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Selected Ground-Water Data for Yucca Mountain Region, Southern Nevada and Eastern California, January–December 2004

Open-File Report 2006-1285

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

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DIRK KEMPTHORNE, Secretary

U.S. Geological Survey
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Conversion Factors and Vertical Datum

Multiply	By	To obtain
acre	4,047	square meter (m^2)
acre-foot (acre-ft)	1,233	cubic meter (m^3)
foot (ft)	0.3048	meter (m)
gallon (gal)	0.003785	cubic meter (m^3)
gallon per minute (gal/min)	0.06309	liter per second (L/s)
mile (mi)	1.609	kilometer (km)
million gallons (Mgal)	3,785	cubic meter (m^3)
pound per square inch (lb/in^2)	6.895	kilopascal (kPa)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:
°F=(1.8×°C)+32

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:
°C=(°F-32)/1.8

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

Horizontal coordinate information is referenced to the North American Datum of 1927 (NAD 27).

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

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By Richard J. La Camera, Glenn L. Locke, Aron M. Habte, and Jon G. Darnell

Abstract

The U.S. Geological Survey, in support of the U.S. Department of Energy, Office of Civilian Radioactive Waste Management, collects, compiles, and summarizes hydrologic data in the Yucca Mountain region of southern Nevada and eastern California. These data are collected to allow assessments of ground-water resources during activities to determine the potential suitability or development of Yucca Mountain for storing high-level nuclear waste.

Data on ground-water levels at 35 boreholes and 1 fissure (Devils Hole), ground-water discharge at 5 springs, both ground-water levels and discharge at 1 flowing borehole, and total reported ground-water withdrawals within Crater Flat, Jackass Flats, Mercury Valley, and the Amargosa Desert are tabulated from January through December 2004. Also tabulated are ground-water levels, discharges, and withdrawals collected by other agencies (or collected as part of other programs) and data revised from those previously published at monitoring sites. Historical data on water levels, discharges, and withdrawals are presented graphically to indicate variations through time.

A statistical summary of ground-water levels at seven boreholes in Jackass Flats is presented for the period 1992–2004 to indicate potential effects of ground-water withdrawals associated with U.S. Department of Energy activities near Yucca Mountain. The statistical summary includes the annual number of measurements, maximum, minimum, and median water-level altitudes, and average deviation of measured water-level altitudes compared to the 1992–93 baseline period. At six boreholes in Jackass Flats, median water levels for 2004 were slightly higher (0.3–2.7 feet) than their median water levels for 1992–93. At one borehole in Jackass Flats, median water level for 2004 equaled the median water level for 1992–93.

Introduction

Activities to assess the potential suitability or development of Yucca Mountain for storing high-level nuclear waste are in progress or planned. The U.S. Department of Energy (DOE), Office of Civilian Radioactive Waste Management, has declared that all facilities and investigations associated with such activities will be operated in a manner that maintains or protects environmental quality, and has established programs to allow assessments of environmental quality. In April 1989, the U.S. Geological Survey (USGS) began a cooperative program with DOE to develop a ground-water-resources monitoring program in the vicinity of Yucca Mountain. The purposes of the monitoring program are to (1) document the historical and current conditions of ground-water resources, (2) detect and document changes in those resources during activities at Yucca Mountain, and (3) provide a basis for analyzing and identifying potential adverse effects on ground-water resources resulting from investigations and activities at Yucca Mountain.

Purpose and Scope

This report presents and summarizes hydrologic data collected as part of the USGS Environmental-Monitoring Program (USGS-EMP). Included are data for calendar year 2004 on ground-water levels at 35 boreholes and 1 fissure (Devils Hole), ground-water discharge at 5 springs, both ground-water levels and discharge at 1 flowing borehole, and total reported ground-water withdrawals within Crater Flat, Jackass Flats, Mercury Valley, and Amargosa Desert. Additional data on ground-water levels, discharges, and withdrawals collected by other agencies (or collected as part of other programs) and data revised from those previously published at the sites also are included.

A discussion of ground-water data for Jackass Flats includes a statistical summary of those data to indicate the potential effects of withdrawals from boreholes in Jackass Flats on water levels near Yucca Mountain. Effects of these withdrawals may be detected in Jackass Flats before they are detected elsewhere in the Yucca Mountain region.

This report is the eleventh in a series of reports as part of the USGS-EMP. Hereafter, the first 10 reports are referred to as previous reports on selected ground-water data for the Yucca Mountain region. The previous reports and the data they contain are:

Report (see references cited)	Data contained
La Camera and Westenburg (1994)	Earliest available data through 1992
Hale and Westenburg (1995)	Data collected in 1993
Westenburg and LaCamera (1996)	Data collected in 1994
La Camera and others (1996)	Data collected in 1995
La Camera and Locke (1998)	Data collected in 1996
La Camera and others (1999)	Data collected in 1997
Locke (2001a)	Data collected in 1998
Locke (2001b)	Data collected in 1999
Locke and La Camera (2003)	Data collected in 2000 through 2002
La Camera and others (2005)	Data collected in 2003

Additional information for sites CF-2, JF-1, JF-2, JF-2a, J-13, J-11, and J-12 are included in Robison (1984), Robison and others (1988), Gemmell (1990), McKinley and others (1991), O'Brien (1991, 1993), Luckey and others (1993), Boucher (1994), Lobmeyer and others (1995), O'Brien and others (1995), Graves and others (1996), Tucci and others (1996a, 1996b), Graves (1998), Graves and Goemaat (1998), Graves (2000), Savard (2001), and the Harry Reid Center for Environmental Studies at the University of Nevada, Las Vegas (2006).

Acknowledgments

Several organizations and programs contributed to this report. Specifically, data were provided by the Harry Reid Center for Environmental Studies at the University of Nevada, Las Vegas (HRC); National Park Service (NPS); U.S. Fish and Wildlife Service (USFWS); Nevada Department of Conservation and Natural Resources, Division of Water Resources (NDWR); Nye County Nuclear Waste Repository Project Office (NWRPO; Nevada Department of Transportation; Bechtel Nevada (BN); Bechtel SAIC Company, LLC; Fenix and Scisson, Inc.; Raytheon Services Nevada; Reynolds Electrical and Engineering Company; U.S. Borax Corp.; U.S. Nevada Gold Search; Barrick Bullfrog, Inc.; Cind-R-Lite Company; U.S. Department of Energy, National Nuclear Security Administration, Nevada Site Office (NTS); and USGS–Yucca Mountain Project Branch studies of saturated-zone site hydrology and saturated-zone regional hydrology as part of the USGS's Site-Characterization Project (USGS-SCP). Additionally, the authors acknowledge the cooperation of the many individual property owners throughout the Amargosa Desert who allowed access to their property for the collection of hydrologic data.

Description of Study Area

The study area is the Yucca Mountain region of southern Nevada and eastern California (fig. 1). The boundary of the Yucca Mountain region, for purposes of this report, roughly coincides with the northern parts of Crater Flat and Jackass Flats, eastern parts of Rock Valley, Mercury Valley, and Amargosa Desert, Nev., and Death Valley Junction and Furnace Creek, Calif., to the south and west. The region is within the Great Basin, a subdivision of the Basin and Range Province (Fenneman, 1931, p. 328).

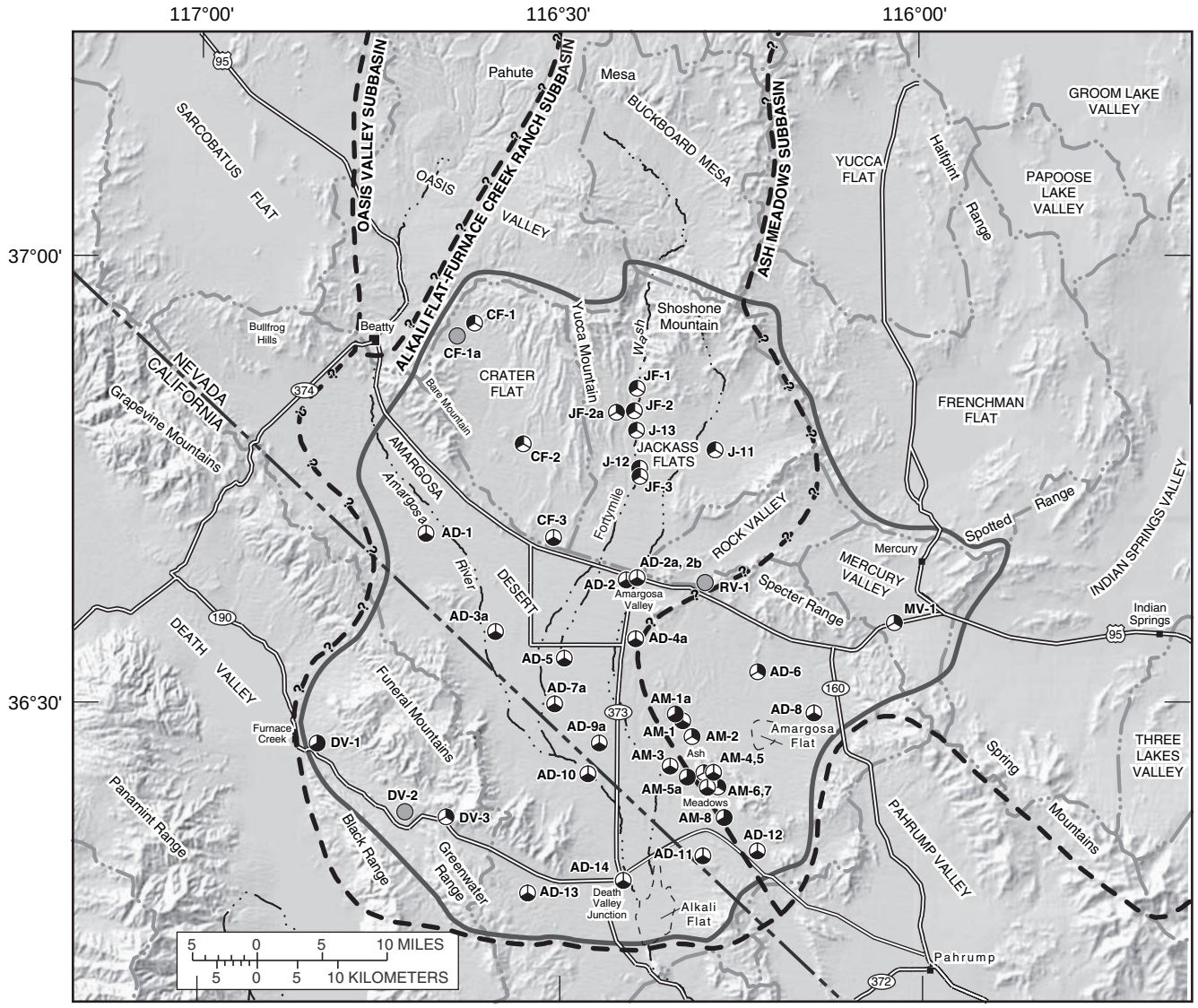
The study area is in the Death Valley Ground-Water Regional Flow System (Harrill and others, 1988, sheet 1) and, within that flow system, the Alkali Flat–Furnace Creek Ranch and Ash Meadows ground-water subbasins. Each ground-water subbasin is a zone consisting of ground-water recharge areas and flow paths to points of discharge at land surface (Waddell and others, 1984, p. 36; Laczniak and others, 1996, p. 16 and pl. 1). Boundaries of the subbasins are defined on the basis of the location of recharge areas, discharge areas, low-permeability rocks, hydraulic gradients, and water chemistry. These boundaries are general indicators of restrictions on ground-water movement in the region.

The study area also is subdivided by hydrographic areas[1] (fig. 1). As defined by Rush (1968, p. 4), hydrographic areas generally consist of valleys (topographic lows) extending to their surrounding surface-water drainage divides (topographic highs). Hydrographic areas include Crater Flat, Jackass Flats, and Rock Valley, most of Mercury Valley and Amargosa Desert, and part of Death Valley (Rush, 1968; Harrill and others, 1988, sheet 2).

Alkali Flat–Furnace Creek Ranch Ground-Water Subbasin

Crater Flat and Jackass Flats (which include Yucca Mountain), most of Rock Valley, the west-central part of the Amargosa Desert, and part of Death Valley are in the Alkali Flat–Furnace Creek Ranch ground-water subbasin (fig. 1). Principal sources of ground water within this subbasin are precipitation and subsurface inflow (Waddell and others, 1984, p. 36; Harrill and others, 1988, sheet 2; Laczniak and others, 1996, table 3). Precipitation occurs mainly on the higher mesas and mountains within the subbasin and along the subbasin's north and northeast mountainous boundaries. Subsurface inflow into the subbasin occurs near Beatty from the Oasis Valley subbasin, near Ash Meadows from the Ash Meadows subbasin, and possibly from Cactus Flat (about 40 mi north of Beatty, Nev.). Ground water discharges from springs in Death Valley and as evapotranspiration from Alkali Flat and Death Valley. Ground water generally flows to the south, southeast, or southwest (Kilroy, 1991, p. 9–13; Tucci and Burkhardt, 1995, p. 8; Laczniak and others, 1996, pl. 1).

[1]The U.S. Geological Survey and Nevada Division of Water Resources delineated formal hydrographic areas in Nevada systematically in the late 1960's for scientific and administrative purposes (Rush, 1968; Cardinalli and others, 1968). The official hydrographic area names, numbers, and geographic boundaries continue to be used in U.S. Geological Survey scientific reports and Water Resources Discipline administrative activities. Extensions of hydrographic areas from Nevada into California and selected hydrographic areas in California also have been delineated by Harrill and others (1988, sheet 2).



Base from U.S. Geological Survey digital elevation data, 1:250,000, 1987, and digital data, 1:100,000, 1981-89; Universal Transverse Mercator projection, Zone 11. Shaded-relief base from 1:250,000-scale Digital Elevation Model; sun illumination from northwest at 30 degrees above horizon.

EXPLANATION

Study-area boundary

Ground-water subbasin boundary—
From Laczniak and others (1996, pl. 1).
Queried where location uncertain

Hydrographic-area boundary

Data-collection site—Site number (table 1) and primary contributing unit are indicated

AD-6 Carbonate rock

CF-2 Volcanic rock

AD-1 Basin fill

DV-2 Undifferentiated sedimentary rock

DV-1 Combined carbonate rock and basin fill

Figure 1. Location of data-collection sites in the Yucca Mountain region, southern Nevada and eastern California, 2004.

Ash Meadows Ground-Water Subbasin

Part of Rock Valley, Mercury Valley, and most of the eastern part of the Amargosa Desert are within the Ash Meadows subbasin (fig. 1). The southeastern part of the Amargosa Desert includes the Ash Meadows spring-discharge area. The Ash Meadows spring-discharge area is a gently sloping land watered by numerous springs (Dudley and Larson, 1976, p. 5) at the southwestern edge of the subbasin.

Principal sources of ground water in the Ash Meadows ground-water subbasin are precipitation and subsurface inflow (Laczniak and others, 1996, table 3). Precipitation occurs mainly on the higher mountains within the subbasin and along the subbasin's north and northeast mountainous boundaries. Subsurface inflow may occur from Railroad Valley and Pahranagat Valley along the basin's north and northeast boundaries (about 100 mi north of Ash Meadows; Winograd and Thordarson, 1975; Laczniak and others, 1996). Ground water discharges from springs and as evapotranspiration in the Ash Meadows area and, possibly, as underflow into the Alkali Flat–Furnace Creek Ranch ground-water subbasin. Ground water in the subbasin generally flows to the south, west, or southwest (Harrill and others, 1988, sheet 2; Laczniak and others, 1996, p. 16–18 and pl. 1).

Data-Collection Sites

Locations of data-collection sites are shown in figure 1. Information on site identification, site location, site owner, and type of data contained in this report are listed in table 1. The sequence of sites in table 1 is followed throughout the report.

Table 1. Index to monitoring sites in Yucca Mountain region, 2004.

Site number: Alphanumeric identifier used to identify sites on maps and tables. First part represents hydrographic area in which sites are located. Hydrographic areas: CF, Crater Flat; JF or J, Jackass Flats; RV, Rock Valley; MV, Mercury Valley; AD or AM, Amargosa Desert; DV, Death Valley. Second part is sequential numbering representing relative location of site within hydrographic area or Ash Meadows spring-discharge area; numbering order generally is north to south, then west to east. Sites J-13, J-11, and J-12 previously were numbered by Raytheon Services Nevada and herein were not renumbered.

U.S. Geological Survey site identification: Unique identification number for sites as stored in files and data bases of U.S. Geological Survey.

Latitude and Longitude: Referenced to North American Datum of 1927. May be revised based on the subsequent availability of GPS values or more accurate maps.

Local site number: Alphanumeric identifier based on location of site within hydrographic areas and rectangular subdivisions of public lands. Referenced to Mount Diablo baseline and meridian for sites in Nevada or San Bernardino base line and meridian for sites in California (U.S. Geological Survey, 1986a, b).

Owner: Acronyms listed for sites owned by Federal agencies: BLM, Bureau of Land Management; DOE, U.S. Department of Energy; NPS, National Park Service; USFWS, U.S. Fish and Wildlife Service; USGS, U.S. Geological Survey.

Data type: Type of data included in this report. D, ground-water discharge; L, ground-water level.

Site number	U.S. Geological Survey site identification	Site name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Local site number		Owner	Data type
CF-1	365520116370301	Crater Flat 1	365515	1163655	229	S12 E48 04DBB1	Rayrock Mines, Inc.	L
CF-1a	365445116383901	Crater Flat 1a	365442	1163841	229	S12 E48 07ADD1	Rayrock Mines, Inc.	L
CF-2	364732116330701	USW VH-1	364732	1163307	229	S13 E48 27C1	DOE	L
CF-3	364105116302601	Crater Flat 3	364106	1163026	229	S14 E48 36DDD1	Cind-R-Lite Block Company	L
JF-1	365116116233801	UE-25 WT 15	365116	1162338	227A	S12 E50 33A1	DOE	L
JF-2	364945116235001	UE-25 WT 13	364943	1162351	227A	S13 E50 18B1	DOE	L
JF-2a	364938116252102	UE-25p 1 PTH	364938	1162521	227A	S13 E49 14A2	DOE	L
J-13	364828116234001	J-13 WW	364829	1162340	227A	S13 E50 19C1	DOE	L
J-11	364706116170601	J-11 WW	364706	1161706	227A	S13 E51 31B1	DOE	L
J-12	364554116232401	J-12 WW	364554	1162324	227A	S14 E50 06A2	DOE	L
JF-3	364528116232201	JF-3 Well	364528	1162322	227A	S14 E50 06D1	DOE	L
RV-1	363815116175901	TW-5	363815	1161759	226	S15 E50 24A1	DOE	L
MV-1	363530116021401	Army 1 WW	363530	1160214	225	S16 E53 05ADB1	DOE	L
AD-1	364141116351401	NA-6 Well BGMW-10	364131	1164114	230	S14 E47 32DA1	USGS	L
AD-2	363830116241401	Airport Well	363824	1162434	230	S15 E49 24ABB1	Doing, Warren	L
AD-2a	363835116234001	NDOT Well	363836	1162356	230	S15 E50 18CCDB1	NV Dept. of Transportation	L
AD-2b	363835116234002	NDOT Well 2	363836	1162357	230	S15 E50 18CCDB2	NV Dept. of Transportation	L
AD-3a	363521116352501	Amargosa Desert 3a	363526	1163527	230	S16 E48 05CAB1	Davidson, Robert	L
AD-4a	363428116234701	Amargosa Desert 4a	363429	1162349	230	S16 E50 07CABB1	Cook, Lewis C.	L
AD-5	363310116294001	USBLM Well	363323	1162943	230	S16 E49 18DCCA1	BLM	L

Table 1. Index to monitoring sites in Yucca Mountain region, 2004—Continued.

Site number	U.S. Geological Survey site identification	Site name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Local site number		Owner	Data type
AD-6	363213116133800	Tracer Well 3	363213	1161338	230	S16 E51 27BAA3	USGS	L
AD-7a	363009116302702	Amargosa Desert 7a	363029	1163024	230	S17 E48 01ABA1	Naxos Mining Company	L
AD-8	362929116085701	Amargosa Desert 8	362906	1160924	230	S17 E52 08CBD1	Clark, Hershel and others	L
AD-9a	362835116264102	Amargosa Desert 9a	362837	1162649	230	S17 E49 15BC 2	Gilgan, Michael	L
AD-10	362525116274301	NA-9 Well	362531	1162745	230	026N005E05F001S	USGS	L
AD-11	361954116181201	GS-3 Well	361955	1161751	230	S19 E50 01BBD1	USGS	L
AD-12	362014116133901	GS-1 Well	362022	1161327	230	S18 E51 34CBD1	USGS	L
AD-13	361724116324201	S-1 Well	361734	1163258	230	025N004E21M001S	USGS	L
AD-14	361817116244701	Death Valley Jct Well	361816	1162447	230	025N005E14M001S	Ettie, Lee	L
AM-1	362858116195301	Rogers Spring Well	362855	1161949	230	S17 E50 10CDD1	USFWS	L
AM-1a	362924116203001	Fairbanks Spring	362926	1162028	230	S17 E50 09AD1	USFWS	D
AM-2	362755116190401	Five Springs Well	362753	1161906	230	S17 E50 23BBC1	USFWS	D,L
AM-3	362555116205301	Ash Meadows 3	362556	1162051	230	S17 E50 33CAA1	Garner, George	L
AM-4	362532116172700	Devils Hole	362532	1161727	230	S17 E50 36DC1	NPS	L
AM-5	362529116171100	Devils Hole Well	362529	1161715	230	S17 E50 36DDC1	USFWS	L
AM-5a	362502116192301	Crystal Pool	362513	1161927	230	S18 E50 03ADBA1	USFWS	D
AM-6	362432116165701	Point of Rocks North Well	362434	1161657	230	S18 E51 07BBBB1	USFWS	L
AM-7	362417116163600	Point of Rocks South Well	362420	1161637	230	S18 E51 07BDB1	USFWS	L
AM-8	362230116162001	Big Spring	362229	1161625	230	S18 E51 19ACB1	USFWS	D
DV-1	362728116501101	Texas Spring	362728	1165011	243	027N001E23BS01S	NPS	D
DV-2	362252116425301	Navel Spring	362252	1164253	243	026N002E13FS01S	U.S. Borax & Chem. Corp.	D
DV-3	362230116392901	Travertine Point 1 Well	362231	1163932	243	026N003E21L001S	U.S. Borax & Chem. Corp.	L

All sites are boreholes or springs except site AM-4 (Devils Hole), which is an open fissure that intersects the ground-water table. Borehole-construction data, source of borehole-construction data, and contributing lithologic units are listed in table 2. Excluded from table 2 are springs and a fissure for which construction data are not applicable.

Contributing units (table 2) are the principal saturated lithologic intervals at the sites that yield water to the borehole. For purposes of this report, contributing units are one or a combination of four general types: carbonate rock, volcanic rock, basin-fill deposits, and undifferentiated sedimentary rock. Boreholes characterized as having a contributing unit of carbonate or volcanic rock are wells with open intervals in those consolidated rocks. In and near the Amargosa Desert, boreholes characterized as having a contributing unit of basin fill are those with open intervals in unconsolidated basin-fill deposits. Boreholes with open intervals in rocks that include argillite, limy sandstones and siltstones, or silty, sandy, and shaley limestones are characterized as having a contributing unit of undifferentiated sedimentary rock. Contributing units are identified by Dudley and Larson (1976), McKinley and others (1991), Robison and others (1988), Thordarson and others (1967), Winograd and Thordarson (1975), or were derived from drillers' logs or well-completion reports that describe geology in the boreholes, open intervals in the boreholes, and measurements of depth to water.

Ground-Water Levels

Ground-water levels are reported as depths to water and altitudes of the water surface. Depth to water is the difference between land surface and the water level in a borehole. Altitude of the water surface is the difference between the water level in a borehole and a point referenced to a common datum.

Depth to water is measured directly from a stable reference that is called the measuring point. Depth-to-water below a measuring point commonly is measured with a steel tape, an electric tape, or a pressure sensor. Measuring points typically are a marked point on the borehole's casing, but can be the top of a bolt as at Devils Hole (AM-4). Depth to water is computed by subtracting the height of a measuring point above land surface from the depth to water below a measuring point.

Table 2. Borehole-completion data at monitoring sites in Yucca Mountain region.

Site number: Alphanumeric identifier used to identify sites on maps and tables. First part represents hydrographic area in which site is located. Hydrographic areas: CF, Crater Flat; JF or J, Jackass Flats; RV, Rock Valley; MV, Mercury Valley; AD or AM, Amargosa Desert; DV, Death Valley. Second part is sequential numbering representing relative location of site within hydrographic area or Ash Meadows spring-discharge area; numbering order generally is north to south, then west to east. Sites J-13, J-11, and J-12 previously were numbered by Raytheon Services Nevada and herein were not renumbered.

U.S. Geological Survey site identification: Unique identification number for sites as stored in files and data bases of U.S. Geological Survey (USGS).

Accessible borehole depth: Borehole depths listed are as reported in sources listed in explanation for Data source (see below) or as measured by USGS personnel (noted with 's').

Casing diameter at land surface: Outside casing diameter of segment most prominent at land surface; rounded to nearest inch.

Top of open interval: Depth to top part(s) of borehole that can receive ground water from lithologic interval. Uncased borehole is designated open interval in this table. Open interval may be deeper than accessible borehole depth, which may reflect original drilled depth. As reported in sources listed in explanation for Data source (see below). U, unknown, no data.

Bottom of open interval: Depth to bottom part(s) of borehole that can receive ground water from lithologic interval. Uncased borehole is designated open interval in this table. Open interval may be deeper than accessible borehole depth, which may reflect original drilled depth. As reported in sources listed in explanation for Data source (see below). U, unknown, no data.

Diameter of open interval: Inside casing diameter; rounded to nearest inch. Hole diameter is listed where no casing is present. U, unknown, no data.

Type of open interval: Description of open interval. P, perforated or slotted casing; S, screened casing, type not known; U, unknown, no data; X, uncased borehole.

Data source: Source of information on borehole depth and open intervals. D, Well-driller's log, well-completion report, Fenix & Scisson, Inc., or Raytheon Services Nevada hole-history data; J, Johnston (1968); M, no source, data not available; O, Owner of well; R, Robison and others (1988); T, Thordarson and others (1967).

