RAINFALL, GROUND-WATER, AND OCEAN-TIDE DATA, GUAM, 1996

By Jill D. Torikai

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RAINFALL, GROUND-WATER, AND OCEAN-TIDE DATA, GUAM, 1996

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ABSTRACT

Rainfall, ground-water, and ocean-tide data were compiled for the island of Guam for 1996 as part of the Water-Data Management Program between the Guam Environmental Protection Agency and the U.S. Geological Survey. Ground-water data consist of pumpage, water levels, chloride concentrations, specific conductance, and temperature. Most data are from sites in northern Guam where ground-water development is concentrated, although pumpage and selected rainfall from southern Guam, including Cocos Island, are also in this report.

Rainfall on Guam in 1996 varied seasonally with greater rainfall during the period July through November 1996. Total ground-water pumpage on Guam in 1996 was 11,569 million gallons, or about 31.6 million gallons per day. Ground-water levels were less than 10 feet above mean sea level for all monitoring sites except well A-20, where water levels were 40 to 60 feet above mean sea level. The mean annual volume-weighted chloride concentrations from all management zones except zone 33 in Agana sub-basin were below 250 milligrams per liter. Monthly mean ocean-tide levels in 1996 ranged from -0.04 to 0.93 feet relative to mean sea level.

INTRODUCTION

The U.S. Territory of Guam is located in the western Pacific Ocean at latitude 13°28′N. and longitude 144°45′E. (fig. 1). The island is about 30 miles (mi) long, ranges in width from 4 to 12 mi and has an area of 212 mi^2. The northern half of Guam is largely composed of permeable limestone, whereas the southern half is underlain by volcanic rock with low permeability (Ward and others, 1965). Ground-water development is concentrated in northern Guam, where it is pumped from a limestone aquifer.

Potable water on Guam is supplied by the Government of Guam through the Guam Waterworks Authority (GWA), and by the U.S. military. GWA serves most of the civilian population by widespread ground-water pumping in northern Guam. The U.S. Air Force also uses ground water to supply its installations in northern Guam. The U.S. Navy's water-supply system uses surface water stored in Fena Valley Reservoir, which provides water to the U.S. Navy's installations and to some of the civilian population in southern Guam. Privately owned wells are scattered throughout Guam for industries, irrigation, and commercial ventures such as resorts and golf courses.

The total population of Guam in 1990 was about 199,000, of which one-third was U.S. military (U.S. Bureau of the Census, written commun., 1997). Population density and urban growth are greatest in the northern and central regions. The southern region remains more rural.

In 1972, the Guam Environmental Protection Agency began a cooperative project with the U.S. Geological Survey (USGS) to develop and maintain a ground-water database management system. The Water-Data Management Program (WDMP), as it is known, involves the collection and compilation of rainfall, ground-water, and ocean-tide data. The program's database integrates water-resource information for Guam from multiple agencies.

Purpose and Scope

This report presents the 1996 rainfall, ground-water, and ocean-tide data that were collected and compiled for Guam. The report contains the following:

Rainfall
- monthly rainfall at 17 sites

Ground Water
- monthly ground-water pumpage from 160 production wells
- monthly ground-water levels at 9 monitoring sites
- daily mean and monthly mean ground-water levels at 8 monitoring sites
- chloride concentration of water from 160 production wells
- pumpage and chloride concentration of water by management zone
- chloride concentration, specific conductance, and temperature of water from 3 monitoring wells
- vertical chloride-concentration profiles of 3 monitoring wells

Ocean Tides
- daily mean and monthly mean ocean-tide levels at 1 tide gage

Acknowledgments

Data were compiled from the following agencies:

Guam Environmental Protection Agency (GEPA)
Guam Waterworks Authority (GWA), formerly known as the Public Utility Agency of Guam (PUAG)
National Weather Service (NWS)
U.S. Air Force (USAF)
U.S. Navy (USN)

Assistance from these agencies in support of the WDMP is gratefully acknowledged. Logistical support from the staff of GEPA is appreciated.

RAINFALL

A dry season occurs on Guam from about January through May, and a wet season occurs from about July through November; June and December are transitional months (Ward and others, 1965). Heavy and prolonged rainfall are usually associated with typhoons that pass near or over Guam. According to Ward and others (1965) mean annual rainfall ranges from about 80 inches on the coastal lowlands to about 100 inches on the uplands in southern Guam. Droughts are frequent.

Rainfall data is compiled from 17 selected rain gages located throughout Guam. The gages are owned and operated by the NWS, USAF, USN, or the USGS. Data from the USAF and the NWS are published in the series "Climatological Data, Hawaii and Pacific" (National Oceanic and Atmospheric Administration, 1996). All other data are provisional.

Monthly rainfall on Guam for 1996 are displayed in figure A1 and in table A1. Seasonal rainfall in 1996 was evident with most stations showing increased rainfall for the period July through November.

GROUND WATER

Ground-water data include pumpage, water levels, and the water-quality characteristics of chloride concentration, specific conductance, and temperature. For management purposes, northern Guam was divided into six ground-water sub-basins, and further divided into 47 management zones by Camp, Dresser and McKee, Inc. (1982) (plate 1). Management zones were not designated for coastal areas. For this report, a coastal area within a sub-basin is referred to as a "coastal" management zone that extends from a sub-basin boundary to the coast, and is named after the adjacent sub-basin. Ground-water data from southern Guam, including Cocos Island, is also in this report, although it is not part of any sub-basin.

Pumpage

Ground water is pumped by the GWA, USAF, USN, and private well owners. Table 1 is a list of 1996 production wells and respective well owners. The GWA, USAF, and USN provide their respective pumpage data to the USGS, and GEPA provides the pumpage data for all privately owned wells.

In 1996, 160 production wells were active, although wells BCC, MCR-1, MJ-2, and TMT were not pumped. New production wells that were pumped in 1996 include: D-22A, F-17, F-18, IE-2, and Y-12. Ground-water pumpage data for 1996 are displayed in figures B1, B2, and B3, and in tables B1 and B2. Pumpage data are presented by sub-basin, management zone, and individual well. Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin and management-zone pumpage totals because assignments to specific management zones are not available.

Total ground-water pumpage on Guam in 1996 was 11,569 million gallons or about 31.6 million gallons per day. Pumpage from the Agana and Yigo sub-basins combined accounted for about 73 percent of total Guam pumpage. About 14 percent was pumped from the Finegayan sub-basin, and the remaining 13 percent was pumped from the Agafo Gumas, Andersen, and Mangilao sub-basins, and from southern Guam.

Water Levels

Ground-water levels are measured by the USGS and GEPA. The USGS measures water levels from eight monitoring sites (seven wells and one tunnel) that are equipped with digital recorders. The recorders measure water levels to the nearest 0.01 feet (ft) at 30-minute intervals. Ground-water levels at sites measured by the USGS were 2 to 7 ft above mean sea level at wells A-16, BPM-1, EX-7, EX-10, M-10A, and M-11 and at ACEORP Tunnel; well A-20 was 40 to 60 ft above mean sea level (fig. B4 and table B3). Water levels peaked in August or September at wells BPM-1, M-10A, and M-11, which are the only wells with complete data for 1996.

GEPA measures water levels at nine monitoring sites (eight wells and one spring) each month using a steel tape. Monthly water-level data for sites measured by GEPA are available for the period May through December 1996. During this period, water levels were less than 10 ft above mean sea level (fig. B5 and table B4). The water levels peaked in September or October at sites EX-4, EX-6, EX-9, Father Duenas, and GHURA-Dededo. Trends are not discernible for Agana Spring and wells Agana 147, EX-1, and Harmon 107 because of the incomplete data during the period May through December 1996.

Water Quality

Water-quality characteristics presented include chloride concentration, specific conductance, and temperature. In this report, chloride concentration is used as a quantitative measure of salinity. A chloride concentration of 250 milligrams per liter (mg/L) is the secondary maximum contaminant level (SMCL) under secondary drinking-water standards (U.S. Environmental Protection Agency, 1991). Secondary standards are not enforceable limits, but instead establish goals for constituents that may affect the aesthetic qualities of drinking water, such as taste or color. For comparison, the chloride concentration in seawater is about 20,000 mg/L.

Chloride concentrations of water are analyzed quarterly by the GWA from their production wells (table 1). Wells owned by the USAF, USN, and privately owned wells are sampled once a year with chloride-concentration analyses performed by GEPA. Chloride concentration data for 1996 are displayed in figure B3 and in table B5 for production wells.

For management purposes, chloride concentrations are further presented as a mean annual volume-weighted chloride concentration when representing the water from a management zone (table B6). Mean annual volume-weighted chloride concentrations are calculated by adding the products of total annual pumpage and mean annual chloride concentration for every sampled well in the zone, and then dividing that sum by the total pumpage for those wells. Mean annual volume-weighted chloride concentration accounts for pumpage and weights chloride concentrations from those wells which pump more water. Mean annual volume-weighted chloride concentrations were calculated only if both pumpage and chloride-concentration data were available for at least two wells in a given management zone.

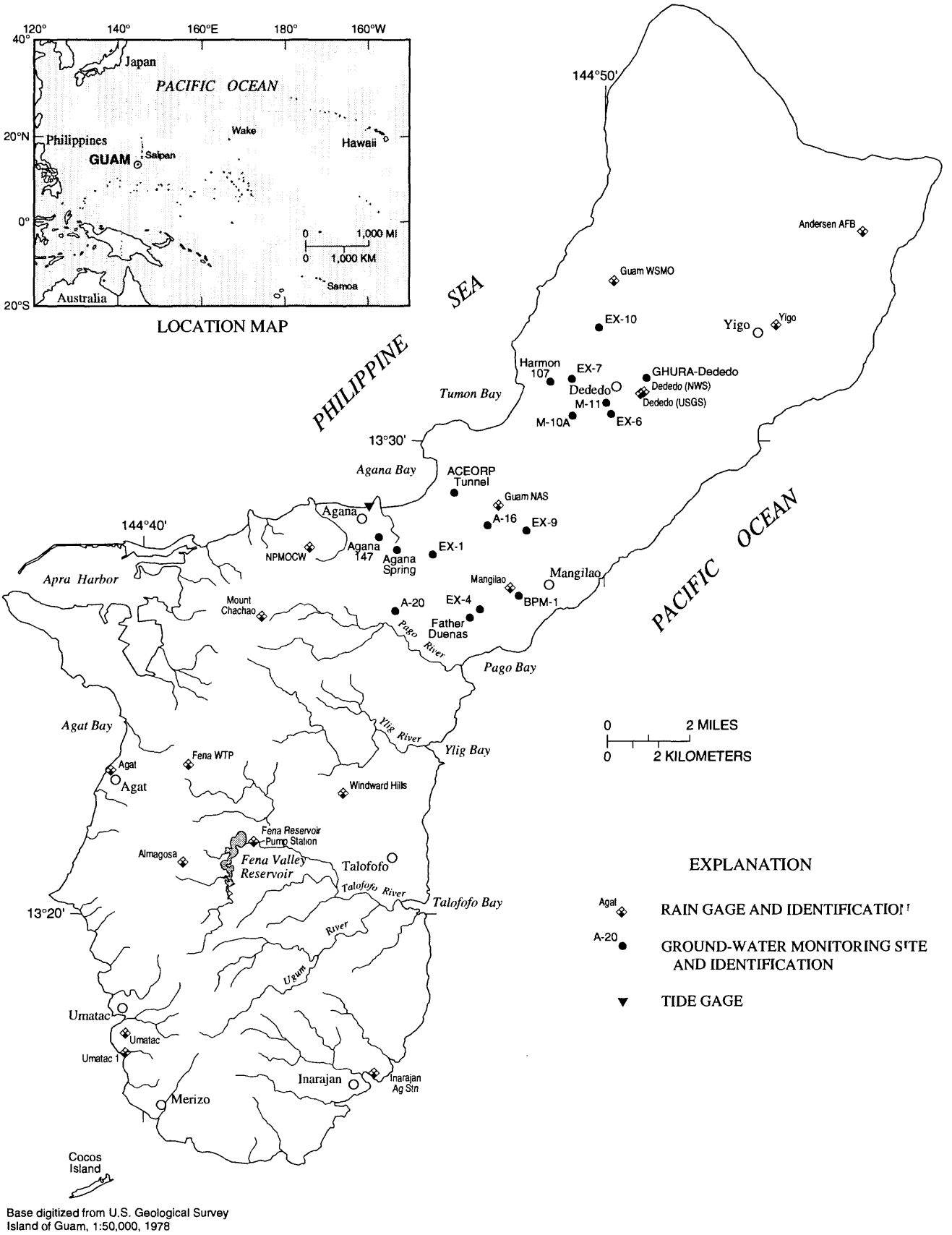
The mean annual volume-weighted chloride concentration of water from all management zones except one (table B6) was below the 250 mg/L secondary drinking-water standard established by the U.S. Environmental Protection Agency (1991). Only the water representative of management zone 33 in the Agana sub-basin was above the secondary limit at 318 mg/L. The high mean annual volume-weighted chloride concentration in zone 33 is a concern because pumpage from this zone is about 26 percent of the total pumpage from Agana sub-basin. Water from six of the nine wells in zone 33 had mean annual chloride concentrations above 250 mg/L in 1996 (table B5).

In 1996, chloride concentration, specific conductance, and temperature were measured by the USGS for water from three monitoring wells using a downhole sampler (table B7). Vertical chloride-concentration profiles of the monitoring wells are shown in figure B6. The "EX" designation in the monitoring well number indicates "exploratory" by which these wells were initially known.

OCEAN TIDES

Tides at Guam are semidiurnal, with two high tides and two low tides each day. The mean tidal range is 1.6 feet (ft) (Ward and others, 1965). The tide gage at Agana is operated by the USGS. Ocean levels are measured on a digital recorder to the nearest 0.01 ft at 15-minute intervals.

Ocean-tide levels at Agana in 1996 are displayed in figure C1 and in table C1. The greatest monthly mean ocean-tide level of 0.93 ft above mean sea level was during July, and the smallest monthly mean level of -0.04 ft below mean sea level was during December. The monthly mean tidal range in 1996 was 0.97 ft.



Base digitized from U.S. Geological Survey
Island of Guam, 1:50,000, 1978

Figure 1. Rain gages, ground-water monitoring sites, and tide gage used in the Water-Data Management Program, Guam, 1996.

Table 1. Production wells and owners, Guam, 1996

Well	Owner[1]	Well	Owner[1]	Well	Owner[1]
A-1	Guam Waterworks Authority	CCP-1	Country Club of the Pacific	EX-5A	Guam Waterworks Authority
A-2	Guam Waterworks Authority	CCP-2	Country Club of the Pacific	EX-11	Guam Waterworks Authority
A-3	Guam Waterworks Authority	CCP-3	Country Club of the Pacific	F-1	Guam Waterworks Authority
A-4	Guam Waterworks Authority	CCP-4	Country Club of the Pacific	F-2	Guam Waterworks Authority
A-5	Guam Waterworks Authority	CCP-5	Country Club of the Pacific	F-3	Guam Waterworks Authority
A-6	Guam Waterworks Authority	CCP-6	Country Club of the Pacific	F-4	Guam Waterworks Authority
A-7	Guam Waterworks Authority	CIR-1,2	Cocos Island Resort	F-5	Guam Waterworks Authority
A-8	Guam Waterworks Authority	D-1	Guam Waterworks Authority	F-6	Guam Waterworks Authority
A-9	Guam Waterworks Authority	D-2	Guam Waterworks Authority	F-7	Guam Waterworks Authority
A-10	Guam Waterworks Authority	D-3	Guam Waterworks Authority	F-8	Guam Waterworks Authority
A-12	Guam Waterworks Authority	D-4	Guam Waterworks Authority	F-9	Guam Waterworks Authority
A-13	Guam Waterworks Authority	D-5	Guam Waterworks Authority	F-10	Guam Waterworks Authority
A-14	Guam Waterworks Authority	D-6	Guam Waterworks Authority	F-11	Guam Waterworks Authority
A-15	Guam Waterworks Authority	D-7	Guam Waterworks Authority	F-12	Guam Waterworks Authority
A-17	Guam Waterworks Authority	D-8	Guam Waterworks Authority	F-13	Guam Waterworks Authority
A-18	Guam Waterworks Authority	D-9	Guam Waterworks Authority	F-15	Guam Waterworks Authority
A-19	Guam Waterworks Authority	D-10	Guam Waterworks Authority	F-16	Guam Waterworks Authority
A-21	Guam Waterworks Authority	D-11	Guam Waterworks Authority	F-17	Guam Waterworks Authority
A-23	Guam Waterworks Authority	D-12	Guam Waterworks Authority	F-18	Guam Waterworks Authority
A-25	Guam Waterworks Authority	D-13	Guam Waterworks Authority	FFH-3	Fadian Fish Hatchery
A-26	Guam Waterworks Authority	D-14	Guam Waterworks Authority	FFH-4	Fadian Fish Hatchery
A-28	Guam Waterworks Authority	D-15	Guam Waterworks Authority	FFH-5A	Fadian Fish Hatchery
A-29	Guam Waterworks Authority	D-16	Guam Waterworks Authority	FFH-7	Fadian Fish Hatchery
A-30	Guam Waterworks Authority	D-17	Guam Waterworks Authority	FFH-8	Fadian Fish Hatchery
A-31	Guam Waterworks Authority	D-18	Guam Waterworks Authority	FM	Foremost Foods, Inc.
A-32	Guam Waterworks Authority	D-19	Guam Waterworks Authority	GH-501	Guam Waterworks Authority
AG-1	Guam Waterworks Authority	D-20	Guam Waterworks Authority	GOR-1	Shell Guam, Inc.
AG-2	Guam Waterworks Authority	D-21	Guam Waterworks Authority	H-1	Guam Waterworks Authority
BCC	Mawashima	D-22A	Guam Waterworks Authority	HGC-2	Guam Waterworks Authority
BPM(AF)	U.S. Air Force	D-24	Guam Waterworks Authority	HGC-3	Hatsuho Country Club

Table 1. Production wells and owners, Guam, 1996--Continued

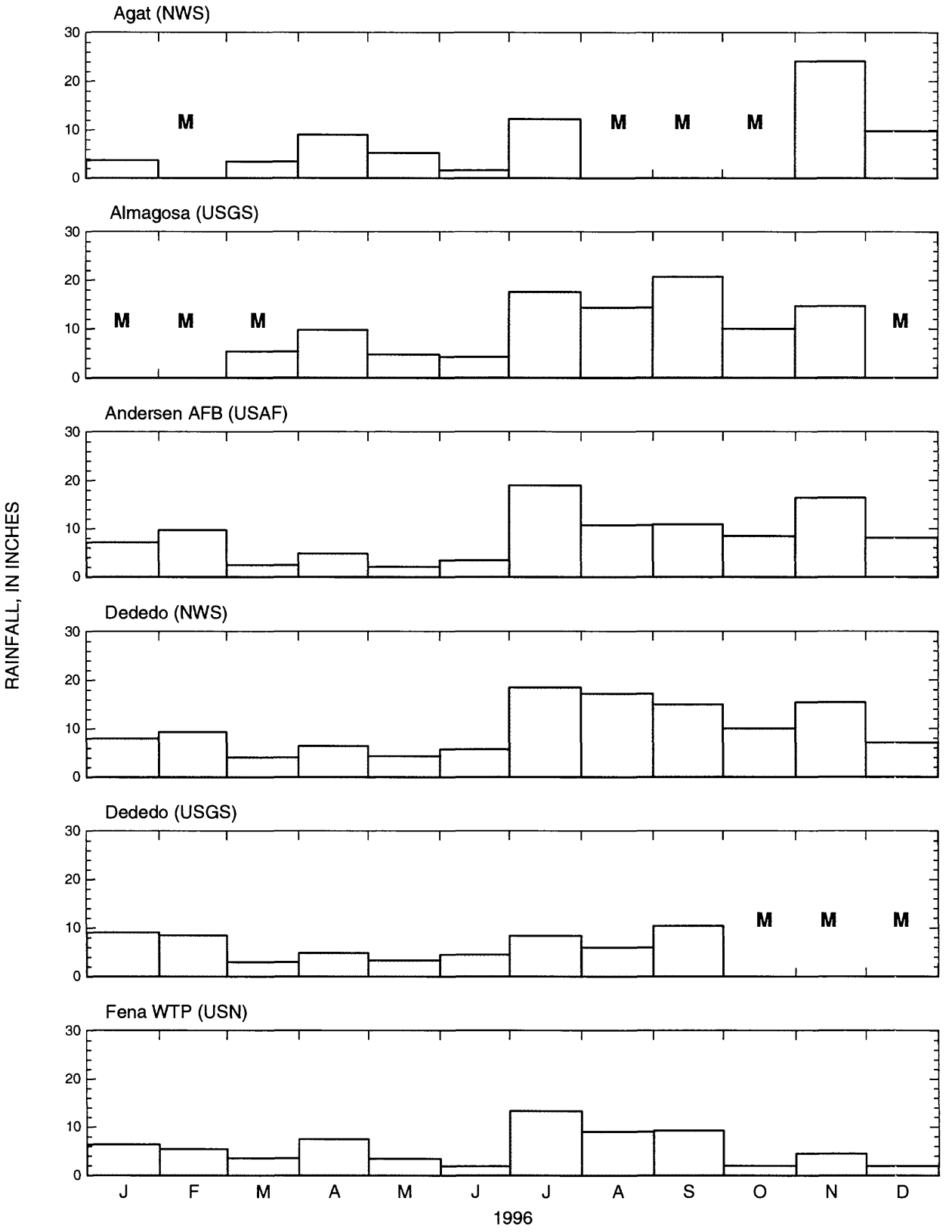
Well	Owner[1]	Well	Owner[1]	Well	Owner[1]
HRP-1	Hawaiian Rock Products	MGC-4	Mangilao Golf Course	NRMC-3	U.S. Navy
HRP-2	Hawaiian Rock Products	MHR-1	Manenggon Hills Resort	PBI-1	Perez Brothers, Inc.
IE-1	Island Equipment Co.	MJ-1	Guam Waterworks Authority	PIC-1	Pacific Islands Club
IE-2	Island Equipment Co.	MJ-2	Guam Waterworks Authority	RCA-1	MCI
M-1	Guam Waterworks Authority	MW-1	U.S. Air Force	TGC-1	Takayama Golf Course
M-2	Guam Waterworks Authority	MW-2	U.S. Air Force	TGR-1	Talofofo Golf Course
M-3	Guam Waterworks Authority	MW-3	U.S. Air Force	TGR-2	Talofofo Golf Course
M-4	Guam Waterworks Authority	MW-5	U.S. Air Force	TGR-3	Talofofo Golf Course
M-5	Guam Waterworks Authority	MW-6	U.S. Air Force	TGR-4	Talofofo Golf Course
M-6	Guam Waterworks Authority	MW-7	U.S. Air Force	TGR-5	Talofofo Golf Course
M-7	Guam Waterworks Authority	MW-8	U.S. Air Force	TGR-6	Talofofo Golf Course
M-8	Guam Waterworks Authority	MW-9	U.S. Air Force	TMT	U.S. Air Force
M-9	Guam Waterworks Authority	NAS	Guam Waterworks Authority	Y-1	Guam Waterworks Authority
M-12	Guam Waterworks Authority	NCS-2	U.S. Navy	Y-2	Guam Waterworks Authority
M-14	Guam Waterworks Authority	NCS(B)-3	U.S. Navy	Y-3	Guam Waterworks Authority
M-15	Guam Waterworks Authority	NCS-5	U.S. Navy	Y-4A	Guam Waterworks Authority
M-16B	Guam Waterworks Authority	NCS-6	U.S. Navy	Y-5	Guam Waterworks Authority
M-17A	Guam Waterworks Authority	NCS-7	U.S. Navy	Y-6(506)	Guam Waterworks Authority
M-17B	Guam Waterworks Authority	NCS(B)-8	U.S. Navy	Y-7	Guam Waterworks Authority
M-20A	Guam Waterworks Authority	NCS-9	U.S. Navy	Y-9	Guam Waterworks Authority
MCR-1	Marbo Cave Resort	NCS-A	U.S. Navy	Y-12	Guam Waterworks Authority
MGC-1	Mangilao Golf Course	NCS-B	U.S. Navy	Y-15	Guam Waterworks Authority
MGC-2	Mangilao Golf Course	NRMC-1	U.S. Navy		
MGC-3	Mangilao Golf Course	NRMC-2	U.S. Navy		

[1] Owner information for all wells other than those owned by the Guam Waterworks Authority, U.S. Air Force, and U.S. Navy was provided by the Guam Environmental Protection Agency.

RAINFALL, GROUND-WATER, AND OCEAN-TIDE DATA GUAM 1996

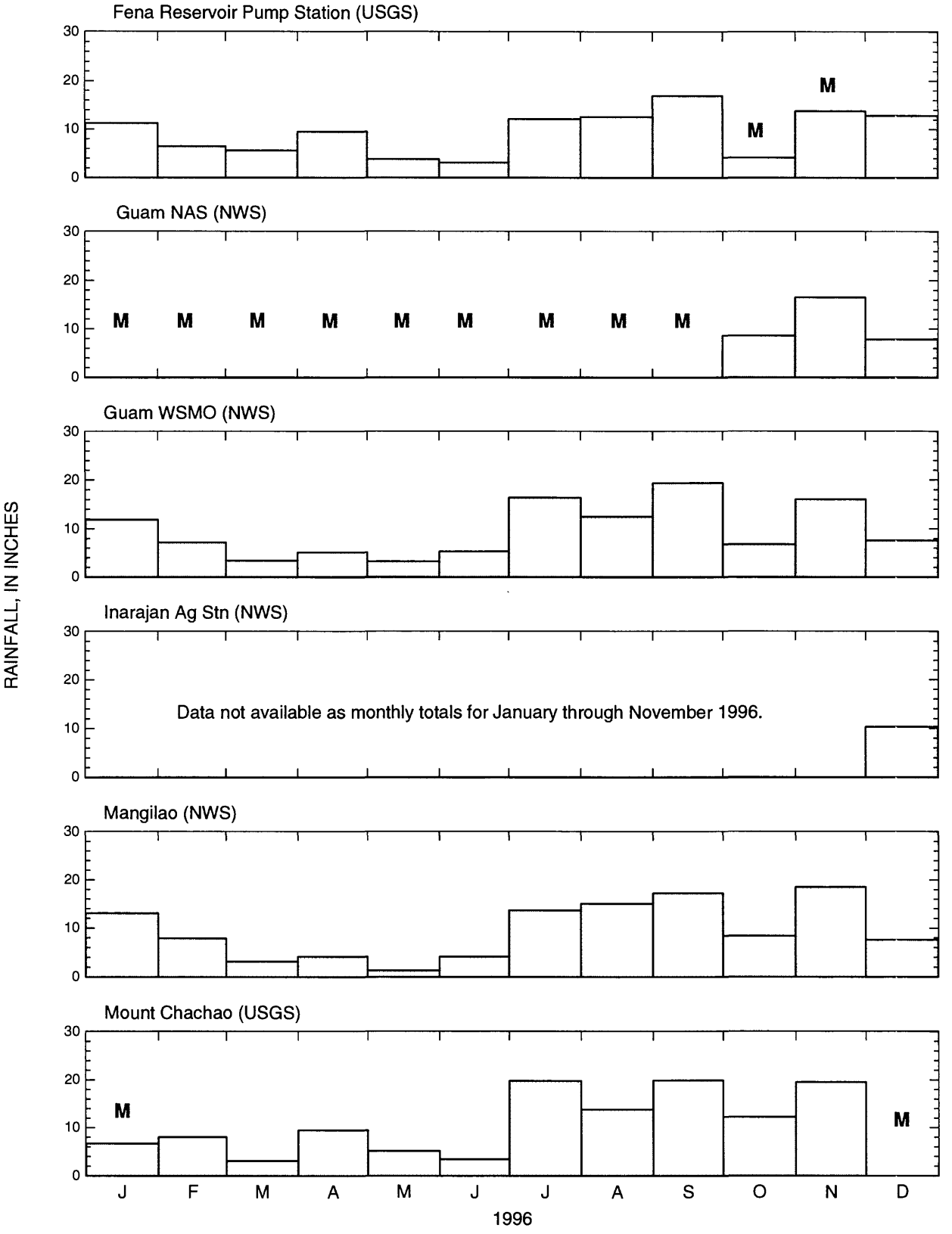
SECTION A

Rainfall



M indicates missing data, and appears with rainfall if 1 to 9 daily rainfall values are missing, or with zero rainfall if more than 10 daily rainfall values are missing.

