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Selected Ground-Water Data for Yucca Mountain Region, Southern Nevada and Eastern California, Through December 1995

By **Richard J. La Camera, Craig L. Westenburg,** *and* **Glenn L. Locke**

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
acre-foot (acre-ft)	1,233	cubic meter
foot (ft)	0.3048	meter
gallon per minute (gal/min)	0.06309	liter per second
inch (in.)	2.54	centimeter
mile (mi)	1.609	kilometer
million gallons (Mgal)	3,785	cubic meter
pound per square inch (lb/in^2)	6.895	kilopascal

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

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ABSTRACT

The U.S. Geological Survey, in support of the U.S. Department of Energy, Yucca Mountain Site Characterization Project, collects, compiles, and summarizes hydrologic data in the Yucca Mountain region. The data are collected to allow assessments of ground-water resources during studies to determine the potential suitability of Yucca Mountain for storing high-level nuclear waste.

Data on ground-water levels at 36 sites, ground-water discharge at 6 sites, and ground-water withdrawals within Crater Flat, Jackass Flats, Mercury Valley, and the Amargosa Desert are presented for calendar year 1995. Data collected prior to 1995 are graphically presented and data collected by other agencies (or as part of other programs) are included to further indicate variations of ground-water levels, discharges, and withdrawals through time.

A statistical summary of ground-water levels at seven wells in Jackass Flats is presented to indicate potential effects of ground-water withdrawals in support of U.S. Department of Energy activities near Yucca Mountain. The statistical summary includes the number of measurements, the maximum, minimum, and median water-level altitudes, and the average deviation of measured water-level altitudes for selected baseline periods and for calendar years 1992-95. Compared with baseline periods for the seven wells, median water levels for calendar year 1995 were slightly lower (0.1 to 0.2 foot) at two principal water-supply wells and one observation well nearest to those supply wells, slightly higher (0.2 to 0.5 foot) at three other wells in Jackass Flats, and unchanged at the seventh well.

INTRODUCTION

Investigations are in progress or planned to determine the potential suitability of Yucca Mountain for storing high-level nuclear waste. The U.S. Department of Energy (USDOE) has declared that all facilities and activities associated with such investigations 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 USDOE to develop a monitoring program for ground-water resources 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 the investigations of Yucca Mountain, and (3) provide a basis for analyzing and identifying potential adverse effects on ground-water resources resulting from investigations of Yucca Mountain.

Purpose and Scope

This report presents and summarizes, in tabular and graphical form, data collected as part of the water-resources monitoring program. Included are 1995 data on ground-water levels at 36 sites, ground-water discharge at 6 sites, and ground-water withdrawals within Crater Flat, Jackass Flats, Mercury Valley, and Amargosa Desert. Data on ground-water levels, discharges, and withdrawals collected by other agencies (or collected as part of other programs) are included to further indicate variations through time at selected monitoring locations.

A discussion of ground-water data for Jackass Flats includes a statistical summary of that data to indicate potential effects of withdrawals from wells 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 fourth of a series as part of the U.S. Geological Survey water-resources monitoring program. The first report in the series was prepared by La Camera and Westenburg (1994) and includes data through December 1992; the second report by Hale and Westenburg (1995) includes data through 1993; and the third report by Westenburg and La Camera (1996) includes data through 1994. Hereafter, the first three reports of this series are referred to as previous reports on selected ground-water data for the Yucca Mountain region.

Additional information for sites CF-2, JF-1, JF-2, JF-2a, J-13, J-11, and J-12 is presented by Robison (1984), Robison and others (1988), Gemmel (1990), McKinley and others (1991), O'Brien (1991, 1993), Luckey and others (1993), Boucher (1994), Lobmeyer and others (1995), O'Brien and others (1995), and Tucci and others (1996a, 1996b).

Acknowledgments

Several organizations and programs contributed to this report. Specifically, data were provided by National Park Service; U.S. Fish and Wildlife Service; Nevada Department of Conservation and Natural Resources, Division of Water Resources; Nevada Department of Transportation; Barrick Bullfrog Inc.; Cathedral Gold U.S. Corporation; Cind-r-Lite Company; Raytheon Services Nevada; Reynolds Electrical and Engineering Company; U.S. Borax Corporation; U.S. Nevada Gold Search; USGS-Hydrologic Resources Management and Environmental Restoration Programs; and USGS-Yucca Mountain Project Branch studies of saturated-zone site hydrology and saturated-zone regional hydrology.

Additionally, the authors acknowledge the cooperation of the many individual property owners throughout the Amargosa Desert who allowed access to their property and the collection of hydrologic data.

DESCRIPTION OF STUDY AREA

The study area is the Yucca Mountain region of southern Nevada and eastern California (pl. 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 the Amargosa Desert, and Death Valley Junction and Furnace Creek, California to the south and west. The region is within the Great Basin, a subdivision of the Basin and Range Physiographic Province (Fenneman, 1931, p. 328).

The study area is in the Death Valley ground-water 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.

Within the Alkali Flat-Furnace Creek Ranch and Ash Meadows subbasins, the study area is further subdivided by hydrographic areas[1] (pl. 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 in the study area 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

In the Alkali Flat-Furnace Creek Ranch ground-water subbasin, ground-water recharge results principally from subsurface interbasin inflow and precipitation on mesas and mountains north of the study area. Subsurface interbasin inflow also may occur near the Ash Meadows area in the Amargosa Desert (Waddell and others, 1984, p. 36; Harrill and others, 1988,

[1]Formal hydrographic areas in Nevada were delineated systematically by the U.S. Geological Survey and Nevada Division of Water Resources 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 Geological Survey scientific reports and Division of Water Resources administrative activities.

sheet 2). Ground water discharges principally in Death Valley and at Alkali Flat about 5 mi southeast of Death Valley Junction (Laczniak and others, 1996, p. 19).

In the part of the subbasin within the northern half of the study area, ground-water flow is generally to the south or southeast (Tucci and Burkhardt, 1995, p. 8). In the part of the subbasin within the southern half of the study area, ground-water flow is to the southeast toward Alkali Flat or southwest toward Death Valley (Kilroy, 1991, p. 9-13; Laczniak and others, 1996, pl. 1).

Crater Flat and Jackass Flats (which include Yucca Mountain), most of Rock Valley, the west-central part of the Amargosa Desert, and part of the Death Valley hydrographic areas are within the Alkali Flat-Furnace Creek Ranch subbasin (pl. 1).

Ash Meadows Ground-Water Subbasin

In the Ash Meadows ground-water subbasin, ground-water recharge principally results from subsurface interbasin inflow and precipitation on mountains to the east and northeast of the study area (Harrill and others, 1988, sheet 2). Ground water discharges principally as springflow 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 west or southwest (Harrill and others, 1988, sheet 2; Laczniak and others, 1996, p. 16-18 and pl. 1).

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

DATA-COLLECTION SITES

Locations of data-collection sites are shown on plate 1. Table 1 includes information on site identification, site location, site owner, and the types of data contained in this report for each site. Table 2 includes information on site identification, well construction, source of well-construction data, and contributing lithologic units. Water-level monitoring at site AD-7 was discontinued because the well at that site was redrilled by the owner in 1994; only the recompleted well (site AD-7a) was monitored during 1995. All sites are wells or springs except site AM-4 (Devils Hole), which is an open fissure that intersects the ground-water table.

Site Number

Sites are identified on plate 1 and in table 1 by an alphanumeric number that also is used in the tables, figures, and text of this report. The site number consists of two parts. The first part represents the hydrographic area in which the site is located: "CF" represents Crater Flat; "JF" or "J," Jackass Flats; "RV," Rock Valley; "MV," Mercury Valley; "AD" or "AM," Amargosa Desert; and "DV," Death Valley. "AM" further indicates that the site is located in the Ash Meadows spring-discharge area. The second part of the number represents the relative location of the site within the hydrographic area (or Ash Meadows spring-discharge area). Within each hydrographic area, sites generally are numbered sequentially in a north-to-south, then west-to-east order. Sites added subsequent to the initial numbering also are numbered as indicated above or are assigned the number of a nearby site and given the suffix of "a." Exceptions are sites J-13, J-11, and J-12, which are or were water-supply wells and were previously numbered by Raytheon Services Nevada; they were not renumbered for this report. The sequence of sites given in table 1 is used elsewhere throughout the report.

U.S. Geological Survey Site Identification

Sites are identified by the standard U.S. Geological Survey identification number, which is based on an initial determination of latitude and longitude for the site. The site identification serves as a unique identification number in files and data bases of the USGS and indicates the approximate geographic location of each site. The identification consists of 15 digits: The first 6 denote the degrees, minutes, and seconds of latitude; the next 7 denote degrees, minutes, and seconds of longitude; and the last 2 digits (assigned sequentially) identify the site within a 1-second grid. For example, site 363530116021401 is at approximately 36°35'30" latitude and 116°02'14" longitude, and it is the first site recorded in that 1-second grid. If a more precise latitude and longitude are subsequently determined, the

Table 1. Index to monitoring sites in Yucca Mountain region for calendar year 1995

Site number: Sites are grouped by hydrographic area and, within each area, are listed in general north-to-south, then west-to-east order. See text section titled "Site Number" for further discussion.

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

Local site number: Alphanumeric number based on location of site within hydrographic areas and rectangular subdivisions of public lands. See text section titled "Local Site Number" for further discussion.

Owner: Abbreviations listed for sites owned by federal agencies: BLM, Bureau of Land Management; NPS, National Park Service; USDOE, U.S. Department of Energy; 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 (plate 1)	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	GEXA Well 4	365520	1163703	229	S12 E48 04DBB1	Rayrock Mines, Inc.	L
CF-1a	365445116383901	GEXA Well 3	365445	1163839	229	S12 E48 07ADD1	Rayrock Mines, Inc.	L
CF-2	364732116330701	USW VH-1	364732	1163307	229	S13 E48 27C1	USDOE	L
CF-3	364105116302601	Cind-R-Lite Well	364105	1163026	229	S15 E48 01AAA1	Cind-R-Lite Block Company	L
JF-1	365116116233801	UE-25 WT 15	365116	1162338	227A	S12 E50 33A1	USDOE	L
JF-2	364945116235001	UE-25 WT 13	364943	1162351	227A	S13 E50 18B1	USDOE	L
JF-2a	364938116252102	UE-25p 1 PTH	364938	1162521	227A	S13 E49 14A1	USDOE	L
J-13	364828116234001	J-13 WW	364828	1162340	227A	S13 E50 19C1	USDOE	L
J-11	364706116170601	J-11 WW	364706	1161706	227A	S13 E51 31B1	USDOE	L
J-12	364554116232401	J-12 WW	364554	1162324	227A	S14 E50 06A1	USDOE	L
JF-3	364528116232201	JF-3 Well	364528	1162322	227A	S14 E50 06D1	USDOE	L
RV-1	363815116175901	TW-5	363815	1161759	226	S15 E50 24A1	USDOE	L
MV-1	363530116021401	Army 1 WW	363530	1160214	225	S16 E53 05ADB1	USDOE	L
AD-1	364141116351401	NA-6 Well BGMW-10	364130	1164112	230	S14 E47 32DA1	USGS	L
AD-2	363830116241401	Airport Well	363825	1162433	230	S15 E49 24ABB1	Doing, Warren	L
AD-2a	363835116234001	NDOT Well	363835	1162358	230	S15 E50 18CCDB1	NV Dept. of Transportation	L
AD-3a	363521116352501	Davidson Well	363526	1163529	230	S16 E48 05CAB1	Davidson, Robert	L
AD-4a	363428116234701	Cooks East Well	363428	1162347	230	S16 E50 07CABB1	Cook, Lewis C.	L
AD-5	363310116294001	USBLM Well	363323	1162944	230	S16 E49 18DCCA1	BLM	L
AD-6	363213116133800	Tracer Well 3	363213	1161338	230	S16 E51 27BAA3	USGS	L
AD-7a	363009116302702	Blackman Well	363009	1163027	230	S17 E48 01AB2	Naxos Mining Company	L
AD-8	362929116085701	Cherry Patch Well	362929	1160857	230	S17 E52 08CDB1	Clark, Hershel & Et al	L
AD-9	362848116264201	Gilgans North Well	362848	1162646	230	S17 E49 15BBBB1	Steelman, James C.	L
AD-10	362525116274301	NA-9 Well	362525	1162743	230	026N005E05E001S	USGS	L
AD-11	361954116181201	GS-3 Well	361957	1161752	230	S19 E50 01BBD1	USGS	L
AD-12	362014116133901	GS-1 Well	362021	1161330	230	S18 E51 34CBD1	USGS	L
AD-13	361724116324201	S-1 Well	361724	1163242	230	025N004E21M001S	USGS	L
AD-14	361817116244701	Death Valley Jct Well	361817	1162447	230	025N005E14M001S	Ettie, Lee	L
AM-1	362858116195301	Rogers Spring Well	362855	1161950	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	362755	1161904	230	S17 E50 23BBCA1	USFWS	D,L
AM-3	362555116205301	Garners Well	362555	1162053	230	S17 E50 33CAAB1	Garner, George	L
AM-4	362532116172700	Devils Hole	362532	1161727	230	S18 E50 36DC1	NPS	L
AM-5	362529116171100	Devils Hole Well	362530	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	362432	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	362235	1163929	243	026N003E21L001S	U.S. Borax & Chem. Corp.	L

unique identification number remains unchanged. Latitude and longitude shown for a site, therefore, are the most accurate locators.

Local Site Number

The local site number (table 1) is based on an index of hydrographic areas (Rush, 1968; Harrill and others, 1988) and the rectangular subdivision of the public lands referenced to the Mount Diablo base line and meridian for sites in Nevada or San Bernadino base line and meridian for sites in California. Numbering conventions differ depending on whether a site is located in Nevada or California.

For sites in Nevada, each local number consists of four units separated by spaces: The first unit is the hydrographic area number. The second unit is the township, preceded by an N or S to indicate location north or south of the base line. The third unit is the range, preceded by an E to indicate location east of the meridian. The fourth unit consists of the section number and letters designating the quarter section, quarter-quarter section and so on (A, B, C, and D, indicate the northeast, northwest, southwest, and southeast quarters, respectively), followed by a number indicating the sequence in which the well was recorded. For example, site 230 S18 E51 34CBD1 is in the Amargosa Desert (hydrographic area 230) and is the first site recorded in the southeast quarter of the northwest quarter of the southwest quarter of section 34, Township 18 South, Range 51 East, Mount Diablo base line and meridian.

For sites in California, the local number consists of the hydrographic area number followed by two spaces. The next 10 characters indicate the township and location north or south of the baseline, the range and location east or west of the meridian, and the section number. The letter following the section number designates the 40-acre subdivision of the section in which the site is located (U.S. Geological Survey, 1996). The final letter indicates that the location is referenced to the San Bernardino (S) base line and meridian and is preceded by a 3-digit number (for wells) or an "S" and 2-digit number (for springs) indicating the sequence in which the site was recorded. For example, well 230 025N005E14M001S is in the Amargosa Desert (hydrographic area 230) and is the first site recorded in the 40-acre subdivision designated M of section 14, Township 25 North, Range 5 East, San Bernardino base line and meridian.

Data Type

Data type (table 1) identifies the types of data (water level and discharge) presented for each site. Ground-water-level data are in tables 5-7 and ground-water-discharge data are in table 8.

Accessible Well Depth

Accessible well depth (table 2) is the measurable depth to the bottom of the well. The drilled depth may be greater than the accessible depth of the well due to modifications of the well, obstructions, or accumulation of sediment at the bottom of the well. The depth of each well was measured by USGS (depths noted with "s") or was reported by other data sources. The USGS measured depths less than 1,000 ft by "sounding" the bottom of the well with weighted steel or electric tapes.

Top and Bottom of Open Interval

Open intervals (table 2) are parts of the borehole that are open to the surrounding lithologic intervals and may allow water to enter the well. An uncased section of a well is considered an open interval in this report.

Type of Open Interval

Type of open interval (table 2) is a physical description of the open intervals of a borehole. The types of openings are perforated or slotted casing, screened casing, and open hole with no casing.

Data Source

Data sources (table 2) are organizations or publications that provided information on depth of the well, open interval, and type of opening. Drillers' logs or records are filed with the Nevada Division of Water Resources (NDWR) or maintained by the well owner; Fenix and Scisson, Inc., and Raytheon Services Nevada were contractors for USDOE and maintained a summary of well-construction information for selected wells in the area. Publications are USGS reports written for USDOE as part of cooperative studies associated with weapons-testing hydrology programs (Thordarson and others, 1967; Johnston, 1968) or Yucca Mountain site-characterization studies (Robison and others, 1988).

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

Site number: Sites are grouped by hydrographic area and, within each area, are listed in general north-to-south, then west-to-east order. See section "Site Number" for further discussion.

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

Accessible well depth: Well depths listed are as reported in sources listed in explanation for Data source below or as measured by USGS personnel since September 1990 (noted with 's'). See section "Accessible Well Depth" for further discussion.

Casing diameter at land surface: Casing segment most prominent at land surface. Outside diameter has been rounded to nearest inch.

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

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

Diameter of open interval: Casing inside diameter has been 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, screen, type not known; U, unknown, no data; X, uncased borehole.

Data source: D, Well driller's log, well-completion report, or 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 well. C, carbonate rock; F, valley fill; S, undifferentiated sedimentary rock; V, volcanic rock.

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Accessible well 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	GEXA Well 4	1,600	16	800	1,600	10	P	D	V
CF-1a	365445116383901	GEXA Well 3	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	Cind-R-Lite Well	460	9	320	460	8	P	D	S
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		

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

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Accessible well 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				
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		
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-3a	363521116352501	Davidson Well	240 s	16	120	250	15	P	D	F
AD-4a	363428116234701	Cooks East Well	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	Blackman Well	210	7	U	U	U	U	O	F

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

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Accessible well 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-8	362929116085701	Cherry Patch Well	215 s	15	U	U	U	U	M	F
AD-9	362848116264201	Gilgans North Well	396 s	13	60	90	12	P	D	F
					154	244	12	P		
					245	396	15	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	Garners Well	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

Contributing Lithologic Units

Contributing units (table 2) are the principal lithologic intervals at the site that yield water to the well. Robison and others (1988) describe the contributing units at sites CF-2, JF-1, JF-2, JF-2a, and J-13. McKinley and others (1991) describe the contributing units for sites J-11, J-12, MV-1, AD-4a, AD-5, AD-6, AD-8, and AM-8. Dudley and Larson (1976) describe the contributing units for sites AM-2, AM-5, and AM-7. Contributing-unit data are not available from listed data sources for some wells; the contributing units indicated for those wells are derived from drillers' logs or well-completion reports that describe geology and open intervals in the boreholes and from measurements of depth to water.

DATA-COLLECTION PROCEDURES AND EQUIPMENT

Water-level and discharge data were compiled from available sources, from USGS files and data bases, and from measurements made by U.S. Geological Survey Environmental-Monitoring Program (USGS-EMP) personnel. Data-collection procedures and equipment used by USGS-EMP are described in detail, and procedures or equipment used by other sources are described briefly. Water-use data are compiled from available sources as described in the section "Ground-Water Withdrawal Data."

Periodic Water-Level Data

Periodic water-level measurements (table 5) are generally made during site visits, using one of the methods described in the section "Water-Level Measurements." An exception is data that are based on water levels continually collected by the National Park Service at site AM-4 (Devils Hole; see "Other"). Supplemental information, including land-surface altitude, height of measurement point, method of measurement, site status, and source of data, is listed in table 5 also.

Land-Surface Altitude and Height of Measurement Point

Land-surface altitude and height of the measurement point (MP) above (or depth below) land surface are included with periodically collected data in table 5. Land-surface altitude is a representative altitude of land at or near the site. An exception is site AM-4, where the land-surface altitude represents the altitude of the measurement point (a bolt fastened to the south wall of the fissure) that is not referenced to land surface. Land surveys were made by USGS personnel at the monitoring sites to determine the altitudes of land surface or the MP.

Heights of MP's for sites in Amargosa Desert (except AM-4), Death Valley, and Rock Valley were determined by measuring the distance of the MP above (or depth below) a representative point on the land surface at or near the well. The altitude of the MP was determined during the USGS land survey, and land-surface altitude was computed by adding or subtracting the MP height from the surveyed MP altitude.

At sites JF-1, JF-2, JF-2a, and J-13, USGS land surveys verified previously reported land-surface and MP altitudes. At sites CF-2, J-11, and J-12, USGS land surveys verified the previously reported land-surface altitudes and determined the MP altitude by adding the height of the MP to the land-surface altitude. At sites CF-1, CF-1a, and MV-1, USGS land surveys determined the land surface and MP altitudes. The height of the MP is the difference between the MP altitude and land-surface altitude. Land-surface altitudes are reported to the nearest tenth of a foot.

Depth to Water and Altitude of Water Surface

Depth to water is the depth to water below land surface. It is computed as the measured depth to water below the MP minus the height of the MP (above land surface) at the well. An exception is site AM-4, where depth to water is measured below the MP, and the MP is not referenced to land surface. Where depth to water is negative (site AM-2), the water surface is above land surface.

The altitude of water surface is the depth to water subtracted from the altitude of land surface and is reported to the nearest tenth of a foot.

Water-Level Measurements

Periodic water-level measurements were made or calculated using the procedures and equipment described in the following sections.

Calibrated Electric Tape

USGS-EMP personnel used five calibrated 1,000-ft electric tapes during 1995. Each tape was marked with a unique identifier (YMP-2, YMP-4, YMP-5,

YMP-6, and YMP-8) for quality-assurance purposes. The electric tapes were calibrated against steel tapes. At depths greater than 500 feet the electric tapes were calibrated against one of two U.S. Geological Survey Site-Characterization Program (USGS-SCP) calibrated steel tapes identified by USGS-SCP as Chain #3 or Chain #4. For shallower depths, the USGS-EMP 500-ft reference steel tape #1 was used for calibration. Summarized in table 3 are selected calibration data for the electric tapes; calibration data for tapes YMP-2 and YMP-5 are presented in Westenburg and La Camera (1996) and are not repeated in this report.

The corrections to the USGS-SCP calibrated steel tapes account for mechanical stretch and thermal expansion of the tape. No corrections were necessary for the USGS-EMP 500-ft reference steel tape because mechanical stretch and thermal expansion of the tape are considered negligible at the depths to water measured. The correction for the electric tapes is the difference between the corrected steel-tape measurement and the uncorrected electric-tape measurement.

A summary of correction factors applied to USGS-EMP electric tapes is listed in table 4. The correction factor is used to adjust depth-to-water measurements made with an electric tape to account for mechanical stretch, inaccurate marking, and changes to the physical condition of the tape. The measurement period represents the dates in which the correction factors were used.

Applied correction factors for a particular tape usually are averages of discrete correction factors presented in table 3; the applied correction factors are based on ranges of measured depths to water or measurement periods within which the difference between an average and any discrete factor is 0.05 ft or less. When an average correction factor cannot be derived accordingly, presumably due to an indeterminate change in the physical condition of a tape, the applied correction factor for a given range of depths to water or measurement period is calculated from a linear proration of factors determined for successive calibrations. Linear prorations of correction factors are represented by listing the beginning and ending factors separated by "to" in table 4.

Correction factors applied to electric-tape measurements in 1995 ranged from 0 to about 0.5 ft. Electric tape YMP-2 was dedicated for use at site CF-1 due to measurement difficulties and placed in the well on April 23, 1993; the correction factor for that tape is based on calibration data collected prior to placement in the well. No ending calibration was possible for electric tapes YMP-5 and YMP-8 because the tapes were unexpectedly damaged on October 16 and 24, 1995 (respectively); the correction factors for these tapes in 1995 were determined from calibration data collected prior to the damage.

Calibrated electric tapes were used at wells when frequent repetitive measurements were required due to fluctuating water levels, depths to water were greater than 500 ft, or wet conditions inside a well prevented measurements using chalked steel tapes. Electric-tape measurements are made by lowering the end of the tape to the water surface until a light or buzzer is activated when a probe on the end of the tape contacts the water. The tape is raised and lowered slowly until the exact point of contact is located. While holding the tape on the MP, the depth to water below the MP is read from markings on the tape. At least two measurements are made during each site visit, and supplemental measurements are made if those two measured depths differ by more than 0.05 ft. If supplemental measurements indicate the difference is due to fluctuating water levels, the measured depths and appropriate site status are recorded. Measurements using calibrated electric tapes are indicated by method "V" in table 5.

An example calculation of depth to water below land surface for a site, using USGS-EMP calibrated electric tape YMP-6, is shown below:

Location: JF-3
Date: June 21, 1995
Tape ID: YMP-6 Correction factor: -0.29 ft (for depths greater than 700 ft)

Depth below MP	712.98 ft
Correction factor	-.29 ft
Corrected depth below MP	712.69 ft
Height of MP above land surface	-2.27 ft
Depth to water below land surface	710.42 ft

Steel Tape

USGS-EMP personnel maintain one 500-ft steel tape as a reference tape and two field steel tapes (one 500-ft and one 300-ft) for routine measurements. The three steel tapes are uniquely marked (reference steel tape #1, ST-2, ST-3) for quality-assurance purposes. The field tapes were checked against the reference tape at several depths to water during December 1992. All the steel-tape measurements were within 0.01 ft of the reference tape; as a result, no correction factor was used for water-level measurements made with USGS-EMP steel tapes.

Table 3. Electric-tape calibration data used to derive correction factors for calendar year 1995. Calibration data for tapes used during 1995 but not listed herein are presented in previous reports on selected ground-water data for Yucca Mountain region.

[USGS-EMP ST1, U.S. Geological Survey Environmental-Monitoring Program 500-ft reference steel tape #1; USGS-SCP ST3, U.S. Geological Survey Site-Characterization Program Chain #3 (steel tape); USGS-SCP ST4, U.S. Geological Survey Site-Characterization Program Chain #4 (steel tape)]

Date	Site number	Tape used	Depth below measuring point		Correction (feet)
			Uncorrected (feet)	Corrected (feet)	
05/05/94	CF-2	USGS-SCP ST3	605.08	605.04	-.04
		YMP-4	604.94	605.04	+.10
05/19/94	AD-5	USGS-EMP ST1	122.50	122.50	.00
		YMP-4	122.65	122.50	-.15
	AD-11	USGS-EMP ST1	226.90	226.90	.00
		YMP-4	227.10	226.90	-.20
	AD-13	USGS-EMP ST1	383.10	383.10	.00
		YMP-4	383.20	383.10	-.10
01/11/95	AD-5	USGS-EMP ST1	121.50	121.50	.00
		YMP-4	121.66	121.50	-.16
		YMP-8	121.50	121.50	.00
	AD-13	USGS-EMP ST1	383.95	383.95	.00
		YMP-4	384.07	383.95	-.12
		YMP-8	383.97	383.95	-.02
01/12/95	CF-2	USGS-SCP ST4	605.20	605.16	-.04
		YMP-4	605.05	605.16	+.11
		YMP-6	605.45	605.16	-.29
		YMP-8	605.15	605.16	+.01
	J-12	USGS-SCP ST4	745.39	745.36	-.03
		YMP-4	744.98	745.36	+.38
		YMP-6	745.67	745.36	-.31
		YMP-8	745.33	745.36	+.03
1/18/95	AD-1	USGS-EMP ST1	271.26	271.26	.00
		YMP-4	271.44	271.26	-.18
		YMP-8	271.28	271.26	-.02
1/12/96	AD-5	USGS-EMP ST1	123.78	123.78	.00
		YMP-4	123.92	123.78	-.14
	AD-11	USGS -EMP ST1	227.15	227.15	.00
		YMP-4	227.34	227.15	-.19
	AD-1	USGS-EMP ST1	271.00	271.00	.00
		YMP-4	271.18	271.00	-.18
	AD-13	USGS-EMP ST1	383.62	383.62	.00
		YMP-4	383.68	383.62	-.06
2/7/96	CF-2	USGS-SCP ST3	604.99	604.95	-.04
		YMP-4	604.77	604.95	+.18
	J-12	USGS-SCP ST3	744.34	744.31	-.03
		YMP-4	743.76	744.31	+.55
		YMP-6	744.59	744.31	-.28

Table 4. Applied correction factors (in feet) for electric tapes YMP-2, YMP-4, YMP-5, YMP-6 and YMP-8. Correction factors are based on calibration data listed in table 3 of this and previous reports on selected ground-water data for Yucca Mountain Region.

[--, no measurements made for given depth-to-water range during period specified]

Tape	Measurement period		Depth to water below measurement point			
	Start	End	Less than 300 feet	300-500 feet	501-700 feet	Greater than 700 feet
YMP-2	01/01/95	12/31/95	--	--	-0.47	-0.47
YMP-4	01/12/95	02/07/96	-0.17	-0.09	+0.13	+0.38 to +0.55
YMP-5	01/19/95	10/16/95	-0.02	+0.04	+0.25	+0.43
YMP-6	01/01/95	12/31/95	--	--	-0.29	-0.29
YMP-8	01/11/95	10/24/95	0.00	0.00	0.00	0.00

General procedures for using 300- and 500-ft reeled steel tapes are to (1) chalk the bottom section of the tape, (2) lower the tape into the well until part of the chalked section is below the water surface, (3) hold the tape on the MP and record the "hold" reading, (4) raise the end of the tape to the surface, observing the "cut" (the top of the wet part of the chalked tape), (5) record the reading of the cut, (6) calculate the depth to water below the MP by subtracting the "cut" reading from the "hold" reading, and (7) calculate the depth to water below land surface by subtracting the height of the MP from the depth to water below MP. USGS-EMP personnel make a minimum of two measurements during each site visit to verify the initial measurement. 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 level, the measured depths and appropriate site status are recorded.