Contributing units: Saturated lithologic interval yielding water to borehole. C, carbonate rock; F, basin fill; S, undifferentiated sedimentary rock; V, volcanic rock.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Accessible borehole depth (feet below land surface)	Casing diameter at land surface (inches)	Open interval				Data source	Contributing units
					Feet below land surface		Diameter (inches)	Type		
					Top	Bottom				
CF-1	365520116370301	Crater Flat 1	1,600	15	800	1,600	10	P	D	V
CF-1a	365445116383901	Crater Flat 1a	700	7	208	313	6	P	D	S
					513	618	6	P		
					658	700	6	P		
CF-2	364732116330701	USW VH-1	2,501	10	911	912	9	X	R	V
					912	2,501	6	X		
CF-3	364105116302601	Crater Flat 3	460	9	320	460	8	P	D	F
JF-1	365116116233801	UE-25 WT 15	1,360	11	127	130	15	X	D	V
					130	1,360	9	X		
JF-2	364945116235001	UE-25 WT 13	1,160	11	222	224	15	X	D	V
					224	1,150	9	X		
					1,150	1,160	8	X		
JF-2a	364938116252102	UE-25p 1 PTH	5,923	24	4,256	4,279	10	X	R	C
					4,279	5,900	7	X		
					5,900	5,923	6	X		

Table 2. Borehole-completion data at monitoring sites in Yucca Mountain region—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Accessible borehole depth (feet below land surface)	Casing diameter at land surface (inches)	Open interval				Data source	Contributing units
					Feet below land surface		Diameter (inches)	Type		
					Top	Bottom				
J-13	364828116234001	J -13 WW	3,488	13	996	1,301	13	P	T	V
					1,301	1,386	11	P		
					2,690	3,312	5	P		
					3,385	3,488	8	X		
J-11	364706116170601	J -11 WW	1,327	13	1,075	1,095	12	P	D	V
					1,242	1,298	12	P		
J-12	364554116232401	J -12 WW	1,139	13	793	868	12	P	D	V
					887	1,139	12	X		
JF-3	364528116232201	JF- 3 Well	1,138	9	735	1,138	8	P	D	V
RV-1	363815116175901	TW- 5	800.s	7	735	800	6	P	T	S
					800	916	U	X		
MV-1	363530116021401	Army 1 WW	1,953	11	800	1,050	11	P	D	C
					1,368	1,370	10	X		
					1,370	1,684	9	X		
					1,684	1,953	7	X		
AD-1	364141116351401	NA-6 Well BGMW-10	960	2	930	940	2	S	D	F
AD-2	363830116241401	Airport Well	750.s	14	360	777	14	P	D	F
AD-2a	363835116234001	NDOT - Well	495	9	395	495	8	P	D	F
AD-2b	363835116234002	NDOT - Well 2	518	8	418	518	8	P	D	F
AD-3a	363521116352501	Amargosa Desert 3a	240.s	16	120	250	15	P	D	F
AD-4a	363428116234701	Amargosa Desert 4a	269.s	13	147	213	12	P	D	F
					238	286	12	P		
AD-5	363310116294001	USBLM Well	348.s	12	U	U	U	U	M	F
AD-6	363213116133800	Tracer Well 3	678.s	9	620	807	6	X	J	C
AD-7a	363009116302702	Amargosa Desert 7a	210	7	U	U	U	U	O	F
AD-8	362929116085701	Amargosa Desert 8	215.s	15	U	U	U	U	M	F

Table 2. Borehole-completion data at monitoring sites in Yucca Mountain region—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Accessible borehole depth (feet below land surface)	Casing diameter at land surface (inches)	Open interval				Data source	Contributing units
					Feet below land surface		Diameter (inches)	Type		
					Top	Bottom				
AD-9a	362835116264102	Amargosa Desert 9a	515	10	55	200	10	P	D	F
					200	515	10	X		
AD-10	362525116274301	NA-9 Well	1,090	2	1,063	1,066	2	S	D	F
AD-11	361954116181201	GS-3 Well	2,000	2	1,969	1,979	2	S	D	F
AD-12	362014116133901	GS-1 Well	1,580	2	1,549	1,559	2	S	D	F
AD-13	361724116324201	S-1 Well	2,000	2	1,969	1,979	2	S	D	F
AD-14	361817116244701	Death Valley Jct Well	225.s	12	160	200	12	S	D	F
AM-1	362858116195301	Rogers Spring Well	202.s	16	100	240	12	P	D	F
					240	420	16	X		
AM-2	362755116190401	Five Springs Well	123.s	14	0	100	13	P	D	C
					100	140	14	X		
AM-3	362555116205301	Ash Meadows 3	202.s	9	140	180	8	P	O	F
AM-5	362529116171100	Devils Hole Well	200.s	16	48	248	16	P	D	F
AM-6	362432116165701	Point of Rocks North Well	500	16	139	500	16	P	D	F
AM-7	362417116163600	Point of Rocks South Well	586.s	14	132	467	14	P	D	C
					468	818	U	X		
DV-3	362230116392901	Travertine Point 1 Well	650.s	5	100	970	5	X	D	C

Ground-water altitude is the difference between altitude of the measuring point and depth to water below the measuring point. The altitudes of all measuring points were surveyed. Altitudes at sites AD-9a and AM-2 were determined using survey grade Global-Positioning Systems (stationary systems left onsite for a minimum of 2 hours). Ground-water altitude is reported to indicate the general direction of ground-water flow.

Accuracy of depths to water and altitudes of the water surface contained in this report are variable. The level of accuracy at each borehole is dependent largely on determinations of heights of measuring points above land surface, surveying techniques, altitudes of benchmarks used as starting points for surveys, and deviations of borehole orientation from true vertical.

Precision of depths to water and altitudes, however, can be used to detect changing conditions through time. Precision is indicated by repeatability of water-level measurements (sequential measurements of similar conditions). Data recorded in the field during 2004 indicate that measurement precision generally is less than or equal to 0.02 ft for calibrated electric tapes and steel tapes. Overall, precision of water levels contained in this report are estimated to be less than or equal to 0.05 ft. On the basis of sequential measurements at sites with similar depths to water, precision of data collected by other agencies using uncalibrated electric tapes is assumed to be comparable.

Table 3 (see Basic Data section) lists periodic measurements of depth to water and water-level altitude for 2004 and figures 2–5 (see Basic Data section) show measurements of water levels from the earliest available information through 2004. The graphical ground-water data were selected from the tables in this and previously published reports for the Yucca Mountain region. Pumping water from or injecting water into a well or nearby well may result in short-term variations in water levels that differ from long-term or sustained ground-water levels. Such short-term variations are excluded from the figures showing variations in water levels through time.

Periodic data usually are from manual onsite measurements of depth to water. Exceptions are water-level data noted with data source “HRC” and method “F” in table 3. These data were derived from measurements by onsite instrumentation. Also included in table 3 are revised water-surface altitudes for site AM-2 for calendar years 1990 through 2003 (on the basis of a new survey of the altitude for the measuring point) and calendar year 2000 through 2003 measurements of water levels at monitoring sites made by data source “NWRPO.” All water-level data collected by other agencies or programs are subject to revision upon further review by that agency or program.

Listed in tables 4 and 5 (see Basic Data section) are daily mean water levels for sites JF-3 and AD-6, respectively, for 2004. Figure 6 (see Basic Data section) shows daily mean water levels at sites JF-3 and AD-6 as listed in this and previous reports on selected ground-water data for the Yucca Mountain region.

Electric Tape

Electric tapes used by USGS-EMP personnel were marked with a unique identifier for quality-assurance purposes and calibrated using reference steel tapes (which serve as accepted representations of depth to water below the measuring point). At depths greater than 500 ft, the electric tapes were calibrated using the HRC 2,800ft reference steel tape or the USGS-EMP calibrated steel tape (chain #5). At depths less than 500 ft, the electric tapes were calibrated using a steel tape maintained by USGS-EMP personnel and identified as the 500ft reference steel tape #1.

HRC 2,800ft reference steel-tape measurements are adjusted to account for mechanical stretch and thermal expansion of the tape. USGS-EMP chain #5 steel-tape measurements are adjusted to account for differences between the HRC reference and USGS-EMP chain #5. No adjustments were necessary for the USGS-EMP 500ft reference steel tape #1 because mechanical stretch and thermal expansion of the tape are considered negligible at the depths to water measured.

A correction factor (table 6) is the difference between the reference steel-tape measurement and uncorrected electric-tape measurement. Differences exist between the reference steel tape and the electric tape because of mechanical stretch, shrinkage caused by decreased elasticity, shortening caused by the presence of kinks or twists in tape, and incorrect marking. Correction factors are computed for individual measurements using calibration data collected at specific depths and times. Although changes in factors probably are not linear, correction factors for individual measurement are on the basis of linear interpolations with depth and time between factors determined during successive calibrations.

Water-level measurements made during site visits are adjusted on the basis of correction factors computed from calibrations before and after the individual measurements. For example, the correction factor for a water-level measurement of 625.81 ft on 01/21/2004 using electric tape YMP-13 would be computed from calibration data collected at 605.08 ft and 743.76 ft in October 2003 and calibration data collected at 605.12 ft and 743.82 ft in February 2004. The water-level measurement made on site would subsequently be adjusted according to that computed correction factor.

Calibrated electric tapes were used at wells when frequent repetitive measurements were required due to fluctuating water levels, when depths to water were greater than 500 ft, or when wet conditions inside a well prevented measurements using chalked steel tapes. At least two measurements are made during each site visit. The secondary measurement serves as a check of first measurement and the initial measurement is reported. Supplemental measurements are made if the two measured depths differ by more than 0.05 ft. If supplemental measurements indicate the difference is due to rapidly changing water levels, the measured depth and appropriate site status are recorded.

Table 6. Electric-tape calibration data used to derive correction factors, 2004.

Uncorrected depth to water: Measured depth to water below measuring point using electric tape.

Device: Electric tape used to measure depth to water.

Correction Factor: Difference between depth to water measurements using reference steel tape and electric tape.

[Abbreviations: YMP-11, 1,000-foot electric tape; YMP-13, 1,000-foot electric tape; PRT-2, 2,000-foot electric tape; PRT-4, 2,000-foot electric tape]

Date	Uncorrected depth to water (feet)	Device	Correction factor (feet)
02/04/2004	605.20	YMP-11	-0.34
02/24/2005	605.10	YMP-11	-0.33
02/04/2004	743.80	YMP-11	-0.33
02/23/2005	743.78	YMP-11	-0.43
03/02/2005	920.56	YMP-11	-0.47
02/25/2005	20.06	YMP-13	-0.03
10/14/2003	133.98	YMP-13	-0.04
02/11/2004	134.02	YMP-13	-0.04
02/25/2005	135.88	YMP-13	-0.04
10/14/2003	368.46	YMP-13	-0.13
02/11/2004	369.62	YMP-13	-0.13
02/24/2005	368.58	YMP-13	-0.15
10/08/2003	605.08	YMP-13	-0.21
02/04/2004	605.12	YMP-13	-0.26
02/24/2005	605.00	YMP-13	-0.23
10/07/2003	743.76	YMP-13	-0.33
02/04/2004	743.82	YMP-13	-0.35
02/23/2005	743.70	YMP-13	-0.35
03/02/2005	920.56	YMP-13	-0.47
02/04/2004	743.59	PRT-2	-0.12
02/23/2005	743.51	PRT-2	-0.16
03/02/2005	920.28	PRT-2	-0.19
02/05/2004	1042.61	PRT-2	-0.14
02/23/2005	1042.40	PRT-2	-0.16
02/05/2004	1137.47	PRT-2	-0.16
02/28/2005	1137.14	PRT-2	-0.15
02/28/2005	1319.84	PRT-2	-0.14
01/22/2003	744.52	PRT-4	-0.79
02/04/2004	744.39	PRT-4	-0.92
10/08/2003	1043.50	PRT-4	-1.18
02/05/2004	1043.70	PRT-4	-1.23
10/07/2003	1138.28	PRT-4	-1.22
02/05/2005	1138.60	PRT-4	-1.29
01/22/2003	1321.28	PRT-4	-1.16
10/07/2003	1321.02	PRT-4	-1.26

Personnel of the HRC made water-level measurements using calibrated electric tapes at sites CF-2, JF-1, JF-2, JF-2a, J-13, J-11, and J-12. These data-collection activities are governed by formal, unpublished technical procedures associated with the Yucca Mountain Office of Civilian Radioactive Waste Management.

For measurements made by HRC personnel, depth to water was computed by subtracting the reported water-level altitude from the altitude of the land surface (determined to the nearest hundredth of a foot during surveys).

Personnel associated with the NWRPO also made water-level measurements using calibrated electric tapes at sites AD-3a, AD-5, AD-9a, and AD-10. That data collection is governed by a technical procedure available from the Nye County Nuclear Waste Repository Project Office (2006). USGS personnel associated with the U.S. Department of Energy, National Nuclear Security Administration, Nevada Site Office made a water-level measurement using a calibrated electric tape at site J-13 in accordance with program-specific procedure NV-NTS-1, R0 (Robert P. Graves, U.S. Geological Survey, written commun., 2006). Additional water-level measurements were made with various electric tapes by the USFWS at sites AM-1, AM-5, AM-6, and AM-7, by NDWR at site AD-7a, and by Bechtel Nevada at site J-11.

Steel Tape

In 2004, USGS-EMP personnel used one uniquely marked 300-ft steel tape (ST-7) and one uniquely marked 500-ft steel tape (ST-10) for measurements. These steel tapes were checked against the USGS-EMP 500ft reference steel tape #1 at several depths to water to define their accuracy. No corrections were needed to the measurements made with these steel tapes.

USGS-EMP personnel make a minimum of two measurements during each site visit to verify the initial measurement. The secondary measurement serves as a check of first and the initial measurement is reported when the two are within 0.05 ft. Supplemental measurements are made if the two measured depths differ by more than 0.05 ft. If supplemental measurements indicate the difference is due to fluctuating water levels, the measured depth and appropriate site status are recorded.

Pressure Sensor

Two sites, JF-3 and AD-6, are instrumented by USGS-EMP to continually record ground-water level and atmospheric pressure at 15minute intervals. Instrumentation includes a vented pressure sensor installed below the water surface, a barometer, and a data logger. Recorded data are processed to produce data on continual depth to water, atmospheric pressure, and daily mean depth to water. The pressure sensors at sites JF-3 and AD-6 transmit data to the data logger in units of pounds per square inch, which varies with the height of the water above the sensor.

The pressure sensor is calibrated at each site for a range of depths that spans the anticipated range of water-level fluctuations. Water-level fluctuations are simulated by raising and lowering the pressure sensor. Raising the sensor 1 ft will decrease the amount of submergence of the pressure sensor by 1 ft, thereby decreasing the water pressure exerted on the sensor and simulating a 1 ft increase in depth to water. Lowering

the sensor 1 ft will increase the amount of submergence of the pressure sensor by 1 ft, thereby increasing the water pressure exerted on the sensor and simulating a 1 ft decrease in depth to water. Upon completion of pressure-sensor calibration, another water-level measurement is made with a calibrated steel or electric tape to check for fluctuation of the water level during calibration of the sensor.

Data recorded while calibrating the sensor are used to develop a regression equation to convert pressure readings to water level below land surface. The pressure readings from the data logger and corresponding simulated depths are regressed using pressure, in pounds per square inch, as the independent variable and depth below land surface, in feet, as the dependent variable.

Water-level measurements are made with a calibrated steel or electric tape when a continual monitoring site is visited. The data logger records the pressure-sensor reading at the time of the measurement. The reading is converted to depth to water using the established regression equation and recorded on a field sheet as computed water level. The steel tape or electric tape water-level reference measurement is then compared to the computed value. Any difference between the reference measurement and computed value is applied as a correction to the continual record. The correction is determined by linearly interpolating the difference with time between consecutive visits to account for drift in pressure-sensor output.

The applicable period for using a particular regression equation usually corresponds with calibrations at the beginning and ending of a period. If the applicable period for a regression equation does not correspond with calibrations, an applicable period is selected to minimize differences between reference measurements made during site visits and computed water levels. Equations developed from pressure-sensor calibration data, applicable periods for equations, and differences between reference and computed water levels are listed in table 7.

Sites JF-2 and JF-2a also were instrumented to collect continual water-level data by HRC personnel. Data collection and processing of these data are governed by formal, unpublished technical procedures associated with the Yucca Mountain Office of Civilian Radioactive Waste Management.

Ground-Water Discharges

Ground-water discharges are reported to two significant figures and range from 0.82 gal/min at site DV-2 to 3,100 gal/min at site AM-5a. The accuracy of the measurements are related directly to the operational conditions of the equipment and to the environmental conditions at the time of measurement.

Measurements of ground-water discharge for 2004 are listed in table 8 (see Basic Data section). Measurements of ground-water discharge from the earliest available information through 2004 are shown in figures 7–9 (see Basic Data section). Discharge measured at site AM-2 represents a combination of flow directly through slotted casing at land surface and leakage through the casing's annular space. The increased discharge at site AM-2 in 1996 probably is attributable to clearing the uppermost portion of annular space surrounding the casing. Data for site DV-1 (table 8), reported with data source "NPS," represent monthly mean discharge collected from instrumentation operated by the NPS and are reported for the 15th of the month on the basis of daily data collected by NPS. Discharge data collected by other agencies or programs are subject to revision upon further review by that agency or program.

The most commonly used method for measuring discharge was the vertical-axis current meter or acoustic-doppler velocimeter. Accuracy of these measurements are estimated to be poor, or no better than 15 percent of actual flow (Rantz and others, 1982, p. 179–180; U.S. Geological Survey, 2004).

Some discharge values were determined by measuring the depth of water inside a flume and comparing that depth to an applicable stage-discharge relation for the flume. Where an instrument has been installed to continually record stage in a flume, mean discharges can be computed for specific times or periods. Accuracy of these measurements is estimated to be fair or within 15 percent of actual flow (U.S. Geological Survey, 2005).

The volumetric method was used for measuring ground-water discharge from sites AM-2 and DV-2. A 5-gal or 4-L container was used to collect all discharge from the sites while a stopwatch was used to determine the amount of time the discharge was collected. The discharge rate is the volume of discharge collected divided by the elapsed time of collection. This method was repeated a minimum of three times and an average rate was computed for each site visit. Accuracy of these measurements is estimated to be good or within 10 percent of actual flow (U.S. Geological Survey, 2005).

Ground-Water Withdrawals

Withdrawals were estimated from data provided by NDWR, DOE, and USGS personnel associated with DOE's Hydrologic Resources Management Program. The majority of data sources report data in gallons and for consistency all withdrawals presented in tables and figures in this report are converted to units of millions of gallons. Estimated annual ground-water withdrawals are based solely on available data. Years during which no withdrawals from a specific area are indicated may reflect the unavailability of data rather than the absence of withdrawals. In these instances, withdrawal may be underestimated.

Estimates of ground-water withdrawals from wells in the Yucca Mountain region for 2004 are listed in table 9 (see Basic Data section). General locations of ground-water withdrawals during 2004 are shown in figure 10 (see Basic Data section). General areas of ground-water withdrawals for all uses are townships and ranges or are portions of townships and ranges in which the majority of ground-water

Table 7. Summary of pressure-sensor calibrations and associated error at boreholes JF-3 and AD-6, 2004.

[ft, feet; >, greater than value indicated; –, not applicable for January–December 2004]

Site number (fig. 1)	Date of calibration	Regression equation[1] (ft below land surface)	Coefficient of determination[2]	Number of points[3]	Equation applied		Differences between measured and computed water levels[4]			
					Begin date	End date	Minimum (ft)	Date	Maximum (ft)	Date
JF-3	01/15/2004	WL = (-2.328 x PSI) + 715.224	>0.99	11	04/28/2003	09/22/2004	0.04	02/12/2004	-0.05	08/12/2004
	02/15/2005	WL = (-2.322 x PSI) + 715.389	>0.99	13	09/22/2004	12/31/2004	-0.02	10/25/2004	0.03	09/27/2004 and 12/14/2004
AD-6	01/16/2004	WL = (-2.310 x PSI) + 48.921	>0.99	13	08/28/1003	12/31/2004	-0.01	09/27/2004	0.02	01/16/2004, 03/04/2004 and 06/08/2004
	02/17/2005	WL= (-2.316 x PSI) + 48.972	>0.99	15	–	–	–	–	–	–

[1] Equation developed to convert pressure readings (PSI) recorded by on-site instrumentation to water level in feet below land surface (WL).

[2] Value representing fraction of the total variation in water level that can be explained by variation in pressure. A value of 1.00 implies all variations in water level can be explained by variations in pressure.

[3] Number of pressure-sensor depths used to develop regression equation during calibration procedure.

[4] Differences between periodic water levels determined using electric or steel tapes and computed water levels determined by use of regression equation.

withdrawals occurred. Figures 11–12 (see Basic Data section) show estimated withdrawals from wells from the earliest available information through 2004. Total bar heights shown in figures 11 and 12 equal the sum of withdrawals from all areas within the subbasin for a given year. Information on withdrawals provided by other agencies or programs is subject to revision upon further review by that agency or program.

Estimated ground-water withdrawals for calendar year 2004 are listed by hydrographic area (Amargosa Desert, Crater Flat, Jackass Flats, and Mercury Valley) within the Alkali Flat–Furnace Creek Ranch and the Ash Meadows ground-water subbasins. The Amargosa Desert spans both subbasins and is further subdivided into two areas within the Ash Meadows ground-water subbasin.

Withdrawals for irrigation account for the majority of pumpage in the study area. Those withdrawals commonly are estimated by multiplying irrigated acreages by water-application rates. Irrigated acreage in the Amargosa Desert during 2004, provided by NDWR, was about 2,444 acres. As per NDWR, the Amargosa Desert within the Alkali Flat–Furnace Creek Ranch subbasin has about 2,442 irrigated acres and the Amargosa Desert within the Ash Meadows subbasin has about 2 irrigated acres. Application rates used by NDWR in 2004 averaged about 4 acre-ft/acre but estimates of application rates in the Amargosa Desert by Moreo and others (2003) ranged from 2 to 12 acre-ft/acre and averaged about 7 acre-ft/acre. Withdrawals listed in this report, therefore, may be underestimated when a portion of the total withdrawal in an area is comprised of use for irrigation.

Withdrawals for domestic use account for the least pumpage within each part of the study area. Reported domestic use is based on the number and location of wells drilled for domestic purposes contained in the NDWR well-log database (at the time that pumpage inventories were prepared).

Withdrawals from Alkali Flat–Furnace Creek Ranch Ground-Water Subbasin

Withdrawals from the Amargosa Desert Hydrographic Area within the Alkali Flat–Furnace Creek Ranch ground-water subbasin (4,391 Mgal) were recompiled from a ground-water pumpage inventory made by NDWR for the entire Amargosa Desert. The pumpage inventory in 2004 includes estimated withdrawals for irrigation, mining, quasi-municipal and commercial, and domestic uses. Most reported withdrawals for the Amargosa Desert are from the Alkali Flat–Furnace Creek Ranch ground-water subbasin. Within this subbasin, ground-water withdrawals in the Amargosa Desert were used for irrigation (79 percent), mining (7 percent), quasi-municipal or commercial (11 percent), and domestic use (3 percent).

Withdrawals from Crater Flat of about 16 Mgal in 2004 were determined from flowmeters at well USW VH-2, and at sites CF-2 and CF-3. Estimated withdrawals for well USW VH-2 (about 9 Mgal during 1996–2003; withdrawals in 2004 were estimated to be comparable) and site CF-3 (about 7 Mgal) are from NDWR (Karl Eitenmiller, Nevada Department of Water Resources, written commun., 2004; Tim Hunt, Nevada Department of Water Resources, written commun., 2005). Total withdrawals in 2004 for site CF-2 are from DOE (Karen Bull, Bechtel SAIC Company, LLC, written commun., 2005). Withdrawals from sites CF-1 and CF-1a during 2004 are estimated as zero based on observations during site visits.

Withdrawals from Jackass Flats were determined from flowmeters at sites J-13 and J-12 during 2004. Ground-water withdrawals from site J-12 accounted for about 84 percent of the roughly 14 Mgal total withdrawals from Jackass Flats. Withdrawals for 2004 at these sites were recompiled from flowmeter readings provided by Bechtel Nevada to USGS personnel associated with DOE's Hydrologic Resources Management Program (U.S. Geological Survey, 2006).

Withdrawals from Rock Valley are considered negligible. The valley mostly is within the Nevada Test Site, which limits public access and use. Within the valley, no known DOE water supply wells exist, no pumpage is reported by DOE, and boreholes that are not pumped are not present in USGS or DOE databases.

Withdrawals from Ash Meadows Ground-Water Subbasin

Withdrawals from Mercury Valley of about 68 Mgal in 2004 were recompiled from flowmeter readings for site MV-1. Periodic flowmeter readings were provided by Bechtel Nevada to USGS personnel associated with DOE's Hydrologic Resources Management Program (U.S. Geological Survey, 2006).

Withdrawals from the Amargosa Desert hydrographic area within the Ash Meadows ground-water subbasin also were recompiled from the ground-water pumpage inventory made by NDWR for the entire Amargosa Desert. In 2004, about 22 Mgal of water were withdrawn from the Amargosa Desert within the Ash Meadows ground-water subbasin. The Amargosa Desert within this subbasin has been divided into two areas to provide information on withdrawals in the immediate vicinity of the environmentally sensitive Ash Meadows area. These areas are identified as the Amargosa Desert (excluding Ash Meadows area) and the Amargosa Desert (Ash Meadows area). Only minor withdrawals for irrigation, quasi-municipal, or mining uses (each less than 1 Mgal) were reported from these two areas. During 2004, withdrawals in the Amargosa Desert (excluding Ash Meadows area) include irrigation and quasi-municipal withdrawals from three wells in T. 17 S., R. 52 E. Also during 2004, withdrawals for quasi-municipal and mining uses from the Amargosa Desert (Ash Meadows area) include withdrawals from two wells in T. 18 S., R. 50 E. Within Ash Meadows subbasin, withdrawals for domestic use in 2004 from the two areas also were minor, about 12 and 2 percent, respectively, in comparison to total withdrawals for domestic use in the Amargosa Desert Hydrographic Area.

Discussion of Ground-Water Levels and Ground-Water Withdrawals in Jackass Flats

Water-level altitudes for seven boreholes and estimated annual ground-water withdrawals in Jackass Flats from 1983 through 2004 are shown in figure 13 (see Basic Data section). Annual ground-water withdrawals in Jackass Flats prior to 1983 are excluded because those data generally represent only the withdrawals from borehole J-12 rather than total withdrawals from Jackass Flats.

Water-level altitudes (fig. 13) are based on periodic measurements contained in this and previously published reports or are daily mean water levels provided by USGS-SCP personnel. Lines are dashed when no data are available.

Ground-water withdrawals in Jackass Flats increased from 13.5 Mgal in 2003 to 13.8 Mgal in 2004 and consisted of combined pumpage from water-supply boreholes J-13 and J-12. Withdrawals during 2004 were about 2 percent greater than withdrawals in 2003 and about 73 percent less than the median withdrawal of 52 Mgal for the period 1983–91 (La Camera and Westenburg, 1994, p. 30). Median water-level altitudes in Jackass Flats usually corresponded with increases or decreases in withdrawals, although changes in water levels may be due to changes in recharge to the ground-water system rather than withdrawals (Fenelon and Moreo, 2002, p. 54–58). Ground-water withdrawals from borehole J-13 increased from about 0.7 Mgal in 2003 to about 2.2 Mgal in 2004. Ground-water withdrawals from borehole J-12 decreased from about 12.8 Mgal in 2003 to 11.6 Mgal in 2004.

Table 10 (see Basic Data section) contains selected statistics for water-level altitudes in Jackass Flats. Data for boreholes JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 are summarized for a baseline period of 1992–93 and for subsequent calendar years through 2004. For each period, the table lists the number of measurements, minimum, maximum, and median water-level altitude, and the average deviation of water levels from the median water level. Only one measurement was available for site JF-2 in 2002, therefore, no statistics were calculated for that year. Continual data for the period following 2001 that subsequently has been released to the public can be obtained from HRC personnel by contacting them directly at URL: <*http://hrcweb.nevada.edu*>. The period 1992–93 was selected as a baseline because it is the earliest period when data were available for all sites and data-collection frequency was roughly equivalent at any particular site during that time.

Median water-level altitudes indicate a statistically representative ground-water level for a particular time. Median water-level measurements are listed because the calculated median is less affected by a few high or low values than is the arithmetic mean.

The average deviation indicates the dispersion of individual measurements about the median; it provides an indication of how representative of a typical water-level altitude the median is during a particular period. The average deviation equals the sum of the absolute differences between individual measurements and the median, divided by the number of individual measurements. This measure of measurement spread was selected rather than standard deviation because it can be used to describe dispersion about a median value rather than dispersion about an arithmetic mean.

Figure 14 (see Basic Data section) shows the median water-level altitudes and the average deviation of the water levels for boreholes JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 for 1992–93 and for subsequent years through 2004. The average deviation of measurements at borehole JF-2 in 2004 equaled 0.0; as a result no average deviation is indicated in figure 14 for that site and year. Median annual ground-water withdrawal in Jackass Flats for 1992–93 and estimated annual withdrawals for subsequent years through 2004 also are included.

