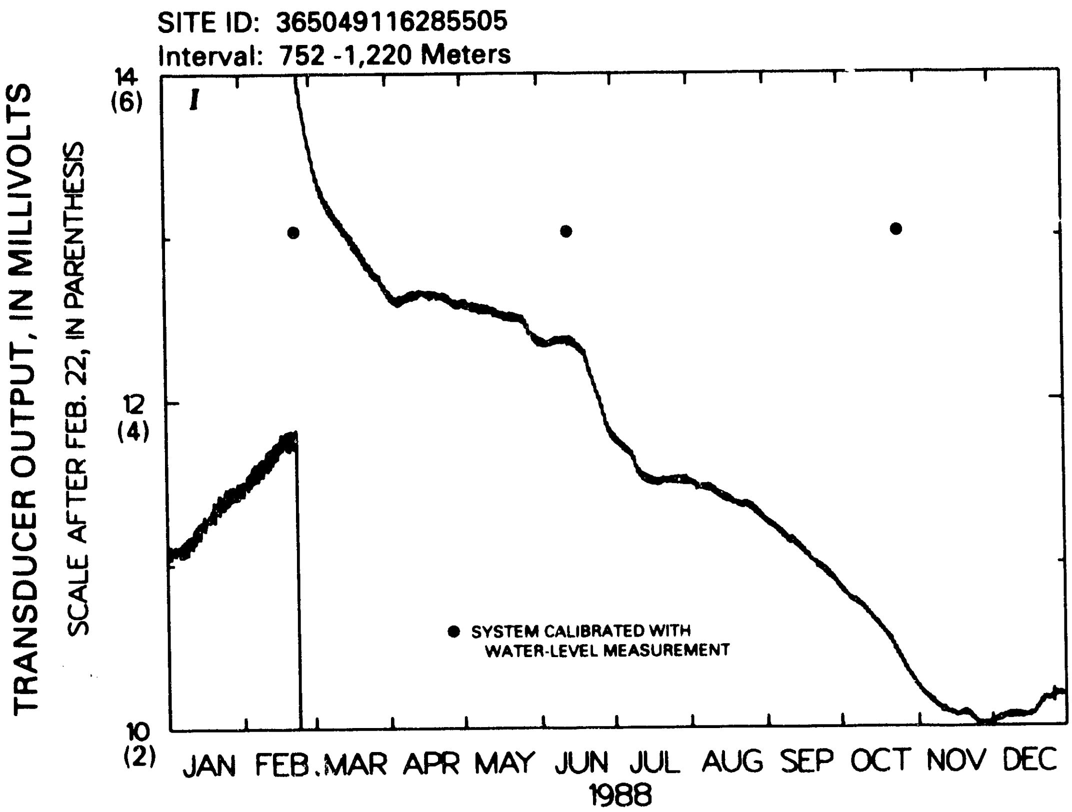


Figure 35.--Transducer output for well USW H-6.--Continued

Water-level altitude

Transducer output was converted to water-level altitude for the following periods:

Site ID: 365049116285504
Interval: 526-752 m

Beginning date	Ending date	Beginning date	Ending date
08-13-85	11-15-85	04-30-87	05-06-87
12-14-85	01-30-86	05-28-87	06-04-87
02-02-86	02-10-86	06-07-87	06-27-87
02-16-86	02-27-86	07-04-87	07-15-87
03-20-86	04-05-86	07-22-87	08-03-87
04-07-86	07-13-86	08-05-87	10-11-87
07-25-86	08-09-86	10-14-87	10-21-87
08-28-86	09-22-86	11-07-87	12-03-87
09-24-86	09-30-86	12-09-87	12-16-87
10-03-86	10-18-86	12-18-87	12-26-87
10-21-86	11-16-86	05-07-88	05-28-88
11-22-86	12-05-86	05-30-88	06-12-88
12-08-86	12-18-86	06-14-88	06-21-88
12-21-86	01-03-87	06-24-88	07-21-88
01-08-87	02-08-87	07-23-88	08-22-88
02-16-87	02-24-87	09-02-88	11-13-88
02-26-87	03-04-87	11-15-88	11-24-88
03-23-87	04-02-87	11-27-88	12-17-88
04-08-87	04-28-87	12-20-88	12-31-88

Site ID: 365049116285505
Interval: 752-1,220 m (Lower)
No convertible data

During various times between February 18 and 27, 1986, the data logger could not read the transducer in the upper interval and hence there is no water-level altitude at these times.

The water-level altitudes are shown in figure 36 and the daily mean water-level altitudes are given in table 15. Approximately 72 percent of the transducer output from the upper interval was converted to water-level altitude. The longest period was 98 days, April 7 through July 13, 1986. No transducer output from the lower interval was converted to water-level altitude.