USGS-SCP personnel made water-level measurements using calibrated steel tapes at sites CF-2, JF-1, JF-2, JF-2a, J-13, J-11, and J-12. Descriptions of the steel tapes, applicable corrections, and procedures used by USGS-SCP for making steel-tape measurements are given by Robison and others (1988, p. 6-11), Gemmell (1990, p. 8-12), O'Brien (1991, p. 8-13), O'Brien and others (1995, p. 4-7), Tucci and others (1996a, p. 5-8), and Tucci and others (1996b, p. 5-8). USGS-SCP steel-tape measurements were compiled from information provided by USGS-SCP (Robert L. Goemaat, U.S. Geological Survey, written communs., 1995). Corrected depth-below-MP measurements were provided by USGS-SCP personnel and converted to depth below land surface by USGS-EMP personnel by subtracting the height of the MP above land surface.

Water-level measurements at some monitoring sites were made by other personnel from the USGS using 300- or 500-ft reeled steel tapes and the general procedures previously described. All measurements using steel tapes are listed with method "S" in table 5.

Other

Site AM-4 (Devils Hole) has a small metal bolt fastened to the south wall of the fissure; the bolt is the measurement point and depth-to-water below the MP is measured with a ruled tape by USGS-EMP personnel during site visits. Such measurements are listed with method "N" in table 5. A water-level recorder operated by the National Park Service (NPS) at site AM-4 also records the depth to water below an installed measurement point. The daily mean water levels for each month with a complete daily record are used to compute a monthly average water level. The monthly average water levels, indicated with method "A" in table 5, are listed as periodic water-level data for the 15th of the month.

Site JF-2a (UE-25p 1 PTH) was equipped with a pressure transducer in March 1985 as part of site-characterization studies (Luckey and others, 1993, p. 117). USGS-SCP personnel calibrate the pressure transducer, develop an equation to convert transducer voltage to depth to water below the MP, and record voltage of the transducer during each site visit. Owing to the small diameter of the access tubes, the transducer must be removed to provide access for measuring the water level with a steel tape. When a steel-tape measurement cannot be made, the depth to water can be computed using the USGS-SCP transducer voltage data and current conversion equation. Periodic water-level measurements at site JF-2a, indicated with method "B" in table 5, are computed using this procedure. Installation, calibration, and operation of pressure transducers by USGS-SCP are described by Luckey and others (1993, p. 14-21), Lobmeyer and others, (1995, p. 12-14), O'Brien and others (1995, p. 8-10), Tucci and others (1996a, p. 10-12), and Tucci and others (1996b, p. 9-11).

Some water-level measurements were made by U.S. Fish and Wildlife Service (USFWS) with uncalibrated electric tapes and are listed with method "T" in table 5. The measurement procedure used is similar to that for a calibrated electric tape, except measurements are not corrected on the basis of comparisons to reference steel tapes.

Methods of water-level measurement were not specified for some data provided by private owners and the Nevada Division of Water Resources. Measurements made using unknown methods are indicated by "Z" in table 5.

Continual Water-Level Data

Two sites, JF-3 and AD-6, are instrumented by USGS-EMP to continually record ground-water level, atmospheric pressure, and battery voltage at 15-minute intervals. Instrumentation includes a gaged (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, battery voltage, and daily average depth to water.

The pressure sensors at sites JF-3 and AD-6 transmit data to the data logger in pounds per square inch, which varies with the height of the water above the sensor. The range of output is 0 to 5.000 lb/in^2, which corresponds to a theoretical range of 0 to 11.53 ft of water above the pressure sensor. The general steps for installing and calibrating pressure sensors and processing pressure-sensor data are as follows:

1. Depth to water below MP is measured with a steel or calibrated-electric tape and recorded. If a calibrated electric-tape measurement is made, a correction factor is applied. Depth to water below MP is used for pressure-sensor calibration, rather than depth to water below land surface, because a fixed point of reference is required.

2. The pressure-sensor cable is connected to a data logger and the sensor is lowered down the well until a substantial change in readings indicates the water surface has been reached. These readings are recorded in the data logger and on a field sheet.

3. The sensor is lowered to a set point and the pressure-sensor readings are recorded after the sensor equilibrates. The set-point depth of the sensor is determined by adding the depth-to-water measurement to the depth at which the sensor is installed below the water surface. For example, if the depth-to-water is 710 ft below the MP and the sensor is installed 5 ft below the water surface, the set-point depth is 715 ft. The sensor cable is marked or tagged at the MP. This mark or tag is used for making measurements when the pressure sensor is raised or lowered.

4. Following installation, the sensor is calibrated for a range of depths that spans the anticipated range of water-level fluctuation. Water-level fluctuations (differing depths to water below the MP) are simulated by raising and lowering the pressure sensor. Raising the sensor 1 ft above the set point will decrease the amount of submergence of the pressure sensor by 1 ft, thereby simulating a 1 ft increase in depth to water. For example, if the depth to water is 710 ft below the MP (step 1) and the sensor is raised 1 ft, the simulated depth to water below the MP would be 711 ft (710+1=711 ft). Lowering the sensor 1 ft below the set point will increase the amount of submergence of the pressure sensor by 1 ft, thereby simulating a 1 ft decrease in depth to water. If the depth to water is 710 ft below the MP and the sensor is lowered 1 ft, the simulated depth to water below the MP would be 709 ft (710-1=709 ft).

The sensor is raised and lowered at 1/2-, 1-, or 2-ft intervals above or below the set point. The tag or marking placed on the sensor cable at the set point (step 3) provides a reference for measuring the distance the sensor is raised or lowered. After the sensor output has stabilized at each interval, the time, pressure readings

from the data logger (in pounds per square inch), distance of sensor above or below the set point, and simulated depth to water are recorded. The sensor cable is marked or tagged at the measured intervals and later used for calibration checks.

5. Upon completion of pressure-sensor calibration, the sensor is returned to the set point and the time and pressure readings from the data logger are recorded. Another water-level measurement is made with a steel or calibrated-electric tape and recorded to check for fluctuation of the water level during installation or calibration of the sensor.

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

The applicable period for utilizing a particular regression equation (to convert pressure readings to depth to water below the MP) generally corresponds with calibrations at the beginning and ending of that period. In some cases, however, the applicable period for a regression equation does not correspond with successive calibrations and a period is selected that minimizes differences between steel-tape measurements and computed water levels at dates intermediate to the two calibrations.

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

Data are retrieved from the data logger using a portable computer, transferred to the USGS National Water-Information System (NWIS), and processed using data-base programs to store pressure-sensor, barometer, and battery data. The pressure-sensor data are converted to depths below land surface and stored. Daily average values are computed from the continual data and stored in the data base. Daily average depth-to-water values are used to compute daily average water-level altitudes, which also are stored in the data base.

Pressure-Sensor System at Site JF-3

Instrumentation is installed at JF-3 to continually collect water-level data every 15 minutes. Equipment was calibrated on January 18, 1995, when a malfunctioning transducer was removed and a functioning transducer was installed, and a regression equation was developed: depth to water below land surface = (-2.321 × pressure reading) + 715.590. Pressure readings stored in the data base for January 18 to October 27 were converted to depth to water below land surface with this equation. Differences between reference measurements made with calibrated electric tapes and computed water levels based on conversion of pressure readings during that period ranged from -0.28 ft (October 7, 1995) to 0.00 ft (January 18, 1995, and February 15, 1995). Equipment was recalibrated on May 9, 1996. A new regression equation was developed: depth to water below land surface = (-2.351 × pressure reading) + 715.290. This equation was used for October 27 to December 31, thereby minimizing corrections to computed water levels. Differences between reference measurements made with calibrated electric tapes and the computed water levels (using the new regression equation) ranged from 0.09 ft (October 27, 1995, and November 21, 1995) to 0.11 ft (December 28, 1995).

Depth-to-water measurements made with calibrated electric tapes during 1995 (table 5) ranged from 710.10 ft (March 16) to 710.57 ft (January 18) below land surface. The daily average water levels (table 6) ranged from 709.85 ft (March 21) to 710.60 ft (February 16 and 17) below land surface.

Pressure-Sensor System at Site AD-6

Instrumentation is installed at AD-6 to continually collect water-level data every 15 minutes. Equipment was calibrated on November 9, 1993, and a regression equation was developed: depth to water below land surface = (-2.340 × pressure reading) + 46.731. Pressure readings stored in the data base for January 1 to January 30, 1995, were converted to depth to water below land surface with this equation. The difference between a reference measurement made with a reeled steel tape and computed water level based on the

conversion of a concurrent pressure reading was -0.02 ft on January 30, 1995. Equipment was recalibrated on June 9, 1995, and a regression equation was developed: depth to water below land surface = (-2.350 x pressure reading) + 46.626. This equation was used from January 30 to June 26, 1995, (when the transducer was replaced) to minimize corrections to computed water levels. Differences between reference measurements made with reeled steel tapes and computed water levels based on conversion of pressure readings during that period ranged from -0.01 ft (June 26) to 0.04 ft (February 14). The transducer that was installed on June 26, 1995, was calibrated on June 28 and a new regression equation was developed: depth to water below land surface = (-2.364 x pressure reading) + 46.11. Pressure readings stored in the data base for June 26 to December 31, 1995, were converted to depth below land surface with this equation. Differences between reference measurements made with reeled steel tapes and computed water levels, using the new regression equation, ranged from -0.04 ft (June 26 and June 28) to 0.01 ft (August 24 to December 28).

Depth-to-water measurements made with reeled steel tapes during 1995 (table 5) ranged from 41.42 ft (February 14) to 41.74 ft (June 9) below land surface. The daily average water levels (table 7) ranged from 41.47 ft (May 12 and 13) to 41.77 ft (November 7 and 11 and December 25) below land surface.

Other

Three monitoring sites also are instrumented to continually collect water-level data as part of other programs; those data are collected, processed, and reviewed by personnel associated with other programs and can be obtained from principal investigators for those programs. Site JF-2a was instrumented by USGS-SCP personnel. Sites AM-5 and AM-7 were instrumented as part of USGS, Nevada District programs.

Ground-Water Discharge Data

Measurements of ground-water discharge were collected and compiled for five springs and one flowing well. Four of the sites, AM-1a, AM-2, AM-5a, and AM-8, are in the Ash Meadows spring-discharge area of the Amargosa Desert. The other two sites, DV-1 and DV-2, are in Death Valley. Discharge measurements were made by NPS, USFWS, and USGS. Periodic or monthly mean discharge data were determined by the use of current meters, flumes, and volumetric techniques.

The most commonly used method for measuring discharge, indicated by method "C" in table 8, was the vertical-axis current meter. This method is used to determine the average velocity of a partial section within a channel cross section. The average velocity within the partial section times the area of the partial section equals the discharge of that section. The summation of the discharges for all the partial sections is the total discharge in the channel. This method is described in more detail by Buchanan and Somers (1969).

Some discharge values were determined by measuring the depth of water inside a flume. This depth, or stage, is compared to an applicable stage-discharge relation for the flume to determine discharge. Where an instrument has been installed to continually record stage in a flume, mean discharges can be computed for specific periods. This method is indicated in table 8 by method "Z" and was used for site DV-1, where monthly mean discharge was computed for months with complete daily data and reported for the 15th of the month. Determining discharges by the use of flumes is further described by Kilpatrick and Schneider (1983).

The volumetric method, indicated by method "V" in table 8, was used for measuring ground-water discharge from sites AM-2 and DV-2. A container with markings indicating known volumes was used to collect all discharge from the site while a stopwatch was used to determine the amount of time the discharge was collected. The container was positioned to collect the discharge and the stopwatch was started simultaneously. The container was removed, before it was overfilled, and the stopwatch was stopped simultaneously. The volume collected and elapsed time were recorded. The discharge rate is the volume collected divided by the time. This procedure was repeated three times and an average rate was computed for each site visit.

The accuracy of the methods is directly related to the operational conditions of the equipment used and to the environmental conditions in which the equipment operated. Discharge values are reported to two significant figures. Discharge determined by all methods ranged from 1.1 gal/min at site AM-2 to 2,800 gal/min at site AM-5a for 1995 (table 8).

Ground-Water Withdrawal Data

Ground-water withdrawals were estimated from compiled data and are listed in table 9. Withdrawal data were supplied by public agencies including USDOE, USGS, and the Nevada Division of Water Resources (NDWR), and private organizations including Reynolds Electrical and Engineering Company (REECo) and Cathedral Gold U.S. Corporation. Estimated annual ground-water withdrawals are based solely on available data. Estimates for some years, therefore, reflect a lack of information for an entire area or underestimate total withdrawals within an area.

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

Withdrawals from the part of the Amargosa Desert within the subbasin were recompiled from ground-water pumpage inventories taken by NDWR. The pumpage inventories were for the entire Amargosa Desert hydrographic area during 1995, and include estimated withdrawals for irrigation, mining or industrial, commercial, and quasi-municipal and domestic use. All reported withdrawals for irrigation, mining or industrial, and commercial use are from the Alkali Flat-Furnace Creek Ranch ground-water subbasin. All quasi-municipal and domestic use for the Amargosa Desert is included in the subbasin because data were not available to estimate or exclude the amount used in the Ash Meadows ground-water subbasin. Withdrawals from the Amargosa Desert for 1994 have been revised from preliminary information listed by Westenburg and La Camera (1996); the revision is based on further review and processing of data by NDWR subsequent to publication of that report.

Withdrawals from Crater Flat were determined from totalizing flowmeters at site CF-2, site CF-3, and well USW VH-2 (located about 1.5 mi northwest of site CF-2). Withdrawals from site CF-2 are based on quarterly pumpage reports provided by USDOE (Wendy Dixon, U.S. Department of Energy, written communs., 1995 and 1996). Withdrawals from site CF-3 were recompiled from flowmeter readings recorded by USGS-EMP personnel. Withdrawals from well USW VH-2 are based on information supplied by a mine manager (Charles Stevens, Cathedral Gold U.S. Corporation, written commun., 1996). No information was available for withdrawals from site CF-1a, although relatively small amounts of ground water (compared to other withdrawals in Crater Flat) are known to have been pumped periodically in 1995.

Withdrawals from Jackass Flats were determined from totalizing flowmeters at site J-13, site J-12, and well UE-25c #3 (located about 0.5 mi northwest of site JF-2a). Withdrawals at sites J-13 and J-12 were recompiled from flowmeter readings supplied by REECo as part of the USGS Hydrologic Resources Management Program (David B. Wood, U.S. Geological Survey, written commun., 1996). Withdrawals from well UE-25c #3 are based on quarterly pumpage reports provided by USDOE (Wendy Dixon, U.S. Department of Energy, written communs., 1995 and 1996). Withdrawals from Rock Valley are considered negligible on the basis of knowledge of activities in that area.

Withdrawals from Ash Meadows Ground-Water Subbasin

Withdrawals from Mercury Valley were recompiled from flowmeter readings supplied by REECo for site MV-1 as part of the USGS Hydrologic Resources Management Program (David B. Wood, U.S. Geological Survey, written commun., 1996). Withdrawals for quasi-municipal and domestic use from the part of the Amargosa Desert within the subbasin were not available, although ground water is known to have been pumped in 1995.

Quality Assurance

Stringent quality assurance is required for all work pertaining to Yucca Mountain studies to establish adequate confidence in the reliability of data collection, processing, and reporting. In the context of this data-collection program, quality assurance is defined as all planned or systematic actions designed to provide data and records of a desired quality. A variety of quality-control procedures, which are the operational techniques and activities used to meet the required quality objectives, have been implemented.

The numerous management and administrative procedures that control processing, record keeping, and reporting of data by USGS-EMP are not detailed in this report. Generally, data such as location, date and time of measurements, and field measurements are recorded onsite. Those data are reviewed for completeness and accuracy, stored in project files and data bases, and are subsequently included in publications by the USGS.

Following publication, data are stored in a comprehensive record-keeping facility maintained by contractors for USDOE.

In addition to standard USGS practices and the procedures previously described, formal unpublished technical procedures associated with the Yucca Mountain Site Characterization Project have been developed for the collection of water-level and discharge data. Those technical procedures include equipment tests and calibrations, in addition to measurement techniques, to ensure that necessary and expected precision and accuracy are attained. The principal technical procedures that control the collection of data by project personnel are listed by La Camera and Westenburg (1994, p. 17).

PRESENTATION OF GROUND-WATER DATA

Tables included in this report generally list only 1995 ground-water data, whereas the figures show data for the period of record to illustrate changes in ground-water resources through time. Exceptions are tables 3, 4, and 10; tables 3 and 4 include data from 1994 and 1996 used to determine correction factors for electric-tape measurements made during 1995 and table 10 includes a summary of historical water-level measurements at monitoring sites in Jackass Flats. A historical water-level measurement for site MV-1 (found in a 1973 report subsequent to publication of previous reports in this series) and revised data on ground-water withdrawals from wells in the Amargosa Desert during 1994 (on the basis of further review and processing of preliminary data by NDWR) also are listed in tables 5 and 9, respectively. Below is a description of the content of the tables and figures presented in this report.

Tables 5-9 list ground-water data that have been collected and compiled in the Yucca Mountain region as part of this study; they are included at the back of this report. Figures 1-13 are hydrographs and other graphical representations of selected data from the tables in this report, previous reports on selected ground-water data for the Yucca Mountain region, and data collected by USGS-SCP.

Pumping of 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. Observations about such activities (noted by field personnel during site visits) and corresponding water levels, which may represent short-term conditions, are reported for "site status" in the data tables. Data which may reflect short-term conditions, however, are excluded from the figures showing variations in water level through time.

Table 5 lists periodic measurements of depth to water and water-level altitude at 36 sites (including a flowing well) for 1995. Also included is a 1969 water-level measurement for site MV-1, which was found in a 1973 report subsequent to publication of previous reports in this series. Periodically collected data generally are from manual onsite measurements of depth to water. Data at site AM-4 (Devils Hole) reported as data source "NPS," however, are monthly average water levels and are based on continual water levels recorded by instrumentation at the site. Monthly average discharges are reported only for months with a complete daily record. Data collected by other agencies or programs are subject to revision upon further review by that agency or program.

Figures 1-4 show water-level altitudes listed in this report and previous reports on selected ground-water data for the Yucca Mountain region. Data for wells with primary contributing units of carbonate rock, volcanic rock, valley fill, and undifferentiated sedimentary rock are presented.

Tables 6 and 7 list measurements of daily average water levels at sites JF-3 and AD-6, respectively, for 1995. The daily average water levels are based on continually collected data at the sites, which are measurements of water levels recorded by instrumentation at 15-minute intervals.

Figures 5 and 6 show measurements of daily average depth to water and water-level altitude, on the basis of continually collected data listed in tables 6 and 7 of this report and previous reports on selected ground-water data for the Yucca Mountain region, for sites JF-3 and AD-6, respectively. Data are presented for 1992 through 1995.

Table 8 lists periodic measurements of ground-water discharge at six sites for 1995. The data for site DV-1 (Texas Spring) reported with data source "NPS" represent monthly average discharge on the basis of instrumentation at the site. Monthly average discharges are reported only for months with a complete daily record. Discharge data collected by other agencies or programs are subject to revision upon further review by that agency or program.

Figure 7 shows measurements of ground-water discharge at sites AM-1a, AM-5a, and AM-8 through 1995, as listed in this and previous reports on selected

ground-water data for the Yucca Mountain region. **Figures 8 and 9** show measurements of ground-water discharge through 1995 at sites AM-2 and DV-2, and DV-1, respectively, listed in this and previous reports on selected ground-water data for the Yucca Mountain region.

Table 9 shows estimates of annual ground-water withdrawals from wells in the Yucca Mountain region for 1995. Also included are revised estimates of withdrawals from the Amargosa Desert for 1994 (on the basis of further review and processing of preliminary data by NDWR) as presented by Westenburg and La Camera (1996). Estimated annual ground-water withdrawals are based solely on available data, and information on withdrawals provided by other agencies or programs are subject to revision upon further review by that agency or program. Ground-water withdrawals, in millions of gallons and in acre-feet, from water-supply wells are grouped by ground-water subbasin and totaled by hydrographic area (or part of a hydrographic area) for calendar year 1995.

Figures 10 and 11 show estimates of annual ground-water withdrawals listed in this and previous reports on selected ground-water data for the Yucca Mountain region. Shown are withdrawals for areas with available data within the Alkali Flat-Furnace Creek Ranch and Ash Meadows ground-water subbasins, respectively, through 1995.

DISCUSSION OF GROUND-WATER LEVELS AND GROUND-WATER WITHDRAWALS IN JACKASS FLATS

In Jackass Flats, ground water is withdrawn to support several USDOE activities (including site characterization); if those withdrawals affect ground-water levels, the effects may be detected in Jackass Flats before they are detected elsewhere within the Yucca Mountain region. Therefore, the following section discusses data on ground-water levels and ground-water withdrawals in Jackass Flats. Changes in water-level altitudes at a particular site through time, discussed in the text towards the end of this section, are described in an order generally corresponding to increasing distance of the site from water-supply wells J-13 and J-12.

Figure 12 shows water-level altitudes for seven wells in Jackass Flats and estimated annual ground-water withdrawals in Jackass Flats from 1983 through 1995. Prior to 1983, available data on ground-water withdrawals in Jackass Flats generally represent only the withdrawals from well J-12 rather than total withdrawals from Jackass Flats. For greater consistency and comparability of data on water-level altitudes, water levels in wells J-13, J-12, and JF-3 that may have been affected by pumping or recent pumping of the well are excluded from figure 12.

Water-level altitudes presented are based on discrete measurements or daily average water levels (when continual data recorded by instrumentation were available for more than half the year). Water levels based on discrete measurements made during site visits are shown for all sites prior to 1985; for sites JF-1, J-13, J-11, and J-12 since 1985; for site JF-2 in 1994 and 1995; and for site JF-3 prior to May 1992. Daily average water levels from USGS-SCP (R.P. Graves, U.S. Geological Survey, written commun., 1996) are shown for sites JF-2 for 1985-93 and JF-2a for 1985-95; continual data collection at site JF-2 was discontinued in June 1994 and daily water levels were consequently available for less than half of each year following 1993. Daily average water levels also are shown for site JF-3 from May 1992 through December 1995; long-term monitoring and continual data collection at this site began in May 1992.

Ground-water withdrawals consist principally of combined pumpage from water-supply wells J-13 and J-12 (which penetrate volcanic rock). Ground water also was withdrawn from volcanic rock penetrated by well UE-25 c#3 during hydraulic testing of the well in 1995; the amounts were minor compared with annual withdrawals from the water-supply wells. Withdrawals from 1983 through 1995 are from data presented in this and previous reports on selected ground-water data for the Yucca Mountain region.

Total 1995 withdrawals in Jackass Flats were about 91 Mgal. Although withdrawals in 1995 increased at well J-13 and decreased at well J-12 compared to 1994 (D.B. Wood, U.S. Geological Survey, written commun., 1996), total withdrawals in Jackass Flats were approximately the same during 1995 as those during 1994. Compared to the median withdrawal of 52 Mgal for 1983 through 1991 (La Camera and Westenburg, 1994, p. 30), total withdrawals in Jackass Flats decreased about 25 percent in 1992 and increased about 29 percent in 1993. Withdrawals increased substantially in 1994 and have remained relatively constant at about 75 percent greater than the median withdrawal for 1983 through 1991.

Table 10 lists selected statistics derived from data shown in figure 12 for water-level altitudes in Jackass Flats. Data for wells JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 are summarized for the selected baseline periods and for subsequent calendar years through 1995. The table shows the number of measurements; the minimum, maximum, and median water-level altitude; and the average deviation of measured water-levels about the median water level for each period.

To minimize effects of variability in measurement frequency on median water-level altitudes calculated for the period prior to 1992, the selection of a baseline period for each site was based on (1) the maximum number of consecutive years (including 1991) for which water-level measurements are available and (2) consecutive years containing approximately similar frequencies of water-level measurement. For consistency, the baseline period selected at instrumented wells JF-2 and JF-2a was the period following installation of continual recorders. The baseline period for JF-3 was based solely on the availability of daily average water levels from the continual data recorder, which was installed in May 1992. These baseline periods are the standard to which following years are compared.

The median water-level altitudes shown in table 10 indicate a statistically representative ground-water level for a particular time period. The median of water-level measurements is listed because the calculated median is less affected by a few high or low values than the arithmetic mean. When more than half a year of continual data at a site were available (recorded hourly or more frequently by instrumentation), the median of daily average water levels is listed.

The average deviation indicates the variability of the individual measurements about the median; it provides an indication of how precisely the median approximates a typical water-level altitude during the period. The average deviation equals the sum of the absolute differences between individual measurements and the median, divided by the number of individual measurements.

Figure 13 shows the median water-level altitudes and the average deviation of the water levels for wells JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 for baseline periods and for subsequent years through 1995. Selected information presented in the figure is summarized in the following discussion.

Median water-level altitude in water-supply well J-13 is 2,390.0 ft above sea level for the baseline period. Since 1991, median water-level altitude decreased 0.1 ft to 2,389.9 ft in 1992, also was 2,389.9 ft in 1993, decreased an additional 0.2 ft to 2,389.7 ft in 1994, and subsequently increased 0.1 ft to 2,389.8 ft in 1995. Median water-level altitude in well J-13 for 1995 was 0.2 ft lower than that for the baseline period. The decrease in median water-level altitude between the baseline period and 1995 is equal to the apparent precision of the median for the baseline period (as indicated by the average deviation for 1989-91).

Median water-level altitude in water-supply well J-12 is 2,388.3 ft above sea level for the baseline period. Median water-level altitude in 1992 and 1993 was identical to that for the baseline period, decreased 0.1 ft to 2,388.2 ft in 1994, and was unchanged in 1995. Median water-level altitude in well J-12 for 1995 was 0.1 ft lower than that for the baseline period. The amount of change in median water-level altitude between the baseline period and 1995 is equal to the calculated precision (average deviation) of the median for 1990-91.

Median water-level altitude in well JF-3, which is 0.5 mi south of water-supply well J-12 and penetrates volcanic rock, is 2,388.3 ft above sea level for the baseline period. Median water-level altitude in well JF-3 decreased 0.2 ft to 2,388.1 ft in 1994 and was unchanged in 1995. Median water-level altitude for 1995 is 0.2 ft lower than that for the baseline period. The observed change in median water-level altitude exceeds the apparent precision of the median for 1992-93; continued monitoring of ground-water withdrawals in Jackass Flats and water levels at this site should indicate whether lower water levels are sustained or further declines in water levels are observed during periods of withdrawals that are greater than those observed prior to 1993 (figure 12).

Median water-level altitude in well JF-2, which is north of the water-supply wells and penetrates volcanic rock, is 2,392.1 ft above sea level for the baseline period. For 1992 through 1995, median water-level altitudes fluctuated on an annual basis from 2,392.1 to 2,392.4 ft. Median water-level altitude for 1995 was 2,392.4 ft in well JF-2, which is 0.3 ft higher than the median for the baseline period. The increase in median water levels between the baseline period and 1995 is equal to the calculated precision of the median for the baseline period (as represented by the average deviation for 1985-91).

Median water-level altitude in well JF-2a, which is northwest of the supply wells and penetrates carbonate rock, is 2,468.6 ft above sea level for the baseline period. Median water-level altitudes in well JF-2a were identical in 1992 to that of the baseline period, then increased 0.2 ft per year through 1993 and 1994 to 2,469.0 ft and increased an additional 0.1 ft to 2,469.1 ft in 1995. The median water-level altitude for 1995 was 0.5 ft higher than that for the baseline period. That increase is greater than the apparent precision of the median water-level altitude for 1985-91; further monitoring at the well should indicate whether water levels continue to rise, stabilize near higher levels, or subsequently decrease to pre-1995 levels.

Median water-level altitude in well JF-1, which is north of the water-supply wells and penetrates volcanic rock, is 2,392.5 ft above sea level for the baseline period. Since 1991, median water-level altitudes have fluctuated annually from 2,392.3 to 2,392.5 ft. Median water-level altitude in well JF-1 for 1995 is 2,392.5 ft, which is equal to that for the baseline period.

Median water-level altitude in well J-11, which is east of water-supply wells J-13 and J-12 and penetrates volcanic rock, is 2,402.2 ft above sea level for the baseline period. Median water-level altitudes in 1992 and 1993 were identical to that for the baseline period, then increased 0.1 ft per year through 1994 and 1995 to 2,402.4 ft. Median water-level altitude in well J-11 for 1995 was 0.2 ft higher than the median for the baseline period. The amount of change in median water-level altitude between the baseline period and 1995 exceeds the calculated precision (average deviation) of the median for 1990-91; similar to site JF-2a, further monitoring at site J-11 should indicate whether water levels continue to rise, stabilize near higher levels, or subsequently decrease to pre-1995 levels.