From 2003 to 2004, median water-level altitudes in three of seven boreholes (JF-1, JF-2, and J-12) in Jackass Flats increased 0.1 ft. At one borehole in Jackass Flats (JF-3) median water-level altitude was unchanged from 2003 to 2004. At three additional boreholes (JF-2a, J-13, and J-11) in Jackass Flats median water-level altitudes decreased from 0.1 to 0.7 ft from 2003 to 2004. The 0.7 ft decrease in median water level and large average deviation of 0.6 ft at borehole J-13 may have resulted from pumpage of an unknown quantity of water from that borehole (the flowmeter was bypassed) following pump replacement in about April 2004.

The median water-level altitudes at six of seven monitoring boreholes (JF-1, JF-2, JF-2a, J-11, J-12, and JF-3) in Jackass Flats in 2004 were greater (0.3–2.7 ft) than their altitudes for the baseline period in 1992–93. At borehole J-13, the median water-level altitude equaled the altitude for the baseline period in 1992–93. All increases or decreases in median water-level altitudes exceeded historical variability in water levels exhibited during their baseline periods. Changes exceeding historical variability could be due to changes in monitoring instrumentation or frequency, limited lengths of historical baseline periods, withdrawals or recharge that differed from those during baseline periods, or a combination of effects.

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Basic Data

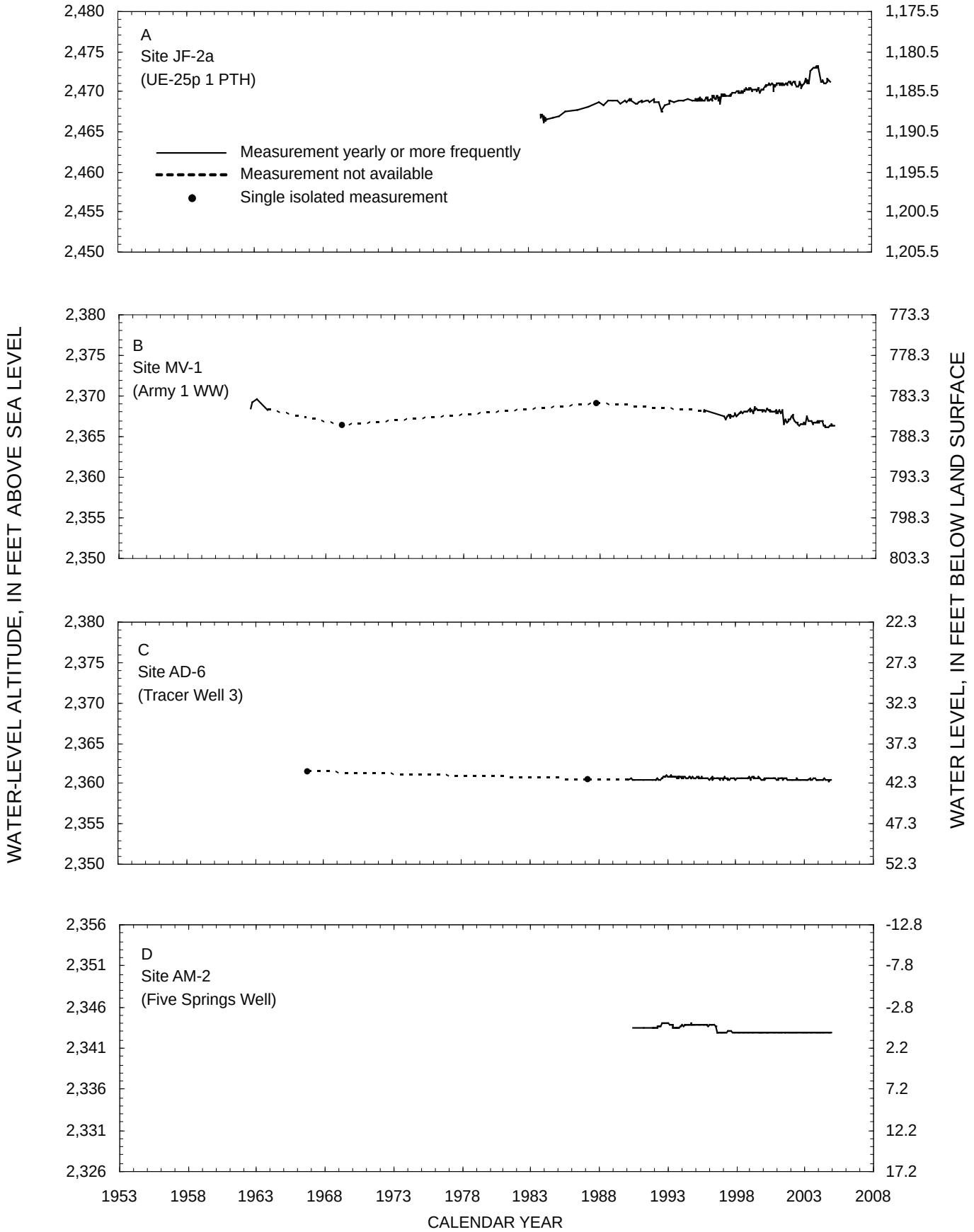


Figure 2. Periodic water levels for selected sites through 2004 at which primary contributing unit is carbonate rock. Data that may represent short-term conditions at a site have been excluded.

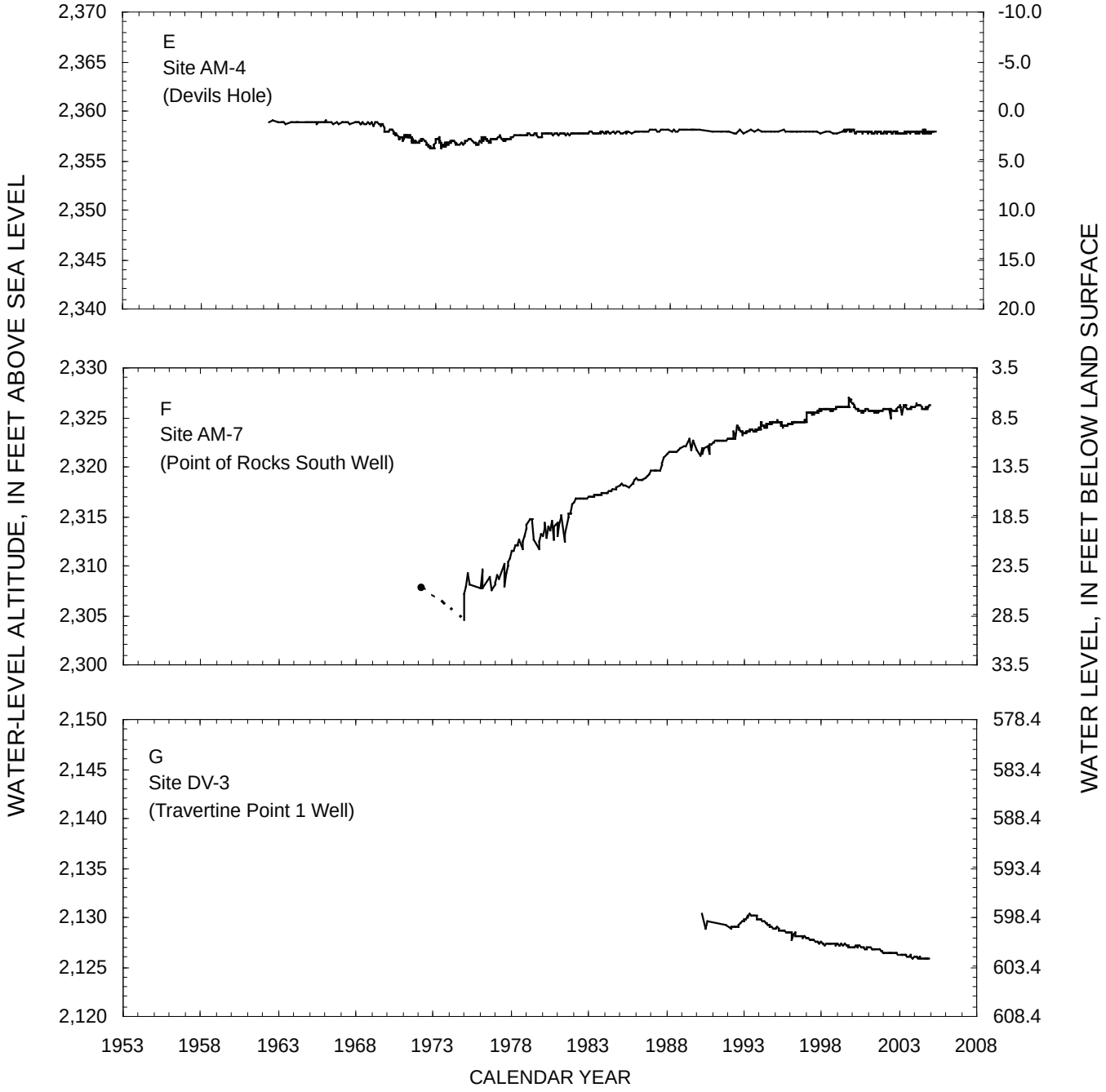


Figure 2. Periodic water levels for selected sites through 2004 at which primary contributing unit is carbonate rock—Continued.

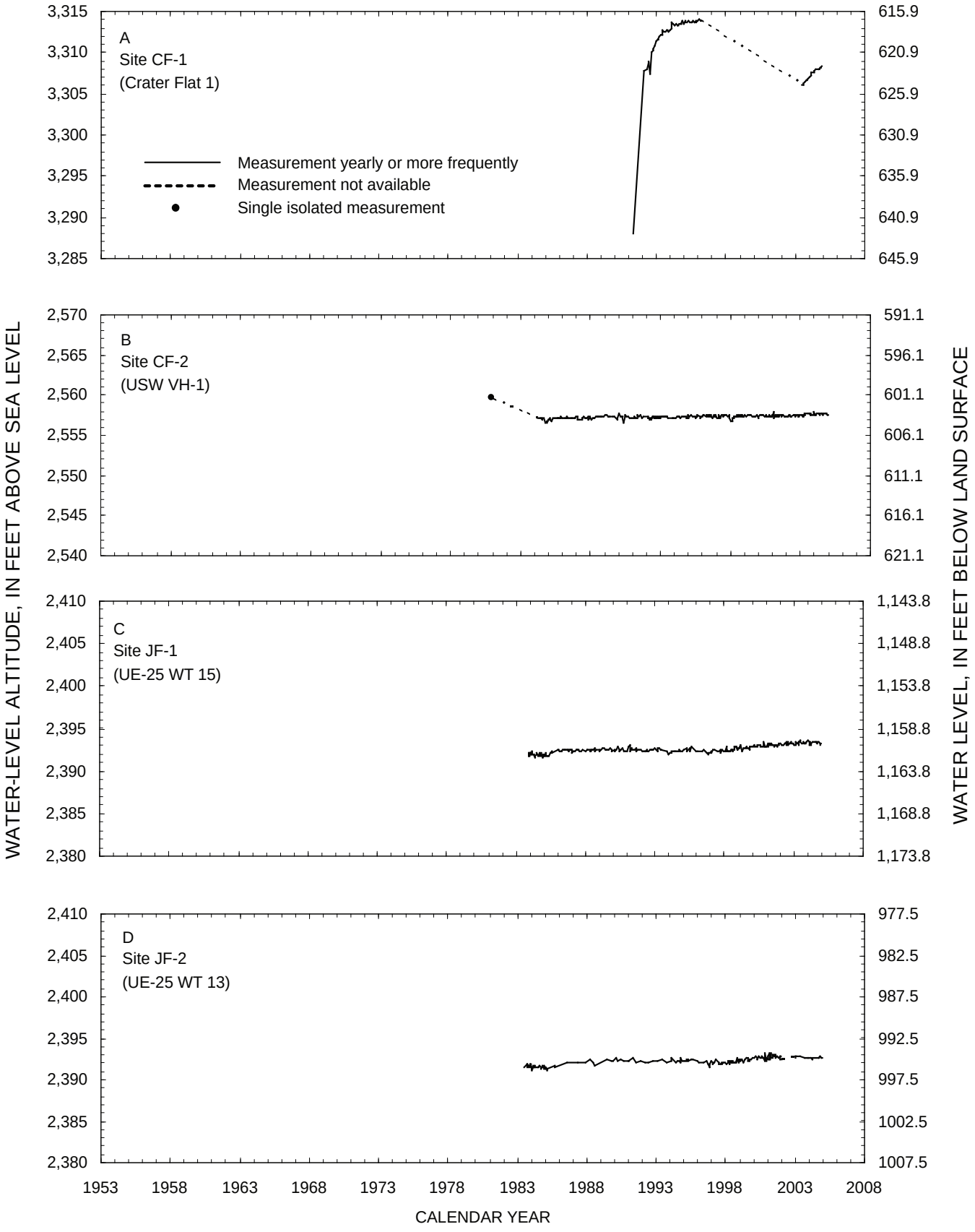


Figure 3. Periodic water levels for selected sites through 2004 at which primary contributing unit is volcanic rock. Data that may represent short-term conditions at a site have been excluded.

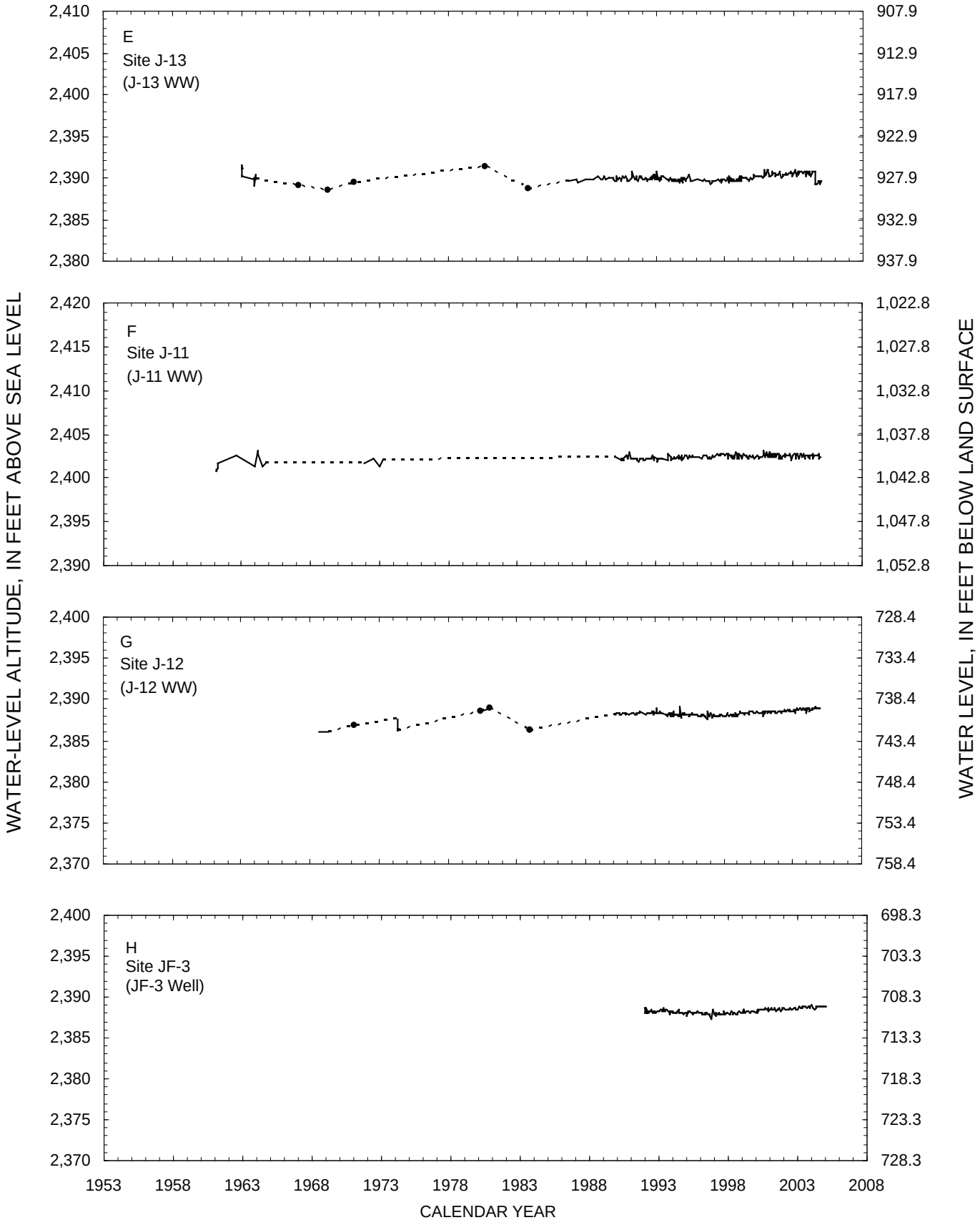


Figure 3. Periodic water levels for selected sites through 2004 at which primary contributing unit is volcanic rock—Continued.

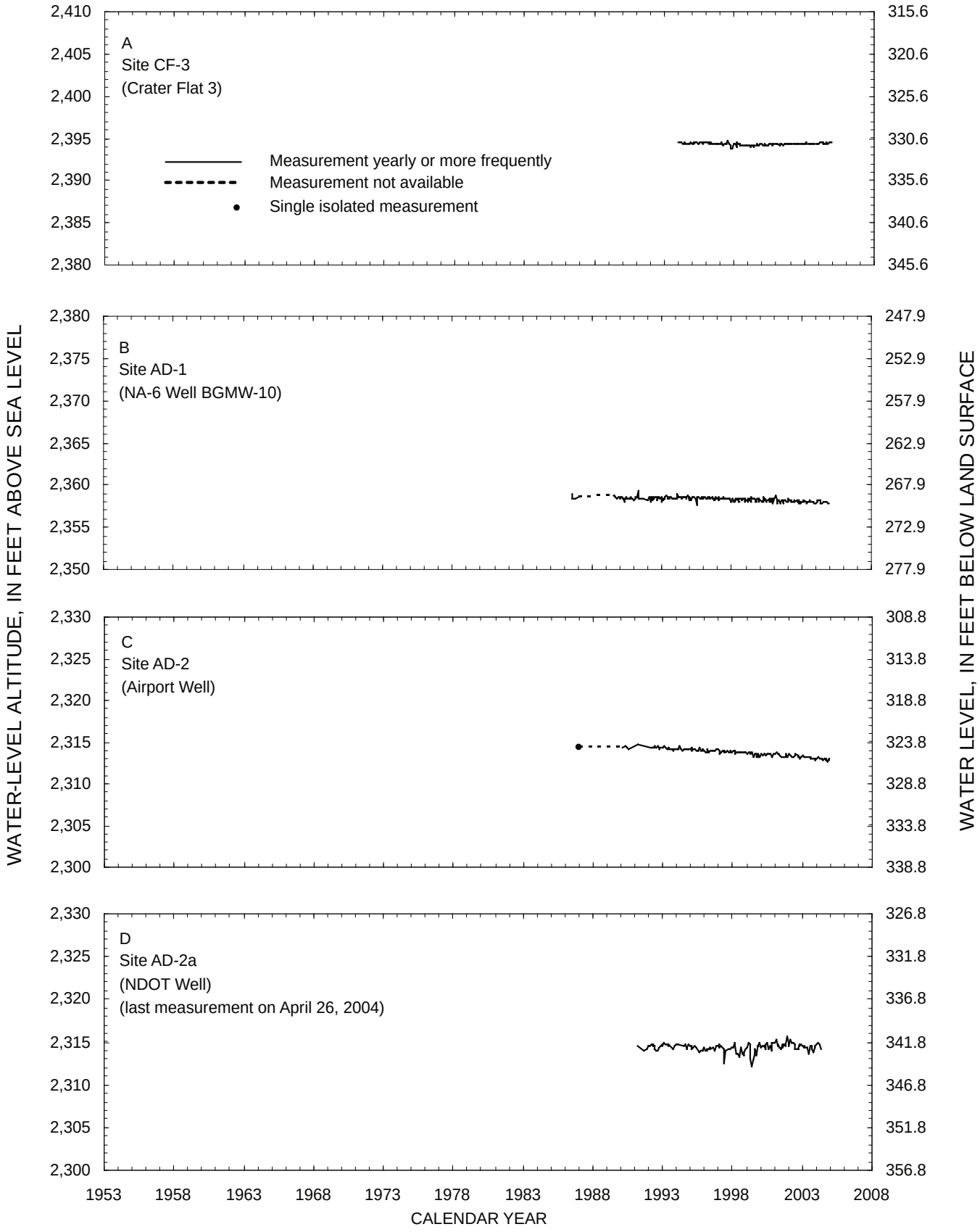


Figure 4. Periodic water levels for selected sites through 2004 at which primary contributing unit is basin fill. Data that may represent short-term conditions at a site have been excluded.

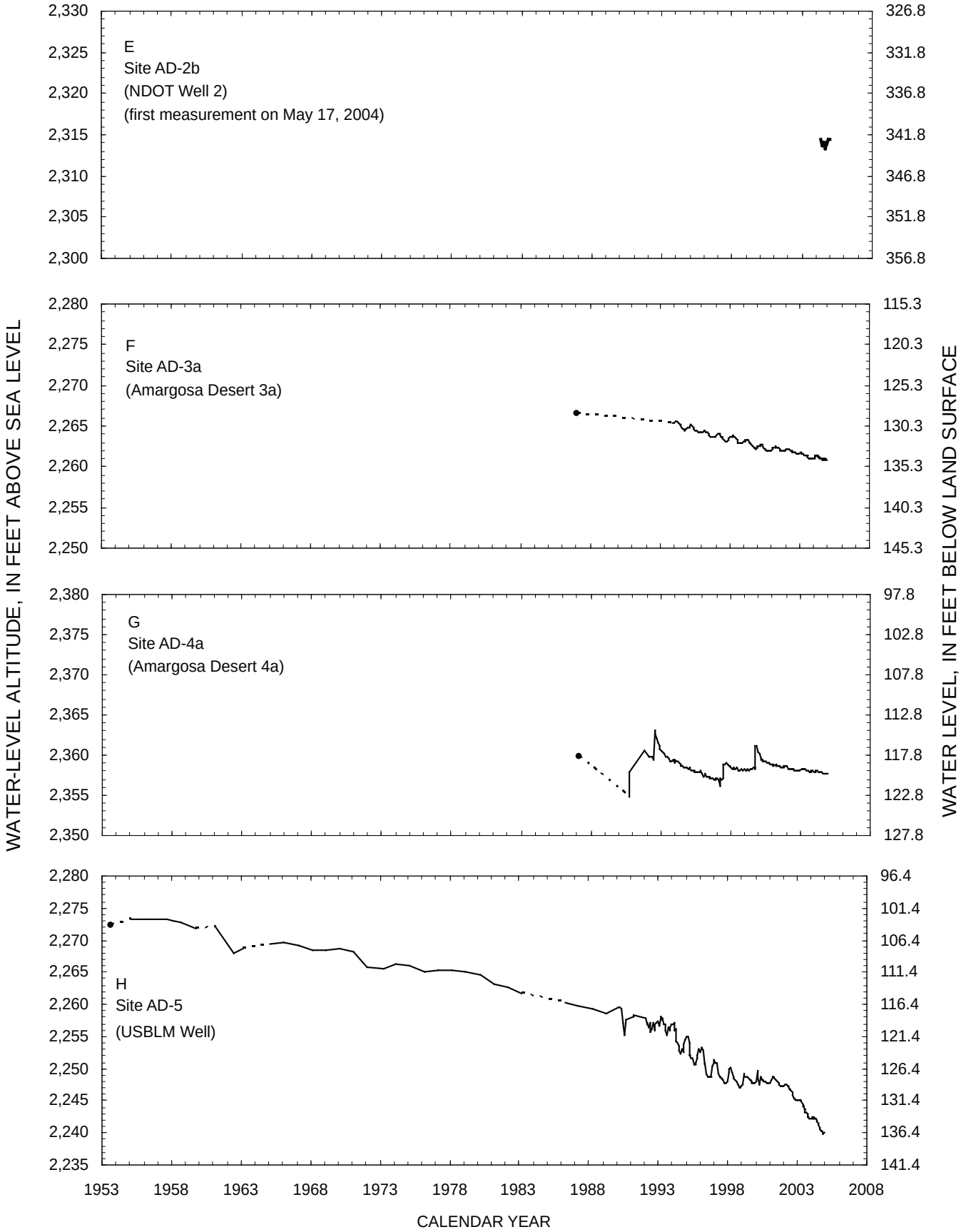


Figure 4. Periodic water levels for selected sites through 2004 at which primary contributing unit is basin fill—Continued.

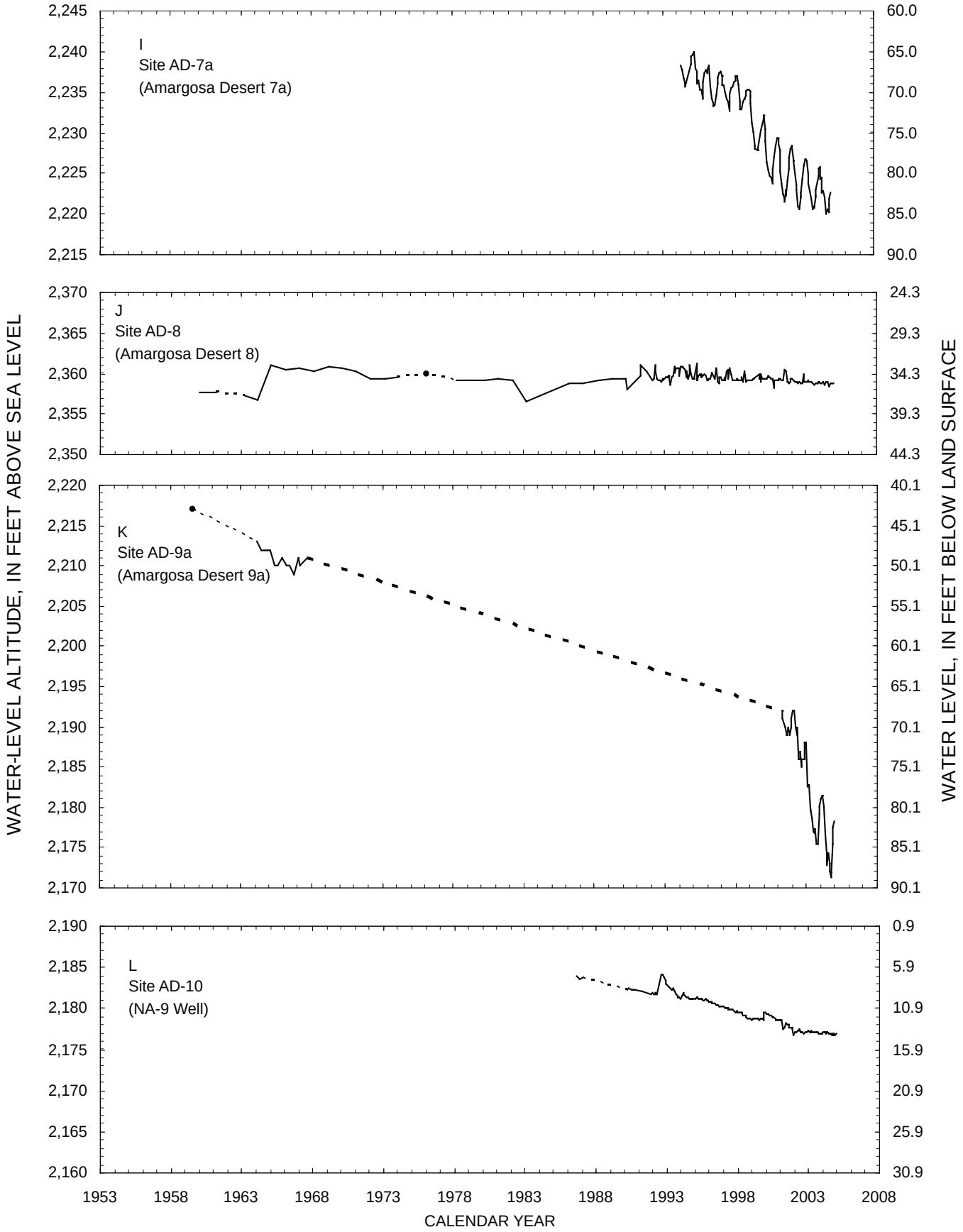


Figure 4. Periodic water levels for selected sites through 2004 at which primary contributing unit is basin fill—Continued.

