

Water Wells on Isla de Vieques, Puerto Rico

By GREGORY S. CHERRY and JUAN RAMOS

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San Juan, Puerto Rico
1995

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CONVERSION FACTORS, ABBREVIATED WATER-QUALITY UNITS, AND ACRONYMS

Multiply	By	To obtain
foot	0.3048	meter
gallon	3.785	liter
gallon per day	0.003785	cubic meter per day
gallon per minute	0.06308	liter per second
inch	25.4	millimeter
mile	1.609	kilometer
square mile	259.0	hectare
Temperature is given in degree Celsius (°C), which can be converted to degree Fahrenheit (°F) by the following equation: °F = 1.8 (°C) + 32.		

Abbreviated water-quality units used in this report:

microsiemen per centimeter at 25 degrees Celsius ($\mu\text{S}/\text{cm}$)

milligram per liter (mg/L)

Acronyms used in this report:

PRASA	Puerto Rico Aqueduct and Sewer Authority
PRIDCO	Puerto Rico Industrial Development Corporation
USGS	U.S. Geological Survey
USOMB	U.S. Office of Management and Budget

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By Gregory S. Cherry and Juan Ramos

Abstract

This report presents a compilation of well-inventory data collected from August through October 1991 on Isla de Vieques, Puerto Rico. The report includes maps depicting well locations and tables of well-inventory data for 73 wells. Currently (1995), the demand for freshwater on Isla de Vieques is met by a pipeline from eastern Puerto Rico and by rooftop-rainfall catchment basins or cisterns. The pipeline, constructed in 1977, replaced the Esperanza Valley well field as a source of public supply. The Esperanza Valley well field was shut down in 1978 due to increasing salinity and maintenance problems. The well-inventory data in this report provides a data base to assist hydrologists, water managers, and planners in the utilization of the limited ground-water resources of Isla de Vieques.

INTRODUCTION

The principal aquifer on Isla de Vieques is in the alluvial deposits of the Esperanza Valley in the south-central part of the island (fig. 1). The Puerto Rico Aqueduct and Sewer Authority (PRASA) is responsible for freshwater supply and distribution to the public for Isla de Vieques. To meet the demand for freshwater on Isla de Vieques, a pipeline from eastern Puerto Rico provides 800,000 gallons per day to the residents of the island (W. Conde, Puerto Rico Aqueduct and Sewer Authority, personal commun., 1992). Prior to the construction of the freshwater pipeline in 1977, the primary source of freshwater was the Esperanza Valley well field (13 wells) operated by the PRASA. These wells produced a combined yield of 400,000 gallons per day for public supply until overpumpage resulted in the intrusion of saline water

into the wells near the coast (Torres-González, 1989). If properly maintained and utilized, the well field in the Esperanza Valley could augment water from the pipeline and provide the island with an alternative source of freshwater in the event of emergencies.

Purpose and Scope

In 1990, the U.S. Geological Survey (USGS) began a cooperative investigation with the U.S. Office of Management and Budget (USOMB) to study and develop the ground-water resources on Isla de Vieques, Puerto Rico. This report presents data from 73 wells surveyed in the field from August through October 1991, including the specific conductance and chloride concentration in water from selected wells.

Description of Study Area

Isla de Vieques is the largest offshore island (about 51 square miles) belonging to the Commonwealth of Puerto Rico and is located about 7 miles east of Puerto Rico and 9 miles south of Isla de Culebra (fig. 1). The topography of Isla de Vieques is characterized by low rounded hills and small valleys with the higher elevations at the center of an east-west trending ridge (Meyerhoff, 1927). The highest peak is Monte Pirata, in the southwest, with an elevation of 987 feet.

Acknowledgments

The authors express their gratitude to the many well and landowners on Isla de Vieques for their assistance in locating wells and allowing access to their property. A special thanks goes to Wilfredo Conde of the PRASA for his support and assistance during the well rehabilitation phase of the study.

DATA PRESENTATION

The locations, descriptions, and water-quality data (specific conductance and chloride concentration) of 73 wells constructed on Isla de Vieques are presented in this report. For ease in locating wells, Isla de Vieques was divided into 13 grids (fig. 1). All grids shown in figure 1 are presented as separate figures in this report (figs. 2-14). Grid 7 (fig. 8) represents a 1.5-by 2.5-minute section; the remaining grids represent 2.5-minute square sections of the USGS topographic map of Isla de Vieques. Each figure is published at the original topographic map scale of 1:30,000. Some grids cover areas in which no wells exist.

Tables 1 to 6 contain well information for grids that have wells located in them. Information presented in these tables includes the well number as referenced on the preceding figure, well name, use of water, year

of construction, measured depth of well, well casing diameter, type of well finish and finish interval, land-surface altitude, date water level was measured, depth to water below land-surface datum, and specific conductance and chloride concentration determined from the water sample. The well numbers used in tables 1 through 6 consist of two numbers, the first referring to the grid number in figure 1 and the second to the number designation in the grid. Wells located in close proximity to one another will have the same well number followed by a letter designation. The distance between the wells is noted in the remarks section of the appendix. Wells listed in this report can be cross-referenced in other USGS publications by the site-identification number that appears in the appendix. The site-identification number conforms with the USGS Ground-Water Site Inventory (GWSI) classification system; once this number is established for a given

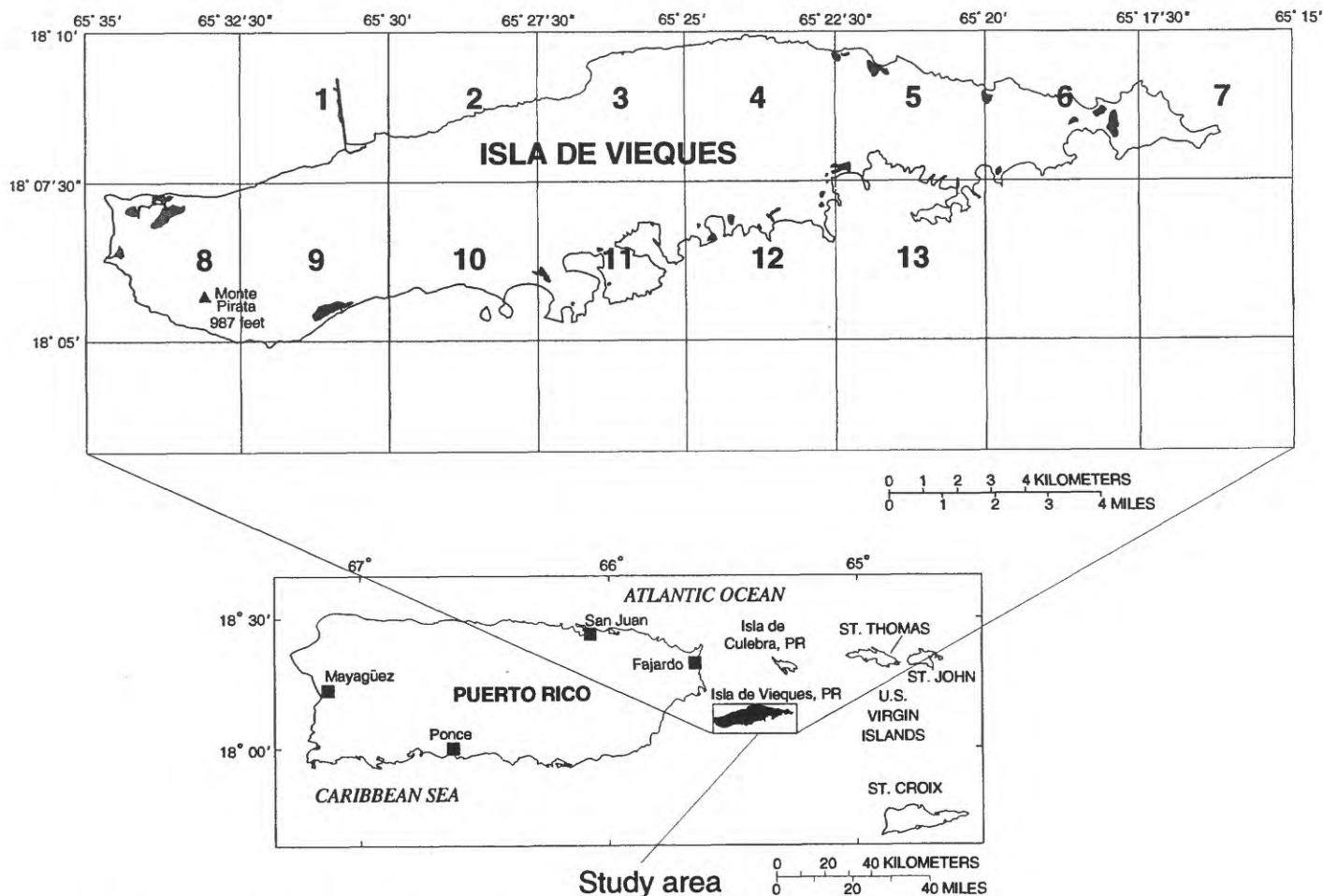


Figure 1. Location of Isla de Vieques, Puerto Rico, and area grids.

well, the site-identification number does not change. The site-identification number is designed to correspond to the latitude-longitude coordinates of the well. Other information included in the appendix are remarks for each well.

Records of wells on Isla de Vieques were compiled from USGS GWSI records and the data were verified in the field by USGS personnel. Additional information on the water resources of the island was provided by the PRASA officials and property owners. USGS personnel performed depth of well soundings with a weighted steel tape at wells that were open at the surface. A weighted steel tape also was used to measure the depth to water below land surface.

Water samples were collected from selected wells with a bailer. The water samples were collected on the date the water-level measurement was recorded. The depth at which the water sample was collected is noted in the remarks of the appendix. If the well was pumping at the time of the survey the water sample was collected from the discharge line.

The land-surface altitude for each well location was estimated from the USGS topographic map. The contour interval of the topographic map of Isla de Vieques is 32.8 feet (10 meters). Dashed contour lines represent an interval of 3.3 feet (1 meter). The estimated land-surface altitudes from the USGS

topographic map were converted to feet for consistency of units within the tables. The accuracy of reporting land-surface altitudes in this report is considered to be one-half of the contour interval used or 16.4 feet (5 meters).