Figure A1. Monthly rainfall at selected sites, Guam, 1996. Monthly rainfall data from the Andersen AFB gage and all National Weather Service gages for January through September 1996 are from the National Oceanic and Atmospheric Administration, 1996. All other data are provisional.



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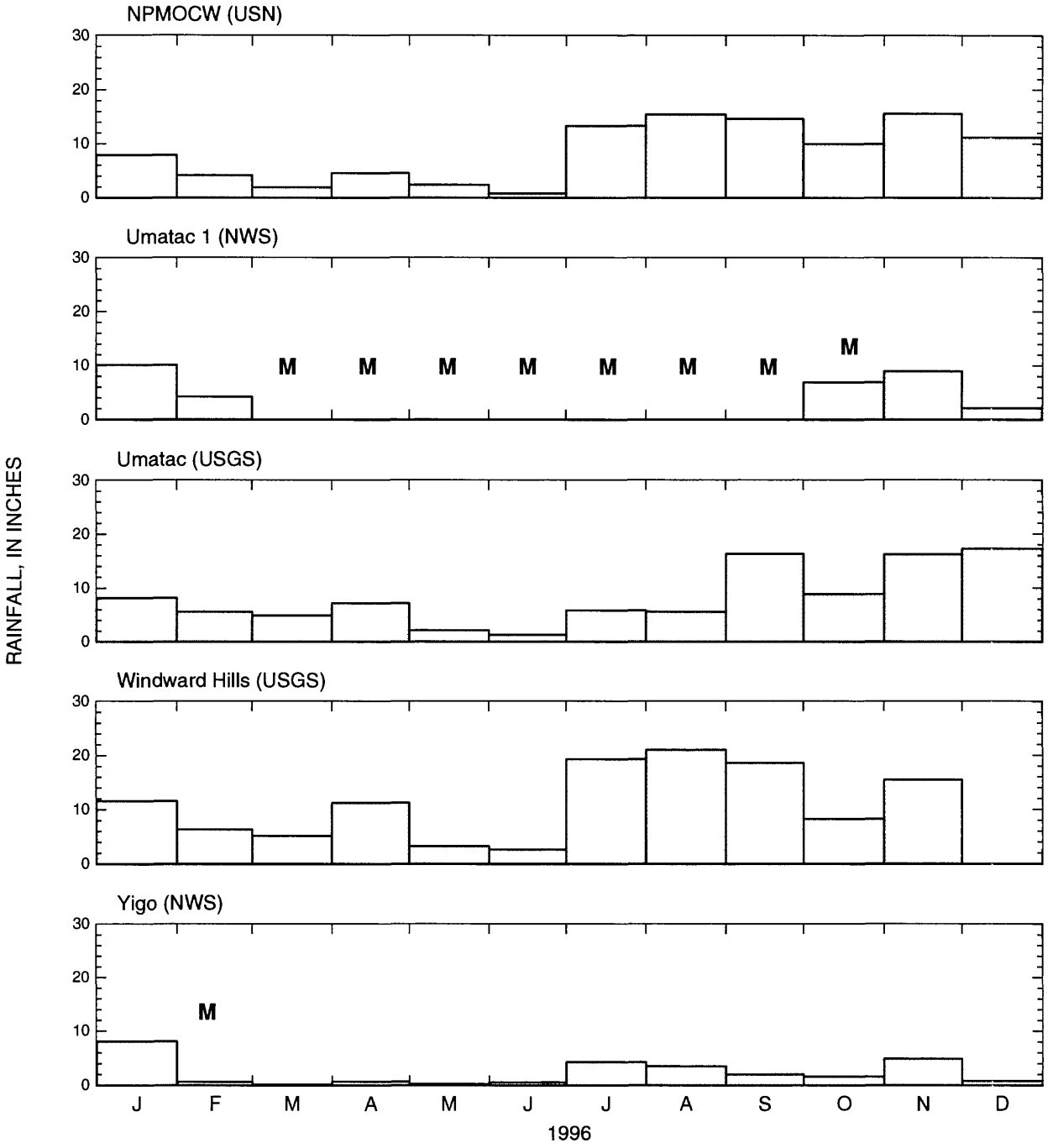

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Table A1. Monthly rainfall at selected sites, Guam, 1996

[Values are in inches; *, rainfall amount is being carried forward to next month's total, and may include amounts from the previous month(s); M, is appended to values with 1 to 9 daily values missing, and M appears alone if 10 or more daily values are missing; NWS, National Weather Service; USAF, U.S. Air Force; USN, U.S. Navy; USGS, U.S. Geological Survey.]

Month	Agat NWS	Almagosa USGS	Andersen AFB USAF	Dededo NWS	Dededo USGS	Fena WTP USN
JAN	3.73	M	7.18	8.07	9.12	6.40
FEB	M	M	9.71	9.35	8.52	5.45
MAR	3.44	5.40 M	2.48	4.12	3.00	3.58
APR	9.02	9.84	4.82	6.45	4.92	7.50
MAY	5.30	4.80	2.13	4.37	3.36	3.47
JUN	1.62	4.32	3.41	5.78	4.56	1.91
JUL	12.26	17.64	19.03	18.51	8.40	13.37
AUG	M	14.40	10.75	17.26	6.00	9.04
SEP	M	20.76	10.94	15.01	10.44	9.29
OCT	M	10.08	8.48	10.07	M	1.99
NOV	24.20	14.76	16.46	15.45	M	4.49
DEC	9.77	M	8.13	7.14	M	1.95

Month	Fena Reservoir Pump Station USGS	Guam NAS NWS	Guam WSMO NWS	Inarajan Ag Stn NWS	Mangilao NWS	Mount Chachao USGS
JAN	11.28	M	11.86	2.99 *	13.07	6.72 M
FEB	6.48	M	7.21	12.33 *	7.93	8.04
MAR	5.64	M	3.40	17.21 *	3.15	3.12
APR	9.48	M	5.14	28.04 *	4.15	9.48
MAY	3.84	M	3.28	30.32 *	1.38	5.16
JUN	3.12	M	5.34	33.55 *	4.18	3.48
JUL	12.12	M	16.40	35.45 *	13.66	19.80
AUG	12.60	M	12.48	50.47 *	15.07	13.80
SEP	16.92	M	19.38	56.32 *	17.24	19.92
OCT	4.20 M	8.66	6.83	12.04 *	8.41	12.24
NOV	13.80 M	16.55	16.08	11.00 M	18.58	19.56
DEC	12.84	7.86	7.64	10.34	7.62	M

Month	NPMOCW USN	Umatac 1 NWS	Umatac USGS	Windward Hills USGS	Yigo NWS
JAN	7.87	10.14	8.16	11.64	8.11
FEB	4.15	4.20	5.64	6.36	0.68 M
MAR	1.93	M	4.92	5.16	0.14
APR	4.55	M	7.20	11.28	0.71
MAY	2.40	M	2.16	3.24	0.27
JUN	0.76	M	1.32	2.64	0.54
JUL	13.31	M	5.88	19.32	4.30
AUG	15.48	M	5.64	21.00	3.50
SEP	14.70	M	16.32	18.60	2.01
OCT	10.00	6.93 M	8.88	8.28	1.63
NOV	15.63	8.96	16.20	15.48	4.90
DEC	11.17	2.12	17.28	M	0.82

NOTE: Monthly rainfall data from the Andersen AFB gage and all NWS gages for January through September 1996 are from published data by the National Oceanic and Atmospheric Administration (NOAA) in the series "Climatological Data, Hawaii and Pacific," 1996, v. 92, no. 1-9. All other monthly rainfall data have not been published by the respective agencies and are considered provisional.

SECTION B

Ground Water

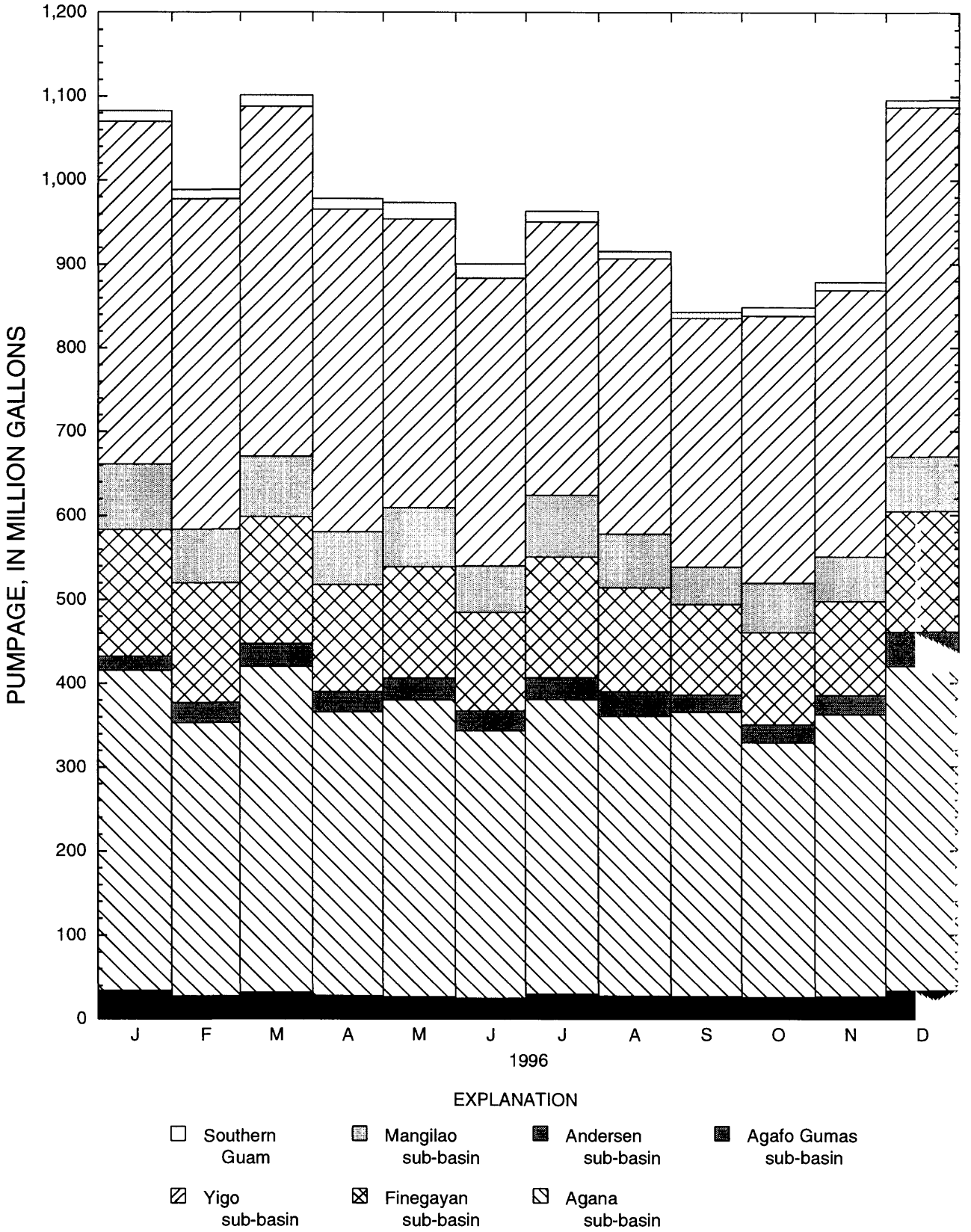


Figure B1. Monthly ground-water pumpage by sub-basin, Guam, 1996. Sub-basin designations are from Camp, Dresser and McKee, Inc. (1982). Pumpage from southern Guam is included. Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin pumpage totals. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.

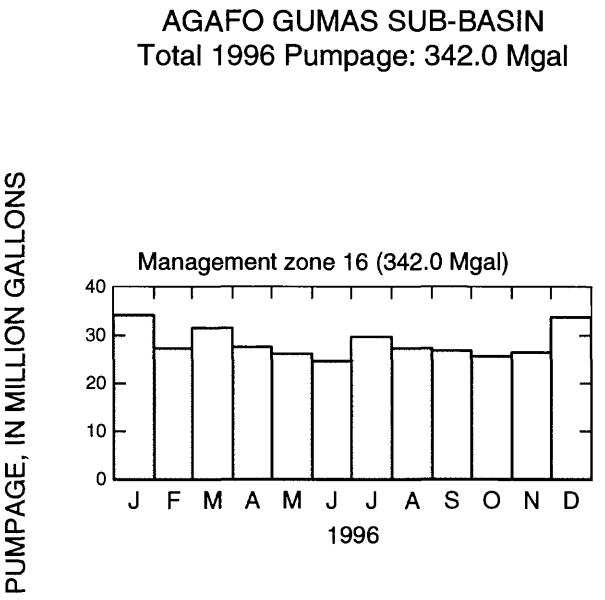


Figure B2a. Monthly ground-water pumpage by management zone, Agafo Gumas sub-basin, Guam, 1996. Sub-basin and management-zone designations are from Camp, Dresser and McKee, Inc. (1982). Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin and management-zone pumpage totals. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy. Total 1996 pumpage is indicated in parentheses for the management zone.

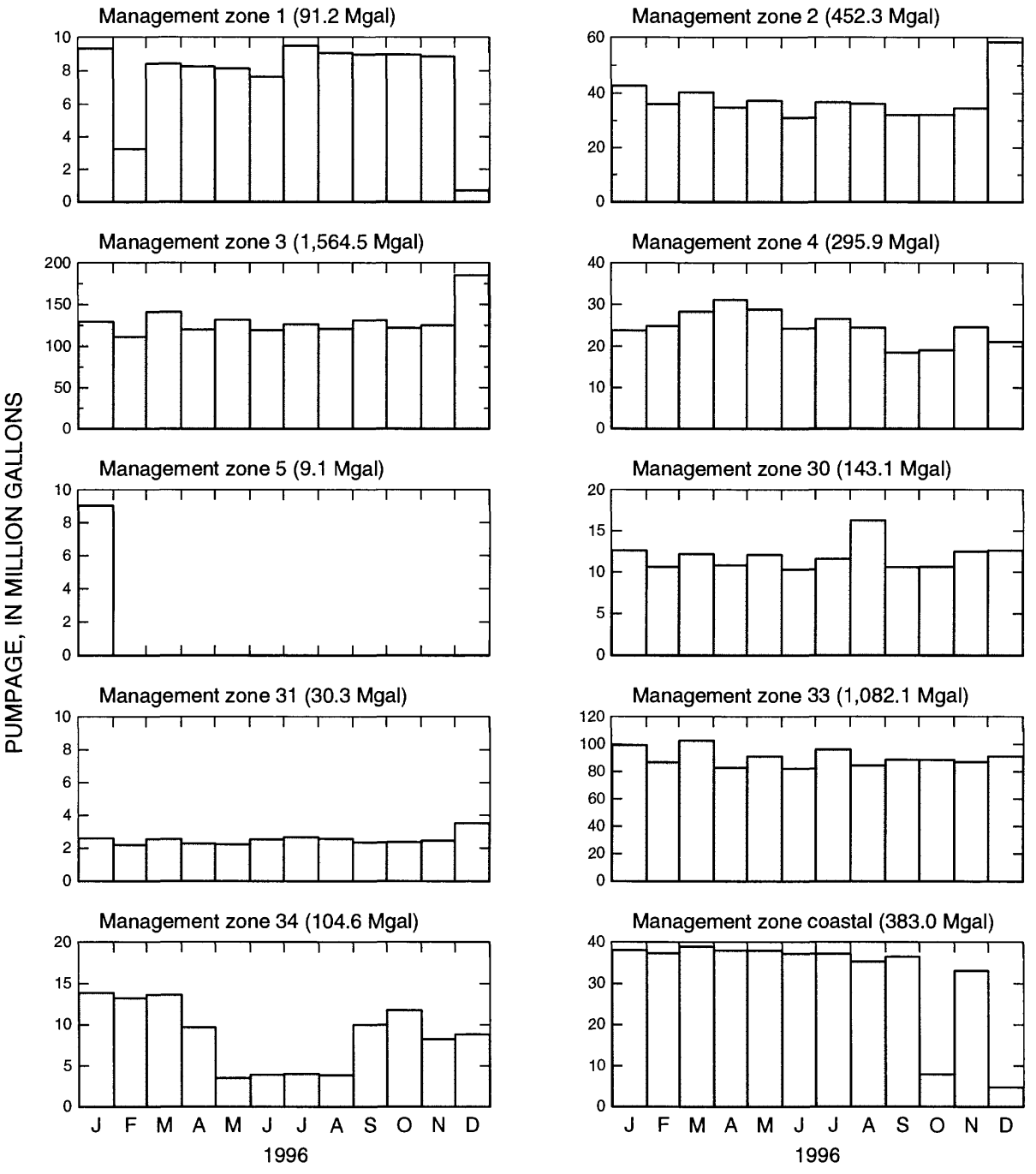


Figure B2b. Monthly ground-water pumpage by management zone, Agana sub-basin, Guam, 1996. Sub-basin and management-zone designations are from Camp, Dresser and McKee, Inc. (1982). Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin and management-zone pumpage totals. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy. Total 1996 pumpage is indicated in parentheses for the management zone.

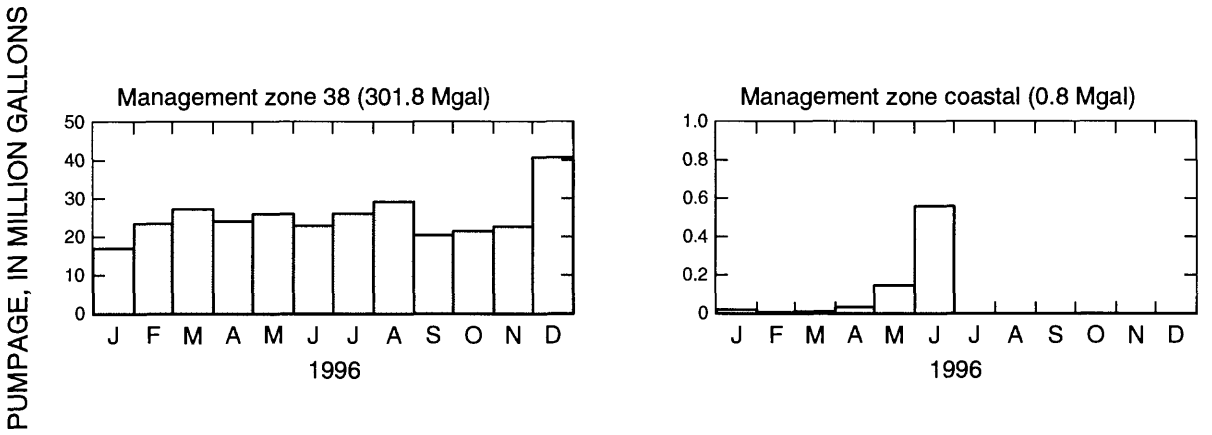


Figure B2c. Monthly ground-water pumpage by management zone, Andersen sub-basin, Guam, 1996. Sub-basin and management-zone designations are from Camp, Dresser and McKee, Inc. (1982). Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin and management-zone pumpage totals. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy. Total 1996 pumpage is indicated in parentheses for the management zone.

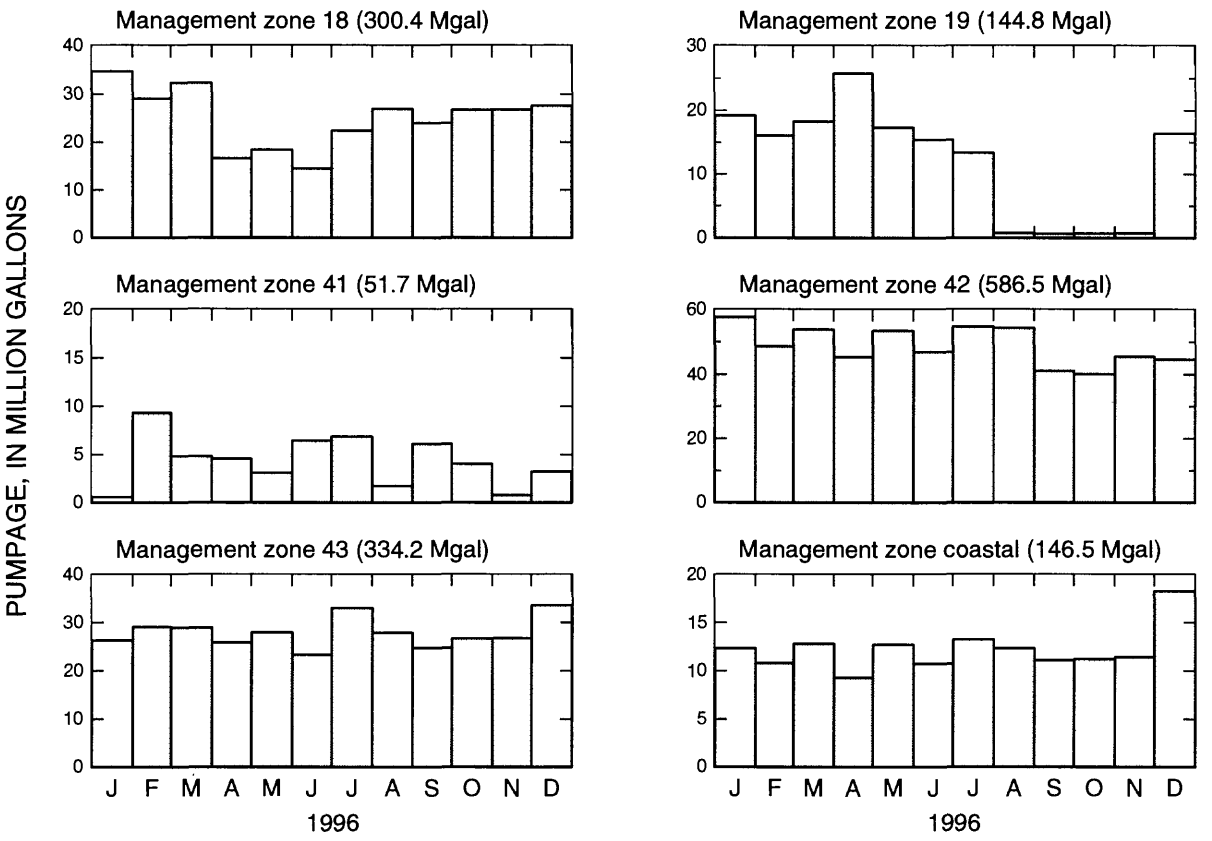


Figure B2d. Monthly ground-water pumpage by management zone, Finegayan sub-basin, Guam, 1996. Sub-basin and management-zone designations are from Camp, Dresser and McKee, Inc. (1982). Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin and management-zone pumpage totals. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy. Total 1996 pumpage is indicated in parentheses for the management zone.

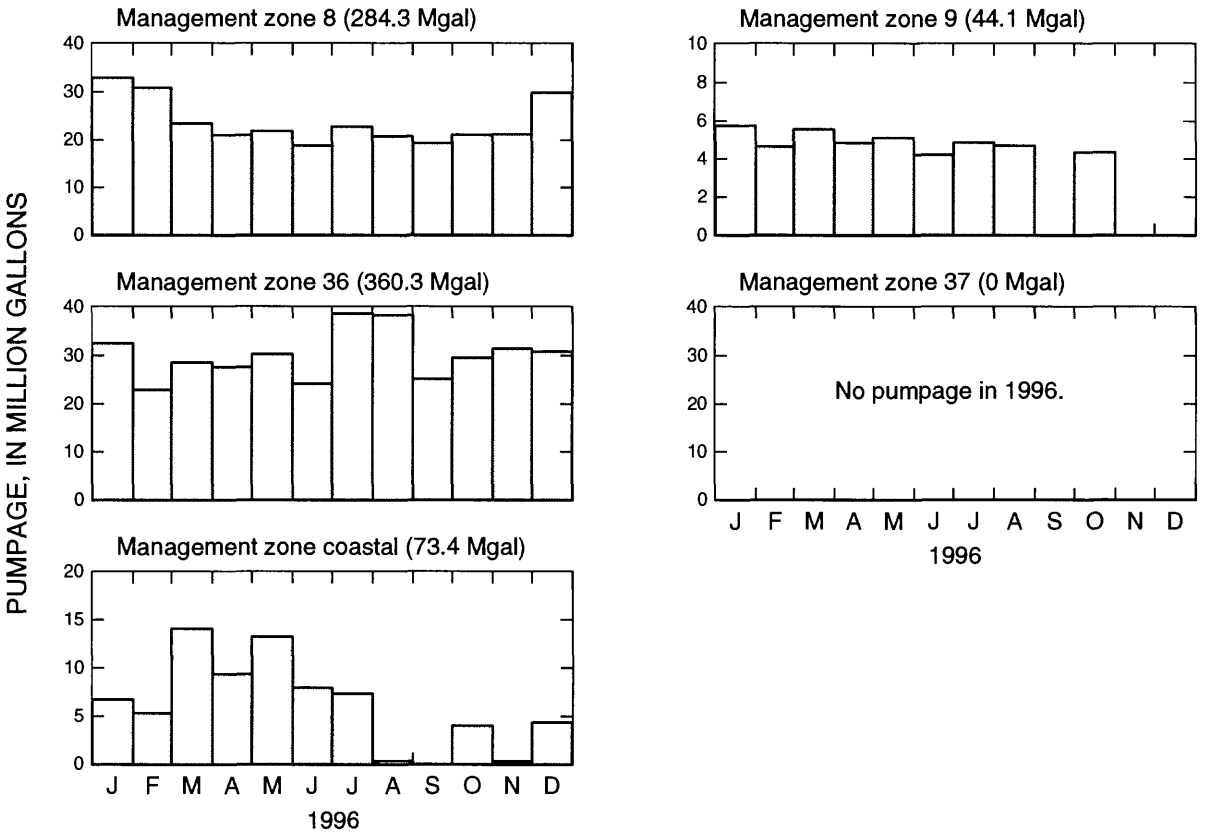


Figure B2e. Monthly ground-water pumpage by management zone, Mangilao sub-basin, Guam, 1996. Sub-basin and management-zone designations are from Camp, Dresser and McKee, Inc. (1982). Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin and management-zone pumpage totals. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy. Total 1996 pumpage is indicated in parentheses for the management zone.