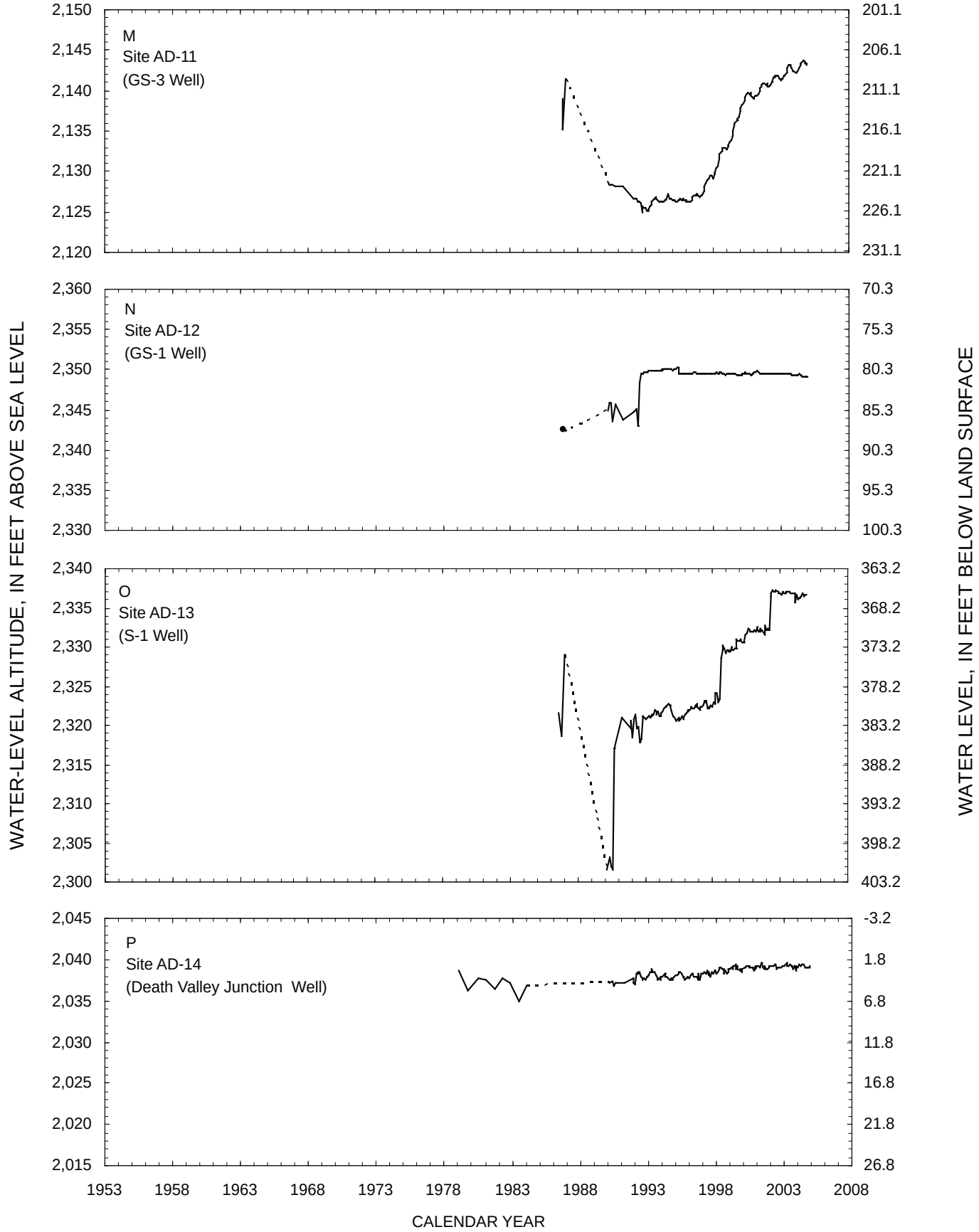


Figure 4. Periodic water levels for selected sites through 2004 at which primary contributing unit is basin fill—Continued.

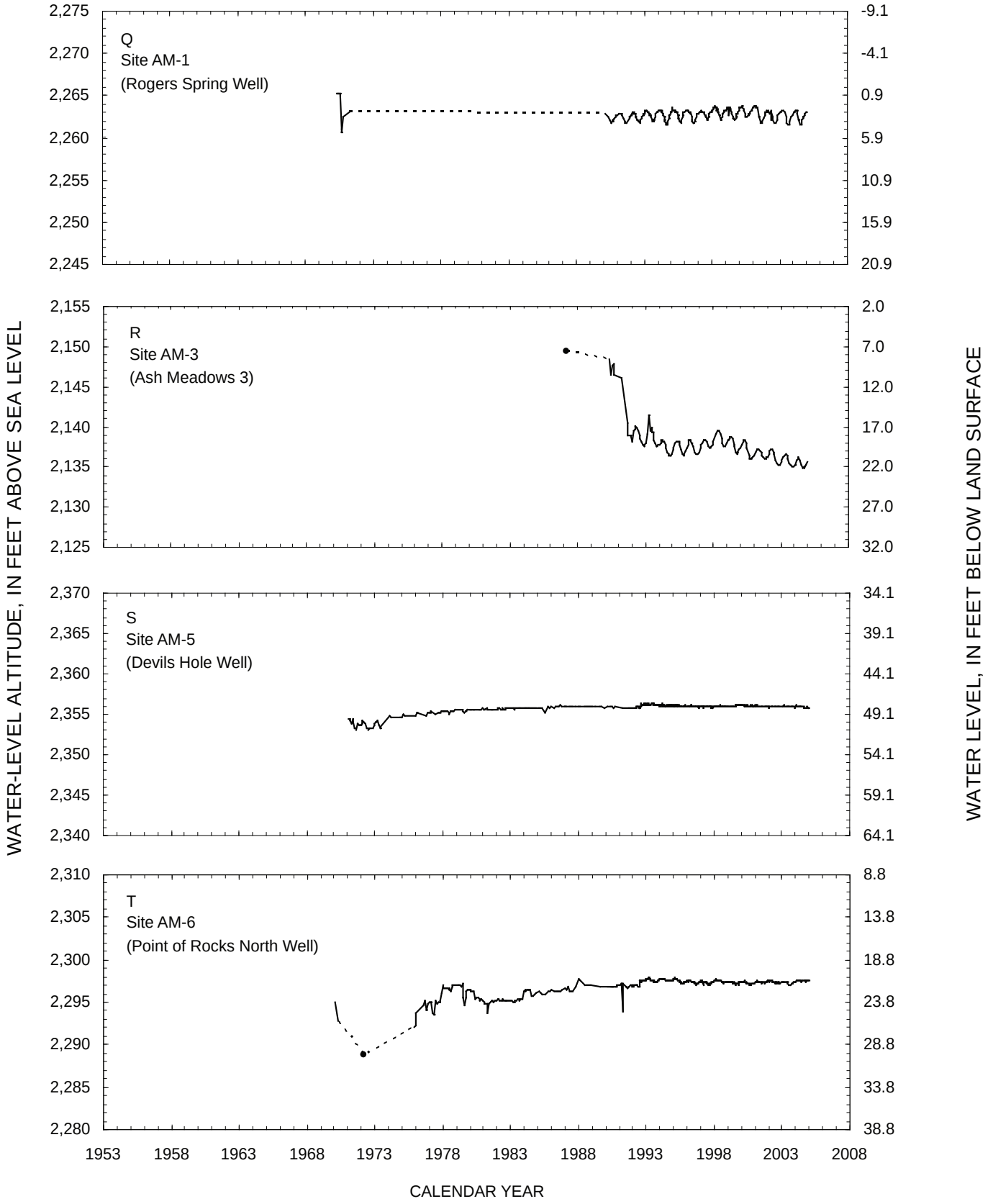


Figure 4. Periodic water levels for selected sites through 2004 at which primary contributing unit is basin fill—Continued.

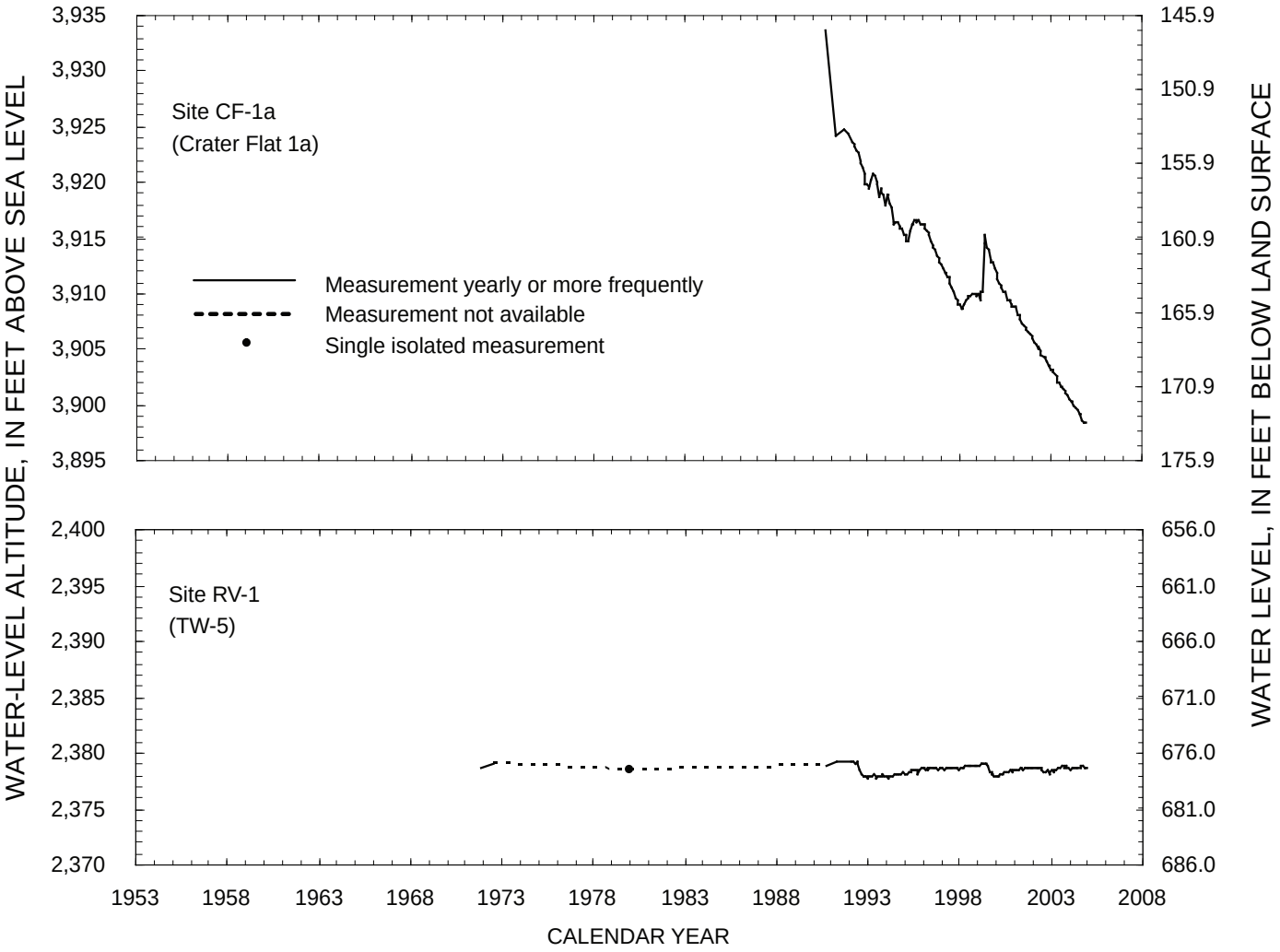


Figure 5. Periodic water levels for selected sites through 2004 at which primary contributing unit is undifferentiated sedimentary rock. Data that may represent short-term conditions at a site have been excluded.

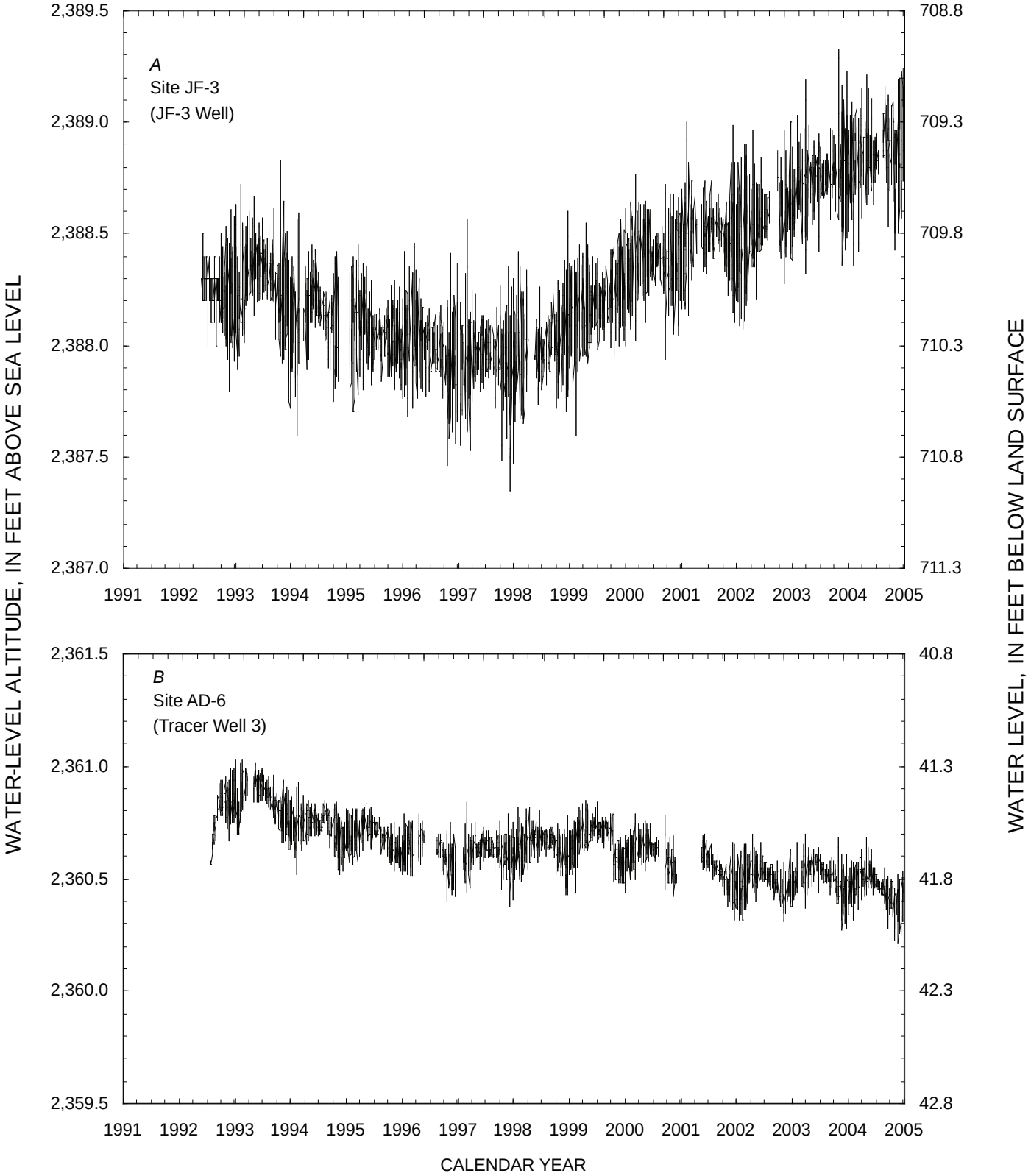


Figure 6. Daily mean water levels in (*A*) borehole JF-3, May 1992–December 2004 and in (*B*) borehole AD-6, July 1992–December 2004.

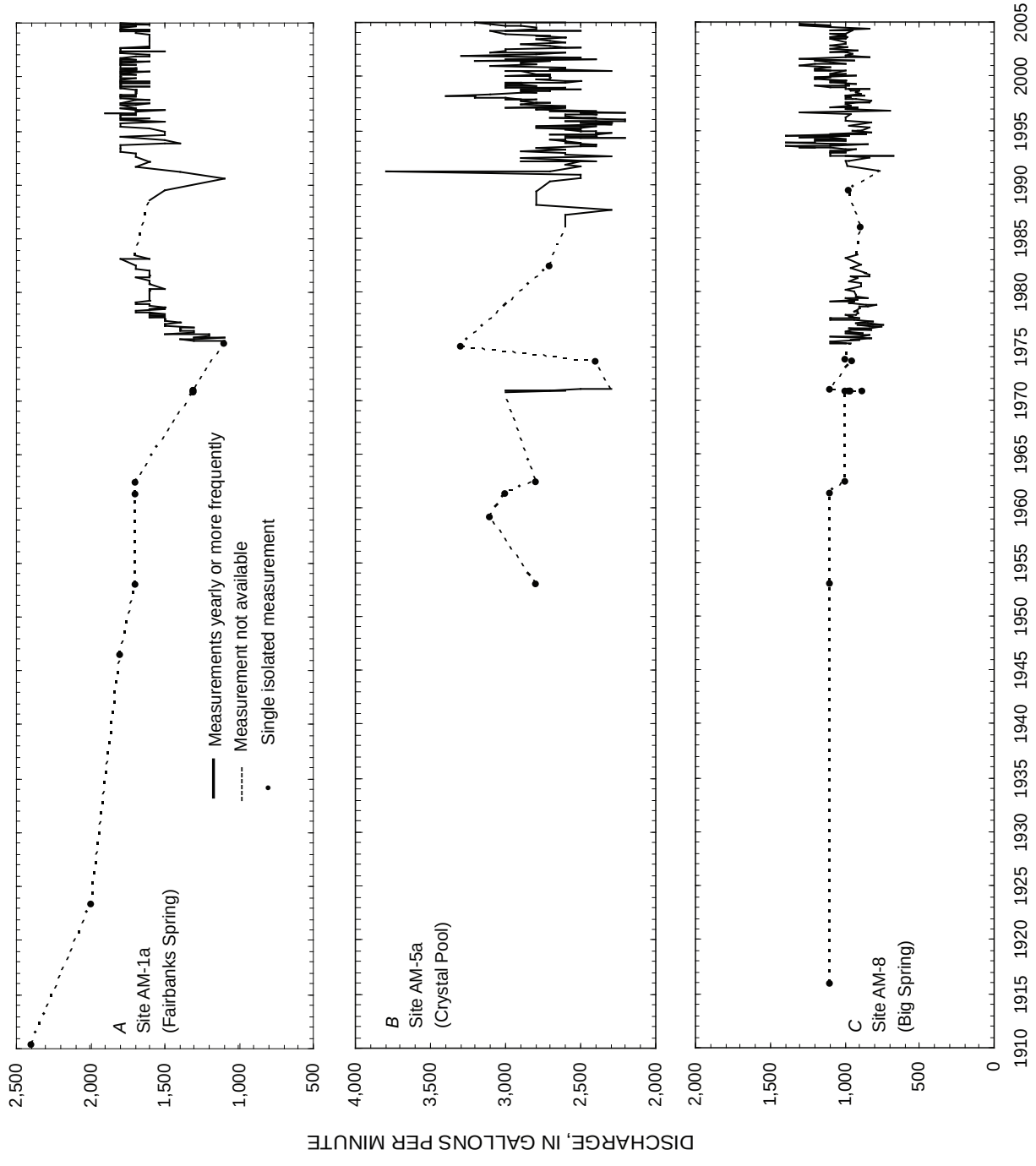


Figure 7. Discharge at sites (*A*) AM-1a (Fairbanks Spring), (*B*) AM-5a (Crystal Pool), and (*C*) AM-8 (Big Spring), 1910–2004.

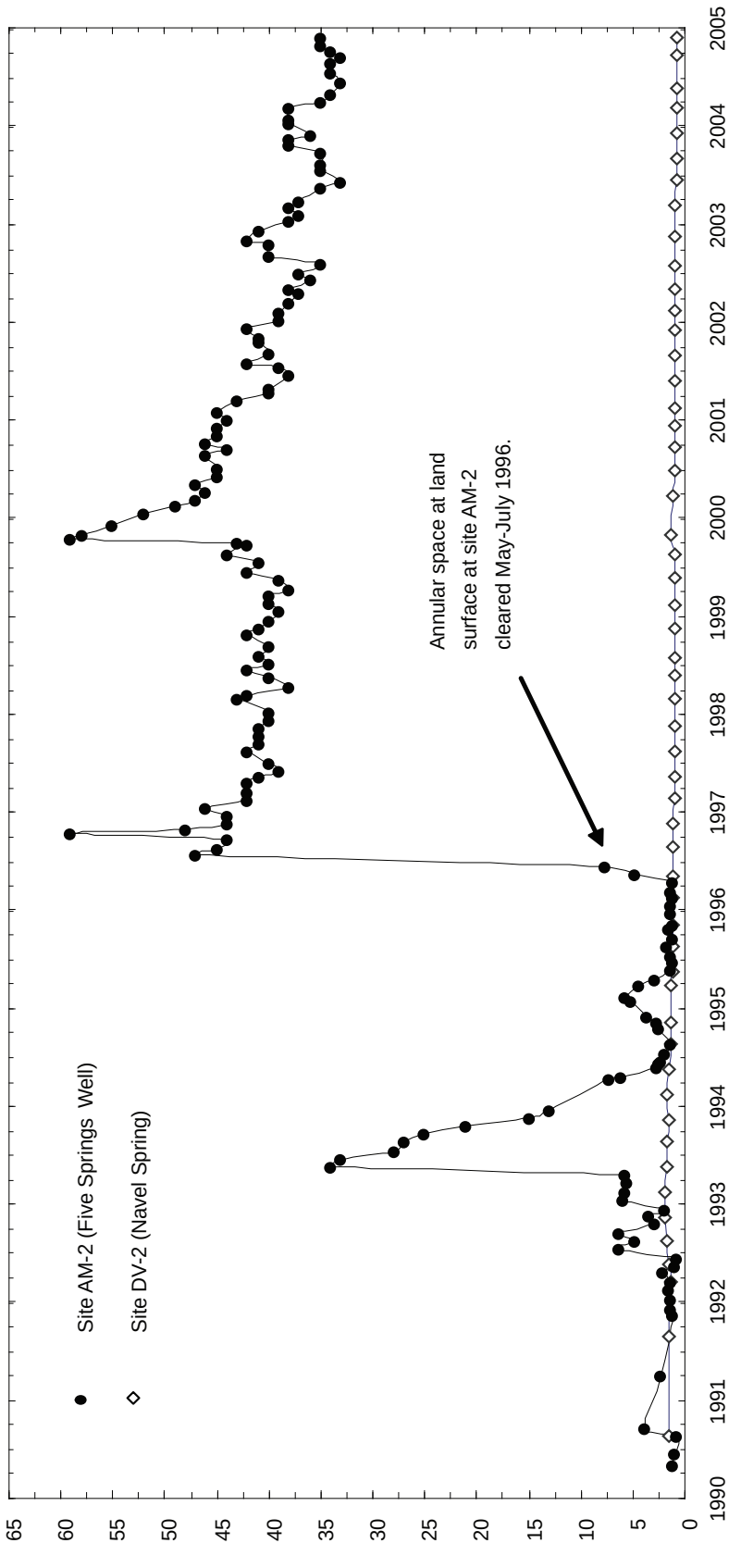


Figure 8. Discharge at sites AM-2 (Five Springs Well) and DV- 2 (Navel Spring), 1990–2004. Symbols shown on lines indicate periodic measurements presented in this and previous reports on selected ground-water data for Yucca Mountain region.