Specific capacity tests were conducted, during March and April 1992, by USGS personnel for 10 PRASA wells in the Esperanza Valley. Prior to the tests, the wells were rehabilitated using compressed air to clear the perforated interval below the water table. The results from each specific capacity test is summarized in the remarks column with the measured drawdown, duration of the test in hours, the pumping rate in gallons per minute, and the date the test was conducted.

REFERENCES

- Meyerhoff, H.A., 1927, *Geology of the Virgin Islands, Culebra, and Vieques: Scientific Survey of Puerto Rico and the Virgin Islands*, New York Academy of Sciences, v. 4, pt. II, p. 184-216.
- Torres-González Sigfredo, 1989, *Reconnaissance of the ground-water resources of Vieques Island, Puerto Rico: U.S. Geological Survey Water-Resources Investigations Report 86-4100*, 37 p.

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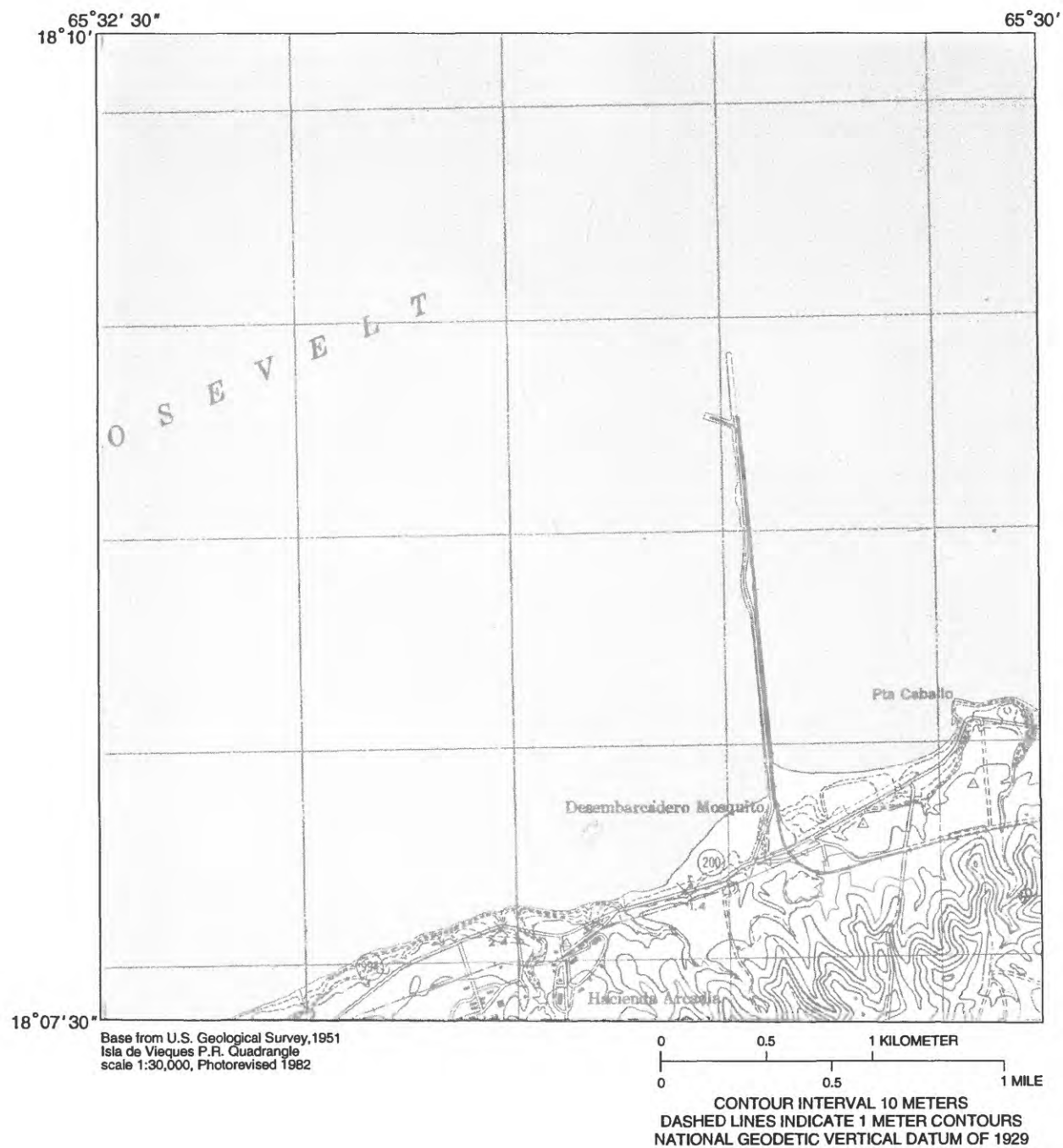


Figure 2. Location of grid 1, Isla de Vieques, Puerto Rico.

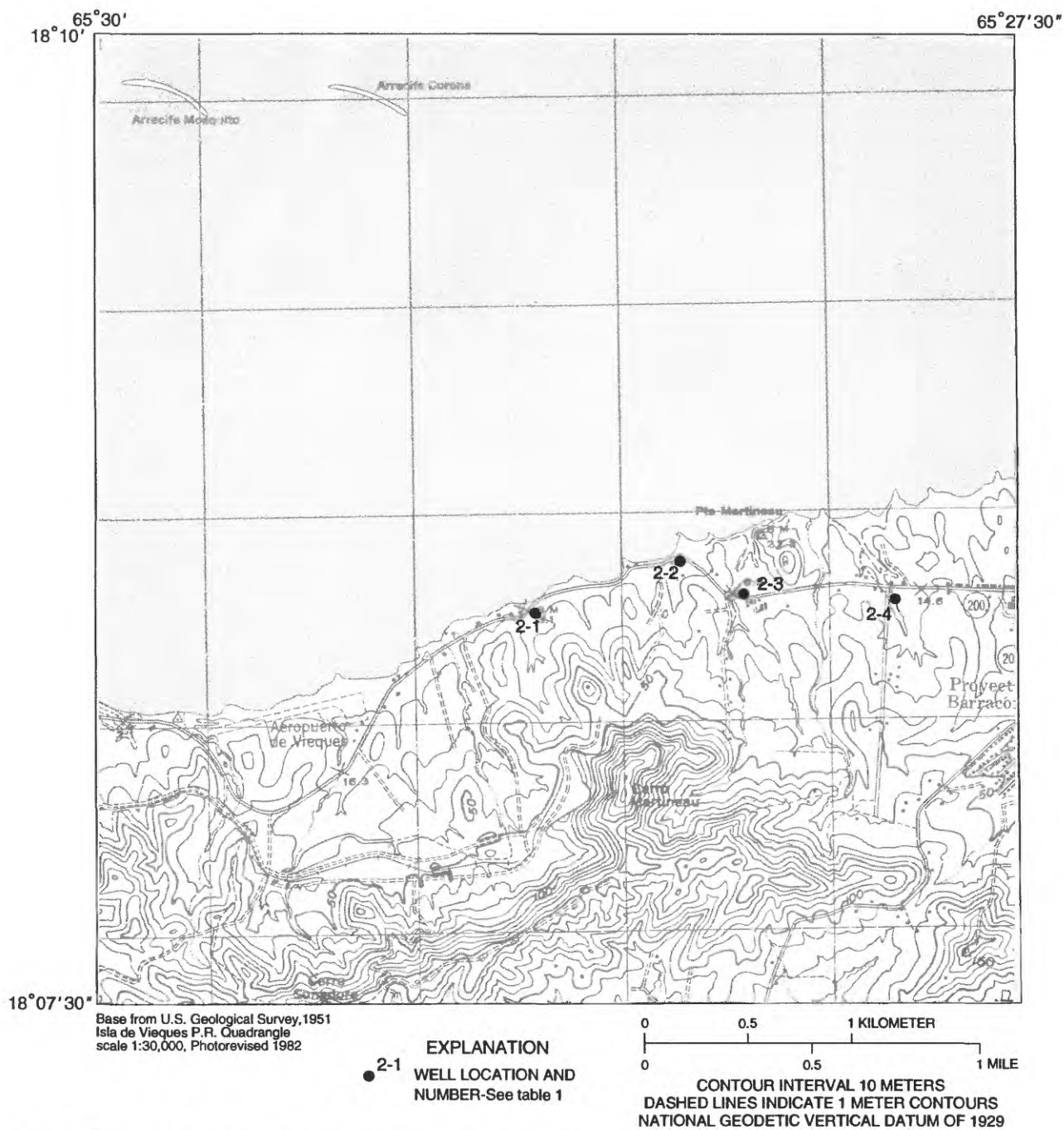


Figure 3. Location of wells in grid 2, Isla de Vieques, Puerto Rico.