The only transducer used to monitor water levels in the lower interval was an absolute transducer. This type of transducer responded not only to water-level changes, but also to barometric-pressure changes. Before the output from the absolute transducer was converted to water levels, the barometric-pressure effects were removed from the record using the procedure described in the "Adjustment for Absolute Transducer" section. The transducer output shown in figure 35 is before the barometric-pressure effects were removed from the record.

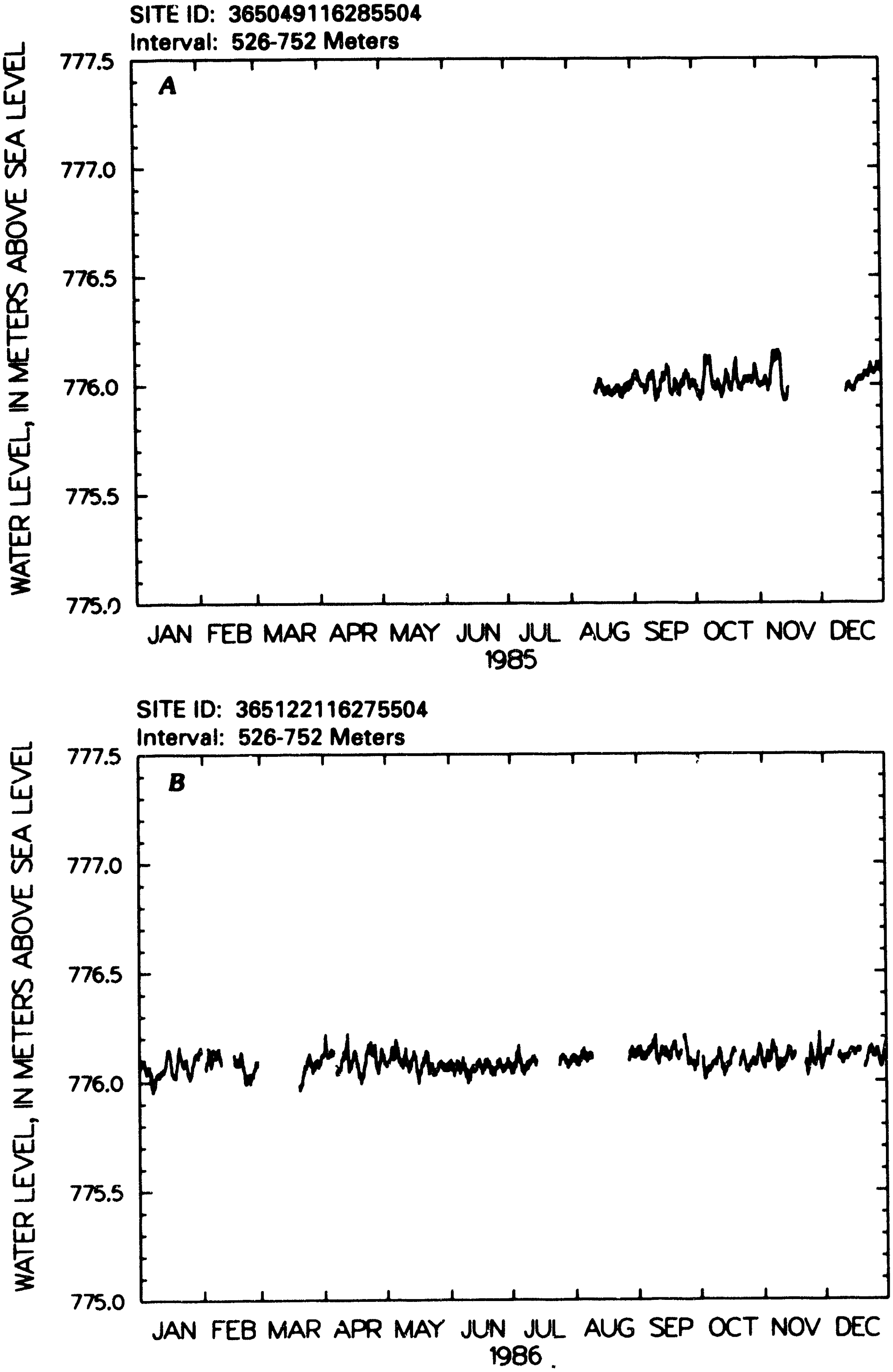
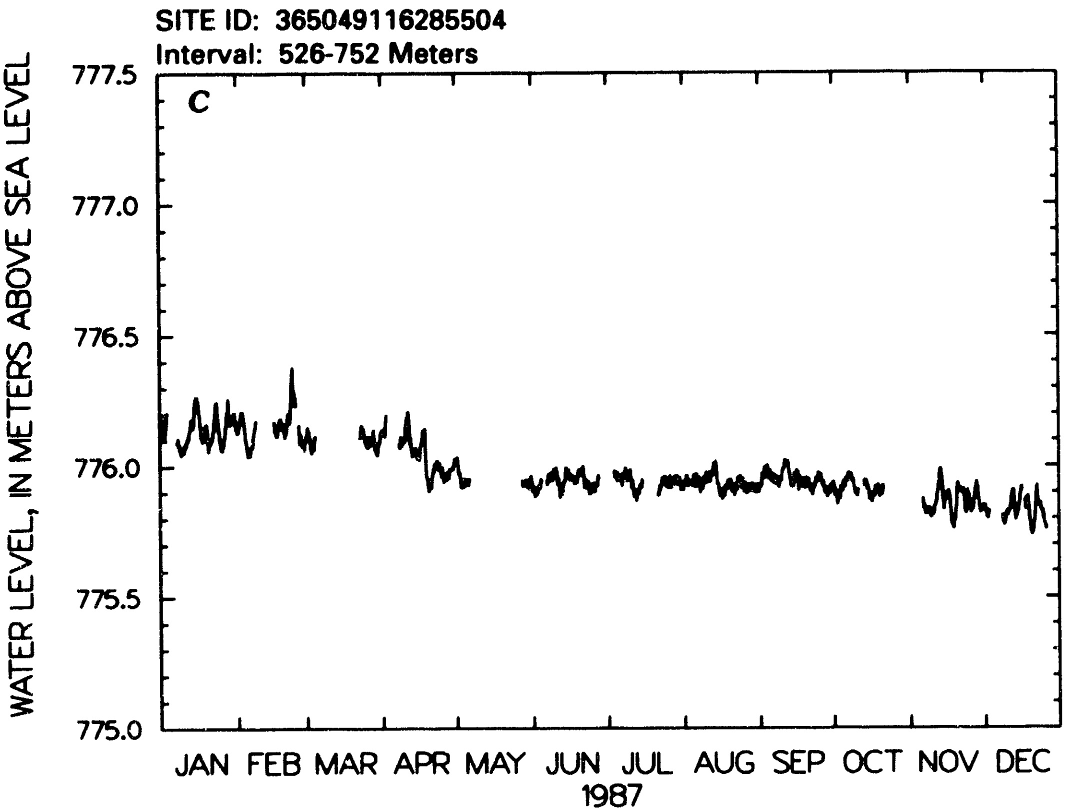