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U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BASIC DATA

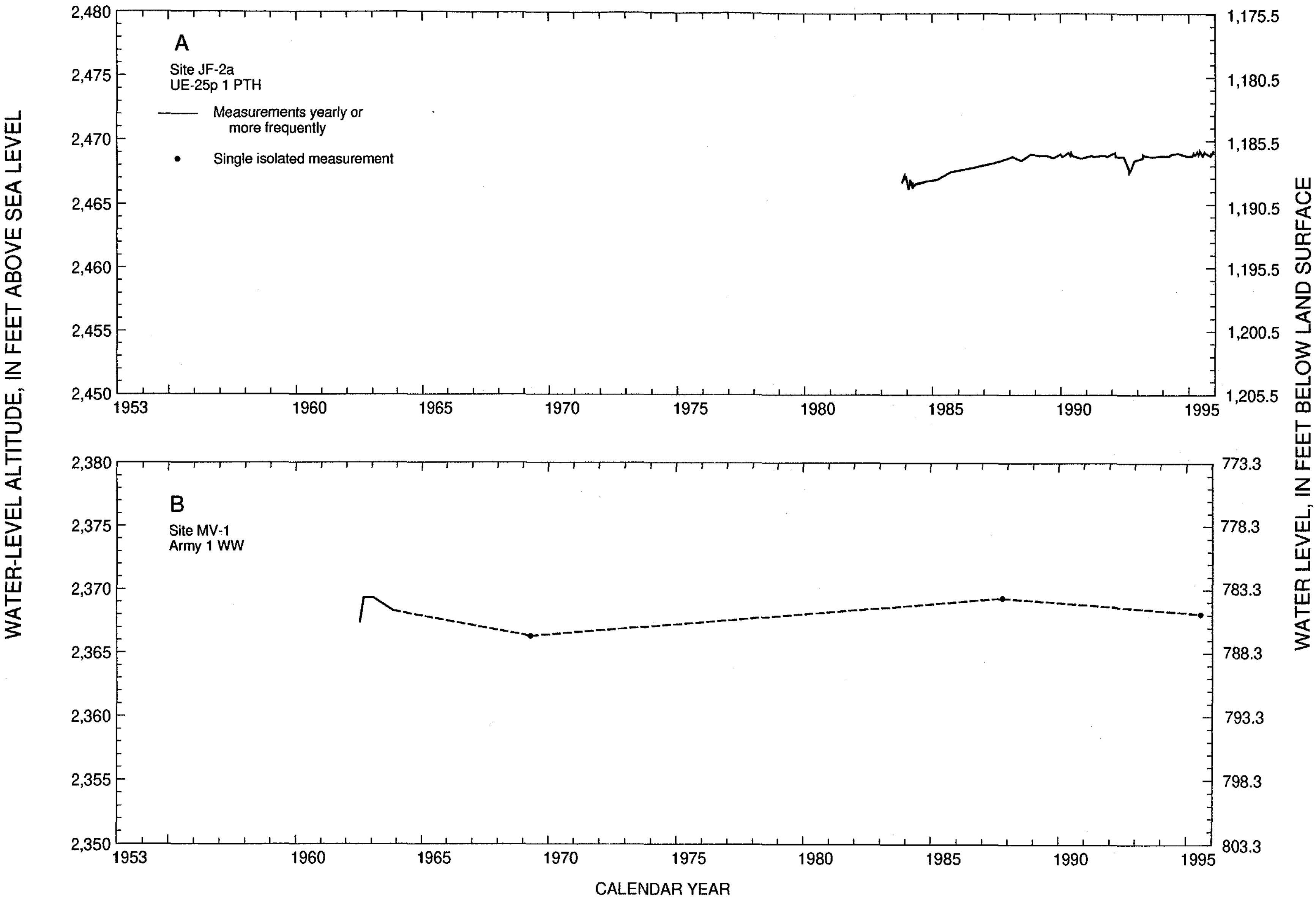
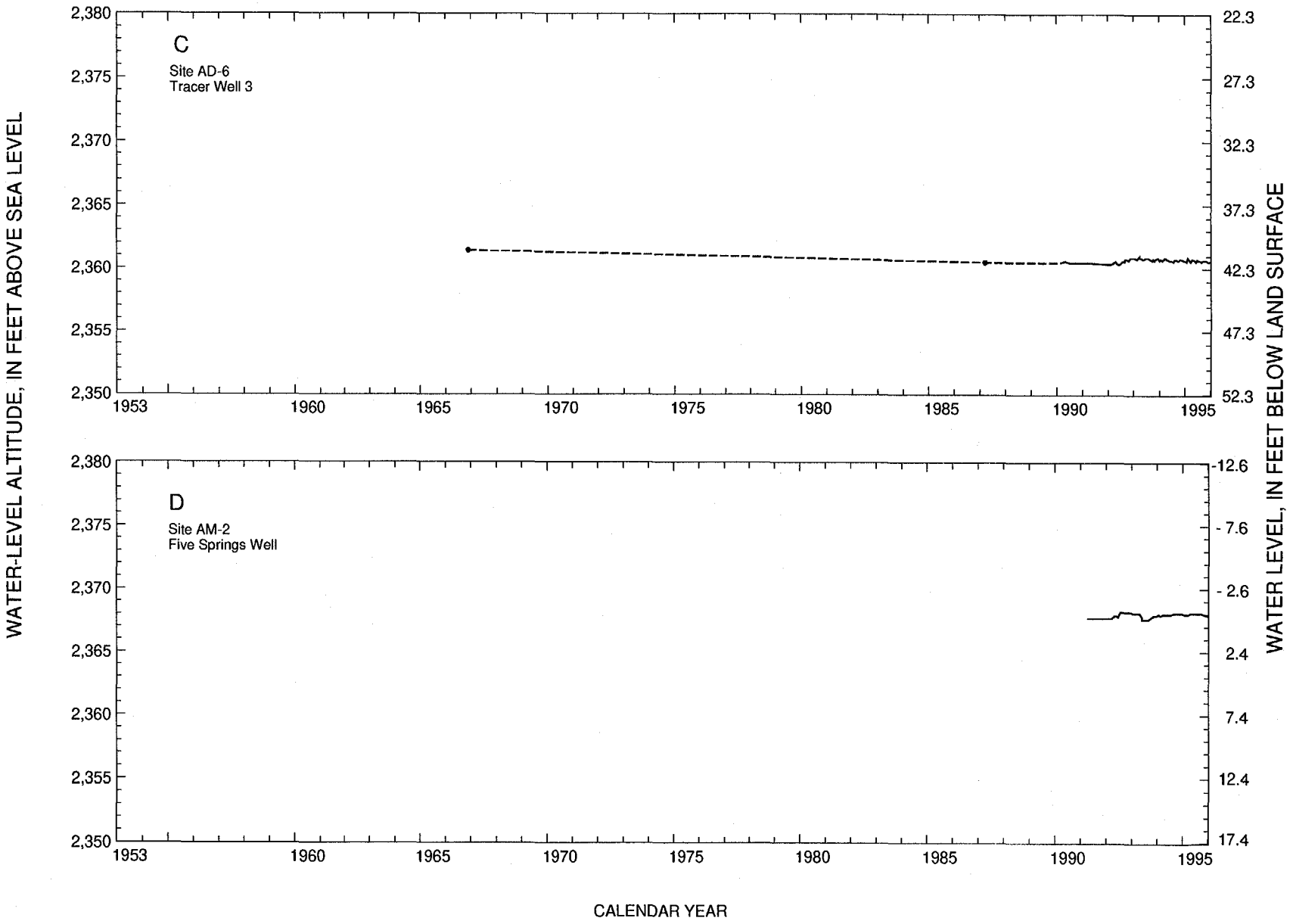


Figure 1. Periodic water levels through 1995 for selected sites at which primary contributing units are carbonate rock. Lines connect discrete data presented in this and previous reports on selected ground-water data for Yucca Mountain region and are dashed where measurements were not available for consecutive calendar years. Data that may represent short-term conditions at a site have been excluded (see section titled "Presentation of Ground-Water Data").



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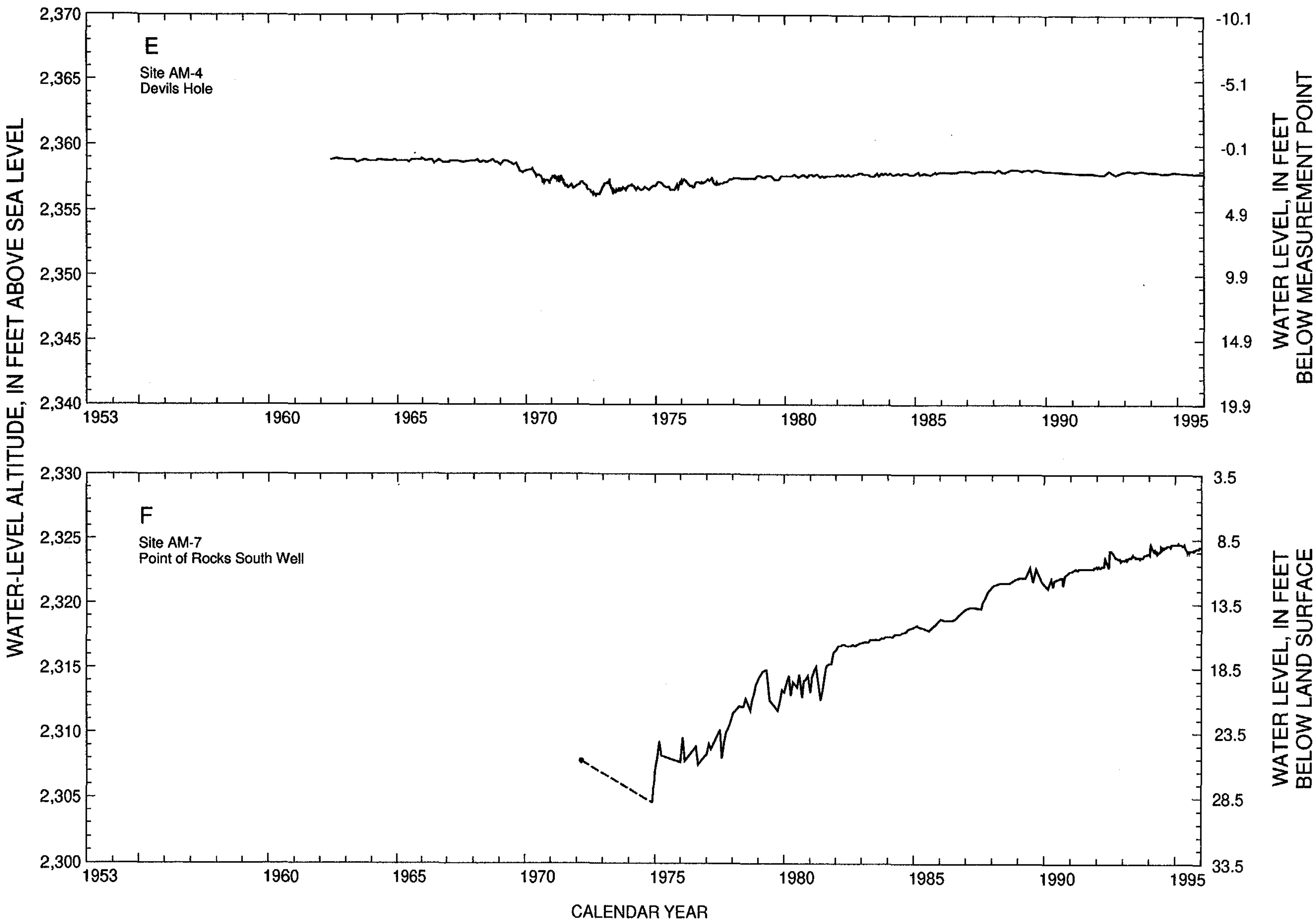

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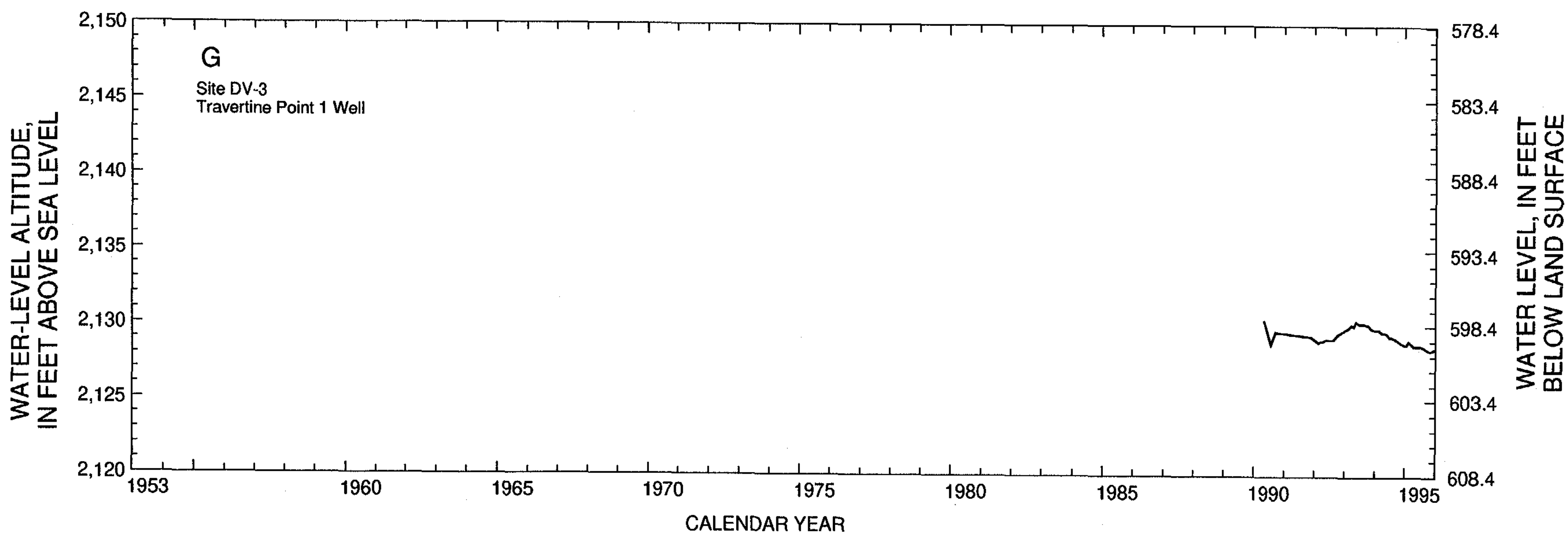

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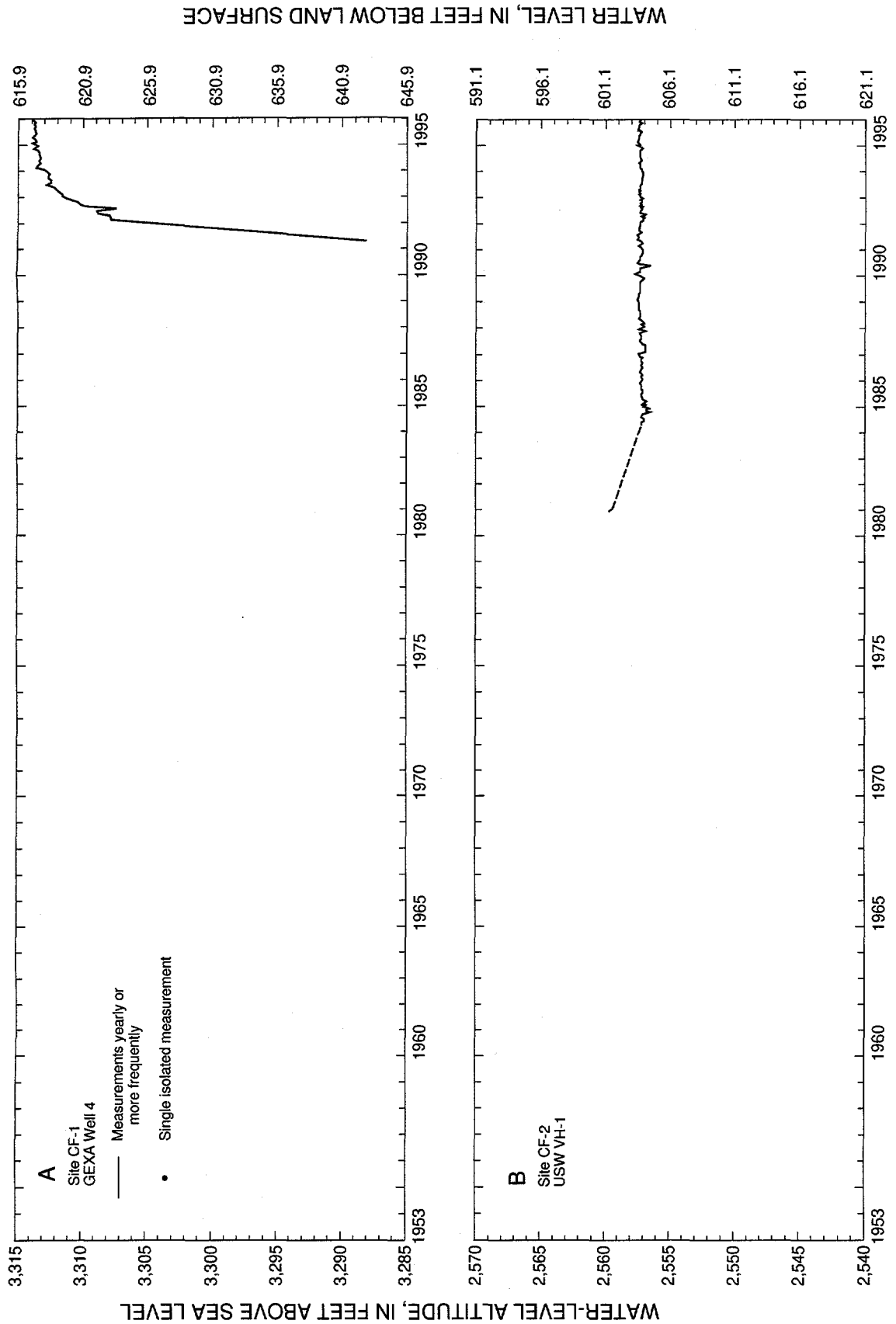
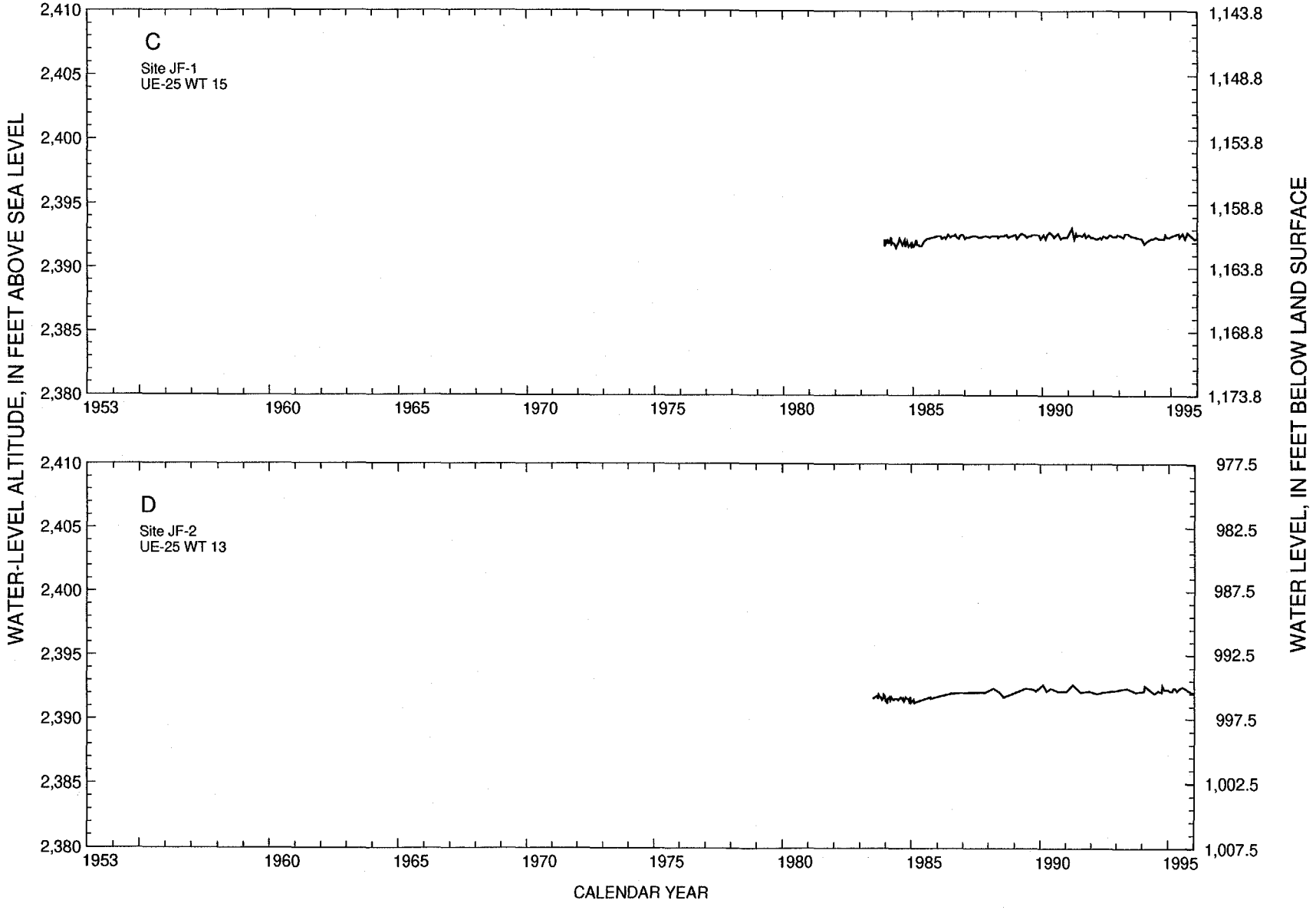


Figure 2. Periodic water levels through 1995 for selected sites at which primary contributing units are volcanic rock. Lines connect discrete data presented in this and previous reports on selected ground-water data for Yucca Mountain region and are dashed where measurements were not available for consecutive calendar years. *Data that may represent short-term conditions at a site have been excluded (see section titled "Presentation of Ground-Water Data").*



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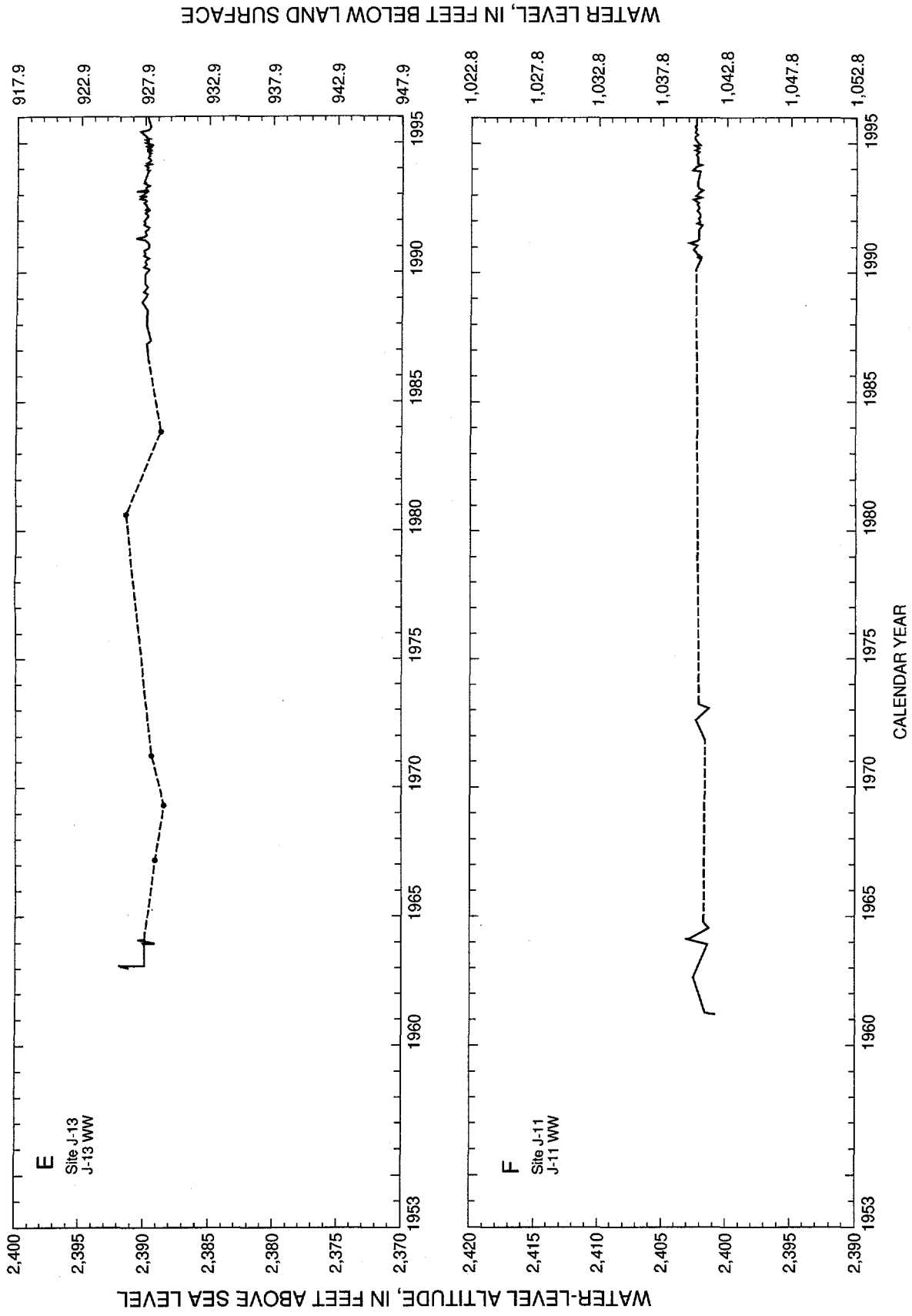

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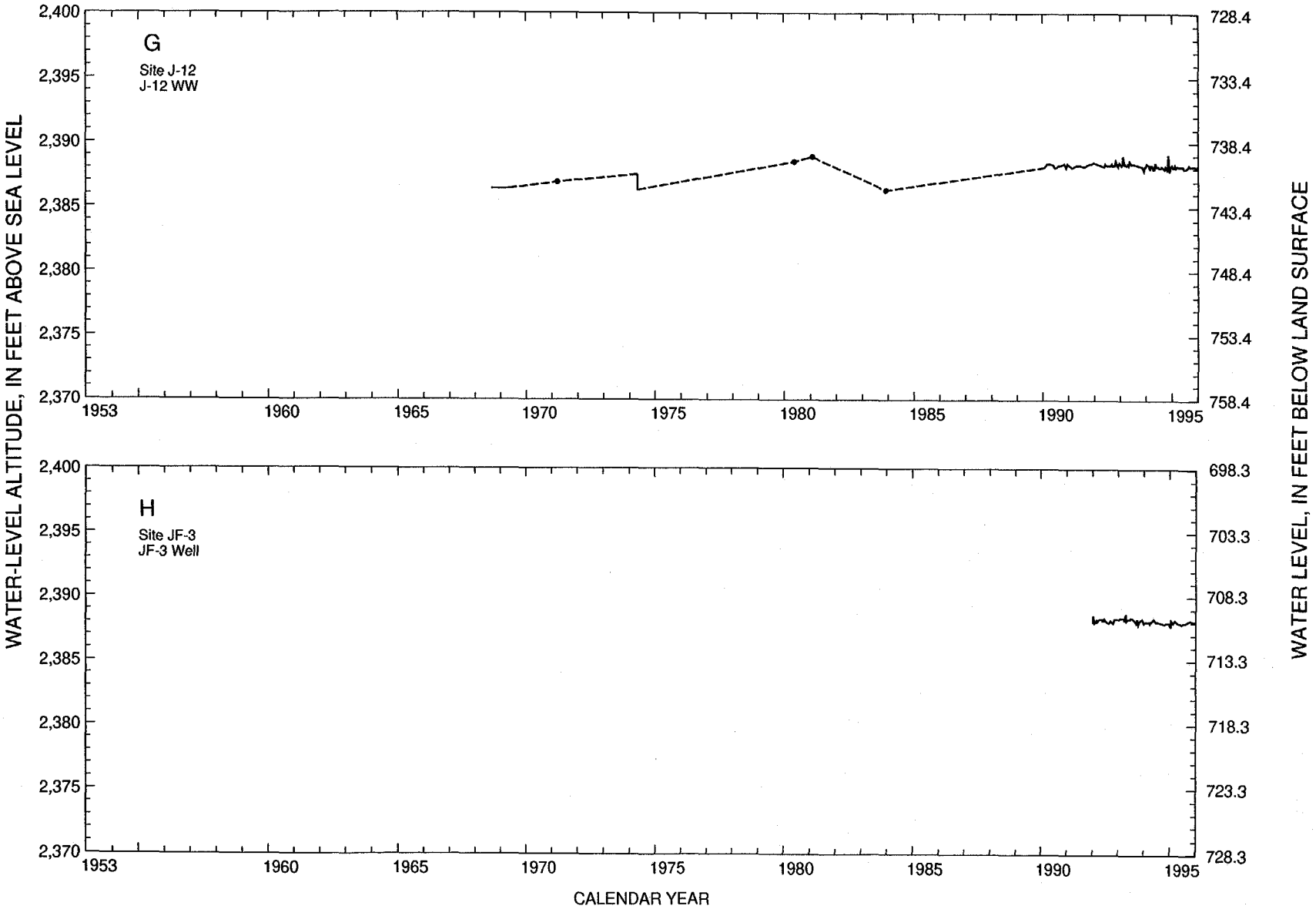