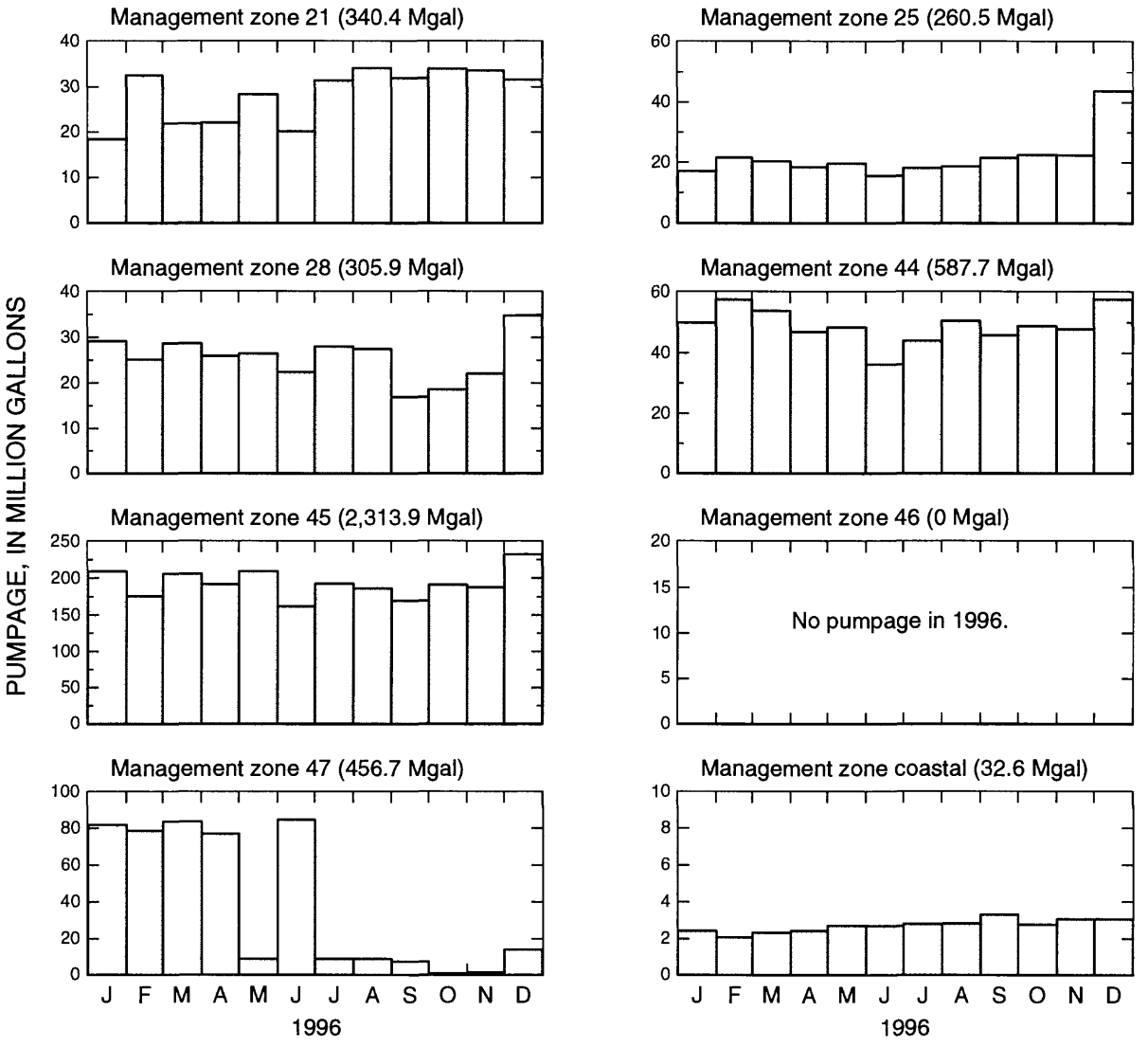


Figure B2f. Monthly ground-water pumpage by management zone, Yigo sub-basin, Guam, 1996. Sub-basin and management-zone designations are from Camp, Dresser and McKee, Inc. (1982). Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin and management-zone pumpage totals. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy. Total 1996 pumpage is indicated in parentheses for the management zone.

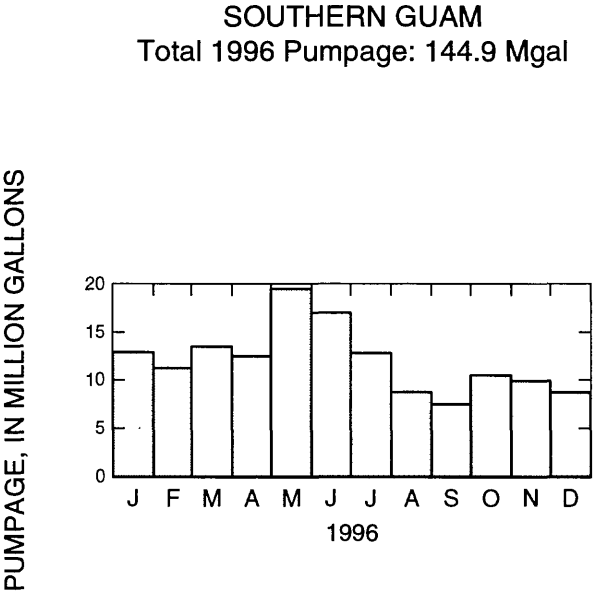


Figure B2g. Monthly ground-water pumpage in southern Guam, 1996.
Pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in pumpage totals. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.

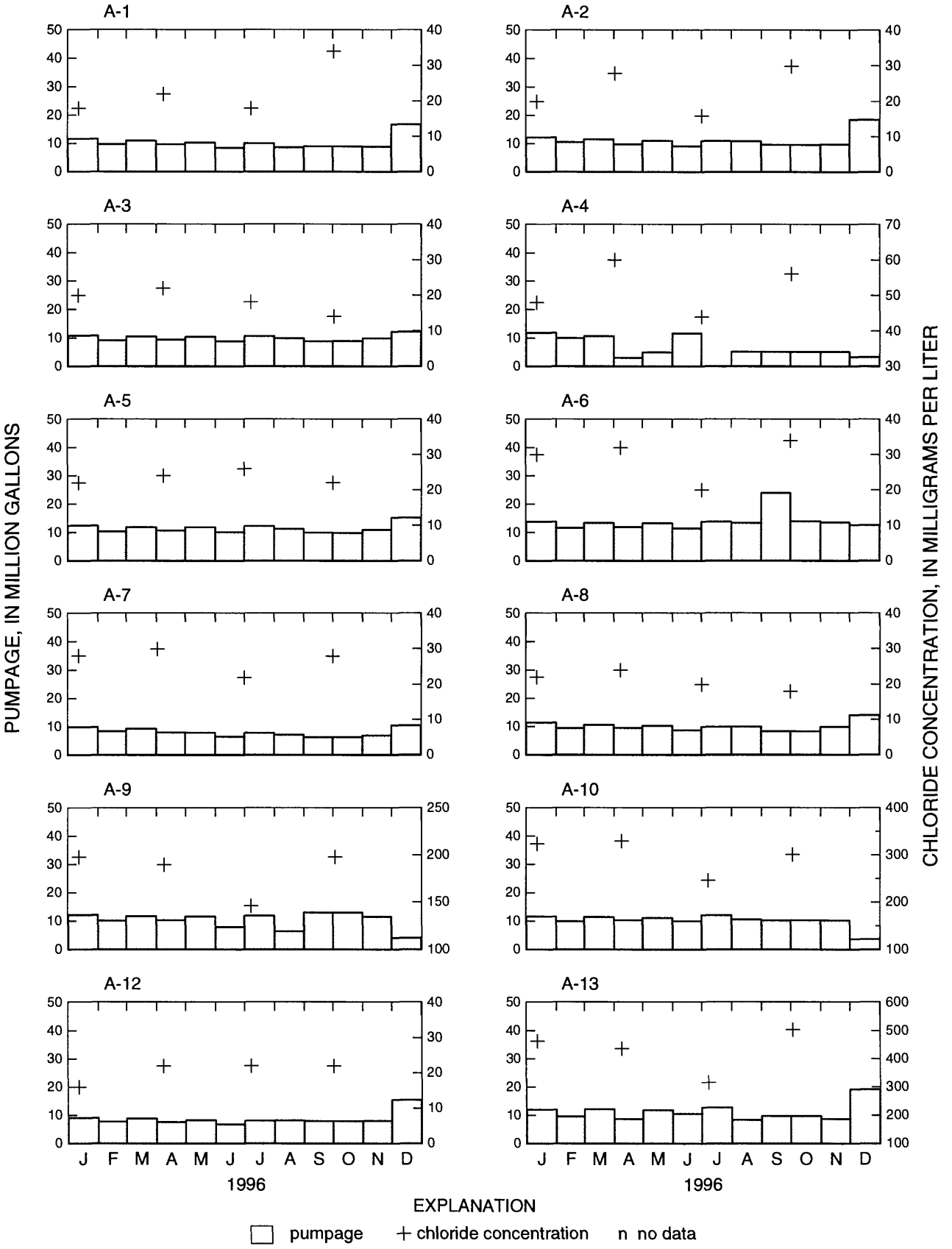


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.