Figure 36.--Water-level altitude for well USW H-6.



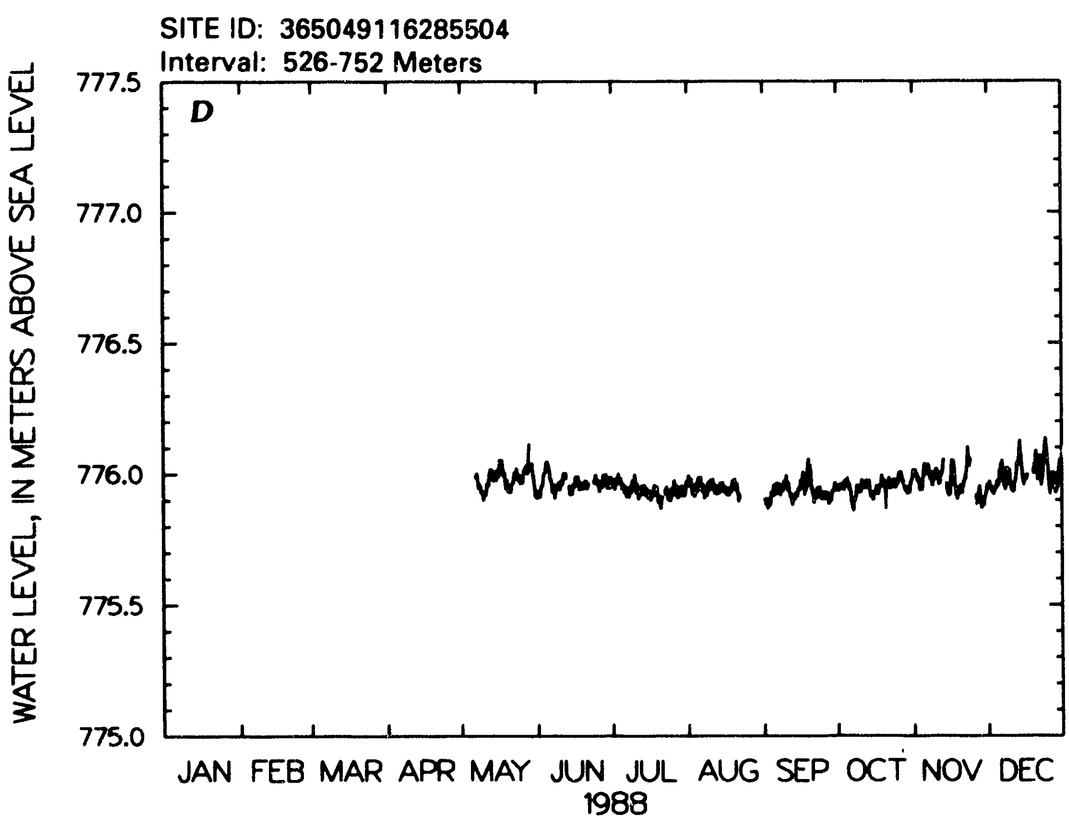


Figure 36.--Water-level altitude for well USW H-6.--Continued

Table 15.--*Daily mean water-level altitude, in meters above sea level, for well USW H-6*