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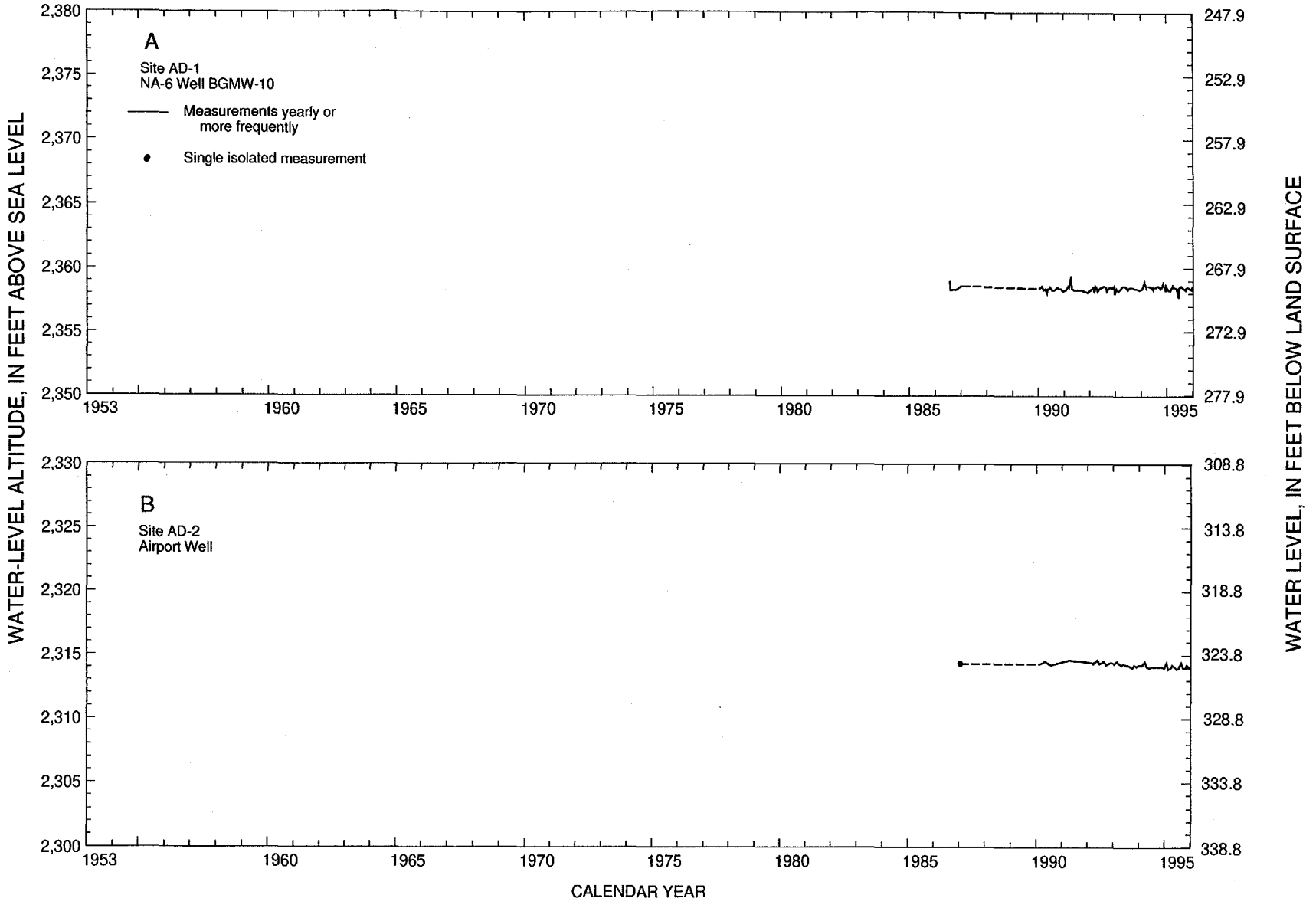
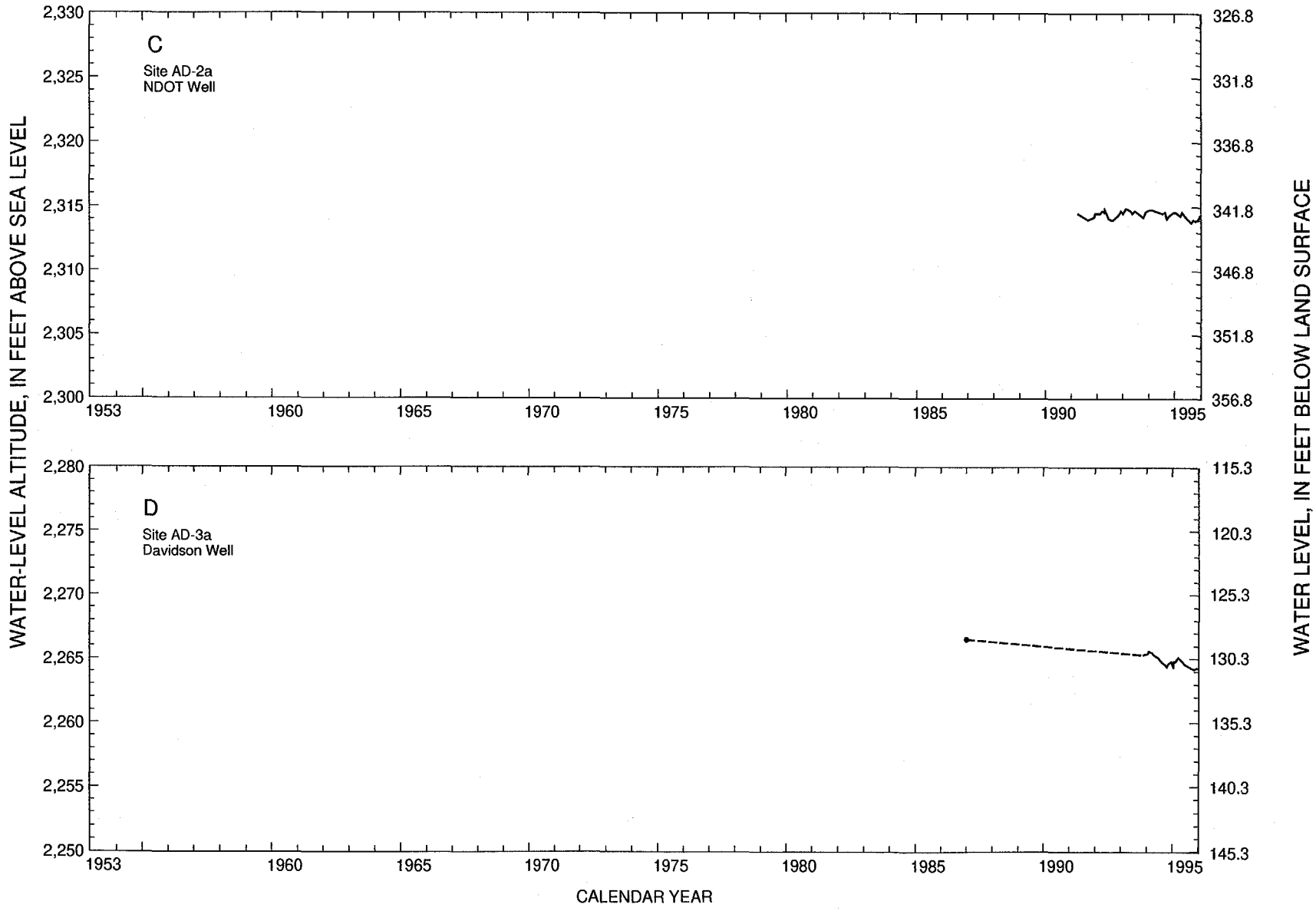


Figure 3. Periodic water levels through 1995 for selected sites at which primary contributing units are valley fill. Lines connect discrete data presented in this and previous reports on selected ground-water data for Yucca Mountain region and are dashed where measurements were not available for consecutive calendar years. Data that may represent short-term conditions at a site have been excluded (see section titled "Presentation of Ground-Water Data").



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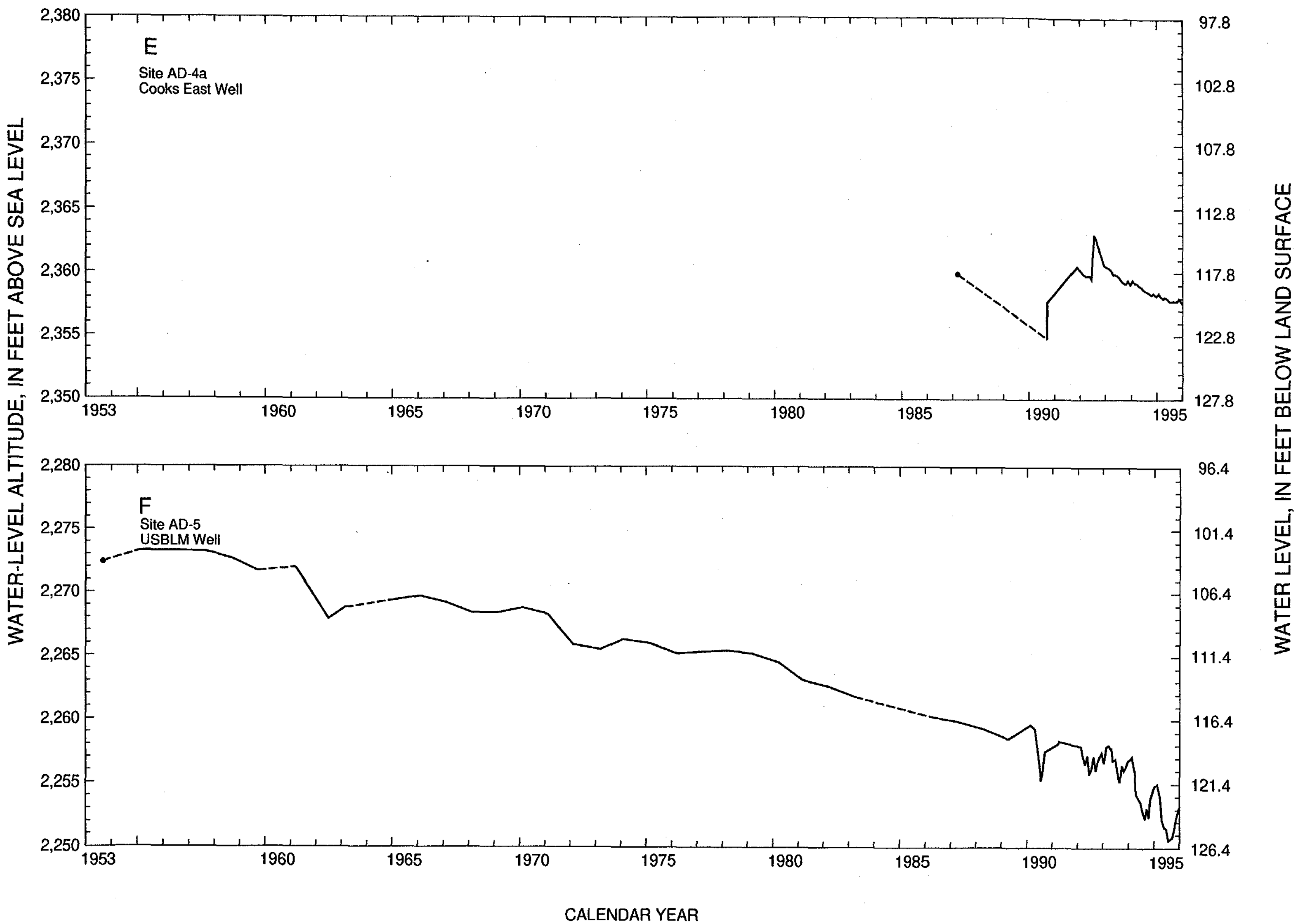

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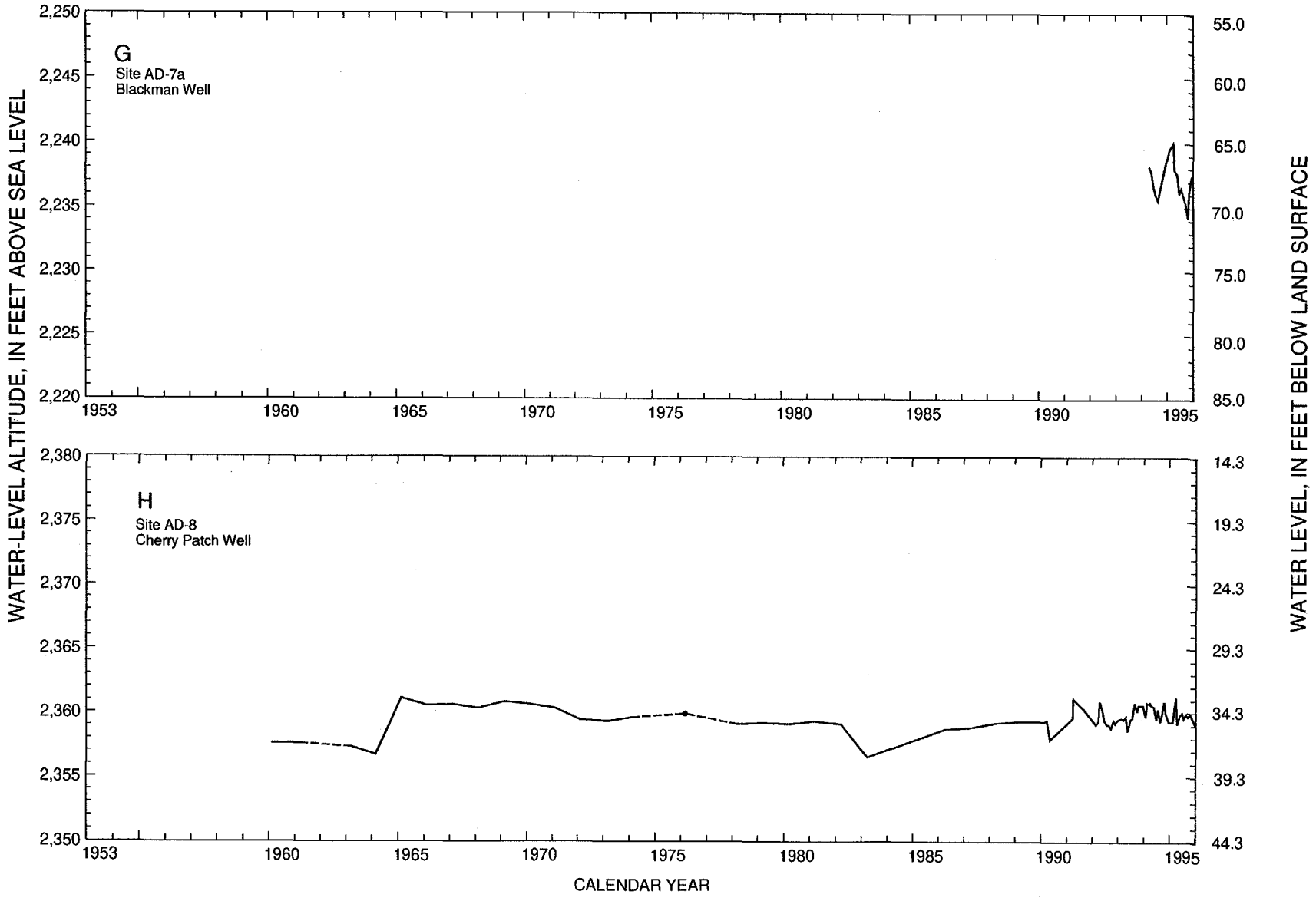


Figure 3. Continued.

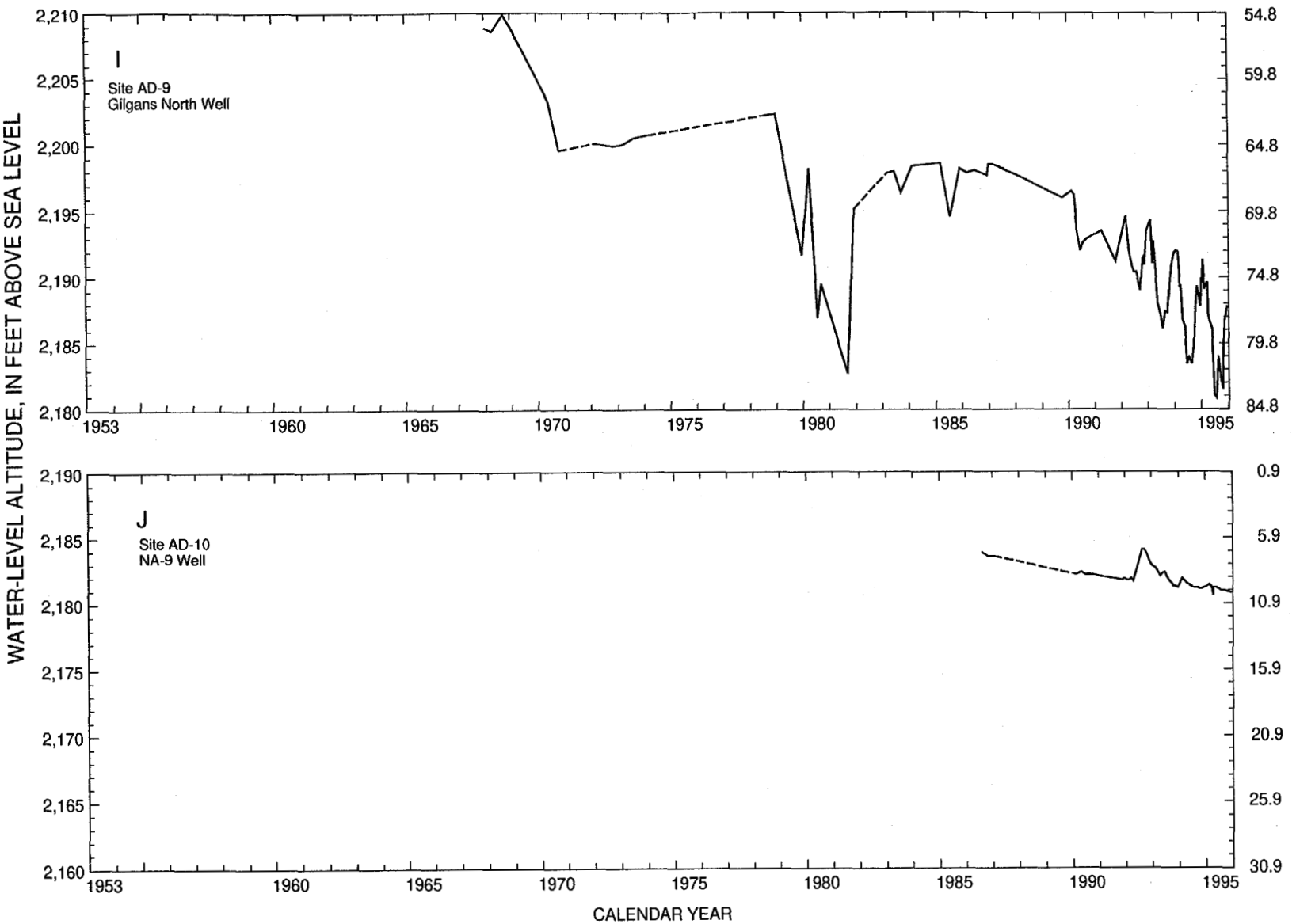


Figure 3. Continued.

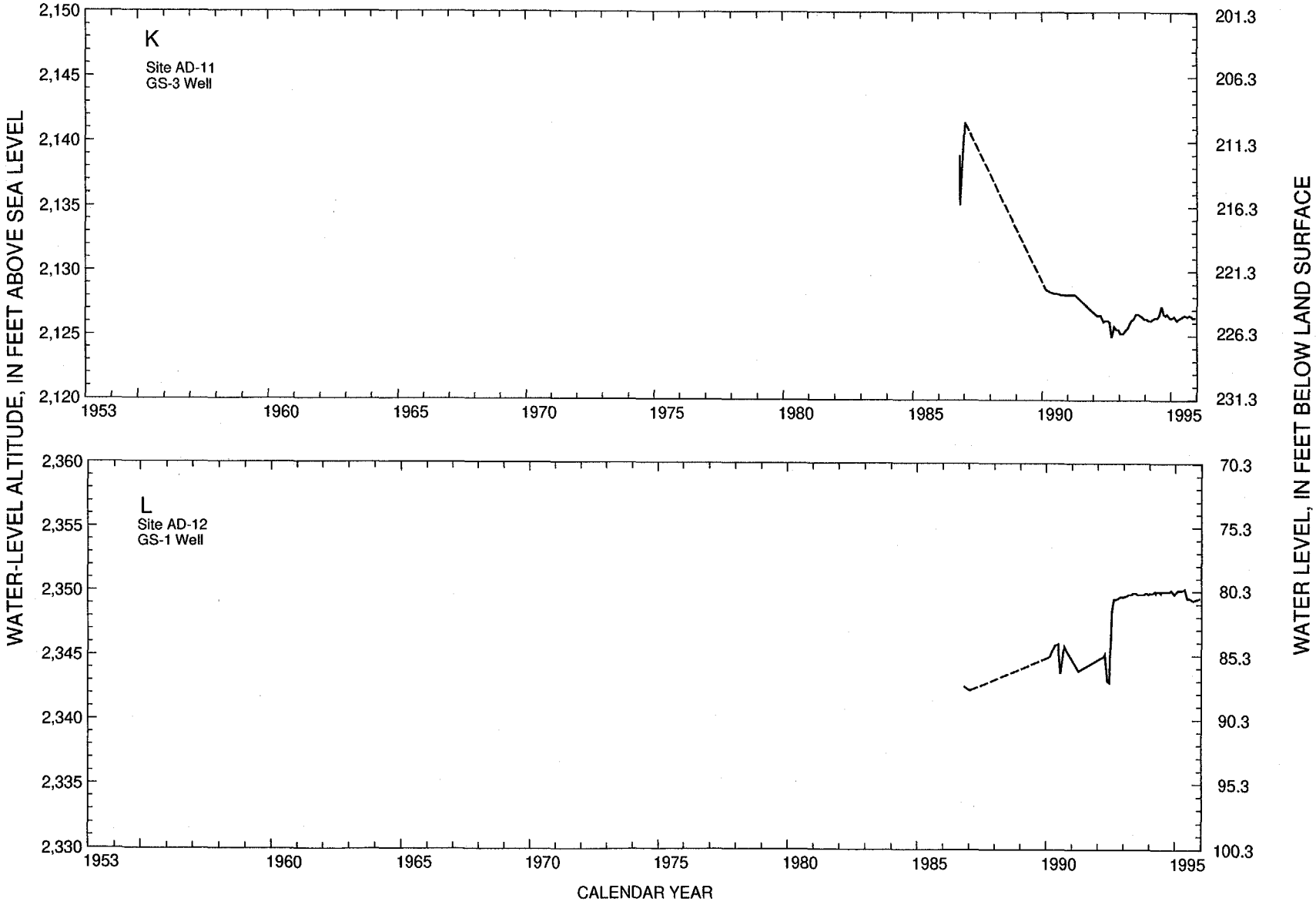


Figure 3. Continued.

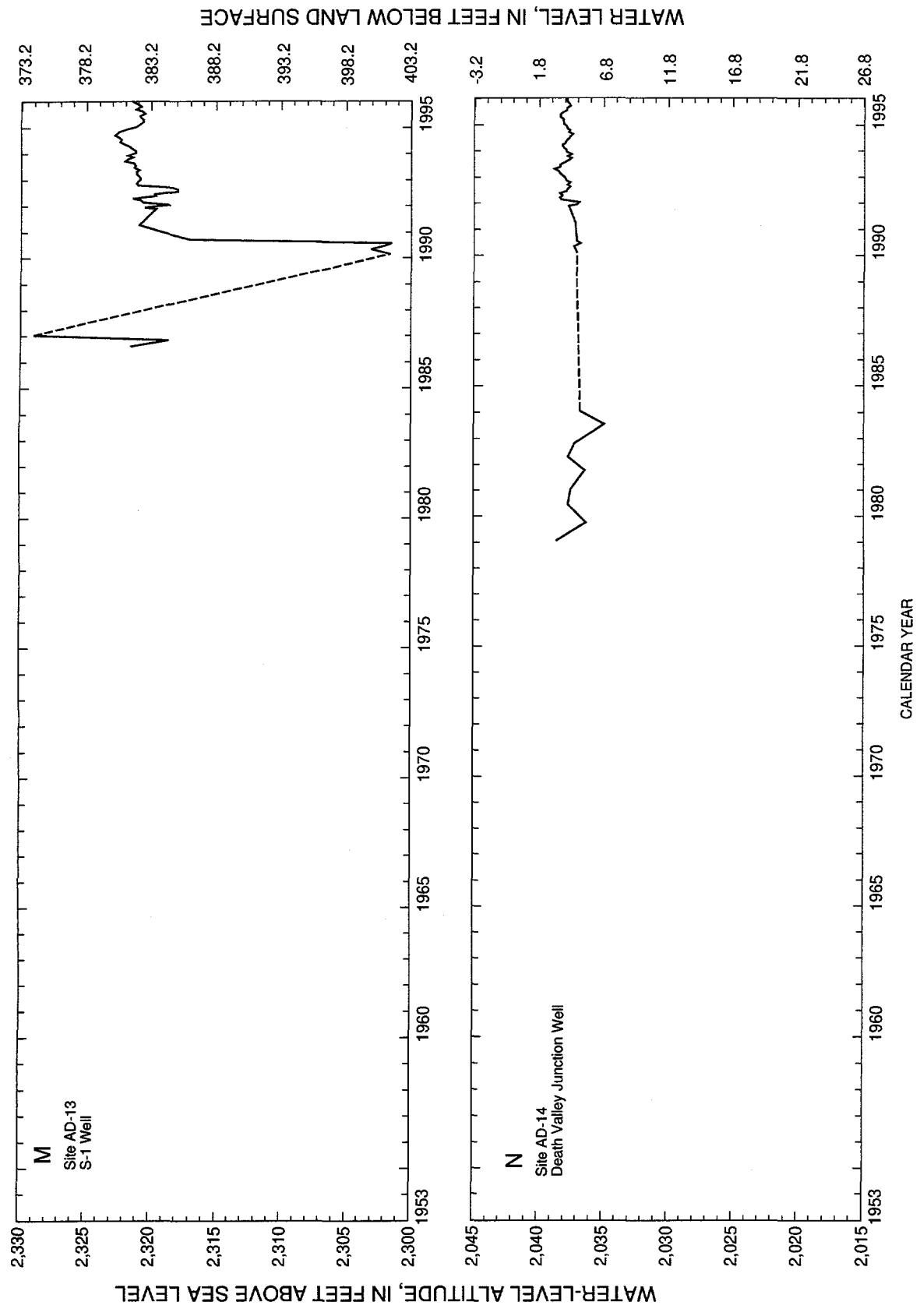


Figure 3. Continued.

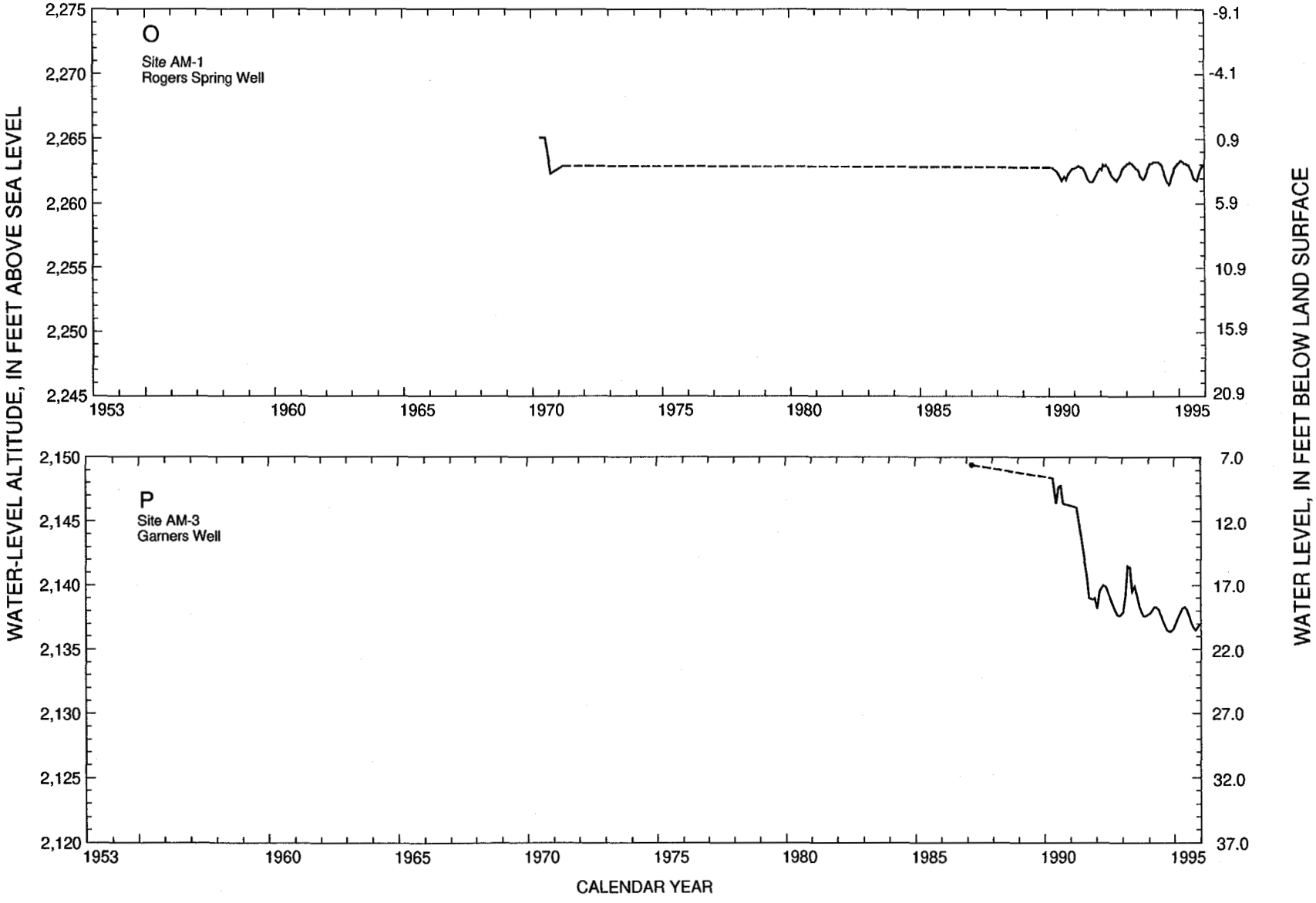


Figure 3. Continued.