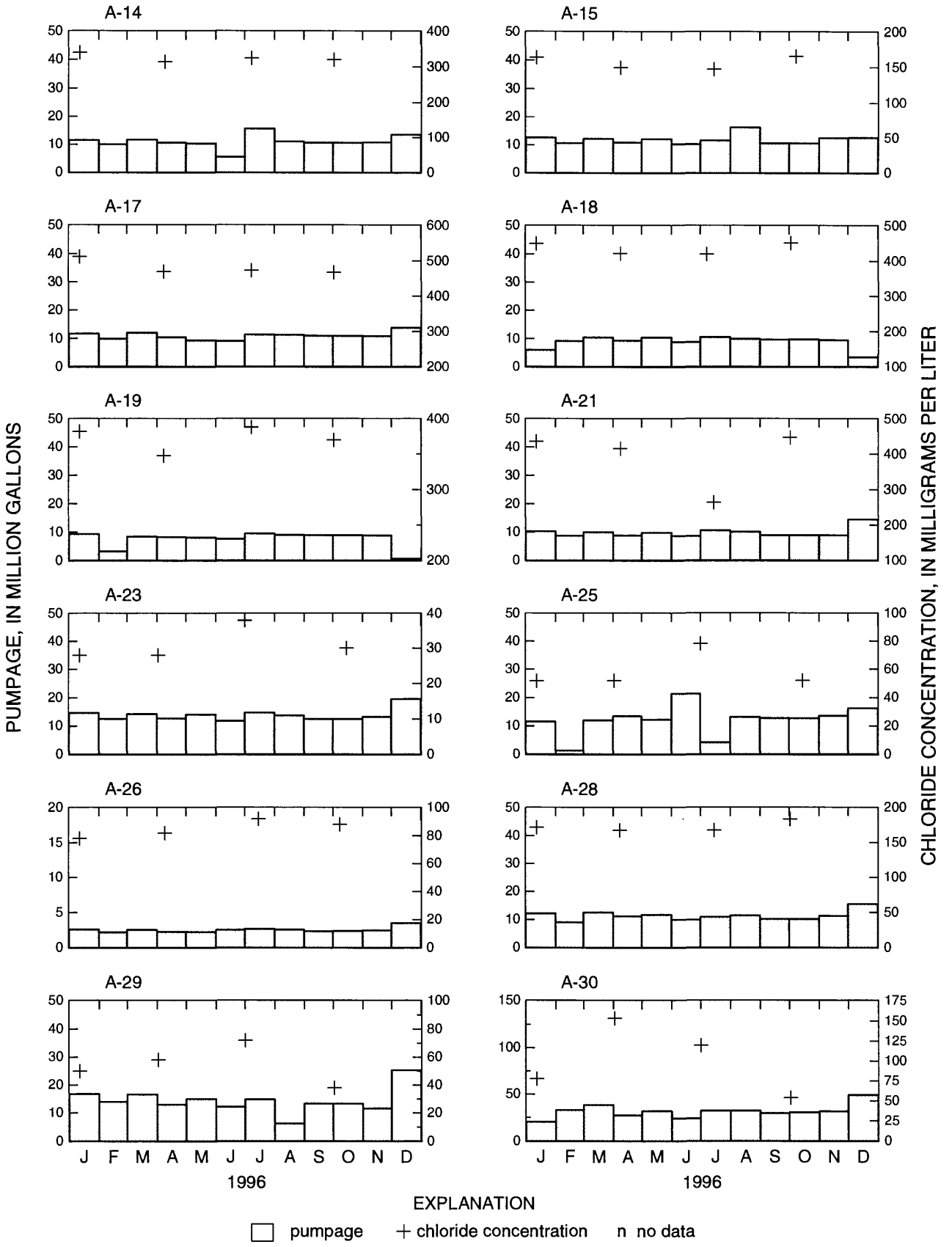


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

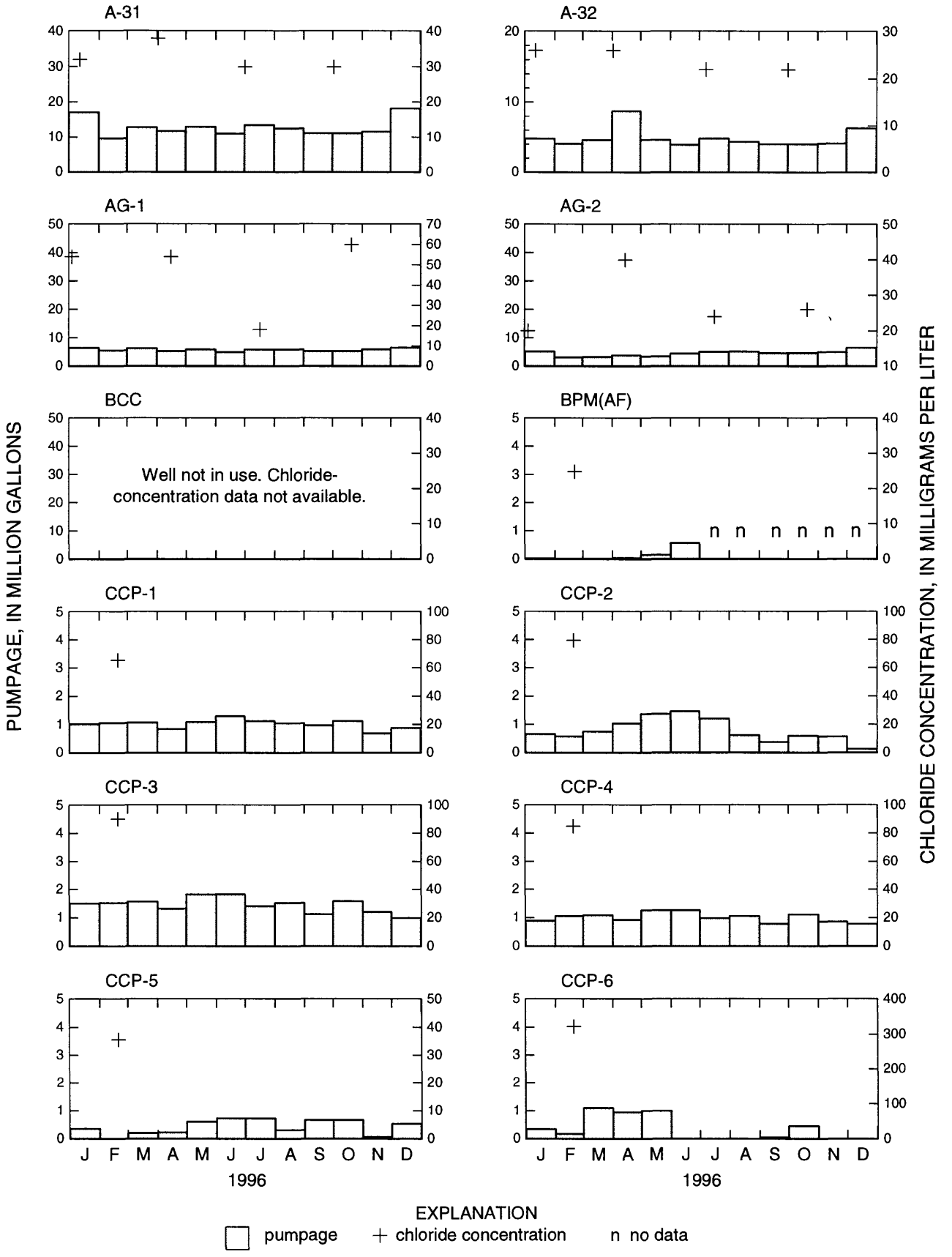


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

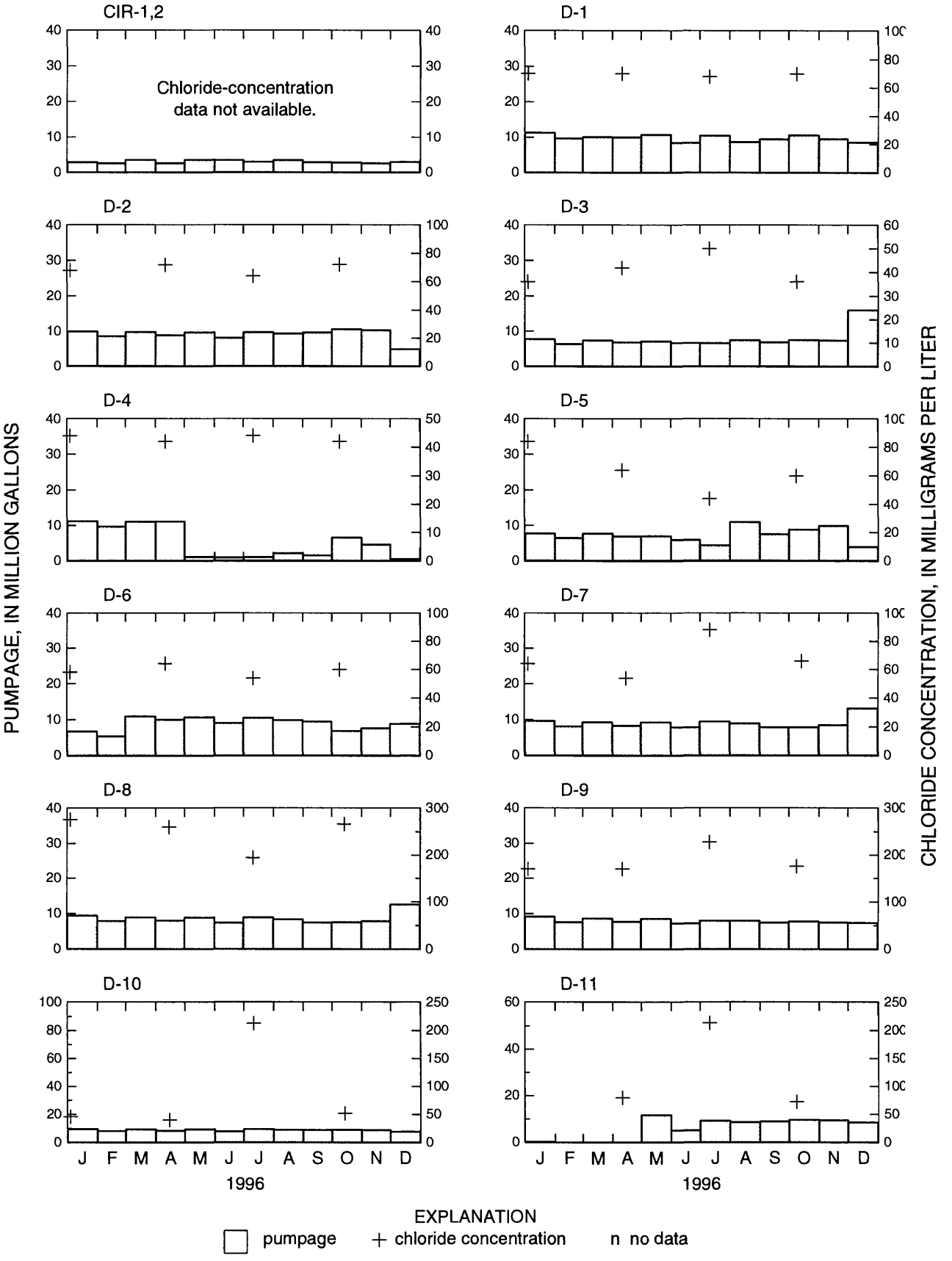


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

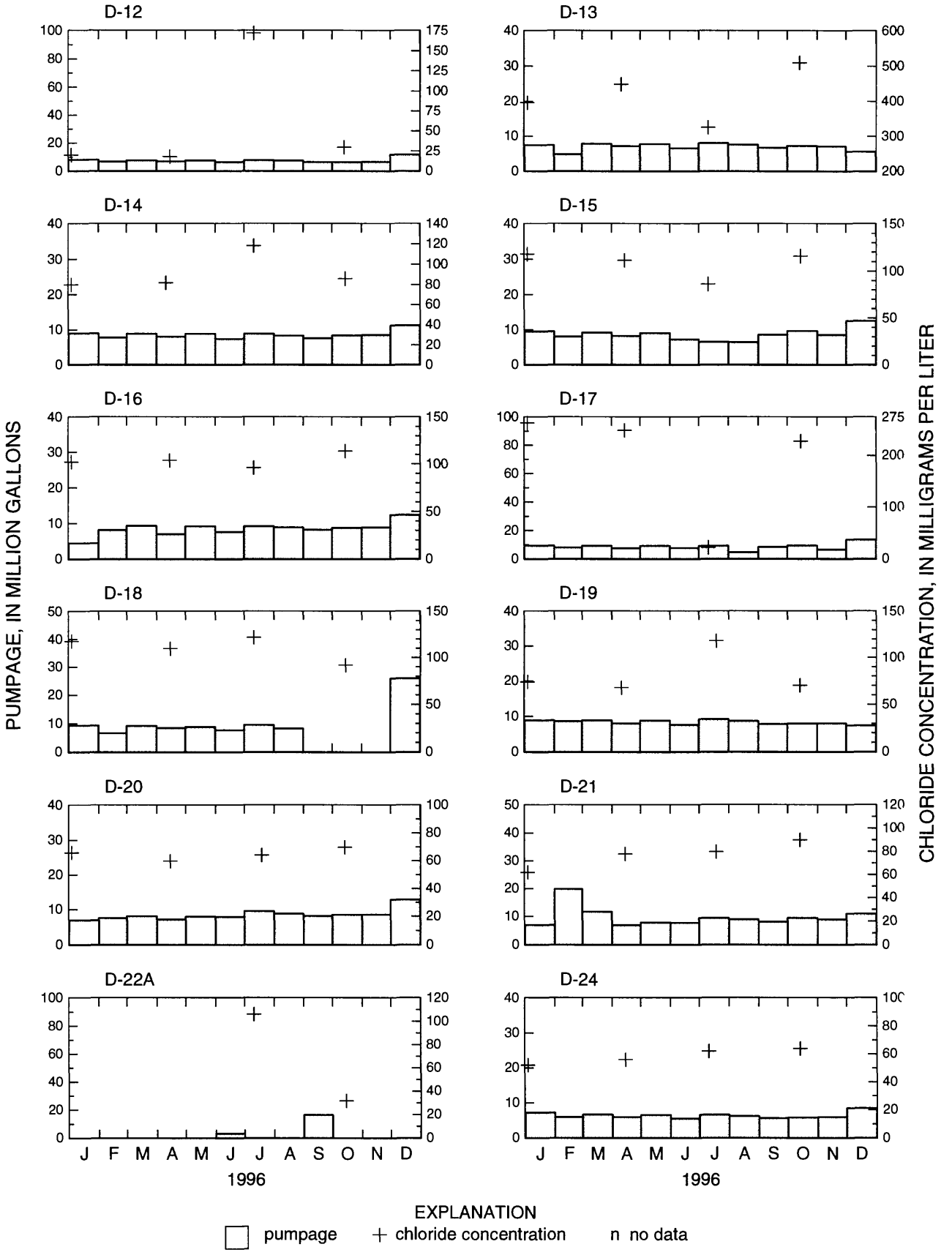


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

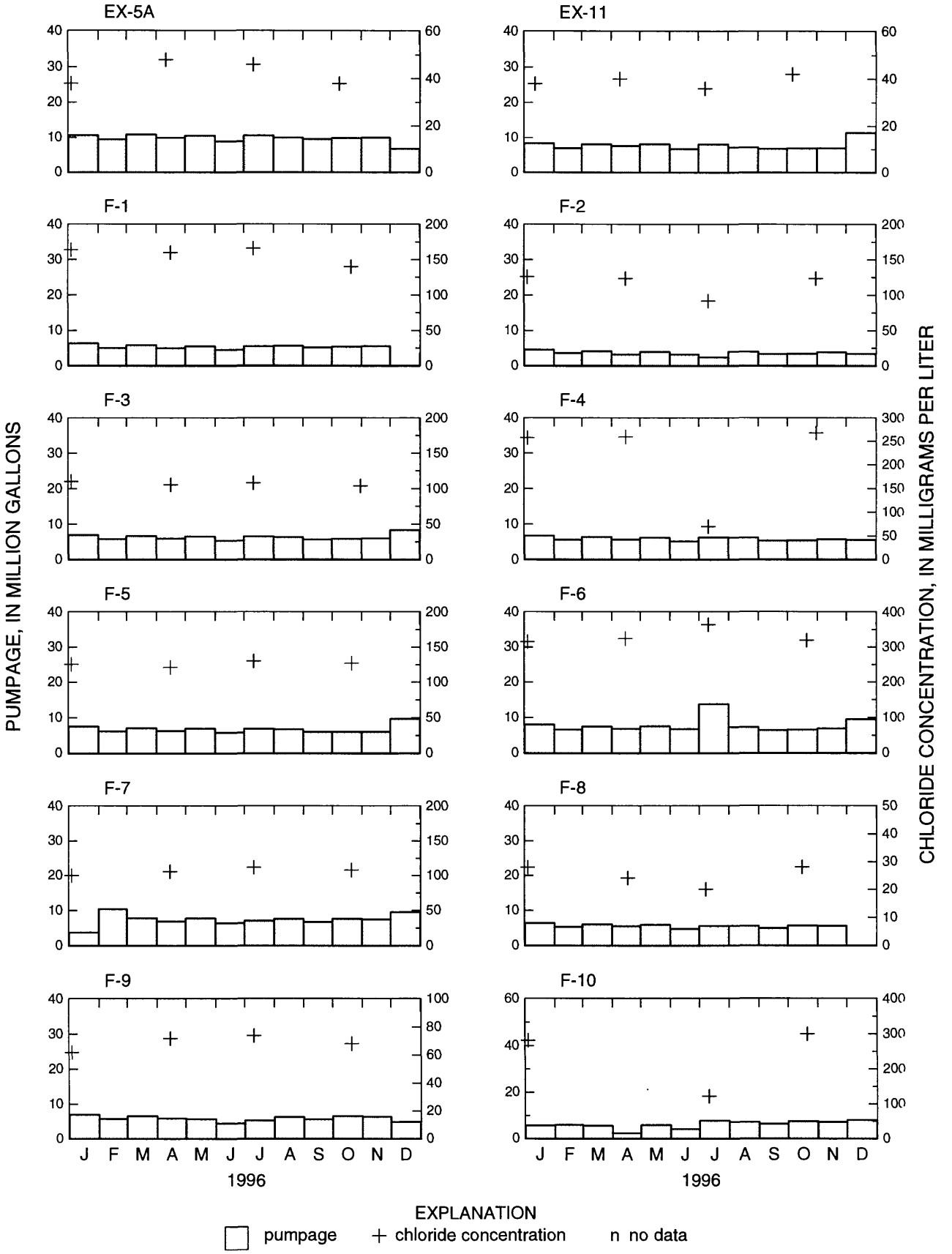


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

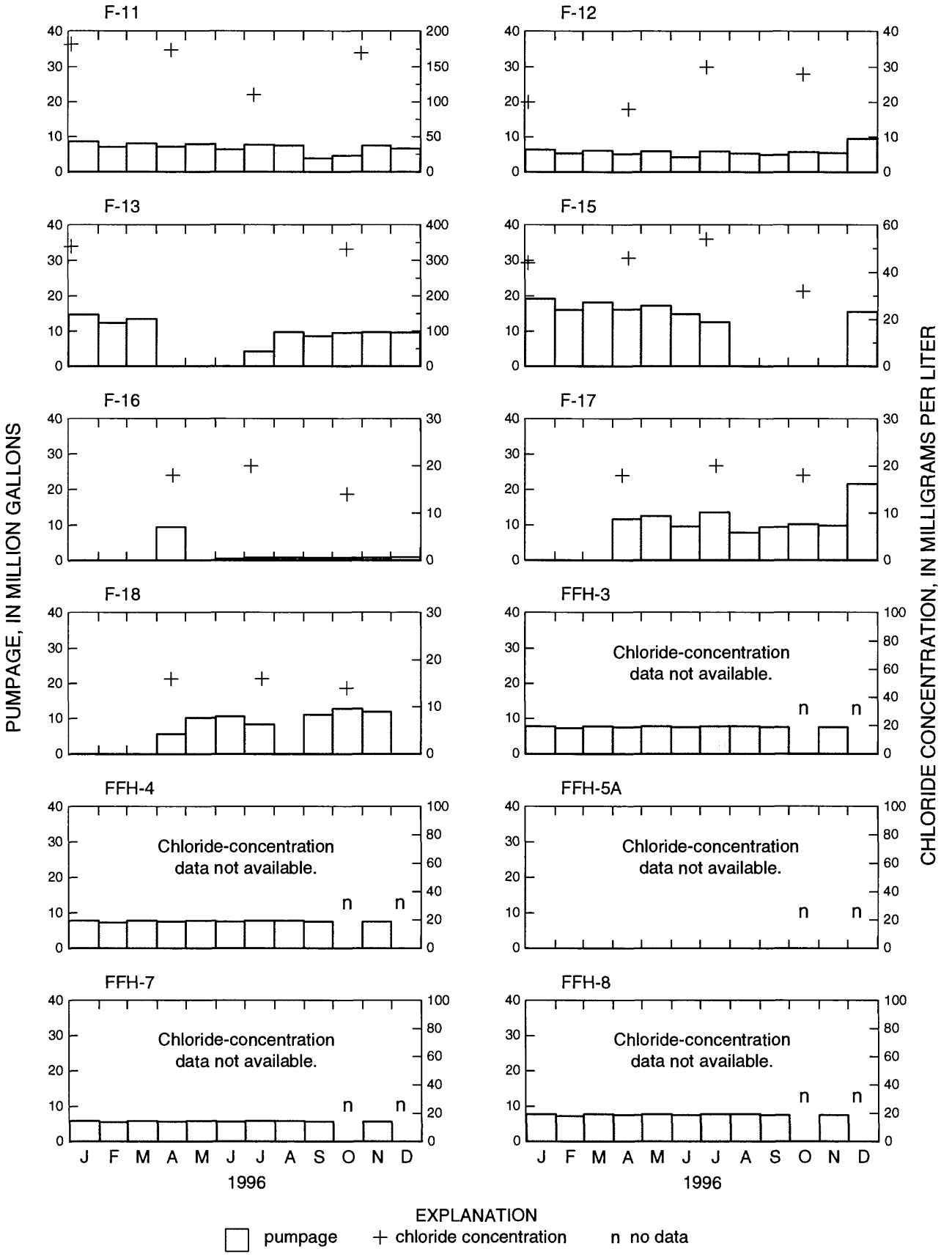


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

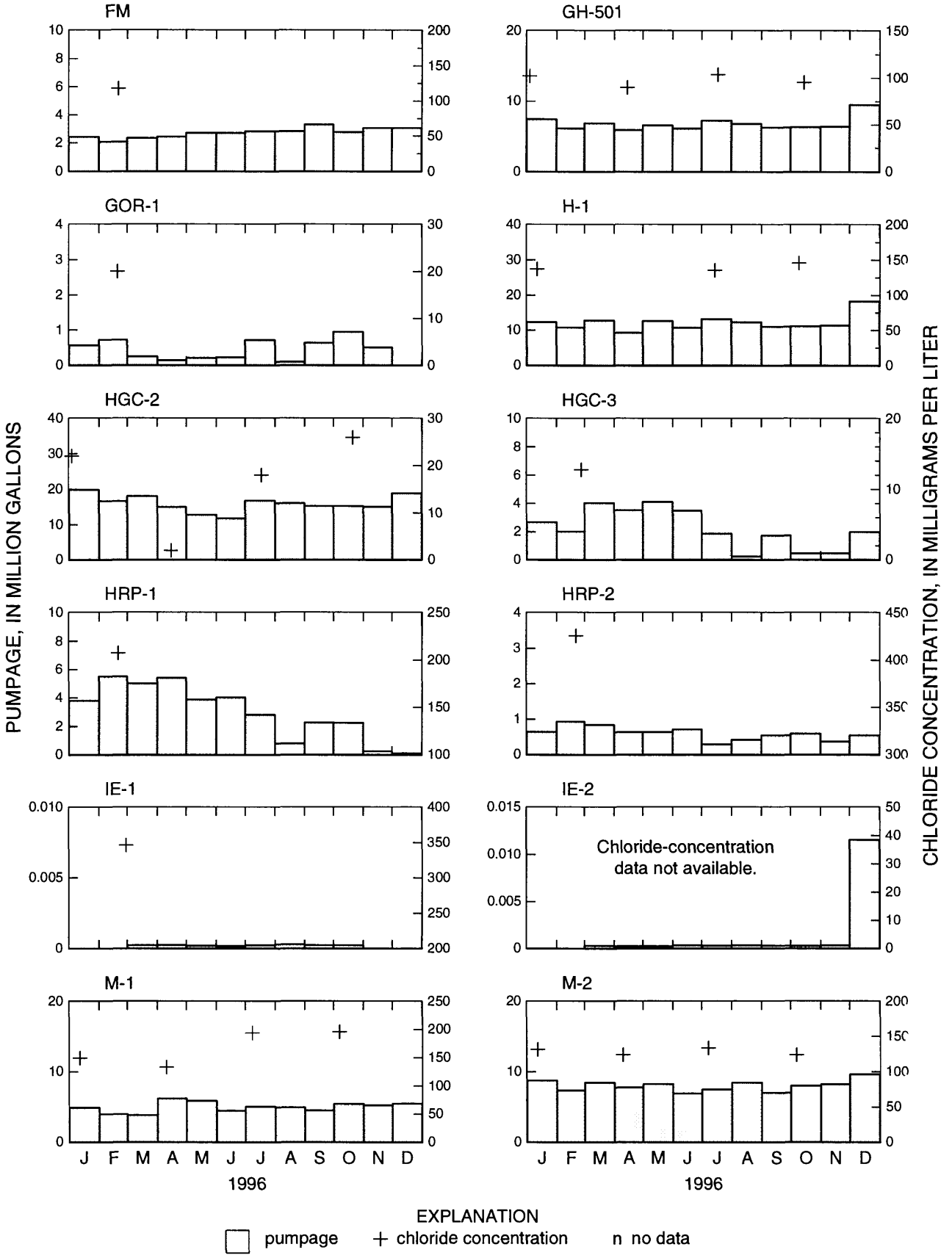


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

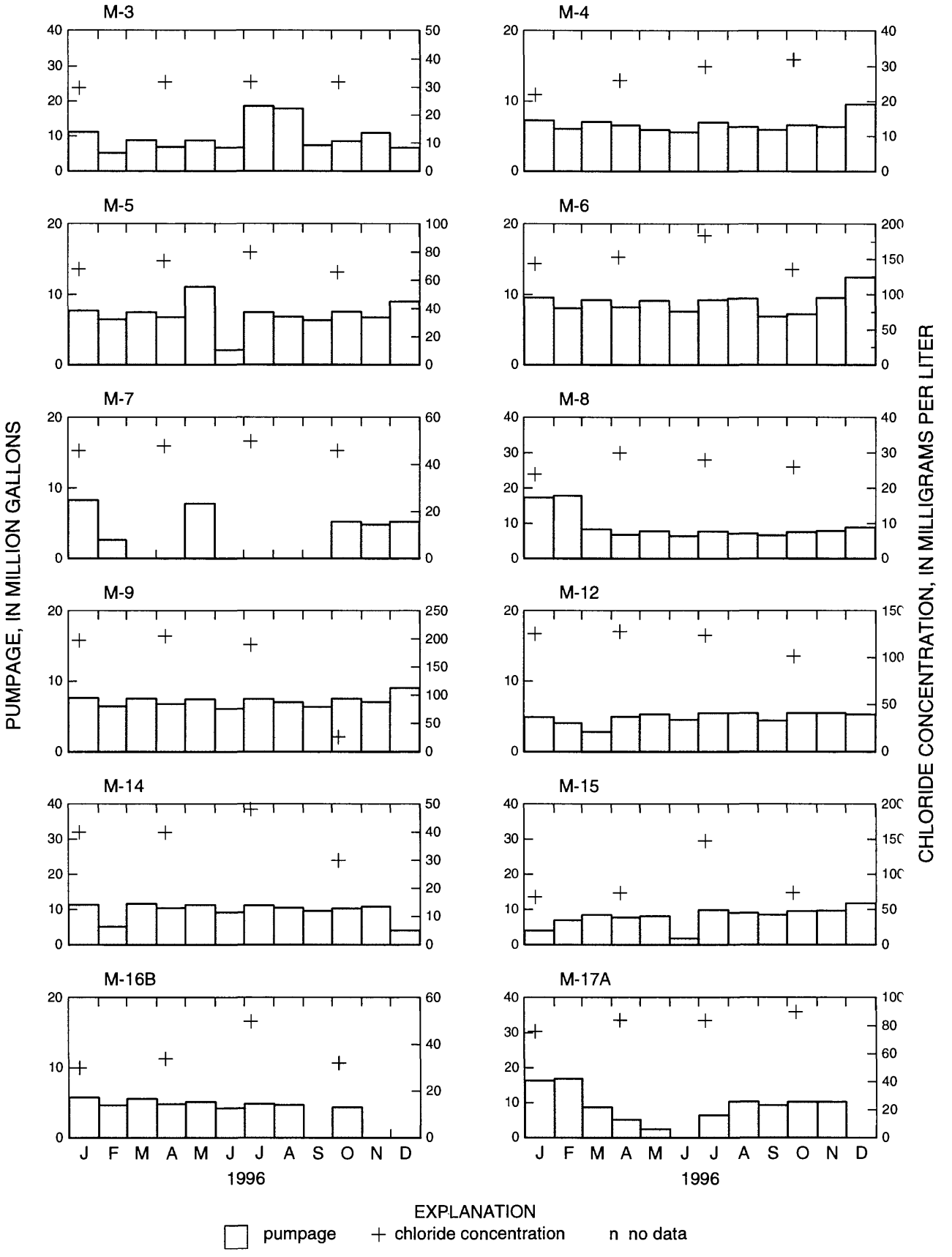


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

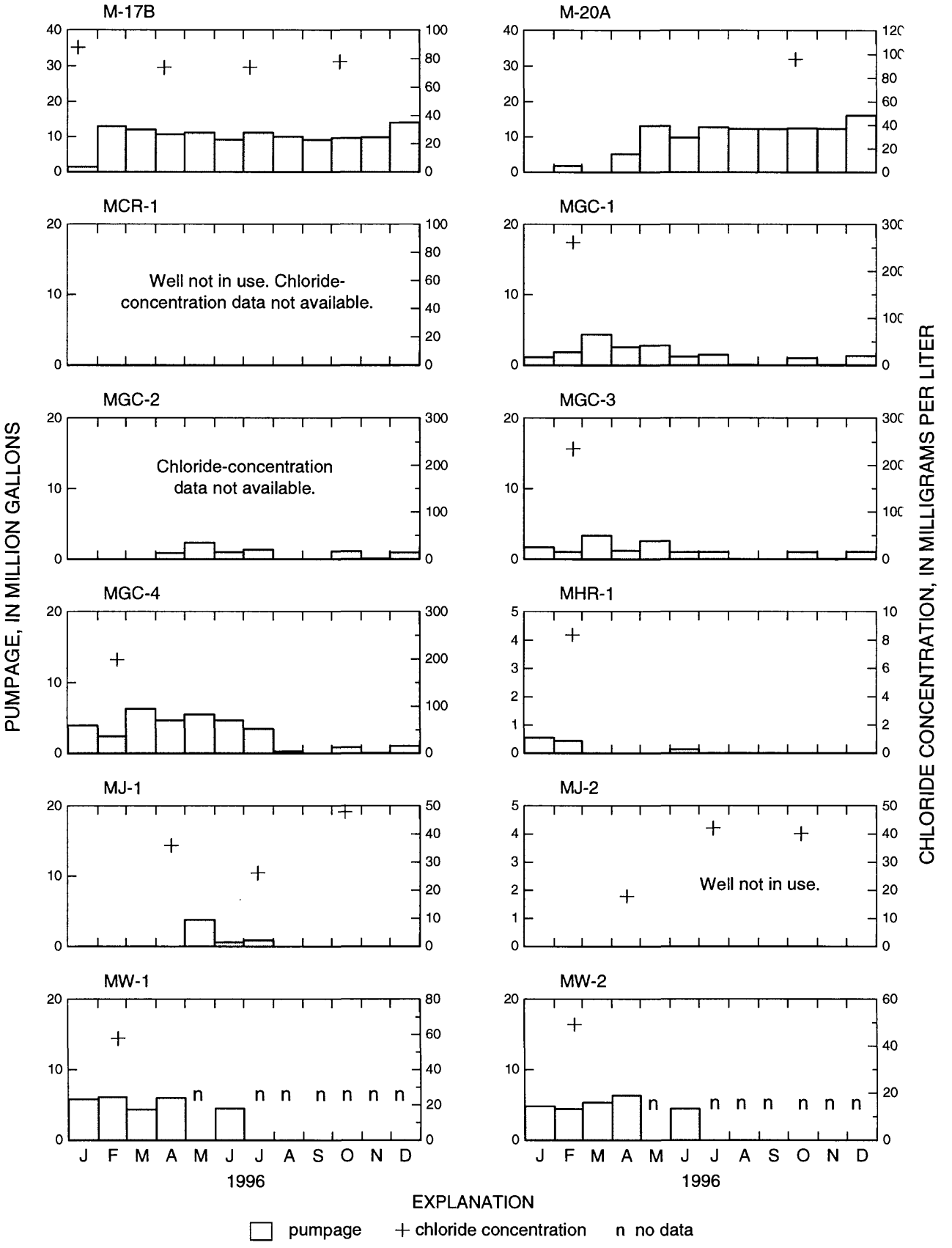


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

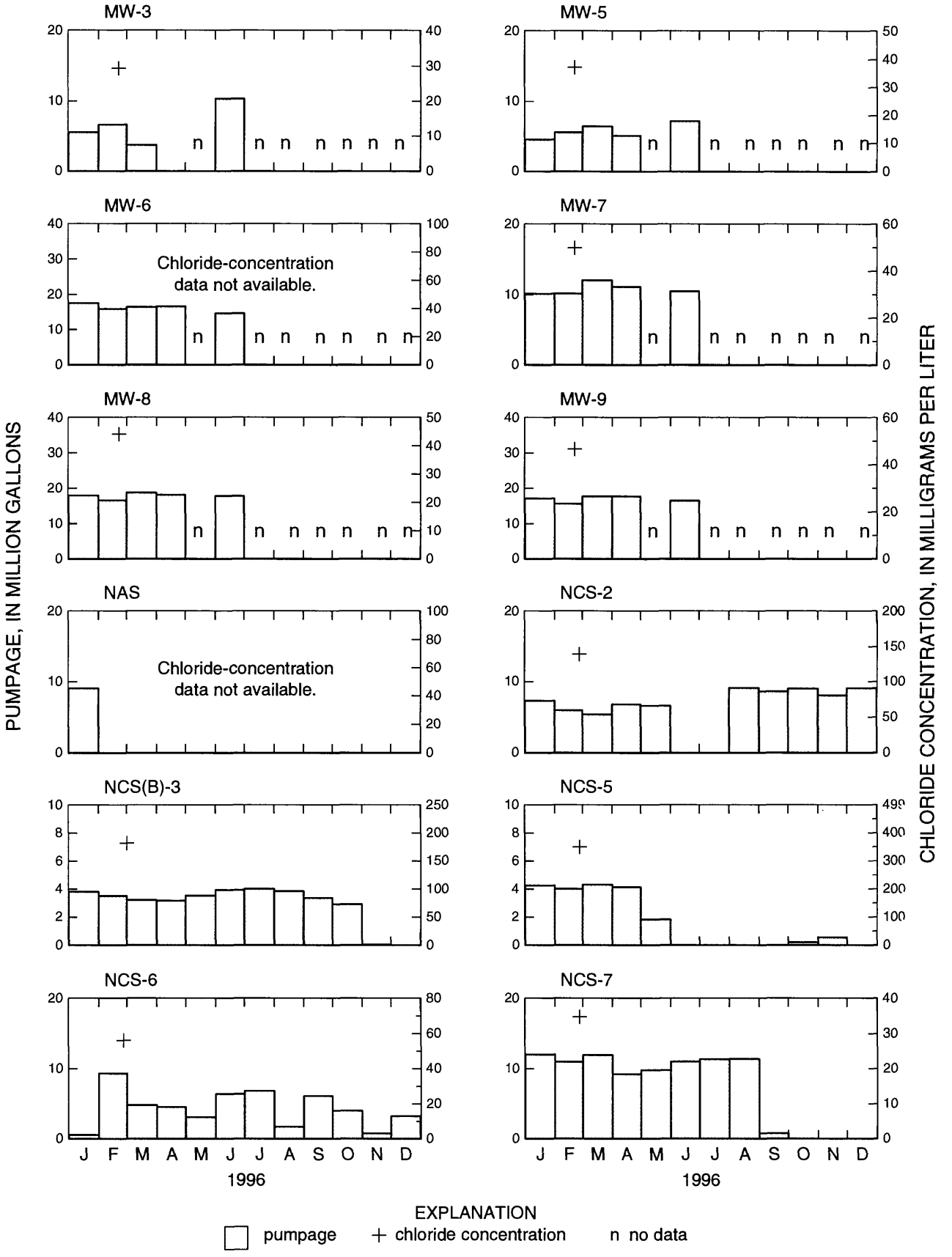


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

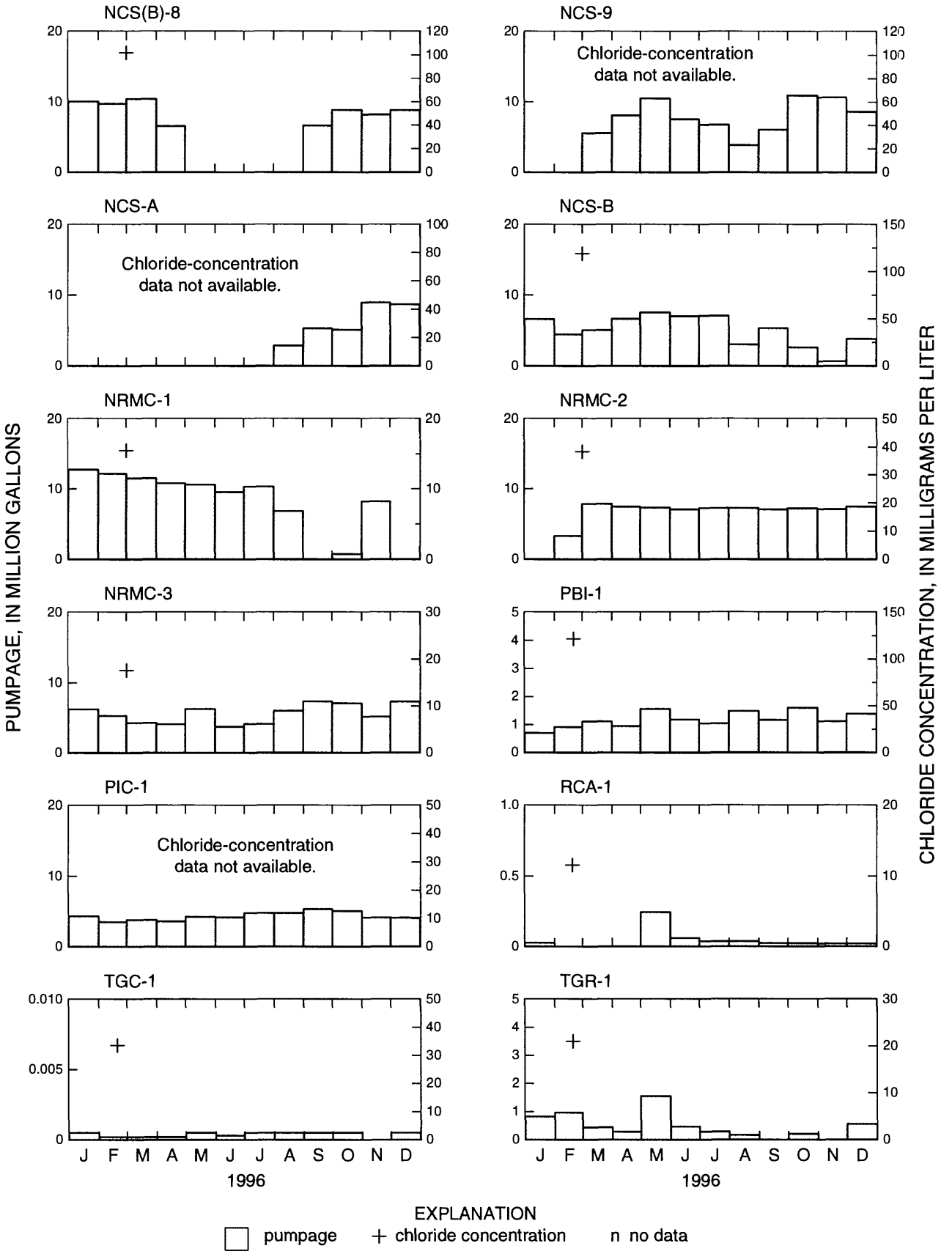


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

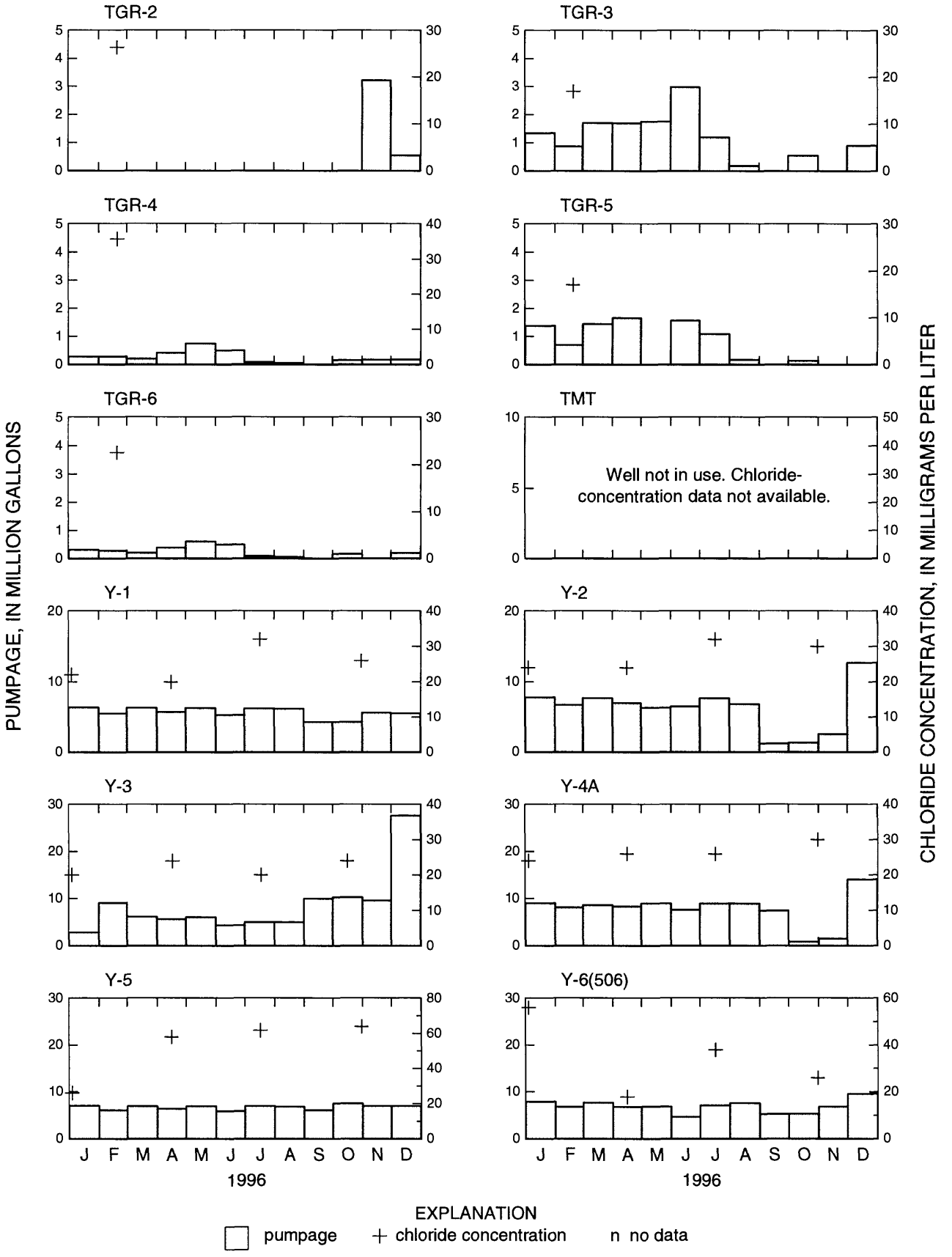


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

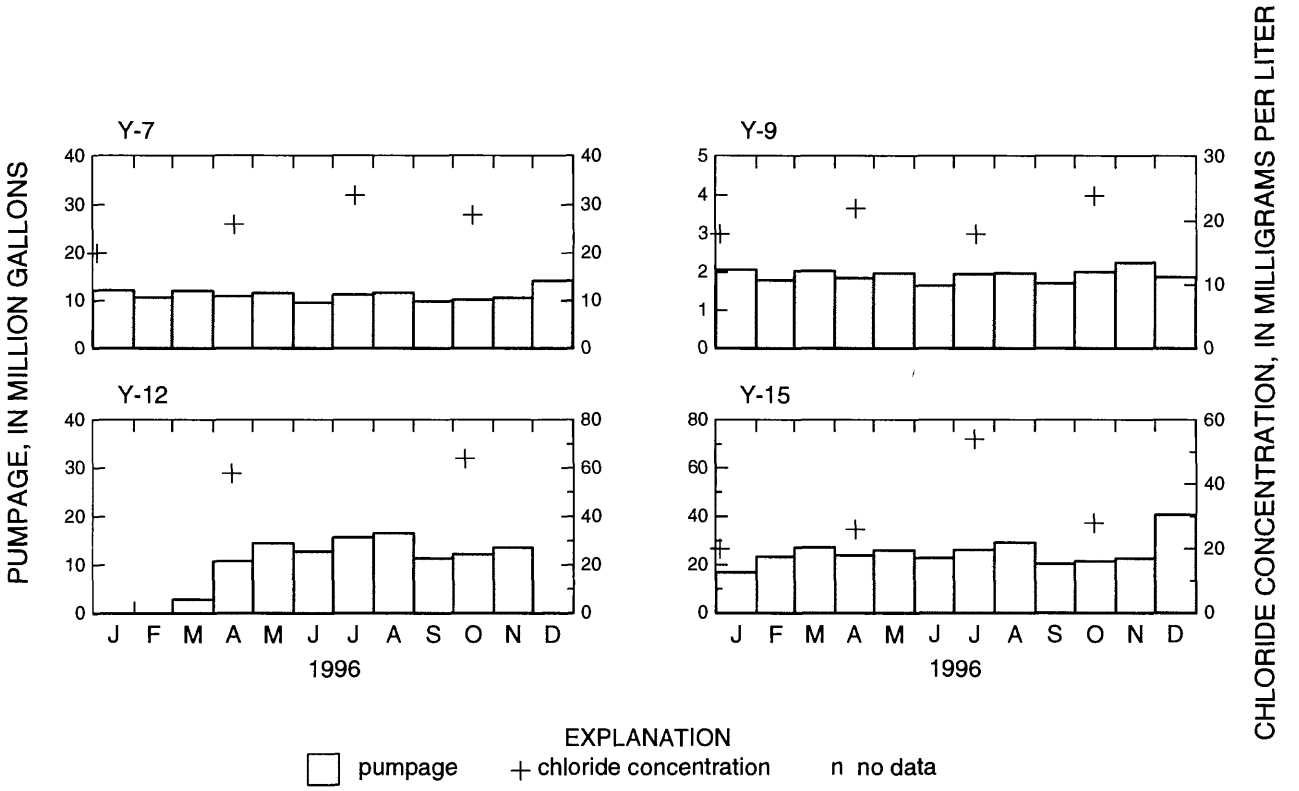


Figure B3. Chloride concentration and monthly ground-water pumpage for production wells, Guam, 1996. Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.--Continued.