Table 1. Description of wells in grid 2, Isla de Vieques, Puerto Rico

[Location of wells shown in figure 3. Use of well: A, agriculture or stock well; NU, well not in use. $\mu\text{S}/\text{cm}$, microsiemen per centimeter at 25 degrees Celsius; mg/L , milligram per liter; --, no data]

Well No.	Well name	Use of water	Year constructed	Measured depth of well (feet)	Casing diameter (inches)	Type of well finish and finish interval (feet)	Land-surface altitude of well (feet)	Date water level measured	Depth to water below land-surface datum (feet)	Specific conductance ($\mu\text{S}/\text{cm}$)	Chloride, dissolved (mg/L)
2-1	U.S. Navy 19 dug well	NU	--	8	144	--	10	8-05-91	dry	--	--
2-2	C. Cruz dug well	A	--	11	150	--	7	8-08-91	4	1,530	180
2-3	Martineau dug well	NU	--	17	170	--	33	8-05-91	9	1,110	108
2-4	Corcino-Meléndez dug well	NU	--	9	96	--	33	--	--	1,500	202

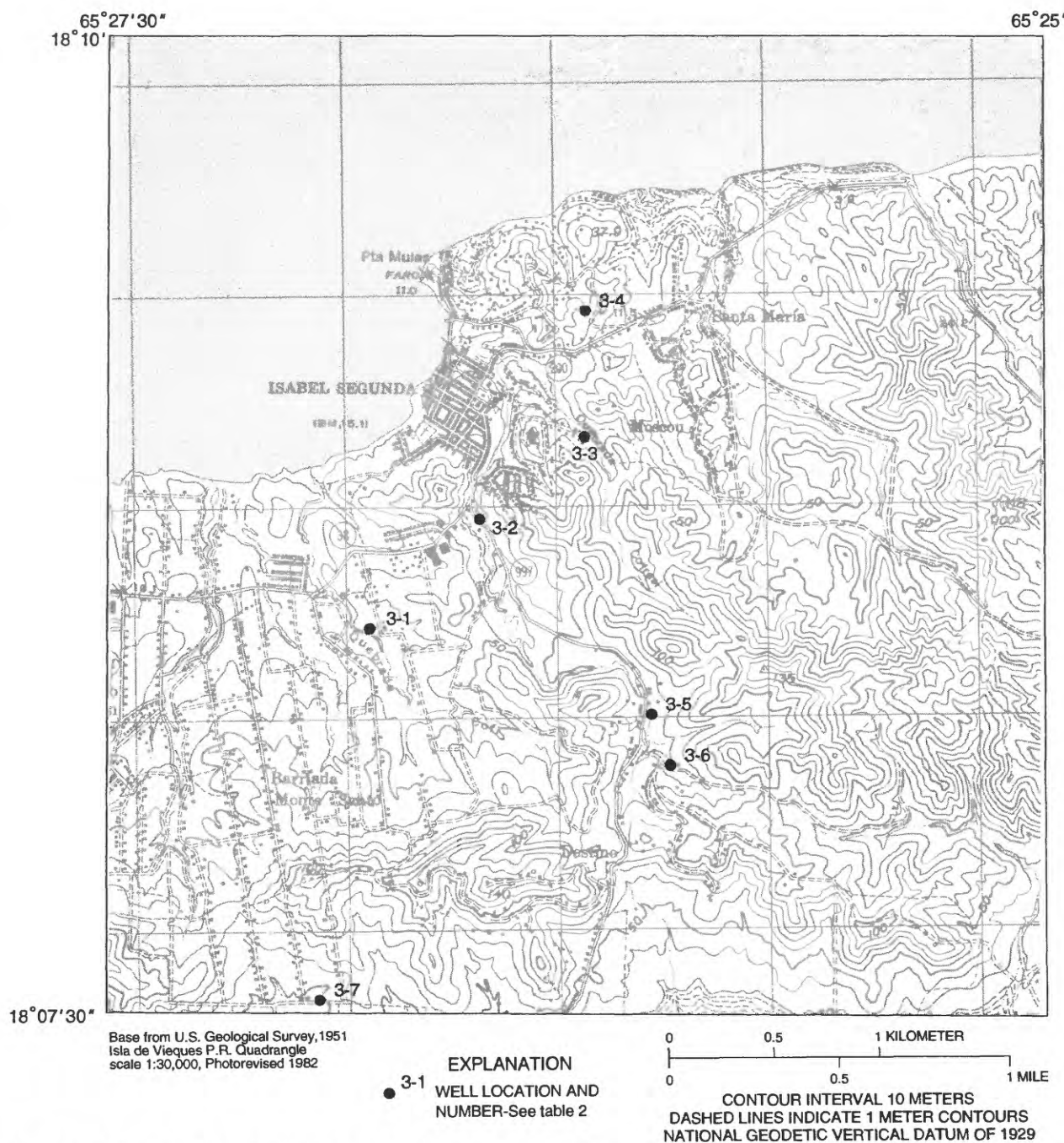


Figure 4. Location of wells in grid 3, Isla de Vieques, Puerto Rico.

Table 2. Description of wells in grid 3, Isla de Vieques, Puerto Rico

[Location of wells shown in figure 4. Use of water: D, domestic well; NU, well not in use. $\mu\text{S}/\text{cm}$, microsiemen per centimeter at 25 degrees Celsius; mg/L, milligram per liter. --, no data]

Well No.	Well name	Use of water	Year constructed	Measured depth of well (feet)	Casing diameter (inches)	Type of well finish and finish interval (feet)	Land-surface altitude of well (feet)	Date water level measured	Depth to water below land-surface datum (feet)	Specific conductance ($\mu\text{S}/\text{cm}$)	Chloride, dissolved (mg/L)
3-1	Iglesia Metodista	NU	--	13	6	--	115	8-15-91	2	--	--
3-2	Castano dug well	NU	--	--	100	--	66	--	--	1,640	178
3-3	Metodista 1	NU	--	10	8	--	66	8-20-91	dry	--	--
3-4	G. Colón	D	--	(¹)	4	--	82	--	--	1,540	176
3-5	Agrícola Corp. 2 dug well	D	--	14	174	--	203	8-16-91	4	1,730	240
3-6	PRASA 10 dug well	NU	--	16	108	--	230	8-19-91	5	940	--
3-7	F. Peterson dug well	D	1943	9	25	--	154	8-20-91	2	1,040	90

¹See remarks in appendix 1.

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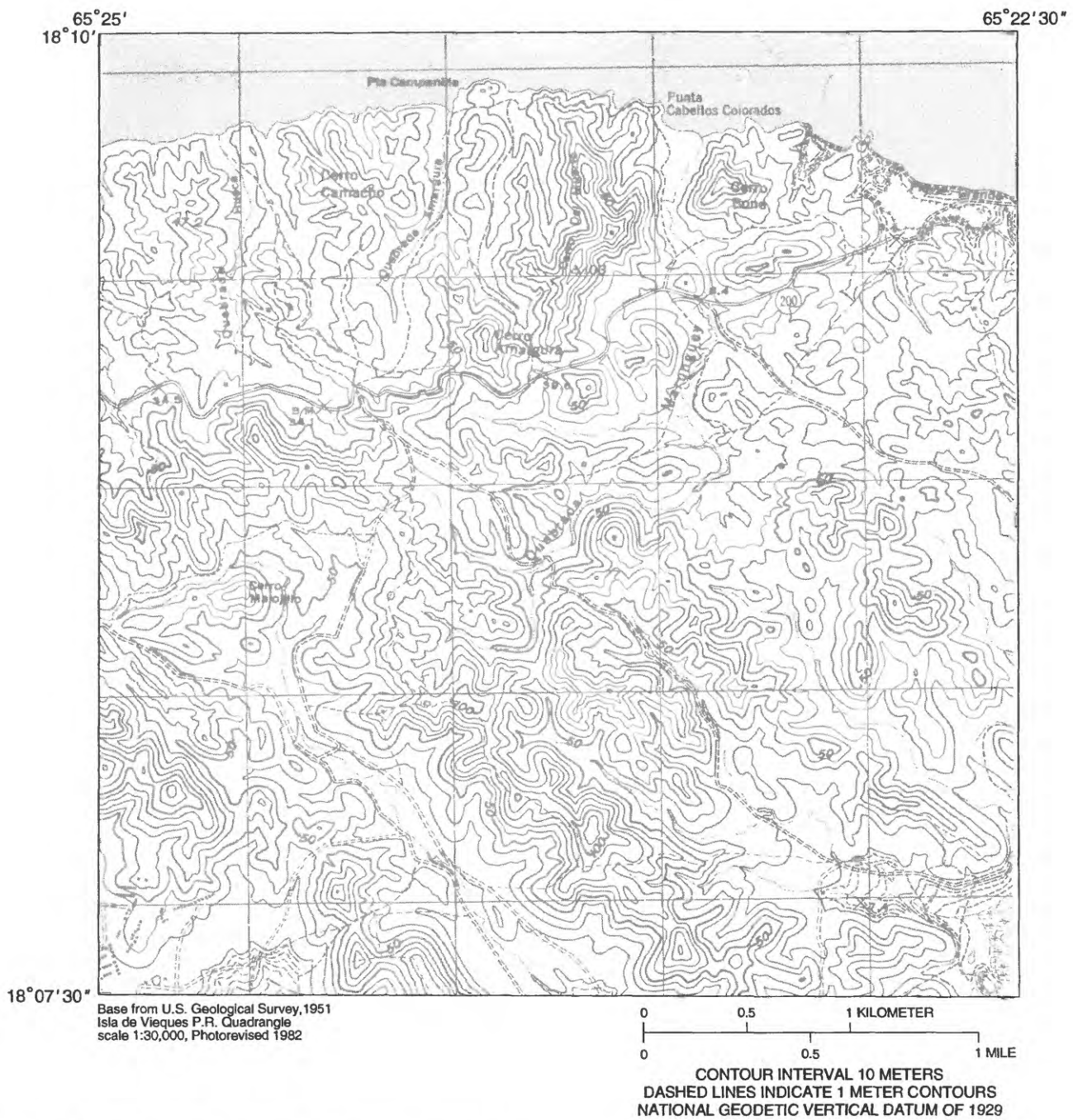


Figure 5. Location of grid 4, Isla de Vieques, Puerto Rico.