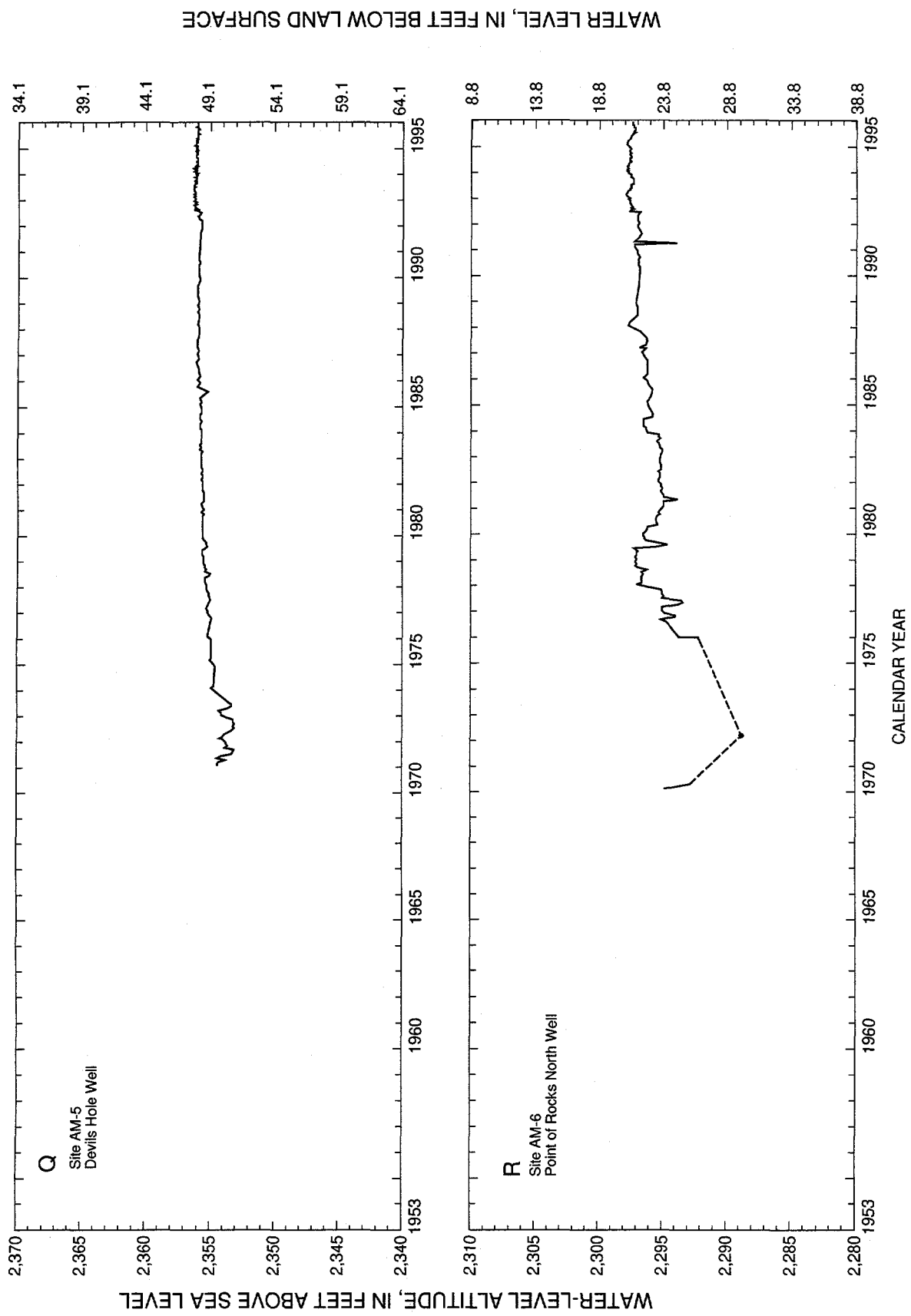


Figure 3. Continued.

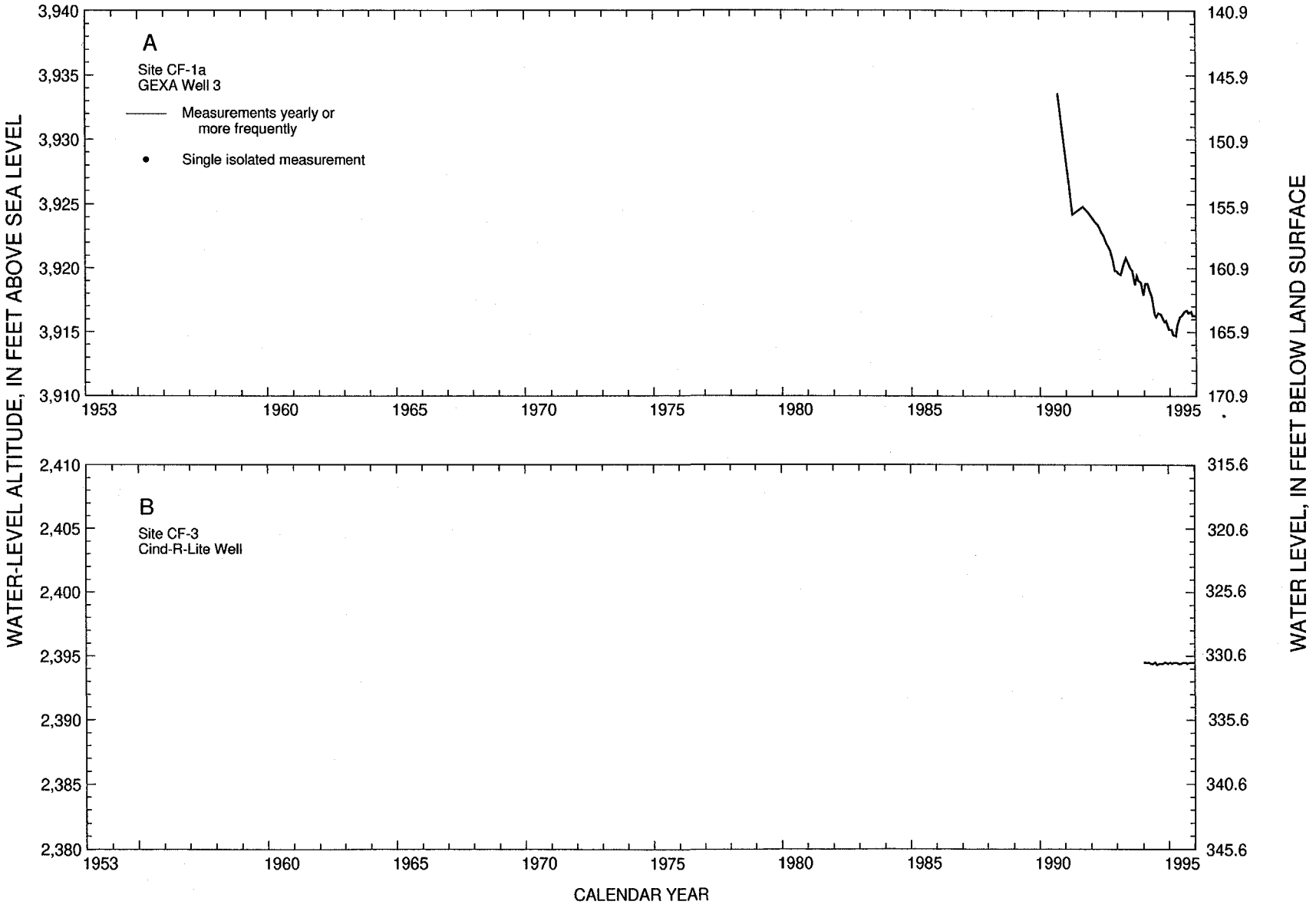


Figure 4. Periodic water levels through 1995 for selected sites at which primary contributing units are undifferentiated sedimentary rock. Lines connect discrete data presented in this and previous reports on selected ground-water data for Yucca Mountain region and are dashed where measurements were not available for consecutive calendar years. Data that may represent short-term conditions at a site have been excluded (see section titled "Presentation of Ground-Water Data").

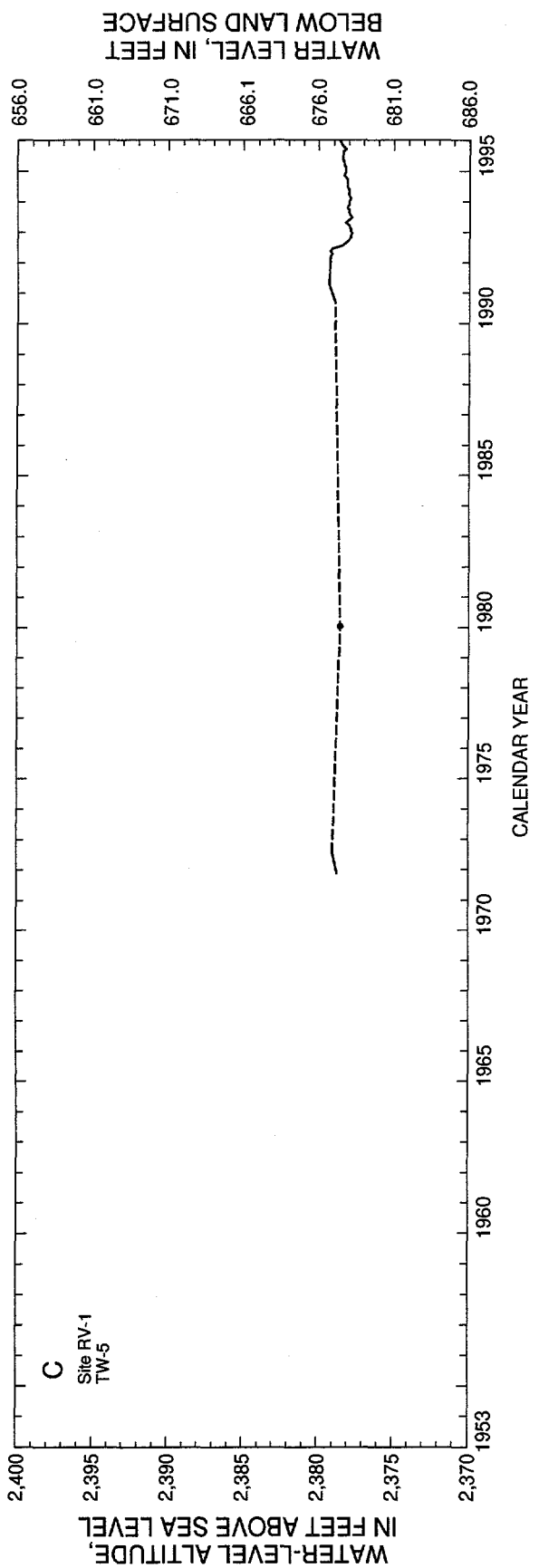


Figure 4. Continued.

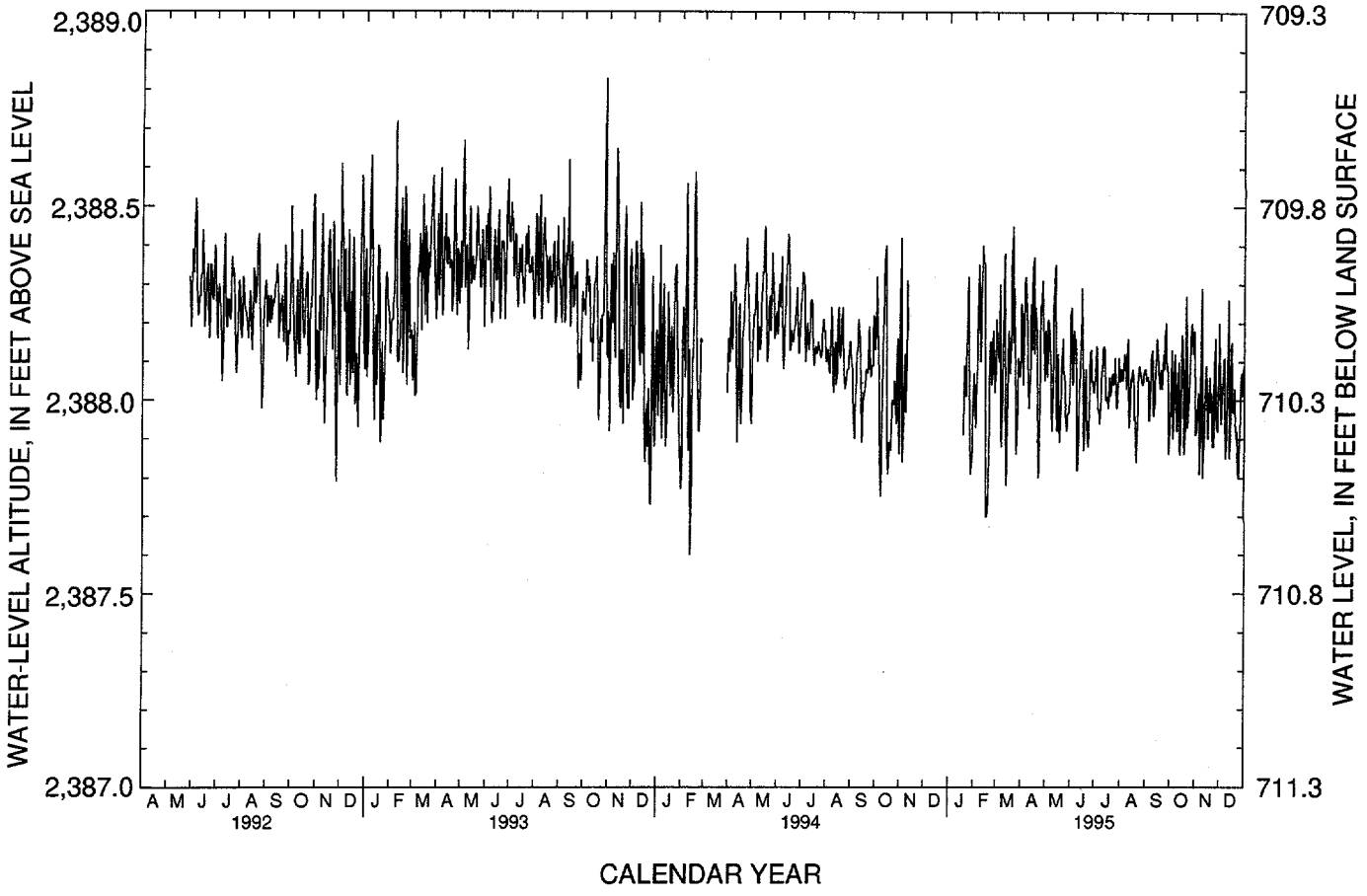


Figure 5. Daily average water levels in well JF-3, May 1992 through December 1995

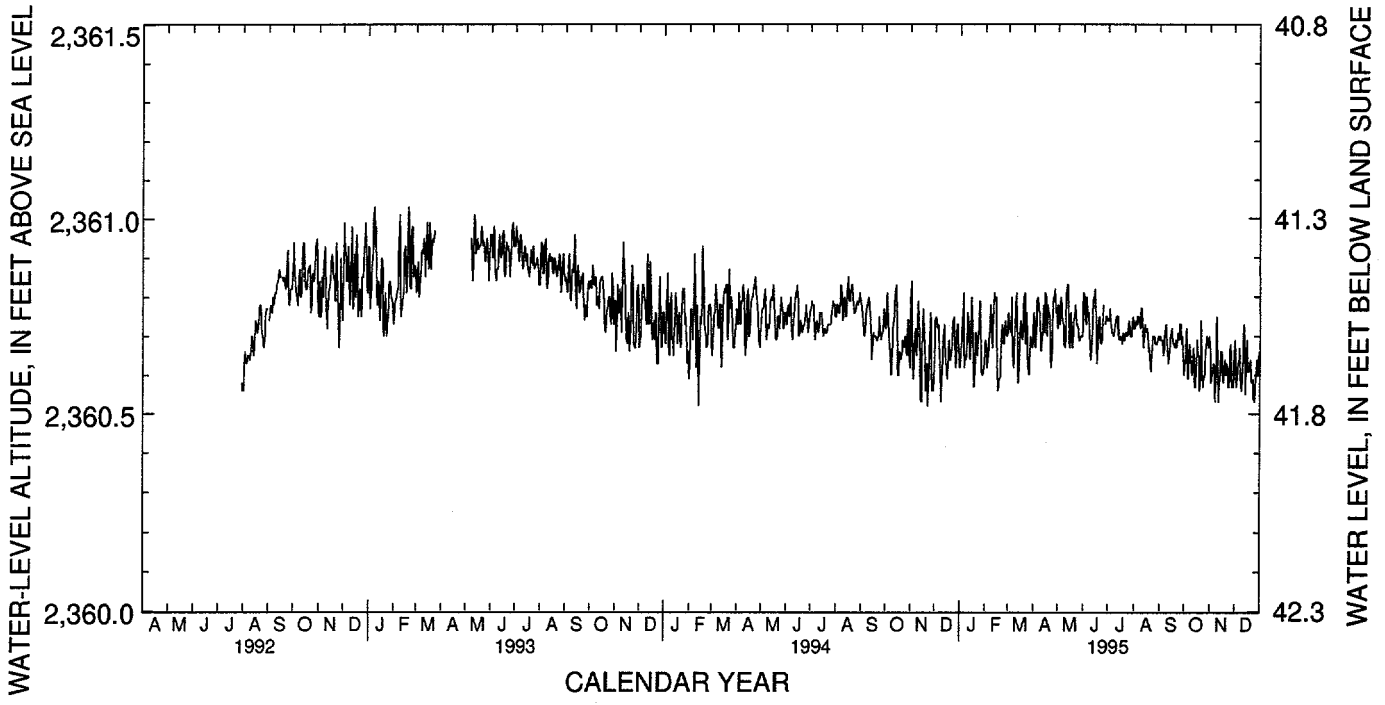


Figure 6. Daily average water levels in well AD-6, July 1992 through December 1995

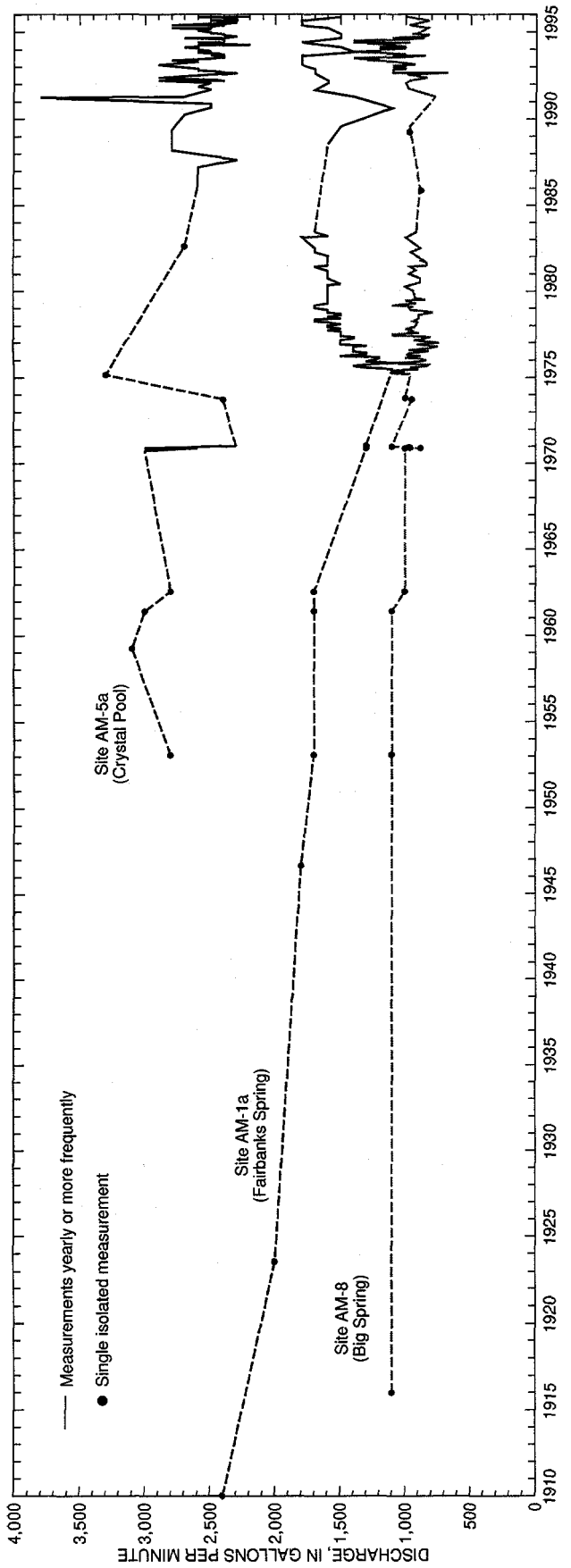


Figure 7. Discharge at sites AM-1a (Fairbanks Spring), AM-5a (Crystal Pool), and AM-8 (Big Spring) through 1995. Lines connect discrete measurements presented in this and previous reports on selected ground-water data for Yucca Mountain region and are dashed where measurements were not available for consecutive calendar years.

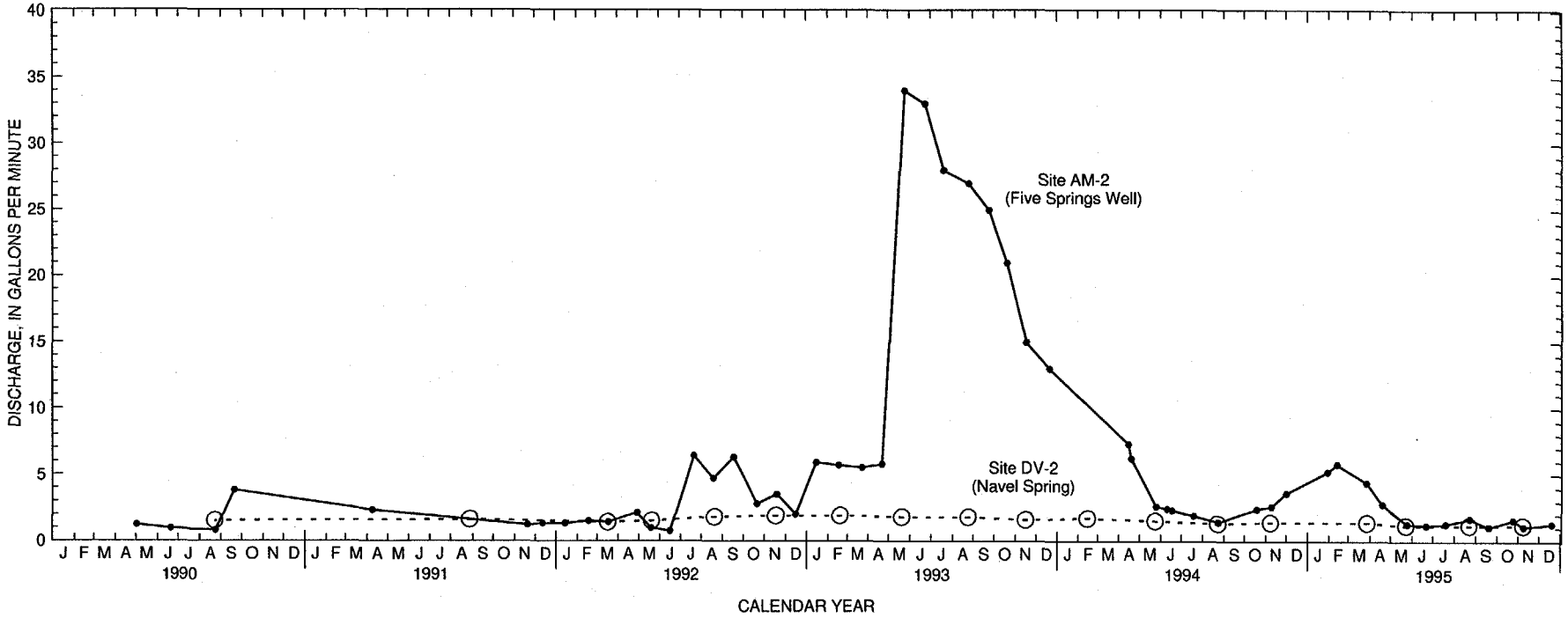


Figure 8. Discharge at sites AM-2 (Five Springs Well) and DV-2 (Navel Spring), 1990 through 1995. Symbols indicate discrete measurements presented in this and previous reports on selected ground-water data for Yucca Mountain region.

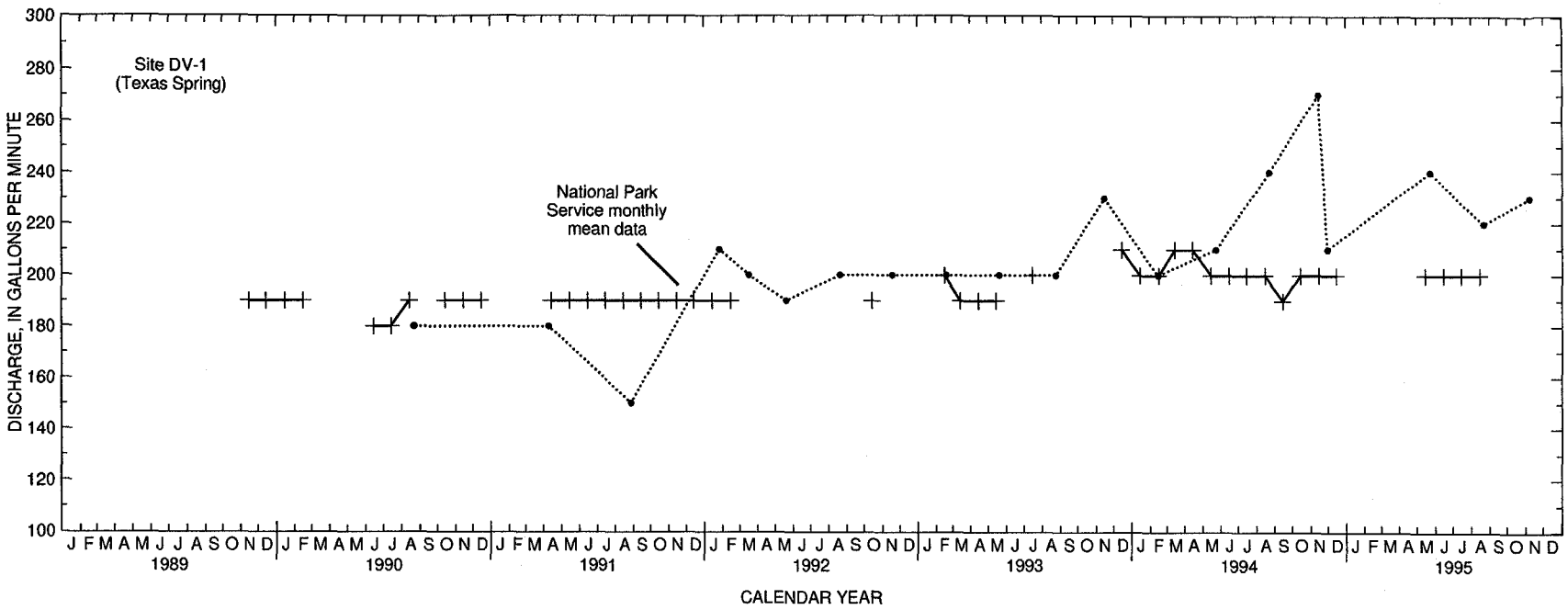


Figure 9. Discharge at site DV-1 (Texas Spring), 1989 through 1995. Dots indicate discrete USGS measurements presented in this and previous reports on selected ground-water data for Yucca Mountain region. Plus symbol represents National Park Service monthly mean data for any given month and are not connected by a line where that data are not available for consecutive months. Differences between discrete measurements and monthly means may be due to site-specific conditions that affect accuracy of the measurement methods utilized. Accuracy of discrete measurements is limited by unmeasurable flow near the walls of the flume, an unequal distribution of velocities in the limited width of the measurement section, and a large percentage of total flow contained in each measurable portion of flow.