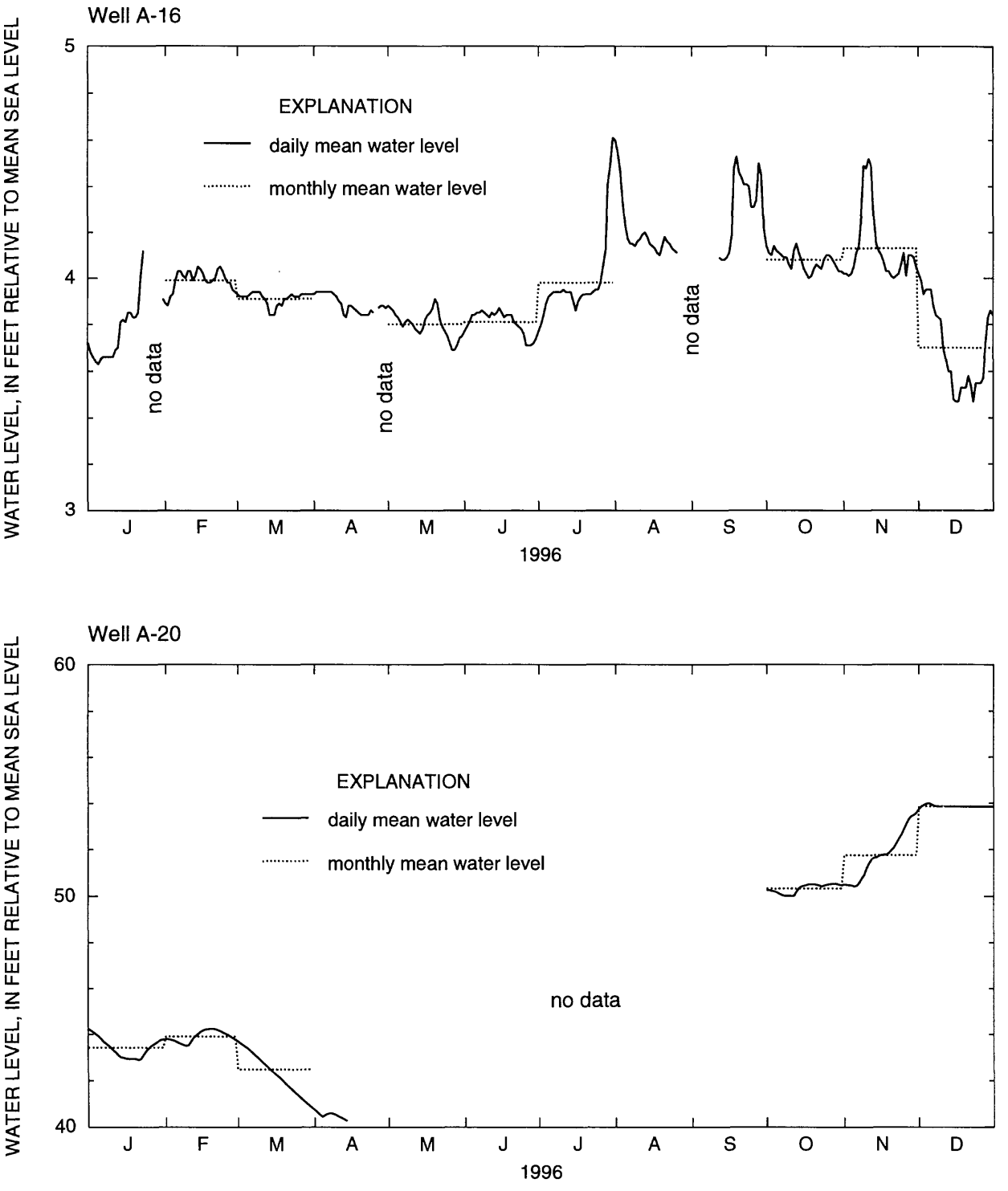
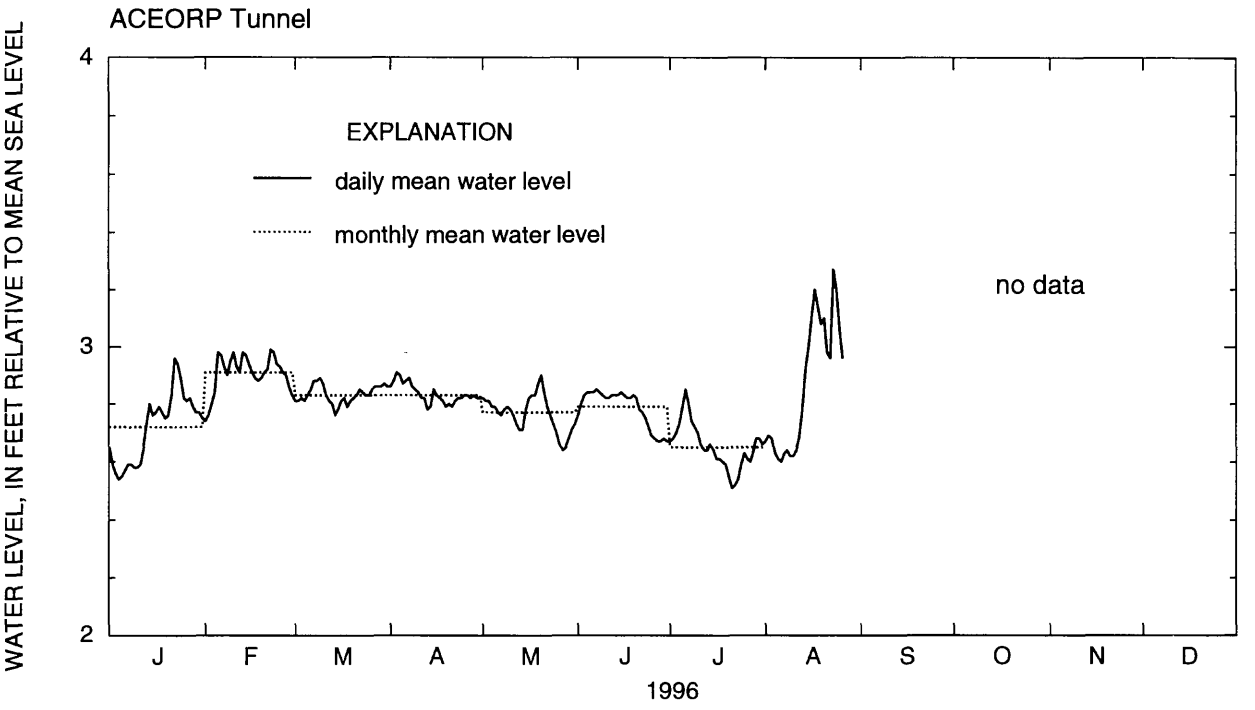


Figure B4. Daily mean and monthly mean ground-water levels at monitoring sites, Guam, 1996. Data are from the U.S. Geological Survey and are provisional.



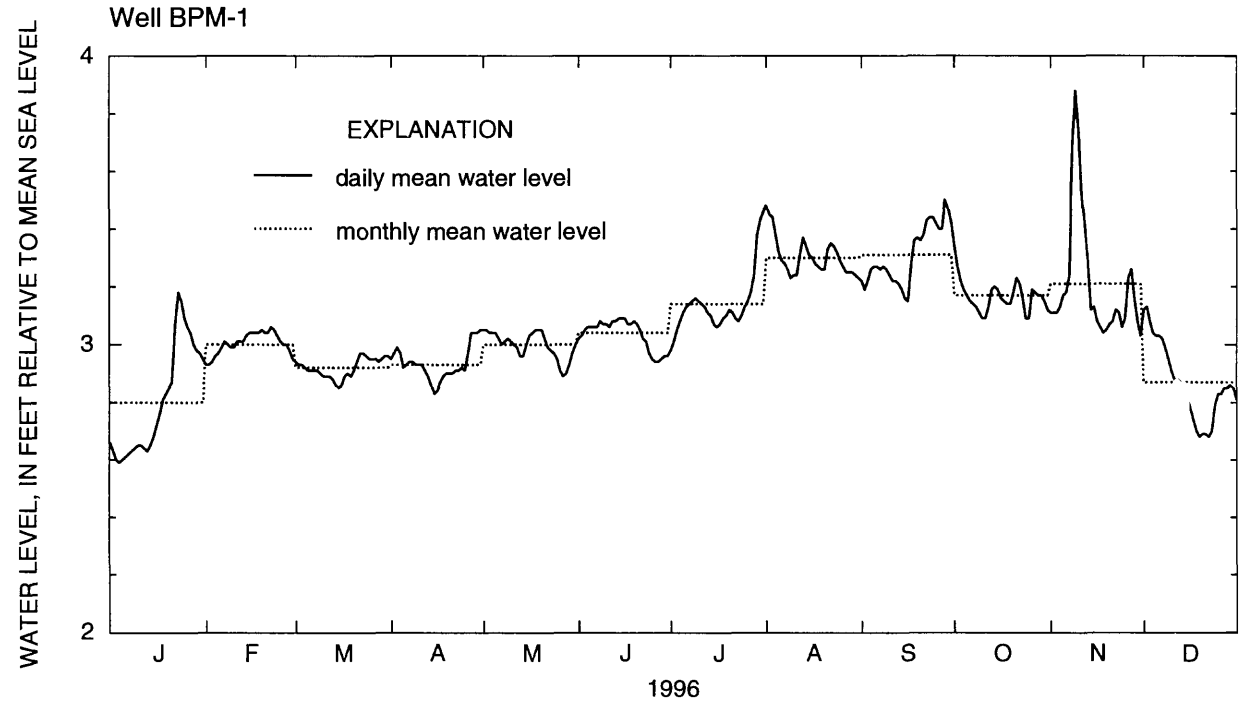
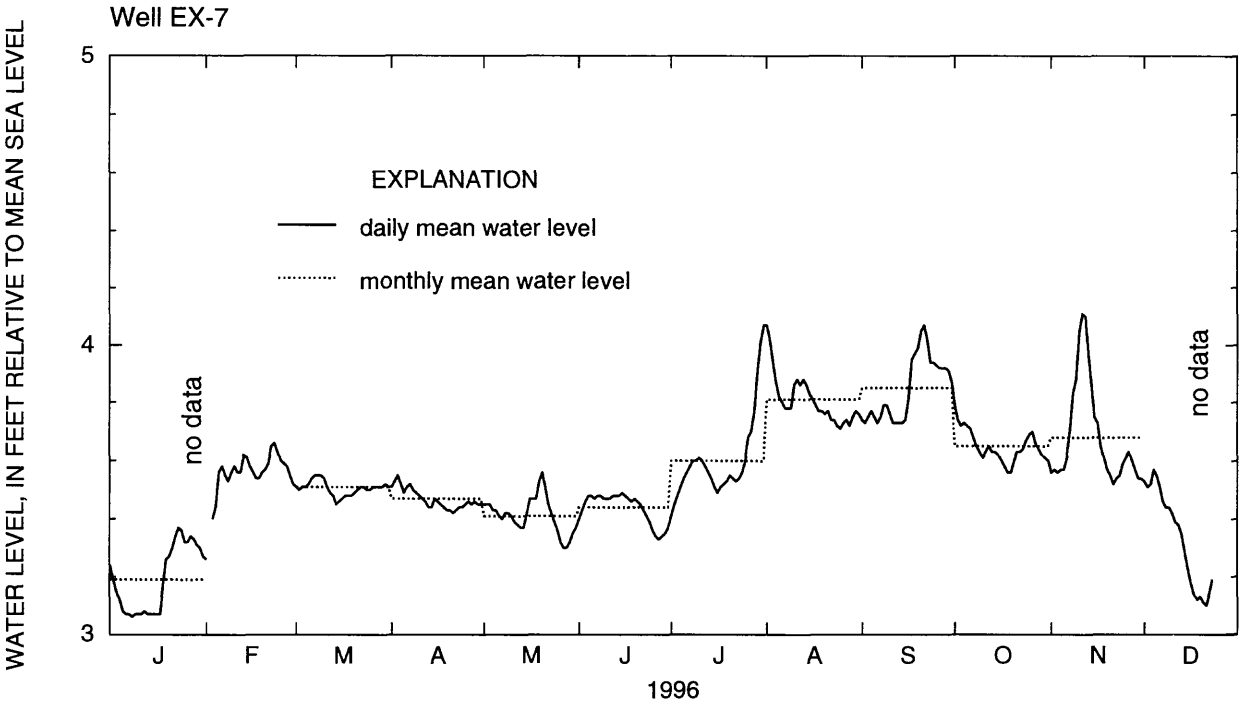


Figure B4. Daily mean and monthly mean ground-water levels at monitoring sites, Guam, 1996. Data are from the U.S. Geological Survey and are provisional.--Continued.



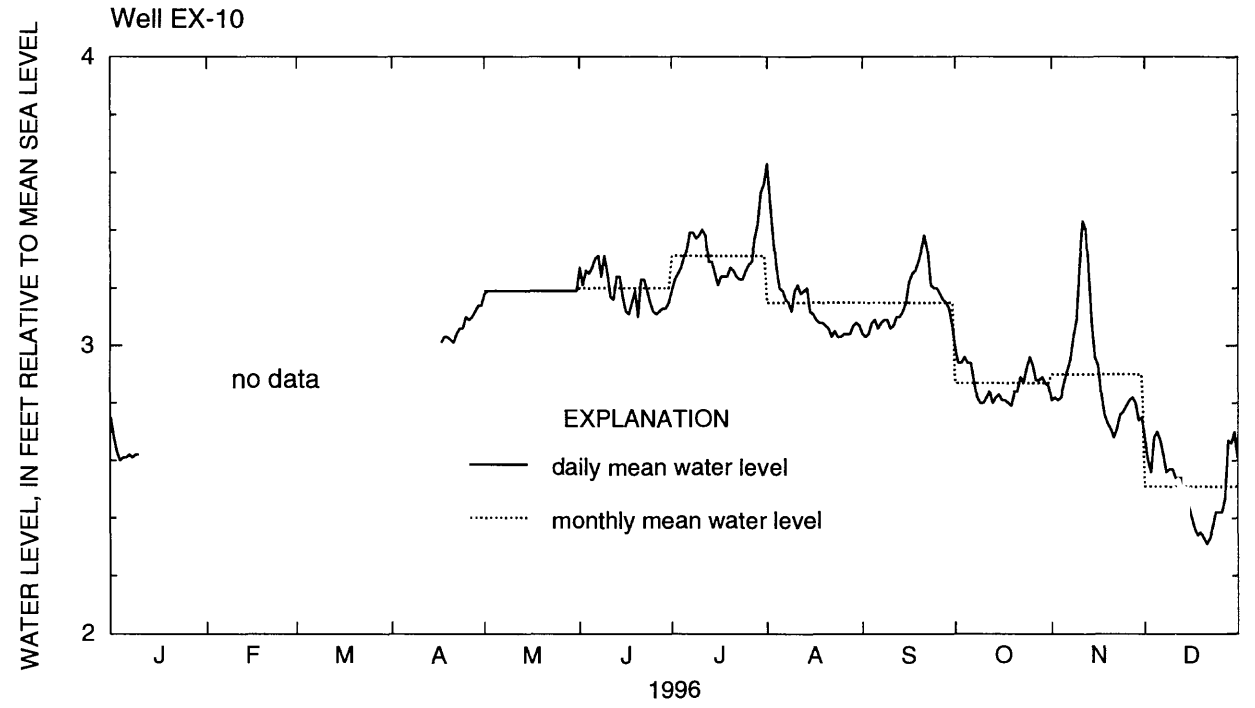
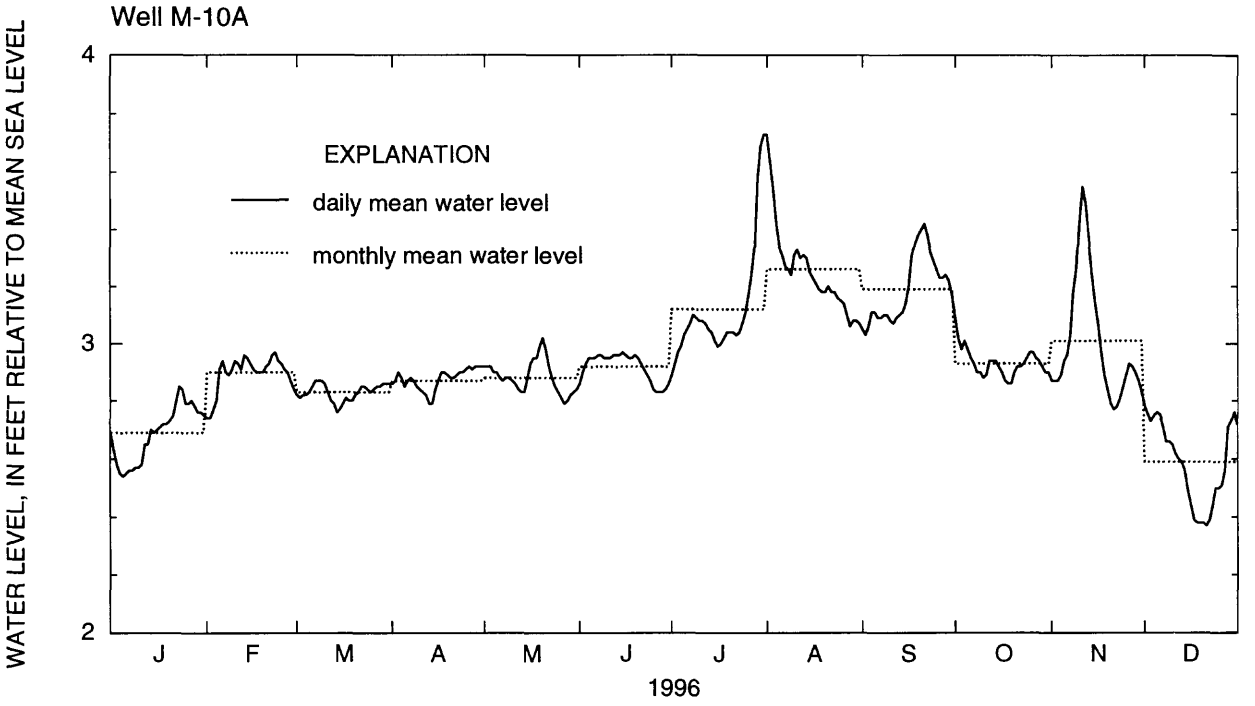


Figure B4. Daily mean and monthly mean ground-water levels at monitoring sites, Guam, 1996. Data are from the U.S. Geological Survey and are provisional.--Continued.



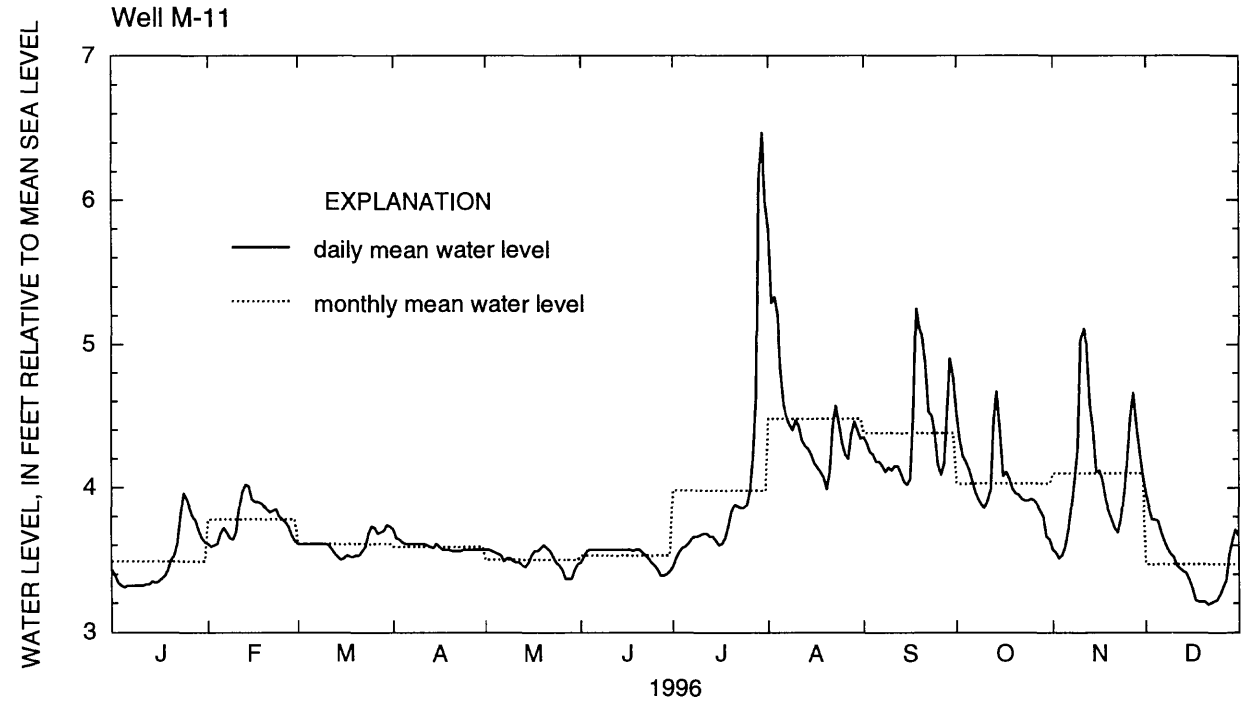


Figure B4. Daily mean and monthly mean ground-water levels at monitoring sites, Guam, 1996. Data are from the U.S. Geological Survey and are provisional.--Continued.

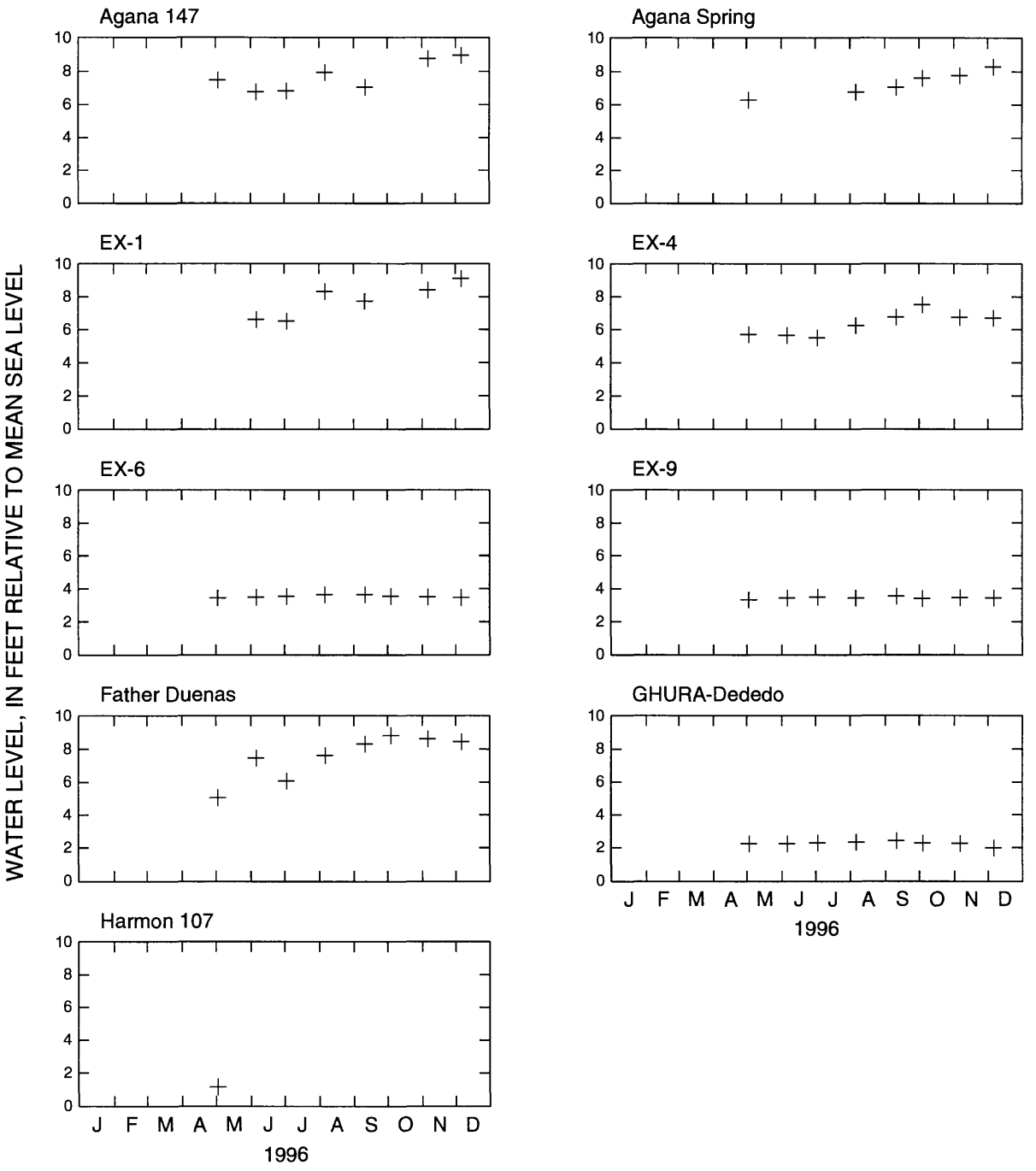


Figure B5. Monthly ground-water levels at monitoring sites, Guam, 1996. Father Duenas site has unknown amount of oil floating on water. Data are from the Guam Environmental Protection Agency.