[Monthly mean, maximum (max), and minimum (min) computed from the daily mean values, indicated only for months that have complete data sets. Dashes indicate insufficient data to calculate daily mean water-level altitude.]

Interval: 526-752 m

Site ID: 365049116285504

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1985						
1	---	---	---	---	---	---	---	---	775.95	775.94	775.96	---
2	---	---	---	---	---	---	---	---	775.98	775.93	775.94	---
3	---	---	---	---	---	---	---	---	775.98	775.90	775.95	---
4	---	---	---	---	---	---	---	---	775.96	775.89	775.96	---
5	---	---	---	---	---	---	---	---	775.94	775.92	775.97	---
6	---	---	---	---	---	---	---	---	775.93	776.02	775.94	---
7	---	---	---	---	---	---	---	---	775.91	776.05	775.98	---
8	---	---	---	---	---	---	---	---	775.93	776.06	776.06	---
9	---	---	---	---	---	---	---	---	775.97	775.99	776.08	---
10	---	---	---	---	---	---	---	---	775.98	775.94	776.08	---
11	---	---	---	---	---	---	---	---	775.96	775.94	776.09	---
12	---	---	---	---	---	---	---	---	775.88	775.95	776.02	---
13	---	---	---	---	---	---	---	---	775.89	775.93	775.90	---
14	---	---	---	---	---	---	---	775.91	775.93	775.90	775.88	775.94
15	---	---	---	---	---	---	---	775.94	775.97	775.92	775.91	775.96
16	---	---	---	---	---	---	---	775.95	775.98	775.98	---	775.94
17	---	---	---	---	---	---	---	775.92	776.00	775.98	---	775.94
18	---	---	---	---	---	---	---	775.90	776.00	775.93	---	775.95
19	---	---	---	---	---	---	---	775.90	775.91	775.93	---	775.97
20	---	---	---	---	---	---	---	775.91	775.90	775.99	---	775.99
21	---	---	---	---	---	---	---	775.89	775.93	776.04	---	775.99
22	---	---	---	---	---	---	---	775.89	775.95	775.96	---	775.99
23	---	---	---	---	---	---	---	775.90	775.91	775.94	---	776.01
24	---	---	---	---	---	---	---	775.91	775.92	775.94	---	776.01
25	---	---	---	---	---	---	---	775.92	775.95	775.96	---	776.01
26	---	---	---	---	---	---	---	775.90	775.96	775.97	---	776.04
27	---	---	---	---	---	---	---	775.90	775.99	775.97	---	776.03
28	---	---	---	---	---	---	---	775.91	775.98	775.98	---	776.02
29	---		---	---	---	---	---	775.92	775.94	775.96	---	776.04
30	---		---	---	---	---	---	775.93	775.95	776.01	---	776.04
31	---		---		---		---	775.93		776.01		776.03
MONTHLY												
MEAN	---	---	---	---	---	---	---	---	775.95	775.96	---	---
MAX	---	---	---	---	---	---	---	---	776.00	776.06	---	---
MIN	---	---	---	---	---	---	---	---	775.88	775.89	---	---

Table 15.--*Daily mean water-level altitude, in meters above sea level, for well USW H-6*--Continued