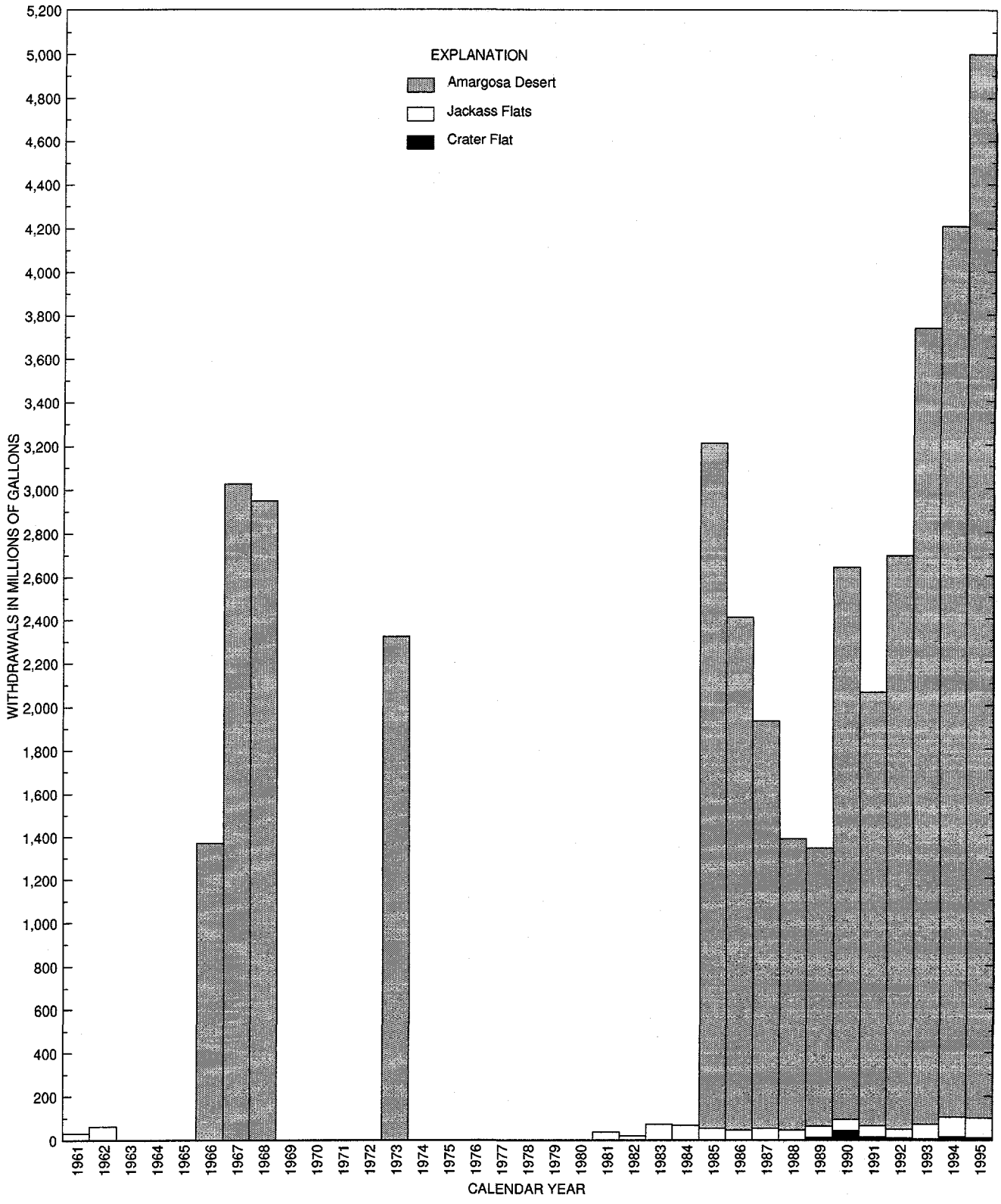


Figure 10. Available estimates of annual ground-water withdrawals for selected areas within Alkali Flat-Furnace Creek Ranch ground-water subbasin, 1961 through 1995. In each hydrographic area, ground water may have been withdrawn in years for which no estimates are available. Total bar height equals the approximate sum of withdrawals from all areas within subbasin for given year.

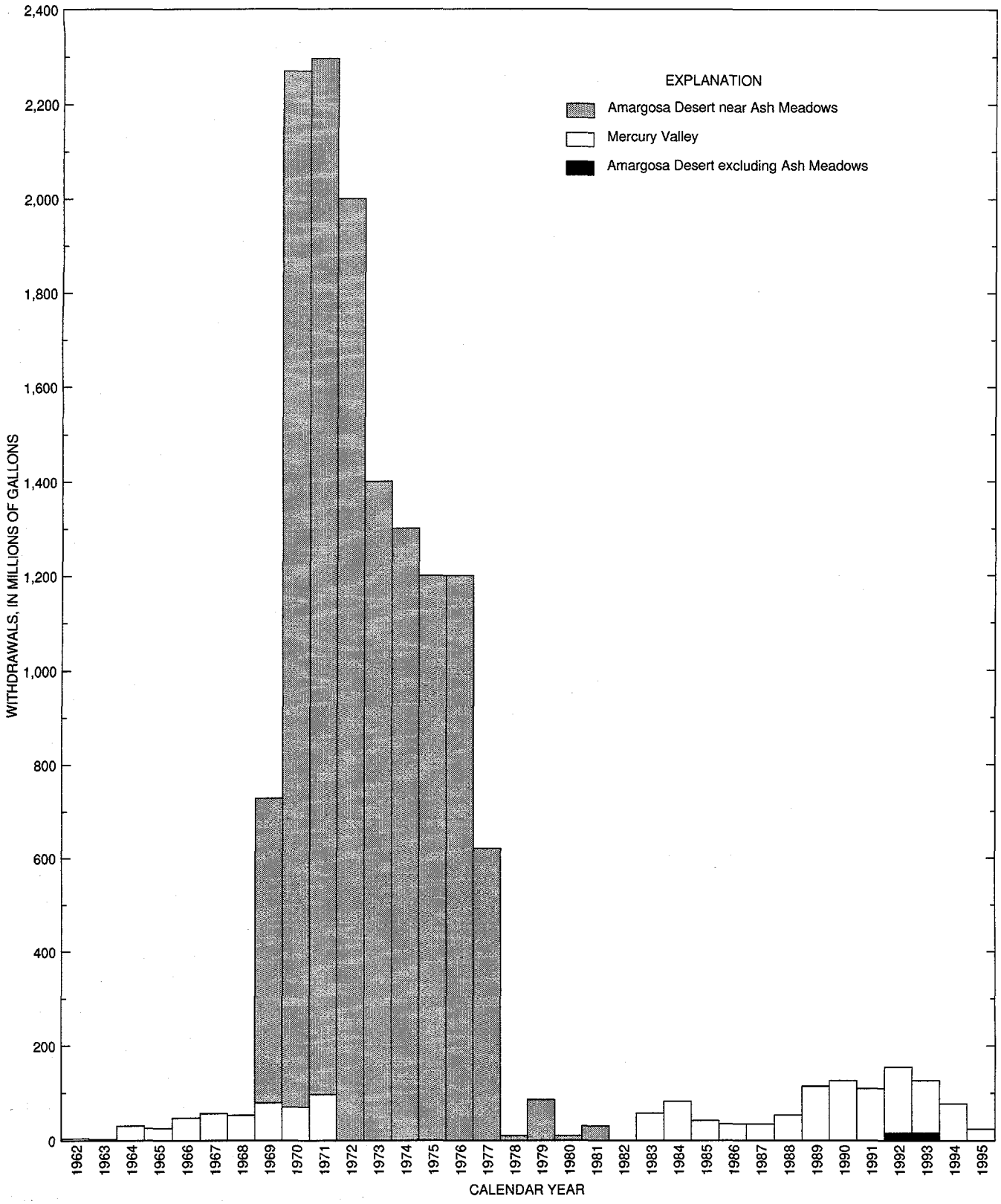


Figure 11. Available estimates of annual ground-water withdrawals for selected areas within Ash Meadows ground-water subbasin, 1962 through 1995. In each hydrographic area, ground water may have been withdrawn in years for which no estimates are available. Total bar height equals the approximate sum of withdrawals from all areas within subbasin for given year.

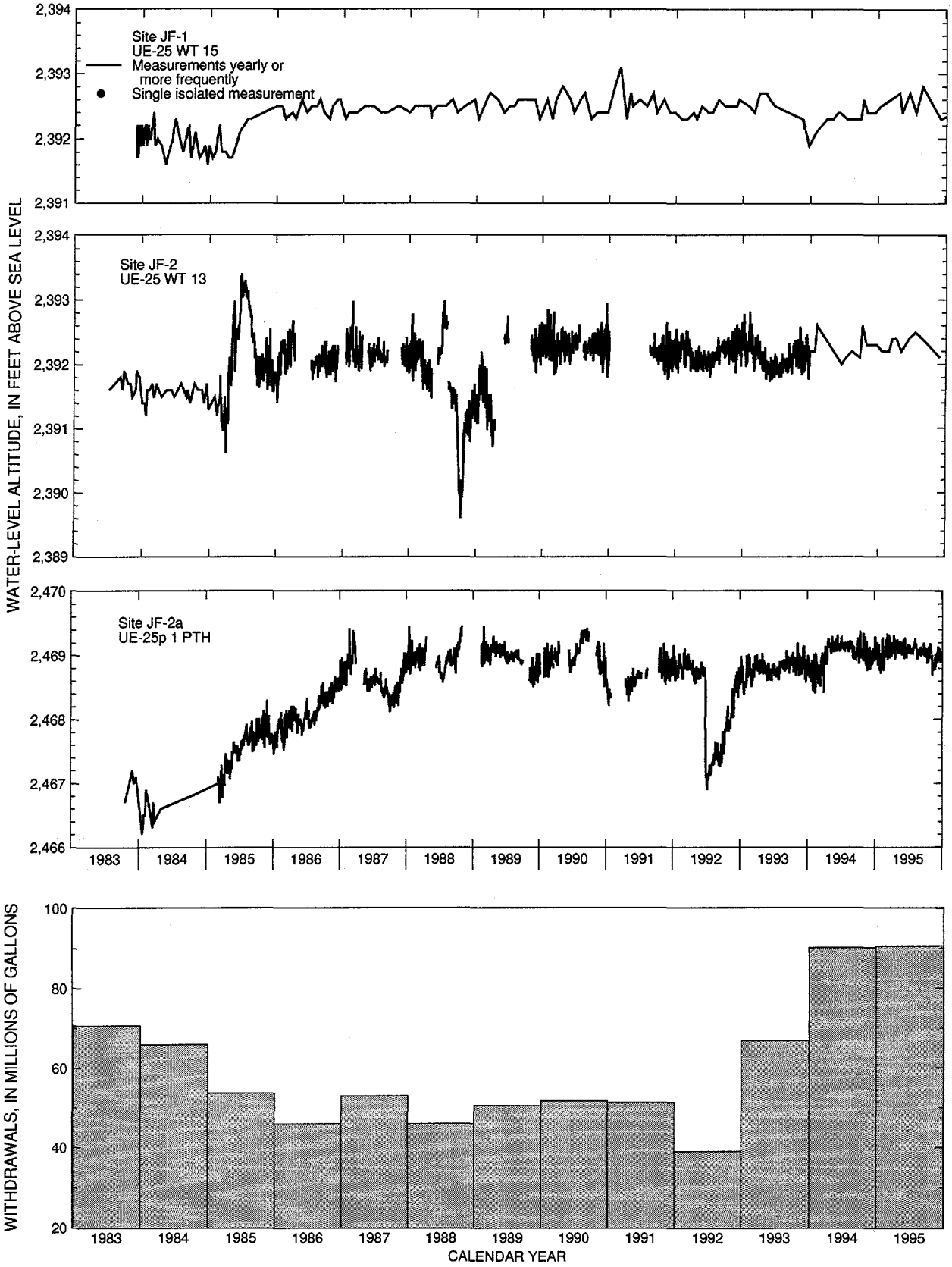


Figure 12. Water-level altitudes in wells JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3, and estimated annual ground-water withdrawals from Jackass Flats, 1983 through 1995. Lines connect discrete measurements or daily average water levels (when continual data recorded by instrumentation were available for more than half a year), and are dashed where measurements were not available for consecutive calendar years. Discrete measurements that may reflect short-term conditions at a site have been excluded (see section titled "Discussion of Ground-Water Levels and Ground-Water Withdrawals in Jackass Flats").

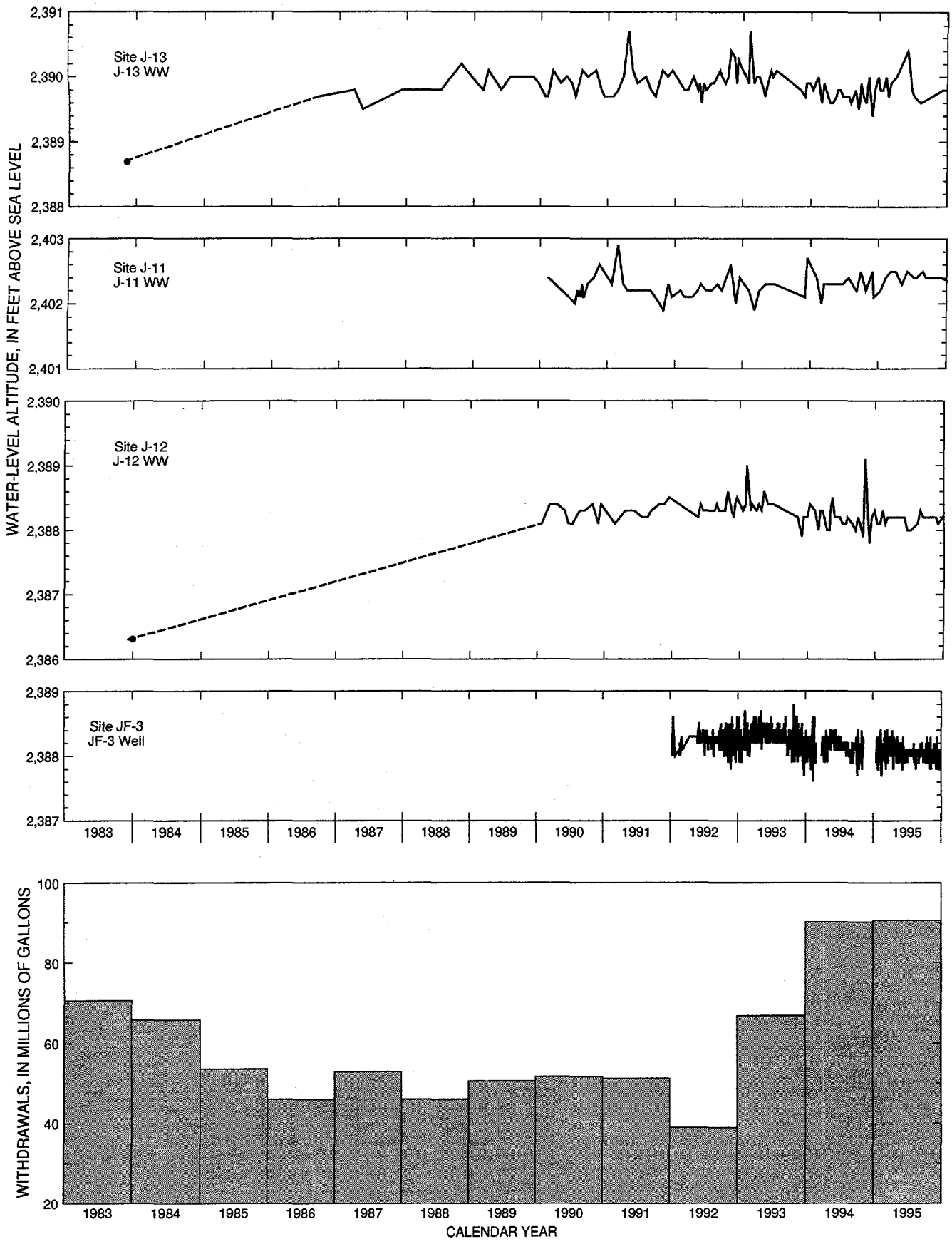


Figure 12. Continued.

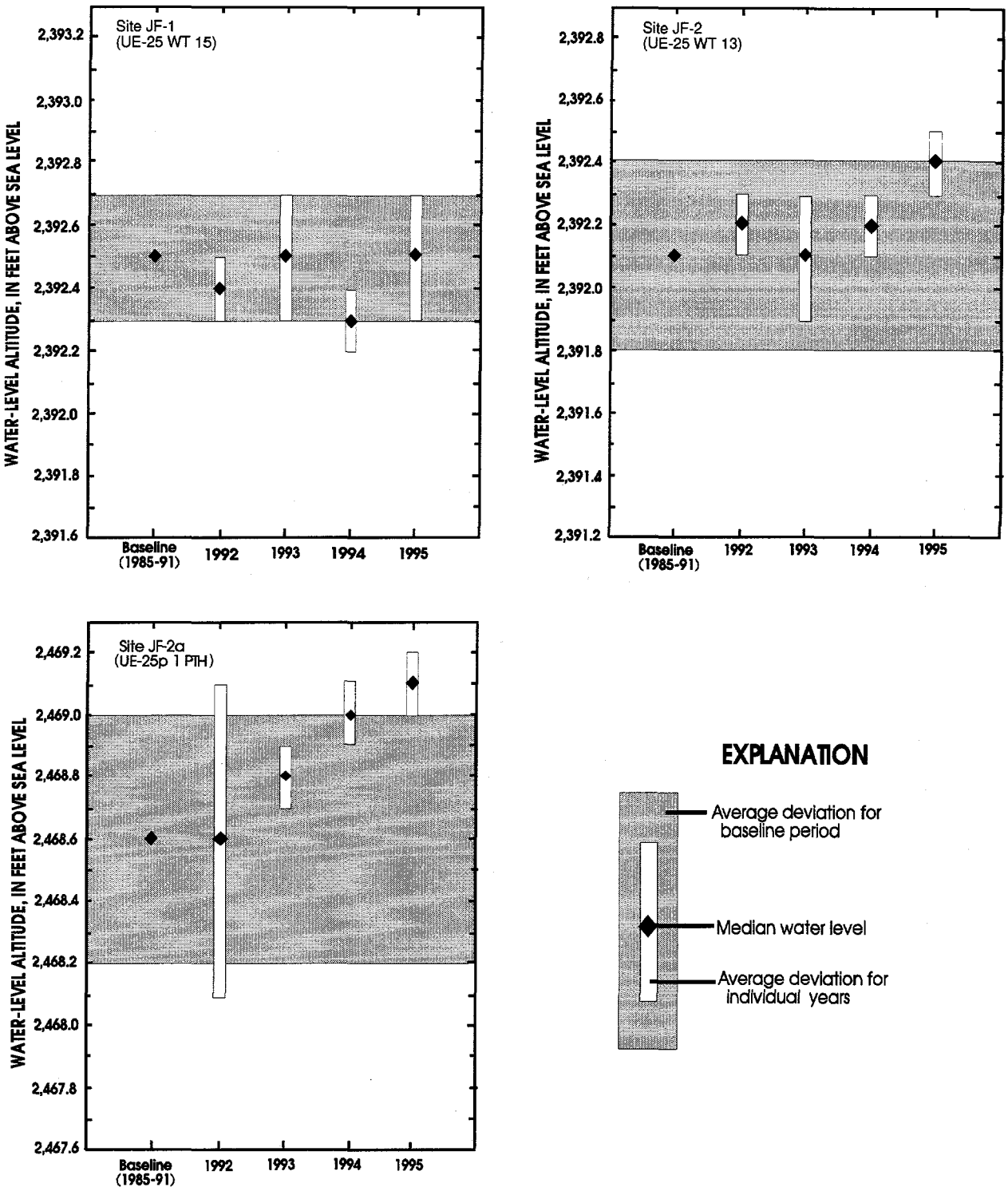


Figure 13. Median water-level altitudes and average deviation of water levels for wells JF-1, JF-2, JF-2a, J-13, J-11, J-12, and JF-3 for selected baseline periods and for calendar years 1992 through 1995. Statistical data for individual years included in baseline periods are not shown.

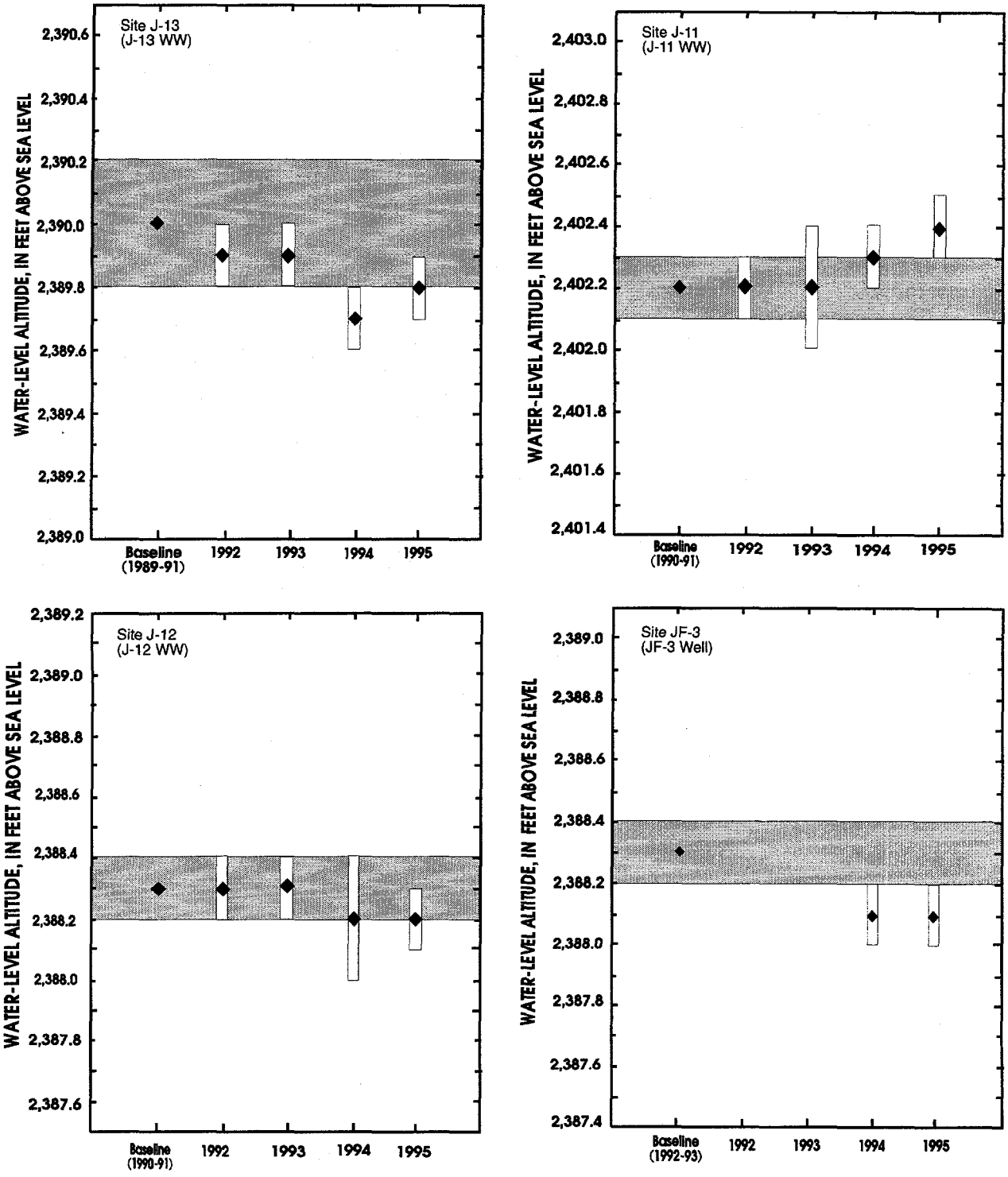


Figure 13. Continued.

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995

Site Number: Sites are grouped by hydrographic area and, within each area, are listed in general north-to-south, then west-to-east order. See text section titled "Site Number" for further discussion.

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: 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 USGS land surveys.

Height of measurement point: Height of measurement point (MP) most recently 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.

Depth to water: Depths listed generally represent water level below land surface. Exceptions are site AM-4, where data represent water level below measurement point, and site AM-2, where negative numbers represent water levels above land surface. Site AM-2 is flowing well with water standing above land surface in casing. 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.

Method: Method used to measure depth to water. A, average monthly water level, reported for 15th of month; B, depth to water calculated from millivolt output of transducer installed in well and most recent calibration of instrumentation; N, ruled tape; S, steel tape; T, uncalibrated-electric tape; V, calibrated electric tape; Z, measurement method unknown.

Site status: Known conditions at site that may have affected measured depth to water. F, flowing; R, well recently pumped.

Data source: EMP, Environmental Monitoring Program (USGS); NDWR, Nevada Division of Water Resources; NPS, National Park Service; OFR 474-158, Claasen (1973); PVT, private owner measurement; SCP, Site Characterization Project (USGS); NTS, Environmental Restoration Program (USGS); USFWS, U.S. Fish and Wildlife Service; USGS-NV, other Nevada District Programs.