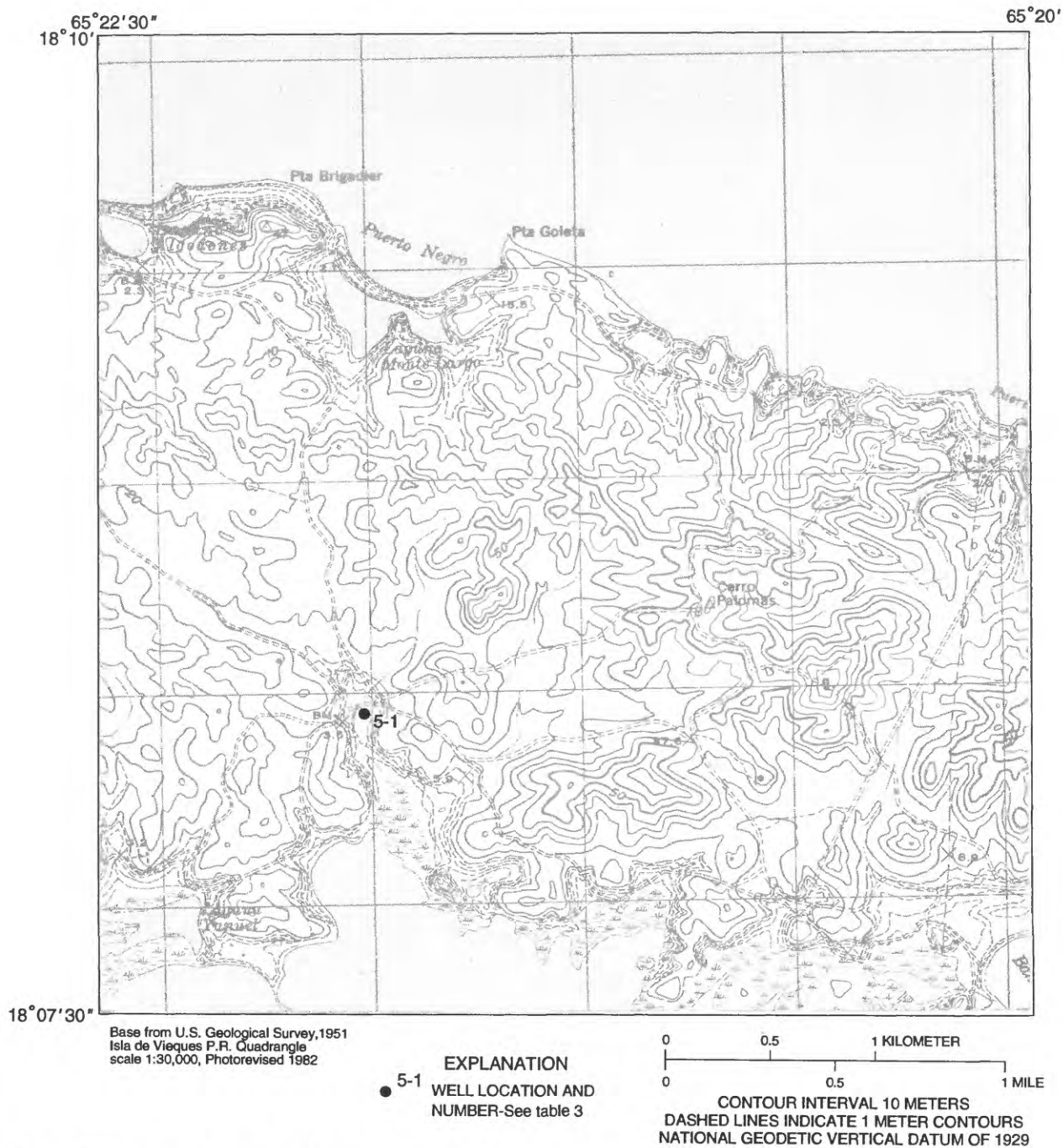


Figure 6. Location of grid 5, Isla de Vieques, Puerto Rico.

Table 3. Description of wells in grid 5, Isla de Vieques, Puerto Rico

[Location of wells shown in figure 6. Use of water: NU, well not in use. $\mu\text{S}/\text{cm}$, microsiemen per centimeter at 25 degrees Celsius; mg/L, milligram per liter. --, no data]

Well No.	Well name	Use of water	Year constructed	Measured depth of well (feet)	Casing diameter (inches)	Type of well finish and finish interval (feet)	Land-surface altitude of well (feet)	Date water level measured	Depth to water below land-surface datum (feet)	Specific conductance ($\mu\text{S}/\text{cm}$)	Chloride, dissolved (mg/L)
5-1	Camp García dug well	NU	--	13	120	--	20	10	8-27-91	13,670	4,138

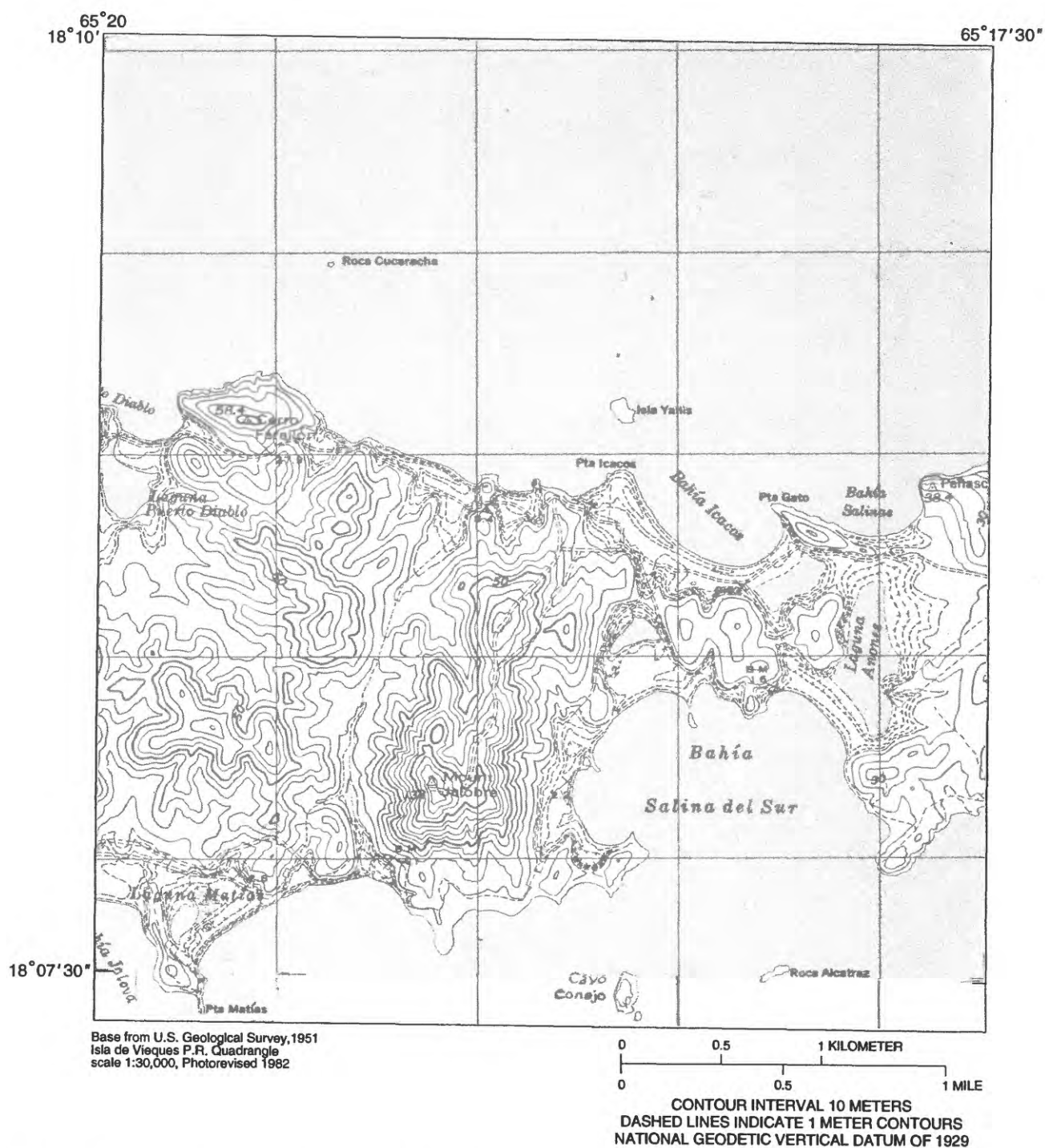


Figure 7. Location of grid 6, Isla de Vieques, Puerto Rico.

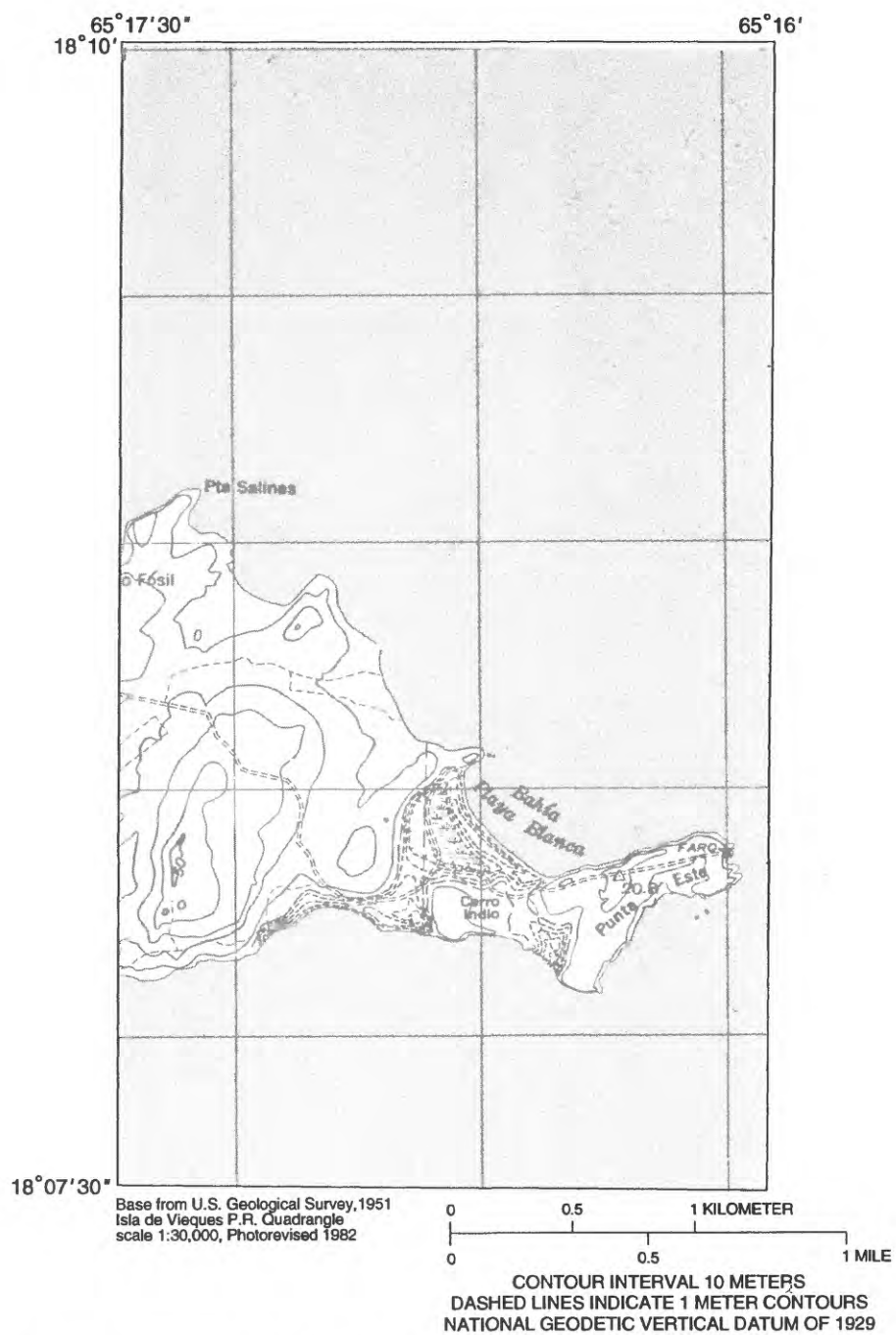


Figure 8. Location of grid 7, Isla de Vieques, Puerto Rico.