Interval: 526-752 m

Site ID: 365049116285504

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1986						
1	776.03	—	—	776.15	776.07	776.07	776.06	776.11	776.15	—	776.11	776.13
2	776.05	776.04	—	776.12	776.08	776.06	776.06	776.10	776.16	—	776.11	776.17
3	776.04	776.09	—	776.10	776.11	776.04	776.10	776.10	776.14	776.09	776.14	776.17
4	776.00	776.07	—	776.12	776.11	776.07	776.14	776.12	776.13	776.05	776.13	776.17
5	776.02	776.08	—	776.11	776.13	776.07	776.10	776.14	776.13	776.07	776.16	776.20
6	775.98	776.10	—	—	776.15	776.05	776.06	776.13	776.15	776.08	776.20	—
7	775.93	776.09	—	776.03	776.10	776.08	776.05	776.11	776.16	776.10	776.17	—
8	775.96	776.11	—	776.04	776.08	776.06	776.07	776.12	776.18	776.11	776.10	776.15
9	775.99	776.07	—	776.06	776.07	776.03	776.08	776.12	776.21	776.11	776.11	776.14
10	775.99	776.06	—	776.10	776.12	776.01	776.09	—	776.13	776.15	776.11	776.13
11	776.01	—	—	776.11	776.08	776.03	776.10	—	776.11	776.14	776.11	776.15
12	776.01	—	—	776.16	776.05	776.06	776.11	—	776.15	776.09	776.13	776.15
13	776.05	—	—	776.05	776.07	776.05	776.09	—	776.16	776.06	776.17	776.17
14	776.11	—	—	776.06	776.11	776.07	—	—	776.15	776.09	776.17	776.18
15	776.08	—	—	776.10	776.11	776.09	—	—	776.15	776.10	776.14	776.17
16	776.01	776.06	—	776.11	776.04	776.07	—	—	776.13	776.12	776.15	776.17
17	775.99	776.06	—	776.06	776.01	776.05	—	—	776.14	776.16	—	776.18
18	776.00	—	—	776.02	776.05	776.08	—	—	776.18	776.17	—	776.18
19	776.08	—	—	776.00	776.08	776.08	—	—	776.19	—	—	—
20	776.10	776.04	775.95	776.03	776.11	776.08	—	—	776.15	—	—	—
21	776.06	775.98	775.98	776.09	776.11	776.06	—	—	776.13	776.12	—	776.11
22	776.05	775.99	776.03	776.13	776.05	776.05	—	—	776.15	776.15	776.11	776.14
23	776.06	—	776.06	776.14	776.07	776.05	—	—	—	776.12	776.07	776.18
24	776.01	775.99	776.09	776.13	776.04	776.07	—	—	776.22	776.08	776.14	776.18
25	775.99	776.01	776.07	776.13	776.04	776.09	776.10	—	776.17	776.08	776.17	776.17
26	776.02	—	776.04	776.07	776.06	776.07	776.12	—	776.11	776.10	776.12	776.16
27	776.07	—	776.05	776.04	776.08	776.05	776.12	—	776.11	776.12	776.12	776.18
28	776.09	—	776.07	776.10	776.07	776.06	776.10	776.13	776.10	776.11	776.17	776.14
29	776.09		776.06	776.11	776.06	776.09	776.08	776.15	776.09	776.12	776.20	776.12
30	776.11		776.08	776.08	776.06	776.08	776.10	776.14	776.12	776.18	776.11	776.15
31	—		776.10		776.06		776.12	776.14		776.16		776.20
MONTHLY												
MEAN	—	—	—	—	776.08	776.06	—	—	—	—	—	—
MAX	—	—	—	—	776.15	776.09	—	—	—	—	—	—
MIN	—	—	—	—	776.01	776.01	—	—	—	—	—	—

Table 15.--*Daily mean water-level altitude, in meters above sea level, for well USW H-6*--Continued

Interval: 526-752 m | Site ID: 365049116285504

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1987						
1	776.21	776.19	776.18	776.20	776.09	776.00	—	776.01	776.01	776.02	—	775.90
2	776.16	776.24	776.17	776.21	776.05	775.98	—	776.03	776.04	775.99	—	775.89
3	776.21	776.23	776.12	—	776.01	775.99	—	776.03	776.07	775.97	—	775.87
4	—	776.15	776.14	—	776.01	776.01	776.05	—	776.08	775.99	—	—
5	—	776.10	—	—	776.01	—	776.04	776.03	776.07	776.01	—	—
6	—	776.11	—	—	776.01	—	776.04	776.04	776.05	776.03	—	—
7	—	776.15	—	—	—	776.03	776.03	776.04	776.05	776.05	775.92	—
8	776.13	776.21	—	776.16	—	776.03	776.06	776.01	776.04	776.05	775.90	—
9	776.10	—	—	776.16	—	776.04	776.05	776.03	776.03	776.03	775.90	775.85
10	776.11	—	—	776.19	—	776.06	776.05	776.04	776.06	775.99	775.88	775.86
11	776.13	—	—	776.25	—	776.03	776.02	776.05	776.10	775.98	775.90	775.88
12	776.17	—	—	776.18	—	775.98	775.99	776.05	776.11	—	775.95	775.92
13	776.21	—	—	776.12	—	775.99	775.98	776.07	776.08	—	776.02	775.94
14	776.24	—	—	776.12	—	776.04	776.00	776.10	776.03	776.02	776.01	775.87
15	776.30	—	—	776.11	—	776.06	776.00	776.03	776.04	776.01	775.93	775.89
16	776.25	776.20	—	776.11	—	776.04	—	775.99	776.07	775.97	775.96	775.96
17	776.17	776.18	—	776.17	—	776.04	—	775.99	776.05	775.96	775.95	—
18	776.16	776.22	—	776.18	—	776.02	—	776.00	776.04	775.99	775.86	775.91
19	776.19	776.20	—	776.03	—	776.04	—	776.02	776.04	776.00	775.85	775.90
20	776.13	776.18	—	775.99	—	776.06	—	776.03	776.04	775.98	775.94	775.81
21	776.15	776.23	—	776.01	—	776.06	—	776.02	776.03	775.99	775.98	775.82
22	776.20	776.25	—	776.06	—	776.02	775.99	776.00	776.02	—	775.97	775.92
23	776.27	776.38	776.19	776.08	—	776.01	776.02	776.03	776.01	—	775.95	775.91
24	776.18	776.31	776.20	776.07	—	776.00	776.03	776.04	776.03	—	775.91	775.89
25	776.12	—	776.16	776.05	—	776.00	776.03	776.03	776.05	—	775.94	775.86
26	776.14	776.17	776.15	776.03	—	776.00	776.03	776.02	776.05	—	775.90	775.82
27	776.22	776.15	776.16	776.03	—	776.02	776.02	776.01	776.03	—	775.92	—
28	776.25	776.14	776.17	776.04	776.01	—	776.03	776.01	776.00	—	775.98	—
29	776.22		776.14	—	776.01	—	776.03	776.01	775.99	—	775.94	—
30	776.24		776.12	776.08	776.01	—	776.03	776.01	776.00	—	775.89	—
31	776.20		776.17		776.03		776.01	776.01		—		—
MONTHLY												
MEAN	—	—	—	—	—	—	—	—	776.04	—	—	—
MAX	—	—	—	—	—	—	—	—	776.11	—	—	—
MIN	—	—	—	—	—	—	—	—	775.99	—	—	—