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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	GEXA Well 4	3,930.9	1.82	01-25-1995	1325	616.97	3,313.9	V	-	EMP
					02-16-1995	0835	617.28	3,313.6	V	-	EMP
					03-28-1995	1023	617.18	3,313.7	V	-	EMP
					04-20-1995	0950	616.99	3,313.9	V	-	EMP
					05-26-1995	0825	617.21	3,313.7	V	-	EMP
					06-23-1995	0750	617.33	3,313.6	V	-	EMP
					07-25-1995	1345	617.19	3,313.7	V	-	EMP
					08-29-1995	1415	617.11	3,313.8	V	-	EMP
					09-21-1995	1120	617.16	3,313.7	V	-	EMP
					10-26-1995	0930	617.07	3,313.8	V	-	EMP
					11-17-1995	1005	617.23	3,313.7	V	-	EMP
					12-20-1995	1510	617.03	3,313.9	V	-	EMP
CF- 1a	365445116383901	GEXA Well 3	4,080.9	1.68	01-25-1995	1250	165.66	3,915.2	S	-	EMP
					02-16-1995	0815	166.10	3,914.8	S	-	EMP
					03-28-1995	1105	166.16	3,914.7	S	-	EMP
					04-20-1995	0920	165.28	3,915.6	S	-	EMP
					05-26-1995	0805	164.71	3,916.2	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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	GEXA Well 3	4,080.9	1.68	06-23-1995	0730	164.57	3,916.3	S	-	EMP
					07-25-1995	1325	164.28	3,916.6	S	-	EMP
					08-29-1995	1325	164.24	3,916.7	S	-	EMP
					09-21-1995	1100	164.37	3,916.5	S	-	EMP
					10-26-1995	0900	164.33	3,916.6	S	-	EMP
					11-17-1995	1100	164.61	3,916.3	S	-	EMP
					12-20-1995	1447	164.59	3,916.3	S	-	EMP
CF- 2	364732116330701	USW VH-1	3,161.1	1.17	01-05-1995	1208	603.58	2,557.5	S	-	SCP
					01-12-1995	1154	603.84	2,557.3	S	-	SCP
					02-21-1995	1320	603.64	2,557.5	S	-	SCP
					04-19-1995	1228	603.67	2,557.4	S	-	SCP
					05-17-1995	1351	603.71	2,557.4	S	-	SCP
					06-22-1995	1118	603.84	2,557.3	S	-	SCP
					07-19-1995	1331	603.87	2,557.2	S	-	SCP
					08-10-1995	1126	603.66	2,557.4	S	-	SCP
					08-10-1995	1159	603.64	2,557.5	S	-	SCP
					10-27-1995	1445	603.70	2,557.4	V	-	EMP
					11-17-1995	1300	603.90	2,557.2	V	-	EMP
					12-06-1995	1211	603.68	2,557.4	S	-	SCP
					12-29-1995	1145	603.82	2,557.3	V	-	EMP
CF- 3	364105116302601	Cind-R-Lite Well	2,725.6	-3.20	01-25-1995	1140	331.10	2,394.5	S	-	EMP
					02-16-1995	1015	331.22	2,394.4	S	-	EMP
					03-27-1995	1120	331.09	2,394.5	V	-	EMP
					04-20-1995	0820	331.09	2,394.5	S	-	EMP
					05-26-1995	0710	331.18	2,394.4	S	-	EMP
					06-23-1995	0735	331.18	2,394.4	S	-	EMP
					07-25-1995	1200	331.10	2,394.5	S	-	EMP
					08-29-1995	1220	331.12	2,394.5	S	-	EMP
					09-21-1995	0940	331.20	2,394.4	S	-	EMP
					10-26-1995	1110	331.13	2,394.5	S	-	EMP
					11-17-1995	1505	331.11	2,394.5	S	-	EMP
					12-20-1995	1245	331.14	2,394.5	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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- 1	365116116233801	UE-25 WT 15	3,553.8	0.18	01-11-1995	0925	1,161.28	2,392.5	S	-	SCP
					04-27-1995	1450	1,161.07	2,392.7	S	-	SCP
					05-09-1995	1518	1,161.36	2,392.4	S	-	SCP
					06-20-1995	1449	1,161.08	2,392.7	S	-	SCP
					07-24-1995	1055	1,161.45	2,392.4	S	-	SCP
					08-29-1995	1435	1,161.01	2,392.8	S	-	SCP
					12-04-1995	1025	1,161.48	2,392.3	S	-	SCP
JF- 2	364945116235001	UE-25 WT 13	3,387.5	1.00	01-26-1995	1053	995.33	2,392.2	S	-	SCP
					03-03-1995	0936	995.29	2,392.2	S	-	SCP
					03-22-1995	1449	995.13	2,392.4	S	-	SCP
					04-13-1995	1156	995.07	2,392.4	S	-	SCP
					05-10-1995	1102	995.32	2,392.2	S	-	SCP
					06-20-1995	1525	995.08	2,392.4	S	-	SCP
					07-24-1995	1130	995.02	2,392.5	S	-	SCP
					08-30-1995	1430	995.13	2,392.4	S	-	SCP
					12-04-1995	1206	995.35	2,392.2	S	-	SCP
JF- 2a	364938116252102	UE-25p 1 PTH	3,655.5	0.56	02-16-1995	1050	1,186.68	2,468.8	S	-	SCP
					03-08-1995	1022	1,186.48	2,469.0	B	-	SCP
					03-17-1995	1248	1,186.61	2,468.9	B	-	SCP
					04-03-1995	1347	1,186.64	2,468.9	B	-	SCP
					04-17-1995	1556	1,186.53	2,469.0	B	-	SCP
					04-26-1995	0951	1,186.48	2,469.0	B	-	SCP
					05-01-1995	1104	1,186.42	2,469.1	B	-	SCP
					05-10-1995	0842	1,186.50	2,469.0	B	-	SCP
					05-11-1995	1137	1,186.46	2,469.0	B	-	SCP
					05-18-1995	1415	1,186.58	2,468.9	B	-	SCP
					06-01-1995	1332	1,186.45	2,469.0	B	-	SCP
					06-08-1995	1535	1,186.33	2,469.2	B	-	SCP
					06-19-1995	1148	1,186.42	2,469.1	B	-	SCP
					06-28-1995	0938	1,186.53	2,469.0	B	-	SCP
					07-06-1995	0859	1,186.63	2,468.9	B	-	SCP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 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- 2a	364938116252102	UE-25p 1 PTH	3,655.5	0.56	07-20-1995	0953	1,186.66	2,468.8	B	-	SCP
					08-14-1995	1219	1,186.42	2,469.1	B	-	SCP
					08-28-1995	1122	1,186.55	2,469.0	B	-	SCP
					11-07-1995	1229	1,186.74	2,468.8	B	-	SCP
					12-18-1995	1530	1,186.34	2,469.2	B	-	SCP
J -13	364828116234001	J -13 WW	3,317.9	1.11	01-12-1995	1334	928.11	2,389.8	S	-	SCP
					01-26-1995	1031	928.07	2,389.8	S	-	SCP
					02-10-1995	0930	927.87	2,390.0	S	-	SCP
					02-24-1995	0950	928.19	2,389.7	S	-	SCP
					03-09-1995	1005	928.04	2,389.9	S	-	SCP
					04-05-1995	1044	927.94	2,390.0	S	-	SCP
					06-06-1995	1011	927.52	2,390.4	S	-	SCP
					06-29-1995	0855	928.05	2,389.8	S	-	SCP
					07-12-1995	1142	928.17	2,389.7	S	-	SCP
					08-15-1995	1116	928.33	2,389.6	S	-	SCP
					12-12-1995	0725	928.05	2,389.8	S	-	SCP
J -11	364706116170601	J -11 WW	3,442.8	2.11	01-13-1995	0813	1,040.55	2,402.2	S	-	SCP
					02-10-1995	1040	1,040.35	2,402.4	S	-	SCP
					03-09-1995	1247	1,040.31	2,402.5	S	-	SCP
					04-05-1995	1122	1,040.29	2,402.5	S	-	SCP
					05-08-1995	1109	1,040.47	2,402.3	S	-	SCP
					06-06-1995	1046	1,040.33	2,402.5	S	-	SCP
					07-13-1995	0842	1,040.39	2,402.4	S	-	SCP
					07-24-1995	1420	1,040.38	2,402.4	S	-	SCP
					08-29-1995	1530	1,040.27	2,402.5	S	-	SCP
					09-14-1995	0741	1,040.41	2,402.4	S	-	SCP
					12-04-1995	1328	1,040.42	2,402.4	S	-	SCP
J -12	364554116232401	J -12 WW	3,128.4	5.04	01-12-1995	0913	740.32	2,388.1	S	-	SCP
					01-26-1995	0958	740.30	2,388.1	S	-	SCP
					02-10-1995	1015	740.14	2,388.3	S	-	SCP
					02-24-1995	0919	740.33	2,388.1	S	-	SCP
					03-09-1995	1030	740.19	2,388.2	S	-	SCP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 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	5.04	04-05-1995	1020	740.16	2,388.2	S	-	SCP
					06-06-1995	0923	740.23	2,388.2	S	-	SCP
					06-21-1995	1014	740.44	2,388.0	S	-	SCP
					07-10-1995	1023	740.36	2,388.0	S	-	SCP
					08-15-1995	1022	740.30	2,388.1	S	-	SCP
					08-30-1995	1406	740.12	2,388.3	S	-	SCP
					09-14-1995	1144	740.23	2,388.2	S	-	SCP
					10-27-1995	1235	740.21	2,388.2	V	-	EMP
					11-21-1995	1340	740.23	2,388.2	V	-	EMP
					12-04-1995	1244	740.29	2,388.1	S	-	SCP
					12-28-1995	1415	740.22	2,388.2	V	-	EMP
JF- 3	364528116232201	JF- 3 Well	3,098.3	2.27	01-18-1995	1128	710.57	2,387.7	V	-	EMP
					01-24-1995	0920	710.14	2,388.2	V	-	EMP
					02-15-1995	0740	710.34	2,388.0	V	-	EMP
					03-16-1995	1240	710.10	2,388.2	V	-	EMP
					04-24-1995	1127	710.26	2,388.0	V	-	EMP
					05-24-1995	0750	710.26	2,388.0	V	-	EMP
					06-21-1995	0820	710.42	2,387.9	V	-	EMP
					07-20-1995	1340	710.29	2,388.0	V	-	EMP
					08-24-1995	0950	710.28	2,388.0	V	-	EMP
					09-20-1995	1250	710.24	2,388.1	V	-	EMP
					10-27-1995	1305	710.13	2,388.2	V	-	EMP
					11-21-1995	1305	710.21	2,388.1	V	-	EMP
					12-28-1995	1440	710.19	2,388.1	V	-	EMP
RV- 1	363815116175901	TW- 5	3,056.0	1.6	01-26-1995	0810	677.77	2,378.2	V	-	EMP
					02-15-1995	1210	677.75	2,378.2	V	-	EMP
					03-27-1995	1031	677.71	2,378.3	V	-	EMP
					04-19-1995	1305	677.67	2,378.3	V	-	EMP
					05-25-1995	1350	677.59	2,378.4	V	-	EMP
					06-21-1995	1315	677.56	2,378.4	V	-	EMP
					07-21-1995	0920	677.62	2,378.4	V	-	EMP
					08-24-1995	1058	677.62	2,378.4	V	-	EMP
					09-21-1995	0900	677.76	2,378.2	V	-	EMP
					10-27-1995	1020	677.56	2,378.4	V	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 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	11-21-1995	1045	677.47	2,378.5	V	-	EMP
					12-28-1995	1115	677.39	2,378.6	V	-	EMP
MV- 1	363530116021401	Army 1 WW	3,153.3	3.14	04-29-1969	--	787	2,366.3	Z	-	OFR 474-158
					07-06-1995	1736	785.18	2,368.1	V	-	EMP
					07-07-1995	0711	785.30	2,368.0	V	-	EMP
					07-07-1995	0947	785.29	2,368.0	V	-	EMP
					07-07-1995	1030	785.29	2,368.0	V	-	EMP
					07-10-1995	0705	785.14	2,368.2	V	-	EMP
					07-10-1995	1120	785.21	2,368.1	V	-	EMP
					07-11-1995	1536	785.03	2,368.3	V	-	EMP
AD- 1	364141116351401	NA-6 Well BGMW-10	2,627.9	1.7	01-18-1995	1505	269.56	2,358.3	S	-	EMP
					02-16-1995	0935	269.71	2,358.2	V	-	EMP
					03-21-1995	--	269.35	2,358.6	Z	-	PVT
					03-28-1995	0858	269.40	2,358.5	V	-	EMP
					04-20-1995	1100	269.39	2,358.5	V	-	EMP
					05-26-1995	0935	269.49	2,358.4	S	-	EMP
					06-22-1995	--	270.2	2,357.7	Z	-	PVT
					06-23-1995	0905	269.49	2,358.4	S	-	EMP
					07-25-1995	1445	269.34	2,358.6	S	-	EMP
					08-29-1995	1515	269.45	2,358.4	S	-	EMP
					09-21-1995	--	269.6	2,358.3	Z	-	PVT
					09-21-1995	1215	269.53	2,358.4	S	-	EMP
					10-26-1995	1020	269.37	2,358.5	S	-	EMP
					11-17-1995	1350	269.49	2,358.4	S	-	EMP
					12-18-1995	--	269.6	2,358.3	Z	-	PVT
					12-20-1995	1334	269.40	2,358.5	S	-	EMP
AD- 2	363830116241401	Airport Well	2,638.8	1.05	01-24-1995	1305	324.41	2,314.4	V	-	EMP
					02-15-1995	0825	324.94	2,313.9	V	-	EMP
					03-27-1995	1105	324.75	2,314.0	V	-	EMP
					04-18-1995	0940	324.65	2,314.2	V	-	EMP
					05-24-1995	0900	324.76	2,314.0	V	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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	1.05	06-21-1995	0910	324.88	2,313.9	V	-	EMP
					07-21-1995	1015	324.78	2,314.0	V	-	EMP
					08-23-1995	1220	324.42	2,314.4	V	-	EMP
					09-19-1995	1325	324.80	2,314.0	V	-	EMP
					10-24-1995	1400	324.81	2,314.0	V	-	EMP
					11-09-1995	1240	324.55	2,314.2	V	-	EMP
					12-20-1995	1150	324.84	2,314.0	V	-	EMP
AD- 2a	363835116234001	NDOT Well	2,656.8	.4	01-24-1995	1225	342.17	2,314.6	S	-	EMP
					02-15-1995	1120	342.60	2,314.2	S	R	EMP
					03-27-1995	1030	342.49	2,314.3	S	-	EMP
					04-20-1995	0745	342.19	2,314.6	S	-	EMP
					05-26-1995	0640	342.52	2,314.3	S	-	EMP
					06-22-1995	0640	343.30	2,313.5	S	R	EMP
					07-21-1995	1100	343.67	2,313.1	S	R	EMP
					08-24-1995	0850	342.99	2,313.8	S	-	EMP
					09-20-1995	1325	342.78	2,314.0	S	-	EMP
					10-25-1995	1345	342.90	2,313.9	S	-	EMP
					11-21-1995	1115	342.80	2,314.0	S	-	EMP
					12-20-1995	1204	342.53	2,314.3	S	-	EMP
AD- 3a	363521116352501	Davidson Well	2,395.3	1.00	01-25-1995	0820	130.45	2,264.8	S	-	EMP
					02-15-1995	0930	130.50	2,264.8	S	-	EMP
					03-28-1995	1311	130.24	2,265.1	S	-	EMP
					04-18-1995	1050	130.32	2,265.0	S	-	EMP
					05-24-1995	1050	130.49	2,264.8	S	-	EMP
					06-21-1995	1015	130.66	2,264.6	S	-	EMP
					07-19-1995	1240	130.78	2,264.5	S	-	EMP
					08-23-1995	1140	130.93	2,264.4	S	-	EMP
					09-19-1995	1230	131.04	2,264.3	S	-	EMP
					10-24-1995	1300	131.12	2,264.2	S	-	EMP
					11-09-1995	1150	131.14	2,264.2	S	-	EMP
					12-19-1995	1332	131.02	2,264.3	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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	Cooks East Well	2,477.8	1.0	01-24-1995	1325	119.39	2,358.4	V	-	EMP
					02-15-1995	0845	119.63	2,358.2	V	-	EMP
					03-27-1995	1139	119.81	2,358.0	V	-	EMP
					04-18-1995	1000	119.68	2,358.1	V	-	EMP
					05-24-1995	0920	119.82	2,358.0	V	-	EMP
					06-21-1995	0930	120.00	2,357.8	V	-	EMP
					07-21-1995	1030	120.04	2,357.8	V	-	EMP
					08-24-1995	0840	119.99	2,357.8	V	-	EMP
					09-19-1995	1300	119.95	2,357.8	V	-	EMP
					10-25-1995	1205	119.95	2,357.8	V	-	EMP
					11-09-1995	1220	119.82	2,358.0	V	-	EMP
					12-20-1995	1129	120.07	2,357.7	V	-	EMP
AD- 5	363310116294001	USBLM Well	2,376.4	.0	01-11-1995	1639	121.50	2,254.9	S	-	EMP
					02-15-1995	0905	121.36	2,255.0	S	-	EMP
					03-28-1995	1240	122.38	2,254.0	S	-	EMP
					04-18-1995	1025	124.23	2,252.2	S	-	EMP
					04-20-1995	1513	124.21	2,252.2	S	-	USGS-NV
					05-24-1995	0945	124.79	2,251.6	S	-	EMP
					06-21-1995	0950	124.93	2,251.5	S	-	EMP
					07-19-1995	1215	125.75	2,250.6	S	-	EMP
					08-23-1995	1115	125.71	2,250.7	S	-	EMP
					09-19-1995	1210	125.56	2,250.8	S	-	EMP
					10-24-1995	1235	124.82	2,251.6	S	-	EMP
					11-09-1995	1125	124.19	2,252.2	S	-	EMP
					12-19-1995	1302	123.44	2,253.0	S	-	EMP
AD- 6	363213116133800	Tracer Well 3	2,402.3	.4	01-30-1995	1211	41.71	2,360.6	S	-	EMP
					02-14-1995	0819	41.42	2,360.9	S	-	EMP
					03-27-1995	0934	41.70	2,360.6	S	-	EMP
					04-18-1995	0850	41.50	2,360.8	S	-	EMP
					05-24-1995	1310	41.58	2,360.7	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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	06-09-1995	1005	41.74	2,360.6	S	-	EMP
					06-26-1995	1035	41.60	2,360.7	S	-	EMP
					06-26-1995	1608	41.50	2,360.8	S	-	EMP
					06-28-1995	1159	41.64	2,360.7	S	-	EMP
					06-28-1995	1316	41.63	2,360.7	S	-	EMP
					07-21-1995	0634	41.64	2,360.7	S	-	EMP
					08-24-1995	1205	41.67	2,360.6	S	-	EMP
					09-20-1995	1420	41.61	2,360.7	S	-	EMP
					10-27-1995	0830	41.62	2,360.7	S	-	EMP
					11-21-1995	0950	41.69	2,360.6	S	-	EMP
					12-28-1995	1025	41.65	2,360.6	S	-	EMP
AD- 7a	363009116302702	Blackman Well	2,305.0	.78	01-25-1995	0920	65.59	2,239.4	S	-	EMP
					02-15-1995	1040	65.44	2,239.6	S	-	EMP
					03-28-1995	1213	65.02	2,240.0	S	-	EMP
					04-18-1995	1240	67.08	2,237.9	S	-	EMP
					05-24-1995	1040	67.41	2,237.6	S	-	EMP
					06-21-1995	1045	68.90	2,236.1	S	-	EMP
					07-19-1995	1150	68.50	2,236.5	S	-	EMP
					08-23-1995	1050	69.70	2,235.3	S	R	EMP
					09-19-1995	1145	69.61	2,235.4	S	-	EMP
					10-24-1995	1210	70.82	2,234.2	S	-	EMP
					11-09-1995	1100	68.82	2,236.2	S	-	EMP
					12-19-1995	1238	67.61	2,237.4	S	-	EMP
AD- 8	362929116085701	Cherry Patch Well	2,394.3	.6	01-23-1995	1110	35.03	2,359.3	S	-	EMP
					02-13-1995	1020	34.97	2,359.3	S	-	EMP
					03-28-1995	1505	33.14	2,361.2	S	-	EMP
					04-17-1995	0940	35.13	2,359.2	S	-	EMP
					04-20-1995	--	35.11	2,359.2	S	-	USGS-NV
					05-22-1995	1325	34.49	2,359.8	S	-	EMP
					06-26-1995	0950	34.29	2,360.0	S	-	EMP
					07-18-1995	1055	34.70	2,359.6	S	-	EMP
					08-21-1995	1115	34.40	2,359.9	S	-	EMP
					09-18-1995	1110	34.63	2,359.7	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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	Cherry Patch Well	2,394.3	0.6	10-23-1995	1240	34.41	2,359.9	S	-	EMP
					11-13-1995	0940	34.63	2,359.7	S	-	EMP
					12-28-1995	0935	35.22	2,359.1	S	-	EMP
AD- 9	362848116264201	Gilgans North Well	2,264.8	-.1	01-25-1995	0945	73.49	2,191.3	S	-	EMP
					02-14-1995	1235	75.74	2,189.1	S	-	EMP
					03-28-1995	1139	75.15	2,189.6	S	-	EMP
					04-05-1995	--	77.70	2,187.1	Z	-	NDWR
					04-18-1995	1205	78.06	2,186.7	S	-	EMP
					05-24-1995	1100	78.78	2,186.0	S	-	EMP
					06-21-1995	1115	83.78	2,181.0	S	-	EMP
					07-19-1995	1130	83.98	2,180.8	S	-	EMP
					08-23-1995	1030	80.78	2,184.0	S	-	EMP
					09-19-1995	1125	82.42	2,182.4	S	-	EMP
					10-18-1995	--	83.30	2,181.5	S	-	EMP
					10-24-1995	1155	80.72	2,184.1	S	-	EMP
					11-09-1995	1050	78.07	2,186.7	S	-	EMP
					12-19-1995	1205	77.02	2,187.8	Z	-	NDWR
AD-10	362525116274301	NA-9 Well	2,190.9	1.3	01-25-1995	1025	9.62	2,181.3	S	-	EMP
					02-14-1995	1205	9.46	2,181.4	S	-	EMP
					03-28-1995	1110	9.74	2,181.2	S	-	EMP
					04-18-1995	1315	9.67	2,181.2	S	-	EMP
					05-24-1995	1140	9.73	2,181.2	S	-	EMP
					06-21-1995	1145	9.82	2,181.1	S	-	EMP
					07-19-1995	1100	9.90	2,181.0	S	-	EMP
					08-23-1995	1000	9.91	2,181.0	S	-	EMP
					09-19-1995	1055	9.85	2,181.0	S	-	EMP
					10-24-1995	1125	9.95	2,181.0	S	-	EMP
					11-09-1995	1025	10.01	2,180.9	S	-	EMP
					12-19-1995	1142	10.09	2,180.8	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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-11	361954116181201	GS-3 Well	2,351.3	1.1	01-23-1995	1350	224.87	2,126.4	S	-	EMP
					02-13-1995	1220	224.76	2,126.5	S	-	EMP
					03-28-1995	0950	225.10	2,126.2	S	-	EMP
					04-17-1995	1135	225.02	2,126.3	S	-	EMP
					05-22-1995	1505	224.85	2,126.4	S	-	EMP
					06-20-1995	1345	224.79	2,126.5	S	-	EMP
					07-18-1995	1250	224.74	2,126.6	S	-	EMP
					08-21-1995	1320	224.79	2,126.5	S	-	EMP
					09-18-1995	1300	224.65	2,126.6	S	-	EMP
					10-23-1995	1415	224.80	2,126.5	S	-	EMP
					11-07-1995	1015	224.93	2,126.4	S	-	EMP
					12-19-1995	0820	224.92	2,126.4	S	-	EMP
AD-12	362014116133901	GS-1 Well	2,430.3	2.0	01-23-1995	1220	80.30	2,350.0	S	-	EMP
					02-13-1995	1150	80.16	2,350.1	S	-	EMP
					03-27-1995	1734	80.22	2,350.1	S	-	EMP
					04-17-1995	1105	80.15	2,350.2	S	-	EMP
					05-19-1995	1435	80.13	2,350.2	S	-	EMP
					06-20-1995	1318	80.79	2,349.5	S	-	EMP
					07-18-1995	1210	80.84	2,349.5	S	-	EMP
					08-21-1995	1245	80.89	2,349.4	S	-	EMP
					09-18-1995	1215	80.95	2,349.4	S	-	EMP
					10-23-1995	1340	80.90	2,349.4	S	-	EMP
					11-07-1995	0940	80.93	2,349.4	S	-	EMP
					12-19-1995	0735	80.82	2,349.5	S	-	EMP
AD-13	361724116324201	S-1 Well	2,703.2	2.0	01-11-1995	1430	381.95	2,321.2	S	-	EMP
					02-14-1995	1005	382.27	2,321.0	V	-	EMP
					03-28-1995	0843	382.60	2,320.6	V	-	EMP
					04-17-1995	1235	382.57	2,320.6	V	-	EMP
					05-23-1995	0840	382.44	2,320.8	V	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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-13	361724116324201	S-1 Well	2,703.2	2.0	06-20-1995	1435	382.33	2,320.9	V	-	EMP
					07-19-1995	0950	382.73	2,320.5	V	-	EMP
					08-21-1995	1420	382.50	2,320.7	V	-	EMP
					09-18-1995	1400	381.98	2,321.2	V	-	EMP
					10-24-1995	0835	382.39	2,320.8	V	-	EMP
					11-07-1995	1115	382.33	2,320.9	V	-	EMP
					12-19-1995	0930	381.91	2,321.3	V	-	EMP
AD-14	361817116244701	Death Valley Jct Well	2,041.8	0.7	01-11-1995	1330	3.73	2,038.1	S	-	EMP
					02-14-1995	0945	3.70	2,038.1	S	-	EMP
					03-28-1995	0910	3.63	2,038.2	S	-	EMP
					04-17-1995	1210	3.37	2,038.4	S	-	EMP
					05-23-1995	0810	3.40	2,038.4	S	-	EMP
					06-20-1995	1415	3.58	2,038.2	S	-	EMP
					07-18-1995	1330	3.87	2,037.9	S	-	EMP
					08-21-1995	1355	3.87	2,037.9	S	-	EMP
					09-18-1995	1335	4.17	2,037.6	S	-	EMP
					10-24-1995	0810	4.10	2,037.7	S	-	EMP
					11-07-1995	1045	3.97	2,037.8	S	-	EMP
					12-19-1995	0855	3.85	2,038.0	S	-	EMP
AM- 1	362858116195301	Rogers Spring Well	2,265.9	.1	01-09-1995	1642	2.75	2,263.2	S	-	NTS
					01-30-1995	1605	2.56	2,263.3	S	-	EMP
					01-31-1995	1452	2.43	2,263.5	T	-	USFWS
					02-02-1995	0947	2.59	2,263.3	S	-	NTS
					02-13-1995	1540	2.64	2,263.3	S	-	EMP
					02-28-1995	1336	2.58	2,263.3	T	-	USFWS
					03-14-1995	1130	2.72	2,263.2	S	-	NTS
					03-27-1995	1224	2.75	2,263.2	S	-	EMP
					03-31-1995	1231	2.65	2,263.2	T	-	USFWS
					04-17-1995	0953	2.80	2,263.1	S	-	NTS

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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	0.1	04-19-1995	1130	2.77	2,263.1	S	-	EMP
					04-27-1995	1128	2.68	2,263.2	T	-	USFWS
					05-09-1995	0936	2.90	2,263.0	S	-	NTS
					05-25-1995	1025	2.90	2,263.0	S	-	EMP
					05-31-1995	1342	2.87	2,263.0	T	-	USFWS
					06-20-1995	0945	3.16	2,262.7	S	-	NTS
					06-22-1995	0745	3.23	2,262.7	S	-	EMP
					06-29-1995	1412	3.16	2,262.7	T	-	USFWS
					07-05-1995	0852	3.38	2,262.5	S	-	NTS
					07-20-1995	0815	3.63	2,262.3	S	-	EMP
					07-27-1995	1332	3.61	2,262.3	T	-	USFWS
					08-07-1995	0806	3.92	2,262.0	S	-	NTS
					08-23-1995	0830	3.95	2,262.0	S	-	EMP
					08-29-1995	1423	3.90	2,262.0	T	-	USFWS
					09-20-1995	1010	4.08	2,261.8	S	-	EMP
					09-29-1995	1118	3.82	2,262.1	T	-	USFWS
					10-25-1995	1015	3.52	2,262.4	S	-	EMP
					10-30-1995	1428	3.27	2,262.6	T	-	USFWS
					11-09-1995	0850	3.28	2,262.6	S	-	EMP
					11-27-1995	1520	2.95	2,263.0	T	-	USFWS
					12-20-1995	1056	2.93	2,263.0	S	-	EMP
AM- 2	362755116190401	Five Springs Well	2,367.4	1.17	01-30-1995	1530	-.61	2,368.0	S	F	EMP
					02-13-1995	1515	-.64	2,368.0	S	F	EMP
					03-27-1995	1258	-.65	2,368.0	S	F	EMP
					04-19-1995	1050	-.69	2,368.1	S	F	EMP
					05-25-1995	0945	-.70	2,368.1	S	F	EMP
					06-22-1995	0815	-.69	2,368.1	S	F	EMP
					07-20-1995	0840	-.68	2,368.1	S	F	EMP
					08-23-1995	0900	-.68	2,368.1	S	F	EMP
					09-20-1995	1055	-.68	2,368.1	S	F	EMP
					10-25-1995	1040	-.57	2,368.0	S	F	EMP
					11-09-1995	0920	-.63	2,368.0	S	F	EMP
					12-20-1995	0917	-.55	2,368.0	S	F	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 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	Garners Well	2,157.0	1.15	01-30-1995	1320	19.78	2,137.2	S	-	EMP
					02-13-1995	1430	19.55	2,137.4	S	-	EMP
					03-27-1995	1505	19.05	2,138.0	S	-	EMP
					04-19-1995	0845	18.84	2,138.2	S	-	EMP
					05-25-1995	0910	18.75	2,138.2	S	-	EMP
					06-22-1995	0725	18.94	2,138.1	S	-	EMP
					07-05-1995	1032	19.13	2,137.9	S	-	NTS
					07-20-1995	0920	19.31	2,137.7	S	-	EMP
					08-23-1995	0930	19.85	2,137.2	S	-	EMP
					09-20-1995	1120	20.31	2,136.7	S	-	EMP
					10-25-1995	1135	20.51	2,136.5	S	-	EMP
					11-09-1995	0955	20.42	2,136.6	S	-	EMP
					12-20-1995	0847	20.03	2,137.0	S	-	EMP
AM- 4	362532116172700	Devils Hole	2,359.9	--	01-15-1995	--	2.06	2,357.8	A	-	NPS
					02-15-1995	--	2.02	2,357.9	A	-	NPS
					03-15-1995	--	2.02	2,357.9	A	-	NPS
					03-27-1995	1405	1.94	2,358.0	N	-	EMP
					04-15-1995	--	2.00	2,357.9	A	-	NPS
					05-15-1995	--	2.00	2,357.9	A	-	NPS
					05-31-1995	1045	2.10	2,357.8	N	-	EMP
					06-15-1995	--	2.01	2,357.9	A	-	NPS
					07-15-1995	--	2.03	2,357.9	A	-	NPS
					08-15-1995	--	2.03	2,357.9	A	-	NPS
					08-30-1995	1350	2.06	2,357.8	N	-	EMP
					10-15-1995	--	2.06	2,357.8	A	-	NPS
					11-08-1995	1200	2.09	2,357.8	N	-	EMP
					11-15-1995	--	2.09	2,357.8	A	-	NPS
					12-15-1995	--	2.09	2,357.8	A	-	NPS
AM- 5	362529116171100	Devils Hole Well	2,404.1	.9	01-09-1995	1215	48.04	2,356.1	S	-	USGS-NV
					01-30-1995	1345	48.08	2,356.0	S	-	EMP
					01-31-1995	1124	48.10	2,356.0	T	-	USFWS
					02-02-1995	1415	48.08	2,356.0	S	-	USGS-NV
					02-13-1995	1410	47.92	2,356.2	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 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	02-22-1995	1048	48.00	2,356.1	S	-	USGS-NV
					02-28-1995	1339	47.99	2,356.1	T	-	USFWS
					03-14-1995	1418	48.03	2,356.1	S	-	USGS-NV
					03-27-1995	1430	48.01	2,356.1	S	-	EMP
					03-31-1995	0942	48.11	2,356.0	T	-	USFWS
					04-17-1995	1337	48.12	2,356.0	S	-	USGS-NV
					04-19-1995	0905	47.98	2,356.1	S	-	EMP
					04-27-1995	1000	48.03	2,356.1	T	-	USFWS
					05-09-1995	0837	48.10	2,356.0	S	-	USGS-NV
					05-25-1995	1100	48.00	2,356.1	S	-	EMP
					05-30-1995	0824	48.08	2,356.0	S	-	USGS-NV
					05-31-1995	1107	48.10	2,356.0	T	-	USFWS
					06-20-1995	0710	48.07	2,356.0	S	-	USGS-NV
					06-22-1995	0905	48.14	2,356.0	S	-	EMP
					06-29-1995	0945	48.09	2,356.0	T	-	USFWS
					07-05-1995	0713	48.11	2,356.0	S	-	USGS-NV
					07-18-1995	1633	48.07	2,356.0	S	-	USGS-NV
					07-20-1995	0750	48.14	2,356.0	S	-	EMP
					07-27-1995	1125	48.15	2,356.0	T	-	USFWS
					08-07-1995	0538	48.05	2,356.0	S	-	USGS-NV
					08-23-1995	0810	48.11	2,356.0	S	-	EMP
					08-29-1995	0542	48.07	2,356.0	S	-	USGS-NV
					08-29-1995	1106	48.09	2,356.0	T	-	USFWS
					09-20-1995	0935	48.14	2,356.0	S	-	EMP
					09-21-1995	0621	48.10	2,356.0	S	-	USGS-NV
					09-29-1995	0940	48.10	2,356.0	T	-	USFWS
					10-02-1995	0647	48.17	2,355.9	S	-	USGS-NV
					10-25-1995	0945	48.08	2,356.0	S	-	EMP
					10-30-1995	1112	48.04	2,356.1	T	-	USFWS
					11-08-1995	1115	48.10	2,356.0	S	-	USGS-NV
					11-08-1995	1205	48.10	2,356.0	S	-	EMP
					11-27-1995	1357	48.12	2,356.0	T	-	USFWS
					12-04-1995	1139	48.11	2,356.0	S	-	USGS-NV
					12-20-1995	0829	48.10	2,356.0	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 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- 6	362432116165701	Point of Rocks North Well	2,318.8	0.0	01-30-1995	1410	20.99	2,297.8	S	-	EMP
					01-31-1995	0942	20.95	2,297.8	T	-	USFWS
					02-13-1995	1315	20.99	2,297.8	S	-	EMP
					02-28-1995	1130	20.99	2,297.8	T	-	USFWS
					03-27-1995	1645	21.09	2,297.7	S	-	EMP
					03-31-1995	0820	21.09	2,297.7	T	-	USFWS
					04-19-1995	0940	21.16	2,297.6	S	-	EMP
					04-27-1995	0910	21.18	2,297.6	T	-	USFWS
					05-25-1995	1200	21.32	2,297.5	S	-	EMP
					05-31-1995	0947	21.29	2,297.5	T	-	USFWS
					06-22-1995	0940	21.43	2,297.4	S	-	EMP
					06-29-1995	0851	21.42	2,297.4	T	-	USFWS
					07-20-1995	0700	21.55	2,297.2	S	-	EMP
					07-27-1995	1033	21.53	2,297.3	T	-	USFWS
					08-23-1995	0715	21.60	2,297.2	S	-	EMP
					08-29-1995	0826	21.57	2,297.2	T	-	USFWS
					09-20-1995	0845	21.62	2,297.2	S	-	EMP
					09-28-1995	1134	21.53	2,297.3	T	-	USFWS
					10-25-1995	0850	21.45	2,297.4	S	-	EMP
					10-30-1995	1040	21.39	2,297.4	T	-	USFWS
					11-09-1995	0750	21.40	2,297.4	S	-	EMP
					11-27-1995	1132	21.37	2,297.4	T	-	USFWS
					12-20-1995	0747	21.35	2,297.4	S	-	EMP
AM- 7	362417116163600	Point of Rocks South Well	2,333.5	.8	01-09-1995	1300	8.87	2,324.6	S	-	USGS-NV
					01-18-1995	1047	8.94	2,324.6	S	-	USGS-NV
					01-18-1995	1200	8.94	2,324.6	S	-	USGS-NV
					01-19-1995	1645	8.88	2,324.6	S	-	USGS-NV
					01-30-1995	1435	8.88	2,324.6	S	-	EMP
					01-31-1995	1015	8.89	2,324.6	T	-	USFWS
					02-02-1995	1527	8.89	2,324.6	S	-	USGS-NV
					02-13-1995	1340	8.83	2,324.7	S	-	EMP
					02-22-1995	0905	8.88	2,324.6	S	-	USGS-NV
					02-28-1995	1150	8.90	2,324.6	T	-	USFWS