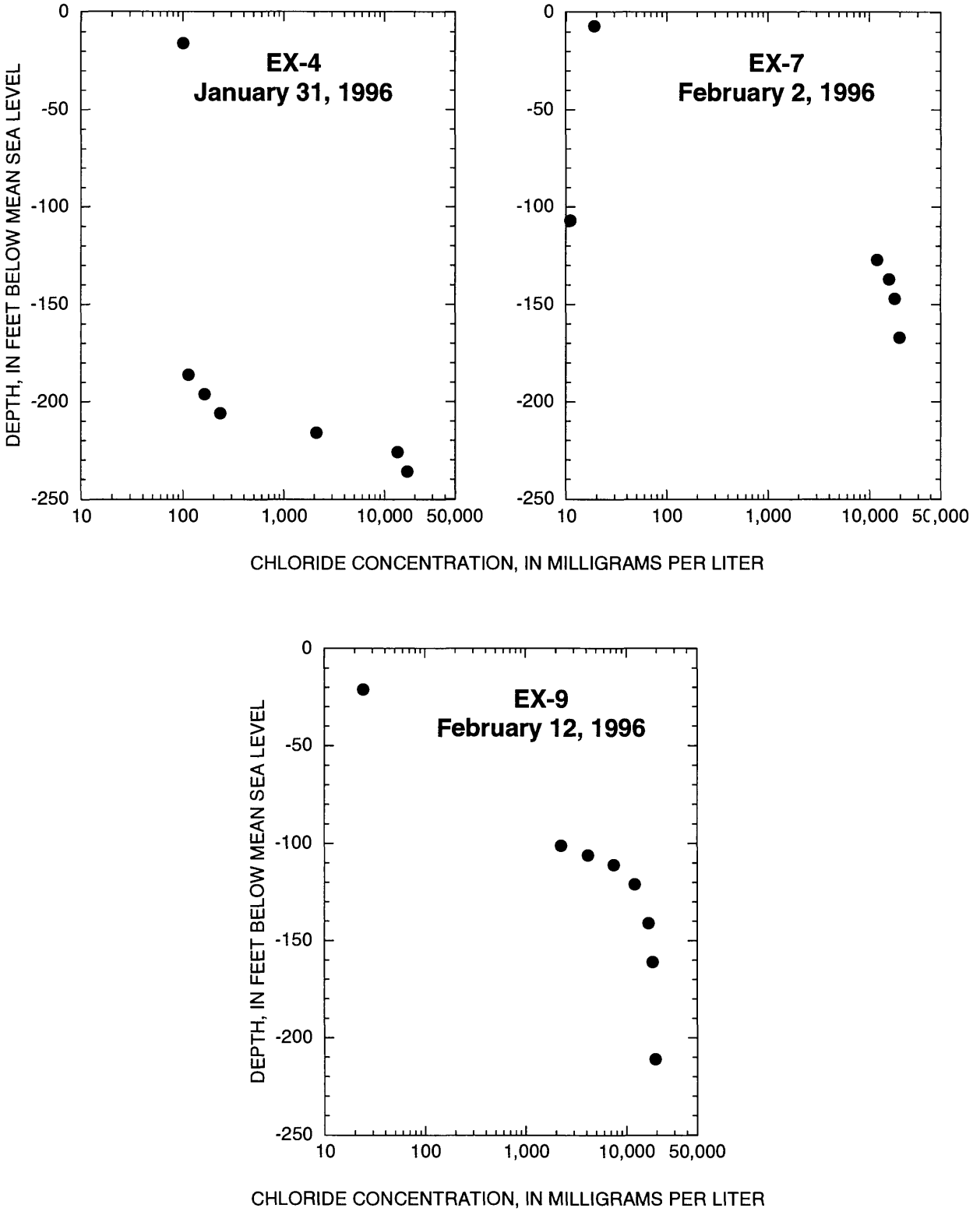


Figure B6. Vertical chloride-concentration profiles of monitoring wells, Guam, 1996.

Table B1. Monthly ground-water pumpage by sub-basin, Guam, 1996
[Sub-basin designations are from Camp, Dresser and McKee, Inc. (1982). Data are from the Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy. Values are rounded to million gallons; pumpage from wells D-22A, F-17, F-18, IE-2, NCS-9, and Y-12 are not included in sub-basin pumpage totals.]

Month	Agafo Gumas Sub-basin	Agana Sub-basin	Andersen Sub-basin	Finegayan Sub-basin	Mangilao Sub-basin	Yigo Sub-basin	Southern Guam
JAN	34.3	381.1	17.1	150.9	78.0	408.2	12.9
FEB	27.3	325.9	23.6	143.0	63.8	393.7	11.2
MAR	31.6	388.4	27.3	151.1	71.9	417.2	13.5
APR	27.6	338.3	24.1	127.5	62.9	384.9	12.5
MAY	26.2	353.7	26.2	132.9	70.6	344.1	19.5
JUN	24.7	318.9	23.5	117.5	55.3	343.8	17.1
JUL	29.7	350.9	26.1	143.7	73.7	326.2	12.8
AUG	27.4	333.4	29.2	124.0	64.1	329.0	8.8
SEP	26.9	338.8	20.4	107.9	44.7	296.7	7.5
OCT	25.7	303.7	21.6	109.5	59.0	318.5	10.5
NOV	26.5	336.4	22.7	112.2	53.0	318.2	9.9
DEC	33.9	386.5	40.8	143.9	65.1	417.0	8.7
Total	342.0	4,156.0	302.6	1,564.0	762.1	4,297.6	144.9

Table B2. Monthly ground-water pumpage of production wells, Guam, 1996

[Values are rounded to million gallons; blank entries indicate no data; Mgal, million gallons; Mgal/d, million gallons per day; data from Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, U.S. Navy.]

Well	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total (Mgal)	Mean (Mgal/d)
A-1	11.7	9.7	11.0	9.7	10.3	8.4	10.0	8.6	8.9	8.9	8.9	16.8	122.9	0.3
A-2	12.2	10.5	11.6	9.8	11.0	9.2	11.0	10.9	9.7	9.7	9.8	18.5	133.8	0.4
A-3	10.9	9.2	10.5	9.4	10.4	8.9	10.7	10.0	8.9	9.0	10.0	12.2	120.2	0.3
A-4	11.9	10.0	10.7	3.0	4.9	11.7	0.0	5.1	5.1	5.1	5.1	3.3	76.1	0.2
A-5	12.5	10.4	11.9	10.7	11.8	10.1	12.3	11.3	9.9	9.8	11.0	15.2	136.8	0.4
A-6	13.8	11.6	13.3	12.0	13.3	11.4	13.8	13.4	24.0	14.0	13.5	12.7	166.8	0.5
A-7	9.9	8.4	9.3	7.9	7.9	6.5	7.8	7.1	6.2	6.3	6.9	10.4	94.3	0.3
A-8	11.5	9.4	10.6	9.5	10.3	8.7	9.8	10.0	8.3	8.3	9.9	14.0	120.2	0.3
A-9	12.2	10.2	11.7	10.3	11.7	7.9	11.9	6.4	13.0	13.0	11.6	4.1	124.1	0.3
A-10	11.7	9.9	11.5	10.4	11.2	10.0	12.2	10.6	10.3	10.4	10.3	3.7	122.2	0.3
A-12	9.1	7.8	8.9	7.6	8.3	6.7	8.1	8.2	7.9	7.9	8.1	15.5	104.0	0.3
A-13	12.0	9.6	12.2	8.7	11.8	10.5	12.7	8.3	9.8	9.8	8.7	19.1	133.2	0.4
A-14	11.5	10.1	11.7	10.6	10.3	5.6	15.6	11.0	10.7	10.7	10.8	13.6	132.1	0.4
A-15	12.7	10.6	12.2	10.8	12.1	10.3	11.6	16.3	10.6	10.7	12.5	12.7	143.1	0.4
A-17	11.7	10.0	12.0	10.5	9.4	9.1	11.4	11.3	10.9	11.0	10.9	13.9	132.0	0.4
A-18	6.1	9.2	10.4	9.4	10.5	8.8	10.7	10.0	9.7	9.7	9.6	3.5	107.5	0.3
A-19	9.3	3.3	8.4	8.3	8.1	7.6	9.5	9.1	9.0	9.0	8.9	0.7	91.2	0.2
A-21	10.3	8.8	10.0	8.9	9.9	8.7	10.7	10.2	9.0	9.0	9.0	14.5	118.9	0.3
A-23	14.7	12.6	14.3	12.8	14.1	11.9	14.8	13.8	12.5	12.5	13.3	19.6	166.9	0.5
A-25	11.6	1.3	12.1	13.6	12.3	21.4	4.2	13.2	12.8	12.8	13.6	16.3	145.0	0.4
A-26	2.6	2.2	2.5	2.3	2.2	2.5	2.7	2.6	2.4	2.4	2.5	3.5	30.3	0.1
A-28	12.2	9.0	12.5	11.2	11.7	10.0	10.9	11.4	10.2	10.2	11.3	15.5	136.0	0.4
A-29	16.8	14.0	16.6	13.0	15.1	12.2	14.8	6.2	13.4	13.4	11.6	25.3	172.3	0.5
A-30	20.5	33.0	38.6	27.3	31.8	24.0	32.3	32.2	29.5	30.5	31.7	49.1	380.6	1.0
A-31	17.0	9.6	12.7	11.7	12.9	11.0	13.5	12.5	11.1	11.1	11.6	18.1	152.9	0.4
A-32	4.8	4.1	4.6	8.8	4.6	4.0	4.8	4.4	4.1	4.1	4.2	6.3	58.7	0.2
AG-1	6.5	5.5	6.3	5.3	5.9	5.0	5.9	5.8	5.3	5.3	6.0	6.5	69.0	0.2
AG-2	5.2	3.1	3.3	3.9	3.4	4.4	5.1	5.2	4.6	4.7	5.0	6.5	54.6	0.1
BCC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BPM(AF)	0.0	0.0	0.0	0.0	0.1	0.6							0.8	0.0
CCP-1	1.0	1.0	1.1	0.8	1.1	1.3	1.1	1.0	1.0	1.1	0.7	0.9	12.2	0.0
CCP-2	0.7	0.6	0.8	1.0	1.4	1.5	1.2	0.6	0.4	0.6	0.6	0.1	9.3	0.0
CCP-3	1.5	1.5	1.6	1.3	1.8	1.8	1.4	1.5	1.1	1.6	1.2	1.0	17.4	0.0
CCP-4	0.9	1.1	1.1	0.9	1.3	1.3	1.0	1.1	0.8	1.1	0.9	0.8	12.1	0.0
CCP-5	0.4	0.0	0.2	0.2	0.6	0.7	0.7	0.3	0.7	0.7	0.1	0.5	5.1	0.0
CCP-6	0.3	0.2	1.1	0.9	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	4.1	0.0
CIR-1,2	2.9	2.6	3.5	2.6	3.5	3.5	3.0	3.5	2.8	2.8	2.6	3.0	36.1	0.1
D-1	11.3	9.7	10.1	10.1	10.8	8.5	10.5	8.7	9.5	10.7	9.6	8.6	118.1	0.3
D-2	9.9	8.5	9.8	8.8	9.6	8.1	9.7	9.3	9.7	10.6	10.3	4.9	109.1	0.3
D-3	7.8	6.3	7.4	6.9	7.2	6.7	6.6	7.5	6.9	7.6	7.5	16.1	94.5	0.3
D-4	11.2	9.7	11.1	11.2	1.1	0.9	1.0	2.1	1.5	6.6	4.6	0.5	61.4	0.2
D-5	7.7	6.5	7.7	6.9	7.0	5.9	4.3	11.0	7.5	8.9	9.9	3.9	87.0	0.2
D-6	6.7	5.4	10.9	10.0	10.7	9.1	10.5	9.9	9.5	6.9	7.6	8.9	106.0	0.3
D-7	9.7	8.1	9.3	8.4	9.3	7.9	9.5	8.9	7.9	7.9	8.5	13.2	108.5	0.3
D-8	9.4	7.9	8.9	8.0	8.9	7.4	8.9	8.4	7.5	7.6	7.9	12.6	103.4	0.3
D-9	9.2	7.6	8.7	7.7	8.6	7.2	8.0	8.0	7.5	7.8	7.5	7.4	95.4	0.3
D-10	9.5	8.2	9.3	8.4	9.4	7.9	9.6	9.0	8.9	9.0	8.8	7.8	105.7	0.3
D-11	0.3	0.0	0.0	0.0	11.7	5.1	9.2	8.7	9.0	9.6	9.5	8.5	71.5	0.2
D-12	8.0	6.7	7.6	6.9	7.6	6.4	7.8	7.4	6.5	6.5	6.6	11.7	89.7	0.2
D-13	7.4	4.8	7.8	7.1	7.8	6.5	8.1	7.6	6.7	7.3	7.1	5.6	83.9	0.2
D-14	9.0	7.8	8.9	8.1	8.9	7.5	8.9	8.4	7.6	8.5	8.6	11.3	103.4	0.3
D-15	9.6	8.1	9.2	8.3	9.1	7.3	6.6	6.5	8.6	9.7	8.6	12.5	104.2	0.3
D-16	4.5	8.1	9.3	7.0	9.2	7.6	9.3	8.9	8.2	8.8	8.9	12.4	102.3	0.3
D-17	9.4	8.0	9.2	7.5	9.3	7.7	9.3	4.7	8.4	9.5	6.6	13.6	103.0	0.3
D-18	9.4	6.6	9.2	8.4	8.9	7.7	9.5	8.3	0.0	0.0	0.0	25.9	93.9	0.3
D-19	8.9	8.6	8.9	8.0	8.8	7.6	9.2	8.7	7.8	8.0	8.1	7.4	100.0	0.3
D-20	7.0	7.6	8.1	7.1	8.0	7.9	9.5	8.8	8.1	8.5	8.5	12.8	101.9	0.3
D-21	7.0	19.8	11.7	6.9	7.8	7.8	9.4	8.9	8.1	9.5	8.9	10.9	116.8	0.3
D-22A	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	16.5	0.0	0.0	0.0	19.7	0.1
D-24	7.2	6.0	6.7	6.0	6.6	5.5	6.6	6.2	5.6	5.8	6.0	8.5	76.6	0.2
EX-5A	10.7	9.4	10.8	9.9	10.5	8.8	10.6	10.0	9.5	9.9	10.0	6.8	116.7	0.3
EX-11	8.4	7.0	8.1	7.7	8.1	6.8	8.1	7.3	6.8	6.9	7.0	11.4	93.6	0.3
F-1	6.4	5.0	5.8	5.0	5.5	4.5	5.5	5.6	5.1	5.5	5.5	0.0	59.5	0.2
F-2	4.5	3.6	4.1	3.3	3.9	3.2	2.4	4.0	3.4	3.5	3.9	3.5	43.3	0.1
F-3	7.0	5.8	6.7	5.9	6.6	5.4	6.5	6.4	5.7	5.9	6.0	8.4	76.3	0.2
F-4	6.8	5.6	6.4	5.7	6.2	5.2	6.3	6.2	5.3	5.5	5.8	5.6	70.5	0.2
F-5	7.6	6.3	7.1	6.3	7.0	5.8	6.9	6.7	6.0	6.0	6.0	9.7	81.2	0.2
F-6	8.0	6.6	7.5	6.8	7.6	6.8	13.8	7.3	6.4	6.6	6.9	9.5	93.7	0.3
F-7	3.8	10.4	7.8	6.9	7.7	6.4	7.1	7.6	6.7	7.6	7.5	9.5	89.1	0.2
F-8	6.4	5.4	6.1	5.6	6.0	4.8	5.6	5.6	4.9	5.7	5.6	0.0	61.7	0.2
F-9	7.0	5.8	6.5	5.8	5.7	4.4	5.3	6.3	5.6	6.5	6.3	4.9	70.1	0.2
F-10	5.7	6.0	5.6	2.4	5.9	4.2	7.8	7.3	6.4	7.5	7.3	8.0	74.1	0.2

Table B2. Monthly ground-water pumpage of production wells, Guam, 1996--Continued

F-11	8.6	7.1	8.1	7.2	7.9	6.4	7.7	7.5	3.8	4.6	7.5	6.7	83.0	0.2
F-12	6.4	5.3	6.1	5.1	5.9	4.2	5.9	5.3	4.9	5.7	5.5	9.5	69.7	0.2
F-13	14.8	12.4	13.5	0.0	0.0	0.0	4.2	9.8	8.6	9.6	9.8	9.7	92.4	0.3
F-15	19.2	16.1	18.3	16.2	17.3	14.9	12.6	0.0	0.0	0.0	0.0	15.5	130.2	0.4
F-16	0.0	0.0	0.0	9.5	0.0	0.5	0.8	0.8	0.7	0.7	0.8	0.9	14.6	0.0
F-17	0.0	0.0	0.0	11.7	12.6	9.6	13.6	7.8	9.4	10.3	9.9	21.6	106.5	0.3
F-18	0.0	0.0	0.0	5.7	10.2	10.6	8.4	0.0	11.1	12.9	12.0	0.0	70.8	0.2
FFH-3	7.8	7.3	7.8	7.6	7.8	7.6	7.8	7.8	7.6		7.6		76.6	0.2
FFH-4	7.8	7.3	7.8	7.6	7.8	7.6	7.8	7.8	7.6		7.6		76.6	0.2
FFH-5A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
FFH-7	5.9	5.5	5.9	5.7	5.9	5.7	5.9	5.9	5.7		5.7		57.8	0.2
FFH-8	7.8	7.3	7.8	7.6	7.8	7.6	7.8	7.8	7.6		7.6		76.6	0.2
FM	2.4	2.1	2.3	2.4	2.7	2.7	2.8	2.8	3.3	2.8	3.1	3.1	32.6	0.1
GH-501	7.5	6.1	6.9	5.9	6.6	6.1	7.3	6.8	6.3	6.3	6.4	9.5	81.8	0.2
GOR-1	0.6	0.7	0.2	0.1	0.2	0.2	0.7	0.1	0.6	1.0	0.5	0.0	5.0	0.0
H-1	12.4	10.8	12.8	9.3	12.7	10.8	13.2	12.4	11.1	11.3	11.5	18.3	146.5	0.4
HGC-2	19.9	16.7	18.1	15.0	12.8	11.8	16.8	16.1	15.3	15.3	15.1	18.9	191.7	0.5
HGC-3	2.7	2.0	4.0	3.5	4.1	3.5	1.9	0.2	1.7	0.5	0.5	2.0	26.7	0.1
HRP-1	3.8	5.5	5.0	5.4	3.9	4.0	2.8	0.8	2.3	2.3	0.2	0.1	36.2	0.1
HRP-2	0.7	0.9	0.8	0.6	0.6	0.7	0.3	0.4	0.5	0.6	0.4	0.5	7.2	0.0
IE-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IE-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M-1	4.9	4.0	3.9	6.2	5.9	4.5	5.1	5.0	4.5	5.5	5.3	5.5	60.3	0.2
M-2	8.8	7.4	8.5	7.8	8.3	6.9	7.5	8.5	7.1	8.0	8.3	9.6	96.5	0.3
M-3	11.1	5.1	8.8	6.9	8.7	6.7	18.6	17.9	7.3	8.5	10.9	6.7	117.1	0.3
M-4	7.3	6.0	7.0	6.6	5.9	5.6	7.0	6.3	5.9	6.6	6.3	9.6	80.1	0.2
M-5	7.8	6.5	7.5	6.8	11.1	2.1	7.5	6.9	6.4	7.6	6.8	9.0	85.9	0.2
M-6	9.6	8.1	9.3	8.3	9.2	7.6	9.3	9.4	6.9	7.3	9.6	12.4	106.8	0.3
M-7	8.3	2.7	0.0	0.0	7.8	0.0	0.0	0.0	0.0	5.3	4.9	5.3	34.2	0.1
M-8	17.3	17.9	8.4	6.8	7.8	6.5	7.7	7.2	6.6	7.6	7.9	8.9	110.6	0.3
M-9	7.6	6.4	7.5	6.8	7.4	6.1	7.5	7.0	6.3	7.5	7.0	9.0	86.3	0.2
M-12	4.9	4.1	2.8	4.9	5.3	4.5	5.5	5.4	4.4	5.4	5.4	5.2	57.8	0.2
M-14	11.3	5.1	11.6	10.4	11.3	9.2	11.2	10.5	9.6	10.3	10.8	4.1	115.4	0.3
M-15	4.0	6.9	8.5	7.7	8.1	1.8	9.9	9.1	8.5	9.6	9.7	11.7	95.5	0.3
M-16B	5.8	4.7	5.6	4.9	5.1	4.2	4.9	4.7	0.0	4.4	0.0	0.0	44.1	0.1
M-17A	16.3	16.9	8.8	5.2	2.5	0.0	6.5	10.4	9.4	10.3	10.3	0.0	96.3	0.3
M-17B	1.4	13.0	12.0	10.7	11.1	9.2	11.2	10.0	9.1	9.7	9.9	14.1	121.3	0.3
M-20A	0.0	1.8	0.0	5.2	13.2	9.8	12.8	12.3	12.3	12.5	12.4	16.2	108.5	0.3
MCR-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MGC-1	1.1	1.9	4.4	2.6	2.8	1.2	1.5	0.1	0.0	1.0	0.1	1.3	18.0	0.0
MGC-2	0.0	0.0	0.0	0.9	2.3	1.0	1.4	0.0	0.0	1.1	0.1	0.9	7.7	0.0
MGC-3	1.7	1.0	3.4	1.2	2.6	1.0	1.0	0.0	0.0	1.0	0.1	1.0	14.1	0.0
MGC-4	4.0	2.4	6.3	4.7	5.6	4.7	3.5	0.3	0.0	0.9	0.1	1.0	33.6	0.1
MHR-1	0.5	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0
MJ-1	0.0	0.0	0.0	0.0	3.8	0.6	0.9	0.0	0.0	0.0	0.0	0.0	5.2	0.0
MJ-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MW-1	5.8	6.1	4.4	6.0		4.5							26.8	0.1
MW-2	4.8	4.4	5.3	6.3		4.5							25.4	0.1
MW-3	5.5	6.6	3.7	0.0		10.4							26.2	0.1
MW-5	4.5	5.6	6.4	5.1		7.2							28.8	0.1
MW-6	17.6	15.9	16.5	16.6		14.6							81.2	0.2
MW-7	10.1	10.2	12.1	11.2		10.5							54.0	0.1
MW-8	17.9	16.6	18.8	18.1		17.8							89.3	0.2
MW-9	17.2	15.7	17.8	17.7		16.6							85.0	0.2
NAS	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0
NCS-2	7.3	6.0	5.4	6.8	6.6	0.0	0.0	9.1	8.6	9.0	8.0	9.1	76.0	0.2
NCS(B)-3	3.8	3.5	3.2	3.2	3.5	3.9	4.0	3.9	3.4	2.9	0.0	0.0	35.4	0.1
NCS-5	4.2	4.0	4.3	4.1	1.8	0.0	0.0	0.0	0.0	0.2	0.5	0.0	19.3	0.1
NCS-6	0.6	9.3	4.8	4.6	3.1	6.4	6.9	1.7	6.1	4.0	0.8	3.3	51.7	0.1
NCS-7	12.0	11.0	12.0	9.2	9.8	11.1	11.4	11.4	0.8	0.0	0.0	0.0	88.6	0.2
NCS(B)-8	10.1	9.7	10.4	6.5	0.0	0.0	0.0	0.0	6.6	8.9	8.2	8.8	69.2	0.2
NCS-9	0.0	0.0	5.6	8.1	10.5	7.5	6.8	3.9	6.1	10.9	10.7	8.6	78.6	0.2
NCS-A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	5.3	5.1	9.0	8.7	31.0	0.1
NCS-B	6.7	4.5	5.1	6.7	7.6	7.1	7.1	3.1	5.3	2.7	0.7	3.9	60.2	0.2
NRMC-1	12.8	12.2	11.5	10.8	10.6	9.5	10.3	6.9	0.0	0.8	8.2	0.0	93.6	0.3
NRMC-2	0.0	3.3	7.9	7.5	7.3	7.1	7.3	7.3	7.1	7.2	7.1	7.5	76.6	0.2
NRMC-3	6.2	5.3	4.3	4.1	6.3	3.7	4.2	6.0	7.3	7.1	5.2	7.3	67.0	0.2
PBI-1	0.7	0.9	1.1	0.9	1.6	1.2	1.0	1.5	1.2	1.6	1.1	1.4	14.2	0.0
PIC-1	4.3	3.5	3.8	3.6	4.2	4.2	4.8	4.8	5.3	5.1	4.1	4.1	51.9	0.1
RCA-1	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
TGC-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TGR-1	0.8	1.0	0.4	0.3	1.5	0.5	0.3	0.2	0.0	0.2	0.0	0.6	5.8	0.0
TGR-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.5	3.8	0.0
TGR-3	1.3	0.9	1.7	1.7	1.8	3.0	1.2	0.2	0.0	0.5	0.0	0.9	13.2	0.0
TGR-4	0.3	0.3	0.2	0.4	0.7	0.5	0.1	0.1	0.0	0.2	0.2	0.2	3.1	0.0
TGR-5	1.4	0.7	1.4	1.7	0.0	1.6	1.1	0.2	0.0	0.1	0.0	0.0	8.2	0.0
TGR-6	0.3	0.3	0.2	0.4	0.6	0.5	0.1	0.1	0.0	0.2	0.0	0.2	2.8	0.0
TMT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-1	6.4	5.5	6.3	5.7	6.3	5.3	6.2	6.2	4.3	4.3	5.7	5.6	67.9	0.2
Y-2	7.8	6.7	7.7	7.0	6.4	6.5	7.7	6.8	1.2	1.4	2.6	12.7	74.5	0.2

Table B2. Monthly ground-water pumpage of production wells, Guam, 1996--Continued

Y-3	2.8	9.1	6.2	5.7	6.1	4.3	5.0	5.0	10.0	10.3	9.6	27.7	101.8	0.3
Y-4A	9.0	8.1	8.6	8.3	9.0	7.6	8.9	8.9	7.5	0.9	1.5	14.0	92.3	0.3
Y-5	7.1	6.1	7.0	6.4	7.0	5.9	7.0	6.8	6.1	7.6	7.0	7.0	80.9	0.2
Y-6(506)	7.9	6.8	7.7	6.8	6.9	4.7	7.1	7.6	5.3	5.4	6.9	9.6	82.6	0.2
Y-7	12.3	10.7	12.1	11.0	11.7	9.6	11.3	11.7	9.9	10.3	10.7	14.2	135.4	0.4
Y-9	2.1	1.8	2.0	1.9	2.0	1.7	2.0	2.0	1.7	2.0	2.3	1.9	23.2	0.1
Y-12	0.0	0.0	2.9	10.9	14.6	12.8	15.8	16.6	11.4	12.3	13.6	0.0	110.8	0.3
Y-15	17.1	23.6	27.3	24.1	26.0	22.9	26.1	29.2	20.4	21.6	22.7	40.8	301.8	0.8

Table B3. Daily mean ground-water levels at monitoring sites, Guam, 1996
[Values are in feet above mean sea level; ---, no data or no statistic; U.S. Geological Survey provisional data.]