Table 15.--*Daily mean water-level altitude, in meters above sea level, for well USW H-6*--Continued

Interval: 526-752 m

Site ID: 365049116285504

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
						1988						
1	---	---	---	---	---	775.92	775.97	775.97	---	775.95	775.98	775.89
2	---	---	---	---	---	775.93	775.96	775.97	775.90	775.95	775.99	775.91
3	---	---	---	---	---	775.97	775.98	775.93	775.89	775.95	775.97	775.89
4	---	---	---	---	---	776.02	775.98	775.93	775.91	775.96	775.93	775.88
5	---	---	---	---	---	776.03	775.96	775.95	775.93	775.97	775.95	775.90
6	---	---	---	---	---	775.98	775.94	775.96	775.94	775.95	776.00	775.93
7	---	---	---	---	775.99	775.95	775.93	775.95	775.94	775.90	776.00	775.98
8	---	---	---	---	775.96	775.93	775.93	775.93	775.94	775.88	775.98	775.91
9	---	---	---	---	775.93	775.95	775.95	775.94	775.95	775.93	775.95	775.94
10	---	---	---	---	775.92	775.96	775.97	775.96	775.97	775.94	775.98	775.94
11	---	---	---	---	775.94	775.98	775.95	775.96	775.95	775.95	775.97	775.89
12	---	---	---	---	775.98	775.99	775.92	775.95	775.92	775.96	775.95	775.89
13	---	---	---	---	776.00	---	775.94	775.94	775.90	775.96	776.00	775.96
14	---	---	---	---	775.99	775.94	775.94	775.94	775.91	775.96	---	776.02
15	---	---	---	---	775.99	775.94	775.93	775.95	775.93	775.92	775.90	775.96
16	---	---	---	---	776.02	775.97	775.92	775.94	775.95	775.92	775.93	775.91
17	---	---	---	---	776.04	775.98	775.92	775.93	775.98	775.94	776.01	775.92
18	---	---	---	---	776.00	775.95	775.93	775.93	775.94	775.94	775.93	---
19	---	---	---	---	775.96	775.95	775.93	775.95	775.99	775.97	775.88	---
20	---	---	---	---	775.94	775.96	775.90	775.96	776.04	775.97	775.91	775.95
21	---	---	---	---	775.95	775.95	775.89	775.95	775.95	775.94	775.91	775.96
22	---	---	---	---	775.98	---	---	775.91	775.91	775.96	775.94	775.95
23	---	---	---	---	776.01	---	775.93	---	775.93	775.96	776.02	775.91
24	---	---	---	---	775.99	775.98	775.92	---	775.93	775.96	776.01	776.00
25	---	---	---	---	775.98	775.97	775.92	---	775.92	775.95	---	776.02
26	---	---	---	---	775.99	775.95	775.94	---	775.92	775.98	---	775.90
27	---	---	---	---	776.02	775.97	775.94	---	775.92	775.99	775.86	775.89
28	---	---	---	---	776.04	775.98	775.93	---	775.90	775.96	775.89	775.91
29	---	---	---	---	---	775.97	775.93	---	775.91	775.93	775.84	775.86
30	---		---	---	776.00	775.97	775.93	---	775.95	775.93	775.85	775.91
31	---		---		775.93		775.94	---		775.94		775.96
MONTHLY												
MEAN	---	---	---	---	---	---	---	---	---	775.95	---	---
MAX	---	---	---	---	---	---	---	---	---	775.99	---	---
MIN	---	---	---	---	---	---	---	---	---	775.88	---	---