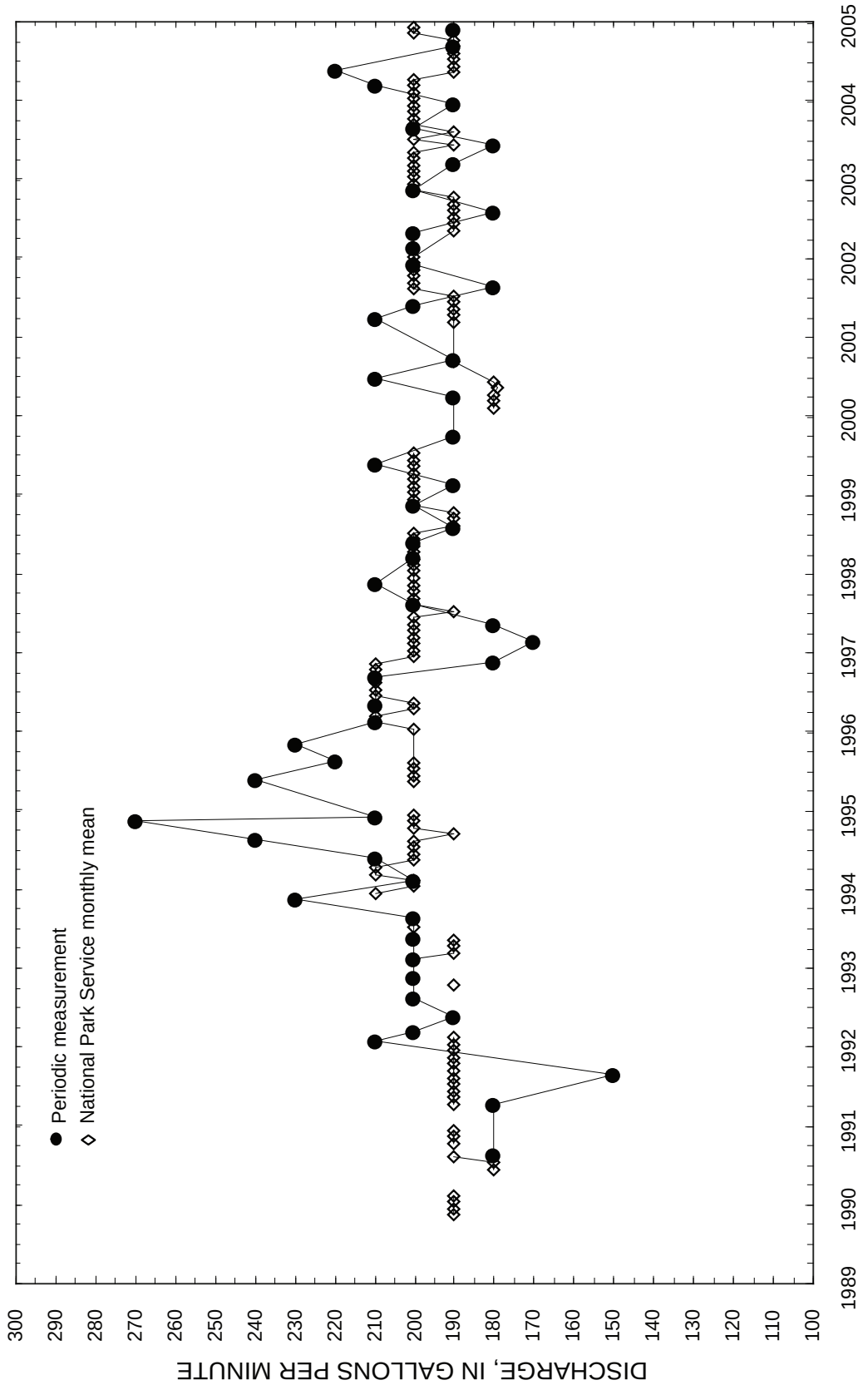
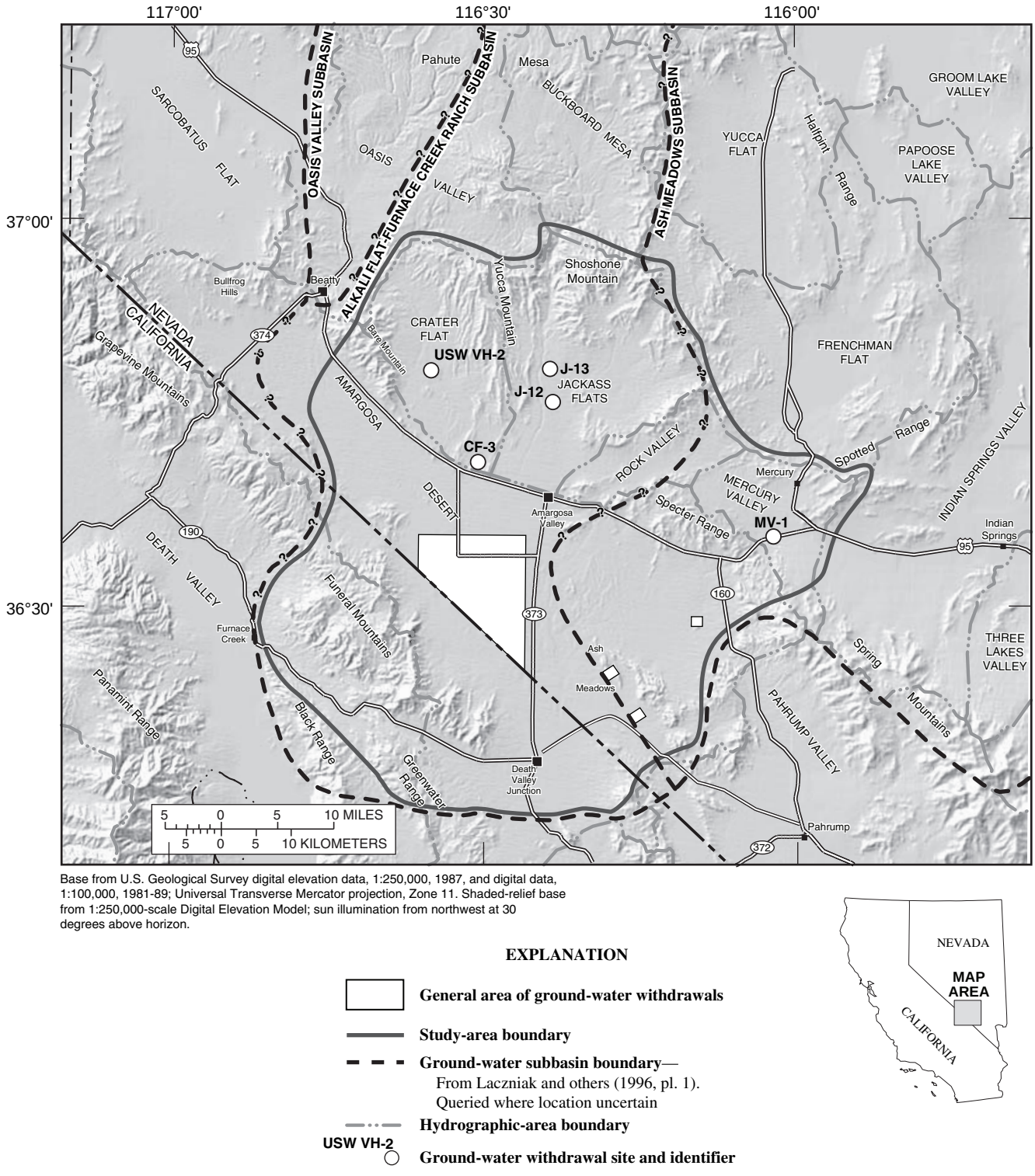


Figure 9. Discharge at site DV-1 (Texas Spring), 1989–2004. National Park Service mean monthly data are not connected by a line where data are not available for consecutive months.



Base from U.S. Geological Survey digital elevation data, 1:250,000, 1987, and digital data, 1:100,000, 1981-89; Universal Transverse Mercator projection, Zone 11. Shaded-relief base from 1:250,000-scale Digital Elevation Model; sun illumination from northwest at 30 degrees above horizon.

EXPLANATION

General area of ground-water withdrawals

Study-area boundary

Ground-water subbasin boundary—
From Laczniak and others (1996, pl. 1).
Queried where location uncertain

Hydrographic-area boundary

USW VH-2
Ground-water withdrawal site and identifier

Sizes of locations indicated do not reflect quantity of ground water withdrawn.

Figure 10. Location of ground-water withdrawal sites and general areas of ground-water withdrawals in the Yucca Mountain region of southern Nevada and eastern California, January-December, 2004. Sizes of locations indicated do not reflect quantity of ground-water withdrawn.

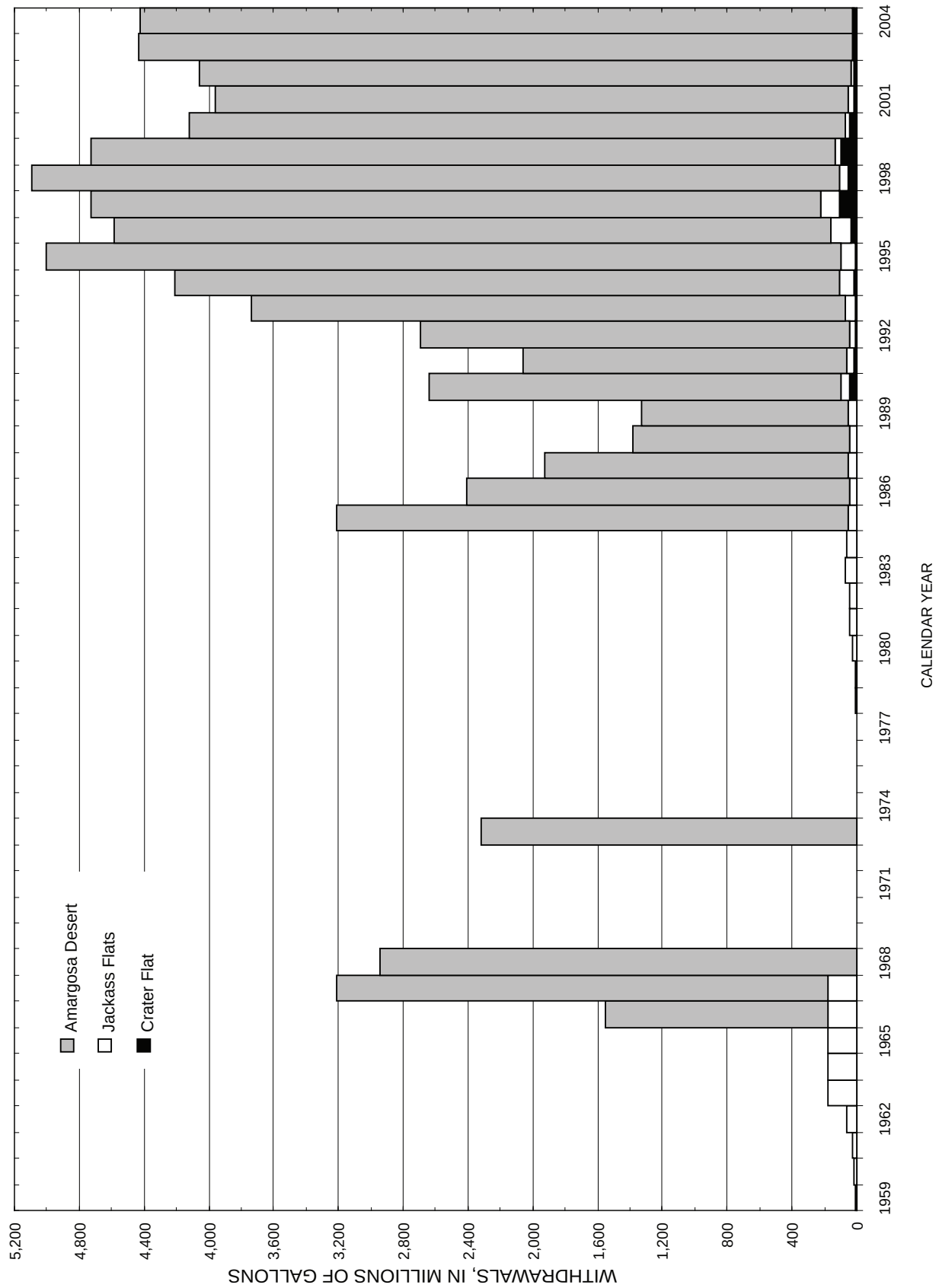


Figure 11. Available estimates of annual ground-water withdrawals for selected areas within Alkali Flat–Furnace Creek Ranch ground-water subbasin, 1959–2004.

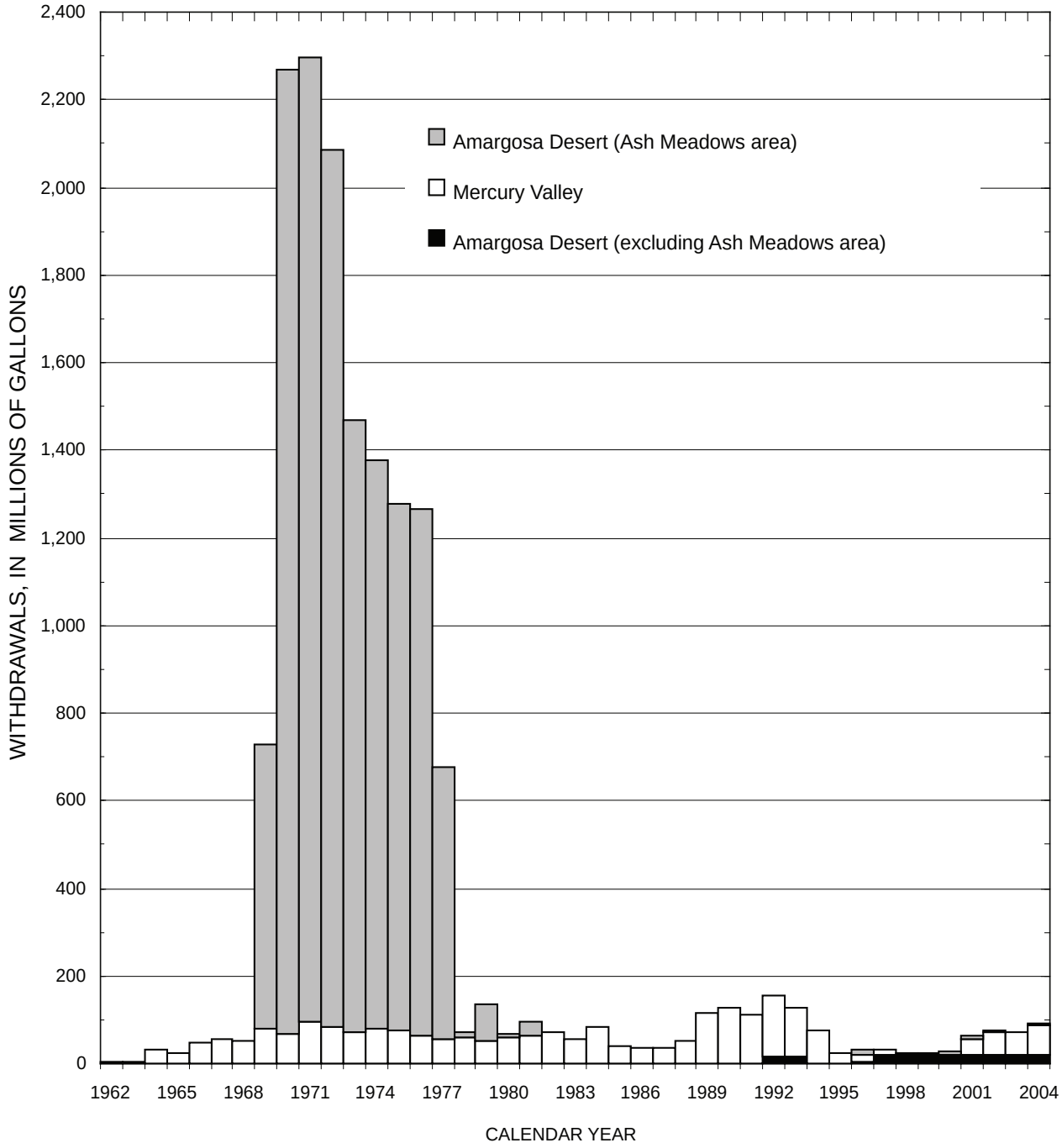


Figure 12. Available estimates of annual ground-water withdrawals for selected areas within Ash Meadows ground-water subbasin, 1962–2004.

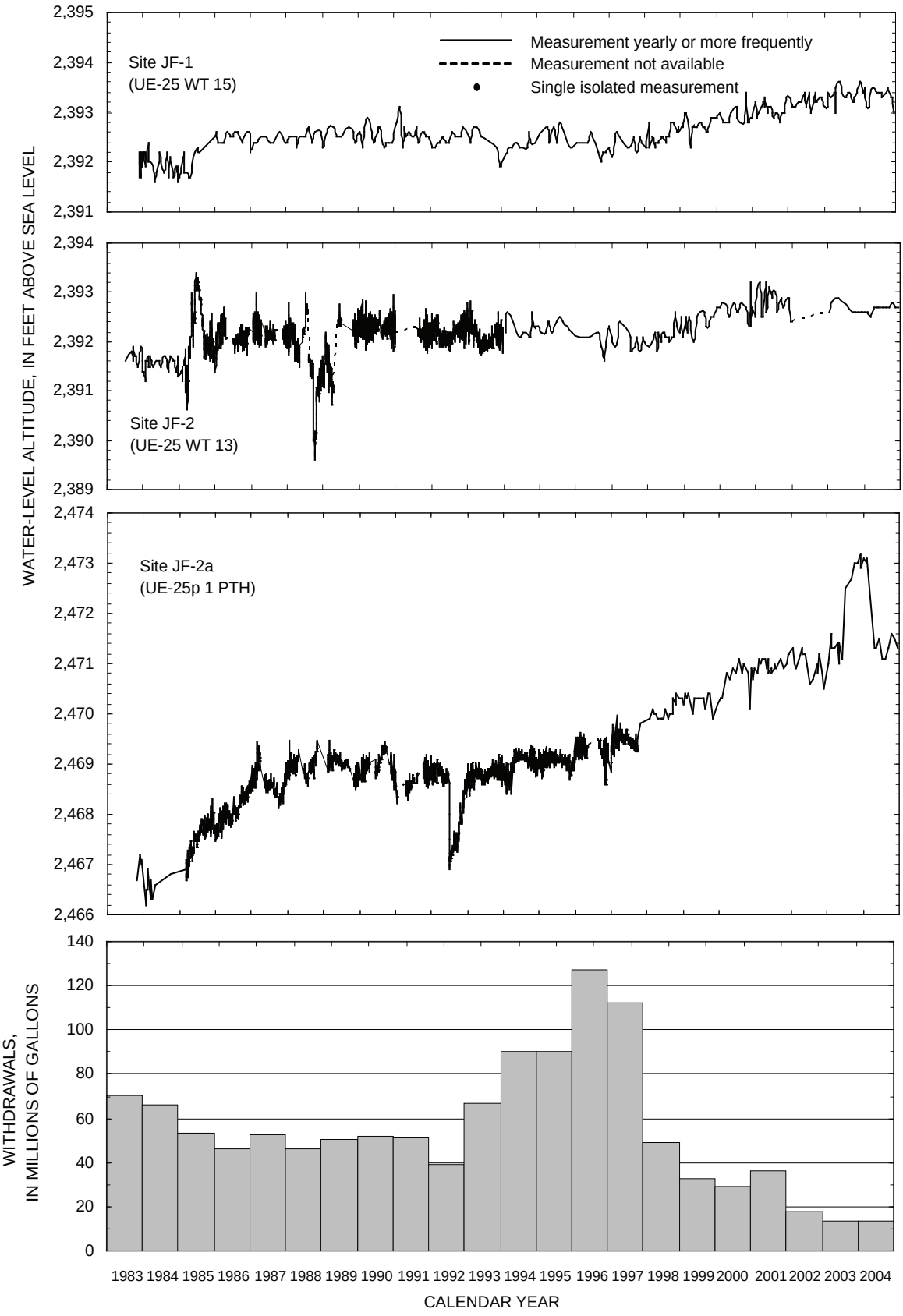


Figure 13. Water-level altitudes in boreholes JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 and estimated annual ground-water withdrawals from Jackass Flats, 1983–2004. Periodic measurements that may reflect short-term conditions at a site have been excluded.

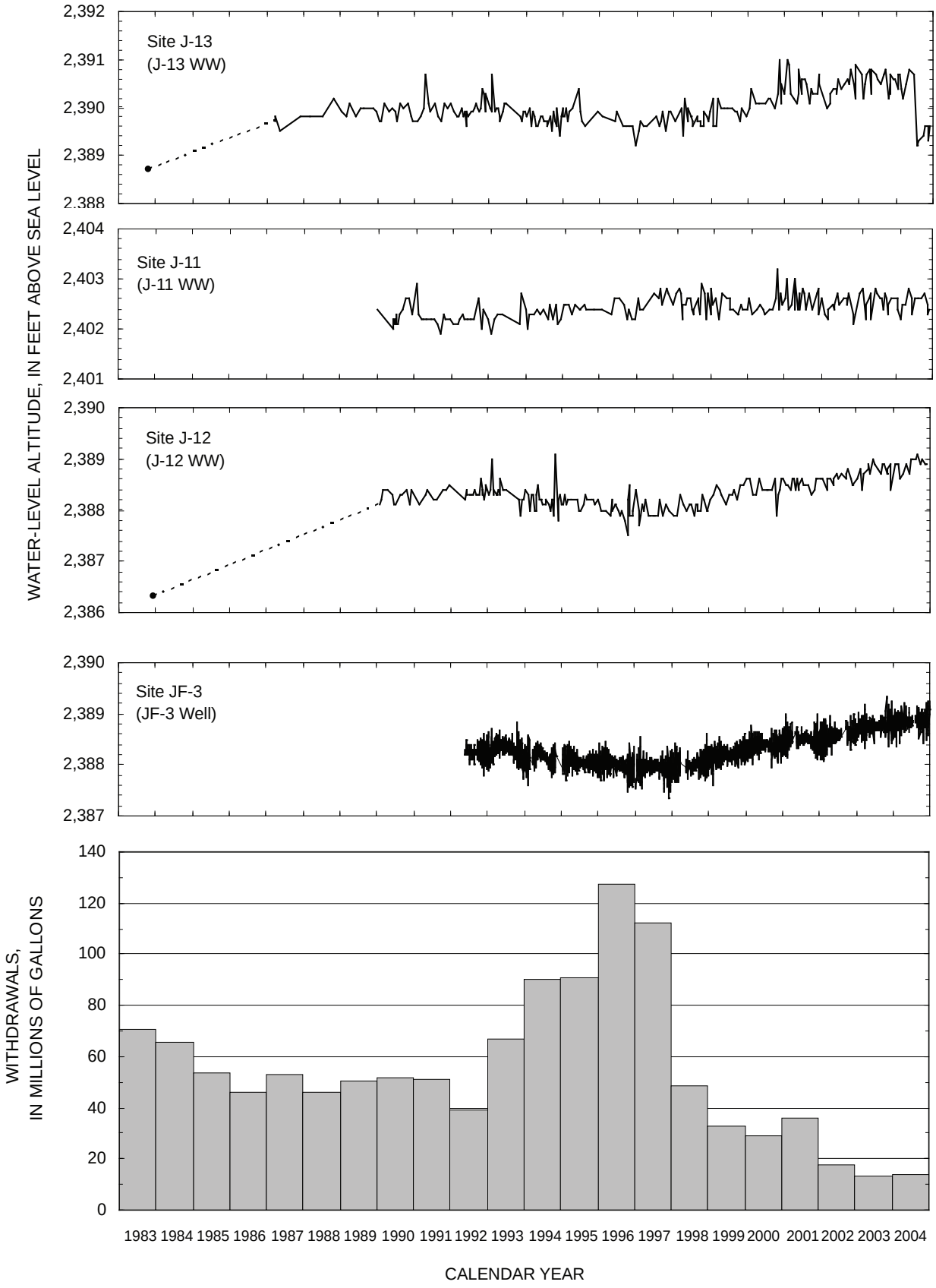


Figure 13. Water-level altitudes in boreholes JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 and estimated annual groundwater withdrawals from Jackass Flats, 1983–2004—Continued.

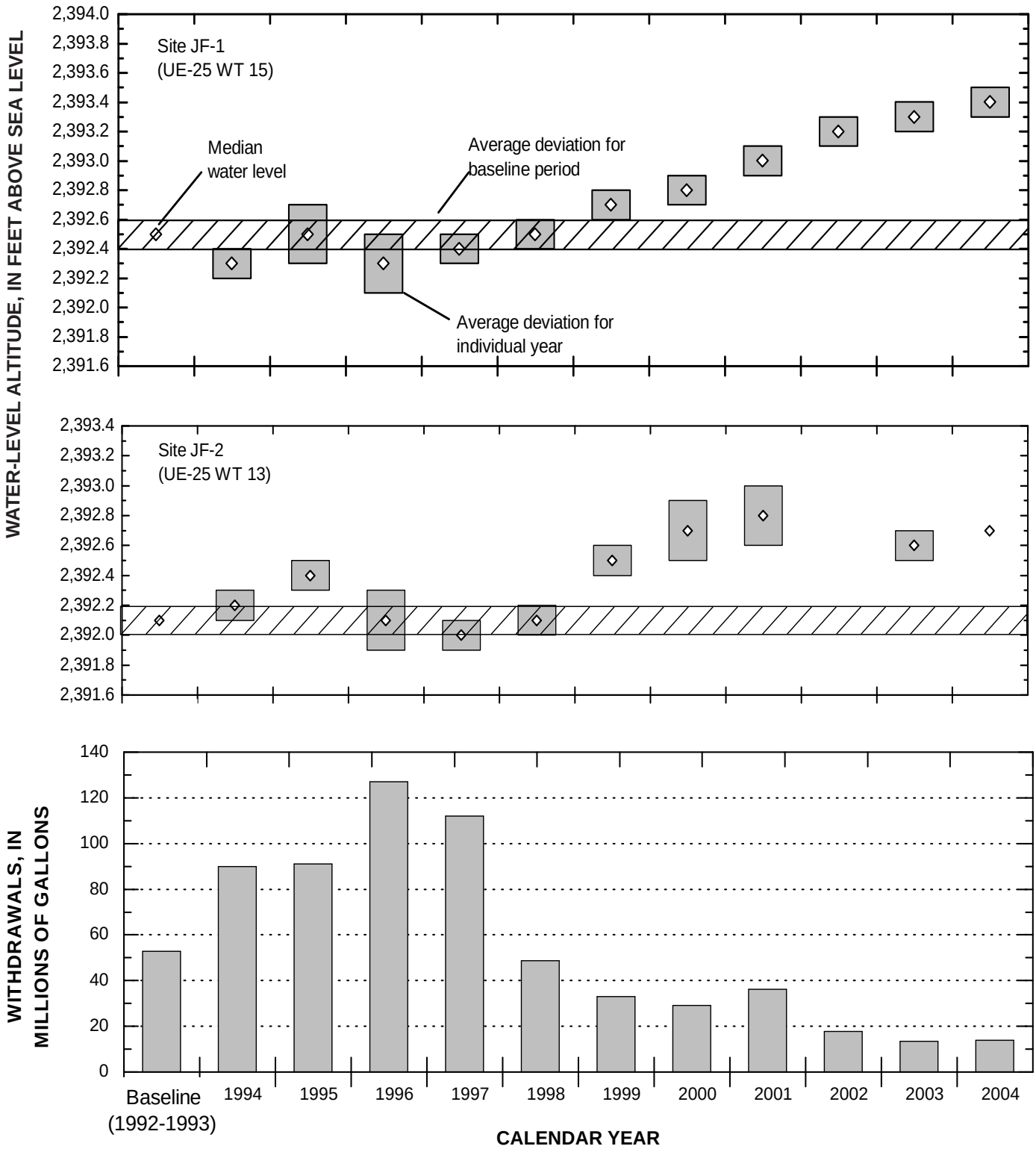


Figure 14. Median water-level altitudes and average deviation of water levels for boreholes JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 and estimated annual ground-water withdrawals from Jackass Flats, for 1992–93 baseline period and for 1994–2004.

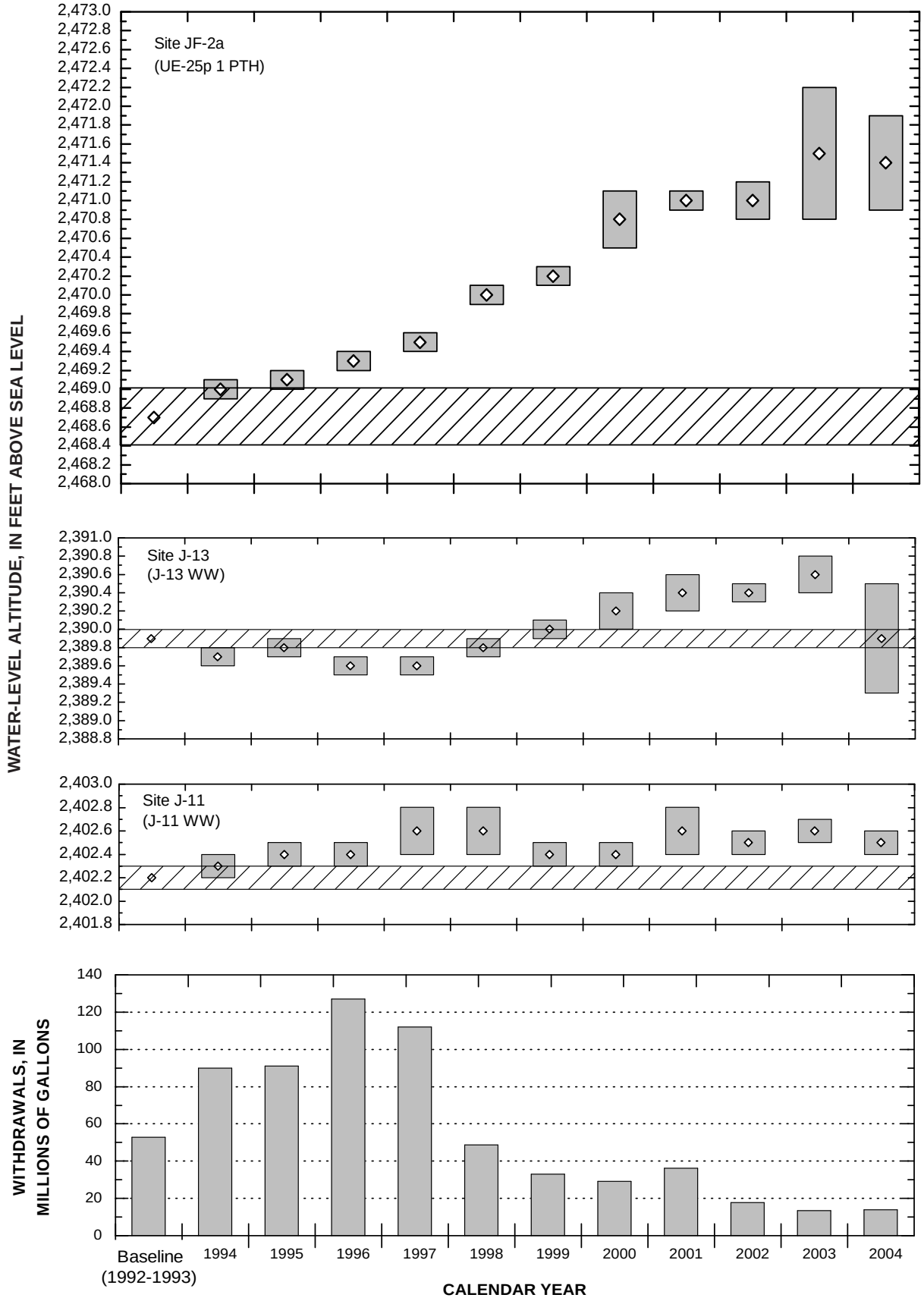


Figure 14. Median water-level altitudes and average deviation of water levels for boreholes JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 and estimated annual ground-water withdrawals from Jackass Flats, for 1992–93 baseline period and for 1994–2004—Continued.