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 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	03-14-1995	1501	8.88	2,324.6	S	-	USGS-NV
					03-27-1995	1544	8.86	2,324.6	S	-	EMP
					03-31-1995	0856	8.89	2,324.6	T	-	USFWS
					04-17-1995	1424	9.01	2,324.5	S	-	USGS-NV
					04-19-1995	1000	8.97	2,324.5	S	-	EMP
					04-27-1995	0938	9.01	2,324.5	T	-	USFWS
					05-10-1995	0701	8.89	2,324.6	S	-	USGS-NV
					05-25-1995	1215	9.22	2,324.3	S	-	EMP
					05-30-1995	0748	9.24	2,324.3	S	-	USGS-NV
					05-31-1995	1011	9.25	2,324.2	T	-	USFWS
					06-20-1995	0633	9.40	2,324.1	S	-	USGS-NV
					06-22-1995	1005	9.46	2,324.0	S	-	EMP
					06-29-1995	0927	9.40	2,324.1	T	-	USFWS
					07-05-1995	0644	9.44	2,324.1	S	-	USGS-NV
					07-18-1995	1600	9.38	2,324.1	S	-	USGS-NV
					07-20-1995	0720	9.45	2,324.0	S	-	EMP
					07-27-1995	1105	9.44	2,324.1	T	-	USFWS
					08-07-1995	0627	9.40	2,324.1	S	-	USGS-NV
					08-23-1995	0740	9.40	2,324.1	S	-	EMP
					08-29-1995	0628	9.38	2,324.1	S	-	USGS-NV
					08-29-1995	0857	9.37	2,324.1	T	-	USFWS
					09-20-1995	0915	9.37	2,324.1	S	-	EMP
					09-21-1995	0654	9.34	2,324.2	S	-	USGS-NV
					09-28-1995	1117	9.26	2,324.2	T	-	USFWS
					10-02-1995	0725	9.32	2,324.2	S	-	USGS-NV
					10-25-1995	0915	9.21	2,324.3	S	-	EMP
					10-30-1995	1021	9.18	2,324.3	T	-	USFWS
					11-08-1995	1239	9.17	2,324.3	S	-	USGS-NV
					11-09-1995	0815	9.16	2,324.3	S	-	EMP
					11-27-1995	1200	9.16	2,324.3	T	-	USFWS
					12-04-1995	1226	9.14	2,324.4	S	-	USGS-NV
					12-20-1995	0802	9.14	2,324.4	S	-	EMP

Table 5. Periodic measurements of water levels at monitoring sites in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 1)	U.S. Geological Survey site identification	Site name	Land-surface altitude (feet above sea level)	Height of measure-ment 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
DV- 3	362230116392901	Travertine Point 1 Well	2,728.4	2.0	01-23-1995	1520	599.57	2,128.8	V	-	EMP
					02-14-1995	1055	599.42	2,129.0	V	-	EMP
					03-28-1995	0715	599.59	2,128.8	V	-	EMP
					04-17-1995	1325	599.72	2,128.7	V	-	EMP
					05-23-1995	0940	599.70	2,128.7	V	-	EMP
					06-20-1995	1525	599.70	2,128.7	V	-	EMP
					07-19-1995	0800	599.80	2,128.6	V	-	EMP
					08-22-1995	0750	599.85	2,128.6	V	-	EMP
					09-19-1995	0840	599.89	2,128.5	V	-	EMP
					10-24-1995	0950	599.97	2,128.4	V	-	EMP
					11-07-1995	1205	600.03	2,128.4	V	-	EMP
					12-19-1995	1027	599.94	2,128.5	V	-	EMP

Table 6. Daily average water levels in well JF-3 for calendar year 1995

[--, data not available]

Day	Water level, in feet below land surface											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	---	710.23	710.09	710.05	710.12	710.08	710.25	710.25	710.22	710.33	710.21	710.10
2	---	710.28	710.15	710.08	710.16	710.06	710.24	710.22	710.25	710.34	710.39	710.23
3	---	710.37	710.15	710.26	710.24	710.21	710.16	710.22	710.24	710.17	710.38	710.36
4	---	710.29	710.20	710.17	710.09	710.26	710.24	710.25	710.24	710.28	710.34	710.32
5	---	710.21	710.00	710.00	710.10	710.12	710.32	710.20	710.35	710.40	710.28	710.26
6	---	710.10	710.29	709.98	710.16	710.18	710.33	710.18	710.35	710.24	710.29	710.24
7	---	709.95	710.42	710.05	710.19	710.14	710.36	710.20	710.25	710.18	710.49	710.19
8	---	710.00	710.32	710.08	710.33	710.29	710.32	710.27	710.19	710.27	710.33	710.38
9	---	710.20	710.15	710.22	710.38	710.48	710.25	710.18	710.17	710.32	710.01	710.45
10	---	710.12	710.05	710.32	710.28	710.48	710.21	710.14	710.26	710.38	710.26	710.42
11	---	709.97	709.92	710.27	710.06	710.34	710.17	710.28	710.34	710.25	710.50	710.23
12	---	709.90	710.34	710.24	709.97	710.26	710.16	710.37	710.31	710.20	710.41	710.04
13	---	709.94	710.52	710.05	709.95	710.20	710.26	710.30	710.24	710.43	710.36	710.14
14	---	709.95	710.41	710.17	710.29	710.12	710.30	710.24	710.19	710.44	710.23	710.45
15	---	710.38	710.22	709.96	710.38	710.01	710.29	710.25	710.14	710.28	710.21	710.34
16	---	710.60	710.12	709.93	710.18	710.18	710.30	710.22	710.18	710.13	710.30	710.15
17	---	710.60	710.20	710.18	710.31	710.43	710.32	710.25	710.22	710.20	710.40	710.31
18	---	710.58	710.23	710.06	710.41	710.38	710.24	710.35	710.25	710.23	710.31	710.33
19	710.39	710.54	710.14	710.09	710.37	710.24	710.29	710.34	710.27	710.44	710.24	710.32
20	710.21	710.32	709.94	710.12	710.27	710.22	710.28	710.44	710.22	710.38	710.33	710.27
21	710.24	710.15	709.85	710.33	710.20	710.36	710.24	710.46	710.27	710.03	710.28	710.36
22	710.29	710.15	710.15	710.50	710.14	710.41	710.23	710.36	710.24	710.24	710.31	710.40
23	710.18	710.26	710.01	710.44	710.22	710.42	710.26	710.24	710.18	710.37	710.42	710.38
24	710.09	710.22	710.23	710.22	710.24	710.31	710.25	710.21	710.22	710.32	710.42	710.48
25	709.98	710.12	710.36	710.05	710.26	710.18	710.19	710.22	710.13	710.28	710.21	710.50
26	710.21	710.21	710.44	710.07	710.34	710.17	710.24	710.24	710.10	710.19	710.14	710.41
27	710.42	710.28	710.33	709.99	710.38	710.25	710.32	710.25	710.22	710.14	710.34	710.32
28	710.49	710.23	710.19	710.12	710.34	710.25	710.31	710.26	710.21	710.10	710.37	710.23
29	710.47		710.22	710.13	710.33	710.27	710.25	710.25	710.30	710.14	710.38	710.29
30	710.43		710.24	710.25	710.33	710.28	710.19	710.23	710.44	710.18	710.23	710.23
31	710.29		710.20		710.28		710.25	710.22		710.12		710.21
Mean	710.28	710.22	710.20	710.15	710.24	710.25	710.26	710.26	710.24	710.26	710.31	710.30
Maximum	710.49	710.60	710.52	710.50	710.41	710.48	710.36	710.46	710.44	710.44	710.50	710.50
Minimum	709.98	709.90	709.85	709.93	709.95	710.01	710.16	710.14	710.10	710.03	710.01	710.04

(1995 annual summary Mean 710.25 Maximum 710.60 Minimum 709.85)

Table 7. Daily average water levels in well AD-6 for calendar year 1995

Day	Water level, in feet below land surface											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	41.67	41.61	41.54	41.54	41.52	41.49	41.56	41.58	41.60	41.66	41.65	41.61
2	41.62	41.63	41.58	41.57	41.54	41.50	41.56	41.57	41.61	41.67	41.72	41.68
3	41.61	41.68	41.58	41.63	41.57	41.56	41.53	41.56	41.61	41.58	41.70	41.73
4	41.54	41.65	41.59	41.58	41.50	41.57	41.57	41.57	41.61	41.65	41.69	41.70
5	41.49	41.62	41.50	41.51	41.52	41.50	41.59	41.55	41.65	41.71	41.67	41.67
6	41.68	41.58	41.65	41.50	41.56	41.55	41.59	41.55	41.63	41.64	41.68	41.66
7	41.65	41.52	41.68	41.53	41.57	41.54	41.60	41.56	41.59	41.62	41.77	41.63
8	41.66	41.55	41.63	41.54	41.62	41.60	41.59	41.58	41.57	41.66	41.68	41.72
9	41.62	41.63	41.56	41.60	41.63	41.66	41.57	41.53	41.60	41.68	41.55	41.74
10	41.54	41.58	41.52	41.64	41.58	41.65	41.56	41.53	41.64	41.70	41.69	41.72
11	41.56	41.51	41.49	41.60	41.49	41.59	41.55	41.60	41.67	41.64	41.77	41.64
12	41.64	41.49	41.67	41.59	41.47	41.56	41.55	41.63	41.65	41.63	41.72	41.57
13	41.66	41.51	41.72	41.52	41.47	41.54	41.60	41.59	41.62	41.73	41.70	41.62
14	41.57	41.50	41.66	41.59	41.62	41.51	41.61	41.57	41.60	41.73	41.64	41.75
15	41.50	41.67	41.59	41.49	41.63	41.48	41.60	41.59	41.58	41.67	41.64	41.68
16	41.59	41.74	41.56	41.50	41.54	41.57	41.61	41.58	41.60	41.61	41.69	41.61
17	41.68	41.72	41.60	41.60	41.60	41.67	41.62	41.59	41.62	41.65	41.72	41.69
18	41.73	41.71	41.61	41.52	41.63	41.61	41.59	41.64	41.62	41.65	41.68	41.69
19	41.65	41.70	41.57	41.55	41.59	41.56	41.61	41.63	41.63	41.74	41.66	41.68
20	41.59	41.62	41.50	41.54	41.56	41.55	41.61	41.68	41.61	41.71	41.70	41.66
21	41.62	41.57	41.49	41.63	41.54	41.61	41.59	41.69	41.63	41.56	41.67	41.71
22	41.65	41.58	41.62	41.68	41.52	41.62	41.59	41.64	41.61	41.69	41.68	41.72
23	41.60	41.62	41.54	41.64	41.57	41.61	41.60	41.60	41.59	41.73	41.73	41.71
24	41.57	41.60	41.64	41.56	41.57	41.57	41.59	41.60	41.61	41.71	41.73	41.76
25	41.51	41.56	41.68	41.50	41.58	41.52	41.56	41.60	41.57	41.70	41.64	41.77
26	41.62	41.59	41.70	41.51	41.61	41.52	41.58	41.62	41.57	41.65	41.62	41.73
27	41.69	41.60	41.64	41.48	41.61	41.57	41.60	41.62	41.62	41.62	41.73	41.70
28	41.70	41.59	41.60	41.54	41.60	41.55	41.60	41.62	41.60	41.60	41.73	41.66
29	41.69		41.62	41.53	41.60	41.55	41.58	41.61	41.66	41.62	41.73	41.70
30	41.68		41.63	41.58	41.60	41.56	41.55	41.60	41.70	41.63	41.66	41.67
31	41.63		41.61		41.58		41.58	41.61		41.60		41.64
Mean	41.62	41.60	41.60	41.56	41.57	41.56	41.58	41.60	41.62	41.66	41.69	41.68
Maximum	41.73	41.74	41.72	41.68	41.63	41.67	41.62	41.69	41.70	41.74	41.77	41.77
Minimum	41.49	41.49	41.49	41.48	41.47	41.48	41.53	41.53	41.57	41.56	41.55	41.61

(1995 annual summary Mean 41.56 Maximum 41.77 Minimum 41.47)

Table 8. Ground-water-discharge data in Yucca Mountain region for calendar year 1995

Site number: Sites are grouped by hydrographic area and, within each area, are listed in general north-to-south, then west-to-east order. See text section titled "Site Number" for further discussion.

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

Time: Time measurement was made, in military time; --, measurement time unknown.

Discharge: Reported to two significant figures.

Method: Method used to measure discharge. C, current meter; V, volumetric; Z, discharge represents monthly mean discharge on basis of daily average flume measurements.

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

Site number (plate 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	03-29-1995	0956	1,600	C	EMP
			05-25-1995	0752	1,800	C	EMP
			08-24-1995	0750	1,800	C	EMP
			11-13-1995	1152	1,500	C	EMP
AM-2	362755116190401	Five Springs Well	01-30-1995	1530	5.2	V	EMP
			02-13-1995	1515	5.8	V	EMP
			03-27-1995	1300	4.4	V	EMP
			04-19-1995	1100	2.8	V	EMP
			05-25-1995	0950	1.3	V	EMP
			06-22-1995	0820	1.2	V	EMP
			07-20-1995	0845	1.3	V	EMP
			08-23-1995	0910	1.7	V	EMP
			09-20-1995	1100	1.1	V	EMP
			10-25-1995	1045	1.6	V	EMP
			11-09-1995	0925	1.1	V	EMP
			12-20-1995	0922	1.3	V	EMP
AM-5a	362502116192301	Crystal Pool	01-31-1995	1438	2,600	C	USFWS
			02-28-1995	1015	2,500	C	USFWS
			03-29-1995	1142	2,800	C	EMP
			03-30-1995	1630	2,500	C	USFWS
			04-26-1995	1250	2,500	C	USFWS
			05-31-1995	1010	2,400	C	USFWS
			05-31-1995	1200	2,800	C	EMP
			06-28-1995	1650	2,400	C	USFWS
			07-31-1995	0900	2,300	C	USFWS
			08-25-1995	1050	2,500	C	EMP
			08-31-1995	1045	2,300	C	USFWS
			09-29-1995	0800	2,300	C	USFWS
			10-30-1995	0846	2,400	C	USFWS
			11-13-1995	1315	2,600	C	EMP
			11-27-1995	0925	2,200	C	USFWS

Table 8. Ground-water-discharge data in Yucca Mountain region for calendar year 1995—Continued

Site number (plate 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	03-29-1995	1335	830	C	EMP
			05-31-1995	1339	970	C	EMP
			08-25-1995	0739	820	C	EMP
			11-28-1995	1115	1,000	C	EMP
DV-1	362728116501101	Texas Spring	05-15-1995	--	200	Z	NPS
			05-23-1995	1443	240	C	EMP
			06-15-1995	--	200	Z	NPS
			07-15-1995	--	200	Z	NPS
			08-15-1995	--	200	Z	NPS
			08-22-1995	1026	220	C	EMP
			09-15-1995	--	200	Z	NPS
			11-08-1995	1428	230	C	EMP
DV-2	362252116425301	Navel Spring	03-28-1995	1320	1.4	V	EMP
			05-23-1995	1315	1.2	V	EMP
			08-22-1995	1130	1.2	V	EMP
			11-08-1995	1010	1.2	V	EMP

Table 9. Estimated annual ground-water withdrawals from wells in Yucca Mountain region for calendar year 1995. Estimated withdrawals for 1994, revised from those presented by Westenburg and La Camera (1996), also are included.

Ground-water subbasin	Hydrographic area	Ground-water withdrawal [1]		
		Year	Millions of gallons	Acre-feet
Alkali Flat-Furnace Creek Ranch	Amargosa Desert [2]	1994	4,104	12,595
		1995	4,899	15,035
	Crater Flat[3]	1995	10.0	31
	Jackass Flats [3]	1995	90.6	278
Ash Meadows	Mercury Valley[3]	1995	24.1	74

[1] See section "Ground-Water Withdrawals" for discussion of data sources.

[2] Data recompiled from ground-water pumpage inventory for entire Amargosa Desert, listed to nearest acre-foot. Conversion to million of gallons is rounded to nearest 1 million gallons. All withdrawals for Amargosa Desert are included in Alkali Flat-Furnace Creek Ranch ground-water subbasin because data were not available to exclude withdrawals within Ash Meadows subbasin.

[3] Data reported or recompiled from flowmeter readings and listed to nearest 0.1 million gallons. Conversions to acre-feet are rounded to nearest acre-foot.

Table 10. Minimum, maximum, and median water-level altitudes, and average deviation of measurements, at wells in Jackass Flats for selected baseline periods and for calendar years 1992 through 1995. 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 selected baseline period.

Number: Number of water-level measurements for year(s) specified. For JF-2 (1985-93), JF-2a, and JF-3, value represents number of daily average water levels.

Water level: Based on discrete water-level measurements made during site visits for JF-1, JF-2 (after 1993), J-13, J-11, and J-12. Based on daily average water levels collected from continual data recorders for JF-2 (1985-93), JF-2a, and JF-3.

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

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

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

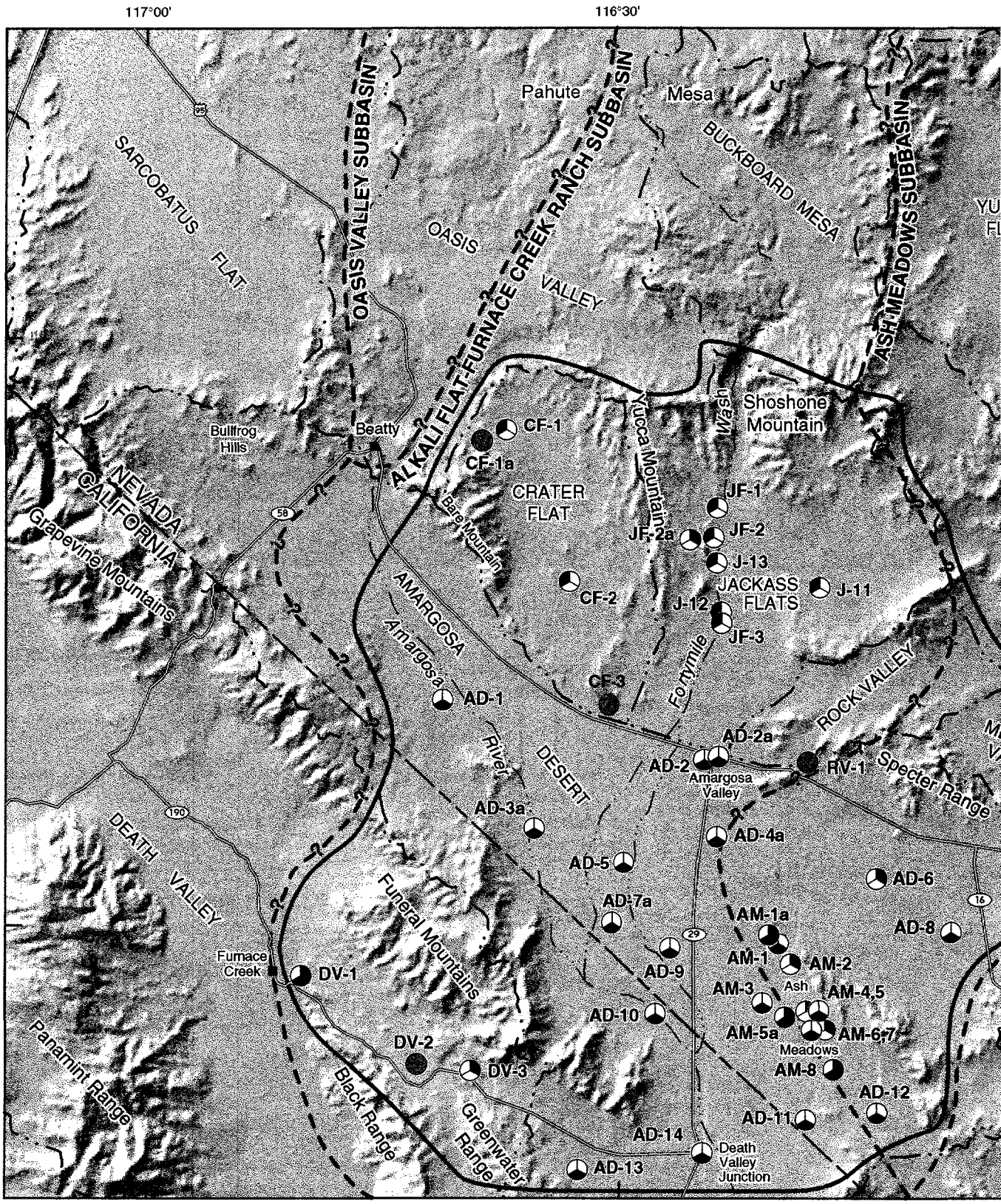
Average deviation: Calculated dispersion of measurements about median water-level altitude. Average deviation is equal to sum of absolute differences between measured water levels and median, divided by number of measurements.

Change in median: Differences between median water level for calendar years 1992, 1993, 1994, and 1995 compared with baseline period. Minus sign indicates that median water-level altitude was lower for the specified year compared with the baseline period.

[Abbreviations and symbols: N/A, not applicable (data field is not related to referenced data set)]

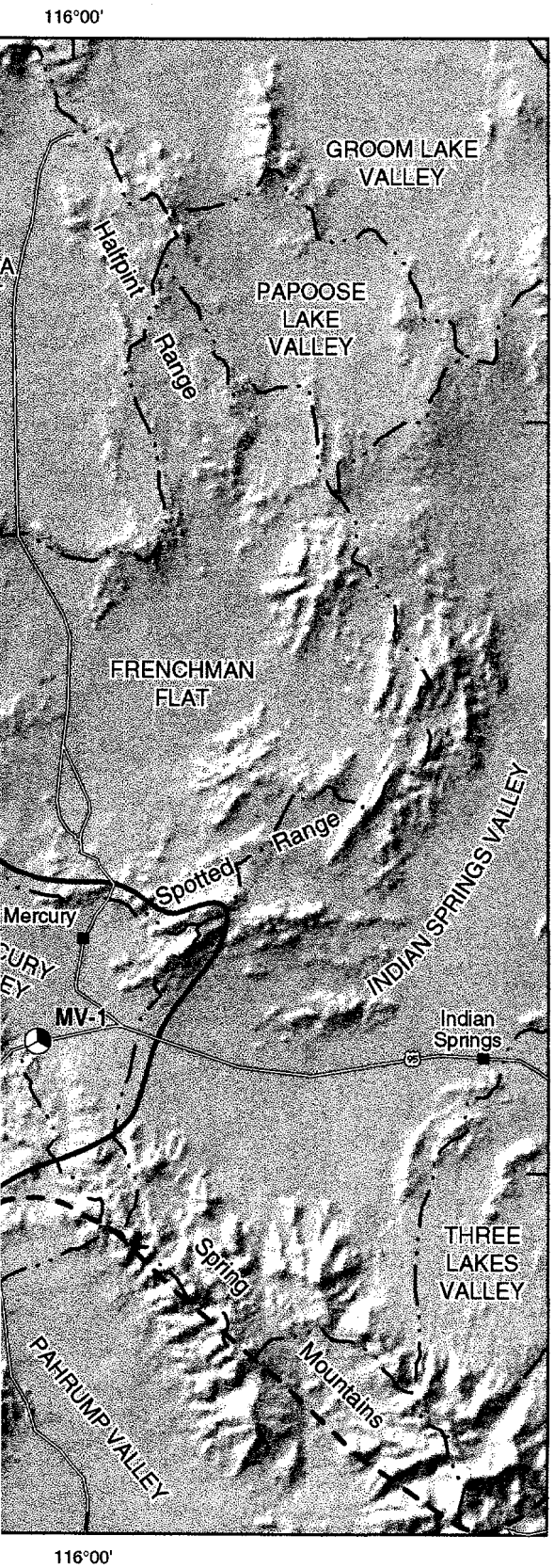
Site number (plate 1)	Calendar year(s)	Number	Water level (feet above sea level)			Average deviation (feet)	Change in median (feet)
			Minimum	Maximum	Median		
JF-1	*1985-91*	86	2,391.7	2,393.1	2,392.5	0.2	N/A
JF-2	*1985-91*	1,777	2,389.6	2,393.4	2,392.1	.3	N/A
JF-2a	*1985-91*	1,876	2,466.7	2,469.5	2,468.6	.4	N/A
J-13	*1989-91*	32	2,389.7	2,390.7	2,390.0	.2	N/A
J-11	*1990-91*	25	2,401.9	2,402.9	2,402.2	.1	N/A
J-12	*1990-91*	22	2,388.1	2,388.5	2,388.3	.1	N/A
JF-3	*1992-93*	582	2,387.7	2,388.8	2,388.3	.1	N/A
JF-1	1992	12	2,392.3	2,392.6	2,392.4	0.1	-0.1
JF-2	1992	357	2,391.8	2,392.6	2,392.2	.1	.1
JF-2a	1992	342	2,466.9	2,469.2	2,468.6	.5	0.0
J-13	1992	21	2,389.6	2,390.4	2,389.9	.1	-.1
J-11	1992	12	2,402.0	2,402.6	2,402.2	.1	0.0
J-12	1992	17	2,388.2	2,388.6	2,388.3	.1	0.0
JF-1	1993	8	2,391.9	2,392.7	2,392.5	0.2	0.0
JF-2	1993	362	2,391.7	2,392.8	2,392.1	.2	0.0
JF-2a	1993	365	2,468.4	2,469.2	2,468.8	.1	.2
J-13	1993	16	2,389.7	2,390.7	2,389.9	.1	-.1
J-11	1993	8	2,401.9	2,402.7	2,402.2	.2	0.0
J-12	1993	19	2,387.9	2,389.0	2,388.3	.1	0.0
JF-1	1994	12	2,392.1	2,392.6	2,392.3	0.1	-0.2
JF-2	1994	9	2,392.0	2,392.6	2,392.2	.1	.1
JF-2a	1994	356	2,468.4	2,469.4	2,469.0	.1	.4
J-13	1994	23	2,389.4	2,390.0	2,389.7	.1	-.3
J-11	1994	12	2,402.0	2,402.5	2,402.3	.1	.1
J-12	1994	24	2,387.8	2,389.1	2,388.2	.2	-.1
JF-3	1994	284	2,387.6	2,388.6	2,388.1	.1	-.2
JF-1	1995	7	2,392.3	2,392.8	2,392.5	0.2	0.0
JF-2	1995	9	2,392.2	2,392.5	2,392.4	.1	.3
JF-2a	1995	357	2,468.7	2,469.3	2,469.1	.1	.5
J-13	1995	11	2,389.6	2,390.4	2,389.8	.1	-.2
J-11	1995	11	2,402.2	2,402.5	2,402.4	.1	.2
J-12	1995	16	2,388.0	2,388.3	2,388.2	.1	-.1
JF-3	1995	347	2,387.7	2,388.4	2,388.1	.1	-.2

*U.S.GOVERNMENT PRINTING OFFICE 1996-0-790-301/44013



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

OPEN-FILE REPORT 96-553
Study area map—PLATE 1
La Camera, R.J., Westenburg, C.L., and Locke, G.L., 1996,
Selected ground-water data for Yucca Mountain region,
southern Nevada and eastern California, through December 1995



EXPLANATION

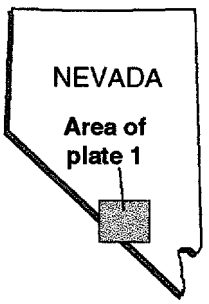
Study-area boundary

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-1	Volcanic rock
AD-1	Valley fill
DV-2	Undifferentiated sedimentary rock
DV-1	Combined carbonate rock and valley fill



MAP SHOWING LOCATION OF DATA-COLLECTION SITES FOR CALENDAR YEAR 1995, YUCCA MOUNTAIN REGION OF SOUTHERN NEVADA AND EASTERN CALIFORNIA

by

Richard J. La Camera, Craig L. Westenburg, and Glenn L. Locke

1996