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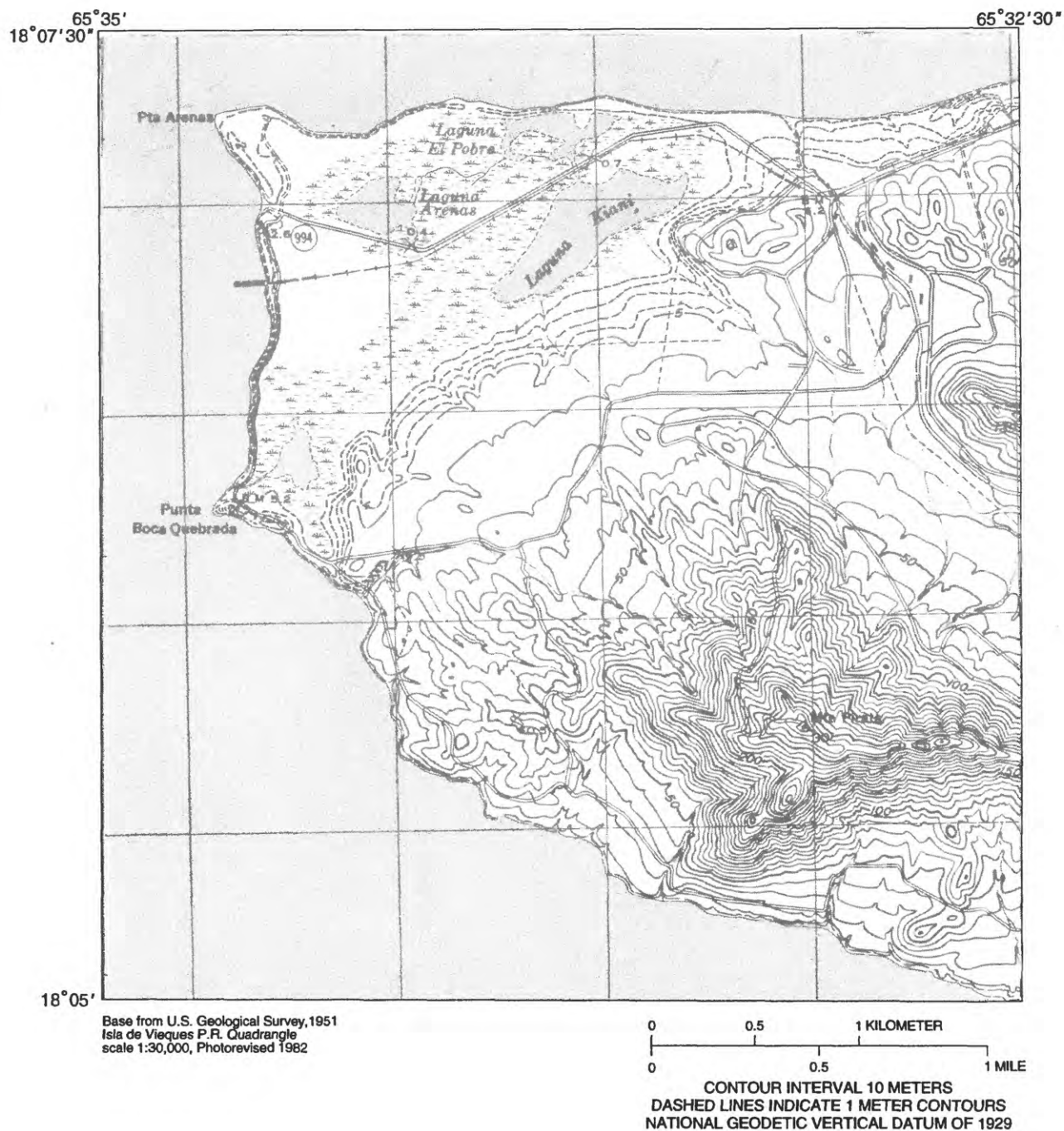


Figure 9. Location of grid 8, Isla de Vieques, Puerto Rico.



Figure 10. Location of grid 9, Isla de Vieques, Puerto Rico.

Table 4. Description of well in grid 9, Isla de Vieques, Puerto Rico

[Location of well shown in figure 10. Use of water: NU, well not in use. $\mu\text{S}/\text{cm}$, microsiemen per centimeter at 25 degrees Celsius; mg/L , milligram per liter. --, no data]

Well No.	Well name	Use of water	Year constructed	Measured depth of well (feet)	Casing diameter (inches)	Type of well finish and finish interval (feet)	Land-surface altitude of well (feet)	Date water level measured	Depth to water below land-surface datum (feet)	Specific conductance ($\mu\text{S}/\text{cm}$)	Chloride, dissolved (mg/L)
9-1	U.S. Navy 17	NU	--	69	8	--	59	8-21-91	51	1,230	200

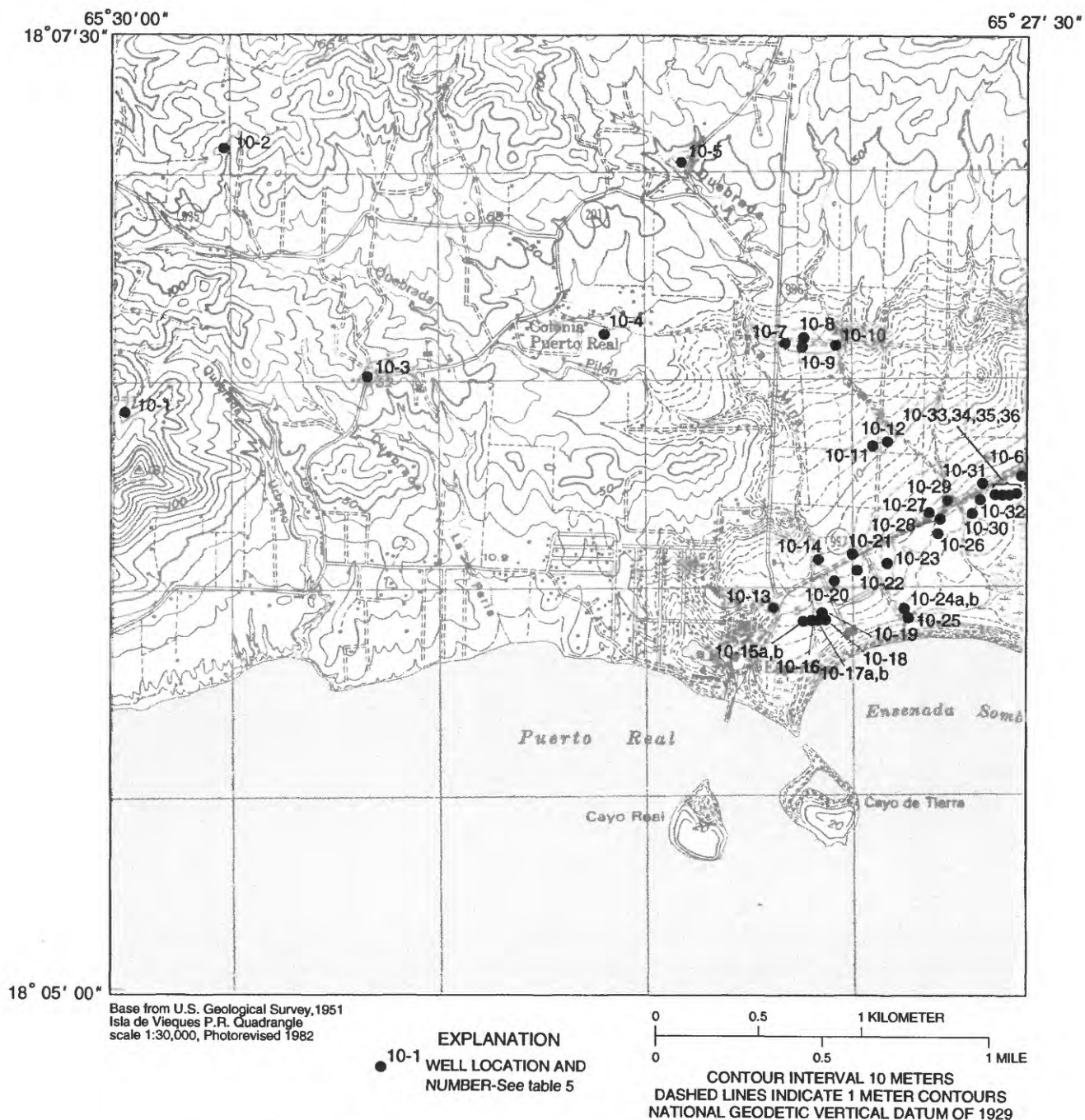


Figure 11. Location of wells in grid 10, Isla de Vieques, Puerto Rico.