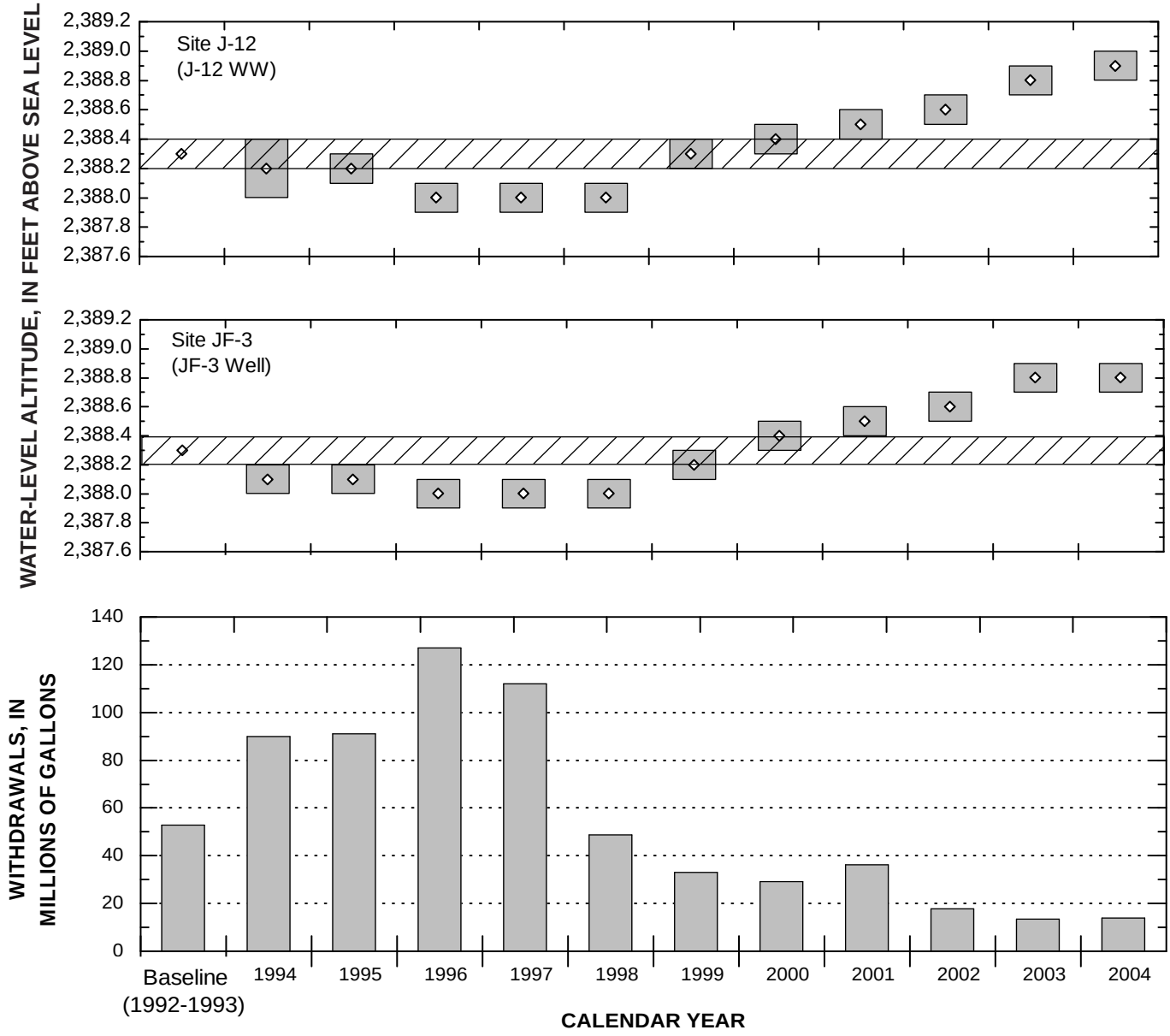


Figure 14. Median water-level altitudes and average deviation of water levels for boreholes JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 and estimated annual ground-water withdrawals from Jackass Flats, for 1992–93 baseline period and for 1994–2004—Continued.

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004.

Site Number: Alphanumeric identifier used to designate sites on map and tables. First part represents hydrographic area in which site is located. Hydrographic areas: CF, Crater Flat; JF or J, Jackass Flats; RV, Rock Valley; MV, Mercury Valley; AD or AM, Amargosa Desert; DV, Death Valley. Second part is sequential numbering representing relative location of site within hydrographic area or Ash Meadows spring-discharge area; numbering order generally is north to south, then west to east. Sites J-13, J-11, and J-12 previously were numbered by Ratheon Services Nevada and herein were not renumbered.

U.S. Geological Survey site identification: Unique identification number for site as stored in files and data bases of U.S. Geological Survey (USGS).

Land-surface altitude: Referenced to the National Geodetic Vertical Datum of 1929. Representative altitude of land surface in vicinity of site. Exception is altitude for site AM-4, which is altitude of bolt that serves as measurement point. Altitudes are reported to nearest 0.1 foot and were derived from land surveys.

Height of measurement point: Height of measurement point (MP) used. MP is stable, recoverable point from which periodic measurements of depth to water are made. MP at site AM-4 is bolt fastened to south wall of fissure, and is not referenced to land surface. Negative number indicates MP is below land surface. –, unknown.

Depth to water: Depths listed generally represent water level below land surface. An exception is site AM-4, where data represent water levels below measurement point. Apparent differences in depth to water at sites that list data from several sources may result from differing estimates of distance from land surface to measurement point used.

Altitude of water surface: Referenced to the National Geodetic Vertical Datum of 1929. Land-surface altitude minus depth to water, reported to nearest 0.1 foot.

Method: Method used to measure depth to water. F, pressure transducer; R, reported (measurement method unknown); S, steel tape; T, electric tape; V, calibrated electric tape.

Site status: Known conditions at site that may have affected measured depth to water. -, unknown; F, flowing; P, pumping; W, well destroyed; Z, measurement made in pump-discharge column.

Data source: BN, Bechtel Nevada; EMP, Environmental-Monitoring Program (USGS); HRC, Harry Reid Center for Environmental Studies (University of Nevada, Las Vegas); NDWR, Nevada Division of Water Resources; NPS, National Park Service; NWRPO, Nye County Nuclear Waste Repository Project Office; NTS, U.S. Department of Energy, National Nuclear Security Administration, Nevada Site Office; USFWS, U.S. Fish and Wildlife Service

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
CF-1	365520116370301	Crater Flat 1	3,930.9	1.77	01/21/2004	1645	623.77	3,307.1	V	-	EMP
					02/19/2004	0931	623.62	3,307.3	V	-	EMP
					03/04/2004	1458	623.27	3,307.6	V	-	EMP
					04/21/2004	1158	623.28	3,307.6	V	-	EMP
					05/12/2004	1240	623.21	3,307.7	V	-	EMP
					06/29/2004	1658	622.96	3,307.9	V	-	EMP
					07/28/2004	1232	623.04	3,307.9	V	-	EMP
					08/20/2004	1130	622.95	3,308.0	V	-	EMP
					09/24/2004	1125	622.91	3,308.0	V	-	EMP
					10/14/2004	1058	622.83	3,308.1	V	-	EMP
					11/05/2004	1216	622.71	3,308.2	V	-	EMP
					12/07/2004	1110	622.55	3,308.4	V	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
CF-1a	365445116383901	Crater Flat 1a	4,080.9	1.68	01/21/2004	1617	180.37	3,900.5	S	-	EMP
					02/19/2004	0911	180.54	3,900.4	S	-	EMP
					03/04/2004	1425	180.48	3,900.4	S	-	EMP
					04/21/2004	1121	180.99	3,899.9	S	-	EMP
					05/12/2004	1218	181.11	3,899.8	S	-	EMP
					06/29/2004	1635	181.42	3,899.5	S	-	EMP
					07/28/2004	1156	181.75	3,899.2	S	-	EMP
					08/20/2004	1056	181.84	3,899.1	S	-	EMP
					09/24/2004	1105	182.26	3,898.6	S	-	EMP
					10/14/2004	1029	182.36	3,898.5	S	-	EMP
					11/05/2004	1126	182.48	3,898.4	S	-	EMP
					12/07/2004	1036	182.54	3,898.4	S	-	EMP
CF-2	364732116330701	USW VH-1	3,161.1	1.17	01/28/2004	1047	603.47	2,557.6	V	-	EMP
					02/04/2004	–	603.47	2,557.6	V	-	HRC
					02/04/2004	1614	603.51	2,557.6	S	-	EMP
					03/04/2004	1254	603.40	2,557.7	V	-	EMP
					04/21/2004	1307	603.31	2,557.8	V	-	EMP
					05/12/2004	1115	603.56	2,557.5	V	-	EMP
					05/20/2004	–	603.41	2,557.7	V	-	HRC
					06/29/2004	1524	603.34	2,557.8	V	-	EMP
					07/28/2004	1010	603.45	2,557.6	V	-	EMP
					08/10/2004	–	603.37	2,557.7	V	-	HRC
					08/20/2004	1245	603.43	2,557.7	V	-	EMP
					09/24/2004	1320	603.36	2,557.7	V	-	EMP
					10/21/2004	1354	603.37	2,557.7	V	-	EMP
					11/05/2004	1405	603.40	2,557.7	V	-	EMP
					11/30/2004	–	603.53	2,557.6	V	-	HRC
					12/06/2004	1422	603.48	2,557.6	V	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
CF-3	364105116302601	Crater Flat 3	2,725.6	-3.20	01/21/2004	1353	331.18	2,394.4	V	-	EMP
					02/23/2004	1201	331.06	2,394.5	V	-	EMP
					03/18/2004	0937	331.13	2,394.5	V	-	EMP
					04/26/2004	1320	331.13	2,394.5	V	-	EMP
					05/18/2004	1031	331.78	2,393.8	V	P	EMP
					05/18/2004	1049	331.27	2,394.3	V	-	EMP
					06/10/2004	1027	331.23	2,394.4	V	-	EMP
					07/28/2004	1601	331.15	2,394.4	V	-	EMP
					08/20/2004	1425	331.03	2,394.6	V	-	EMP
					09/24/2004	1440	331.15	2,394.4	V	-	EMP
					10/14/2004	1337	331.07	2,394.5	V	-	EMP
					11/17/2004	1304	331.08	2,394.5	V	-	EMP
					12/07/2004	1255	331.03	2,394.6	V	-	EMP
JF-1	365116116233801	UE-25 WT 15	3,553.8	0.18	01/15/2004	1217	1,160.18	2,393.6	V	-	EMP
					02/19/2004	–	1,160.45	2,393.4	V	-	HRC
					02/24/2004	0855	1,160.31	2,393.5	V	-	EMP
					03/08/2004	1226	1,160.73	2,393.1	V	-	EMP
					04/20/2004	–	1,160.68	2,393.1	V	-	HRC
					04/20/2004	1203	1,160.51	2,393.3	V	-	EMP
					05/17/2004	1027	1,160.26	2,393.5	V	-	EMP
					06/29/2004	1140	1,160.37	2,393.4	V	-	EMP
					07/19/2004	1234	1,160.39	2,393.4	V	-	EMP
					08/12/2004	1239	1,160.36	2,393.4	V	-	EMP
					08/24/2004	–	1,160.46	2,393.3	V	-	HRC
					09/27/2004	1128	1,160.43	2,393.4	V	-	EMP
					10/25/2004	1030	1,160.29	2,393.5	V	-	EMP
					11/16/2004	1530	1,160.51	2,393.3	V	-	EMP
					12/13/2004	1534	1,160.53	2,393.3	V	-	EMP
					12/14/2004	–	1,160.84	2,393.0	V	-	HRC

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
JF-2	364945116235001	UE-25 WT 13	3,387.5	1.00	01/15/2004	1020	994.94	2,392.6	F	-	HRC
					02/15/2004	1020	994.90	2,392.6	F	-	HRC
					03/15/2004	1020	994.99	2,392.5	F	-	HRC
					04/15/2004	1120	994.85	2,392.6	F	-	HRC
					05/15/2004	1120	994.81	2,392.7	F	-	HRC
					06/09/2004	1120	994.80	2,392.7	F	-	HRC
					07/23/2004	1120	994.83	2,392.7	F	-	HRC
					08/23/2004	1120	994.80	2,392.7	F	-	HRC
					09/23/2004	–	994.78	2,392.7	V	-	HRC
					10/15/2004	1036	994.70	2,392.8	F	-	HRC
					11/15/2004	0936	994.79	2,392.7	F	-	HRC
					12/15/2004	0936	994.79	2,392.7	F	-	HRC
JF-2a	364938116252102	UE-25p 1 PTH	3,655.5	0.63	01/15/2004	1035	1,182.37	2,473.1	F	-	HRC
					02/15/2004	1035	1,182.46	2,473.0	F	-	HRC
					02/19/2004	1335	1,182.37	2,473.1	F	-	HRC
					04/29/2004	–	1,184.21	2,471.3	V	-	HRC
					05/15/2004	1145	1,184.20	2,471.3	F	-	HRC
					06/09/2004	1145	1,183.98	2,471.5	F	-	HRC
					07/15/2004	1145	1,184.39	2,471.1	F	-	HRC
					08/15/2004	1145	1,184.36	2,471.1	F	-	HRC
					09/15/2004	1145	1,184.16	2,471.3	F	-	HRC
					10/15/2004	1045	1,183.95	2,471.6	F	-	HRC
					11/15/2004	0945	1,184.02	2,471.5	F	-	HRC
					12/15/2004	0945	1,184.17	2,471.3	F	-	HRC

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
J -13	364828116234001	J -13 WW	3,317.9	0.98	01/29/2004	1511	927.49	2,390.4	V	-	NTS
					01/29/2004	1528	927.24	2,390.7	V	-	EMP
					02/12/2004	1326	927.21	2,390.7	S	-	EMP
					03/05/2004	–	927.47	2,390.4	V	-	HRC
					03/08/2004	1042	927.65	2,390.2	V	-	EMP
					04/20/2004	1112	927.39	2,390.5	V	-	EMP
					05/17/2004	1106	927.13	2,390.8	V	-	EMP
					06/29/2004	1226	927.18	2,390.7	V	-	EMP
					07/27/2004	1612	928.68	2,389.2	V	-	EMP
					07/28/2004	0720	928.73	2,389.2	V	-	EMP
					08/12/2004	1344	928.56	2,389.3	V	-	EMP
					09/27/2004	1333	928.50	2,389.4	V	-	EMP
					10/25/2004	1345	928.30	2,389.6	V	-	EMP
					11/16/2004	1246	928.33	2,389.6	V	-	EMP
					11/19/2004	–	928.64	2,389.3	V	-	HRC
					12/13/2004	1152	928.27	2,389.6	V	-	EMP
J -11	364706116170601	J -11 WW	3,442.8	2.11	01/29/2004	1343	1,040.23	2,402.6	V	-	EMP
					02/05/2004	0825	1,040.36	2,402.4	S	-	EMP
					03/08/2004	1133	1,040.59	2,402.2	V	-	EMP
					03/18/2004	–	1,040.31	2,402.5	V	-	HRC
					04/19/2004	1240	1,040.29	2,402.5	V	-	EMP
					05/17/2004	0941	1,040.05	2,402.8	V	-	EMP
					06/14/2004	1111	1,040.21	2,402.6	V	-	EMP
					06/24/2004	–	1,040.48	2,402.3	V	-	HRC
					07/13/2004	–	1,040.53	2,402.3	T	-	BN
					07/19/2004	1138	1,040.21	2,402.6	V	-	EMP
					08/12/2004	1147	1,040.19	2,402.6	V	-	EMP
					09/27/2004	1027	1,040.22	2,402.6	V	-	EMP
					10/25/2004	0946	1,040.07	2,402.7	V	-	EMP
					11/16/2004	1049	1,040.33	2,402.5	V	-	EMP
					11/18/2004	–	1,040.50	2,402.3	V	-	HRC
					12/13/2004	1020	1,040.36	2,402.4	V	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
J -12	364554116232401	J -12 WW	3,128.4	3.95	01/29/2004	1308	739.52	2,388.9	V	-	EMP
					02/04/2004	1136	739.50	2,388.9	S	-	EMP
					03/05/2004	–	739.51	2,388.9	V	-	HRC
					03/08/2004	1009	739.77	2,388.6	V	-	EMP
					04/20/2004	1038	739.66	2,388.7	V	-	EMP
					05/17/2004	1130	739.46	2,388.9	V	-	EMP
					06/24/2004	–	739.67	2,388.7	V	-	HRC
					06/29/2004	1253	739.44	2,389.0	V	-	EMP
					07/19/2004	1337	739.39	2,389.0	V	-	EMP
					08/12/2004	1429	739.44	2,389.0	V	-	EMP
					09/02/2004	–	739.33	2,389.1	V	-	HRC
					09/27/2004	1213	739.46	2,388.9	V	-	EMP
					10/25/2004	1157	739.40	2,389.0	V	-	EMP
					11/16/2004	1331	739.50	2,388.9	V	-	EMP
					11/18/2004	–	739.50	2,388.9	V	-	HRC
					12/13/2004	1236	739.55	2,388.8	V	-	EMP
JF-3	364528116232201	JF-3 Well	3,098.3	2.27	01/15/2004	1030	709.31	2,389.0	V	-	EMP
					02/12/2004	1115	709.70	2,388.6	V	-	EMP
					03/08/2004	0930	709.78	2,388.5	V	-	EMP
					04/19/2004	1315	709.61	2,388.7	V	-	EMP
					05/17/2004	1145	709.44	2,388.9	V	-	EMP
					06/29/2004	1315	709.48	2,388.8	V	-	EMP
					07/19/2004	1400	709.42	2,388.9	V	-	EMP
					08/12/2004	1530	709.37	2,388.9	V	-	EMP
					09/27/2004	1245	709.41	2,388.9	V	-	EMP
					10/25/2004	1115	709.41	2,388.9	V	-	EMP
					11/16/2004	1415	709.52	2,388.8	V	-	EMP
					12/13/2004	1446	709.53	2,388.8	V	-	EMP
					12/14/2004	1330	709.55	2,388.8	V	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
RV-1	363815116175901	TW- 5	3,056.0	1.6	01/21/2004	1204	677.50	2,378.5	V	-	EMP
					02/18/2004	1142	677.41	2,378.6	V	-	EMP
					03/18/2004	0836	677.43	2,378.6	V	-	EMP
					04/08/2004	1354	677.32	2,378.7	V	-	EMP
					05/07/2004	1238	677.35	2,378.6	V	-	EMP
					06/08/2004	1313	677.28	2,378.7	V	-	EMP
					07/28/2004	0848	677.36	2,378.6	V	-	EMP
					08/13/2004	1320	677.25	2,378.8	V	-	EMP
					09/27/2004	1654	677.24	2,378.8	V	-	EMP
					10/22/2004	1157	677.40	2,378.6	V	-	EMP
					11/04/2004	1604	677.32	2,378.7	V	-	EMP
					12/07/2004	1401	677.28	2,378.7	V	-	EMP
MV-1	363530116021401	Army 1 WW	3,153.3	3.10	01/20/2004	0817	786.36	2,366.9	V	Z	EMP
					02/23/2004	0929	786.38	2,366.9	V	Z	EMP
					03/08/2004	0821	786.90	2,366.4	V	Z	EMP
					04/19/2004	0826	787.02	2,366.3	V	Z	EMP
					05/17/2004	0820	787.13	2,366.2	V	Z	EMP
					06/14/2004	0823	787.20	2,366.1	V	Z	EMP
					07/19/2004	0816	787.06	2,366.2	V	Z	EMP
					08/16/2004	0815	787.00	2,366.3	V	Z	EMP
					09/27/2004	0830	787.02	2,366.3	V	Z	EMP
					10/25/2004	0810	786.69	2,366.6	V	Z	EMP
					11/08/2004	0825	786.91	2,366.4	V	Z	EMP
					12/13/2004	0834	787.01	2,366.3	V	Z	EMP
AD-1	364141116351401	NA-6 Well BGMW-10	2,627.9	1.7	01/21/2004	1454	269.98	2,357.9	S	-	EMP
					02/19/2004	1154	269.89	2,358.0	S	-	EMP
					03/04/2004	1648	269.74	2,358.2	S	-	EMP
					04/21/2004	1405	269.72	2,358.2	S	-	EMP
					05/12/2004	1352	270.00	2,357.9	S	-	EMP
					06/10/2004	0909	270.13	2,357.8	S	-	EMP
					07/28/2004	1407	269.89	2,358.0	S	-	EMP
					08/20/2004	1335	269.91	2,358.0	S	-	EMP
					09/24/2004	1225	269.89	2,358.0	S	-	EMP
					10/14/2004	1217	269.93	2,358.0	S	-	EMP
					11/17/2004	1151	269.98	2,357.9	S	-	EMP
					12/06/2004	1315	270.02	2,357.9	S	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AD-2	363830116241401	Airport Well	2,638.8	1.15	01/21/2004	1256	325.83	2,313.0	S	-	EMP
					02/23/2004	1056	325.65	2,313.2	S	-	EMP
					03/18/2004	1008	325.68	2,313.1	S	-	EMP
					04/26/2004	1217	325.84	2,313.0	S	-	EMP
					05/17/2004	1623	325.71	2,313.1	S	-	EMP
					06/10/2004	1110	325.91	2,312.9	S	-	EMP
					07/27/2004	1420	325.71	2,313.1	S	-	EMP
					08/27/2004	1154	325.99	2,312.8	S	-	EMP
					09/28/2004	0845	325.79	2,313.0	S	-	EMP
					10/22/2004	1332	326.07	2,312.7	S	-	EMP
					11/15/2004	1305	325.77	2,313.0	S	-	EMP
					12/08/2004	1146	325.87	2,312.9	S	-	EMP
AD-2a	363835116234001	NDOT Well	2,656.8	0.4	01/21/2004	1314	342.13	2,314.7	S	-	EMP
					02/23/2004	1134	341.84	2,315.0	S	-	EMP
					03/18/2004	1028	342.06	2,314.7	S	-	EMP
					04/26/2004	1235	342.63	2,314.2	S	-	EMP
					05/17/2004	1530	--	--	-	W	EMP
AD-2b	363835116234002	NDOT Well 2	2,656.8	0.76	05/17/2004	1609	342.42	2,314.4	V	-	EMP
					06/10/2004	1130	343.17	2,313.6	V	-	EMP
					07/27/2004	1446	342.84	2,314.0	V	-	EMP
					08/27/2004	1214	343.53	2,313.3	S	-	EMP
					09/28/2004	1233	342.80	2,314.0	S	-	EMP
					10/22/2004	1306	343.04	2,313.8	S	-	EMP
					11/17/2004	1358	342.45	2,314.4	V	-	EMP
					12/08/2004	1214	342.32	2,314.5	V	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AD-3a	363521116352501	Amargosa Desert 3a	2,395.3	1.00	01/10/2000	–	132.67	2,262.6	V	-	NWRPO
					07/24/2000	–	133.15	2,262.2	V	-	NWRPO
					10/15/2002	–	133.70	2,261.6	V	-	NWRPO
					02/25/2003	–	133.70	2,261.6	V	-	NWRPO
					06/10/2003	–	133.90	2,261.4	V	-	NWRPO
					07/09/2003	–	134.01	2,261.3	V	-	NWRPO
					08/04/2003	–	134.14	2,261.2	V	-	NWRPO
					09/16/2003	1155	134.18	2,261.1	V	-	NWRPO
					10/14/2003	1005	134.27	2,261.0	V	-	NWRPO
					01/22/2004	0801	134.18	2,261.1	S	-	EMP
					01/23/2004	1345	134.00	2,261.3	V	-	NWRPO
					02/19/2004	1309	133.99	2,261.3	S	-	EMP
					02/23/2004	1020	134.08	2,261.2	V	-	NWRPO
					03/23/2004	1240	133.99	2,261.3	S	-	EMP
					04/07/2004	1145	134.09	2,261.2	V	-	NWRPO
					04/12/2004	1311	134.03	2,261.3	S	-	EMP
					05/18/2004	0914	134.25	2,261.0	S	-	EMP
					06/07/2004	1316	134.15	2,261.2	S	-	EMP
					06/28/2004	1120	134.25	2,261.0	V	-	NWRPO
					07/06/2004	1223	134.23	2,261.1	S	-	EMP
					08/17/2004	1040	134.37	2,260.9	V	-	NWRPO
					08/27/2004	1443	134.29	2,261.0	S	-	EMP
					09/28/2004	0943	134.41	2,260.9	S	-	EMP
					09/28/2004	1120	134.35	2,261.0	V	-	NWRPO
					10/21/2004	1248	134.36	2,260.9	S	-	EMP
					11/15/2004	1539	134.33	2,261.0	S	-	EMP
					12/06/2004	1217	134.38	2,260.9	S	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AD-4a	363428116234701	Amargosa Desert 4a	2,477.8	1.0	01/22/2004	0927	119.92	2,357.9	S	-	EMP
					02/18/2004	1227	119.68	2,358.1	S	-	EMP
					03/23/2004	1313	119.83	2,358.0	S	-	EMP
					04/12/2004	1341	119.95	2,357.8	S	-	EMP
					05/18/2004	0848	119.97	2,357.8	S	-	EMP
					06/07/2004	1353	119.93	2,357.9	S	-	EMP
					07/06/2004	1253	119.95	2,357.8	S	-	EMP
					08/27/2004	1247	120.09	2,357.7	S	-	EMP
					09/28/2004	1145	120.08	2,357.7	S	-	EMP
					10/22/2004	1245	120.18	2,357.6	S	-	EMP
					11/15/2004	1341	120.09	2,357.7	S	-	EMP
					12/08/2004	1044	120.17	2,357.6	S	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AD-5	363310116294001	USBLM Well	2,376.4	0.0	02/12/2000	–	126.84	2,249.6	V	-	NWRPO
					03/22/2001	–	127.70	2,248.7	V	-	NWRPO
					10/10/2002	–	131.00	2,245.4	V	-	NWRPO
					02/25/2003	–	131.30	2,245.1	V	-	NWRPO
					06/10/2003	–	132.25	2,244.2	V	-	NWRPO
					07/09/2003	–	132.70	2,243.7	V	-	NWRPO
					08/04/2003	–	133.07	2,243.3	V	-	NWRPO
					09/16/2003	1030	133.54	2,242.9	V	-	NWRPO
					10/14/2003	0850	133.96	2,242.4	V	-	NWRPO
					01/23/2004	1130	134.15	2,242.2	V	-	NWRPO
					01/23/2004	1435	134.10	2,242.3	S	-	EMP
					02/11/2004	1243	133.99	2,242.4	S	-	EMP
					02/23/2004	0925	134.05	2,242.4	V	-	NWRPO
					03/23/2004	1216	133.94	2,242.5	S	-	EMP
					04/07/2004	1010	134.14	2,242.3	V	-	NWRPO
					04/12/2004	1246	134.09	2,242.3	S	-	EMP
					05/10/2004	1242	134.36	2,242.0	S	-	EMP
					06/07/2004	1242	134.69	2,241.7	S	-	EMP
					06/28/2004	1020	135.00	2,241.4	V	-	NWRPO
					07/06/2004	1158	135.08	2,241.3	S	-	EMP
					08/17/2004	0935	135.71	2,240.7	V	-	NWRPO
					08/27/2004	1419	135.77	2,240.6	S	-	EMP
					09/28/2004	1020	136.20	2,240.2	V	-	NWRPO
					09/28/2004	1025	136.21	2,240.2	S	-	EMP
					10/21/2004	1224	136.44	2,240.0	S	-	EMP
					11/15/2004	1511	136.47	2,239.9	S	-	EMP
					12/06/2004	1147	136.43	2,240.0	S	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AD-6	363213116133800	Tracer Well 3	2,402.3	0.4	01/14/2004	0900	41.82	2,360.5	S	-	EMP
					01/16/2004	1015	41.78	2,360.5	S	-	EMP
					02/18/2004	1030	41.77	2,360.5	S	-	EMP
					03/04/2004	1115	41.79	2,360.5	S	-	EMP
					04/08/2004	1115	41.80	2,360.5	S	-	EMP
					05/07/2004	1115	41.86	2,360.4	S	-	EMP
					06/08/2004	1145	41.75	2,360.6	S	-	EMP
					07/27/2004	1300	41.85	2,360.4	S	-	EMP
					08/13/2004	1100	41.95	2,360.4	S	-	EMP
					09/27/2004	1545	41.85	2,360.4	S	-	EMP
					10/22/2004	1030	42.04	2,360.3	S	-	EMP
					11/15/2004	1146	41.90	2,360.4	S	-	EMP
					12/07/2004	0845	41.95	2,360.4	S	-	EMP
AD-7a	363009116302702	Amargosa Desert 7a	2,305.0	0.78	01/22/2004	0840	80.35	2,224.6	S	-	EMP
					02/23/2004	1314	79.29	2,225.7	S	-	EMP
					03/11/2004	–	79.06	2,225.9	T	-	NDWR
					03/23/2004	1152	80.67	2,224.3	S	-	EMP
					04/12/2004	1227	80.48	2,224.5	S	-	EMP
					05/10/2004	1214	82.31	2,222.7	S	-	EMP
					06/07/2004	1219	82.23	2,222.8	S	-	EMP
					07/06/2004	1139	82.86	2,222.1	S	-	EMP
					08/27/2004	1358	85.04	2,220.0	S	-	EMP
					09/28/2004	1045	84.40	2,220.6	S	-	EMP
					10/21/2004	1157	84.65	2,220.4	S	-	EMP
					10/28/2004	–	83.92	2,221.1	T	-	NDWR
					11/15/2004	1449	83.13	2,221.9	S	-	EMP
					12/06/2004	1126	82.29	2,222.7	S	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AD-8	362929116085701	Amargosa Desert 8	2,394.3	0.60	01/20/2004	0910	35.59	2,358.7	S	-	EMP
					02/23/2004	1010	35.65	2,358.6	S	-	EMP
					03/18/2004	0750	35.37	2,358.9	S	-	EMP
					04/26/2004	1424	36.60	2,357.7	S	P	EMP
					04/26/2004	1450	35.66	2,358.6	S	-	EMP
					05/18/2004	0802	35.39	2,358.9	S	-	EMP
					06/08/2004	1100	36.28	2,358.0	S	P	EMP
					06/08/2004	1223	35.32	2,359.0	S	-	EMP
					07/27/2004	1201	35.38	2,358.9	S	-	EMP
					08/13/2004	1224	35.95	2,358.4	S	-	EMP
					09/27/2004	1457	35.47	2,358.8	S	-	EMP
					10/22/2004	1418	35.56	2,358.7	S	-	EMP
					11/17/2004	1504	35.53	2,358.8	S	-	EMP
					12/08/2004	1414	35.63	2,358.7	S	-	EMP
AD-9a	362835116264102	Amargosa Desert 9a	2,260.1	0.40	09/26/2003	1410	86.10	2,174.0	V	-	NWRPO
					01/22/2004	0857	78.96	2,181.1	V	-	EMP
					02/23/2004	1252	78.55	2,181.6	V	-	EMP
					02/24/2004	1505	78.65	2,181.4	V	-	NWRPO
					03/23/2004	1418	79.98	2,180.1	V	-	EMP
					04/26/2004	1127	83.61	2,176.5	V	-	EMP
					05/24/2004	1121	85.86	2,174.2	V	-	EMP
					06/07/2004	1153	87.30	2,172.8	V	-	EMP
					07/06/2004	1112	85.86	2,174.2	V	-	EMP
					07/06/2004	1145	85.80	2,174.3	V	-	NWRPO
					08/18/2004	1025	87.05	2,173.0	V	-	NWRPO
					08/27/2004	1310	88.14	2,172.0	V	-	EMP
					09/28/2004	1106	88.70	2,171.4	V	-	EMP
					09/30/2004	1030	88.18	2,171.9	V	-	NWRPO
					10/21/2004	1119	84.61	2,175.5	V	-	EMP
					11/15/2004	1415	82.47	2,177.6	V	-	EMP
					12/06/2004	1038	81.85	2,178.2	V	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AD-10	362525116274301	NA-9 Well	2,190.9	1.3	09/18/2003	–	13.92	2,177.0	V	-	NWRPO
					01/22/2004	1047	13.79	2,177.1	S	-	EMP
					02/18/2004	1411	13.79	2,177.1	S	-	EMP
					02/24/2004	1330	13.71	2,177.2	V	-	NWRPO
					03/23/2004	1029	13.80	2,177.1	S	-	EMP
					04/07/2004	1535	13.85	2,177.0	V	-	NWRPO
					04/12/2004	1134	13.89	2,177.0	S	-	EMP
					05/10/2004	1105	13.85	2,177.0	S	-	EMP
					06/07/2004	1107	13.88	2,177.0	S	-	EMP
					06/28/2004	1600	13.96	2,176.9	V	-	NWRPO
					07/06/2004	1015	13.97	2,176.9	S	-	EMP
					08/18/2004	0900	14.07	2,176.8	V	-	NWRPO
					08/30/2004	1211	14.02	2,176.9	S	-	EMP
					09/28/2004	1310	14.05	2,176.8	S	-	EMP
					09/30/2004	1145	14.02	2,176.9	V	-	NWRPO
					10/21/2004	1050	13.94	2,177.0	S	-	EMP
					11/03/2004	1428	14.17	2,176.7	S	-	EMP
					12/06/2004	0959	13.99	2,176.9	S	-	EMP
AD-11	361954116181201	GS-3 Well	2,351.3	2.0	01/20/2004	1339	208.97	2,142.3	S	-	EMP
					02/18/2004	1317	209.07	2,142.2	S	-	EMP
					03/25/2004	1105	208.83	2,142.5	S	-	EMP
					04/15/2004	1325	208.58	2,142.7	S	-	EMP
					05/24/2004	1229	208.09	2,143.2	S	-	EMP
					06/16/2004	1256	207.89	2,143.4	S	-	EMP
					07/29/2004	1404	207.66	2,143.6	S	-	EMP
					08/30/2004	1317	207.62	2,143.7	S	-	EMP
					09/22/2004	1535	207.84	2,143.5	S	-	EMP
					10/13/2004	1101	207.94	2,143.4	S	-	EMP
					11/04/2004	1039	208.04	2,143.3	S	-	EMP
					12/06/2004	0911	208.09	2,143.2	S	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AD-12	362014116133901	GS-1 Well	2,430.3	2.0	01/22/2004	1012	81.00	2,349.3	S	-	EMP
					02/19/2004	1451	80.98	2,349.3	S	-	EMP
					03/25/2004	1022	80.96	2,349.3	S	-	EMP
					04/15/2004	1410	80.92	2,349.4	S	-	EMP
					05/24/2004	1315	80.97	2,349.3	S	-	EMP
					06/10/2004	1417	80.98	2,349.3	S	-	EMP
					07/29/2004	1440	81.09	2,349.2	S	-	EMP
					08/26/2004	1029	81.13	2,349.2	S	-	EMP
					09/21/2004	0953	81.17	2,349.1	S	-	EMP
					10/08/2004	1112	81.19	2,349.1	S	-	EMP
					11/03/2004	0906	81.16	2,349.1	S	-	EMP
					12/02/2004	0938	81.17	2,349.1	S	-	EMP
AD-13	361724116324201	S-1 Well	2,703.2	2.0	01/23/2004	1117	366.45	2,336.8	S	-	EMP
					02/11/2004	1040	367.50	2,335.7	S	-	EMP
					03/25/2004	1156	366.52	2,336.7	S	-	EMP
					04/15/2004	1213	367.20	2,336.0	S	-	EMP
					05/17/2004	1708	366.88	2,336.3	S	-	EMP
					06/16/2004	0950	366.86	2,336.3	S	-	EMP
					07/29/2004	1101	366.73	2,336.5	S	-	EMP
					08/30/2004	1306	366.43	2,336.8	S	-	EMP
					09/22/2004	1218	366.67	2,336.5	S	-	EMP
					10/13/2004	1154	366.53	2,336.7	S	-	EMP
					11/04/2004	1400	366.55	2,336.6	S	-	EMP
					12/02/2004	1509	366.63	2,336.6	S	-	EMP
AD-14	361817116244701	Death Valley Jct Well	2,041.8	0.70	01/20/2004	1309	2.67	2,039.1	S	-	EMP
					02/19/2004	1424	2.38	2,039.4	S	-	EMP
					03/25/2004	1133	2.58	2,039.2	S	-	EMP
					04/15/2004	1249	2.33	2,039.5	S	-	EMP
					05/18/2004	1300	2.32	2,039.5	S	-	EMP
					06/10/2004	1218	2.31	2,039.5	S	-	EMP
					07/29/2004	1324	2.76	2,039.0	S	-	EMP
					08/26/2004	1404	2.66	2,039.1	S	-	EMP
					09/22/2004	1450	2.76	2,039.0	S	-	EMP
					10/13/2004	1400	2.70	2,039.1	S	-	EMP
					11/04/2004	1450	2.77	2,039.0	S	-	EMP
					12/02/2004	1602	2.50	2,039.3	S	-	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-1	362858116195301	Rogers Spring Well	2,265.9	0.14	01/14/2004	1127	2.83	2,263.1	S	-	EMP
					02/02/2004	1014	2.80	2,263.1	S	-	EMP
					03/01/2004	1357	2.66	2,263.2	T	-	USFWS
					03/11/2004	1413	2.60	2,263.3	S	-	EMP
					04/05/2004	1315	2.71	2,263.2	S	-	EMP
					04/06/2004	1235	2.71	2,263.2	T	-	USFWS
					05/03/2004	1358	2.99	2,262.9	S	-	EMP
					06/09/2004	1550	3.65	2,262.2	T	-	USFWS
					06/16/2004	1150	3.73	2,262.2	S	-	EMP
					07/22/2004	1050	4.27	2,261.6	S	-	EMP
					08/10/2004	1345	4.27	2,261.6	T	-	USFWS
					08/26/2004	1306	3.82	2,262.1	S	-	EMP
					09/21/2004	1148	3.60	2,262.3	S	-	EMP
					09/28/2004	1107	3.54	2,262.4	T	-	USFWS
					10/08/2004	1345	3.52	2,262.4	S	-	EMP
					10/25/2004	1455	3.24	2,262.7	T	-	USFWS
					11/03/2004	1338	3.05	2,262.8	S	-	EMP
					12/02/2004	1257	2.83	2,263.1	S	-	EMP
					12/07/2004	1100	2.78	2,263.1	T	-	USFWS