Well A-16

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	3.72	3.89	3.93	3.93	3.88	3.77	3.77	4.60	---	4.14	4.02	4.02
2	3.68	3.88	3.92	3.94	3.87	3.79	3.80	4.55	---	4.11	4.02	3.99
3	3.66	3.92	3.92	3.94	3.86	3.81	3.84	4.47	---	4.10	4.01	3.93
4	3.64	3.93	3.92	3.94	3.84	3.84	3.89	4.34	---	4.14	4.02	3.95
5	3.63	3.99	3.92	3.94	3.83	3.84	3.92	4.23	---	4.12	4.05	3.95
6	3.65	4.03	3.93	3.94	3.81	3.85	3.93	4.17	---	4.11	4.11	3.95
7	3.66	4.03	3.94	3.94	3.79	3.85	3.94	4.15	---	4.10	4.14	3.88
8	3.66	4.01	3.94	3.94	3.81	3.86	3.94	4.15	---	4.09	4.27	3.84
9	3.66	4.00	3.94	3.93	3.82	3.85	3.94	4.14	---	4.09	4.49	3.83
10	3.66	4.03	3.94	3.92	3.81	3.84	3.94	4.16	---	4.06	4.48	3.82
11	3.66	4.03	3.92	3.90	3.80	3.83	3.95	4.17	---	4.04	4.52	3.70
12	3.69	3.99	3.91	3.89	3.78	3.85	3.94	4.19	4.09	4.12	4.49	3.65
13	3.70	4.01	3.89	3.84	3.77	3.84	3.94	4.20	4.08	4.15	4.27	3.60
14	3.81	4.05	3.84	3.83	3.76	3.85	3.94	4.18	4.08	4.11	4.15	3.60
15	3.82	4.04	3.84	3.88	3.78	3.87	3.90	4.15	4.09	4.08	4.12	3.48
16	3.81	4.02	3.84	3.88	3.82	3.85	3.86	4.14	4.11	4.04	4.10	3.47
17	3.85	3.99	3.88	3.87	3.84	3.83	3.90	4.13	4.19	4.02	4.07	3.47
18	3.85	3.98	3.89	3.86	3.85	3.84	3.92	4.11	4.48	4.00	4.03	3.53
19	3.83	3.98	3.88	3.85	3.87	3.84	3.93	4.10	4.53	4.01	4.03	3.53
20	3.83	3.99	3.91	3.84	3.91	3.84	3.93	4.14	4.46	4.04	4.01	3.53
21	3.85	4.00	3.91	3.84	3.89	3.81	3.93	4.18	4.44	4.06	4.00	3.58
22	4.01	4.04	3.92	3.84	3.82	3.80	3.93	4.16	4.41	4.05	4.01	3.54
23	4.12	4.05	3.93	3.84	3.79	3.79	3.94	4.15	4.41	4.04	4.02	3.47
24	---	4.03	3.92	3.86	3.77	3.78	3.95	4.13	4.40	4.08	4.06	3.55
25	---	4.00	3.92	3.85	3.75	3.76	3.95	4.12	4.31	4.10	4.11	3.55
26	---	3.98	3.92	---	3.72	3.71	3.98	4.11	4.31	4.10	4.01	3.55
27	---	3.98	3.93	3.87	3.69	3.71	4.05	---	4.34	4.09	4.10	3.57
28	---	3.95	3.93	3.88	3.69	3.71	4.12	---	4.50	4.07	4.10	3.72
29	---	3.94	3.93	3.88	3.71	3.72	4.41	---	4.45	4.05	4.09	3.83
30	---	---	3.93	3.87	3.74	3.74	4.49	---	4.21	4.03	4.05	3.86
31	3.91	---	3.93	---	3.75	---	4.61	---	---	4.03	---	3.84
MEAN	---	3.99	3.91	---	3.80	3.81	3.98	---	---	4.08	4.13	3.70
MAX	---	4.05	3.94	---	3.91	3.87	4.61	---	---	4.15	4.52	4.02
MIN	---	3.88	3.84	---	3.69	3.71	3.77	---	---	4.00	4.00	3.47

Table B3. Daily mean ground-water levels at monitoring sites, Guam, 1996--Continued

Well A-20

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	44.23	43.78	43.69	40.73	---	---	---	---	---	50.27	50.51	53.75
2	44.16	43.79	43.61	40.64	---	---	---	---	---	50.26	50.50	53.87
3	44.08	43.76	43.54	40.53	---	---	---	---	---	50.23	50.48	53.93
4	44.00	43.73	43.46	40.44	---	---	---	---	---	50.21	50.47	53.98
5	43.91	43.69	43.38	40.50	---	---	---	---	---	50.17	50.43	54.00
6	43.80	43.63	43.28	40.56	---	---	---	---	---	50.11	50.45	53.95
7	43.68	43.58	43.18	40.59	---	---	---	---	---	50.06	50.58	53.89
8	43.60	43.54	43.08	40.58	---	---	---	---	---	50.02	50.76	53.87
9	43.51	43.50	42.99	40.55	---	---	---	---	---	50.02	50.91	53.86
10	43.41	43.51	42.89	40.49	---	---	---	---	---	50.03	51.21	53.86
11	43.30	43.66	42.78	40.43	---	---	---	---	---	50.01	51.43	53.86
12	43.20	43.82	42.68	40.38	---	---	---	---	---	50.03	51.59	53.86
13	43.08	43.93	42.59	40.32	---	---	---	---	---	50.21	51.64	53.86
14	43.00	44.02	42.48	40.26	---	---	---	---	---	50.35	51.66	53.86
15	42.98	44.11	42.39	---	---	---	---	---	---	50.43	51.72	53.86
16	42.95	44.17	42.29	---	---	---	---	---	---	50.46	51.76	53.86
17	42.94	44.21	42.20	---	---	---	---	---	---	50.49	51.78	53.86
18	42.94	44.22	42.11	---	---	---	---	---	---	50.52	51.77	53.86
19	42.94	44.24	42.01	---	---	---	---	---	---	50.53	51.85	53.86
20	42.93	44.23	41.89	---	---	---	---	---	---	50.53	51.97	53.86
21	42.88	44.22	41.79	---	---	---	---	---	---	50.50	52.09	53.86
22	42.93	44.17	41.69	---	---	---	---	---	---	50.47	52.28	53.86
23	43.10	44.13	41.59	---	---	---	---	---	---	50.43	52.48	53.86
24	43.25	44.07	41.49	---	---	---	---	---	---	50.46	52.65	53.86
25	43.38	44.02	41.40	---	---	---	---	---	---	50.50	52.87	53.86
26	43.49	43.97	41.30	---	---	---	---	---	---	50.52	53.12	53.86
27	43.55	43.90	41.19	---	---	---	---	---	---	50.54	53.32	53.86
28	43.62	43.83	41.09	---	---	---	---	---	---	50.55	53.44	53.86
29	43.69	43.76	41.00	---	---	---	---	---	---	50.54	53.49	53.86
30	43.75	---	40.91	---	---	---	---	---	---	50.50	53.59	53.86
31	43.77	---	40.82	---	---	---	---	---	---	50.49	---	53.86
MEAN	43.42	43.90	42.28	---	---	---	---	---	---	50.34	51.76	53.87
MAX	44.23	44.24	43.69	---	---	---	---	---	---	50.55	53.59	54.00
MIN	42.88	43.50	40.82	---	---	---	---	---	---	50.01	50.43	53.75

Table B3. Daily mean ground-water levels at monitoring sites, Guam, 1996--Continued

ACEORP Tunnel

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	2.65	2.74	2.81	2.86	2.82	2.76	2.67	2.67	---	---	---	---
2	2.59	2.76	2.81	2.88	2.81	2.80	2.68	2.69	---	---	---	---
3	2.56	2.80	2.82	2.91	2.81	2.83	2.70	2.68	---	---	---	---
4	2.54	2.84	2.81	2.90	2.79	2.84	2.73	2.63	---	---	---	---
5	2.55	2.98	2.83	2.87	2.79	2.84	2.79	2.61	---	---	---	---
6	2.57	2.97	2.85	2.88	2.77	2.84	2.85	2.60	---	---	---	---
7	2.59	2.93	2.88	2.89	2.76	2.85	2.80	2.63	---	---	---	---
8	2.59	2.90	2.88	2.86	2.78	2.84	2.74	2.64	---	---	---	---
9	2.58	2.95	2.89	2.85	2.79	2.83	2.72	2.62	---	---	---	---
10	2.58	2.98	2.87	2.84	2.78	2.82	2.70	2.62	---	---	---	---
11	2.59	2.93	2.83	2.82	2.76	2.82	2.66	2.64	---	---	---	---
12	2.65	2.91	2.81	2.82	2.73	2.83	2.64	2.68	---	---	---	---
13	2.73	2.98	2.80	2.78	2.71	2.83	2.64	2.78	---	---	---	---
14	2.80	2.97	2.76	2.79	2.71	2.83	2.66	2.92	---	---	---	---
15	2.76	2.94	2.78	2.85	2.78	2.84	2.64	3.00	---	---	---	---
16	2.77	2.91	2.81	2.83	2.82	2.83	2.61	3.11	---	---	---	---
17	2.79	2.89	2.82	2.82	2.83	2.82	2.61	3.20	---	---	---	---
18	2.77	2.88	2.79	2.81	2.83	2.82	2.60	3.14	---	---	---	---
19	2.75	2.89	2.81	2.79	2.87	2.83	2.59	3.08	---	---	---	---
20	2.76	2.91	2.82	2.80	2.90	2.82	2.55	3.10	---	---	---	---
21	2.83	2.92	2.83	2.79	2.84	2.78	2.51	2.98	---	---	---	---
22	2.96	2.99	2.85	2.81	2.79	2.77	2.52	2.96	---	---	---	---
23	2.94	2.98	2.84	2.82	2.76	2.75	2.54	3.27	---	---	---	---
24	2.89	2.94	2.83	2.82	2.73	2.72	2.59	3.20	---	---	---	---
25	2.82	2.93	2.83	2.83	2.70	2.69	2.63	3.06	---	---	---	---
26	2.81	2.91	2.85	2.83	2.66	2.68	2.61	2.96	---	---	---	---
27	2.82	2.90	2.86	2.82	2.64	2.67	2.60	---	---	---	---	---
28	2.79	2.86	2.86	2.83	2.65	2.67	2.64	---	---	---	---	---
29	2.77	2.83	2.86	2.82	2.68	2.68	2.68	---	---	---	---	---
30	2.77	---	2.87	2.82	2.71	2.67	2.68	---	---	---	---	---
31	2.75	---	2.86	---	2.73	---	2.66	---	---	---	---	---
MEAN	2.72	2.91	2.83	2.83	2.77	2.79	2.65	---	---	---	---	---
MAX	2.96	2.99	2.89	2.91	2.90	2.85	2.85	---	---	---	---	---
MIN	2.54	2.74	2.76	2.78	2.64	2.67	2.51	---	---	---	---	---

Table B3. Daily mean ground-water levels at monitoring sites, Guam, 1996--Continued

Well BPM-1

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	2.66	2.93	2.94	2.95	3.05	3.02	2.98	3.48	3.22	3.34	3.11	3.12
2	2.63	2.93	2.93	2.97	3.05	3.03	3.01	3.45	3.19	3.27	3.11	3.13
3	2.60	2.94	2.93	2.99	3.04	3.05	3.05	3.44	3.22	3.22	3.11	3.08
4	2.59	2.96	2.92	2.97	3.04	3.06	3.08	3.38	3.26	3.19	3.13	3.04
5	2.60	2.97	2.91	2.92	3.04	3.06	3.11	3.32	3.27	3.17	3.17	3.03
6	2.61	2.99	2.91	2.93	3.02	3.06	3.13	3.29	3.27	3.15	3.18	3.03
7	2.62	3.01	2.91	2.94	3.00	3.06	3.14	3.28	3.26	3.14	3.24	3.02
8	2.63	3.00	2.91	2.94	3.01	3.08	3.15	3.26	3.27	3.13	3.68	2.99
9	2.64	2.99	2.90	2.93	3.02	3.07	3.16	3.23	3.26	3.11	3.88	2.95
10	2.65	2.99	2.89	2.93	3.01	3.07	3.15	3.24	3.24	3.09	3.74	2.91
11	2.65	3.01	2.89	2.93	3.00	3.06	3.14	3.24	3.22	3.09	3.52	2.88
12	2.64	3.01	2.89	2.91	2.99	3.08	3.13	3.31	3.22	3.13	3.41	2.88
13	2.63	3.01	2.88	2.89	2.96	3.08	3.11	3.37	3.21	3.19	3.28	2.87
14	2.65	3.03	2.86	2.86	2.96	3.09	3.10	3.34	3.19	3.20	3.12	2.86
15	2.68	3.04	2.85	2.83	3.00	3.09	3.07	3.31	3.16	3.19	3.13	2.82
16	2.72	3.04	2.86	2.84	3.03	3.09	3.06	3.30	3.15	3.16	3.08	2.78
17	2.76	3.04	2.89	2.87	3.04	3.07	3.07	3.28	3.28	3.15	3.06	2.74
18	2.81	3.04	2.90	2.89	3.05	3.07	3.09	3.27	3.36	3.14	3.04	2.70
19	2.83	3.05	2.89	2.90	3.05	3.08	3.10	3.26	3.37	3.14	3.05	2.68
20	2.85	3.04	2.91	2.90	3.05	3.07	3.12	3.26	3.36	3.18	3.07	2.69
21	2.87	3.04	2.94	2.90	3.02	3.05	3.11	3.33	3.38	3.23	3.08	2.69
22	3.07	3.06	2.97	2.91	2.99	3.02	3.09	3.35	3.43	3.21	3.12	2.68
23	3.18	3.05	2.97	2.91	2.98	3.01	3.08	3.34	3.44	3.16	3.11	2.70
24	3.15	3.03	2.96	2.92	2.97	2.97	3.10	3.32	3.44	3.09	3.06	2.79
25	3.09	3.01	2.95	2.91	2.95	2.95	3.13	3.29	3.42	3.09	3.09	2.83
26	3.06	3.00	2.95	2.97	2.91	2.94	3.15	3.27	3.40	3.19	3.23	2.83
27	3.04	3.00	2.95	3.04	2.89	2.94	3.18	3.25	3.40	3.18	3.26	2.85
28	3.00	2.98	2.94	3.04	2.90	2.95	3.24	3.25	3.50	3.17	3.16	2.85
29	2.98	2.95	2.95	3.04	2.93	2.96	3.38	3.25	3.47	3.17	3.08	2.86
30	2.97	---	2.96	3.05	2.97	2.96	3.43	3.24	3.42	3.15	3.03	2.85
31	2.95	---	2.96	---	3.00	---	3.46	3.23	---	3.12	---	2.81
MEAN	2.80	3.00	2.92	2.93	3.00	3.04	3.14	3.30	3.31	3.17	3.21	2.87
MAX	3.18	3.06	2.97	3.05	3.05	3.09	3.46	3.48	3.50	3.34	3.88	3.13
MIN	2.59	2.93	2.85	2.83	2.89	2.94	2.98	3.23	3.15	3.09	3.03	2.68

Table B3. Daily mean ground-water levels at monitoring sites, Guam, 1996--Continued

Well EX-7

AY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	3.24	3.26	3.51	3.51	3.45	3.40	3.41	4.07	3.74	3.79	3.56	3.53
2	3.19	---	3.50	3.53	3.45	3.43	3.45	4.02	3.73	3.74	3.57	3.51
3	3.15	3.40	3.51	3.55	3.45	3.46	3.48	3.94	3.75	3.72	3.56	3.52
4	3.12	3.44	3.51	3.52	3.43	3.48	3.51	3.87	3.77	3.73	3.57	3.57
5	3.08	3.56	3.52	3.49	3.43	3.48	3.54	3.82	3.75	3.72	3.57	3.55
6	3.07	3.58	3.54	3.51	3.41	3.47	3.56	3.80	3.73	3.71	3.61	3.51
7	3.07	3.55	3.55	3.52	3.40	3.48	3.58	3.78	3.75	3.68	3.70	3.46
8	3.06	3.53	3.55	3.50	3.42	3.48	3.60	3.78	3.79	3.65	3.83	3.44
9	3.07	3.56	3.55	3.49	3.42	3.47	3.60	3.78	3.79	3.63	3.88	3.44
10	3.07	3.58	3.54	3.48	3.41	3.47	3.61	3.86	3.76	3.61	4.05	3.42
11	3.07	3.56	3.51	3.47	3.39	3.47	3.60	3.88	3.73	3.63	4.11	3.39
12	3.08	3.56	3.49	3.46	3.38	3.48	3.58	3.86	3.73	3.65	4.10	3.38
13	3.07	3.62	3.48	3.44	3.37	3.48	3.56	3.88	3.73	3.63	3.97	3.35
14	3.07	3.61	3.45	3.44	3.37	3.48	3.54	3.86	3.73	3.63	3.86	3.29
15	3.07	3.58	3.46	3.47	3.42	3.49	3.51	3.83	3.74	3.62	3.75	3.23
16	3.07	3.56	3.47	3.46	3.47	3.48	3.49	3.81	3.81	3.60	3.73	3.18
17	3.07	3.54	3.48	3.45	3.47	3.47	3.51	3.79	3.95	3.58	3.65	3.14
18	3.17	3.54	3.48	3.44	3.47	3.46	3.52	3.77	3.97	3.56	3.61	3.12
19	3.26	3.56	3.48	3.43	3.53	3.47	3.53	3.77	3.99	3.56	3.57	3.13
20	3.27	3.57	3.49	3.43	3.56	3.46	3.55	3.76	4.05	3.60	3.55	3.11
21	3.30	3.59	3.50	3.42	3.51	3.45	3.54	3.77	4.07	3.63	3.52	3.10
22	3.34	3.65	3.51	3.43	3.45	3.43	3.53	3.74	4.02	3.63	3.54	3.14
23	3.37	3.66	3.51	3.44	3.42	3.41	3.54	3.74	3.94	3.64	3.55	3.19
24	3.36	3.63	3.50	3.44	3.39	3.39	3.56	3.72	3.94	3.67	3.59	---
25	3.32	3.60	3.50	3.45	3.36	3.36	3.60	3.71	3.93	3.69	3.61	---
26	3.32	3.59	3.51	3.46	3.32	3.34	3.68	3.73	3.92	3.70	3.63	---
27	3.34	3.58	3.51	3.45	3.30	3.33	3.70	3.74	3.92	3.66	3.60	---
28	3.33	3.55	3.51	3.46	3.30	3.34	3.77	3.72	3.92	3.64	3.57	---
29	3.31	3.52	3.51	3.45	3.32	3.35	3.91	3.75	3.91	3.62	3.54	---
30	3.30	---	3.52	3.45	3.35	3.37	4.01	3.77	3.87	3.61	3.54	---
31	3.27	---	3.51	---	3.37	---	4.07	3.76	---	3.60	---	---
MEAN	3.19	---	3.51	3.47	3.41	3.44	3.60	3.81	3.85	3.65	3.68	---
MAX	3.37	---	3.55	3.55	3.56	3.49	4.07	4.07	4.07	3.79	4.11	---
MIN	3.06	---	3.45	3.42	3.30	3.33	3.41	3.71	3.73	3.56	3.52	---

Table B3. Daily mean ground-water levels at monitoring sites, Guam, 1996--Continued

Well EX-10

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	2.75	---	---	---	3.18	3.27	3.19	3.63	3.04	2.99	2.81	2.68
2	2.68	---	---	---	3.18	3.21	3.23	3.50	3.03	2.94	2.82	2.60
3	2.63	---	---	---	3.18	3.26	3.25	3.37	3.04	2.94	2.81	2.56
4	2.60	---	---	---	3.18	3.25	3.27	3.27	3.08	2.96	2.82	2.68
5	2.61	---	---	---	3.18	3.27	3.31	3.20	3.09	2.94	2.87	2.70
6	2.61	---	---	---	3.16	3.30	3.33	3.19	3.06	2.94	2.91	2.67
7	2.62	---	---	---	3.13	3.31	3.39	3.16	3.08	2.88	2.95	2.62
8	2.61	---	---	---	3.15	3.24	3.39	3.15	3.09	2.82	3.03	2.56
9	2.62	---	---	---	3.15	3.31	3.37	3.12	3.09	2.80	3.09	2.57
10	2.62	---	---	---	3.16	3.25	3.38	3.19	3.06	2.80	3.29	2.57
11	---	---	---	---	3.13	3.17	3.40	3.21	3.07	2.82	3.43	2.54
12	---	---	---	---	3.11	3.16	3.38	3.18	3.10	2.84	3.40	2.54
13	---	---	---	---	3.12	3.24	3.29	3.19	3.10	2.80	3.24	2.54
14	---	---	---	---	3.13	3.24	3.29	3.20	3.12	2.82	3.07	2.49
15	---	---	---	---	3.21	3.17	3.25	3.12	3.15	2.83	2.96	2.45
16	---	---	---	---	3.28	3.12	3.21	3.11	3.22	2.81	2.93	2.41
17	---	---	---	3.01	3.30	3.11	3.24	3.09	3.25	2.81	2.83	2.37
18	---	---	---	3.03	3.27	3.15	3.24	3.08	3.26	2.80	2.76	2.34
19	---	---	---	3.03	3.34	3.19	3.24	3.08	3.29	2.79	2.73	2.35
20	---	---	---	3.02	3.38	3.10	3.27	3.07	3.33	2.84	2.71	2.33
21	---	---	---	3.01	3.32	3.23	3.26	3.06	3.38	2.84	2.68	2.31
22	---	---	---	3.04	3.26	3.23	3.24	3.03	3.33	2.89	2.71	2.33
23	---	---	---	3.06	3.21	3.19	3.23	3.05	3.21	2.87	2.76	2.37
24	---	---	---	3.06	3.18	3.15	3.23	3.03	3.20	2.92	2.77	2.42
25	---	---	---	3.10	3.15	3.12	3.26	3.03	3.20	2.96	2.79	2.42
26	---	---	---	3.09	3.11	3.11	3.28	3.04	3.18	2.93	2.81	2.42
27	---	---	---	3.10	3.10	3.12	3.29	3.04	3.16	2.88	2.82	2.47
28	---	---	---	3.12	3.12	3.13	3.37	3.04	3.15	2.88	2.80	2.67
29	---	---	---	3.14	3.16	3.13	3.42	3.07	3.13	2.89	2.74	2.66
30	---	---	---	3.14	3.21	3.15	3.53	3.08	3.07	2.87	2.75	2.70
31	---	---	---	---	3.22	---	3.56	3.07	---	2.86	---	2.61
MEAN	---	---	---	---	3.19	3.20	3.31	3.15	3.15	2.87	2.90	2.51
MAX	---	---	---	---	3.38	3.31	3.56	3.63	3.38	2.99	3.43	2.70
MIN	---	---	---	---	3.10	3.10	3.19	3.03	3.03	2.79	2.68	2.31

Table B3. Daily mean ground-water levels at monitoring sites, Guam, 1996--Continued

Well M-10A

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	2.69	2.74	2.82	2.86	2.92	2.86	2.89	3.73	3.05	3.09	2.87	2.78
2	2.63	2.74	2.81	2.87	2.92	2.90	2.93	3.64	3.03	3.02	2.87	2.75
3	2.58	2.77	2.82	2.90	2.92	2.93	2.97	3.54	3.06	2.98	2.87	2.73
4	2.55	2.80	2.82	2.88	2.90	2.95	2.99	3.42	3.11	3.01	2.89	2.75
5	2.54	2.91	2.83	2.85	2.90	2.95	3.03	3.34	3.11	2.98	2.94	2.76
6	2.55	2.94	2.85	2.87	2.88	2.95	3.05	3.31	3.09	2.95	2.96	2.75
7	2.56	2.90	2.87	2.88	2.87	2.96	3.07	3.27	3.09	2.93	3.03	2.71
8	2.56	2.89	2.87	2.87	2.88	2.96	3.10	3.26	3.10	2.90	3.18	2.66
9	2.57	2.91	2.87	2.85	2.88	2.95	3.09	3.24	3.10	2.90	3.26	2.66
10	2.57	2.94	2.86	2.84	2.87	2.95	3.08	3.31	3.08	2.88	3.43	2.65
11	2.58	2.93	2.83	2.83	2.86	2.95	3.08	3.33	3.07	2.89	3.55	2.62
12	2.65	2.91	2.80	2.82	2.84	2.96	3.07	3.30	3.09	2.94	3.49	2.60
13	2.65	2.96	2.79	2.79	2.83	2.96	3.05	3.31	3.10	2.94	3.37	2.59
14	2.70	2.95	2.76	2.79	2.83	2.96	3.04	3.30	3.11	2.94	3.25	2.56
15	2.69	2.93	2.77	2.84	2.88	2.97	3.01	3.25	3.14	2.92	3.15	2.49
16	2.70	2.91	2.79	2.87	2.93	2.96	2.99	3.23	3.20	2.90	3.07	2.44
17	2.71	2.90	2.81	2.90	2.95	2.95	3.00	3.21	3.31	2.87	2.97	2.39
18	2.72	2.90	2.80	2.90	2.95	2.95	3.02	3.19	3.35	2.86	2.89	2.38
19	2.72	2.90	2.80	2.89	2.99	2.96	3.04	3.18	3.38	2.86	2.84	2.38
20	2.73	2.92	2.82	2.88	3.02	2.95	3.04	3.18	3.40	2.90	2.79	2.38
21	2.75	2.93	2.83	2.88	2.98	2.93	3.04	3.20	3.42	2.92	2.77	2.37
22	2.80	2.96	2.85	2.89	2.92	2.91	3.03	3.18	3.38	2.92	2.78	2.39
23	2.85	2.97	2.85	2.90	2.88	2.89	3.04	3.18	3.32	2.93	2.81	2.44
24	2.84	2.94	2.84	2.90	2.85	2.87	3.07	3.16	3.29	2.95	2.85	2.50
25	2.79	2.93	2.83	2.91	2.83	2.84	3.11	3.15	3.26	2.97	2.89	2.50
26	2.79	2.91	2.84	2.92	2.81	2.83	3.17	3.14	3.23	2.97	2.93	2.51
27	2.80	2.90	2.85	2.91	2.79	2.83	3.24	3.10	3.23	2.95	2.92	2.56
28	2.78	2.87	2.85	2.92	2.80	2.83	3.34	3.06	3.24	2.94	2.90	2.71
29	2.76	2.84	2.86	2.92	2.82	2.84	3.58	3.08	3.22	2.92	2.87	2.73
30	2.76	---	2.86	2.92	2.83	2.86	3.69	3.08	3.17	2.90	2.83	2.76
31	2.75	---	2.86	---	2.84	---	3.73	3.07	---	2.90	---	2.72
MEAN	2.69	2.90	2.83	2.87	2.88	2.92	3.12	3.26	3.19	2.93	3.01	2.59
MAX	2.85	2.97	2.87	2.92	3.02	2.97	3.73	3.73	3.42	3.09	3.55	2.78
MIN	2.54	2.74	2.76	2.79	2.79	2.83	2.89	3.06	3.03	2.86	2.77	2.37

Table B3. Daily mean ground-water levels at monitoring sites, Guam, 1996--Continued

Well M-11

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	3.43	3.61	3.61	3.71	3.57	3.48	3.45	5.80	4.35	4.53	3.57	3.96
2	3.39	3.59	3.61	3.65	3.57	3.52	3.51	5.29	4.31	4.34	3.55	3.86
3	3.34	3.60	3.61	3.64	3.56	3.56	3.55	5.33	4.25	4.22	3.51	3.78
4	3.32	3.61	3.61	3.62	3.55	3.57	3.58	5.21	4.23	4.18	3.53	3.78
5	3.31	3.68	3.61	3.61	3.54	3.57	3.59	4.82	4.18	4.13	3.59	3.77
6	3.32	3.72	3.61	3.61	3.53	3.57	3.61	4.58	4.18	4.05	3.70	3.69
7	3.32	3.69	3.61	3.61	3.49	3.57	3.64	4.49	4.15	3.97	3.87	3.63
8	3.32	3.65	3.61	3.61	3.51	3.57	3.66	4.44	4.11	3.92	4.06	3.58
9	3.32	3.64	3.61	3.61	3.51	3.57	3.66	4.40	4.14	3.88	4.27	3.54
10	3.32	3.69	3.61	3.61	3.49	3.57	3.67	4.47	4.12	3.86	5.03	3.52
11	3.32	3.86	3.60	3.61	3.48	3.57	3.68	4.43	4.15	3.91	5.11	3.46
12	3.33	3.97	3.57	3.60	3.48	3.57	3.68	4.33	4.15	3.99	5.00	3.44
13	3.33	4.02	3.54	3.59	3.46	3.57	3.66	4.29	4.10	4.46	4.58	3.42
14	3.35	4.01	3.52	3.58	3.45	3.57	3.66	4.27	4.04	4.67	4.41	3.41
15	3.34	3.92	3.50	3.61	3.48	3.57	3.63	4.23	4.02	4.41	4.11	3.36
16	3.35	3.90	3.51	3.59	3.53	3.57	3.60	4.17	4.06	4.08	4.12	3.30
17	3.37	3.90	3.53	3.57	3.56	3.57	3.61	4.14	4.52	4.11	4.05	3.22
18	3.39	3.89	3.52	3.57	3.56	3.56	3.65	4.11	5.25	4.06	3.92	3.21
19	3.43	3.87	3.52	3.57	3.58	3.57	3.73	4.07	5.11	3.99	3.84	3.21
20	3.50	3.85	3.53	3.56	3.60	3.57	3.83	3.99	5.05	3.96	3.78	3.21
21	3.53	3.83	3.53	3.56	3.58	3.55	3.88	4.11	4.86	3.95	3.72	3.19
22	3.61	3.84	3.56	3.56	3.56	3.53	3.87	4.43	4.53	3.92	3.69	3.20
23	3.79	3.85	3.59	3.56	3.52	3.51	3.86	4.57	4.50	3.91	3.79	3.21
24	3.96	3.80	3.68	3.57	3.48	3.48	3.86	4.45	4.37	3.91	3.97	3.22
25	3.92	3.78	3.73	3.57	3.46	3.46	3.88	4.31	4.16	3.92	4.20	3.26
26	3.86	3.76	3.72	3.57	3.43	3.43	3.98	4.23	4.09	3.91	4.50	3.31
27	3.80	3.73	3.68	3.57	3.37	3.39	4.21	4.20	4.17	3.88	4.66	3.36
28	3.77	3.67	3.69	3.57	3.37	3.39	4.62	4.37	4.52	3.84	4.43	3.54
29	3.70	3.63	3.70	3.57	3.37	3.40	6.14	4.46	4.90	3.80	4.24	3.63
30	3.65	---	3.74	3.57	3.43	3.42	6.47	4.40	4.77	3.66	4.08	3.71
31	3.62	---	3.73	---	3.47	---	5.98	4.34	---	3.64	---	3.67
MEAN	3.49	3.78	3.61	3.59	3.50	3.53	3.98	4.48	4.38	4.03	4.10	3.47
MAX	3.96	4.02	3.74	3.71	3.60	3.57	6.47	5.80	5.25	4.67	5.11	3.96
MIN	3.31	3.59	3.50	3.56	3.37	3.39	3.45	3.99	4.02	3.64	3.51	3.19

Table B4. Monthly ground-water levels at monitoring sites, Guam, 1996
[Values are in feet above mean sea level; ---, no data; Father Duenas site has unknown amount of oil floating on water; data from Guam Environmental Protection Agency.]