Table 5. Description of wells in grid 10, Isla de Vieques, Puerto Rico

[Location of wells shown in figure 11. Use of water: D, domestic well; NU, well not in use. Type of well: P, perforated; S, screened. $\mu\text{S}/\text{cm}$, microsiemen per centimeter at 25 degrees Celsius; mg/L , milligram per liter. --, no data]

Well No.	Well name	Use of water	Year constructed	Measured depth of well (feet)	Casing diameter (inches)	Type of well finish and finish interval (feet)	Land-surface altitude of well (feet)	Date water level measured	Depth to water below land-surface datum (feet)	Specific conductance ($\mu\text{S}/\text{cm}$)	Chloride, dissolved (mg/L)
10-1	Pilón 1 dug well	NU	--	9	16	--	292	8-29-91	4	600	78
10-2	Sucn Díaz 1 dug well	D	--	14	70	--	295	8-29-91	6	1,170	156
10-3	O. González	NU	--	--	4	--	105	--	--	950	104
10-4	Vieques 12	NU	1986	57	4	S 23-38	105	8-01-91	43	1,080	90
10-5	U.S. Navy 15 dug well	NU	--	--	26	--	148	8-03-91	dry	--	--
10-6	Vieques 8	NU	1986	32	4	S 28-32	23	8-05-91	6	1,420	178
10-7	PRASA 1	NU	--	34	10	--	66	8-08-91	dry	--	--
10-8	USGS La Mina	NU	--	48	4	--	70	8-08-91	34	800	68
10-9	PRASA 2	NU	--	26	10	--	69	8-08-91	dry	--	--
10-10	PRASA 3	NU	--	26	10	--	66	8-08-91	dry	--	--
10-11	La Mina 1	NU	--	21	4	--	36	8-12-91	dry	--	--
10-12	La Mina 2	NU	--	46	4	--	36	8-12-91	22	990	112
10-13	Fesa 2 dug well	NU	--	21	156	--	10	8-02-91	13	1,650	196
10-14	O'Conner 12	NU	--	32	12	--	36	8-05-91	15	930	118
10-15a	PRASA A-5	NU	--	(¹)	7	--	16	--	--	--	--
10-15b	PRASA A-5A	NU	--	34	10	--	16	8-02-91	11	950	126
10-16	PRASA A-4	NU	--	(¹)	10	--	7	--	--	--	--
10-17a	PRASA A-2	NU	1966	40	10	P 25-40	16	3-26-92	8	820	92
10-17b	PRASA A-3	NU	1966	48	10	P 25-48	16	3-19-92	9	830	90
10-18	PRASA A-1	NU	1966	44	10	P 20-44	16	3-11-92	9	710	80
10-19	USGS-piezometer 1	NU	--	25	2	--	16	8-29-91	10	700	96
10-20	Vieques 5A	NU	1986	47	4	S 27-42	36	8-01-91	10	400	40
10-21	PRASA 4	NU	--	24	8	--	36	8-02-91	14	960	100
10-22	Vieques 5	NU	1986	37	4	S 26-41	36	8-01-91	11	890	90
10-23	PRASA D-3	NU	1966	46	10	--	32	3-26-92	10	960	90
10-24a	PRIDCO 9A	NU	--	(¹)	4	--	21	7-31-91	6	2,320	294
10-24b	PRIDCO 9	NU	--	83	4	--	21	7-31-91	4	1,080	140
10-25	PRASA 151	NU	--	48	6	--	20	7-31-91	2	370	70
10-26	PRASA D-2	NU	1966	66	10	--	26	4-01-92	8	975	100
10-27	PRASA 5	NU	--	27	10	--	30	8-06-91	8	--	--
10-28	Vieques 18	NU	1986	40	4	S 28-43	26	8-14-91	8	590	64
10-29	PRASA 6	NU	--	29	10	--	26	8-06-91	8	550	84
10-30	PRASA D-1	NU	1966	74	10	--	23	4-01-92	6	1,100	120
10-31	PRASA 7	NU	--	11	10	--	23	8-06-91	8	1,750	146
10-32	Vieques 22	NU	1986	46	4	S 33-47	36	8-05-91	6	1,050	124
10-33	PRASA B-4	NU	1966	45	10	P 15-45	23	4-02-92	4	990	90
10-34	PRASA B-3	NU	1966	47	10	P 21-47	23	3-13-92	3	1,030	120
10-35	PRASA B-2	NU	1966	50	10	P 20-50	23	4-03-92	4	1,100	110
10-36	PRASA B-1	NU	1966	62	10	P 20-57	23	4-02-92	4	1,210	120

¹See remarks in appendix.

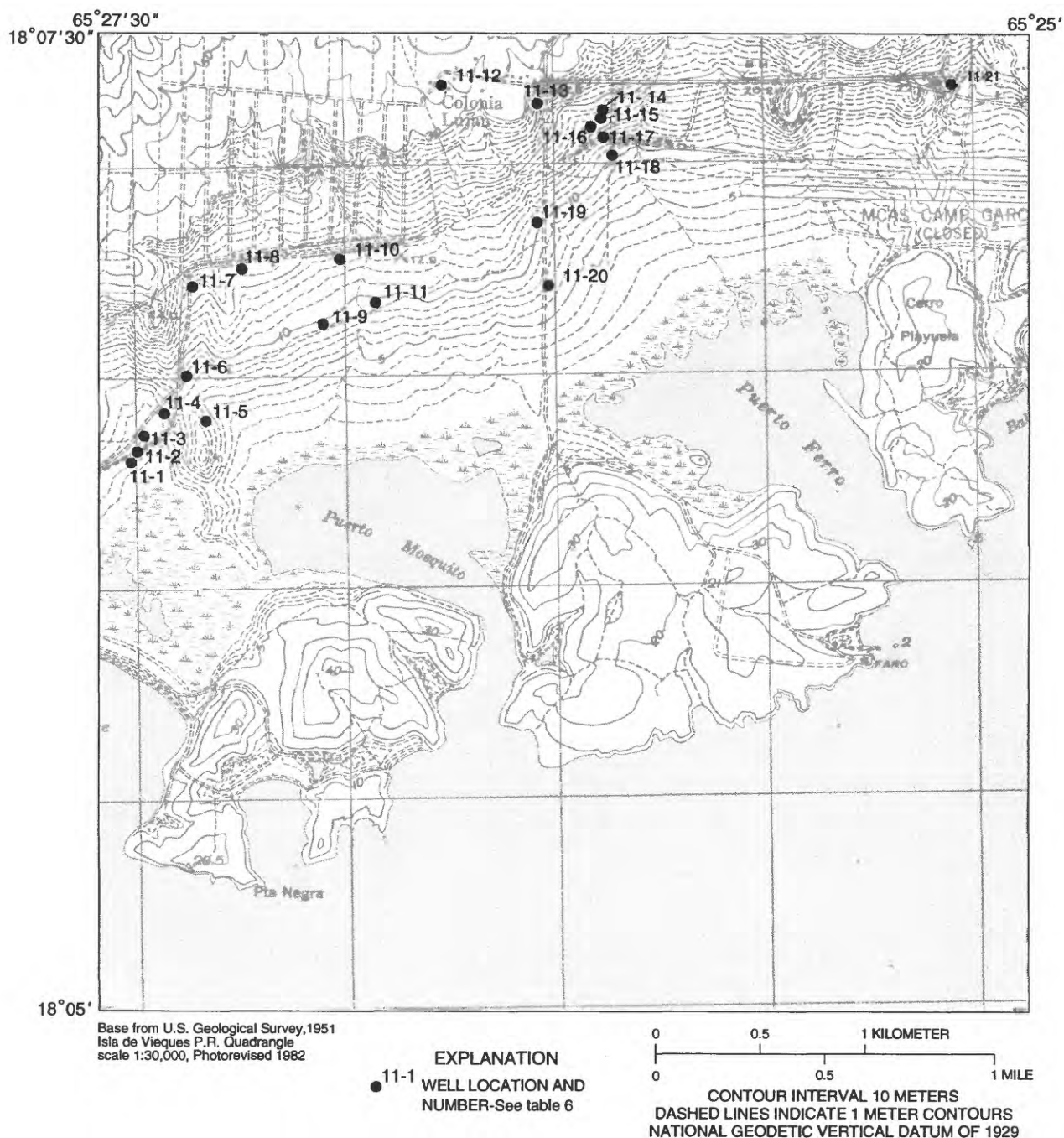


Figure 12. Location of wells in grid 11, Isla de Vieques, Puerto Rico.

Table 6. Description of wells in grid 11, Isla de Vieques, Puerto Rico

[Location of wells shown in figure 12. Use of water: PS, public-supply well; NU, well not in use. $\mu\text{S}/\text{cm}$, microsiemen per centimeter at 25 degrees Celsius; mg/L , milligram per liter. --, no data]

Well No.	Well name	Use of water	Year constructed	Measured depth of well (feet)	Casing diameter (inches)	Type of well finish and finish interval (feet)	Land-surface altitude of well (feet)	Date water level measured	Depth to water below land-surface datum (feet)	Specific conductance ($\mu\text{S}/\text{cm}$)	Chloride, dissolved (mg/L)
11-1	PRASA C-3	NU	1966	¹ 34	10	--	23	8-07-91	6	200	24
11-2	PRASA C-2	NU	1966	49	10	P 25-49	23	8-07-91	7	1,100	166
11-3	PRASA C-1	NU	1966	44	10	P 18-44	24	8-07-91	6	430	22
11-4	Vieques 14	NU	1986	² 48	4	S 41-52	20	8-07-91	17	--	--
11-5	Vieques 16	NU	1986	42	4	S 38-43	18	8-07-91	26	2,840	782
11-6	Vieques 17	NU	1986	--	4	S 26-36	25	--	--	--	--
11-7	Vieques 15	NU	1986	49	4	S 42-52	52	8-13-91	31	1,010	74
11-8	Vieques 8A	NU	1986	--	4	S 33-43	56	--	--	410	--
11-9	O'Conner 4	NU	--	40	6	--	33	8-13-91	29	1,180	104
11-10	Vieques 1	NU	1986	50	4	S 32-52	46	9-06-91	12	1,200	100
11-11	O'Conner 5	NU	--	21	10	--	33	10-19-91	dry	--	--
11-12	Land Authority dug well	NU	--	12	132	--	148	8-20-91	8	1,030	76
11-13	Vieques 19	NU	1986	¹ 46	4	S 48-58	86	8-13-91	43	1,530	110
11-14	U.S. Marines 6	PS	--	--	10	--	66	--	--	--	--
11-15	U.S. Navy 13	NU	--	(¹)	10	--	56	--	--	--	--
11-16	U.S. Navy Camp García	NU	--	28	6	--	69	8-23-91	21	940	92
11-17	U.S. Navy 14	PS	--	--	10	--	44	--	--	--	--
11-18	USGS-piezometer 2	NU	--	25	2	--	49	8-22-91	dry	--	--
11-19	Vieques 2	NU	--	54	4	--	49	8-13-91	17	1,330	110
11-20	Vieques 4	NU	1986	¹ 29	4	S 35-45	20	8-21-91	28	500	46
11-21	U.S. Marines 4	NU	1965	59	8	--	49	8-22-91	31	1,750	138

¹See remarks in appendix 1.