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-2	362755116190401	Five Springs Well	2,343.2	1.17	06/20/1990	–	-0.29	2,343.5	S	F	EMP
					04/08/1991	–	-0.35	2,343.6	S	F	EMP
					11/20/1991	–	-0.30	2,343.5	S	F	EMP
					12/12/1991	–	-0.27	2,343.5	S	F	EMP
					01/14/1992	–	-0.26	2,343.5	S	F	EMP
					02/18/1992	–	-0.29	2,343.5	S	F	EMP
					03/18/1992	–	-0.30	2,343.5	S	F	EMP
					04/14/1992	–	-0.39	2,343.6	S	F	EMP
					04/28/1992	–	-0.47	2,343.7	S	F	EMP
					05/19/1992	–	-0.48	2,343.7	S	F	EMP
					06/16/1992	–	-0.45	2,343.6	S	F	EMP
					07/21/1992	–	-0.83	2,344.0	S	F	EMP
					08/19/1992	–	-0.84	2,344.0	S	F	EMP
					09/17/1992	–	-0.81	2,344.0	S	F	EMP
					10/21/1992	0730	-0.83	2,344.0	S	F	EMP
					11/18/1992	1600	-0.80	2,344.0	S	F	EMP
					12/16/1992	1330	-0.80	2,344.0	S	F	EMP
					01/15/1993	1230	-0.75	2,344.0	S	F	EMP
					02/16/1993	1745	-0.72	2,343.9	S	F	EMP
					03/23/1993	1700	-0.72	2,343.9	S	F	EMP
					04/21/1993	0640	-0.72	2,343.9	S	F	EMP
					05/21/1993	1330	-0.44	2,343.6	S	F	EMP
					05/25/1993	1530	-0.23	2,343.4	S	F	EMP
					06/23/1993	1015	-0.22	2,343.4	S	F	EMP
					07/14/1993	1527	-0.22	2,343.4	S	F	NTS
					07/20/1993	1100	-0.23	2,343.4	S	F	EMP
					07/28/1993	1603	-0.25	2,343.4	S	F	NTS
					08/26/1993	0700	-0.24	2,343.4	S	F	EMP
					09/24/1993	1300	-0.28	2,343.5	S	F	EMP
					10/20/1993	1110	-0.36	2,343.6	S	F	EMP
					11/17/1993	0725	-0.48	2,343.7	S	F	EMP
					12/21/1993	1100	-0.52	2,343.7	S	F	EMP
					01/19/1994	1620	-0.56	2,343.8	S	F	EMP
					02/15/1994	1030	-0.55	2,343.8	S	F	EMP
					03/22/1994	1205	-0.58	2,343.8	S	F	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-2	362755116190401	Five Springs Well	2,343.2	1.17	03/28/1994	1213	-0.57	2,343.8	S	F	NTS
					04/05/1994	1330	-0.58	2,343.8	S	F	EMP
					04/07/1994	1025	-0.60	2,343.8	S	F	NTS
					04/19/1994	1340	-0.60	2,343.8	S	F	EMP
					05/25/1994	1100	-0.64	2,343.8	S	F	EMP
					06/10/1994	1150	-0.61	2,343.8	S	F	EMP
					06/17/1994	0113	-0.65	2,343.8	S	F	NTS
					07/01/1994	0817	-0.65	2,343.8	S	F	NTS
					07/19/1994	0915	-0.65	2,343.8	S	F	EMP
					08/24/1994	1154	-0.70	2,343.9	S	F	EMP
					09/13/1994	0834	-0.75	2,344.0	S	F	NTS
					09/20/1994	1205	-0.72	2,343.9	S	F	EMP
					10/18/1994	1145	-0.70	2,343.9	S	F	EMP
					11/09/1994	1045	-0.70	2,343.9	S	F	EMP
					12/01/1994	1235	-0.68	2,343.9	S	F	EMP
					12/14/1994	1602	-0.70	2,343.9	S	F	NTS
					01/30/1995	1530	-0.61	2,343.8	S	F	EMP
					02/13/1995	1515	-0.64	2,343.8	S	F	EMP
					03/27/1995	1258	-0.65	2,343.8	S	F	EMP
					04/19/1995	1050	-0.69	2,343.9	S	F	EMP
					05/25/1995	0945	-0.70	2,343.9	S	F	EMP
					06/22/1995	0815	-0.69	2,343.9	S	F	EMP
					07/20/1995	0840	-0.68	2,343.9	S	F	EMP
					08/23/1995	0900	-0.68	2,343.9	S	F	EMP
					09/20/1995	1055	-0.68	2,343.9	S	F	EMP
					10/25/1995	1040	-0.57	2,343.8	S	F	EMP
					11/09/1995	0920	-0.63	2,343.8	S	F	EMP
					12/20/1995	0917	-0.55	2,343.8	S	F	EMP
					01/24/1996	0900	-0.62	2,343.8	S	F	EMP
					02/23/1996	1033	-0.63	2,343.8	S	F	EMP
					03/13/1996	1355	-0.66	2,343.9	S	F	EMP
					04/18/1996	0950	-0.64	2,343.8	S	F	EMP
					05/17/1996	0928	-0.58	2,343.8	S	F	EMP
					06/13/1996	0924	-0.54	2,343.7	S	F	EMP
					06/13/1996	0953	-0.49	2,343.7	S	F	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-2	362755116190401	Five Springs Well	2,343.2	1.17	07/18/1996	1317	0.21	2,343.0	S	F	EMP
					07/31/1996	0911	0.21	2,343.0	S	F	EMP
					08/21/1996	1811	0.23	2,343.0	S	F	EMP
					09/24/1996	1312	0.24	2,343.0	S	F	EMP
					10/18/1996	0815	0.23	2,343.0	S	F	EMP
					10/29/1996	1435	0.24	2,343.0	S	F	EMP
					11/22/1996	1033	0.23	2,343.0	S	F	EMP
					12/18/1996	1454	0.23	2,343.0	S	F	EMP
					01/21/1997	1246	0.22	2,343.0	S	F	EMP
					02/19/1997	0835	0.23	2,343.0	S	F	EMP
					03/18/1997	0945	0.22	2,343.0	S	F	EMP
					04/22/1997	0935	0.22	2,343.0	S	F	EMP
					05/13/1997	0815	0.19	2,343.0	S	F	EMP
					06/09/1997	0800	0.19	2,343.0	S	F	EMP
					07/07/1997	0800	0.19	2,343.0	S	F	EMP
					08/20/1997	1025	0.20	2,343.0	S	F	EMP
					09/19/1997	0815	0.22	2,343.0	S	F	EMP
					10/14/1997	1330	0.23	2,343.0	S	F	EMP
					11/17/1997	1355	0.22	2,343.0	S	F	EMP
					12/11/1997	0955	0.23	2,343.0	S	F	EMP
					01/14/1998	1315	0.24	2,343.0	S	F	EMP
					02/27/1998	1245	0.23	2,343.0	S	F	EMP
					03/17/1998	1030	0.22	2,343.0	S	F	EMP
					04/16/1998	1202	0.22	2,343.0	S	F	EMP
					05/19/1998	0814	0.22	2,343.0	S	F	EMP
					06/16/1998	0710	0.23	2,343.0	S	F	EMP
					07/14/1998	0620	0.21	2,343.0	S	F	EMP
					08/12/1998	0724	0.22	2,343.0	S	F	EMP
					09/15/1998	0812	0.22	2,343.0	S	F	EMP
					10/27/1998	0850	0.22	2,343.0	S	F	EMP
					11/19/1998	0847	0.22	2,343.0	S	F	EMP
					12/17/1998	0910	0.23	2,343.0	S	F	EMP
					01/27/1999	0805	0.24	2,343.0	S	F	EMP
					02/19/1999	0843	0.24	2,343.0	S	F	EMP
					03/24/1999	0841	0.23	2,343.0	S	F	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-2	362755116190401	Five Springs Well	2,343.2	1.17	04/13/1999	1111	0.23	2,343.0	S	F	EMP
					05/18/1999	1000	0.22	2,343.0	S	F	EMP
					06/15/1999	0715	0.23	2,343.0	S	F	EMP
					07/27/1999	0927	0.24	2,343.0	S	F	EMP
					08/25/1999	1847	0.23	2,343.0	S	F	EMP
					09/29/1999	1022	0.23	2,343.0	S	F	EMP
					10/07/1999	1547	0.23	2,343.0	S	F	EMP
					10/18/1999	1602	0.21	2,343.0	S	F	EMP
					11/04/1999	1109	0.21	2,343.0	S	F	EMP
					12/10/1999	1145	0.22	2,343.0	S	F	EMP
					01/21/2000	1000	0.23	2,343.0	S	F	EMP
					02/17/2000	1641	0.24	2,343.0	S	F	EMP
					03/14/2000	1155	0.23	2,343.0	S	F	EMP
					04/13/2000	0852	0.23	2,343.0	S	F	EMP
					05/01/2000	1351	0.24	2,343.0	S	F	EMP
					06/08/2000	1153	0.22	2,343.0	S	F	EMP
					07/05/2000	1241	0.22	2,343.0	S	F	EMP
					08/24/2000	1418	0.25	2,343.0	S	F	EMP
					09/18/2000	1609	0.25	2,343.0	S	F	EMP
					10/10/2000	1247	0.25	2,343.0	S	F	EMP
					11/07/2000	1017	0.25	2,343.0	S	F	EMP
					12/07/2000	1152	0.25	2,343.0	S	F	EMP
					01/08/2001	1213	0.25	2,343.0	S	F	EMP
					02/07/2001	1245	0.25	2,343.0	S	F	EMP
					03/20/2001	1537	0.25	2,343.0	S	F	EMP
					04/17/2001	1741	0.25	2,343.0	S	F	EMP
					05/02/2001	0938	0.24	2,343.0	S	F	EMP
					06/21/2001	1240	0.25	2,343.0	S	F	EMP
					07/18/2001	0857	0.24	2,343.0	S	F	EMP
					08/02/2001	1115	0.26	2,342.9	S	F	EMP
					09/10/2001	1024	0.25	2,343.0	S	F	EMP
					10/22/2001	1251	0.25	2,343.0	S	F	EMP
					11/07/2001	1524	0.26	2,342.9	S	F	EMP
					12/10/2001	1330	0.26	2,342.9	S	F	EMP
					01/08/2002	1555	0.26	2,342.9	S	F	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-2	362755116190401	Five Springs Well	2,343.2	1.17	02/07/2002	1045	0.25	2,343.0	S	F	EMP
					03/15/2002	1040	0.26	2,342.9	S	F	EMP
					04/22/2002	1542	0.25	2,343.0	S	F	EMP
					05/07/2002	1532	0.25	2,343.0	S	F	EMP
					06/14/2002	1310	0.25	2,343.0	S	F	EMP
					07/04/2002	0840	0.25	2,343.0	S	F	EMP
					08/07/2002	1157	0.25	2,343.0	S	F	EMP
					09/11/2002	1136	0.29	2,342.9	S	F	EMP
					10/25/2002	1340	0.31	2,342.9	S	F	EMP
					11/07/2002	0827	0.31	2,342.9	S	F	EMP
					12/09/2002	1027	0.31	2,342.9	S	F	EMP
					01/16/2003	1221	0.31	2,342.9	S	F	EMP
					02/06/2003	1518	0.32	2,342.9	S	F	EMP
					03/06/2003	1447	0.31	2,342.9	S	F	EMP
					04/03/2003	1425	0.31	2,342.9	S	F	EMP
					05/22/2003	0854	0.31	2,342.9	S	F	EMP
					06/13/2003	1227	0.31	2,342.9	S	F	EMP
					07/23/2003	0752	0.30	2,342.9	S	F	EMP
					08/19/2003	1658	0.29	2,342.9	S	F	EMP
					09/29/2003	1217	0.30	2,342.9	S	F	EMP
					10/27/2003	1548	0.30	2,342.9	S	F	EMP
					11/17/2003	1304	0.32	2,342.9	S	F	EMP
					12/05/2003	1159	0.32	2,342.9	S	F	EMP
					01/14/2004	1236	0.32	2,342.9	S	F	EMP
					02/02/2004	1125	0.33	2,342.9	S	F	EMP
					03/11/2004	1343	0.32	2,342.9	S	F	EMP
					04/05/2004	1250	0.32	2,342.9	S	F	EMP
					05/03/2004	1325	0.32	2,342.9	S	F	EMP
					06/16/2004	1125	0.32	2,342.9	S	F	EMP
					07/22/2004	1031	0.31	2,342.9	S	F	EMP
					08/26/2004	1236	0.31	2,342.9	S	F	EMP
					09/21/2004	1232	0.30	2,342.9	S	F	EMP
					10/08/2004	1321	0.31	2,342.9	S	F	EMP
					11/03/2004	1256	0.32	2,342.9	S	F	EMP
					12/02/2004	1213	0.32	2,342.9	S	F	EMP

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-3	362555116205301	Ash Meadows 3	2,157.0	1.29	01/20/2004	1051	21.85	2,135.2	S	-	EMP
					02/02/2004	1200	21.71	2,135.3	S	-	EMP
					03/11/2004	1439	21.21	2,135.8	S	-	EMP
					04/05/2004	1339	20.94	2,136.1	S	-	EMP
					05/03/2004	1418	20.85	2,136.2	S	-	EMP
					06/16/2004	1032	21.12	2,135.9	S	-	EMP
					07/22/2004	1110	21.69	2,135.3	S	-	EMP
					08/26/2004	1336	22.08	2,134.9	S	-	EMP
					09/21/2004	1128	22.04	2,135.0	S	-	EMP
					10/13/2004	1425	22.11	2,134.9	S	-	EMP
					11/03/2004	1157	21.85	2,135.2	S	-	EMP
					12/02/2004	1135	21.40	2,135.6	S	-	EMP
AM-4	362532116172700	Devils Hole	2,360.0	–	01/06/2004	1018	2.14	2,357.9	R	-	NPS
					02/05/2004	1115	2.19	2,357.8	R	-	NPS
					02/17/2004	1123	2.15	2,357.8	R	-	NPS
					03/03/2004	0831	2.11	2,357.9	R	-	NPS
					03/04/2004	1533	1.93	2,358.1	R	-	NPS
					03/18/2004	1536	1.94	2,358.1	R	-	NPS
					04/01/2004	1510	1.90	2,358.1	R	-	NPS
					04/07/2004	1003	2.18	2,357.8	R	-	NPS
					04/16/2004	1211	2.11	2,357.9	R	-	NPS
					04/16/2004	1302	2.06	2,357.9	R	-	NPS
					05/01/2004	1405	2.06	2,357.9	R	-	NPS
					05/01/2004	1439	2.03	2,358.0	R	-	NPS
					05/17/2004	1127	2.21	2,357.8	R	-	NPS
					06/08/2004	1425	2.10	2,357.9	R	-	NPS
					06/08/2004	1441	2.10	2,357.9	R	-	NPS
					06/22/2004	1157	2.18	2,357.8	R	-	NPS
					07/08/2004	1346	2.09	2,357.9	R	-	NPS
					07/21/2004	0809	2.09	2,357.9	R	-	NPS
					07/30/2004	0723	2.22	2,357.8	R	-	NPS
					08/13/2004	0755	2.28	2,357.7	R	-	NPS
					09/02/2004	0650	2.04	2,358.0	R	-	NPS
					09/02/2004	0707	2.04	2,358.0	R	-	NPS
					09/19/2004	1014	2.06	2,357.9	R	-	NPS
					10/17/2004	0958	2.07	2,357.9	R	-	NPS
					12/20/2004	0940	2.12	2,357.9	R	-	NPS