Well J-13

Information about the history of well J-13 and about previous data from the well was obtained from various sources. These sources are: Robison (1984, 1986); Holmes & Narver, Inc. (written commun., 1986); Thordarson (1983); Young (1972); Fenix & Scisson Inc. (1987c).

Well specifications

The following are specifications for well J-13:

1. Location and identification:

   Latitude and longitude: 36°48'28" N.; 116°23'40" W.
   Nevada State Central Zone Coordinates (m): N 228,359; E 176,678.
   U.S. Geological Survey Site ID: 364828116234001.

2. Drilling and casing information:

   Well started: September 12, 1962.
   Well completed: January 8, 1963.
   Drilling method: Rotary, using air, and aerated mud as circulating medium.
   Bit diameter below water level: 438 mm used to 402 m; 381 mm used from 402 m to 471 m; 194 mm used from 471 m to 1,063 m.
   Casing extending below water level: 323 mm inside diameter, from land surface to 397 m; 282-mm inside diameter from 397 to 471 m; 126 mm inside diameter from 452 to 1.032 m; casing perforated from 304 to 424 m, within the Topopah Spring Member of the Paintbrush Tuff, and from 820 to 1,010 m, within the Tram Member of the Crater Flat Tuff and the upper part of the Lithic Ridge Tuff.
   Total drilled depth: 1,063 m.

3. Access to and description of interval for measuring water levels:

   Access tube installed in 1986, in order for measuring equipment to safely bypass pump assembly.

4. Information for calculating water-level altitude:

   Reference point: chiseled square on concrete well collar, 1,011.47 m (surveyed by U.S. Geological Survey, 1984).
   Depth correction for borehole deviation from vertical: Not available.

History of instrumentation, calibrations, and comments

Well J-13 was completed in 1963 to supply water for activities in the western part of the Nevada Test Site. In automatic response to needs of the connected water-supply system, well J-13 typically is pumped several times per day. The well produces about 50 liters per second (800 gallons per minute). A downhole pressure transducer and a data logger at the surface were installed in September 1986 to enable continuous monitoring of the water level.

The following transducers were used in well J-13:

[Range is pressure limit for transducer, in pounds per square inch]

Date of use		Transducer			
Beginning	Ending	Type	Model	Range	Serial number
09-11-86	03-24-87	Absolute	PSI Tronix	25	1951
03-24-87	05-08-87	Absolute	Bell&Howell	50	L134607
05-08-87	12-09-87	Absolute	PSI Tronix	100	1888
12-09-87	03-04-88	Absolute	PSI Tronix	100	1887
03-04-88	07-07-88	Absolute	PSI Tronix	100	1890
07-07-88	09-27-88	Absolute	Bell&Howell	100	L191058

The following calibrations of the water-level monitoring system were performed in well J-13:

Transducer				Water level	
		Regression line			
Serial number	Calib-ration date	Slope (millivolts per meter)	Coefficient of determination	Date	Altitude (meters)
1951	09-11-86	-2.600	0.996	09-11-86	728.39[4]
L134607	03-24-87	-1.198	1.000	03-24-87	728.41
1888	05-08-87	-1.795	0.999	05-08-87	728.33
1888	06-18-87	-2.633	1.000	06-18-87	730.28
1887	12-09-87	-1.366	0.999	12-09-87	728.41
1887	12-31-87	-1.378	1.000	12-31-87	728.40
1890	03-04-88	-0.664	0.999	03-04-88	728.41
1890	04-21-88	-0.686	1.000	04-21-88	728.50
L191058	07-07-88	-0.258	0.998	07-07-88	728.41

There is a marked difference in the calibrations of the transducer with serial number 1888 in May and June of 1987. Calculations for both calibrations were rechecked and the values appear correct. However, the techniques used in the May calibration may not have been the usual technique; this is surmised only because the notes kept in the field logbook during this calibration were different from typical notes for other calibrations.

[4]Published as 728.03 by Robison and others (1988)

None of the transducers used in this well lasted a long period of time. The rapid changes in pressure as the pump cycled on and off may have caused failure of the transducers. The transducers also may have been destroyed by being mechanically banged against the wall of the pipe as the pump cycled on and off. The pump used in the well is electrically powered; it is not known if stray electrical currents were contributing to the failure of the transducers. When the transducers were functioning, the transducer output consisted of distinct values, one when the pump was on and one when the pump was off. A typical set of data is shown on figure 37 for the period January 12-18, 1988. The transducer output with the pump off is about 17.2 millivolts and the output with the pump on is about 11.0 millivolts. Using the slope of the regression line of the calibration of this transducer of -1.38 millivolts per meter, the values indicate a difference between the pumping and non-pumping water levels of about 4.5 m.