²Reported depth.

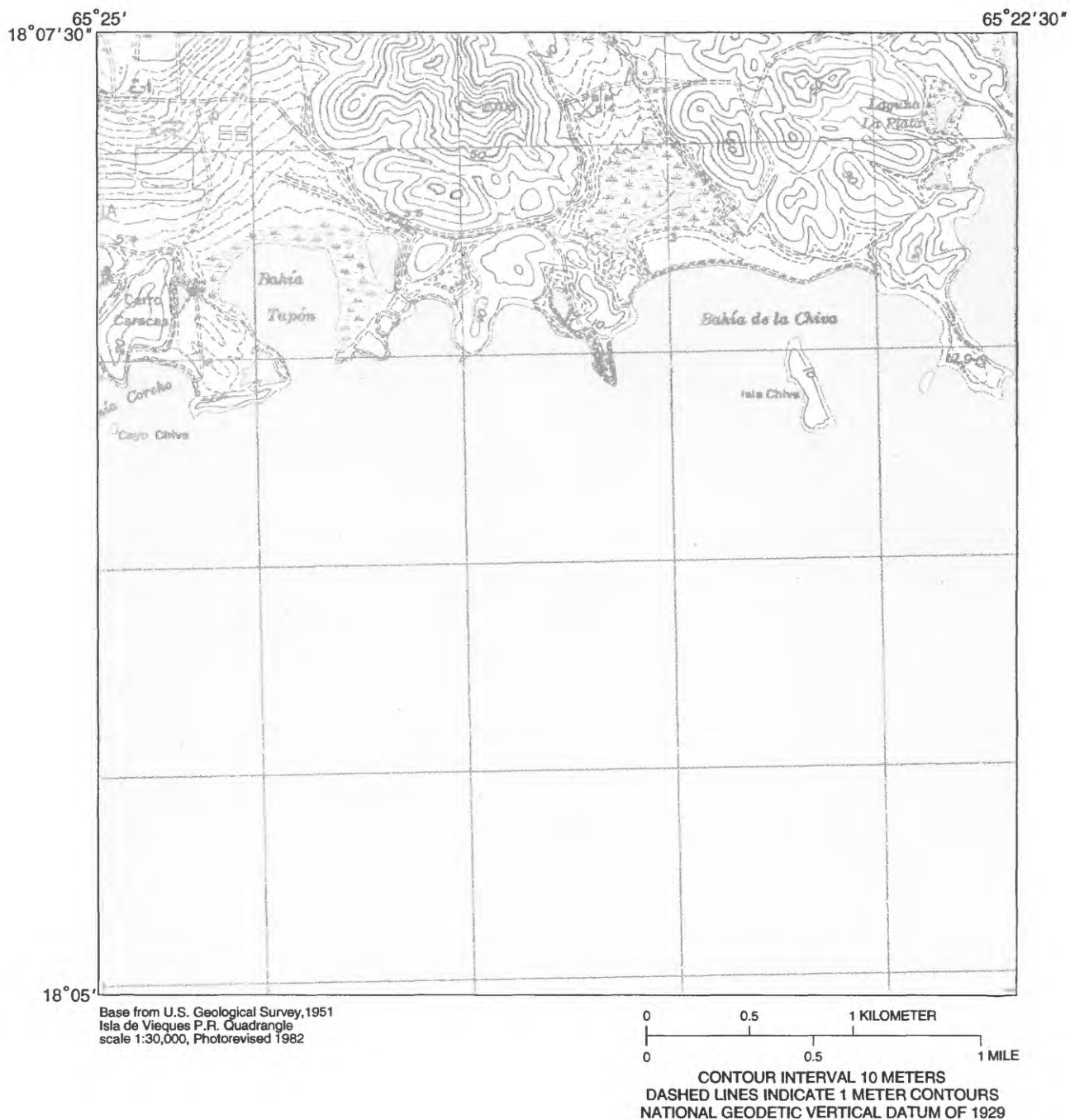


Figure 13. Location of grid 12, Isla de Vieques, Puerto Rico.

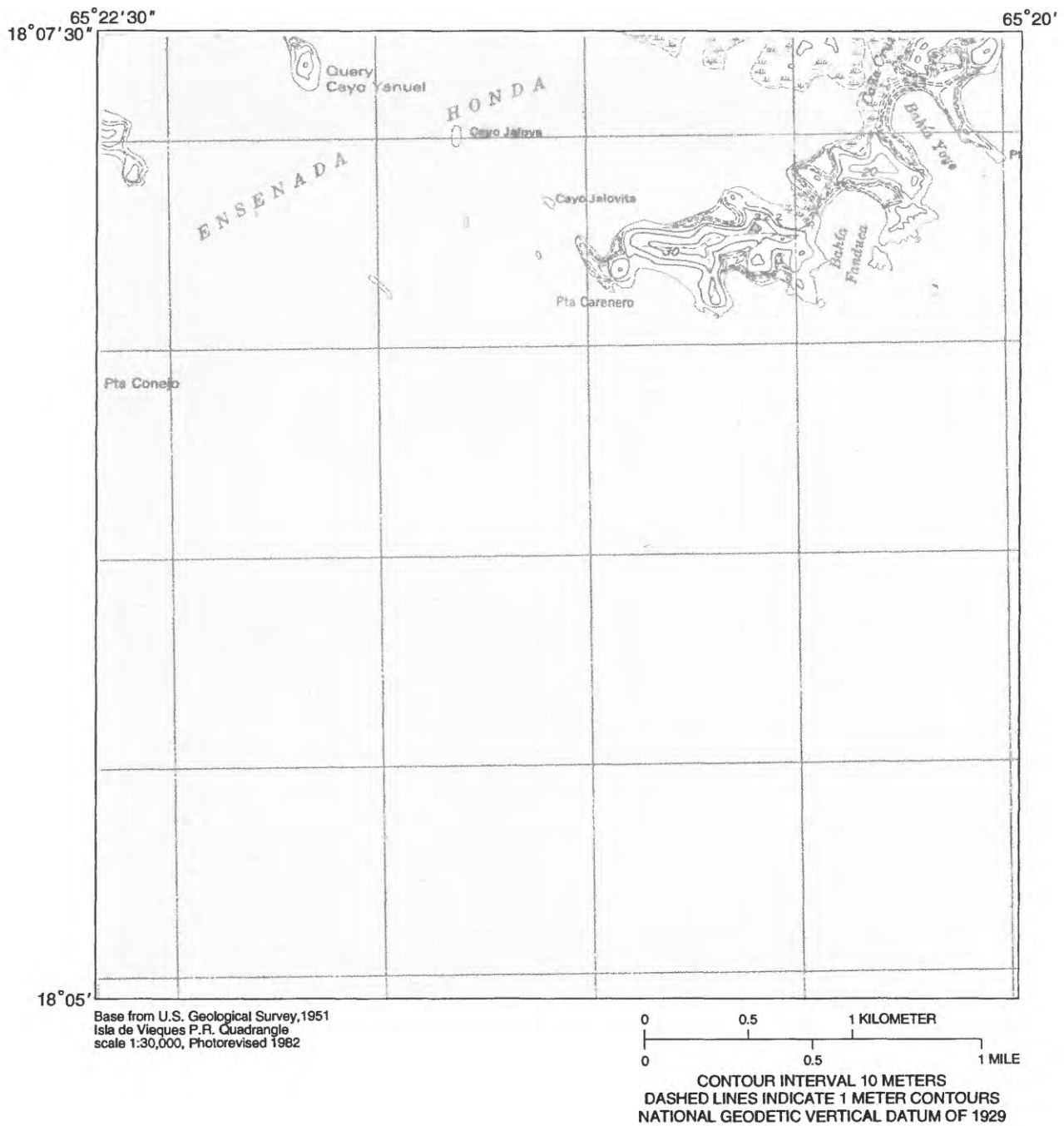


Figure 14. Location of grid 13, Isla de Vieques, Puerto Rico.

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APPENDIX 1

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Appendix 1. Well names, site-identification number, and remarks for wells on Isla de Vieques, Puerto Rico

[Site identification No.: Unique number for each site based on the latitude and longitude of the site. First six digits are latitude, next seven digits are longitude, and final two digits are a sequence number to uniquely identify each site. --, no data]

Well No.	Figure No.	Well name	Site identification No.	Remarks
2-1	3	U.S. Navy 19 dug well	180830065284900	--
2-2	3	C. Cruz dug well	180838065282500	Water sample for specific conductance and chloride concentration bailed from a depth of 3 feet below the water table.
2-3	3	Martineau dug well	180834065281600	Well used to supply potable water to the neighborhood following Hurricane Hugo ¹ . Water sample for specific conductance and chloride concentration bailed from a depth of 6 feet below the water table.
2-4	3	Corcino-Meléndez dug well	180833065275100	Well used for potable water following Hurricane Hugo ¹ . Water sample for specific conductance and chloride concentration bailed from a depth of 8 feet below the water table.
3-1	4	Iglesia Metodista	180828065265000	--
3-2	4	Castañó dug well	180844065263100	Well is about 12 feet from stream. Roots and debris inside well. Well used in the past by the neighborhood for potable water. Water sample for specific conductance and chloride concentration bailed from the top of the water table.
3-3	4	Metodista 1	180859065261200	--
3-4	4	G. Colón	180918065261400	Reported depth of well of 107 feet. Water level of 20 feet below land surface reported by driller. Water sample for specific conductance and chloride concentration taken from the discharge line.
3-5	4	Agrícola Corp. 2 dug well	180816065260300	Water sample for specific conductance and chloride concentration bailed from a depth of 8 feet below the water table.
3-6	4	PRASA 10 dug well	180810065255800	Well used in the past for public water supply.
3-7	4	F. Peterson dug well	180733065265800	Well used in the past for potable water. Water sample for specific conductance and chloride concentration bailed from a depth of 5 feet below the water table.
5-1	6	Camp García dug well	180816065214800	Water sample for specific conductance and chloride concentration bailed from a depth of 1 foot below the water table.
9-1	10	U.S. Navy 17	180727065312600	Water sample for specific conductance and chloride concentration bailed from a depth of 10 feet below the water table.
10-1	11	Pilón 1 dug well	180631065295800	Well casing (6 inch PVC) placed inside a 72-inch diameter. Water sample for specific conductance and chloride concentration bailed from a depth of 4 feet below the water table. Submersible pump installed.