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-5	362529116171100	Devils Hole Well	2,404.1	0.9	01/16/2004	1255	48.03	2,356.1	S	-	EMP
					02/02/2004	1228	48.05	2,356.0	S	-	EMP
					03/01/2004	1555	48.10	2,356.0	T	-	USFWS
					03/11/2004	1223	48.13	2,356.0	S	-	EMP
					04/05/2004	1150	48.17	2,355.9	S	-	EMP
					04/06/2004	1120	48.17	2,355.9	T	-	USFWS
					05/03/2004	1225	48.21	2,355.9	S	-	EMP
					06/09/2004	0920	48.24	2,355.9	T	-	USFWS
					06/16/2004	1222	48.22	2,355.9	S	-	EMP
					07/22/2004	1135	48.18	2,355.9	S	-	EMP
					08/10/2004	1201	48.24	2,355.9	T	-	USFWS
					08/26/2004	1142	48.26	2,355.8	S	-	EMP
					09/21/2004	1108	48.32	2,355.8	S	-	EMP
					10/13/2004	1443	48.28	2,355.8	S	-	EMP
					10/26/2004	0926	48.26	2,355.8	T	-	USFWS
					11/03/2004	1128	48.24	2,355.9	S	-	EMP
					12/02/2004	1115	48.27	2,355.8	S	-	EMP
					12/07/2004	1430	48.27	2,355.8	T	-	USFWS
AM-6	362432116165701	Point of Rocks North Well	2,318.8	0.0	01/16/2004	1347	21.30	2,297.5	S	-	EMP
					02/02/2004	1305	21.24	2,297.6	S	-	EMP
					03/01/2004	1711	21.20	2,297.6	T	-	USFWS
					03/11/2004	1100	21.20	2,297.6	S	-	EMP
					04/05/2004	1059	21.25	2,297.6	S	-	EMP
					04/06/2004	1007	21.22	2,297.6	T	-	USFWS
					05/03/2004	1134	21.34	2,297.5	S	-	EMP
					06/09/2004	0828	21.32	2,297.5	T	-	USFWS
					06/10/2004	1305	21.37	2,297.4	S	-	EMP
					07/22/2004	0912	21.28	2,297.5	S	-	EMP
					08/10/2004	1045	21.30	2,297.5	T	-	USFWS
					08/26/2004	1054	21.30	2,297.5	S	-	EMP
					09/21/2004	1025	21.30	2,297.5	S	-	EMP
					09/28/2004	1514	21.32	2,297.5	T	-	USFWS
					10/08/2004	1153	21.48	2,297.3	S	-	EMP
					10/26/2004	0950	21.32	2,297.5	T	-	USFWS
					11/03/2004	1049	21.31	2,297.5	S	-	EMP
					12/02/2004	1016	21.25	2,297.6	S	-	EMP
					12/07/2004	1440	21.31	2,297.5	T	-	USFWS

Table 3. Periodic water-level data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig. 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measurement point (feet above land surface)	Water-level measurement						
					Date	Time	Depth to water (feet below land surface)	Altitude of water surface (feet above sea level)	Method	Site status	Data Source
AM-7	362417116163600	Point of Rocks South Well	2,333.5	0.8	01/20/2004	1009	7.18	2,326.3	S	-	EMP
					02/02/2004	1335	7.14	2,326.4	S	-	EMP
					03/01/2004	1648	7.20	2,326.3	T	-	USFWS
					03/11/2004	1137	7.23	2,326.3	S	-	EMP
					04/05/2004	1130	7.28	2,326.2	S	-	EMP
					04/06/2004	1038	7.27	2,326.2	T	-	USFWS
					05/03/2004	1202	7.35	2,326.2	S	-	EMP
					06/10/2004	1335	7.51	2,326.0	S	-	EMP
					06/10/2004	1648	7.55	2,326.0	T	-	USFWS
					07/22/2004	0934	7.62	2,325.9	S	-	EMP
					08/10/2004	1115	7.74	2,325.8	T	-	USFWS
					08/26/2004	1117	7.66	2,325.8	S	-	EMP
					09/21/2004	1043	7.62	2,325.9	S	-	EMP
					09/28/2004	1532	7.53	2,326.0	T	-	USFWS
					10/08/2004	1224	7.58	2,325.9	S	-	EMP
					10/26/2004	1012	7.46	2,326.0	T	-	USFWS
					11/03/2004	1012	7.40	2,326.1	S	-	EMP
					12/02/2004	1049	7.33	2,326.2	S	-	EMP
					12/07/2004	1455	7.30	2,326.2	T	-	USFWS
DV-3	362230116392901	Travertine Point 1 Well	2,728.4	2.0	01/20/2004	1205	602.37	2,126.0	V	-	EMP
					02/23/2004	1455	602.39	2,126.0	V	-	EMP
					03/25/2004	1309	602.45	2,126.0	V	-	EMP
					04/15/2004	1111	602.44	2,126.0	V	-	EMP
					05/18/2004	1217	602.47	2,125.9	V	-	EMP
					06/16/2004	0905	602.45	2,126.0	V	-	EMP
					07/29/2004	1129	602.46	2,125.9	V	-	EMP
					08/30/2004	1434	602.50	2,125.9	V	-	EMP
					09/22/2004	1354	602.56	2,125.8	V	-	EMP
					10/13/2004	1302	602.52	2,125.9	V	-	EMP
					11/04/2004	1236	602.48	2,125.9	V	-	EMP
					12/02/2004	1412	602.59	2,125.8	V	-	EMP

Table 4. Daily mean water levels in borehole JF-3, 2004.

[–, data not available]

Day	Daily mean water level (feet below land surface) calendar year January–December 2004											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	709.44	709.52	709.45	709.15	709.67	709.37	709.51	–	709.42	709.51	709.87	709.49
2	709.34	709.44	709.39	709.31	709.59	709.41	709.49	–	709.14	709.61	709.75	709.50
3	709.49	709.28	709.51	709.52	709.47	709.51	709.39	–	709.19	709.57	709.34	709.44
4	709.74	709.54	709.41	709.54	709.35	709.57	709.41	–	709.48	709.46	709.34	709.10
5	709.79	709.84	709.68	709.45	709.37	709.44	709.48	–	709.57	709.44	709.49	709.10
6	709.60	709.94	709.84	709.43	709.51	709.28	709.50	–	709.50	709.46	709.37	709.33
7	709.53	709.64	709.88	709.48	709.53	709.19	709.38	–	709.40	709.49	709.35	–
8	709.68	709.66	709.71	709.45	709.46	–	709.35	–	709.38	709.49	709.38	–
9	709.68	709.62	709.45	709.52	709.36	–	709.40	–	709.39	709.22	709.53	–
10	709.52	709.63	709.38	709.54	709.15	709.67	709.47	–	709.45	709.23	709.51	–
11	709.43	709.52	709.40	709.58	709.34	709.56	709.47	–	709.46	709.50	709.42	–
12	709.58	–	709.28	709.51	709.54	709.54	709.43	–	709.30	709.57	709.34	–
13	709.66	709.57	709.43	709.42	709.62	709.57	709.45	709.45	709.22	709.58	709.39	–
14	709.43	709.47	709.56	709.39	709.53	709.45	709.53	709.45	709.29	709.52	709.57	–
15	709.27	709.48	709.58	709.37	709.40	709.38	709.52	709.46	709.38	709.34	709.54	709.56
16	709.34	709.58	709.52	709.37	709.33	709.44	709.45	709.46	709.38	709.23	709.55	709.73
17	709.50	709.62	709.39	709.33	709.38	709.52	709.45	709.43	709.33	709.21	709.57	709.62
18	709.55	709.35	709.36	709.62	709.50	709.57	709.45	709.34	709.20	709.29	709.48	709.49
19	709.46	709.38	709.46	709.58	709.50	709.56	–	709.34	709.18	709.30	709.29	709.38
20	709.45	709.35	709.59	709.53	709.49	709.47	–	709.39	709.60	709.30	709.27	709.07
21	709.71	709.27	709.45	709.30	709.48	709.37	–	709.36	709.77	709.42	709.22	709.15
22	709.74	709.24	709.27	709.47	709.45	709.44	–	709.26	709.68	709.65	709.33	709.43
23	709.52	709.31	709.24	709.57	709.36	709.57	–	709.26	709.57	709.59	709.45	709.51
24	709.21	709.60	709.37	709.53	709.41	709.56	–	709.38	709.50	709.44	709.61	709.56
25	709.39	709.58	709.37	709.62	709.47	709.50	–	709.41	709.43	709.37	709.43	709.32
26	709.65	709.32	709.42	709.66	709.50	709.41	–	709.34	709.38	709.28	709.39	709.14
27	709.62	709.38	709.62	709.47	709.52	709.38	–	709.52	709.38	709.36	709.11	709.23
28	709.55	709.54	709.73	709.09	709.36	709.44	–	709.48	709.33	709.63	709.46	709.20
29	709.56	709.59	709.58	709.36	709.50	709.45	–	709.42	709.28	709.80	709.80	709.06
30	709.33	–	709.34	709.62	709.61	709.48	–	709.43	709.32	709.64	709.68	–
31	709.30	–	709.28	–	–	–	–	709.47	–	709.60	–	–
MEAN	709.52	709.51	709.48	709.46	709.46	709.47	709.45	709.40	709.40	709.45	709.46	709.35
MAX	709.79	709.94	709.88	709.66	709.67	709.67	709.53	709.52	709.77	709.80	709.87	709.73
MIN	709.21	709.24	709.24	709.09	709.15	709.19	709.35	709.26	709.14	709.21	709.11	709.06
(2004 Annual summary		Mean 709.46		Maximum 709.94		Minimum 709.06)						

Table 5. Daily mean water levels in borehole AD-6, 2004.

[–, data not available]

Day	Daily mean water level (feet below land surface) calendar year January–December 2004											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	41.84	41.86	41.78	41.67	41.86	41.73	41.84	41.83	41.86	41.93	42.07	41.94
2	41.79	41.80	41.76	41.75	41.83	41.75	41.83	41.84	41.75	41.96	42.01	41.96
3	41.86	41.73	41.81	41.83	41.77	41.79	41.79	41.85	41.80	41.93	41.84	41.94
4	41.96	41.84	41.76	41.82	41.73	41.81	41.80	41.83	41.92	41.89	41.87	41.80
5	41.96	41.95	41.88	41.77	41.75	41.75	41.83	41.84	41.94	41.89	41.93	41.82
6	41.86	41.98	41.94	41.76	41.81	41.70	41.83	41.86	41.90	41.90	41.86	41.91
7	41.85	41.85	41.93	41.79	41.81	41.67	41.78	41.87	41.86	41.91	41.86	41.93
8	41.91	41.89	41.86	41.77	41.78	41.73	41.78	41.86	41.86	41.91	41.88	41.96
9	41.91	41.87	41.78	41.80	41.74	41.83	41.81	41.85	41.86	41.80	41.95	42.04
10	41.84	41.89	41.77	41.80	41.66	41.87	41.83	41.84	41.89	41.81	41.93	41.99
11	41.82	41.84	41.78	41.83	41.76	41.80	41.83	41.82	41.89	41.93	41.89	41.91
12	41.88	41.91	41.73	41.80	41.83	41.81	41.80	41.84	41.82	41.93	41.86	41.89
13	41.91	41.87	41.80	41.76	41.84	41.82	41.82	41.87	41.80	41.93	41.89	41.96
14	41.80	41.84	41.84	41.76	41.79	41.77	41.85	41.87	41.83	41.90	41.96	41.98
15	41.75	41.84	41.83	41.75	41.74	41.75	41.85	41.87	41.87	41.84	41.93	41.97
16	41.79	41.87	41.81	41.76	41.73	41.78	41.82	41.87	41.85	41.81	41.95	42.05
17	41.85	41.87	41.76	41.75	41.75	41.81	41.83	41.86	41.83	41.81	41.96	42.00
18	41.86	41.75	41.76	41.88	41.80	41.83	41.83	41.82	41.79	41.84	41.92	41.95
19	41.81	41.80	41.80	41.84	41.79	41.82	41.82	41.83	41.80	41.84	41.85	41.92
20	41.81	41.77	41.84	41.81	41.79	41.79	41.82	41.85	41.98	41.83	41.86	41.80
21	41.92	41.75	41.78	41.72	41.79	41.75	41.81	41.83	42.02	41.88	41.85	41.85
22	41.92	41.73	41.71	41.81	41.78	41.79	41.80	41.80	41.97	41.97	41.90	41.96
23	41.83	41.76	41.71	41.84	41.74	41.84	41.81	41.81	41.93	41.92	41.94	41.98
24	41.72	41.87	41.76	41.81	41.77	41.83	41.86	41.86	41.91	41.86	41.99	41.99
25	41.81	41.84	41.76	41.84	41.78	41.81	41.86	41.86	41.89	41.84	41.90	41.90
26	41.92	41.73	41.78	41.85	41.79	41.78	41.82	41.83	41.87	41.81	41.90	41.82
27	41.88	41.77	41.86	41.77	41.79	41.78	41.81	41.91	41.87	41.86	41.78	41.86
28	41.84	41.84	41.89	41.62	41.72	41.80	41.83	41.88	41.85	41.96	41.96	41.83
29	41.86	41.85	41.82	41.78	41.80	41.81	41.82	41.86	41.84	42.02	42.09	41.77
30	41.75	–	41.73	41.87	41.84	41.82	41.81	41.86	41.85	41.94	42.02	41.90
31	41.76	–	41.72	–	41.78	–	41.82	41.88	–	41.94	–	41.83
MEAN	41.85	41.83	41.80	41.79	41.78	41.79	41.82	41.85	41.87	41.89	41.92	41.92
MAX	41.96	41.98	41.94	41.88	41.86	41.87	41.86	41.91	42.02	42.02	42.09	42.05
MIN	41.72	41.73	41.71	41.62	41.66	41.67	41.78	41.80	41.75	41.80	41.78	41.77
(2004 Annual summary		Mean 41.84		Maximum 42.09		Minimum 41.62)						

Table 8. Ground-water-discharge data at monitoring sites in Yucca Mountain region, 2004.

Site number: Alphanumeric identifier used to designate sites on map and tables. First part represents hydrographic area in which site is located.

Hydrographic areas: AD or AM, Amargosa Desert; DV, Death Valley. Second part is sequential numbering representing relative location of site within hydrographic area or Ash Meadows spring-discharge area; numbering order generally is north to south, then west to east.

U.S. Geological Survey site identification: Unique identification number for site as stored in files and data bases of U.S. Geological Survey (USGS).

Discharge: Reported to two significant figures. Discharge measured at site AM-2 represents a combination of flow directly through slotted casing at land surface and leakage from the casing's annular space. Water-level data for site AM-2 are listed in table 3.

Method: Method used to measure discharge. A, acoustic-doppler velocimeter; C, vertical-axis current meter; V, volumetric; Z, discharge represents monthly mean discharge on basis of continually recorded stage.

Data source: EMP, Environmental-Monitoring Program (USGS); NPS, National Park Service; USFWS, U.S. Fish and Wildlife Service.

[–, measurement time not available or not applicable]

Site number (fig.1)	U.S. Geological Survey site identification	Site name	Discharge measurement				
			Date	Time	Discharge (gallons per minute)	Method	Data source
AM- 1a	362924116203001	Fairbanks Spring	01/15/2004	1425	1,700	C	USFWS
			03/01/2004	1504	1,700	C	USFWS
			03/05/2004	1131	1,600	C	EMP
			04/06/2004	1339	1,800	C	USFWS
			05/14/2004	1230	1,800	C	USFWS
			05/28/2004	1122	1,600	C	EMP
			06/09/2004	1312	1,800	C	USFWS
			08/10/2004	1407	1,800	C	USFWS
			09/03/2004	1015	1,700	C	EMP
			09/28/2004	1140	1,800	C	USFWS
			10/25/2004	1525	1,800	C	USFWS
			12/01/2004	1113	1,600	C	EMP
			12/07/2004	1017	1,800	C	USFWS
AM- 2	362755116190401	Five Springs Well	01/14/2004	1230	38	V	EMP
			02/02/2004	1116	38	V	EMP
			03/11/2004	1335	38	V	EMP
			04/05/2004	1247	35	V	EMP
			05/03/2004	1320	34	V	EMP
			06/16/2004	1120	33	V	EMP
			07/22/2004	1028	34	V	EMP
			08/26/2004	1230	34	V	EMP
			09/21/2004	1224	33	V	EMP
			10/08/2004	1315	34	V	EMP
			11/03/2004	1303	35	V	EMP
			12/02/2004	1221	35	V	EMP
AM- 5a	362502116192301	Crystal Pool	03/03/2004	946	3,100	C	USFWS
			03/18/2004	1303	2,500	A	EMP
			04/05/2004	1025	3,000	C	USFWS
			05/25/2004	1350	2,800	A	EMP
			06/25/2004	1153	2,800	C	USFWS
			09/03/2004	1216	2,900	A	EMP
			09/23/2004	1010	3,000	C	USFWS
			12/09/2004	1240	3,200	A	EMP
			12/09/2004	1515	2,600	C	USFWS

Table 8. Ground-water-discharge data at monitoring sites in Yucca Mountain region, 2004—Continued.

Site number (fig.1)	U.S. Geological Survey site identification	Site name	Discharge measurement				
			Date	Time	Discharge (gallons per minute)	Method	Data source
AM- 8	362230116162001	Big Spring	03/05/2004	911	950	A	EMP
			03/09/2004	1534	1,000	C	USFWS
			04/05/2004	1520	1,100	C	USFWS
			05/25/2004	1148	830	A	EMP
			06/29/2004	1053	1,100	C	USFWS
			09/03/2004	1342	1,300	A	EMP
			09/23/2004	1500	1,100	C	USFWS
			12/01/2004	1321	1,300	C	EMP
DV- 1	362728116501101	Texas Spring	01/15/2004	–	200	Z	NPS
			02/15/2004	–	200	Z	NPS
			03/15/2004	–	200	Z	NPS
			03/17/2004	1224	210	C	EMP
			04/15/2004	–	200	Z	NPS
			05/15/2004	–	190	Z	NPS
			05/26/2004	1248	220	A	EMP
			06/15/2004	–	190	Z	NPS
			07/15/2004	–	190	Z	NPS
			08/15/2004	–	190	Z	NPS
			09/15/2004	–	190	Z	NPS
			09/15/2004	1210	190	C	EMP
			10/15/2004	–	190	Z	NPS
			11/15/2004	–	200	Z	NPS
			11/30/2004	1416	190	C	EMP
			12/15/2004	–	200	Z	NPS
DV- 2	362252116425301	Navel Spring	03/17/2004	1422	0.86	V	EMP
			05/26/2004	1422	0.84	V	EMP
			09/28/2004	1528	0.85	V	EMP
			11/30/2004	1230	0.82	V	EMP

Table 9. Estimated annual ground-water withdrawals from wells in Yucca Mountain region, 2004.

Ground-water subbasin (fig. 1)	Hydrographic area (fig. 1)	Ground-water withdrawal (millions of gallons)
Alkali Flat-Furnace Creek Ranch	Amargosa Desert[1]	4,391
	Crater Flat[2]	16.1
	Jackass Flats[2]	13.8
Ash Meadows	Amargosa Desert1 (excluding Ash Meadows area)	19
	Amargosa Desert1 (Ash Meadows area)	3
	Mercury Valley[2]	67.8

[1] Data recompiled from ground-water pumpage inventory (by Nevada Divison of Water Resources) for entire Amargosa Desert. Data are converted to millions of gallons (325,851 gallons per acre-foot) for consistency with other data tabulated and are rounded to nearest 1 million gallons.

[2] Data reported, estimated, or recompiled from flowmeter readings and listed to nearest 0.1 million gallons.

Table 10. Minimum, maximum, and median water-level altitudes, and average deviation of measurements, at selected boreholes in Jackass Flats for the baseline period 1992-93 and for calendar years 1994 through 2004. Excludes water-level altitudes that may reflect short-term conditions at a site.

Calendar years: Years for which measurements were used to calculate summary statistics. Italics indicate 1992-93 baseline period.

Number: Number of water-level measurements for year(s) specified. For JF-2 (1992-93), JF-2a (1992-97), and JF-3, value represents number of daily mean water levels.

Water level: Based on periodic water-level measurements for JF-1, JF-2 (after 1993), JF-2a (after 1997), J-13, J-11, and J-12. Based on daily mean water levels for JF-2 (1992-93), JF-2a (1992-97), and JF-3.

Minimum: Minimum water-level altitude or minimum daily mean water-level altitude for year(s) specified.

Maximum: Maximum water-level altitude or maximum daily mean water-level altitude for year(s) specified.

Median: Statistically representative water-level altitude calculated from periodic measurements or daily mean water levels for year(s) specified.

Average deviation: Calculated dispersion of measurements about median water-level altitude. Average deviation is equal to sum of absolute differences between measured water levels and median, divided by number of measurements.

Change in median: Differences between median water level for calendar years 1994 through 2004 compared with the 1992-93 baseline period. Minus sign indicates that median water-level altitude was lower for the specified year than for the baseline period.

[Abbreviations and symbols: N/A, not applicable (data field is not related to referenced data set); --, transducer installed in site JF-2 prevented periodic measurement for most of 2002]

Site number (fig. 1)	Calendar year(s)	Number	Water level (feet above sea level)			Average deviation (feet)	Change in median (feet)
			Minimum	Maximum	Median		
JF-1	*1992–93*	20	2391.9	2392.7	2392.5	0.1	N/A
	2004	16	2393.0	2393.6	2393.4	0.1	0.9
	2003	16	2393.0	2393.6	2393.3	0.1	0.8
	2002	16	2393.0	2393.4	2393.2	0.1	0.7
	2001	18	2392.8	2393.3	2393.0	0.1	0.5
	2000	14	2392.8	2393.4	2392.8	0.1	0.3
	1999	12	2392.3	2393.0	2392.7	0.1	0.2
	1998	22	2392.3	2392.8	2392.5	0.1	0.0
	1997	10	2392.1	2392.6	2392.4	0.1	-0.1
	1996	8	2392.0	2392.6	2392.3	0.2	-0.2
	1995	7	2392.3	2392.8	2392.5	0.2	0.0
	1994	12	2392.1	2392.6	2392.3	0.1	-0.2

Table 10. Minimum, maximum, and median water-level altitudes, and average deviation of measurements, at selected boreholes in Jackass Flats for the baseline period 1992-93 and for calendar years 1994 through 2004—Continued.

Site number (fig. 1)	Calendar year(s)	Number	Water level (feet above sea level)			Average deviation (feet)	Change in median (feet)
			Minimum	Maximum	Median		
JF-2	*1992–93*	718	2391.7	2392.8	2392.1	0.1	N/A
	2004	12	2392.5	2392.8	2392.7	0.0	0.6
	2003	10	2392.6	2392.9	2392.6	0.1	0.5
	2002	1	–	–	–	–	–
	2001	18	2392.4	2393.2	2392.8	0.2	0.7
	2000	14	2392.3	2393.2	2392.7	0.2	0.6
	1999	13	2392.0	2392.7	2392.5	0.1	0.4
	1998	21	2391.8	2392.6	2392.1	0.1	0.0
	1997	11	2391.8	2392.4	2392.0	0.1	-0.1
	1996	7	2391.6	2392.3	2392.1	0.2	0.0
	1995	9	2392.2	2392.5	2392.4	0.1	0.3
	1994	9	2392.0	2392.6	2392.2	0.1	0.1
JF-2a	*1992–93*	707	2466.9	2469.2	2468.7	0.3	N/A
	2004	12	2471.1	2473.1	2471.4	0.5	2.7
	2003	14	2471.0	2473.2	2471.5	0.7	2.8
	2002	16	2470.5	2471.3	2471.0	0.2	2.3
	2001	18	2470.8	2471.2	2471.0	0.1	2.3
	2000	14	2470.1	2471.1	2470.8	0.3	2.1
	1999	13	2469.8	2470.4	2470.2	0.1	1.5
	1998	20	2469.8	2470.4	2470.0	0.1	1.3
	1997	267	2468.8	2470.0	2469.5	0.1	0.8
	1996	214	2468.6	2469.6	2469.3	0.1	0.6
	1995	357	2468.7	2469.3	2469.1	0.1	0.4
	1994	356	2468.4	2469.4	2469.0	0.1	0.3
J-13	*1992–93*	37	2389.6	2390.7	2389.9	0.1	N/A
	2004	16	2389.2	2390.8	2389.9	0.6	0.0
	2003	19	2390.2	2390.9	2390.6	0.2	0.7
	2002	15	2390.0	2390.8	2390.4	0.1	0.5
	2001	17	2390.1	2390.9	2390.4	0.2	0.5
	2000	13	2390.0	2391.0	2390.2	0.2	0.3
	1999	13	2389.6	2390.2	2390.0	0.1	0.1
	1998	20	2389.4	2390.2	2389.8	0.1	-0.1
	1997	11	2389.5	2389.9	2389.6	0.1	-0.3
	1996	8	2389.2	2389.9	2389.6	0.1	-0.3
	1995	11	2389.6	2390.4	2389.8	0.1	-0.1
	1994	23	2389.4	2390.0	2389.7	0.1	-0.2

Table 10. Minimum, maximum, and median water-level altitudes, and average deviation of measurements, at selected boreholes in Jackass Flats for the baseline period 1992-93 and for calendar years 1994 through 2004—Continued.

Site number (fig. 1)	Calendar year(s)	Number	Water level (feet above sea level)			Average deviation (feet)	Change in median (feet)
			Minimum	Maximum	Median		
J-11	*1992–93*	20	2401.9	2402.7	2402.2	0.1	N/A
	2004	16	2402.2	2402.8	2402.5	0.1	0.3
	2003	17	2402.2	2402.8	2402.6	0.1	0.4
	2002	16	2402.1	2402.7	2402.5	0.1	0.3
	2001	18	2402.3	2403.0	2402.6	0.2	0.4
	2000	14	2402.3	2403.2	2402.4	0.1	0.2
	1999	14	2402.2	2402.8	2402.4	0.1	0.2
	1998	20	2402.2	2402.9	2402.6	0.2	0.4
	1997	10	2402.2	2402.8	2402.6	0.2	0.4
	1996	8	2402.2	2402.6	2402.4	0.1	0.2
	1995	11	2402.2	2402.5	2402.4	0.1	0.2
	1994	12	2402.0	2402.5	2402.3	0.1	0.1
J-12	*1992–93*	36	2387.9	2389.0	2388.3	0.1	N/A
	2004	16	2388.6	2389.1	2388.9	0.1	0.6
	2003	18	2388.4	2389.0	2388.8	0.1	0.5
	2002	16	2388.4	2388.8	2388.6	0.1	0.3
	2001	18	2388.3	2388.6	2388.5	0.1	0.2
	2000	14	2387.9	2388.6	2388.4	0.1	0.1
	1999	12	2388.1	2388.5	2388.3	0.1	0.0
	1998	17	2387.9	2388.3	2388.0	0.1	-0.3
	1997	16	2387.7	2388.4	2388.0	0.1	-0.3
	1996	18	2387.5	2388.5	2388.0	0.1	-0.3
	1995	16	2388.0	2388.3	2388.2	0.1	-0.1
	1994	24	2387.8	2389.1	2388.2	0.2	-0.1
JF-3	*1992–93*	582	2387.7	2388.8	2388.3	0.1	N/A
	2004	327	2388.4	2389.2	2388.8	0.1	0.5
	2003	365	2388.3	2389.3	2388.8	0.1	0.5
	2002	314	2388.1	2389.0	2388.6	0.1	0.3
	2001	331	2388.1	2389.0	2388.5	0.1	0.2
	2000	366	2387.9	2388.8	2388.4	0.1	0.1
	1999	365	2387.6	2388.6	2388.2	0.1	-0.1
	1998	316	2387.6	2388.6	2388.0	0.1	-0.3
	1997	345	2387.4	2388.8	2388.0	0.1	-0.3
	1995	347	2387.7	2388.4	2388.1	0.1	-0.2
	1994	284	2387.6	2388.6	2388.1	0.1	-0.2

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