Date	Agana 147	Agana Spring	EX-1	EX-4	EX-6	EX-9	Father Duenas	GHURA-Dededo	Harmon 107
05/03/96	7.48	6.30	---	5.72	3.45	3.34	5.06	2.25	1.16
06/06/96	6.76	---	6.60	5.66	3.49	3.44	7.47	2.27	---
07/03/96	6.82	---	6.52	5.51	3.55	3.51	6.09	2.31	---
08/06/96	7.95	6.80	8.33	6.26	3.65	3.45	7.62	2.36	---
09/11/96	7.08	7.08	7.74	6.75	3.66	3.56	8.32	2.43	---
10/04/96	---	7.62	---	7.52	3.55	3.40	8.83	2.28	---
11/06/96	8.79	7.78	8.40	6.75	3.52	3.46	8.65	2.25	---
12/06/96	8.99	8.30	9.13	6.72	3.48	3.44	8.45	1.98	---

NOTE: Monthly ground-water level data are not available for the period January through April, 1996.

Table B5. Chloride concentration of water from production wells, Guam, 1996
[Values are in milligram per liter; blank entries indicate no data or no statistic; Cl-, chloride concentration; data from Guam Environmental Protection Agency, Guam Waterworks Authority.]

Well	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Number of Analyses	Maximum Cl-	Minimum Cl-	Mean Cl-
A-1	18	22	18	34	4	34	18	23
A-2	20	28	16	30	4	30	16	24
A-3	20	22	18	14	4	22	14	19
A-4	48	60	44	56	4	60	44	52
A-5	22	24	26	22	4	26	22	24
A-6	30	32	20	34	4	34	20	29
A-7	28	30	22	28	4	30	22	27
A-8	22	24	20	18	4	24	18	21
A-9	198	190	146	198	4	198	146	183
A-10	324	330	246	302	4	330	246	300
A-12	16	22	22	22	4	22	16	21
A-13	464	436	316	504	4	504	316	430
A-14	340	314	324	320	4	340	314	324
A-15	164	150	148	166	4	166	148	157
A-17	512	470	472	468	4	512	468	480
A-18	450	422	420	452	4	452	420	436
A-19	382	348	388	370	4	388	348	372
A-21	436	416	264	448	4	448	264	391
A-23	28	28	38	30	4	38	28	31
A-25	52	52	78	52	4	78	52	59
A-26	78	82	92	88	4	92	78	85
A-28	172	168	168	184	4	184	168	173
A-29	50	58	72	38	4	72	38	55
A-30	78	154	120	54	4	154	54	101
A-31	32	38	30	30	4	38	30	33
A-32	26	26	22	22	4	26	22	24
AG-1	54	54	18	60	4	60	18	47
AG-2	20	40	24	26	4	40	20	28
BCC					0			
BPM(AF)	25				1			
CCP-1	66				1			
CCP-2	80				1			
CCP-3	90				1			
CCP-4	85				1			
CCP-5	36				1			
CCP-6	322				1			
CIR-1,2					0			
D-1	70	70	68	70	4	70	68	70
D-2	68	72	64	72	4	72	64	69
D-3	36	42	50	36	4	50	36	41
D-4	44	42	44	42	4	44	42	43
D-5	84	64	44	60	4	84	44	63
D-6	58	64	54	60	4	64	54	59
D-7	64	54	88	66	4	88	54	68
D-8	276	260	194	266	4	276	194	249
D-9	170	170	228	176	4	228	170	186
D-10	46	40	213	52	4	213	40	88
D-11		80	214	72	3	214	72	122
D-12	20	18	172	30	4	172	18	60
D-13	396	449	326	510	4	510	326	420
D-14	80	82	118	86	4	118	80	92
D-15	118	112	86	116	4	118	86	108
D-16	102	104	96	114	4	114	96	104
D-17	264	250	22	228	4	264	22	191
D-18	118	110	122	92	4	122	92	110
D-19	74	68	118	70	4	118	68	83
D-20	66	60	64	70	4	70	60	65
D-21	62	78	80	90	4	90	62	78
D-22A			106	32	2	106	32	69
D-24	52	56	62	64	4	64	52	59
EX-5A	38	48	46	38	4	48	38	43
EX-11	38	40	36	42	4	42	36	39
F-1	164	160	166	140	4	166	140	157
F-2	126	124	92	124	4	126	92	116
F-3	110	106	108	104	4	110	104	107
F-4	258	260	70	268	4	268	70	214
F-5	126	122	130	128	4	130	122	126
F-6	316	326	364	320	4	364	316	331
F-7	100	106	112	108	4	112	100	106
F-8	28	24	20	28	4	28	20	25
F-9	62	72	74	68	4	74	62	69

Table B5. Chloride concentration of water from production wells, Guam, 1996--Continued

F-10	282		122	300	3	300	122	235
F-11	182	174	110	170	4	182	110	159
F-12	20	18	30	28	4	30	18	24
F-13	340			332	2	340	332	336
F-15	44	46	54	32	4	54	32	44
F-16		18	20	14	3	20	14	17
F-17		18	20	18	3	20	18	19
F-18		16	16	14	3	16	14	15
FFH-3					0			
FFH-4					0			
FFH-5A					0			
FFH-7					0			
FFH-8					0			
FM	118				1			
GH-501	102	90	104	96	4	104	90	98
GOR-1	20				1			
H-1	138		136	146	3	146	136	140
HGC-2	22	2	18	26	4	26	2	17
HGC-3	13				1			
HRP-1	208				1			
HRP-2	426				1			
IE-1	347				1			
IE-2					0			
M-1	150	134	194	196	4	196	134	168
M-2	132	124	134	124	4	134	124	128
M-3	30	32	32	32	4	32	30	32
M-4	22	26	30	32	4	32	22	28
M-5	68	74	80	66	4	80	66	72
M-6	144	154	184	136	4	184	136	154
M-7	46	48	50	46	4	50	46	48
M-8	24	30	28	26	4	30	24	27
M-9	198	206	190	26	4	206	26	155
M-12	126	128	124	102	4	128	102	120
M-14	40	40	48	30	4	48	30	40
M-15	68	74	148	74	4	148	68	91
M-16B	30	34	50	32	4	50	30	37
M-17A	76	84	84	90	4	90	76	84
M-17B	88	74	74	78	4	88	74	79
M-20A				96	1			
MCR-1					0			
MGC-1	262				1			
MGC-2					0			
MGC-3	235				1			
MGC-4	200				1			
MHR-1	8				1			
MJ-1		36	26	48	3	48	26	37
MJ-2		18	42	40	3	42	18	33
MW-1	58				1			
MW-2	49				1			
MW-3	29				1			
MW-5	37				1			
MW-6					0			
MW-7	50				1			
MW-8	44				1			
MW-9	47				1			
NAS					0			
NCS-2	139				1			
NCS(B)-3	182				1			
NCS-5	350				1			
NCS-6	56				1			
NCS-7	35				1			
NCS(B)-8	102				1			
NCS-9					0			
NCS-A					0			
NCS-B	119				1			
NRMC-1	16				1			
NRMC-2	38				1			
NRMC-3	18				1			
PBI-1	122				1			
PIC-1					0			
RCA-1	12				1			
TGC-1	34				1			
TGR-1	21				1			
TGR-2	26				1			
TGR-3	17				1			
TGR-4	36				1			
TGR-5	17				1			
TGR-6	23				1			
TMT					0			
Y-1	22	20	32	26	4	32	20	25

Table B5. Chloride concentration of water from production wells, Guam, 1996--Continued

Y-2	24	24	32	30	4	32	24	28
Y-3	20	24	20	24	4	24	20	22
Y-4A	24	26	26	30	4	30	24	27
Y-5	26	58	62	64	4	64	26	53
Y-6(506)	56	18	38	26	4	56	18	35
Y-7	20	26	32	28	4	32	20	27
Y-9	18	22	18	24	4	24	18	21
Y-12		58		64	2	64	58	61
Y-15	20	26	54	28	4	54	20	32

NOTE: Quarter 1 is the period January 1 through March 31, 1996
Quarter 2 is the period April 1 through June 30, 1996
Quarter 3 is the period July 1 through September 30, 1996
Quarter 4 is the period October 1 through December 31, 1996

Table B6. Ground-water pumpage and chloride concentration by management zone and well, Guam, 1996
[Sub-basin and management-zone designations are from Camp, Dresser and McKee, Inc. (1982); Mgal/yr, million gallons per year; Mgal/day, million gallons per day; mg/L, milligrams per liter; Vol-wtd, mean annual volume-weighted chloride concentration; --, no calculation; blank entries indicate no data; data from Guam Environmental Protection Agency, Guam Waterworks Authority, U.S. Air Force, and U.S. Navy.]

Sub-basin	Management zone	Well	Total pumpage Mgal/yr	Mean pumpage Mgal/day	Chloride concentration mg/L	Percentage of total pumpage in the zone used in calculation of volume-weighted chloride concentration
Agafo Gumas	16	AG-1	69.0	0.2	47	
		AG-2	54.6	0.1	28	
		HGC-2	191.7	0.5	17	
		HGC-3	26.7	0.1	13	
		total	342.0	0.9	Vol-wtd 24	100
Agana	1	A-19	91.2	0.2	372	
	2	A-2	133.8	0.4	24	
		A-7	94.3	0.3	27	
		A-8	120.2	0.3	21	
		A-12	104.0	0.3	21	
		total	452.3	1.3	Vol-wtd 23	100
	3	A-1	122.9	0.3	23	
		A-3	120.2	0.3	19	
		A-5	136.8	0.4	24	
		A-6	166.8	0.5	29	
		A-23	166.9	0.5	31	
		A-25	145.0	0.4	59	
		A-29	172.3	0.5	55	
		A-30	380.6	1.0	101	
		A-31	152.9	0.4	33	
		total	1564.5	4.3	Vol-wtd 51	100
	4	A-32	58.7	0.2	24	
		NRMC-1	93.6	0.3	16	
		NRMC-2	76.6	0.2	38	
		NRMC-3	67.0	0.2	18	
		total	295.9	0.9	Vol-wtd 24	100
	5	NAS	9.1	0.0		
	30	A-15	143.1	0.4	157	
	31	A-26	30.3	0.1	85	
	33	A-4	76.1	0.2	52	
		A-9	124.1	0.3	183	
		A-10	122.2	0.3	300	
		A-13	133.2	0.4	430	
		A-14	132.1	0.4	324	
		A-17	132.0	0.4	480	
		A-18	107.5	0.3	436	
		A-21	118.9	0.3	391	
		A-28	136.0	0.4	173	
		total	1082.1	3.0	Vol-wtd 318	100
	34	NCS(B)-3	35.4	0.1	182	
		NCS(B)-8	69.2	0.2	102	
		total	104.6	0.3	Vol-wtd 129	100
	coastal	FFH-3	76.6	0.2		
		FFH-4	76.6	0.2		
		FFH-5A	0.0	0.0		
		FFH-7	57.8	0.2		
		FFH-8	76.6	0.2		
		HRP-1	36.2	0.1	208	
		HRP-2	7.2	0.0	426	
		IE-1	0.0	0.0	347	
		PIC-1	51.9	0.1		

Table B6. Ground-water pumpage and chloride concentration by management zone and well, Guam, 1996--Continued

		total	383.0	1.0	Vol-wtd	244	11
Andersen	38	Y-15	301.8	0.8		32	
	coastal	BPM(AF)	0.8	0.0		25	
Finegayan	18	D-24	76.6	0.2		59	
		F-8	61.7	0.2		25	
		F-12	69.7	0.2		24	
		F-13	92.4	0.3		336	
		total	300.4	0.9	Vol-wtd	129	100
	19	F-15	130.2	0.4		44	
		F-16	14.6	0.0		17	
		total	144.8	0.4	Vol-wtd	41	100
	41	NCS-6	51.7	0.1		56	
	42	F-1	59.5	0.2		157	
		F-2	43.3	0.1		116	
		F-3	76.3	0.2		107	
		F-4	70.5	0.2		214	
		F-10	74.1	0.2		235	
		F-11	83.0	0.2		159	
		NCS-A	31.0	0.1			
		NCS-B	60.2	0.2		119	
		NCS-7	88.6	0.2		35	
		total	586.5	1.6	Vol-wtd	141	95
	43	F-5	81.2	0.2		126	
		F-6	93.7	0.3		331	
		F-7	89.1	0.2		106	
		F-9	70.1	0.2		69	
		total	334.2	0.9	Vol-wtd	166	100
	coastal	H-1	146.5	0.4		140	
Mangilao	8	EX-11	93.6	0.3		39	
		M-4	80.1	0.2		28	
		M-8	110.6	0.3		27	
		total	284.3	0.8	Vol-wtd	31	100
	9	M-16B	44.1	0.1		37	
	36	M-1	60.3	0.2		168	
		M-2	96.5	0.3		128	
		M-3	117.1	0.3		32	
		M-9	86.3	0.2		155	
		total	360.3	1.0	Vol-wtd	110	100
	37	MCR-1	0.0	0.0			
	coastal	MGC-1	18.0	0.0		262	
		MGC-2	7.7	0.0			
		MGC-3	14.1	0.0		235	
		MGC-4	33.6	0.1		200	
		total	73.4	0.1	Vol-wtd	224	90
Yigo	21	M-17A	96.3	0.3		84	
		M-17B	121.3	0.3		79	
		M-20A	108.5	0.3		96	
		PBI-1	14.2	0.0		122	
		total	340.4	0.9	Vol-wtd	88	100
	25	Y-3	101.8	0.3		22	
		Y-7	135.4	0.4		27	
		Y-9	23.2	0.1		21	
		total	260.5	0.8	Vol-wtd	25	100
	28	Y-1	67.9	0.2		25	

Table B6. Ground-water pumpage and chloride concentration by management zone and well, Guam, 1996--Continued

		Y-2	74.5	0.2		28	
		Y-5	80.9	0.2		53	
		Y-6(506)	82.6	0.2		35	
		total	305.9	0.8	Vol-wtd	36	100
	44	D-12	89.7	0.2		60	
		D-13	83.9	0.2		420	
		D-19	100.0	0.3		83	
		D-20	101.9	0.3		65	
		D-21	116.8	0.3		78	
		NCS-2	76.0	0.2		139	
		NCS-5	19.3	0.1		350	
		total	587.7	1.6	Vol-wtd	140	100
	45	D-1	118.1	0.3		70	
		D-2	109.1	0.3		69	
		D-3	94.5	0.3		41	
		D-4	61.4	0.2		43	
		D-5	87.0	0.2		63	
		D-6	106.0	0.3		59	
		D-7	108.5	0.3		68	
		D-8	103.4	0.3		249	
		D-9	95.4	0.3		186	
		D-10	105.7	0.3		88	
		D-11	71.5	0.2		122	
		D-14	103.4	0.3		92	
		D-15	104.2	0.3		108	
		D-16	102.3	0.3		104	
		D-17	103.0	0.3		191	
		D-18	93.9	0.3		110	
		EX-5A	116.7	0.3		43	
		GH-501	81.8	0.2		98	
		M-5	85.9	0.2		72	
		M-6	106.8	0.3		154	
		M-7	34.2	0.1		48	
		M-12	57.8	0.2		120	
		M-14	115.4	0.3		40	
		M-15	95.5	0.3		91	
		MW-1	26.8	0.1		58	
		MW-2	25.4	0.1		49	
		total	2313.9	6.6	Vol-wtd	97	100
	46	BCC	0.0	0.0			
	47	MW-3	26.2	0.1		29	
		MW-5	28.8	0.1		37	
		MW-6	81.2	0.2			
		MW-7	54.0	0.1		50	
		MW-8	89.3	0.2		44	
		MW-9	85.0	0.2		47	
		Y-4A	92.3	0.3		27	
		total	456.7	1.2	Vol-wtd	40	82
	coastal	FM	32.6	0.1		118	
		TMT	0.0	0.0			
		total	32.6	0.1	Vol-wtd	--	
Southern Guam		CCP-1	12.2	0.0		66	
		CCP-2	9.3	0.0		80	
		CCP-3	17.4	0.0		90	
		CCP-4	12.1	0.0		85	
		CCP-5	5.1	0.0		36	
		CCP-6	4.1	0.0		322	
		CIR-1,2	36.1	0.1			
		GOR-1	5.0	0.0		20	
		MHR-1	1.1	0.0		8	
		MJ-1	5.2	0.0		37	
		MJ-2	0.0	0.0		33	
		RCA-1	0.5	0.0		12	
		TGC-1	0.0	0.0		34	
		TGR-1	5.8	0.0		21	
		TGR-2	3.8	0.0		26	
		TGR-3	13.2	0.0		17	
		TGR-4	3.1	0.0		36	
		TGR-5	8.2	0.0		17	

Table B6. Ground-water pumpage and chloride concentration by management zone and well, Guam, 1996--Continued

	TGR-6	2.8	0.0		23	
	total	144.9	0.1	Vol-wtd	62	75
Additional wells not identified by management zone	D-22A	19.7	0.1		69	
	F-17	106.5	0.3		19	
	F-18	70.8	0.2		15	
	IE-2	0.0	0.0			
	NCS-9	78.6	0.2			
	Y-12	110.8	0.3		61	

Note: Total pumpage and mean pumpage are referenced from Table B2. Chloride-concentration data are referenced from table B5. Because of computational rounding, management-zone pumpage totals may not be exactly the same as the arithmetic sum of pumpages for the wells in each zone.

Table B7. Water-quality data for monitoring wells, Guam, 1996
[All depths are in feet; lsd, land surface datum; msl, mean sea level; ft, feet; C, Celsius; mg/L, milligram per liter; cm, centimeter; ---, no data; U.S. Geological Survey provisional data.]

DATE	TIME	WATER LEVEL (ft)	SAMPLE DEPTH below lsd	SAMPLE DEPTH below msl	TEMPERATURE (degrees C)	FIELD SPECIFIC CONDUCTANCE (microsiemens/cm)	CHLORIDE CONCENTRATION (mg/L)
WELL EX-4							
Jan. 31	0908	6.23					
	0940	---	170	16	27.5	886	101
	1015	---	340	186	27.5	925	114
	1050	---	350	196	27.5	1090	164
	1130	---	360	206	28.0	1320	235
	1210	---	370	216	28.5	6970	2110
	1250	---	380	226	28.0	36600	13500
	1330	---	390	236	29.0	44100	16900
	1405	6.28					
WELL EX-7							
Feb. 2	0759	3.29					
	0835	---	290	7	28.0	443	19
	0915	---	390	107	28.5	427	11
	0955	---	410	127	28.0	33200	11900
	1040	---	420	137	28.5	41300	15600
	1125	---	430	147	29.0	46400	17800
	1210	---	450	167	28.0	50700	19800
WELL EX-9							
Feb. 12	0920	3.33					
	0940	---	260	21	28.0	535	24
	1015	---	340	101	28.0	7560	2250
	1055	---	345	106	28.0	12900	4140
	1135	---	350	111	28.0	21400	7440
	1215	---	360	121	28.0	33200	12100
	1255	---	380	141	28.0	43600	16600
	1335	---	400	161	28.0	47500	18300
	1415	---	450	211	28.0	49900	19500
	1450	3.43					

SECTION C

Ocean Tides

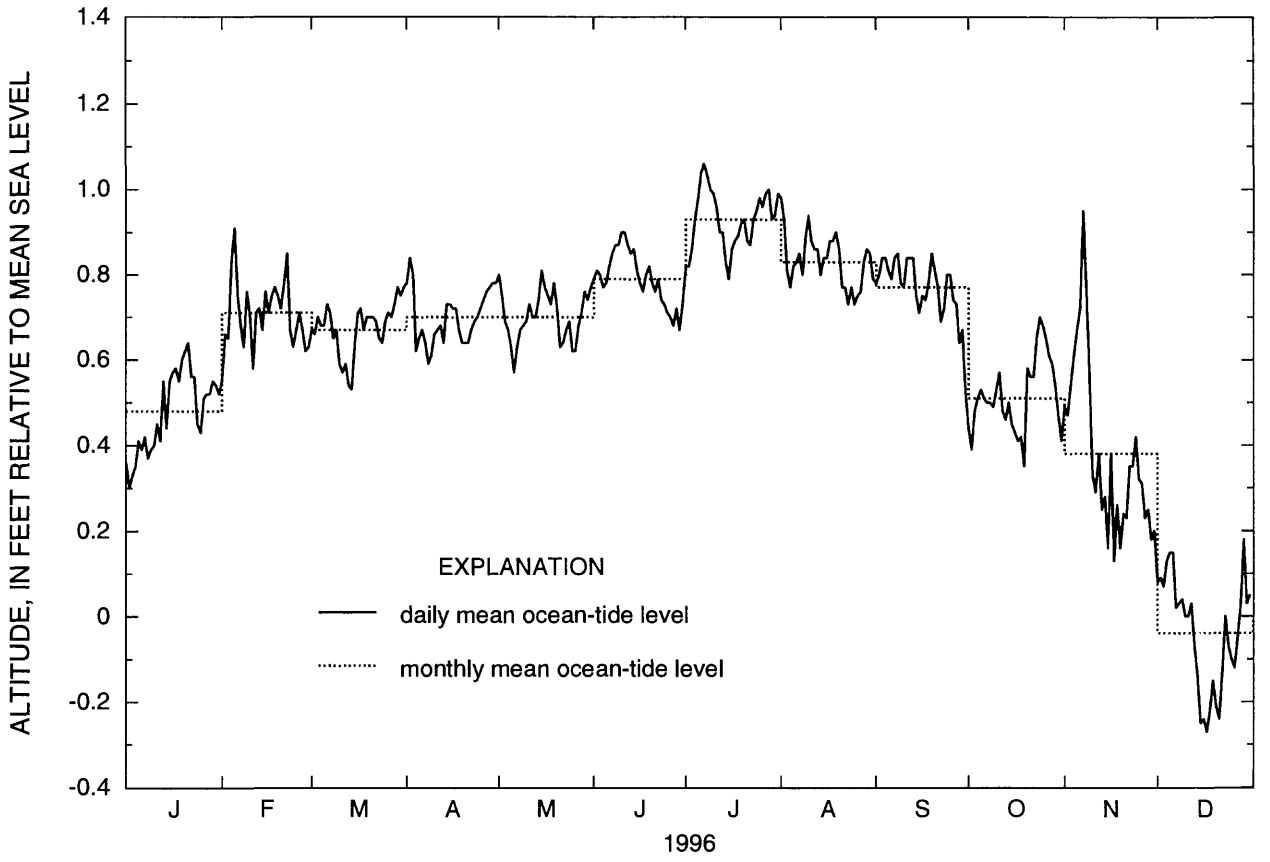


Figure C1. Daily mean and monthly mean ocean-tide levels at Agana, Guam, 1996. Data are from the U.S. Geological Survey and are provisional.

Table C1. Daily mean ocean-tide levels at Agana, Guam, 1996
[Values are in feet relative to mean sea level; ---, no data; U.S. Geological Survey provisional data.]

Tide Gage at Agana

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	.36	.55	.67	.78	.80	.79	.82	.98	.78	.44	.49	.08
2	.30	.66	.66	.84	.75	.81	.82	.93	.80	.39	.47	.09
3	.33	.65	.70	.80	.69	.80	.86	.81	.84	.48	.54	.07
4	.35	.83	.68	.62	.67	.77	.93	.77	.84	.51	.61	.13
5	.41	.91	.68	.65	.63	.78	.98	.82	.81	.53	.67	.15
6	.39	.75	.73	.67	.57	.82	1.04	.83	.79	.51	.72	.15
7	.42	.68	.71	.64	.63	.85	1.06	.85	.84	.50	.95	.02
8	.37	.63	.65	.59	.67	.87	1.03	.80	.85	.50	.76	.03
9	.39	.76	.67	.61	.68	.87	1.00	.89	.78	.49	.57	.04
10	.40	.70	.59	.66	.69	.90	.99	.94	.77	.53	.33	.00
11	.45	.58	.57	.67	.73	.90	.96	.88	.84	.57	.29	.00
12	.41	.71	.59	.68	.70	.87	.90	.86	.84	.48	.38	.03
13	.55	.72	.54	.64	.70	.85	.90	.86	.84	.46	.25	-.07
14	.44	.67	.53	.73	.74	.86	.83	.80	.75	.50	.28	-.14
15	.55	.76	.64	.73	.81	.81	.79	.84	.71	.45	.16	-.25
16	.57	.71	.71	.72	.77	.78	.86	.84	.75	.43	.38	-.24
17	.58	.75	.72	.72	.75	.76	.88	.88	.74	.41	.13	-.27
18	.55	.77	.67	.67	.73	.80	.89	.88	.78	.42	.26	-.22
19	.60	.75	.70	.64	.78	.82	.92	.90	.85	.35	.16	-.15
20	.62	.72	.70	.64	.72	.78	.93	.86	.81	.58	.24	-.21
21	.64	.78	.70	.64	.63	.76	.88	.77	.77	.56	.23	-.24
22	.56	.85	.69	.67	.64	.79	.87	.77	.69	.56	.35	-.13
23	.56	.67	.65	.69	.67	.74	.93	.73	.72	.65	.35	.00
24	.45	.63	.64	.70	.69	.73	.95	.77	.80	.70	.42	-.07
25	.43	.67	.69	.72	.62	.71	.98	.73	.80	.68	.32	-.10
26	.51	.71	.71	.74	.62	.70	.96	.75	.74	.65	.31	-.12
27	.52	.67	.70	.76	.68	.68	.99	.76	.73	.61	.23	-.05
28	.52	.62	.73	.77	.71	.72	1.00	.83	.64	.59	.25	.03
29	.55	.63	.77	.78	.76	.67	.93	.86	.67	.54	.18	.18
30	.54	---	.75	.78	.74	.73	.94	.85	.53	.47	.20	.03
31	.52	---	.77	---	.77	---	.99	.79	---	.41	---	.05
MEAN	.48	.71	.67	.70	.70	.79	.93	.83	.77	.51	.38	-.04
MAX	.64	.91	.77	.84	.81	.90	1.06	.98	.85	.70	.95	.18
MIN	.30	.55	.53	.59	.57	.67	.79	.73	.53	.35	.13	-.27

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