Appendix 1. Well names, site-identification number, and remarks for wells on Isla de Vieques, Puerto Rico—*Continued*

Well No.	Figure No.	Well name	Site identification No.	Remarks
10-2	11	Sucn Díaz 1 dug well	180659065293800	Water sample for specific conductance and chloride concentration bailed from a depth of 6 feet below the water table.
10-3	11	O. González	180636065291900	Measured yield of 8 gallons per minute. Surface pump installed. Water sample for specific conductance and chloride concentration taken from the discharge line.
10-4	11	Vieques 12	180638065284000	Water sample for specific conductance and chloride concentration bailed from a depth of 6 feet below the water table.
10-5	11	U.S. Navy 15 dug well	180709065282700	--
10-6	11	Vieques 8	180622065273100	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 20 feet below the water table.
10-7	11	PRASA 1	180641065280700	--
10-8	11	USGS La Mina	180643065280700	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 5 feet below the water table.
10-9	11	PRASA 2	180648065280600	--
10-10	11	PRASA 3	180641065280100	--
10-11	11	La Mina 1	180626065280200	U.S. Geological Survey observation well.
10-12	11	La Mina 2	180625065280100	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 20 feet below the water table.
10-13	11	Fesa 2 dug well	180601065281100	Well used by the sugarcane industry in the past. Water sample for specific conductance and chloride concentration bailed from a depth of 6 feet below the water table.
10-14	11	O'Conner 12	180605065280300	Water sample for specific conductance and chloride concentration bailed from a depth of 10 feet below the water table.
10-15a	11	PRASA A-5	180559065280700	Well clogged with soil and debris.
10-15b	11	PRASA A-5A	180559065280701	Well is 9 feet from PRASA A-5 well.
10-16	11	PRASA A-4	180559065280600	Well clogged with soil and debris.
10-17a	11	PRASA A-2	180559065280500	Submersible pump installed. Drawdown was 2.4 feet after 18 hours pumping 25 gallons per minute (March 26-27, 1992).

Appendix 1. Well names, site-identification number, and remarks for wells on Isla de Vieques, Puerto Rico—*Continued*

Well No.	Figure No.	Well name	Site identification No.	Remarks
10-17b	11	PRASA A-3	180559065280501	Well is 50 feet from PRASA A-2 well. Submersible pump installed. Drawdown was 4.3 feet after 8 hours pumping 25 gallons per minute (March 19, 1992).
10-18	11	PRASA A-1	180559065280400	Wells PRASA A-1-3 provided water to the public in the aftermath of Hurricane Hugo ¹ . Water sample for specific conductance and chloride concentration bailed from a depth of 20 feet below the water table. Drawdown was 1.5 feet after 8 hours pumping 25 gallons per minute (March 11, 1992).
10-19	11	USGS piezometer 1	180600065280400	Water sample for specific conductance and chloride concentration bailed from a depth of 10 feet below the water table.
10-20	11	Vieques 5A	180605065275900	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 30 feet below the water table.
10-21	11	PRASA 4	180612065275500	Water sample for specific conductance and chloride concentration bailed from a depth of 10 feet below the water table.
10-22	11	Vieques 5	180607065275600	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 20 feet below the water table.
10-23	11	PRASA D-3	180608065275400	Submersible pump installed. Drawdown was 1.7 feet after 21 hours pumping 25 gallons per minute (March 26-27, 1992).
10-24a	11	PRIDCO 9A	180558065275000	U.S. Geological Survey observation well. Well seems to be clogged or collapsed. Water sample for specific conductance and chloride concentration bailed from a depth of 1 foot below the water table. Analog digital recorder installed to monitor daily and seasonal fluctuations of the water level.
10-24b	11	PRIDCO 9	180558065275001	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 70 feet below the water table. Analog digital recorder installed to monitor daily and seasonal fluctuations of the water level.
10-25	11	PRASA 151	180559065275100	Water sample for specific conductance and chloride concentration bailed from a depth of 1 foot below the water table.

Appendix 1. Well names, site-identification number, and remarks for wells on Isla de Vieques, Puerto Rico—*Continued*

Well No.	Figure No.	Well name	Site identification No.	Remarks
10-26	11	PRASA D-2	180613065274600	Submersible pump installed. Drawdown was 1.6 feet after 8 hours pumping 25 gallons per minute (April 1, 1992).
10-27	11	PRASA 5	180616065274700	Submersible pump installed.
10-28	11	Vieques 18	180614065274700	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 25 feet below the water table.
10-29	11	PRASA 6	180618065274400	Water sample for specific conductance and chloride concentration bailed from a depth of 20 feet below the water table.
10-30	11	PRASA D-1	180616065274000	Submersible pump installed. Drawdown was 2.4 feet after 8 hours pumping 25 gallons per minute (April 1, 1992).
10-31	11	PRASA 7	180616065274600	Water sample for specific conductance and chloride concentration bailed from a depth of 2 feet below the water table.
10-32	*11	Vieques 22	180615065271900	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 30 feet below the water table.
10-33	11	PRASA B-4	180621065274900	Submersible pump installed. Drawdown was 0.8 foot after 4 hours pumping 25 gallons per minute (April 2, 1992).
10-34	11	PRASA B-3	180621065274901	Submersible pump installed. Drawdown was 5.9 feet after 24 hours pumping 62 gallons per minute (March 31 to April 1, 1992).
10-35	11	PRASA B-2	180621065274902	Submersible pump installed. Drawdown was 6.8 feet after 8 hours pumping 25 gallons per minute (April 3, 1992).
10-36	11	PRASA B-1	180621065274903	Submersible pump installed. Drawdown was 3.9 feet after 8 hours pumping 25 gallons per minute (April 2, 1992).
11-1	12	PRASA C-3	180625065272500	Broken water line next to well. It is likely that water from the broken water-supply line has mixed with the well water. Water sample for specific conductance and chloride concentration bailed from a depth of 20 feet below the water table. Reported depth of well from PRASA records of 82 feet.

Appendix 1. Well names, site-identification number, and remarks for wells on Isla de Vieques, Puerto Rico—*Continued*

Well No.	Figure No.	Well name	Site identification No.	Remarks
11-2	12	PRASA C-2	180626065272500	Water sample for specific conductance and chloride concentration bailed from a depth of 35 feet below the water table.
11-3	12	PRASA C-1	180628065272300	Water sample for specific conductance and chloride concentration bailed from a depth of 28 feet below the water table.
11-4	12	Vieques 14	180631065272000	U.S. Geological Survey observation well. Unable to sample or measure depth of well due to obstruction inside casing.
11-5	12	Vieques 16	180630065271300	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 5 feet below the water table.
11-6	12	Vieques 17	180636065271300	Well constructed by the U.S. Geological Survey. Submersible pump installed.
11-7	12	Vieques 15	180650065271400	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 10 feet below the water table.
11-8	12	Vieques 8A	180654065270800	Well constructed by the U.S. Geological Survey. Reported yield of 20 gallons per minute. Submersible pump installed at a depth of 55 feet below land surface. Water sample for specific conductance and chloride concentration taken from the discharge line.
11-9	12	O'Conner 4	180644065265500	Water sample for specific conductance and chloride concentration bailed from a depth of 4 feet below the water table.
11-10	12	Vieques 1	180657065264600	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 35 feet below the water table.
11-11	12	O'Conner 5	180647065264800	--
11-12	12	Land Authority dug well	180723065263300	Well was used in the past for potable water by the Lujan community. Water sample for specific conductance and chloride concentration bailed from a depth of 3 feet below the water table.
11-13	12	Vieques 19	180719065261900	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed from a depth of 2 feet below the water table. Well may be blocked at 46 feet.

Appendix 1. Well names, site-identification number, and remarks for wells on Isla de Vieques, Puerto Rico—*Continued*

Well No.	Figure No.	Well name	Site identification No.	Remarks
11-14	12	U.S. Marines 6	180717065260900	This well, combined with U.S. Navy 14 well (well 11-17), pumps about 84,000 gallons per day twice a week for use by the Camp García personnel. Submersible pump installed at a depth of 65 feet below land surface.
11-15	12	U.S. Navy 13	180715065260800	Unable to measure well depth or sample due to bees' nest inside well casing.
11-16	12	U.S. Navy Camp García	180716065261100	Water sample for specific conductance and Camp García chloride concentration bailed from a depth of 6 feet below the water table.
11-17	12	U.S. Navy 14	180714065260800	This well combined with U.S. Marines 6 well (well 11-14) pumps about 84,000 gallons per day twice a week for use by the Camp García personnel. Submersible pump installed at a depth of 65 feet below land surface.
11-18	12	USGS-piezometer 2	180712065260800	--
11-19	12	Vieques 2	180702065262000	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed at a depth of 30 feet below the water table.
11-20	12	Vieques 4	180652065261700	U.S. Geological Survey observation well. Water sample for specific conductance and chloride concentration bailed at a depth of 1 foot below the water table. Well may be blocked at 29 feet.
11-21	12	U.S. Marines 4	180721065251200	Submersible pump installed. Water sample for specific conductance and chloride concentration bailed from a depth of 20 feet below the water table.

¹ Hurricane Hugo struck Isla de Vieques, Puerto Rico, during the early morning hours of September 18, 1989.