No useful data on small water-level fluctuations caused by barometric-pressure changes or earth tides could be monitored in this well because of the large changes caused by pumping. As a result of this and the large amount of time and number of transducers being used, this well was dropped from the continuous water-level network in September 1988. After initial examination indicated little, if any, usable data were collected at this well and it would take a large effort to process the data, it was decided not to process the data. As a result, only one week of data is shown on figure 37 and no water levels were calculated. No data from this well, other than the water-level measurements done during calibrations, were stored in the USGS computer files. The raw data were retained on the cassette tapes used to retrieve data from the data loggers.

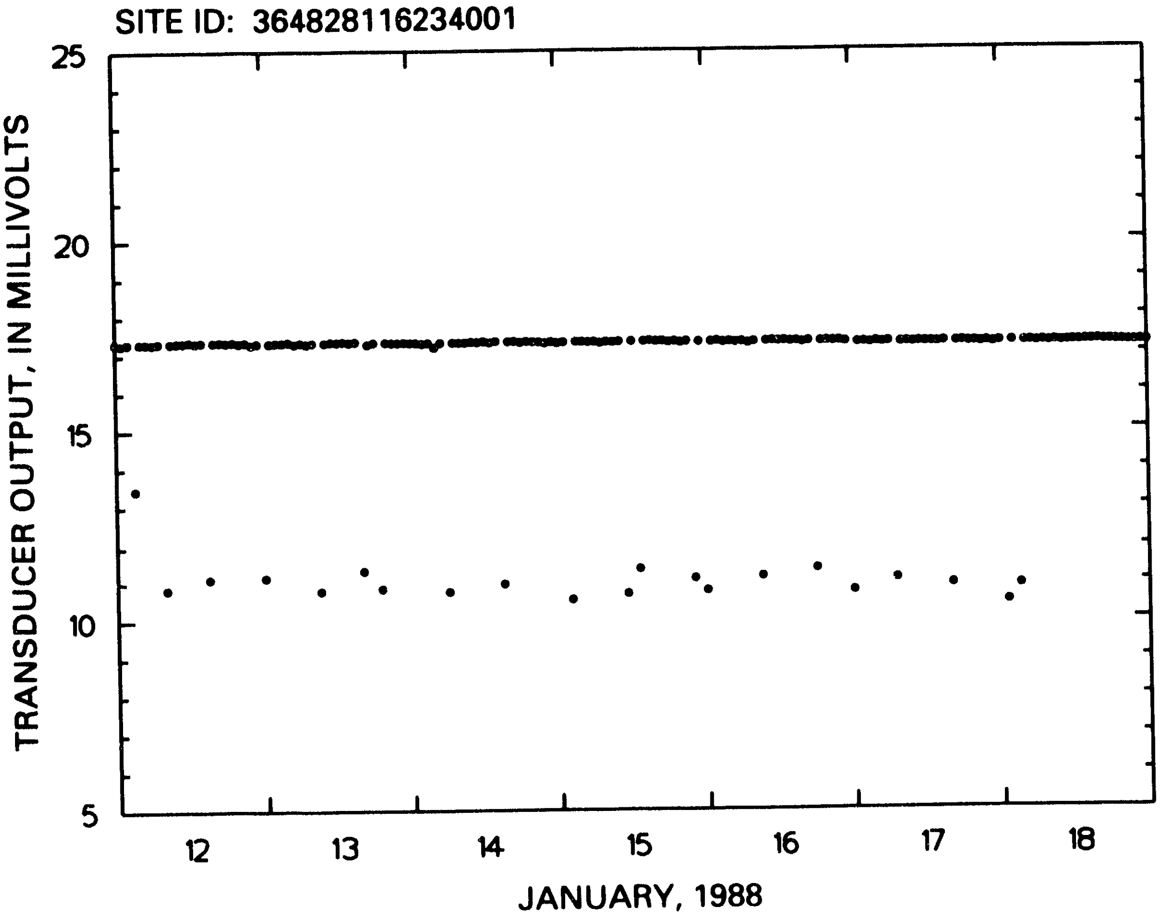


Figure 37.--Transducer output for well USW J-13.

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Note: Parenthesized numbers following each cited reference are for U.S. Department of Energy Office of Civilian Radioactive Waste Management records management purposes only and should not be used when ordering the publication.

*U.S. GOVERNMENT PRINTING OFFICE:1993-774-207/60049

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9/17/93

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